



MANAGEMENT FACTORS AFFECTING HEALTH SERVICE DELIVERY IN UGANDA: A
STRUCTURAL EQUATION MODELLING ANALYSIS OF THE WASH, IMMUNIZATION, AND NTD
PROGRAMS

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Abstract

MANAGEMENT FACTORS AFFECTING HEALTH SERVICE DELIVERY IN UGANDA: A
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Healthcare service delivery in resource-limited settings such as Uganda is influenced by management factors including management education, training, innovation, networks, and corruption. Despite their critical importance, limited research has examined how these factors influence service delivery across key programs, including Water, Sanitation, and Hygiene (WASH); Immunization; and Neglected Tropical Diseases (NTD). This research addresses this gap by exploring the relationships between these factors, with a focus on the mediating role of innovation and moderating role of networks and corruption.

This research employs a quantitative research design with data collection from 206 healthcare program managers through structured online surveys. AMOS Structural Equation Modeling (SEM) was used to analyze the complex interrelationships among variables.

The findings demonstrate that advanced management education and continuous training significantly enhance the adoption of innovation, which serves as a key mediator, enhancing the effects of education and training on service delivery, while corruption emerges as a substantial barrier. Collaborative networks, although supportive, exhibited limited direct influence on the relationship between management education and service delivery.

This research underscores the importance of investing in management education, training, innovation, and anti-corruption measures to strengthen healthcare delivery systems in Uganda. It

offers actionable recommendations for policymakers, healthcare managers, and academic institutions to promote ethical, innovative, and resilient management practices.

Keywords: Healthcare Management, Innovation, Anti-Corruption, Health Programs, Collaborative Networks, Service Delivery

Declaration

I declare that this thesis has been composed solely by myself and that it has not been submitted, in whole or in part, in any previous application for a degree. Except where stated otherwise by reference or acknowledgment, the work presented is entirely my own.

AI Acknowledgement

I acknowledge my use of Grammar Checker (<https://www.grammarly.com/grammar-check>) to proofread chapter 2 of my thesis. This action was completed in 12.11.2024. The prompts used included: Proofread the text below.

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Dedication

This thesis is dedicated with appreciation for the divine guidance received throughout this scientific endeavor to the key supporters: God, family, mentors, and supervisors.

To my wife and daughters: Your support and understanding have been a source of strength throughout the challenges of academic research. Your steadfast encouragement, resilience, and sacrifices are greatly appreciated. You have transformed this demanding endeavor into a meaningful pursuit.

To the mentors who have influenced my career trajectory: the late Dr. David Kitimbo, whose insights continue to inform my work; Dr. Sarah Byikaka, exemplifying diligence and encouragement; Dr. Edridah Muheki, who provided guidance through healthcare complexities; and Mr. Andrew Hartwich, an exemplary manager and career model. Each has contributed significantly to my scientific development, providing support through various career stages.

To my supervisors, Dr. Sam Zisuh Njinyah and Dr. Luciana Chaanine, your academic mentorship has been instrumental. Your patience and insightful guidance have enhanced my intellectual rigor and understanding. Your expertise has been invaluable in guiding this research from its initial stages to completion. Your contributions are evident throughout this thesis.

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Table of Contents

List of Abbreviations	xvii
List of Tables	xviii
List of Figures	xix
CHAPTER 1: INTRODUCTION	1
Background.....	1
Overview of Healthcare in Uganda.....	7
WASH (Water, Sanitation, and Hygiene) Program.....	7
Immunization Program	8
Neglected Tropical Diseases Program.....	8
The Importance of Management Factors.....	9
Management education.....	11
Management Training	12
Innovation	13
Networks.....	13
Corruption.....	14
Health Service Delivery.....	14
Mixed Outcomes in Health Programs	16
Healthcare Management	18
Health Program Management	20
Healthcare Management Gap.....	23
Relevance in the Ugandan Context	25
The Role of Management in Healthcare Delivery.....	28

Research Gap	31
Statement of the Problem	33
Purpose of the Study, Research Aims, and Objectives.....	36
The Purpose of the Study.....	36
Research objectives	40
Nature and Significance of the Study.....	41
Nature of the Study.....	41
Justification for the Quantitative Approach.....	41
Research Methodology	43
Structural Equation Modelling (SEM).....	43
Justification of SEM.....	45
Comparison with Alternative Methodologies	46
Significance of the Research.....	47
Potential Policy Implications	48
Research Questions and Research Hypotheses.....	48
Research questions	48
Research Hypotheses.....	49
Chapter conclusion.....	49
CHAPTER 2: LITERATURE.....	52
Chapter Introduction.....	52
Healthcare Program Management	53
Theoretical Frameworks	57
Upper Echelon Theory (UET).....	57
Institutional Theory	59

	xii
Network Theory	63
Integrative Framework	67
Case Studies	70
Industry description	72
The Immunization Program/UNEPI	75
WASH Program	78
Neglected Tropical Diseases program (NTD)	80
Management Challenges	82
Review of Relevant Constructs	85
Management Level of Education	86
Management Training	101
Innovation	104
Networks	115
Corruption	121
Hypotheses development	125
Interplay between the management factors	127
Management Level of Education and Innovation	129
Management Training and Innovation	130
Innovation and improved delivery of health services	131
Moderation effect of network on the management level of education	132
Moderation effect of corruption on managers' level of education	133
Gaps and Contradictions in the Literature	136
Addressing the Gaps in the Literature	138
CHAPTER 3. RESEARCH METHODS AND DATA COLLECTION	141

	xiii
Research Focus	144
Research Approach and Design	146
Conceptual foundation.....	146
Research Process.....	148
Research Philosophies	152
Research Design.....	157
Research Design and Approach	161
Data Collection Methodology	162
Analytical Techniques	163
Ensuring Validity and Reliability	165
Population and Sample	166
Study Population	170
Inclusion Criteria.....	173
Engagement Process.....	174
Materials/Instrumentation	175
Reliability and Validity.....	178
Addressing Potential Issues with Cronbach's Alpha	180
Addressing Potential Issues with Factor Loadings.....	182
Methodological Rigor.....	183
Potential Electronic Questionnaire Challenges	184
Operational Definition of Variables	186
Independent Variable: Improved Delivery of Health Services	186
Dependent Variable: Management Level of Education.....	188
Dependent Variable: Management Training.....	189

	xiv
Dependent Variable: Innovation	190
Dependent Variable: Network	191
Dependent Variable: Perceived Corruption	192
Study Procedures and Ethical Assurances	194
Pretesting	195
Key Informants.....	196
Ethical Assurances	197
Ethical Considerations	198
Mitigating Potential Bias	199
Data Collection and Analysis.....	201
Survey Instrumentation.....	203
Secondary Data	204
Data Analysis Methods.....	206
Confirmatory Factor Analysis (CFA).....	213
Validity and Reliability Metrics	215
Description of data	217
Chapter Summary.....	219
CHAPTER 4: FINDINGS	221
Chapter introduction.....	221
Statistical Analyses used.....	222
Confirmatory Factor Analysis (CFA).....	222
Fit Indices in SEM.....	226
Trustworthiness of Data.....	228
Skewness and Kurtosis	230

	xv
Reliability and Validity of Data	231
Results	234
Demographic Characteristics	234
Management Level of Education	238
Management Training	243
Innovation	249
Perceived corruption as a Moderator.....	250
Networks in Health Programs	252
Improved Health Services Delivery	255
SEM Analysis	257
Results of the Confirmatory Factor Analysis(CFA).....	259
CFA for Management Level of Education.....	266
CFA for Innovation	269
CFA for Corruption.....	270
CFA for Network	271
CFA for Delivery of Health services.....	272
Explanation of Modifications.....	273
Structural Model Test	287
Correlation Metrics for the Constructs	291
Item-Effect Analysis.....	295
Hypothesis Testing and Path Analysis	295
Evaluation of Findings	301
Chapter Summary.....	307
CHAPTER 5: IMPLICATIONS, RECOMMENDATIONS, AND CONCLUSIONS.....	310

	xvi
Chapter Introduction.....	310
Implications by research question	311
Implications by Construct	331
Education and Training	331
Network Implications	335
Implications for Perceived Corruption	338
Study Limitations	341
Recommendations for application.....	343
Counterarguments to recommendations	346
Recommendations for future research.....	348
Counterarguments to the research hypothesis.....	351
Conclusion	354
REFERENCES.....	358
APPENDICES	533
APPENDIX A: Tool.....	533
APPENDIX B: Gate Keeper Letter.....	559
APPENDIX B: Informed Consent Form.....	561
APPENDIX D: REAF-DS	563

List of Abbreviations

AIDS: Acquired Immunodeficiency Syndrome

AMOS Analysis of Moment Structures

APA: American Psychological Association

CDC: Centers for Disease Control and Prevention

CMT: Continuous management Training

COVID-19: Coronavirus Disease 2019

GPA: Grade Point Average

HIV/AIDS: Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome

HIV: Human Immunodeficiency Virus

IRB: Institutional Review Board

MOH Ministry of Health

NGO Non-Governmental Organization

NTD: Neglected Tropical Diseases

PhD: Doctor of Philosophy

SEM Structural Equation Modeling

SOP: Standard Operating Procedure

TMTs: Total Management Teams

UNEPI: Uganda National Expanded Program on Immunization

USAID: United States Agency for International Development

WASH: Water, Sanitation, and Hygiene

WHO: World Health Organization

List of Tables

Table 1 Test For Skewness And Kurtosis	231
Table 2 Reliability Statistics	233
Table 3 Item Total Statistics	234
Table 4 Sociodemographic Characteristics	235
Table 5 Benefit of Highest Education	240
Table 6 Benefit of Type of Education	242
Table 7 Benefit of Highest Education Type	243
Table 8 Perceived Impact of Management Training Frequency on Health Programs	244
Table 9 Benefit of Type of Training	246
Table 10 Managerial Training Methods	247
Table 11 Perceived Impact of Innovation	250
Table 12 Type of Network Used	253
Table 13 Attributes Enhance Service Delivery	257
Table 14 CMIN/DF	261
Table 15 Showing RMR, GIF	262
Table 16 Baseline Comparison	263
Table 17 RMSEA	264
Table 18 Standardized Regression Weights	267
Table 19 Standardized Regression Weights for Mangement Training	269
Table 20 Standardized regression weights for All Measured Variables	283
Table 21 Covariancies	284
Table 22 Model Fit Summary	289

Table 23	RMR, GFI	290
Table 24	Baseline Comparisons	290
Table 25	Parsimony-Adjusted Measures	290
Table 26	NCP	290
Table 27	FMIN	290
Table 28	RMSEA	291
Table 29	AIC	291
Table 30	ECVI	291
Table 31	HOELTER	291
Table 32	Total Effects	293
Table 33	Direct Effects	293
Table 34	Indirect Effects	294
Table 35	Test for Hypothesis	295

List of Figures

Figure 1 Conceptual Framework.....	38
Figure 2 Uganda Ministry of Health Organogram	75
Figure 3 Levels of Education in Uganda	88
Figure 4 Showing Key Actors In Health System Corruption	123
Figure 5 Research Hypothesis.....	145
Figure 6 Research Process Flow Chart.....	151
Figure 7 <i>The Quantitative Survey Flow Chart</i>	160
Figure 8 Levels Of The Uganda Healthcare System	173
Figure 9 Showing Health Programs of respondents	236
Figure 10 Showing Years Respondents Have Spent In Healthcare Management Roles	237
Figure 11 Number Of Staff Supervsied By Respondents.....	238
Figure 12 Showing Health Manager's Level Of Education	239
Figure 13 Clinical v Management qualifications	241
Figure 14 Impact of Management training Frequency	243
Figure 15 Type Of Managerial Training Undertaken	245
Figure 16 Effectiveness of training method	248
Figure 17 Most Commonly Used Type Of Innovation	249
Figure 18 Types Of Corruption In Health Programs	251
Figure 19 Negative impact of Corruption	252
Figure 20 Network Channels Used	254
Figure 21 Impact Of Network Channels	255
Figure 22 Improved Healthcare Delivery Attributes.....	256

Figure 23 Initial Measurement Model.....	285
Figure 24 Improved Measurement Model	287
Figure 25 The Structural Model.....	289
Figure 26 Conceptual Model	299
Figure 27 Innovation's mediating effect.....	315

CHAPTER 1: INTRODUCTION

Background

The global healthcare landscape is characterized by an increasing demand for health services driven by demographic shifts and the rising prevalence of chronic diseases (WHO, 2018). This demand places immense pressure on healthcare systems, necessitating efficient management practices to ensure sustainability and high-quality care (Kruk et al., 2018). The African continent grapples with the dual challenge of a rapidly expanding population and a rising incidence of both infectious and lifestyle-related diseases. Compounding these issues is the critical shortage of trained healthcare professionals and the acute need for qualified healthcare managers (Sammut & Ngoye, 2019). This situation is further aggravated by the common practice of assigning physicians to managerial roles despite their admission to be ill-prepared for such responsibilities in health systems and facilities (Sammut & Ngoye, 2019). Additionally, health care systems in low- and middle-income countries face challenges related to managerial deficiencies across all levels, highlighting the need for targeted interventions (Figueroa et al., 2019).

In many countries, including Uganda, these challenges are exacerbated by a significant shortage of health care staff. According to a recent WHO report (2022), Uganda has a healthcare worker density of approximately 1.55 health workers per 1,000 population, including physicians, nurses, and midwives. This figure is significantly below the WHO recommended threshold of 4.45 healthcare workers per 1,000 population necessary to achieve universal health coverage and meet the Sustainable Development Goals (SDGs). To further complicate matters, the available doctors routinely assume top management positions, including in areas such as laboratory services, where their expertise may not be directly relevant. This practice has sparked opposition and legal

challenges from other qualified professionals (EOC, 2023). According to Spehar et al., (2012), doctors in management positions have acknowledged their limited proficiency in healthcare system management, and instead depend on experiential learning. Paradoxically, effective deployment of medical expertise relies heavily on the presence of strong healthcare systems that support health managers (Vriesendorp et al., 2010). As a result, physician health managers frequently face challenges in performing critical tasks such as strategic planning, efficient allocation of resources, budget management, and financial responsibility.

Recently, the Ministry of Health (MoH) was brought several times before the Equal Opportunities Commission by the Council of the Pharmaceutical Society of Uganda, the Nurses and Midwives Association, the Data Managers Association, and the Uganda Allied Health Professional Council over the unfair practice of ring-fencing management positions for doctors at the expense of other medical professionals with specialist and management qualifications (EOC, 2023). Ironically, the same Ministry of Health periodically issues circulars, stating that senior doctors and specialists are often absent from their workstations and do not commensurate their pay (MoH, 2023).

The importance of management in healthcare delivery cannot be overstated because effective management practices are linked to improved health outcomes, patient satisfaction, and cost efficiency (Teisberg et al., 2020). In resource-limited settings, the role of health care managers becomes even more critical. Research indicates that effective management is associated with better facility performance and quality of patient care (Bradley et al., 2015). Harris et al., (2017) conducted a study in Uganda and found that health facilities with better management practices had significantly higher rates of patient satisfaction and better clinical outcomes. Moreover, the

integration of various management factors, such as resource allocation, workforce training, and performance monitoring, is crucial for effective functioning of healthcare systems (Buchan et al., 2015). Effective integration ensures that limited resources are optimally utilized and healthcare providers are adequately supported and supervised (Friedman & Kohn, 2016). According to Mbonye et al., (2016), enhancing management capacity within the health sector involves increasing the number of trained healthcare managers and improving the quality of management education and practices.

In response to the need for improved management of health resources, the Republic of Uganda issued a Presidential Directive (GoU, 2016) stipulating management qualifications for individuals aspiring to hold senior managerial positions, highlighting the need for management qualifications such as a Master of Business Administration (MBA). The MoH's investment strategy places significant emphasis on health governance, management, and accountability (MoH, 2020). This suggests that it is imperative for health managers to obtain graduate degrees or advanced qualifications in management. According to Mosadeghrad (2014), the acquisition of advanced education and training positively affects healthcare service delivery by improving management knowledge and, by extension, minimizing inefficiency.

Management deficiencies may be ameliorated by continuous professional development through management training, a crucial component for enhancing the job performance of health managers as it complements formal education (Ahiaz, 1989; Erwin et al., 2014). According to Rockers & Bärnighausen (2013), health managers who consistently participate in management training perform better in delivering health services. This is particularly crucial in resource-limited settings such as Uganda, where healthcare systems face multifaceted challenges. Management

training equips healthcare managers with essential competencies for effective resource allocation, staff supervision, integration of evidence-based practices, and navigation of complex healthcare systems (Mutale et al., 2017). Furthermore, advanced education has the potential to enhance problem-solving skills, adaptability, innovation, and managerial capabilities, contributing positively to workplace performance (Kasika, 2015; Ochonma et al., 2018). Although the Ugandan Ministry of Health emphasizes effective resource management, empirical research is required to assess the current extent of management training in the country.

Management training and education can be strengthened through effective networks that enable collaboration among health professionals. Collaborative networks profoundly influence health service delivery by enabling diverse teams to transcend traditional boundaries and advance shared health policies (Burt, 2000). These networks facilitate information exchange, leverage social capital, and foster innovation and problem-solving within healthcare systems (Uddin et al., 2013). This suggests that networks have a significant potential for enhancing healthcare system performance, clinical care quality, patient satisfaction, and cost efficiency. Healthcare networks have been shown to improve system performance by facilitating better coordination and integration of care between providers and settings. Provan and Kenis (2008) highlighted the role of networks in promoting collaboration and information sharing among healthcare organizations, leading to more efficient and effective delivery of healthcare services. Furthermore, Mery et al., (2014) demonstrated that healthcare networks can enhance system performance by reducing fragmentation, improving access to care, and optimizing resource allocation.

Collaborative healthcare networks contribute to social sustainability by involving specific actors in these collaborations (Maghsoudi et al., 2020). According to Priyadarshini et al., (2017),

factors limiting collaborative opportunities in healthcare include organizational size and complexity, partner attitudes, and absence of rewards. However, collaborative networks are crucial in enhancing health service delivery, as they enable information exchange, social capital utilization, problem solving, and innovation in healthcare systems.

On the other hand, corruption significantly undermines healthcare systems in low-income countries by restricting access to marginalized populations. Key factors that exacerbate corruption include inadequate compensation for healthcare workers, poor governance, limited supervision, and ineffective accountability mechanisms (Onwujekwe et al., 2020). Numerous scholarly sources have provided in-depth insights into the nature of corruption in healthcare. Vian (2008) examines corrupt practices such as unauthorized payments and drug diversion, focusing on their detrimental implications for service delivery. Paredes-Solís et al., (2011) highlighted how corruption, including unauthorized payments and drug diversion, adversely affects access to essential healthcare services, especially for vulnerable groups. Corrupt practices erode public trust, leading to inefficient allocation of disrupted healthcare operations, a compromise of service delivery, and health equity (Onwujekwe et al., 2019; Radević et al., 2022; Vian, 2020). Corruption in healthcare can deter individuals from seeking services, perpetuating a hierarchical system in which the socioeconomically disadvantaged are marginalized.

Despite its considerable impact, healthcare corruption remains largely unaddressed (Garcia, 2019). For example, Berger (2014) noted that corruption damages the doctor-patient relationship in India, highlighting the widespread issue of kickbacks and bribes. Corruption favors influential individuals and negatively impacts society (Komic & Tandır, 2020). Therefore, mitigating corruption requires improved governance, transparency, accountability, rigorous

oversight, and enforcement of anti-corruption legislation (Kohler and Bowra, 2020; Vian, 2020). Effective governance involves strong institutions, rule of law, and transparent and accountable decision-making (Cohan, 1984).

Transparency is a crucial element of the battle against corruption. This entails making information accessible to the public, which in turn facilitates scrutiny and accountability (Lindstedt & Naurin, 2010). Enhancing transparency may include the disclosure of financial data, publicization of government contracts, and assurance of open and equitable procurement processes. However, Lindstedt and Naurin (2010) emphasized that transparency alone may not be sufficient and should be complemented by measures that empower citizens to effectively utilize available information. Accountability is integral to stopping corruption, as holding individuals and institutions answerable for their actions serves as a deterrent to corrupt behavior. This can be achieved through stringent law enforcement, independent judiciary systems, and mechanisms for reporting and probing corruption cases (Kohler & Bowra, 2020).

In the healthcare context, implementing anti-corruption measures is vital to safeguarding the integrity of health systems. Transparency and accountability in the governance of healthcare can forestall corruption in areas such as procurement of medical supplies, allocation of healthcare resources, and management of healthcare facilities (Vian, 2020). Therefore, various challenges have been encountered in the management of health care resources in Uganda. The absence of adequately skilled healthcare managers and managers who frequently lack formal managerial education is a significant barrier to the successful execution of health programs. Factors such as management education, managerial training, networks, and innovation substantially affect the

delivery of health services. However, the pervasive problem of corruption presents a substantial challenge to the delivery of healthcare services.

Overview of Healthcare in Uganda

Uganda's healthcare system operates within a decentralized model that integrates both the public and private sectors, overseen by the Ministry of Health (MoH). The MoH coordinates healthcare delivery at the national, regional, district, and community levels, providing a spectrum of services from primary healthcare to specialized care. However, Uganda faces persistent challenges in delivering equitable, high-quality healthcare, particularly in resource-constrained and rural areas, where infrastructure, skilled personnel, and funding are often limited (Czabanowska & Kuhlmann, 2021).

Key Health Programs, specifically in Water, Sanitation, and Hygiene (WASH), Immunization, and Neglected Tropical Diseases (NTD), are critical in reducing disease burden and improving public health outcomes. These programs are vital for addressing Uganda's public health needs; however, their success is deeply dependent on effective management practices. Management factors such as education, training, innovation, networks, and governance (including corruption control) play a pivotal role in shaping the effectiveness of these programs (Henson, 2023; Oleribe et al., 2019).

WASH (Water, Sanitation, and Hygiene) Program

WASH programs are fundamental to Uganda's public health landscape and aim to reduce waterborne diseases through improved access to clean water, sanitation facilities, and hygiene education. However, these programmes face significant challenges. Approximately 33% of Ugandan children lack access to safe drinking water, and 7% of the population still practice open

defecation, leading to high rates of diarrheal diseases, particularly among children under five years of age (Khanpour et al., 2020; Ssekandi et al., 2023). These gaps highlight the need for robust management practices, particularly resource allocation, infrastructure planning, and community engagement. Poor sanitation and hygiene are major contributors to preventable morbidity and mortality, underscoring the need for effective leadership, cross-sectoral collaboration, and innovative solutions for WASH program delivery (Dobson, 2023).

Immunization Program

The Uganda National Expanded Program on Immunization (UNEPI) focuses on vaccinating children and vulnerable populations against preventable diseases, contributing significantly to reducing child mortality. While Uganda has made strides in immunization coverage, the program faces high dropout rates, vaccine supply inconsistencies, and incidents of corruption, such as vaccine theft and suspension of GAVI funds (Farzanegan & Hofmann, 2021; Saeed et al., 2023). These issues reflect broader systemic weaknesses including inadequate financial oversight, logistical inefficiencies, and fragile governance structures. Effective financial management and supply chain optimization are crucial to ensure that immunization campaigns consistently reach target populations. Addressing these management deficiencies would improve immunization outcomes and help maintain the benefits achieved in reducing vaccine-preventable diseases (Malande et al., 2019).

Neglected Tropical Diseases Program

Uganda remains heavily burdened by neglected tropical diseases (NTDs), such as trachoma, lymphatic filariasis, and schistosomiasis, which disproportionately affect impoverished and rural populations. Uganda's NTD programs, primarily reliant on Mass Drug Administration

(MDA), face challenges in achieving consistent uptake and coverage (Adriko et al., 2018; Ayebazibwe, 2022). Issues such as the motivation of Community Drug Distributors (CDDs), community engagement, and integration of NTD interventions with other health programs (such as WASH) are significant barriers to success. Studies indicate that limited training and inadequate engagement of community members hinder the effectiveness of NTD programs, underscoring the need for improved management training, community-centered strategies, and multi-stakeholder networks to foster trust and ensure program sustainability (Muhumuza et al., 2019).

The Importance of Management Factors

The success of Uganda's WASH, immunization, and NTD programs is fundamentally influenced by several management factors. Management education equips healthcare leaders with the theoretical and practical knowledge required to address the multifaceted challenges of healthcare delivery, including strategic planning, resource optimization, and policy implementation (Henson, 2023). In a setting such as Uganda, where health service managers often face high demands with limited resources, formal education in management is essential for effective decision-making and leadership.

Management training provides healthcare personnel with the practical skills needed for program implementation, enhancing competencies in areas such as financial oversight, human resource management, monitoring, and evaluation (Goetzel & Ozminkowski, 2008; Khalil & Liu, 2021). Continuous training is crucial for keeping health care leaders and administrators informed of best practices, enabling them to address the dynamic challenges facing Uganda's health sector.

Innovation plays a critical role in overcoming Uganda's resource constraints. Healthcare managers can optimize service delivery by adopting new technologies, processes, and program

designs. For instance, leveraging digital tools for tracking immunization coverage or utilizing mobile platforms for community health worker (CHW) training can help address logistical and communication gaps in WASH, immunization, and NTD programs (Freeman et al., 2013; Corley et al., 2016).

Networks and collaborative partnerships facilitate resource sharing and enhance program coordination among stakeholders, including healthcare providers, government agencies, non-governmental organizations (NGOs), and community groups (Haapasalo et al., 2022). Effective networks are essential for scaling healthcare initiatives and ensuring that resources reach the underserved populations. For example, WASH programs benefit from partnerships with local government bodies to ensure sustainable infrastructure maintenance and community compliance (Krentel et al., 2017).

Finally, corruption remains a significant challenge for Uganda's healthcare system. Corrupt practices, such as embezzlement, bribery, and theft, erode public trust, compromise service delivery, and divert crucial resources from health programmes. Addressing corruption requires implementing accountability mechanisms, improving transparency, and strengthening governance frameworks within the healthcare system (Farzanegan & Hofmann, 2021; Saeed et al., 2023).

While Uganda's healthcare system is making efforts to address public health needs, particularly through WASH, immunization, and NTD programs, effective management is crucial to ensure consistent, high-quality service delivery. Addressing challenges related to education, training, innovation, networks, and corruption will be instrumental in improving health outcomes and reducing the disease burden in Uganda. This research examines these management factors

using structural equation modelling (SEM) to provide a comprehensive understanding of their interplay and impact on healthcare service delivery in Uganda. By identifying key areas for improvement, this research aims to contribute to policy reforms and capacity-building efforts that will strengthen Uganda's healthcare system and support sustainable health outcomes.

Management Education

Management education among healthcare leaders is a crucial factor influencing the effectiveness of healthcare program delivery, especially within complex, resource-constrained settings like Uganda. In the context of this research, management education is explored as a key element impacting the outcomes of WASH, immunization, and neglected tropical disease (NTD) programs, where effective leadership is needed to navigate significant logistical, financial, and human resource challenges. Studies, such as those by Hølge-Hazelton et al., (2021), highlight that healthcare leaders with formal management training are more prepared and capable of making informed decisions, even during crises like the COVID-19 pandemic. Leaders who possess structured management education feel more empowered in decision-making processes, underscoring the importance of targeted leadership development programs for improving program efficiency and sustainability in Uganda.

Additionally, effective management education equips healthcare leaders with the skills to address emerging challenges in technology and innovation, which are increasingly important in program implementation and monitoring. For instance, Petersson et al., (2022) identify critical management skills required for the successful integration of technologies like digital health and AI, which can improve monitoring and data collection for immunization and NTD programs. This research considers how management education impacts leaders' capacity to adopt innovations that

enhance program outcomes, while also highlighting the role of leadership in fostering collaborative networks essential for healthcare program success.

Furthermore, findings from similar resource-limited settings, such as Nigeria, reveal that the absence of structured management education contributes to leadership deficiencies, leading to issues like healthcare worker strikes and inefficient service delivery (Oleribe et al., 2016). The development of targeted health management programs, such as the Ethiopian Ministry of Health's Master's in Health Administration, serves as a model for Uganda, demonstrating how structured management education can cultivate skilled leaders who are equipped to drive program success under challenging conditions.

Management Training

Management training is essential to equip healthcare managers with practical skills that are critical for effective program implementation. While management education lays a theoretical foundation, training emphasizes the development of specific competencies, such as financial management, human resource management, monitoring and evaluation (M&E), and stakeholder engagement (Hargett et al., 2017). In Uganda, where healthcare programs often contend with constraints such as limited resources and fragmented infrastructure, targeted management training helps to bridge operational efficiency gaps. For example, healthcare managers trained in effective financial oversight can better allocate resources for immunization campaigns, reduce wastage, and improve vaccination coverage (Onyango et al., 2023). Continuous training is also essential for adapting to evolving health challenges, such as the integration of innovative technologies or responding to unexpected public health emergencies.

Innovation

Innovation in healthcare management involves the adoption of new technologies, strategies, and methodologies to enhance the efficiency and effectiveness of service delivery. In resource-constrained environments such as Uganda, innovation is indispensable for overcoming the limitations of traditional healthcare delivery models. For example, digital health tools can track immunization coverage, mobile platforms can facilitate community health worker training, and integrating Water, Sanitation, and Hygiene (WASH) interventions with other health programs can maximize the impact (González–García et al., 2021). Additionally, innovation extends to program design, such as adapting mass drug administration (MDA) campaigns for neglected tropical diseases (NTDs) to local contexts and improving uptake and compliance. Healthcare leaders must not only embrace innovation, but also possess the skills to implement it effectively, ensuring that new approaches are scalable and sustainable.

Networks

Networks refer to relationships and collaborations among healthcare organizations, government agencies, non-governmental organizations (NGOs), and community stakeholders. Effective networks enable resource-sharing, coordination, and collective action to address public health challenges. In Uganda, the success of programs, such as WASH, immunization, and NTD control, often depends on the strength of these collaborative networks. For instance, partnerships between healthcare providers and local governments are necessary to ensure that the water and sanitation infrastructure is accessible and maintained (Hargett et al., 2017). Similarly, immunization campaigns benefit from robust coordination among health ministries, international donors, and community organizations to ensure that vaccines reach vulnerable populations.

Networks also foster knowledge exchange and build consensus on best practices, making them a crucial management factor in health-service delivery.

Corruption

Corruption significantly impedes the effective management of healthcare programmes in Uganda. This compromises resource allocation integrity, disrupts service delivery, and erodes public trust in the health system. Corruption manifests in various forms, including fund embezzlement, supply mismanagement, and bribery in the procurement of medical equipment. In WASH, immunization, and NTD programs, corruption leads to inefficiencies that directly affect service delivery (González–García et al., 2021). For example, vaccine theft or misappropriation of funds intended for mass drug administration can severely limit the reach and effectiveness of these initiatives. Addressing corruption requires strong governance structures, accountability mechanisms, and transparent financial management practices, all of which are central to improving health-service delivery in Uganda.

Health Service Delivery

Health service delivery encompasses the processes through which health care services are provided to individuals and communities, including infrastructure, resources, and personnel. In Uganda, service delivery faces numerous challenges such as limited access to clean water, insufficient immunization coverage, and a high NTD burden. Effective service delivery requires adequate funding, resources, and strong management practices to ensure efficient and equitable health program operations (Hargett et al., 2017).

In summary, management factors such as education, training, innovation, networks, and corruption are integral to the success of Uganda's health programs. Effective management of these

factors can improve the performance of the WASH, immunization, and NTD initiatives, leading to better health outcomes for the population. Through Structural Equation Modelling, this study provides a detailed analysis of how these management factors influence health service delivery, offering valuable insights for policymakers and healthcare leaders in Uganda (González–García et al., 2021; Onyango et al., 2023).

Corruption and Collaborative Networks

In Uganda, corruption is a substantial obstacle to effective healthcare management, directly affecting the efficiency and integrity of healthcare programs, such as WASH, immunization, and NTD control. Persistent issues such as fund embezzlement, bribery, and supply mismanagement divert resources and compromise service quality, undermining public trust and stakeholder engagement (Esaku, 2021; Kayizzi-Mugerwa, 2020). Transparency International frequently ranks Uganda among the most corrupt nations in Africa, with minimal improvement over the years (Transparency International [TI], 2020). The complex nature of corruption as a collective action problem where perceived short-term gains overshadow long-term societal costs further entrenches these practices, exacerbating resource shortages and healthcare facility inadequacies (Persson et al., 2012).

Corruption also disrupts collaborative networks among healthcare stakeholders, which is critical for effectively managing healthcare programs. Collaborative networks comprising government agencies, healthcare professionals, NGOs, and communities facilitate efficient resource sharing, knowledge exchange, and operational coordination, which are essential in Uganda's resource-limited settings (Chouinard et al., 2021; Ghia & Rambhad, 2021). Effective networks support sustainable WASH infrastructure, ensure consistent vaccine supply chains, and

enhance community outreach for NTD campaigns. However, corruption erodes trust within these networks, deterring active stakeholder participation and weakening program delivery owing to fragmented coordination and misallocated resources (Muthuri et al., 2020).

Addressing the interplay between corruption and collaborative networks is crucial for improving health care management in Uganda. By enhancing governance and promoting transparency, Uganda can strengthen stakeholder collaboration, optimize resource use, and foster trust, leading to more effective WASH, immunization, and NTD programmes. This research aims to examine how factors such as corruption and network efficacy influence healthcare service delivery, providing insights to improve program management and health outcomes in Uganda.

Mixed Outcomes in Health Programs

The Ugandan government has allocated significant financial resources to the implementation of health programs that specifically address neglected tropical diseases (NTDs); the Uganda National Expanded Program on Immunization (UNEPI); and water, sanitation, and hygiene (WASH). Nevertheless, the results of these programmes have been marked by a combination of significant achievements and serious setbacks.

Despite its success in reducing child mortality, the Uganda immunization program has faced challenges due to corruption scandals such as the suspension of GAVI funds and theft of vaccines during the COVID-19 pandemic (Saeed et al., 2023). Malande et al., (2019) explored the challenges hindering effective immunization in a rural district of Uganda, revealing high dropout rates, insufficient coverage, and frequent outbreaks of vaccine-preventable diseases. The study also sheds light on the detrimental effects of GAVI fund suspension and rampant vaccine theft, which are indicative of the deeper issue of corruption plaguing the healthcare system. Farzanegan

and Hofmann (2021) further emphasized that financial mismanagement, notably during the suspension of the GAVI fund, gravely impacted immunization efforts and the fair distribution of vaccines. These studies collectively unveil systemic flaws that cripple the efficiency of immunization initiatives in Uganda.

Regarding NTDs, a study by Dilliot et al., (2022) revealed notable disparities in the resilience levels of NTD community drug distributors in Uganda. Another study by Muhumuza et al. (2019) reported poor drug uptake during mass drug administration against bilharzia in Uganda. The motivation of community drug distributors is a crucial element that significantly affects the efficacy of NTD control and elimination. Krentel et al., (2017) conducted an extensive study on the motivational factors influencing community drug distributors in Uganda and other countries. Their findings revealed that inadequate training not only hindered program effectiveness but also diminished community trust in NTD volunteers and the overall program. This underscores the critical need to understand the contextual factors that affect a program's success.

The WASH programs in Uganda fall significantly short of their targets (Dobson, 2023; Oleribe et al., 2019). Diarrheal diseases continue to be a major health concern, particularly among children under five, with inadequate hygiene and sanitation ranking among the leading causes of mortality in this age group (Ssekandi et al., 2023). Despite efforts to develop and expand WASH initiatives, 33% of Ugandan children still lack access to safe drinking water and 7% of the population practice open defecation (Khanpour et al., 2020). While WASH is integral to improving overall health outcomes, its integration with other health programs, such as those targeting neglected tropical diseases (NTDs) and immunization efforts, has faced significant hurdles. The mixed outcomes of Uganda's WASH, NTD, and immunization programs highlight the

complexities and interdependencies within the country's healthcare system, highlighting the need for more cohesive and effective management strategies.

Healthcare Management

The analysis of management factors affecting health service delivery in Uganda requires an in-depth understanding of healthcare management principles, especially in relation to WASH, immunization, and neglected tropical diseases (NTD) programs. Healthcare management plays a pivotal role in coordinating the diverse processes and operations that underpin these programs, including strategic management, supply chain dynamics, and patient-care coordination. By leveraging operations management strategies, Uganda's healthcare system can potentially enhance the efficiency of service delivery, which is a crucial element for achieving the intended outcomes of these programs (Gorter et al., 2015; Roehrich, 2015).

In the context of the WASH, UNEPI, and NTD programs, the integration of care models and the implementation of comprehensive management approaches are essential for improving outcomes. For instance, Uganda's challenges in WASH where 33% of children still lack access to safe water and 7% of the population practice open defecation highlight the need for more robust management and operational oversight. These structural gaps in the healthcare system, particularly concerning resource allocation and stakeholder coordination, can be attributed to management inefficiencies that hinder program success. A stronger focus on process management and stakeholder relationship management could help mitigate these issues and enhance the overall effectiveness of WASH programmes (Coventry et al., 2015; Haapasalo et al., 2022).

Similarly, despite achieving some success in reducing child mortality, the immunization program in Uganda continues to grapple with high dropout rates, low coverage, and challenges

related to corruption and supply chain failures. These issues underscore the importance of supply chain management and quality control in health care management. Effective management of these factors is critical for ensuring vaccine availability, minimizing corruption, and improving immunization outcomes (Farzanegan & Hofmann, 2021; Malande et al., 2019). The suspension of GAVI funds because of corruption further emphasizes how financial management and accountability mechanisms within healthcare management directly impact program performance and sustainability.

In terms of NTD control and elimination, Uganda faces significant challenges related to community engagement and motivation of community drug distributors (CDDs), which are vital for the successful implementation of mass drug administration (MDA) campaigns. Studies have shown that inadequate training and poor motivation among CDDs can lead to reduced efficacy of NTD programs (Dilliot et al., 2022; Krentel et al., 2017). Therefore, human resource management and capacity building are critical management factors that affect the success of these health programs, highlighting the need for effective training, supervision, and motivation strategies to boost program efficacy.

Ultimately, the mixed outcomes of Uganda's WASH, immunization, and NTD programs reflect the deeper structural healthcare management challenges that need to be addressed. These challenges include the need for interoperability in health informatics, adaptive leadership, and stakeholder collaborations. By addressing these management factors through a more cohesive and strategic approach, Uganda can significantly improve the efficiency, effectiveness, and sustainability of its health-service delivery systems. Structural equation modeling analysis of these

programs can reveal the interconnectedness of these management factors, helping to identify the key levers for improving health outcomes in Uganda.

Health Program Management

Health program management involves a systematic process of planning, organizing, implementing, and evaluating initiatives, all of which directly impact the effectiveness of WASH, immunization, and NTD efforts in the country. Effective resource management is a critical factor in determining the success of these programmes. The allocation of financial, human, and material resources directly influences the ability of the WASH, immunization, and NTD programs to meet their goals. For example, WASH programs have struggled because of inadequate investments in sanitation infrastructure, leaving large portions of the population without access to safe water. Similarly, the suspension of GAVI funds and corruption issues have impacted Uganda's immunization program, undermining the progress in vaccine distribution and coverage. Thus, proper resource allocation and financial oversight are essential for improving the efficiency and outcomes of health programs (Goetzel & Ozminkowski, 2008; Khalil & Liu, 2021).

Additionally, personnel management plays a pivotal role in the success of Uganda's health programs. The motivation and training of community health workers (CHWs), including community drug distributors (CDDs) for NTDs, are significant management factors that affect program effectiveness. Studies have shown that CDDs' motivation and proper training are critical to the success of mass drug administration (MDA) campaigns. Lack of adequate training not only reduces the effectiveness of NTD programs but also diminishes community trust in healthy volunteers. Similarly, challenges related to the training and support of CHWs in immunization programmes have led to high dropout rates and poor coverage. Therefore, improving human

resource management and ensuring sustained capacity-building initiatives are vital for boosting the performance of health programs (Krentel et al., 2017; Malande et al., 2019).

Monitoring and evaluation (M&E) are fundamental management factors that influence the success of WASH, immunization, and NTD programs in Uganda. Robust M&E systems allow for continuous assessment of program performance, ensuring that interventions are refined and adapted to address emerging challenges. In Uganda, the lack of strong M&E frameworks has led to inefficiencies in service delivery, particularly in the WASH sector where program outcomes remain below the target despite significant investments. The ability to track progress, evaluate outcomes, and adjust strategies based on data is crucial for improving program effectiveness and achieving long-term health goals (Khalil & Liu, 2021).

Stakeholder involvement is another key aspect of health program management, which directly affects service delivery in Uganda. Effective health programs require collaboration across multiple sectors including health, education, local governments, and community organizations. The integration of WASH interventions with NTD and immunization programs, for instance, demonstrates the need for cross-sectoral cooperation to address health challenges holistically. Engaging a broad range of stakeholders ensures that health programs are tailored to meet the specific needs of communities, and that resources are efficiently used to maximize impact. The involvement of local community leaders and health workers is vital for building trust and ensuring that programs resonate with the population they serve (Coventry et al., 2015; Haapasalo et al., 2022).

The historical and sociopolitical context of health program management in Uganda also shapes the current challenges. The evolution of Uganda's health system, from its colonial legacy

to the introduction of the primary healthcare (PHC) model in the late 1970s, has influenced the structure and operation of WASH, immunization, and NTD programs. Structural adjustment programs (SAPs) in the 1980s and the 1990s, which reduced public health spending, have had lasting impacts on the healthcare system's ability to deliver effective services, particularly for vulnerable populations. Understanding this context is crucial for identifying the systemic management issues that continue to hinder program outcomes and developing strategies to address them (Public Health Reviews [PHR], 2017).

Uganda's innovative approaches to health program management, such as Family Health Days (FHDs) for immunization outreach, highlight the importance of adaptive and context-specific interventions. These initiatives have successfully increased vaccine access in remote areas, underscoring the need for flexible management strategies to respond to local challenges. Similarly, integrated approaches to disease control, such as combining WASH infrastructure improvements with NTD control efforts, have proven to be effective in enhancing program outcomes. These strategies demonstrate the value of adaptive management in achieving health service delivery goals, particularly in resource-constrained settings, such as Uganda (Mupere et al., 2020).

In summary, the management factors affecting health service delivery in Uganda's WASH, immunization, and NTD programs are closely intertwined with the core principles of health program management. Effective resource allocation, personnel management, monitoring and evaluation, and stakeholder engagement are critical for addressing current challenges and improving service delivery. By applying a structural equation modelling analysis, these management factors can be better understood and optimized, providing a clearer path to enhanced health outcomes and more efficient healthcare delivery in Uganda.

Healthcare Management Gap

A significant challenge facing healthcare systems globally, including in African nations, is the widespread appointment of healthcare professionals in managerial positions without adequate management qualifications (Samutt & Ngoye, 2019). This practice raises critical concerns about the competence and effectiveness of healthcare managers in fulfilling their roles, necessitating a deeper examination of gaps in management skills. Research indicates that many healthcare professionals encounter difficulties in balancing their clinical expertise with the demands of management, often resulting in inefficiencies and conflicts in healthcare service delivery.

For instance, McGivern et al., (2015) explored the experiences of medical professionals in management roles within the British National Health Service, referring to them as "hybrids." These individuals, who juggle both clinical and managerial responsibilities, often struggle to reconcile their professional identities with managerialist principles imposed by their roles. This tension can lead to conflicting priorities and challenges in decision making, indicating that professional expertise alone does not automatically translate into effective leadership in healthcare environments.

Similarly, Fanelli et al., (2020) examined healthcare professionals' perceptions of managerial competencies in public organizations and found significant divergence in views between those in managerial and non-managerial positions. Healthcare staff in managerial roles prioritized different skill sets compared with their non-managerial counterparts, revealing how organizational hierarchies shape perceptions of what constitutes effective management. This gap in understanding underscores the importance of targeted management training for healthcare

leaders, as the absence of shared perspectives can hinder collaboration and organizational cohesion.

Lega and Sartirana (2016) also investigated the challenges faced by physicians transitioning to managerial roles within the Italian National Health Service, identifying resistance from peers, role ambiguity, and difficulties in clinical leadership as the major barriers to successful integration. These findings suggest that healthcare professionals often face cultural and organizational resistance when assuming leadership positions, making it difficult for them to fully embrace their new roles and responsibilities. Such resistance can undermine the effectiveness of healthcare management and create operational inefficiency.

In Nigeria, Okonkwo et al., (2019) highlight the critical need for managerial competence among hospital managers, particularly in areas such as financial and organizational management. The study revealed that perceptions of managerial abilities differed significantly based on an individual's role within the organization, with hospital administrators being more likely to recognize gaps in skills that frontline healthcare workers may overlook. This disparity highlights the pressing need for structured management training to ensure that healthcare leaders are equipped with the financial acumen and strategic oversight necessary to run complex health systems.

The practice of promoting health care professionals to executive management positions without sufficient management training presents a global challenge that affects health care systems in both developed and developing nations. The conflicts between professional and managerial identities, divergent views on essential management skills, and organizational resistance to clinical leadership all contribute to the inefficiencies and strained integration of healthcare professionals into managerial roles. To address this gap, concerted efforts are needed to build management

competencies among the healthcare staff. This includes providing formal management education and leadership training, ensuring that individuals appointed to managerial roles possess not only clinical expertise, but also the strategic, financial, and operational skills required to lead healthcare organizations effectively. By investing in the development of healthcare management capabilities, healthcare systems can improve service delivery, optimize resources, and ensure that leadership roles are filled by individuals with appropriate qualifications and competencies.

Relevance in the Ugandan Context

The widespread practice of appointing healthcare professionals to managerial roles without formal management training is a critical issue that affects healthcare systems across Africa, including Uganda. This challenge has significant implications for the efficiency and effectiveness of health service delivery, particularly within key programs such as WASH, immunization, and neglected tropical disease (NTD) initiatives. The absence of formal management qualifications among healthcare managers leads to systemic inefficiencies and organizational shortcomings, which can ultimately undermine the overall success of these programmes.

Liang et al., (2018) demonstrated that even in developed healthcare systems like Australia, health service management positions often do not require formal managerial qualifications, raising concerns about the competence of those in leadership roles. In the Ugandan context, where healthcare systems face resource constraints, gaps in management expertise are even more detrimental. Effective management is essential to optimize the limited resources available for Uganda's WASH, immunization, and NTD programs. However, healthcare professionals are often promoted based solely on clinical expertise with limited training in strategic management, financial oversight, and human resource coordination.

In line with this, Paliadelis et al., (2007) noted that healthcare professionals receive education primarily focused on clinical skills, leaving them underprepared for the complexities of their top management positions. This deficiency is particularly problematic in Uganda, where the integration of WASH, immunization, and NTD programs requires adept management to coordinate multisectoral efforts, ensure proper resource allocation, and facilitate effective program implementation. Inadequate management training contributes to inefficiencies such as delays in the delivery of essential services, mismanagement of funds, and ineffective stakeholder engagement.

The relevance of this issue is further underscored by research conducted in other African countries. For instance, Maphumulo and Bhengu (2019) highlight the critical need for skilled health managers in South Africa to drive quality improvement initiatives and enhance management effectiveness. Oleribe et al., (2018) emphasized how managerial shortcomings, including salary disputes, were a key factor in industrial actions among healthcare workers in Nigeria, pointing to systemic deficiencies that also resonate with Uganda's healthcare management challenges. In Uganda, the lack of formal management training for healthcare professionals in leadership positions can lead to similar disruptions, undermining the continuity of vital healthcare services, including those targeting neglected tropical diseases and immunization efforts.

Additionally, the successful implementation of innovative healthcare solutions such as telemedicine and ICT integration depends on competent management. Adamu et al., (2017) demonstrated that telemedicine holds significant potential for addressing healthcare disparities in sub-Saharan Africa, but its effectiveness relies on well-trained managers capable of overseeing complex technological and operational frameworks. Similarly, Gagnon et al., (2010) investigated

the factors influencing ICT adoption in Uganda's healthcare system and concluded that, without qualified managers, the integration of such technologies may falter, negatively impacting healthcare delivery. These findings highlight that management training is vital not only for traditional healthcare services, but also for the implementation of modern healthcare innovations that are critical for Uganda's future.

The challenges posed by appointing underqualified individuals to managerial roles extend resource utilization. Managers lacking proper financial and operational skills may struggle to use resources efficiently, leading to waste and suboptimal service delivery. In the context of the WASH, immunization, and NTD programs in Uganda, poor resource management can result in missed opportunities to improve health outcomes. Kiwanuka et al., (2018) stress that effective healthcare delivery hinges on managers' abilities to make informed decisions, optimize the use of limited resources, and develop strategies that align with the goals of healthcare programs.

To address these issues, there is a pressing need for investment in management education and training of healthcare personnel in Uganda. By equipping healthcare managers with essential skills in financial management, human resource management, quality improvement, and strategic planning, the Ugandan healthcare system can enhance the effectiveness of its health programs significantly. Properly trained managers can drive better decision making, ensure more efficient use of resources, and improve the overall delivery of healthcare services, particularly in the critical areas of WASH, immunization, and NTD programs.

In summary, the appointment of healthcare professionals to managerial roles without adequate training presents a profound challenge for healthcare delivery in Uganda. As the success of WASH, immunization, and NTD programs relies on effective management, it is crucial to

prioritize management education and training for health care leaders. By doing so, Uganda can strengthen its healthcare management capabilities, enhance program outcomes, and improve health service delivery across the country.

The Role of Management in Healthcare Delivery

Management plays a critical role in healthcare delivery, influencing key areas, such as service quality, staff productivity, patient care, resource management, innovation, stakeholder relationships, and cost efficiency. The successful implementation of WASH, immunization, and NTD programs in Uganda hinges on the effective application of management principles, which are vital for overcoming the challenges in resource-constrained environments. Financial management is the cornerstone of effective healthcare delivery, particularly in Uganda, where WASH, immunization, and NTD programs require judicious resource allocation to maximize impact. Proper financial management strategies, such as optimizing budgets, controlling expenditures, and ensuring the efficient use of resources, enable healthcare organizations to maintain sustainability while delivering high-quality services. In the context of these programs, inadequate financial oversight can lead to misallocation of funds, ultimately affecting program reach and outcome (Abban, 2021; Henson, 2023). Thus, the effectiveness of Uganda's health service delivery is closely tied to resource optimization and budgetary management, which are critical for sustaining long-term health interventions.

In addition to financial management, strategic management plays a pivotal role in adapting healthcare systems to the ever-changing public health landscape. For Uganda's WASH, immunization, and NTD programs to succeed, health care managers must establish clear goals, devise evidence-based strategies, and implement initiatives that align with the overarching mission

of improving public health outcomes. The use of tools such as the Balanced Scorecard (BSC) allows managers to bridge the gap between their strategic vision and day-to-day operations, ensuring that organizational goals translate into measurable improvements in service delivery (Chan, 2009). The strategic decisions made by healthcare leaders are crucial for enhancing the competitiveness and effectiveness of healthcare services, particularly in resource-constrained settings such as Uganda (Parayitam, 2010).

Human resource management (HRM) is a critical factor in healthcare delivery. In Uganda, the success of WASH, immunization, and NTD programs depends on the productivity and motivation of healthcare personnel from community health workers to program managers. Effective HRM, which includes recruitment, training, performance evaluation, and retention strategies, ensures that healthcare teams are well-equipped to meet program objectives. For instance, well-trained health workers are essential for the proper implementation of mass drug administration (MDA) campaigns for NTDs, while effective HR practices can reduce burnout and improve staff retention, which is vital for the continuity of healthcare services (Surji & Sourchi, 2020). Leadership and management practices that prioritize staff well-being and professional development are essential for enhancing the performance and sustainability of health programmes (Mosadeghrad, 2014).

Collaborative management of stakeholders is also critical for ensuring the success of health programs in Uganda. Effective stakeholder relationship management fosters collaboration among healthcare providers, policymakers, NGOs, and community leaders, which is essential for the integrated delivery of WASH, immunization, and NTD services. For example, successful WASH interventions often require collaboration of healthcare providers with local government bodies,

educational institutions, and community organizations to promote sanitation and hygiene practices. Coordinated efforts among these stakeholders improve program implementation, strengthen community engagement, and ensure that healthcare interventions are both contextually relevant and sustainable (Haapasalo et al., 2022).

Additionally, the COVID-19 pandemic has highlighted the need for robust healthcare surveillance and management strategies to ensure the resilience of the health systems in Uganda. The pandemic has exposed gaps in healthcare preparedness, emphasizing the importance of proactive planning and the role of middle management in implementing health innovations, improving patient care, and maintaining service delivery during crises (Birken et al., 2012; Elliot et al., 2020). These lessons are directly applicable to the management of WASH, immunization, and NTD programs, in which responsive and agile management can mitigate the impact of disruptions on healthcare services.

Finally, cost and case management play crucial roles in ensuring the economic viability of healthcare systems. Efficient case management can reduce healthcare utilization and associated costs, provide economic benefits, and improve the long-term sustainability of healthcare services (Kim & Lee, 2020). In Uganda, where healthcare resources are limited, effective cost management is essential for optimizing the delivery of health services, especially within the WASH, immunization, and NTD programs, which require ongoing investment in infrastructure, supplies, and personnel.

In summary, management factors, such as financial oversight, strategic planning, human resource management, stakeholder collaboration, and cost management, are integral to the success of Uganda's WASH, immunization, and NTD programs. Effective management practices ensure

the optimization of resources, enhancement of service delivery, and sustainability of healthcare interventions. By employing a structural equation modeling analysis, the influence of these management factors on healthcare delivery in Uganda can be better understood, providing insights that can inform future improvements in the management and implementation of these vital health programs.

Research Gap

Healthcare program management is inherently complex and requires the integration of various factors to ensure effective delivery of services. Despite a growing body of research, significant gaps remain in understanding the combined influence of critical management elements such as management education, managerial training, collaborative networks, corruption, and innovation. Addressing these gaps is essential to enhance healthcare program management systems and improve patient outcomes. This research investigated these management factors in the context of Uganda, recognizing the need to incorporate contextual factors that shape how management practices impact healthcare delivery.

Uganda's unique socioeconomic, cultural, and political context greatly influences its healthcare management. The socioeconomic landscape, characterized by resource constraints and variable infrastructure, requires management strategies that are responsive to these limitations (Chouinard et al., 2021). Cultural beliefs and practices also play a significant role in influencing patient perceptions and behaviors, underscoring the importance of culturally sensitive healthcare management practices (Kim et al., 2022). Effective management in Uganda must, therefore, consider these cultural nuances to foster patient engagement and trust. Additionally, the political environment, including governance structures and policy frameworks, affects healthcare

management through policy decisions, regulations, and the level of government support, all of which affect program implementation and efficacy (Kim et al., 2022).

A major research gap exists in understanding the role of management education and training in healthcare programme effectiveness in Uganda. Although studies have suggested that education and training can enhance management capacity, research specifically linking these factors to healthcare program delivery in low-resource settings is limited (Newton-Lewis et al., 2021). Investigating how management education and training affect program outcomes is critical for developing targeted training programs that equip healthcare managers with skills relevant to their roles in Uganda's healthcare sector.

Another significant gap is the impact of collaborative networks within health care systems. Collaborative networks, which involve partnerships among government agencies, healthcare providers, NGOs, and communities, are essential for resource sharing, knowledge dissemination, and coordination in program management (Cunningham et al., 2011). However, research has not fully explored how these networks impact program outcomes and facilitate healthcare management, particularly in low-income settings, such as Uganda. Understanding the structure and function of these networks in Uganda's healthcare context is crucial because these networks can help overcome resource limitations and strengthen program delivery (Frich et al., 2014).

Additionally, the influence of corruption on healthcare management remains underexplored, especially in settings in which corruption is pervasive and can significantly hinder service delivery. Studies reveal that corruption in healthcare management leads to the misallocation of resources, undermines stakeholder collaboration, and erodes public trust (Muthuri et al., 2020; Witvliet et al., 2013). Research on the specific mechanisms through which corruption

impacts healthcare program outcomes is needed to develop effective anti-corruption strategies that can be integrated into management practices, particularly in countries such as Uganda, which has a low global corruption perception index (Kayizzi-Mugerwa, 2020).

Finally, while innovation has the potential to transform healthcare delivery by introducing new technologies, strategies, and processes, research on how innovation can mediate the impact of management factors in resource-limited healthcare settings is limited. Innovation in program design, such as digital health tools or tailored community interventions, may offer practical solutions to many healthcare challenges in Uganda (Ghia & Rambhad, 2021). This research seeks to address this gap by examining how innovation can serve as a mediating factor in improving service delivery, particularly within the WASH, immunization, and NTD programs.

This study aims to address these critical research gaps by examining the interplay between management education, training, collaborative networks, corruption, and innovation in Uganda. The hypothesis suggests that improvements in managerial education and training will enhance health care managers' ability to implement evidence-based and innovative approaches, ultimately optimizing program management and service outcomes. The findings of this research will contribute valuable insights into healthcare management practices that are contextually relevant and tailored to the unique challenges of Uganda's healthcare system, thus supporting more effective and sustainable healthcare delivery in low-resource settings.

Statement of the Problem

Despite substantial governmental investment, Uganda's healthcare sector continues to grapple with critical management challenges that result in inconsistent health outcomes. The key issues affecting the system include inadequate management education among healthcare leaders,

insufficient managerial training, lack of innovation, weak collaborative networks, and pervasive corruption. These management deficiencies are exacerbated by a broader healthcare workforce crisis characterized by poor financing, a shortage of healthcare professionals, and fragile policy frameworks. This has severely impacted primary healthcare service delivery, particularly during the COVID-19 pandemic, when these vulnerabilities have become even more pronounced (Czabanowska & Kuhlmann, 2021; Kuhlmann et al., 2023).

Systemic issues in Uganda's healthcare management have contributed to the ongoing prevalence of diseases, significant gaps in immunization coverage, and numerous incidents of corruption. In particular, corruption has undermined public trust and healthcare outcomes, with high-profile scandals leading to the censure of three health ministers and the circulation of counterfeit vaccines during the COVID-19 pandemic. As a result, critical public health targets remain unmet, especially in areas such as immunization and water, sanitation, and hygiene (WASH) programs. Uganda's WASH initiatives, which are integral to preventing diarrheal diseases a leading cause of mortality in children under the age of five are significantly underperforming. For instance, 33% of Ugandan children still lack access to safe drinking water and 7% of the population practice open defecation, both of which contribute to ongoing public health crises (Dobson, 2023; Oleribe et al., 2019; Ssekandi et al., 2023).

Neglected tropical disease (NTD) control programs, which rely heavily on Mass Drug Administration (MDA), also face considerable challenges, such as low drug uptake and fluctuating coverage rates across communities. These inconsistencies threaten Uganda's ability to meet the World Health Organization's (WHO) elimination goals for diseases such as schistosomiasis. Failure to sustain consistent MDA coverage underscores the need for tailored, community-specific

strategies to increase participation and adherence to NTD interventions (Adriko et al., 2018; Ayebazibwe, 2022).

While the existing literature has extensively examined various aspects of healthcare management challenges in Uganda, a significant gap remains in understanding the combined impact of management education, training, networks, corruption, and innovation on health service delivery. Current studies have predominantly focused on these factors in isolation, neglecting their intricate interplay and how they collectively shape health outcomes. Furthermore, no recent research has utilized structural equation modelling (SEM) to simultaneously analyze these management factors within the Ugandan healthcare context, leaving a critical gap in both theory and practice.

This research seeks to fill this gap by investigating how managerial education, training, collaborative networks, corruption, and innovation collectively influence the delivery of health services in Uganda, specifically within the WASH, immunization, and NTD programs. This study posits that advanced managerial education and continuous management training, combined with the effective utilization of networks and innovative practices, can significantly enhance healthcare management and service delivery. By narrowing the focus to these key factors and exploring their interrelationships through SEM, this research aims to provide a more nuanced and comprehensive understanding of healthcare management challenges in Uganda.

Addressing these multifaceted challenges requires an integrated approach that considers the influence of management education, managerial training, innovation, collaboration, and governance on health care service delivery. This study critically examined these relationships and their impact on health program outcomes, offering insights into potential strategies for improving

healthcare services. The findings of this study will contribute to a broader understanding of the complexities of healthcare management in developing countries and propose innovative solutions that can enhance health outcomes in Uganda and other similar contexts, enriching the global discourse on healthcare system improvement.

Purpose of the Study, Research Aims, and Objectives

The Purpose of the Study

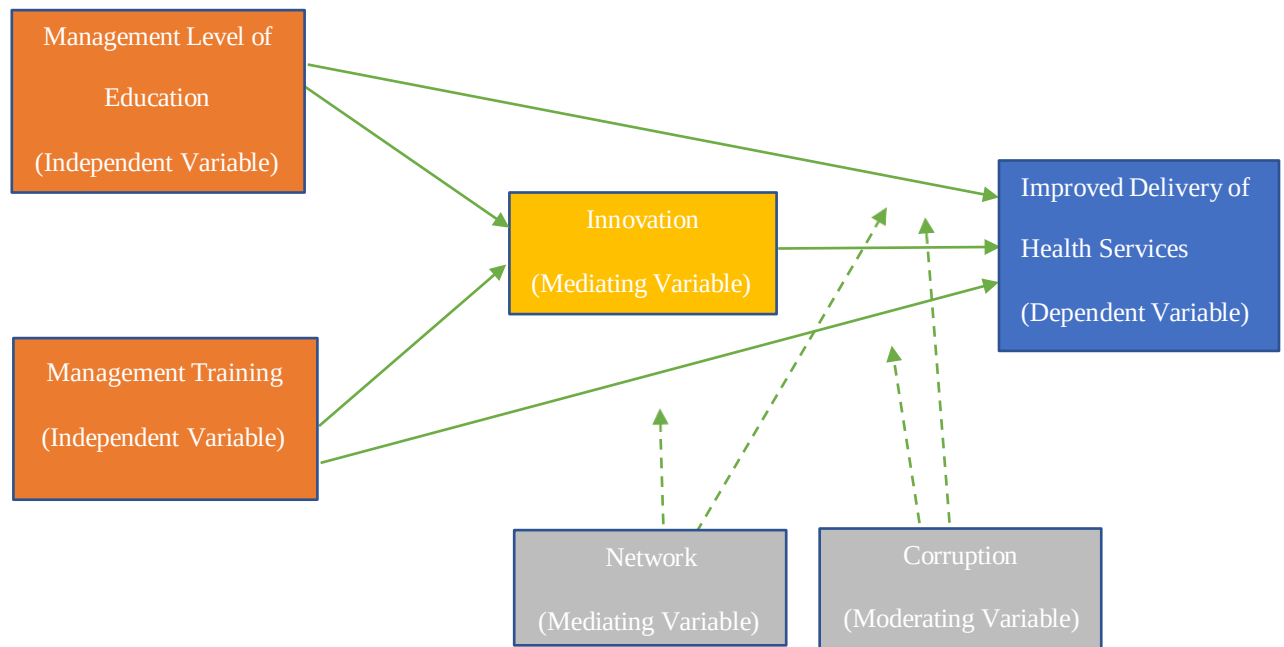
The primary purpose of this quantitative study is to develop a comprehensive analytical model to examine how various management factors affect health service delivery within health programs in Uganda. Specifically, this research aims to investigate the moderating role of networks and corruption, as well as the mediating effects of innovation, on the improved delivery of health services. This research offers a holistic understanding of the complex dynamics affecting health service delivery in Uganda's healthcare settings from a health management perspective.

Figure 1 presents a proposed framework that illustrates the interplay between management education, management training, collaborative networks, corruption, innovation, and improved quality delivery of services by health programs. This framework is constructed to guide the investigation of how the management level of education, management training, collaborative networks, and innovative practices, when moderated by networks and corruption, contribute to enhancing the delivery of healthcare services. This research hypothesizes that effective management practices, when supported by robust collaborative networks and minimized corruption, lead to improved health service delivery. Furthermore, it posits that innovation serves as a critical mediator in this process, enabling the translation of effective management into tangible improvements in service delivery.

Employing a quantitative methodology, this study utilizes appropriate and robust statistical analyses to test hypothetical relationships within the proposed framework. Data were collected from a diverse group of health program managers across Uganda using structured questionnaires as the primary data collection method. This approach was chosen to quantitatively assess managers' perceptions regarding the impact of management factors on health service delivery. The findings of this research are expected to contribute significantly to the existing scholarly literature on health service delivery, management factors, health-focused collaboration networks, corruption, and innovative practices.

By investigating the inhibitory role of corruption, this research reveals how these contextual factors influence the relationship between management factors and improved health service delivery. Additionally, by examining the mediating effects of innovation, this research seeks to clarify the mechanisms by which management factors ultimately lead to enhanced service delivery. This research provides insights that have practical implications for policymakers, healthcare program managers, and stakeholders committed to improving healthcare delivery in Uganda. It provides actionable recommendations for enhancing management practices within healthcare programs, optimizing the use of collaborative networks, mitigating the impact of corruption, and leveraging innovation for better health outcomes.

By exploring the complex interplay between management factors, collaborative networks, corruption, and innovation, this research seeks to offer comprehensive insights into the challenges and opportunities in healthcare management. The outcomes of this research will be instrumental in guiding policy decisions and management strategies to improve healthcare service delivery in Uganda and other similar contexts.

Figure 1*Conceptual Framework*

The proposed conceptual framework aims to elucidate the relationships between key management factors—managerial education, training, collaborative networks, corruption, and innovation—and their collective impact on the delivery of health services through health programs.

Managerial education encompasses formal academic training and qualifications for healthcare managers, including degrees and certifications for healthcare management. Higher levels of managerial education are expected to equip healthcare managers with the knowledge and skills necessary to implement effective management practices, leading to improved delivery of healthcare services (Dhanaraj & Parkhe, 2006).

Continuous managerial training involves professional development activities, such as workshops, seminars, and on-the-job training. It is hypothesized that this ongoing training will

keep health care managers updated on best practices and innovations, thereby enhancing the efficiency and effectiveness of health care service delivery (Kianto et al., 2018). Collaborative networks involve the formation of alliances and partnerships between healthcare professionals and institutions to facilitate knowledge exchange and resource-sharing. Effective collaborative networks are expected to foster innovation, problem-solving, and collective action, leading to more efficient healthcare service delivery and better patient outcomes (Liu, 2024).

Corruption refers to the misuse of public offices for private gain, including practices such as bribery, embezzlement, and fraud within the healthcare sector. High levels of corruption are hypothesized to negatively impact healthcare service delivery by diverting resources, undermining trust, and reducing the overall effectiveness of healthcare programmes (Fanelli et al., 2020). Innovation in health care management involves the implementation of new and improved practices, technologies, and processes aimed at enhancing service delivery. The integration of innovative practices and technologies is expected to significantly improve the quality and efficiency of healthcare service delivery and to address existing challenges and gaps (Virgüez, 2023).

The framework hypothesizes that advanced managerial education and continuous training will enhance the capabilities of healthcare managers, enabling them to effectively leverage collaborative networks. These networks foster innovation and facilitate the implementation of the best practices. However, corruption can undermine these efforts by misallocating resources and reducing trust in a system. Therefore, mitigating corruption is crucial to ensure that the benefits of education, training, networks, and innovation are fully realized, leading to improved healthcare service delivery (Ominyi et al., 2019).

By comprehensively understanding and addressing the interactions among these factors, this framework aims to provide a holistic approach for enhancing healthcare service delivery in Uganda. The literature supports the significance of managerial roles in healthcare innovation implementation, emphasizing the role of middle managers in promoting innovation and information synthesis (Puspita, 2024). Studies have also highlighted the importance of collaborative networks in healthcare innovation and the impact of corruption on service delivery (Hans et al., 2011; Quartz-Topp, 2019). Furthermore, research underscores the role of innovation in enhancing healthcare quality and efficiency, emphasizing the need to combat corruption and promote collaborative networks for successful innovation implementation (Giacomelli et al., 2019; Liou et al., 2022).

The conceptual framework offers a structured approach to enhancing healthcare service delivery by integrating managerial education, training, collaborative networks, corruption mitigation, and innovation. By addressing these interconnected factors, healthcare systems can work towards improved service quality and patient outcomes in Uganda

Research objectives

The following research objectives were achieved.

1. Identify specific management factors influencing healthcare service delivery through the NTD, WASH, and UNEPI programs in Uganda.
2. Evaluate the impact of collaborative healthcare networks on the delivery of healthcare services by the NTD, WASH, and UNEPI programs in Uganda.
3. Investigate the extent and impact of corruption on the effectiveness of healthcare service delivery through the NTD, WASH, and UNEPI programs in Uganda.

4. Examine how innovation in management practices affects the effectiveness of healthcare service delivery in Uganda.
5. Develop and validate a theoretical model to understand the interplay between management factors, collaborative networks, corruption, and healthcare service quality and provide evidence-based policy recommendations in Uganda.

Nature and Significance of the Study

Nature of the Study

This research adopts a quantitative research approach to answer these research questions. The initial phase involved rigorous review of the relevant literature for multiple purposes. First, the researcher comprehensively assessed various health programmes in Uganda, focusing on their development, implementation mechanisms, and outcomes. Additionally, this study examined scholarly work on management education and training, highlighting the mediating role of innovation in enhancing healthcare delivery. To broaden the scope and applicability of the research, the literature pertaining to existing collaborative networks within the Ugandan health system was scrutinized. This was complemented by exploring the literature on perceived corruption to understand its influence on the interplay between management education, training, and the improved delivery of health programs. Through this meticulous literature review, key variables were identified, measurement metrics were established, and data-collection methods were formulated.

Justification for the Quantitative Approach

The choice of the quantitative analysis approach was justified by several factors aligned with the nature of the study. This research aims to identify, quantify, and clarify the relationships

among various management factors affecting healthcare service delivery. A quantitative approach enables objective measurement of these variables, providing a clear empirical basis for the analysis. This research seeks to understand the complex interactions between multiple constructs, such as management education, training, innovation, networks, and corruption. Quantitative methods, particularly structural equation Modeling (SEM), allow for the examination of these intricate relationships using statistical techniques that can handle multiple variables simultaneously.

Using a large sample of healthcare management professionals across Uganda, a quantitative approach facilitates the generalization of the findings. This ensures that the results are applicable to the broader context of the Ugandan health care system. Quantitative methods provide robust data analysis techniques namely confirmatory factor analysis (CFA) and structural equation modelling (SEM), which enhance the validity and reliability of the findings. These methods allow for the rigorous testing of hypotheses and evaluation of model fit, ensuring methodological rigor.

The structured nature of quantitative research helps to reduce potential biases. Random sampling and the use of standardized questionnaires ensured that the collected data were representative and minimized the influence of researcher subjectivity. By integrating these considerations, the quantitative analysis approach is well suited to achieve the study's objectives, providing clear, measurable insights into the factors influencing healthcare service delivery in Uganda. This approach aligns with the research aim of offering actionable recommendations for improving healthcare management practices, based on empirical evidence.

Research Methodology

This research uses a quantitative approach to explore the relationship between management education levels, management training, innovation, networks, corruption, and the delivery of health services by health programs in Uganda. Participants included healthcare management professionals overseeing NTDs and the WASH and UNEPI programs at the national and district levels in Uganda. The participants were randomly selected to minimize sample bias (Taherdoost, 2016). Data were collected using an online questionnaire. The survey was conducted in four phases: identifying key concepts and variables from the literature, content adequacy drafts reviewed and approved by the supervisor, a pre-test to ensure clarity, and incorporating feedback to finalize the questionnaire.

Data analysis employed structural equation modeling (SEM) techniques, justified by the latent construct properties of the variables of interest (Cheng, 2001). Variables were loaded into constructs, followed by confirmatory analysis to assess the model fit. SEM then elucidated the path coefficients to clarify hypothetical relationships within the framework.

Structural Equation Modelling (SEM)

Structural equation Modelling (SEM) is a powerful analytical tool that enables the simultaneous examination of multiple variables and their interrelationships, making it particularly well-suited for analyzing complex factors in healthcare program management (Birken et al., 2012). In Uganda, where healthcare systems face significant challenges across WASH, immunization, and neglected tropical disease (NTD) programs, SEM provides a comprehensive approach to investigating the interactions among management factors such as education, training, collaborative networks, perceived corruption, and innovation.

The use of SEM in this study is especially advantageous because it allows for the inclusion of latent variables unobservable constructs, such as managerial education and innovation, capturing abstract yet critical dimensions of healthcare management that directly impact program effectiveness (Birken et al., 2015). By incorporating these variables, SEM provides a nuanced understanding of how management practices shape the delivery of health care services, particularly in resource-limited settings.

This research employs SEM to analyze the interconnectedness of key factors affecting healthcare program outcomes in Uganda. Specifically, it investigates how innovation mediates the relationship between management practices and program effectiveness, providing insights into optimizing management strategies within the socioeconomic and infrastructural constraints of Uganda. In the context of WASH programs, where clean water and sanitation are vital for preventing waterborne diseases, SEM enables an understanding of how management influences the success of these initiatives. Similarly, in immunization programs, the study assesses how managerial training and collaborative networks impact coverage and logistical effectiveness, helping overcome barriers in rural and underserved areas. In NTD programs, innovative management approaches are essential for effectively addressing endemic diseases, given the systemic challenges in Uganda's healthcare landscape.

Thus, this research thus aims to contribute to healthcare management by providing targeted recommendations for interventions and training that address critical management deficiencies. By employing SEM, this study not only offers a robust analysis of the factors influencing WASH, immunization, and NTD programs in Uganda, but also contributes to a broader academic discourse on healthcare management methodologies applicable to low-resource settings globally. The SEM

approach allows for a comprehensive assessment of how various management factors are interrelated, offering valuable insights to policymakers and practitioners seeking to enhance healthcare service delivery in Uganda and other similar settings.

In conclusion, SEM provides an essential framework for understanding the complexities of healthcare program management, offering an integrative view of the factors influencing healthcare outcomes. This approach is instrumental in identifying actionable strategies to improve service delivery and patient outcomes, not only within Uganda, but also in comparable low-resource environments worldwide.

Justification of SEM

Structural Equation Modeling (SEM) was selected for this research because of its robust capability to handle complex relationships between latent constructs and observed variables (Cheng, 2001). SEM is particularly suitable for this research, as it allows for the simultaneous examination of multiple variables, providing a comprehensive understanding of the proposed relationships within the conceptual framework. The variables of interest namely management education, management training, innovation, networks, corruption, and healthcare service delivery, are latent constructs. SEM effectively handles these constructs by accounting for measurement errors and providing reliable estimates of their relationships. Before testing the hypothesized relationships, confirmatory factor analysis was conducted to assess the model fit. This step ensured that the measurement model accurately represented the data, thus validating the constructs used in this study. SEM elucidates the path coefficients, which clarify the strength and direction of the relationships between variables. This detailed analysis helps understand how

changes in one variable affect others within the framework, providing insights into the direct and indirect effects of management practices on healthcare service delivery.

Comparison with Alternative Methodologies

While capable of examining relationships between variables, other methods such as multiple regression analysis have limitations compared to SEM. It focuses solely on observed variables and does not effectively handle latent constructs, potentially introducing bias through measurement errors. However, SEM integrates factor and path analyses, making it more suitable for studies that involve complex interrelationships among latent constructs (Hair et al., 2010). SEM includes latent variables, which are crucial for accurately measuring constructs such as management training and perceived corruption. SEM allows for the concurrent analysis of multiple relationships, unlike multiple regression, which examines relationships individually. SEM accounts for measurement errors, thus enhancing the reliability and validity of the results. SEM provides comprehensive model fit indices (e.g., CFI and RMSEA) that assess how well the hypothesized model fits the data, which is not possible with multiple regressions.

The utilization of Structural Equation Modeling (SEM) in this research is justified by its suitability for analyzing intricate relationships among latent constructs and its robustness in addressing potential biases and confounding variables. SEM offers a more comprehensive and reliable examination of how management factors impact healthcare service delivery in Uganda than alternative methodologies, such as multiple regression analysis. This methodological choice ensured that the study's findings were precise, valid, and offered insightful perspectives on the complex dynamics of health care management. SEM excels over multiple regression analysis in

handling latent variables, conducting simultaneous analyses, accounting for measurement errors, and providing comprehensive model fit indices, making it the preferred method for this study.

Significance of the Research

This research is especially significant in the field of health program management, contributing substantially to the existing literature by developing a comprehensive framework that explores how management training and education influence health program service delivery. This study enriches the current research by focusing on innovation, training, and education, highlighting these factors as crucial in enhancing health service delivery. Additionally, it contributes to the understanding of the moderating role of corruption in the relationship between management training, education, and health-service delivery (Vian, 2020). Acknowledging corruption as a significant factor, this research illuminates how high corruption levels can diminish the impact of management training and education on health service delivery, thereby providing essential insights for policymakers and stakeholders in formulating anti-corruption strategies and strengthening governance in health programme management.

This research also underscores the importance of networking and collaboration in managing health programmes. Collaborative networks can significantly impact the relationships among managerial education, training, and health service delivery (Baine et al., 2018), highlighting the need for strong networks to improve health program delivery. The developed framework has practical policy implications for Uganda, offering valuable insights for government officials to make informed decisions regarding targeted investments in specific training and education types to enhance various health programs (Vian, 2020). Aligning training and education initiatives with

identified improvement mechanisms can effectively elevate health service delivery by health program managers, contributing to the country's overall development (Baine et al., 2018).

Potential Policy Implications

The findings of this research offer significant policy implications for enhancing healthcare management in Uganda. Insights into the roles of management education, training, innovation, networks, and corruption can guide targeted interventions within the WASH, immunization, and NTD programs. Aligning management training with identified needs can enhance health care managers' skills, ensure effective program implementation, and improve health outcomes. Policies promoting digital health solutions and innovative practices can increase the efficiency and resilience of health care systems. Strengthening collaboration among stakeholders through policy support can streamline resource-sharing and improve service delivery, particularly in rural areas. Strengthening governance and transparency mechanisms will ensure effective resource utilization and foster public trust. Implementing policies in these areas will support Uganda's healthcare system in achieving a more sustainable and effective service delivery.

Research Questions and Research Hypotheses

Research Questions

1. How does management education affect innovation in healthcare programs and, subsequently, the delivery of health services in Uganda?
2. What is the influence of managerial training on nurturing innovation in Uganda's healthcare programs?
3. To what extent does innovation mediate the relationship between the management level of education and delivery of health services in Uganda's health programs?

4. How does corruption moderate the relationship between management education and training and the delivery of health services in Uganda's health programs?

Research Hypotheses

H1: Managers' level of education has a positive effect on innovation in healthcare programs.

H2: Managerial training has a positive effect on innovation by healthcare programs.

H3: There is a positive relationship between innovation and the improved delivery of health services through health programs.

H4: The relationship between the management level of education and improved delivery of health services by health programs is moderated by collaborative networks.

H5: The relationship between the management level of education and improved delivery of health services by health programs is moderated by corruption.

Chapter Conclusion

This introductory chapter highlights the significance of this research and outlines the key aspects to be explored. Central to this research is an investigation of how management training and advanced education can potentially impact the quality delivery of health programs in Uganda. This research acknowledges the role of corruption and networks as critical moderators in the relationship between management education, training, and service delivery within healthcare programs (Ghura et al., 2019). It posits that corruption may diminish the positive effects of management training and education on health-service delivery. Additionally, this research explores how collaborative networks and innovation can enhance the impact of management training and education on the quality delivery of health services (Ghura et al., 2019).

Chapter 2 presents an extensive literature review, offering a comprehensive evaluation of the current knowledge related to the influence of management education, training, and innovation on the delivery of quality health services in health programs. This includes examining the moderating effects of corruption on these relationships (Liang et al., 2020). This literature review aims to meticulously examine and synthesize existing knowledge, thereby contributing to a deeper understanding of the interplay between various management factors, collaborative networks, innovation, and corruption in shaping health service delivery in Ugandan health programs.

By analyzing this confluence of factors, this study aims to offer valuable insights that will inform healthcare policies and practices. These insights are expected to lead to improved service delivery and health outcomes in Uganda (Doran et al., 2014). The findings also have broader implications for healthcare management, potentially offering lessons applicable in other contexts that face similar challenges. This chapter has set the foundation for a thorough exploration of the management factors in healthcare program delivery. By addressing the gaps in current research and focusing on the complex dynamics of management training, education, collaborative networks, corruption, and innovation, this study makes a significant contribution to the healthcare management field. The insights garnered from this research will be instrumental in shaping effective health program management strategies, ultimately enhancing healthcare delivery and accessibility in Uganda and potentially in other similar healthcare settings.

In conclusion, this research contributes substantially to the field of health program management by developing a comprehensive framework that explores the critical roles of management training, education, innovation, and collaborative networks while also addressing the

detrimental impact of corruption. The next chapter delves deeper into these themes, providing a thorough literature review to support this study's objectives and framework.

CHAPTER 2: LITERATURE

Chapter Introduction

Building on the overview, significance, and purpose outlined in the previous chapter, this literature review explores the multifaceted management factors that influence the delivery of health services in Uganda, with a particular focus on WASH, UNEPI, and NTD programs. This chapter examines how health managers' education and managerial training impact healthcare delivery, and how these effects are mediated by innovation and moderated by corruption, and collaborative networks. The ultimate goal was to provide a robust framework that integrates these management factors to improve healthcare service delivery outcomes in Uganda.

The chapter begins with a theoretical framework that anchors subsequent analysis. This framework incorporates three key perspectives: Upper Echelon Theory, Institutional Theory, & Network Theory. These theories were critically examined to offer a comprehensive understanding of the role of management factors in health programs. Following this theoretical foundation, this chapter presents an in-depth review of the healthcare industry in Uganda, which contextualizes the research and highlights the critical challenges faced by the health sector. This exploration further emphasizes the relevance of this research in addressing management challenges in Uganda's health programs. Key constructs such as management education, training, innovation, networks and corruption are explored in detail, laying the foundation for empirical theory testing in later chapters. These sections systematically examine how management factors influence health-service delivery and strengthen healthcare systems (Muteti, 2021). Special attention is given to WASH, Immunization, and NTD programs, as they are critical components of Uganda's health sector, where program managerial competency is linked to public health outcomes.

This review is organized into six main sections. Section 2.2 presents the theoretical frameworks guiding this research, including Upper Echelon Theory, Institutional Theory, and Network Theory. These frameworks provide insights into how managerial characteristics, organizational institutions, and networks influence healthcare service delivery, particularly within the context of Uganda's health system. Section 2.3 explores an industry description of the Ministry of Health programs. Section 2.4 reviews the relevant constructs, while Section 2.5 addresses hypothesis development. Finally, Section 2.6 discusses gaps in the literature. This chapter lays the theoretical and empirical foundation for hypothesis testing and quantitative analysis in subsequent chapters, ultimately contributing to a deeper understanding of how to improve healthcare service delivery in Uganda.

Healthcare Program Management

Healthcare program management encompasses the planning, organizing, and coordinating of health services to improve the health and well-being of communities, especially in low-resource settings. Effective program management ensures that healthcare services are accessible, affordable, and of good quality, which in turn reduces disease burden and enhances public health outcomes. Key metrics for assessing healthcare quality include patient satisfaction, adherence to treatment, morbidity, and mortality rates, all of which reflect the effectiveness of healthcare delivery (Khamis & Njau, 2014).

In low-resource settings, healthcare systems often face significant challenges, including limited infrastructure, workforce shortages, and inadequate funding. Strengthening healthcare delivery through effective management practices becomes essential for addressing these challenges. Furthermore, resilient health systems are better able to maintain service continuity and

respond to external shocks, such as pandemics, thereby preserving public health and well-being (Doubova et al., 2021; Mavodza et al., 2022). The COVID-19 pandemic has further highlighted the critical role of healthcare management in maintaining access to essential services, emphasizing the need for robust and adaptable healthcare systems. A good example is the continuity of essential health services initiative in Uganda that was instituted during the COVID 19 pandemic (Kabwama et al., 2022).

Healthcare Context in Uganda

Uganda's healthcare system operates on a decentralized model, with services delivered across national, regional, district, and community levels. Each level has distinct responsibilities, from specialized care in national referral hospitals to primary health services in community health centers (Albutt et al., 2018; Slivesteri, 2023). The Ministry of Health oversees the coordination and policy implementation, but resource constraints and high disease burdens present substantial challenges, especially in rural and underserved regions where public health services often struggle with staffing shortages, infrastructure gaps, and funding deficiencies (Green, 2018).

Three critical programs in Uganda's healthcare system are the WASH , UNEPI, and NTD control programs that exist at national and district levels complete with program managers. These programs are crucial for public health, especially for vulnerable groups such as children, pregnant women, and rural communities facing higher risks of infectious diseases. Despite progress by these programs in meeting their set targets, challenges persist due to inadequate resource allocation, inefficient management, and logistical barriers. These barriers limit the programs' ability to reach target populations effectively (Ndagire et al., 2021; Noory et al., 2020). Research shows that while decentralization has allowed local governments to tailor services to community needs, it has also

led to disparities in service delivery quality and access, largely due to variations in managerial capacity and resource distribution among districts (Birabwa et al., 2019; Hausken & Ncube, 2018). Effective healthcare program management is essential for addressing these disparities and achieving equitable healthcare access across Uganda.

Key Management Factors

This research explores five primary management factors namely management education, management training, collaborative networks, corruption, and innovation, and their impact on healthcare service delivery in Uganda. Each factor plays a vital role in shaping healthcare program outcomes, especially in WASH, UNEPI, and NTD programs:

Formal management education equips healthcare managers with theoretical knowledge in strategic planning, policy development, and resource management. Managers with a solid educational foundation are better prepared to make informed decisions, navigate complex systems, and implement effective healthcare programs. This is particularly critical in low-resource settings like Uganda, where effective allocation and utilization of limited resources can significantly impact program success (Hølge-Hazelton et al., 2021).

Continuous, targeted management training provides healthcare managers with practical skills in areas such as financial oversight, human resources, monitoring, and evaluation (M&E). In Uganda, training healthcare managers can help address operational challenges, improve resource allocation, and enhance program efficiency. For example, training in financial management can reduce vaccine wastage and improve coverage by ensuring resources are optimally utilized (Green, 2018).

Collaborative networks among stakeholders, including healthcare cadres, government entities, NGOs, healthcare providers, and communities, facilitate knowledge and resource sharing, improve coordination, and promote collective action in healthcare delivery. Effective networks can strengthen WASH, immunization, and NTD programs by aligning efforts, mobilizing resources, and enhancing service delivery (Chouinard et al., 2021; Ghia & Rambhad, 2021).

Corruption poses significant barriers to effective healthcare program management. In Uganda, corruption can manifest as embezzlement of funds, mismanagement of supplies, and bribery, all of which undermine public trust, reduce resource availability, and disrupt service delivery (Kayizzi-Mugerwa, 2020). Addressing corruption through accountability measures and governance reforms is crucial for improving healthcare outcomes and ensuring equitable access to services (Gumisiriza & Mukobi, 2019; Kayizzi-Mugerwa, 2020).

Innovation in healthcare management involves the adoption of new technologies, methodologies, and management strategies to improve service delivery efficiency. In low-resource settings, innovations such as digital health tools, mobile platforms, and AI for data analysis can address systemic inefficiencies and enhance monitoring and evaluation processes. However, successful innovation requires skilled management capable of adapting and integrating these tools effectively (Petersson et al., 2022; Vis et al., 2020).

These management factors are interdependent and collectively influence healthcare delivery outcomes. By exploring the relationships between these factors and healthcare outcomes through structural equation modeling, this research aims to provide insights into how Uganda's healthcare management practices can be improved, ultimately contributing to better public health outcomes.

Theoretical Frameworks

This research employs an integrative theoretical framework comprising Upper Echelon Theory (UET), Institutional Theory, and Network Theory to analyze the management factors namely education, training, innovation, networks, and corruption that shape healthcare service delivery in Uganda's WASH, UNEPI, and NTD programs. Each theory provides a unique perspective on the structural and operational dynamics within Uganda's healthcare context, contributing to a comprehensive understanding of how these factors affect program success in resource-limited settings.

Upper Echelon Theory (UET)

Upper Echelon Theory (UET), originally proposed by Hambrick and Mason (1984), avers that the attributes, experiences, and values of top executives significantly influence organizational outcomes. This theory posits that managers' cognitive bases and values are reflected in their strategic decisions, thereby shaping their organizational performance and effectiveness. UET emphasizes that demographic characteristics, such as education, age, tenure, and functional background, serve as proxies for these cognitive and value-based attributes, impacting decision-making styles and strategic approaches within an organization (Hambrick & Mason, 1984).

In the healthcare sector, particularly in resource-limited settings such as Uganda, UET offers a valuable framework for analyzing how management dynamics impact service delivery in critical areas such as WASH, UNEPI, and NTD programs. These programs require leaders who can address complex operational challenges, and adapt to limited resources and high stakeholder expectations. According to Carpenter et al., (2004), organizations are reflective of their top management teams (TMTs); thus, demographic diversity within TMTs influences organizational

innovation and adaptability which are essential qualities in healthcare management for addressing complex public health needs.

Education is a key demographic factor highlighted by UET as it equips managers with analytical skills and a strategic perspective that can significantly impact organizational effectiveness. In the Ugandan healthcare context, leaders with robust educational backgrounds in management and healthcare administration bring valuable expertise to decision making, enabling them to optimize resource allocation, enhance operational efficiencies, and strategically plan interventions (Mwangi, 2019). This is particularly relevant in managing programs for WASH, immunization, and NTDs, in which leaders must balance scarce resources with high community health needs. Chandler and Thomas (2015) further support the importance of education, finding that executive sponsorship in project management relies heavily on sponsors' educational and experiential backgrounds to ensure project success.

UET emphasizes that cognitive diversity within Top Management Teams (TMTs) enhances decision making and fosters innovative solutions, particularly in complex sectors like healthcare. Krisnadewi et al., (2023) argue that diverse perspectives within leadership teams lead to more comprehensive problem-solving approaches, a necessity for effective health service delivery in Uganda's varied healthcare landscape. Cognitive diversity is especially pertinent in WASH, UNEPI, and NTD programs, which demand flexible and adaptive strategies to address distinct public health challenges. By incorporating UET's focus on diversity, healthcare managers in Uganda can benefit from a leadership structure that promotes innovative approaches to health service delivery and is better suited to adapting to local community needs.

Ethical leadership is another dimension of UET with significant implications for organizational trust and transparency. In healthcare systems, ethical leadership is essential for ensuring accountability and integrity, particularly when managing public health programs and associated finances. Nyamuyonjo et al., (2023) highlight that ethical leadership within TMTs mitigates corruption and fosters public trust, critical components in healthcare environments where transparency is key to effective service delivery. For Uganda's healthcare sector, integrating UET's principles of ethical leadership can enhance organizational legitimacy and community trust, which are vital for successful WASH, immunization, and NTD interventions.

In summary, UET offers a robust theoretical framework for examining how healthcare leaders' characteristics influence organizational outcomes. By analyzing educational backgrounds, cognitive diversity, and ethical grounding, UET provides a structured approach to understand how executive attributes can impact health service delivery in Uganda, particularly within the crucial areas of WASH, immunization, and NTD programs. This theoretical approach underscores the importance of selecting and training healthcare leaders with the competencies and ethical foundations required to effectively navigate complex public health challenges.

Institutional Theory

Institutional Theory, as articulated by DiMaggio and Powell (1983), provides a foundational framework for analyzing how formal rules, norms, and cultural beliefs shape organizational behavior. This theory posits that organizations often adopt structures and practices more for legitimacy in the eyes of stakeholders than for operational efficiency, leading to a disconnect between formal policy and actual practice (Meyer & Rowan, 1977). In Uganda's healthcare sector, these theoretical tenets are especially relevant, where institutional constraints,

including weak governance, pervasive corruption, and regulatory gaps, continue to present significant barriers to the efficacy of healthcare programmes, especially in rural areas (Marakbi et al., 2019). These limitations impede essential public health programs such as WASH, UNEPI, and NTD programs, which are crucial for improving community health outcomes.

Institutional Theory is a key concept in institutional isomorphism, a process through which organizations conform to prevailing norms and standards in their field to gain legitimacy, even if these practices are not optimal for their specific context (DiMaggio & Powell, 1983). In Uganda, health institutions often emulate international standards and protocols, aiming to align themselves with globally recognized healthcare practices. However, the systemic limitations that these institutions face, such as resource constraints and infrastructural inadequacies, frequently prevent meaningful and consistent improvements in service delivery (Mocan, 2004). This misalignment highlights a critical issue within the healthcare sector: although policies and standards might reflect international best practices, their implementation often falls short, creating a gap between formal policies and actual healthcare outcomes.

Institutional Theory emphasizes how governance structures and regulatory environments significantly influence organizational behavior and outcomes. In Uganda, weak governance frameworks exacerbate inefficiencies within healthcare programs, often leading to the entrenchment of corrupt practices. Marakbi et al., (2019) noted that governance challenges and corruption are substantial barriers to effective healthcare delivery, particularly in rural areas in Uganda. These issues result in frequent drug shortages, understaffing, and inadequate medical infrastructure, all of which diminish the delivery of healthcare services and drive patients to seek

private alternatives despite the reintroduction of free public healthcare services (Twikirize & O'Brien, 2011).

This governance gap is further compounded by a lack of transparency and accountability, which Institutional Theory suggests can create an environment that is conducive to corruption. Park & Blenkinsopp (2011) found that in settings with high levels of corruption, transparency can moderate the relationship between corruption and citizen satisfaction with public services, whereas trust serves as a partial mediator in this relationship. In Uganda, the absence of these mediating factors contributes to low public trust in government-provided health care, driving a significant proportion of rural households to private health services despite financial barriers.

Institutional Theory sheds light on the divergence between formal policies and actual practices, a phenomenon often observed in Ugandan health care institutions. This discrepancy is influenced by institutional pressure to adopt widely accepted standards, even if the internal capacity to uphold these standards is insufficient. As Meyer and Rowan (1977) argue, organizations may adopt formal structures and practices to appear aligned with normative expectations rather than to enhance operational effectiveness. In Uganda, the adoption of international health guidelines frequently lacks necessary support systems, such as adequate funding and workforce training, to ensure genuine compliance. Consequently, efforts to improve healthcare delivery remain largely superficial, with policy frameworks and regulatory standards reflecting ideals, rather than achievable practices.

Glynn (2022) underscores the complexity of health systems and the role that institutional constraints play in shaping organizational practices within these systems. Glynn advocates for a systems-thinking approach to address the systemic roots of corruption in healthcare, arguing that

without a holistic understanding of the health system's internal dynamics, anti-corruption efforts may inadvertently produce unintended consequences, such as resource wastage or entrenched corrupt practices. A systems-thinking approach involves mapping out the variables and causal links within healthcare institutions to identify both reinforcing loops that exacerbate corruption and stabilizing loops that support positive organizational behavior.

In Uganda, public healthcare workers in rural areas often adapt to staffing shortages and resource scarcity by altering workflows, a practice that can inadvertently normalize corrupt behaviors over time. Such adaptations demonstrate how corruption can become institutionalized within healthcare systems, further entrenching inefficiencies and impacting healthcare delivery (Glynn, 2022). A systems thinking approach, as suggested by Institutional Theory, can therefore guide policy interventions that aim to address the root causes of corruption, rather than focusing solely on symptoms.

Institutional Theory provides a valuable framework for understanding the broader governance dynamics of healthcare delivery in Uganda. By highlighting the tension between legitimacy and operational efficiency, this theory emphasizes the need for comprehensive reforms that address both policy gaps and the structural roots of corruption. Marakbi et al., (2019) argued that effective healthcare reforms should prioritize governance structures that enhance transparency, accountability, and institutional trust. Addressing these elements can bridge the gap between formal policies and actual practice, ensuring that healthcare institutions can meet the needs of Ugandan communities more effectively.

In summary, Institutional Theory serves as a critical lens through which to examine healthcare governance in Uganda, emphasizing the importance of aligning organizational practices

with the realities of resource-constrained environments. By understanding the impact of legitimacy-driven practices, governance challenges, and the pervasive role of corruption, policymakers can work towards establishing sustainable healthcare reforms that promote transparency, integrity, and improved health outcomes.

Network Theory

Network Theory underscores the centrality of relationships and collaborations among organizations and stakeholders, especially in managing complex healthcare challenges (Burt, 1992; Granovetter, 1973). In the Ugandan context, where health-service delivery faces resource limitations and structural inefficiencies, collaborative networks are instrumental in enhancing the reach and efficacy of public health interventions. Partnerships among local governments, healthcare providers, non-governmental organizations (NGOs), and community stakeholders enable resource sharing, knowledge exchange, and coordinated responses. These collaborations are particularly essential for programs targeting WASH, UNEPI, and NTDs (Politzer et al., 2001; Provan & Kenis, 2008).

This research investigates the function of these networks within Uganda's healthcare sector, examining their role in bridging resource disparities, extending service reach, and fostering resilience. Network Theory, by illuminating the dynamics and benefits of interorganizational collaboration, highlights the importance of integrated approaches that promote community engagement, capacity building, and equitable healthcare access (Luxon et al., 2022). In Uganda's healthcare environment, Network Theory emphasizes the critical role of collaborative networks in optimizing scarce resources and maximizing the healthcare impact.

Networked partnerships facilitate access to financial, technical, and human resources, enabling organizations to overcome resource constraints through shared responsibilities and capabilities. Provan and Kenis (2008) argued that collaborative networks in healthcare can improve service delivery through increased communication, resource alignment, and goal convergence among stakeholders. In Uganda, partnerships between local government agencies, international organizations, and NGOs create a synergistic framework for pooling resources, which is particularly beneficial for WASH, UNEPI and NTD programs, where high demand often surpasses available resources.

For example, local governments and NGOs collaborate in community-based WASH initiatives, leveraging local knowledge to tailor interventions to address specific needs. These partnerships also extend to immunization programs, where networks help overcome logistical barriers and ensure that vaccines reach underserved and rural areas. Through these interconnected efforts, collaborative networks bridge gaps in resource availability and enhance the sustainability of health interventions, ultimately leading to improved health outcomes (Politzer et al., 2001).

Network Theory posits that organizations embedded in robust networks can effectively expand their service reach and improve access to essential healthcare, particularly in underserved regions. by creating an integrated network of health care providers, community health workers, and NGOs. Luxon et al., (2022) highlight that collaborative networks support comprehensive healthcare outreach and education, which are vital for increasing vaccine uptake and reducing the burden of NTDs. For instance, the integration of governmental and non-governmental actors within immunization programs allows for a broader and more sustainable approach to vaccine distribution even in hard-to-reach rural communities.

Bréton et al., (2013), in a relevant case study from Quebec, Canada, illustrated the potential of network-based healthcare reforms to enhance collaboration within primary care systems. Government-initiated reforms aimed at establishing local health networks (LHNs) have significantly influenced inter-organizational partnerships and improved service delivery within well-defined geographic boundaries. This study underscores the potential of networked healthcare structures to optimize health service delivery through regional integration and highlights a comparable opportunity for Uganda's health sector to foster localized, community-integrated networks. Such networks could facilitate the alignment of healthcare programs, such as WASH and NTDs, allowing Uganda to maximize reach while strengthening local healthcare delivery capacities.

Network Theory emphasizes the importance of knowledge exchange and capacity building within collaborative networks. By fostering connections among healthcare organizations, networks serve as conduits for transferring expertise, sharing innovative practices, and developing the skills needed to effectively address public health challenges (Burt, 1992). In Uganda, healthcare networks support continuous learning and professional development among stakeholders, equipping healthcare workers with the knowledge and competencies required to manage the WASH, immunization, and NTD interventions. Collaborative training programs involving NGOs and local health departments enable health care providers to learn from best practices and stay updated on new treatment protocols, thereby enhancing service quality and consistency.

Network Theory highlights that resilient healthcare systems are those in which inter-organizational networks foster adaptive responses and community involvement, creating a

foundation for sustainable healthcare interventions. In Uganda, integrating community stakeholders into healthcare networks ensures that interventions are culturally and contextually relevant, thereby increasing the acceptance and sustainability of public health initiatives. Community involvement in healthcare delivery fosters a sense of ownership and accountability, which is crucial for the continuity of programs, such as WASH and immunization.

By embedding health programs within local communities, networked healthcare models can build resilience against disruptions and allow for rapid adaptation in response to shifting health needs. In NTD programs, for example, community-driven efforts enhance the efficacy of interventions by leveraging local knowledge and addressing specific environmental and social determinants of the disease. As Provan and Kenis (2008) suggested, networks that incorporate a broad range of stakeholders can balance community needs with systemic health objectives, leading to comprehensive health outcomes and enduring community benefits.

In summary, network theory provides a comprehensive framework for understanding the dynamics of healthcare delivery in Uganda, emphasizing the role of collaborative networks in enhancing resource sharing, expanding service reach, and fostering resilience. By illuminating the value of partnerships among healthcare providers, government agencies, NGOs, and community stakeholders, Network Theory underscores the importance of integrated healthcare models that can effectively address public health challenges in resource-constrained settings. Fostering collaboration through networked approaches can lead to more equitable access to care and improved health outcomes, especially in underserved regions with limited healthcare resources.

Integrative Framework

This research constructs an integrative framework that draws from UET, Institutional Theory, and Network Theory to explore how management education, training, innovation, networks, and corruption influence healthcare service delivery in Uganda's WASH, UNEPI, and NTD programs. By synthesizing these theoretical perspectives, this framework provides a comprehensive understanding of the multifaceted influences on healthcare management and their implications for program effectiveness. Specifically, it investigates the role of top management's educational background and values in shaping healthcare policies and practices (UET), the impact of regulatory and cultural environments on corruption, healthcare access and quality (Institutional Theory), and the critical function of collaborative networks in resource mobilization and knowledge exchange (Network Theory).

The integration of UET, Institutional Theory, and Network Theory offers a nuanced view of the factors that shape healthcare delivery in Uganda. Upper Echelon Theory (Hambrick & Mason, 1984) emphasizes the influence of top management characteristics, suggesting that managers' educational qualifications, experiences, and values directly impact organizational decision-making and performance. In healthcare, these factors affect how managers allocate resources, prioritize interventions, and set ethical standards, particularly in areas where corruption can undermine service delivery. By examining these leadership traits, UET provides insights into how effective management can foster better healthcare outcomes, even within constrained environments.

Institutional Theory complements UET by contextualizing the external pressures that shape healthcare practices, such as corruption, regulatory requirements and societal norms.

Organizations, particularly in resource-limited settings, like Uganda, face institutional pressures that influence their structure and operations (DiMaggio & Powell, 1983). For instance, regulatory frameworks and cultural expectations shape how the public designs, delivers, and perceives healthcare services. Institutional Theory also considers the concept of mimetic isomorphism (Liao, 2021), which suggests that healthcare organizations may adopt successful practices from other regions or countries to gain legitimacy. However, as Oliver (1991) highlights, organizations do not passively adhere to institutional pressures but instead employ strategic responses such as adaptation or defiance, allowing them to navigate complex environments and better serve their populations.

Network Theory enhances this framework by focusing on the relational structures within healthcare and emphasizing that partnerships among various stakeholders, including local governments, healthcare providers, NGOs, and communities, are vital crucial for successful healthcare interventions (Burt, 1992; Granovetter, 1973). In Uganda, where healthcare resources are often scarce, collaborative networks allow the pooling of resources, sharing of expertise, and coordinated responses to healthcare challenges, particularly in underserved regions. Networks facilitate knowledge flow and capacity building, which are essential for sustainable improvements in the WASH, UNEPI, and NTD programs (Luxon et al., 2022).

To empirically test these theoretical linkages, this research employs Structural Equation Modeling (SEM), a sophisticated analytical technique that allows the examination of complex relationships among variables. SEM is particularly suited for assessing latent constructs such as managerial education, innovation, and ethical governance, which are challenging to measure directly. By modeling these latent variables, SEM facilitates a holistic analysis of how these

management factors collectively influence healthcare service delivery outcomes across Uganda's WASH, UNEPI, and NTD programs. Through this integrative framework, SEM enables the identification of pathways through which effective management practices can mitigate Uganda's healthcare challenges. By modeling both observed and latent variables, the SEM approach captures the cumulative effects of management education, corruption, and stakeholder collaboration on healthcare service delivery, providing empirical support for the theoretical assumptions derived from UET, Institutional Theory, and Network Theory.

The emphasis of network Theory on collaboration is also reinforced by studies on community engagement and service accessibility. Provan and Kenis (2008) argue that inter-organizational networks facilitate resource sharing and increase service reach, while Bréton et al., (2013) illustrate how local health networks in Quebec improve healthcare integration through collaborative practices. In Uganda, similar networked approaches can bridge resource disparities and enhance access to care in underserved areas, particularly for WASH and NTD programs where local partnerships are instrumental in community-based health initiatives.

This integrative framework underscores the importance of strong management structures, ethical leadership, and inter-organizational collaboration in addressing Uganda's healthcare delivery challenges. By synthesizing insights from UET, Institutional Theory, and Network Theory, this research offers actionable recommendations for policymakers and healthcare leaders, emphasizing that educational investment in management, regulatory reform, and networked partnerships are critical for sustainable healthcare improvements. This approach not only enhances healthcare outcomes in Uganda, but also serves as a model for other resource-limited settings facing similar challenges.

Case Studies

In examining the application of UET, Institutional Theory, and Network Theory to enhance healthcare management and service delivery in Uganda, relevant case studies illustrate the impact of these frameworks in addressing challenges, promoting innovation, and improving service delivery. The first case study, conducted by Lubega (2023), investigated the role of community-based health clubs in promoting health education for diabetes self-care management in an urban Ugandan setting. This study aligns with Upper Echelon Theory (UET) by demonstrating how the characteristics and decisions of healthcare managers and community leaders shape health outcomes. Lubega found that empowering patients through health education at the community level enhances self-care practices and improves health outcomes, showing that leaders' focus on community-oriented strategies can foster effective health interventions. This aligns with the UET's assertion that the values and expertise of healthcare managers influence the success of healthcare programs by shaping policies and practices that resonate with community needs (Carpenter et al. 2004; Hambrick & Mason 1984).

A case study by Wilunda et al., (2014) on barriers to institutional delivery services in the Moroto and Napak districts highlighted how cultural norms and structural constraints limit healthcare access. This study underscores the need for community-based approaches and institutional reforms to boost demand for institutional deliveries, which are vital for improving maternal and neonatal health outcomes. By engaging community stakeholders in healthcare planning, such reforms can enhance service accessibility and quality, aligning with Institutional Theory's focus on the role of regulatory and cultural expectations in shaping organizational practices (DiMaggio & Powell, 1983; Harris et al., 2017).

Further exploring the application of Institutional Theory, Bouchard et al., (2012) reveal that weak regulatory oversight and lack of accountability foster institutionalized corruption within Uganda's healthcare system, limiting access to essential services and eroding public trust. Addressing these issues necessitates strengthened institutional frameworks to enhance transparency and accountability in health care. Similarly, Naidoo et al., (2023) found that institutionalized corruption, prevalent in low-income settings such as Uganda, leads to resource misallocation, longer waiting times, and reduced patient satisfaction. These findings reinforce the Institutional Theory perspective that inadequate governance frameworks perpetuate corrupt practices and hinder effective healthcare delivery, illustrating the need for comprehensive regulatory reforms to mitigate such systemic inefficiencies.

The case study by Kakyoo and Xiao (2017), explored nurse managers' experiences with continuous quality improvement (CQI) initiatives in Uganda's resource-limited healthcare settings. This study underscores the role of Network Theory in fostering collaborative relationships among healthcare providers, managers, and community stakeholders to enhance service delivery. Kakyoo and Xiao (2017) found that nurse managers rely on collaborative networks to overcome resource constraints and achieve CQI goals, thereby highlighting the importance of teamwork and communication. This study aligns with Network Theory, which emphasizes that robust networks facilitate resource sharing, knowledge exchange, and coordinated responses to healthcare challenges, particularly in settings with limited infrastructure (Provan & Kenis, 2008; Luxon et al., 2022).

These case studies demonstrate the application of the Upper Echelon Theory (UET), Institutional Theory, and Network Theory within Uganda's healthcare management context.

Lubega (2023) underscored UET by highlighting how leadership values shape community-based health initiatives. Wilunda et al., (2014) and Bouchard et al. (2012) apply Institutional Theory to show the impact of regulatory and cultural structures on healthcare practices, while Kakyo and Xiao (2017) illustrate Network Theory's relevance by emphasizing collaboration to overcome resource challenges. Collectively, these studies underscore the importance of managerial characteristics, institutional reforms, and collaborative networks in addressing healthcare challenges in Uganda. They provide a comprehensive model for enhancing healthcare service delivery, particularly for programs focused on WASH, immunization, and neglected tropical diseases (NTDs). By leveraging these theoretical frameworks, Uganda's healthcare sector can pursue targeted reforms to improve service delivery, transparency, and system resilience.

Industry Description

Following a structural realignment in 2017, the Uganda Ministry of Health focused on specialized programs to enhance health service delivery, including UNEPI, WASH, and the NTDs programs (see figure 2). UNEPI, under the Directorate of Public Health, is pivotal for administering vaccines against preventable diseases. Despite its success, it faces challenges such as resource limitations, corruption scandals, geographic disparities in vaccine coverage, and vaccine hesitancy (Dobson, 2023; Magambo et al., 2020; Oleribe et al., 2019). Basic vaccination for all vaccines is only 54% according to the Uganda Demographic and Health Survey (UDHS, 2022) and shows a decreasing trend compared to the UDHS conducted in 2016.

The WASH program, which is pivotal in reducing waterborne diseases, is managed by both the Department of Environmental Health and the Department of Water within the Ministry of Water and Environment. It aims to enhance access to clean water, improve sanitation facilities,

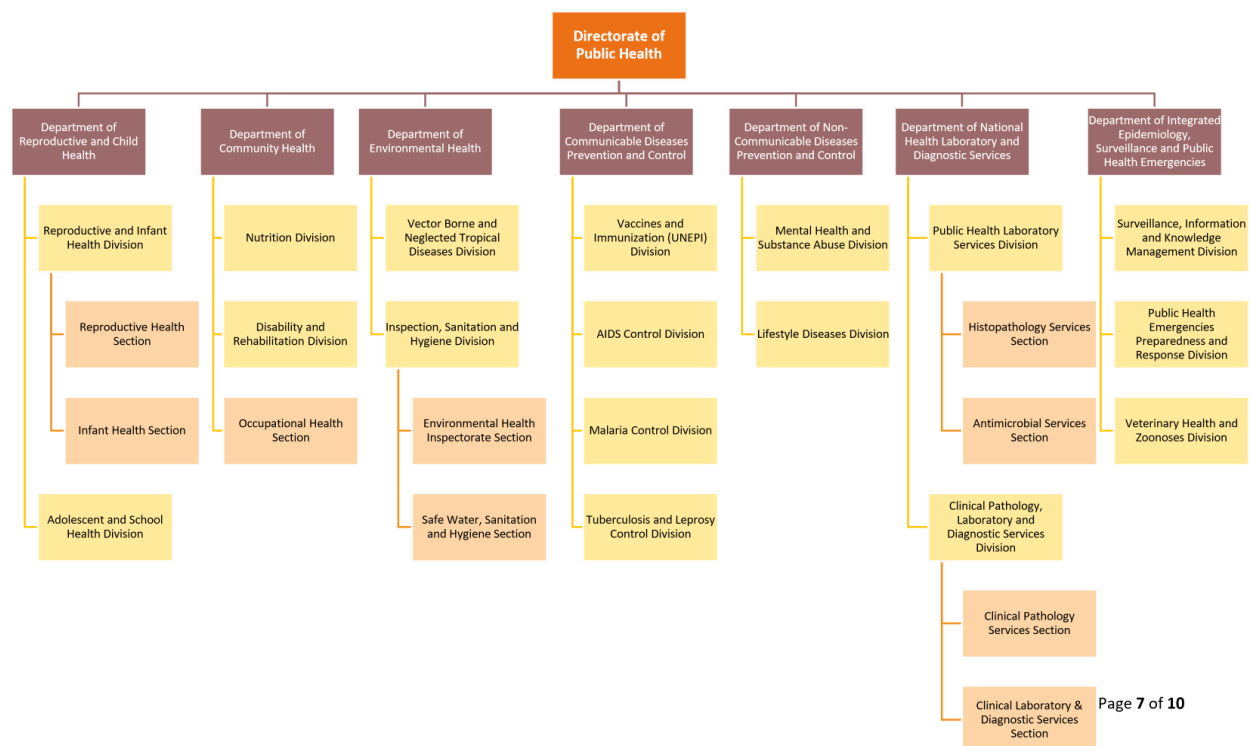
and promote hygienic practices. However, the program faces significant challenges, including the maintenance of infrastructure in remote areas and the complexities of coordination owing to its dual management structure (Valcourt et al., 2020). Furthermore, diarrheal diseases continue to pose a severe health threat to Uganda. Poor hygiene and inadequate sanitation are major contributors to high rates of child mortality. Despite ongoing efforts and extensive research, a substantial proportion of the population remains vulnerable: 33% of Ugandan children lack access to safe water, and 7% engage in open defecation, demonstrating critical gaps in sanitation (Khanpour et al., 2020). These issues highlight the urgent need for a more efficient and effective WASH program management to improve public health.

The Vector Borne and NTD Division of Uganda's Ministry of Health are tasked with addressing 20 diseases, including schistosomiasis, trachoma, and lymphatic filariasis, which are prevalent mainly in rural areas. This division faces several challenges including limited coverage with medicines, inadequate disease surveillance, and difficulties in integrating NTD management with broader public health initiatives (Masiira et al., 2019). While some progress has been made, as evidenced by diseases such as trachoma nearing elimination in 47 out of 51 districts, other NTDs, notably schistosomiasis (*Bilharzia*), have seen an increase in geographical spread from 82 districts in 2006 to 91 districts in 2024 (Exum et al., 2019; MoH, 2024). Furthermore, challenges persist in the coverage of mass drug administration programmes (Adriko et al., 2019). These complexities underline the need for enhanced strategies to improve the reach and effectiveness of interventions against NTDs in Uganda

The Ministry faces overall challenges such as resource constraints, the need for improved data management systems, and the integration of innovative healthcare technologies. Cultural and

social factors also play critical roles in health interventions (Tanumihardjo et al., 2017). The Health Ministry is responsible for policy formulation, strategic planning, and managing public hospitals, whereas the Ministry of Local Government oversees services at lower levels (Nabukeera, 2016). The delivery of health services in Uganda is hampered by skilled human resource shortages, management inadequacies, and insufficient infrastructure (Nabukeera, 2016; Wane & Martin, 2013). Despite the necessity for effective healthcare management, progress is impeded by a lack of skilled managers and resource limitations (Mosadeghrad, 2014).

This research examines the managerial factors affecting health service delivery in Uganda, focusing on UNEPI, WASH, and NTD programs. These programmes offer insights into the complexities of health management in Uganda, each with distinct challenges and potential improvements. The Ministry's commitment to UNEPI, WASH, and NTD management signifies its dedication to public health, highlighting the need to overcome managerial challenges and adopt innovative solutions for success and sustainability. The findings of this study are expected to offer valuable insights into enhancing health service delivery and management strategies in Uganda.

Figure 2*Uganda Ministry of Health Organogram*

Page 7 of 10

Note. Courtesy Of the Directorate of Public Health 2023

The Immunization Program/UNEPI

The Uganda National Expanded Program on Immunization (UNEPI) is a fundamental component of Uganda's public health strategy designed to improve vaccine coverage and reduce preventable diseases. UNEPI operates through a structured framework that includes policy formulation, strategic integration, resource allocation, and extensive vaccination campaigns with dedicated managers at both national and District levels. At the national level, UNEPI is responsible for developing immunization policies, introducing new vaccines, collaborating with global partners, making crucial decisions on resource distribution, setting guidelines for vaccine administration, and ensuring robust cold chain management (Mupere et al., 2020). Training

programs for healthcare workers and public vaccination education form essential components of UNEPI's strategy with continuous monitoring and evaluation to enhance vaccination coverage and address service gaps (Malande et al., 2019).

At the district level, UNEPI has adopted a microsystem quality improvement approach to strengthen routine immunization services. In collaboration with the World Health Organization and other partners, district-level management implements strategies such as the Reaching Every District (RED) initiative, prioritizing service quality and accessibility in underserved areas to achieve widespread vaccine coverage (Bazos et al., 2015). Despite these efforts, UNEPI faces substantial management challenges, particularly maintaining vaccine efficacy through the cold chain. Frequent power outages and insufficient refrigeration infrastructure affect the quality and effectiveness of vaccines (Ashok et al., 2017).

Furthermore, UNEPI's management is constrained by limited resources, corruption incidents, geographic disparities in vaccine distribution, and vaccine hesitancy, impacting its ability to reach adequate coverage. Basic vaccination coverage remains at only 54%, a decline from the 2016 figures (Uganda Demographic and Health Survey, 2022), indicating persistent systemic challenges. Financial and operational mismanagement, including the misuse of GAVI funds, distribution of counterfeit vaccines, and misallocations during the COVID-19 pandemic, have resulted in the suspension of funding and removal of key health ministers, underscoring the need for stringent governance and transparency reforms to rebuild public trust (Dobson, 2023; Magambo et al., 2020; Oleribe et al., 2019).

In rural Uganda, logistical barriers and limited healthcare access further impede the distribution and uptake of vaccines. Addressing these challenges requires innovative solutions

such as mobile vaccination clinics, expanded community health worker programs, and transportation subsidies to reach remote populations. Health education initiatives are critical to changing community attitudes and reducing vaccine hesitancy (Vonasek et al., 2016). With its heavy reliance on foreign funding, UNEPI's financial sustainability is at risk; exploring alternative financing options, such as health bonds or earmarked taxes, could provide a more stable fiscal foundation (Kamya et al., 2021). Integrating immunization services with other healthcare programs, such as combining HPV vaccines with cervical cancer screening, may create synergistic health benefits and more efficient resource utilization (Spencer et al., 2021).

Advancements in digital technology present UNEPI with new opportunities to optimize management and improve monitoring capabilities. Digital tools, including electronic health records and mobile health applications, enable real-time data tracking to identify coverage gaps and facilitate timely interventions (Kiberu et al., 2017). Improving the education and training of UNEPI's management team is vital to enhance vaccine storage, distribution, and data management strategies (Sinnei et al., 2023). The use of electronic vaccination registries and data analytics can streamline distribution processes and enable the real-time monitoring of vaccine uptake (Enciu et al., 2023; Pambudi et al., 2022).

Addressing corruption and fostering strong network dynamics are also essential for UNEPI's success. Implementing transparency reforms and empowering citizens to act on information can reduce corruption, enhance institutional trust, and improve health outcomes (Bauhr & Grimes, 2013; Lindstedt & Naurin, 2010). Effective management can mitigate the impact of adverse local norms and build trust in regions where corruption is entrenched (Nguyen

2020). In addition, routine assessments of vaccine handling, distribution, and storage practices are necessary to correct management deficiencies and to ensure high standards (Osadolor et al., 2023). This research investigates how management education, training, and innovation can enhance UNEPI's effectiveness of UNEPI by examining the moderating effects of corruption and network structures. By addressing these multifaceted challenges, this research aims to optimize immunization outcomes in Uganda, offering actionable insights for improving health service delivery and management strategies across UNEPI programs.

WASH Program

The WASH program in Uganda is a vital component of public health, aimed at enhancing access to clean water and promoting hygiene practices to combat waterborne diseases. Co-managed by the Department of Environmental Health and the Department of Water within the Ministry of Water and Environment, the program's effectiveness relies on a multitiered management approach spanning both national and district levels. At the national level, the focus is on strategic policy formulation and coordination of WASH-related activities, involving the development of innovative strategies and implementation of public health improvements. This level includes policymakers, public health experts, and program managers, whose roles ensure that policies and guidelines align with broader public health and sustainability goals (Johnston et al., 2015; Kikomeko et al., 2021).

At the district level, various personnel, including Village Health Teams (VHTs), environmental health officers, and community leaders, play pivotal roles. VHTs promote hygiene practices at the grassroots level, environmental health officers oversee compliance with sanitation standards, and community leaders drive mobilization and awareness efforts (Kikomeko et al.,

2021; Pandya et al., 2022; Scandurra et al., 2014). Despite this structured approach, the WASH program faces challenges, particularly in maintaining infrastructure in remote areas and managing the complexities of its dual management structure, which can sometimes lead to coordination problems (Valcourt et al., 2020). Additionally, a substantial portion of the population, including 33% of children, lacks access to safe water, while 7% of Ugandans practice open defecation, underscoring significant gaps in sanitation (Khanpour et al., 2020). These vulnerabilities highlight the urgent need for effective and efficient WASH programs.

Capacity building and targeted training for WASH personnel are critical to enhancing their skills in hygiene promotion, sanitation management, and water treatment. However, comprehensive WASH services are limited in healthcare facilities, especially in rural areas, which heightens infection risks and compromises healthcare quality (He et al., 2018; Kayiwa et al., 2020). Ensuring the sustainability of WASH initiatives in remote and economically disadvantaged regions is particularly challenging, requiring sustained community and local stakeholder involvement. Financial constraints and dependence on external funding further underscore the need for innovative financing mechanisms and increased domestic investments (Guo et al., 2017).

Cultural and societal factors, such as gender disparities and menstrual hygiene management, also significantly influence the effectiveness of WASH interventions (Masiira et al., 2019). Addressing these issues requires adaptable management strategies that emphasize stakeholder engagement, advanced data collection, monitoring, and strong community participation (Silvestri et al., 2018). This research aims to examine the management factors affecting the effectiveness of the WASH program in Uganda, with a focus on management education, training, and the integration of technology and innovation. It explores how managerial

competencies can help overcome challenges and assesses the impact of corruption and networking dynamics on management practices and program outcomes. By investigating these areas, the research seeks to provide insights into the complexities surrounding the WASH program, offering guidance for developing effective management strategies to enhance sustainable and equitable WASH services across Uganda.

This comprehensive approach is expected to contribute significantly to understanding the management challenges within the WASH program, providing a blueprint for optimizing its outcomes to improve public health. The findings will offer actionable strategies to enhance the program's capacity to deliver sustainable and equitable WASH services nationwide, enriching the global discourse on healthcare management and public health infrastructure.

Neglected Tropical Diseases program (NTD)

The Uganda Neglected Tropical Disease (NTD) program is mandated to control and eliminate 21 neglected tropical diseases across the country. This program operates through a structured, multilevel management framework involving national and district roles essential for the effective execution and oversight of NTD interventions. At the national level, the program focuses on developing and implementing policies and strategies specifically aimed at combating NTDs (Dambisya & Matinhure, 2012). At the district level, a diverse range of professionals ensure effective service delivery, including Community Drug Distributors (CDDs) and Village Health Teams (VHTs), who play critical roles in the mass distribution of medicines in high-prevalence areas. Additionally, vector control officers and environmental health staff are responsible for monitoring and evaluating disease control interventions, collaborating with community leaders

and volunteers to mobilize communities, and promoting behavioral changes related to NTD prevention (Em et al., 2018; Guo et al., 2017; Kayiwa et al., 2020).

Capacity building and training for these diverse cadres is inconsistent, which hinders their ability to reach remote areas where NTD prevalence is high. These challenges underscore the need for innovative management strategies and improved healthcare delivery systems to ensure effective medicine distribution (Longbottom et al., 2020; Nsabagasani et al., 2015; Zhang, Speare, & Kozary, 2007).

Although progress has been made, persistent challenges in mass drug administration coverage remain, with diseases such as schistosomiasis expanding from 82 districts in 2006 to 91 districts in 2024. This highlights the need for enhanced strategies to improve the reach and efficacy of NTD interventions across Uganda (Adriko et al. 2019; Exum et al., 2019; MoH 2024). Coordinated efforts within the healthcare system are essential for enhancing a program's sustainability and effectiveness. Collaborative networks and partnerships are crucial for resource allocation, program supervision, and establishment of sustainable interventions (Hanson et al., 2012; Kabatereine et al., 2010).

Community engagement and empowerment are vital to the success of a program. Actively involving communities in the design, implementation, and evaluation of NTD interventions fosters a sense of ownership and enhances the effectiveness of disease control efforts. Training programs that strengthen healthcare professionals' competencies in NTD management are fundamental to building community trust and improving outreach (Krentel et al., 2017). Furthermore, diversifying funding sources through public-private partnerships, philanthropic contributions, and innovative financing models is essential to address financial constraints and ensure long-term program

sustainability (Boisson et al., 2016). The integration of technologies, such as mobile health tools for disease surveillance and Geographic Information Systems (GIS) for resource allocation, has the potential to significantly improve program efficiency (Shakarishvili et al., 2010; Sundewall et al., 2011).

This research seeks to examine the relationship between management education and training and the delivery of NTD program services, focusing on the moderating roles of corruption and networking dynamics, with innovation serving as a mediating factor. By addressing these aspects, this research aimed to provide insights into improving the efficiency and effectiveness of health service delivery for NTDs in Uganda.

Management Challenges

The UNEPI, WASH and NTD programs are critical components of Uganda's public health infrastructure. However, each faces substantial management challenges that hinder their efficiency and effectiveness in health-service delivery, with significant implications for public health outcomes across the country. For UNEPI, the key obstacles include inadequate staffing, counterfeit vaccines, vaccine hesitancy, corruption scandals, and a decline in basic vaccine coverage (Malande et al., 2019). At the district level, these issues are exacerbated by logistical challenges, such as transportation deficiencies, ineffective communication, delayed fund disbursement, and high turnover rates, especially among personnel responsible for managing the cold chain system. Consequently, vaccine coverage remains suboptimal, posing a serious health risk to vulnerable populations, particularly to infants and children (Ashok et al., 2017; Malande et al., 2019).

In the WASH sector, challenges, such as inadequate sanitation coverage and limited access to safe water, especially in healthcare facilities, contribute to the spread of waterborne diseases.

Management issues in this sector stem from weak supervision, delegation of planning responsibilities to private operators, and limited management capacity within the local government structures. Additional issues such as mismanagement of water points, poor coordination, and project duplication further exacerbate these challenges. Effective management practices, improved regulatory frameworks, enhanced monitoring mechanisms, and stronger government oversight are crucial for addressing these issues (Da Silva et al., 2013).

Similarly, the NTD program faces its own set of challenges, including low Mass Drug Administration (MDA) coverage, inadequate funding, and difficulties integrating disease-control activities. Heavy reliance on donors, outdated tools, bureaucratic inefficiencies, demand for incentives from drug distributors, insufficient health messaging, staffing shortages, and social mobilization barriers further hinder program success. To address these challenges, a comprehensive approach is necessary to strengthen the health system, build human resource capacity, and improve the monitoring and evaluation processes (Adriko et al., 2019; Kolaczinski et al., 2007).

These management challenges underscore the importance of examining the role that the education and training of managers play in enhancing the delivery of health program delivery. Understanding how management practices influence health service delivery, particularly in relation to network dynamics, corruption, and innovation, is essential for developing strategies to improve the performance of health programs in Uganda. Strengthening the managerial capabilities of those overseeing these programs is critical to their long-term success and sustainability.

Opportunities for Collaboration

Integrating UNEPI, WASH, and NTD programs is vital for enhancing public health outcomes in Uganda. Leveraging inter-sectoral collaboration across these programs addresses core management challenges and optimizes service delivery. Integration across services and policies counters the fragmented nature of health care delivery. Oldeide et al., (2020) emphasized the value of vertical and horizontal collaboration throughout the planning, implementation, and evaluation stages. Through comprehensive integration, the UNEPI, WASH, and NTD programs can jointly address multiple health determinants, resulting in more holistic public health interventions.

Effective data management enables robust program monitoring and decision making. Hendriks et al., (2012) suggest integrating sector responsibilities, such as public health and spatial planning, to streamline data sharing and optimize resource allocation. Joint training initiatives across health sectors further ensure a cohesive, cross-sectoral approach to address public health challenges. Community engagement is essential for local ownership and programme relevance. Ndumbe-Eyoh and Moffatt (2013) advocate community-based participation to foster culturally aligned health programs and enhance the effectiveness of interventions. Moreover, innovative financing, including public-private partnerships, can provide sustainable funding and strengthen collaborative health efforts, as suggested by Pinto et al., (2015).

Technology can also facilitate efficient collaboration. Harris et al., (2012) highlight the role of health impact assessments (HIA) in embedding intersectoral cooperation within public policy. Additionally, understanding network dynamics, as recommended by Kriegner et al., (2020), is essential for fostering partnerships and maximizing the collective impact of UNEPI, WASH, and NTD programs. Therefore, intersectoral collaboration among the UNEPI, WASH, and NTD

programs is vital for sustainable health outcomes in Uganda. Through integrated services, data management, community engagement, innovative financing, and networked technology use, Uganda can address systemic management challenges and enhance the effectiveness of public health programs. This research contributes to the development of sustainable, collaborative health systems, reinforcing Uganda's capacity for comprehensive health service delivery.

Review of Relevant Constructs

This section provides a detailed review of the key constructs that are essential for understanding the complexities of healthcare program management in Uganda. This lays the foundation for exploring critical factors that influence the functionality and efficiency of healthcare systems. The constructs examined included the management level of education, management training, innovation, networks, and corruption, which are integral to understanding the intricate dynamics of healthcare management, particularly within Uganda's healthcare programs.

The construct of the management level of education delves into the academic backgrounds and qualifications of healthcare managers, emphasizing how educational attainment influences their decision-making abilities and leadership effectiveness. Management training, the second construct, investigates the role of ongoing professional development in enhancing managerial competencies in the health care sector. The third construct, innovation, examines the adoption of new technologies and practices in healthcare management and its impact on service delivery and patient outcomes. Networks, the fourth construct, consider the significance of collaborative relationships and partnerships among various stakeholders within the healthcare system. Finally,

corruption addresses the challenges posed by unethical practices and their adverse effects on healthcare service provision.

This section provides a comprehensive framework for understanding how these constructs interact with and shape the management of healthcare programs in Uganda. By examining these key areas, this research aims to uncover insights and strategies to enhance the effectiveness and efficiency of healthcare services, ultimately contributing to improved health outcomes and system sustainability.

Management Level of Education

The concept of "management level of education" within healthcare management refers to the formal educational attainment of healthcare managers and its impact on healthcare service delivery. In Uganda, where systemic challenges pervade the healthcare sector, this construct is essential for understanding how educational qualifications influence management effectiveness across key programs, including UNEPI, Water, WASH, and NTD programs.

In Uganda, many healthcare managers possess strong clinical expertise but lack formal management education, a gap that hinders strategic decision-making and complex problem-solving within the healthcare system (Glickman et al., 2007; Greenberg & Baron, 2003). Studies have shown that healthcare managers with advanced management education are better equipped to handle industry-specific challenges, employ strategic thinking, and ensure financial stability, all of which are critical to program effectiveness and sustainable healthcare delivery (Karadağ, 2017). Furthermore, research underscores a positive correlation between managerial education and healthcare outcomes, with higher educational attainment being linked to improved quality of care, operational efficiency, and fiscal management (Bloom et al., 2021; Liang et al., 2020).

The integration of digital learning platforms, such as Learning Management Systems (LMS), enhances management education by promoting interactive and accessible learning experiences (Zabolotniaia et al., 2020). LMS tools facilitate the acquisition of essential management competencies, enabling healthcare leaders to remain updated on healthcare advancements and adapt to emerging challenges. Continuous professional development (CPD) initiatives further support skill refinement in areas such as digital health, data analytics, and evidence-based management (EBMgt), all of which are vital in an evolving healthcare landscape (Galstian et al., 2018; Guo et al., 2019).

Despite the benefits of advanced management education, certain limitations persist. Some programs may prioritize cost reduction over quality of care or lack practical application in healthcare settings (Dorgan et al., 2010; Succi & Alexander, 1999). Consequently, healthcare management education must balance clinical experience with management skills to foster well-rounded leaders who are capable of implementing evidence-based strategies (Ayeleke et al., 2018). Collaborative initiatives between healthcare institutions and academic entities are critical to address the gaps in management education. Such partnerships enable the development of curricula relevant to the unique needs of healthcare organizations, bridging theory, and practice. Collaborative governance, characterized by shared goals, trust, and transparent communication, enhances the efficacy of educational programs in equipping healthcare managers to effectively navigate complex health systems (Ansell & Gash, 2007).

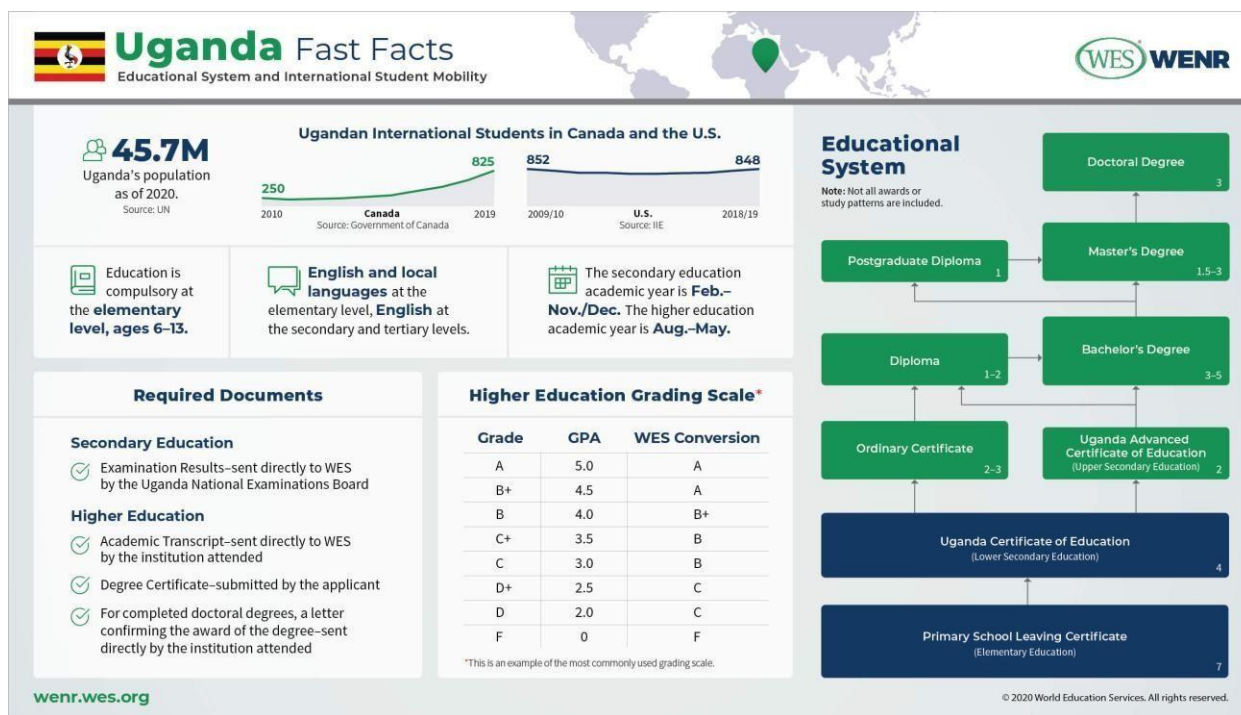
In Uganda, the Ministry of Health's guidelines for human resource recruitment in healthcare lack specific educational requirements for managerial roles, resulting in discretionary recruitment that may not emphasize management's educational qualifications (MOH, 2013).

Given the correlation between managerial education and healthcare delivery, establishing educational prerequisites for health managers can enhance the operational capacity of the healthcare system and improve both service delivery and public health outcomes.

In summary, the management level of education is a critical determinant of effective healthcare delivery, particularly in resource-limited settings, such as Uganda. Higher educational standards, ongoing professional development, and strategic collaboration with academic institutions contribute to building the managerial capacity necessary to improve health outcomes across the UNEPI, WASH, and NTD programs. Investing in the education of healthcare managers will not only address immediate management challenges, but also promote the long-term sustainability and efficiency of Uganda's healthcare system.

Figure 3

Levels of Education in Uganda



Note. Adapted From (Hasan & Macha, 2021)

Doctor of Philosophy (Ph.D.) Degree

A Doctor of Philosophy (Ph.D.) degree represents the highest academic achievement in a specific discipline, originating from the Latin "Doctor Philosophiae." This degree signifies a high level of scholarly expertise, developed through rigorous academic supervision and advanced research. In healthcare management, a Ph.D. is transformative, equipping professionals with deep insights into complex healthcare systems and the strategic leadership skills essential for effective management (Baptista et al., 2015; Muriisa & Bergen, 2015). Attaining a Ph.D. in Health Management requires advanced research competencies, critical thinking, and the capacity to make substantial contributions to healthcare policies and system improvements.

Ph.D. programs in health management prepare professionals beyond the master's level, enabling them to address diverse challenges in healthcare administration, lead impactful research, and develop evidence-based solutions that enhance healthcare practices and policies (Alnoor, 2020; Prasetyo, Budiman & Isa, 2021; Wally & Baum, 1994). The value of these programs lies in their focus on real-world applications, which address complex management challenges within healthcare systems. However, gaps in research and funding persist, particularly within African PhD programs, where comprehensive data on enrollment and competition are limited (Muriisa & Bergen, 2015).

The impact of a Ph.D. in health management extends beyond personal advancement, fostering leaders who can navigate regulatory challenges and propel healthcare organizations toward improved health outcomes (Bloom et al., 2021; Ofei et al., 2020). Despite this, some PhD programs may overemphasize theoretical knowledge at the expense of practical applications, occasionally focusing on cost reduction over quality care delivery (Dorgan et al., 2010; Slipicevic

& Masic, 2012; Succi & Alexander, 1999). Integrating clinical experience with management education is essential to produce well-rounded healthcare managers (Ayeleke et al., 2018). These programs are not only catalysts for professional growth but are also vital for developing effective healthcare policies and initiating groundbreaking research that enhances societal well-being (Galstian et al., 2018; Ng & Feldman, 2009).

Doctoral education contributes significantly to both academic and professional fields by equipping individuals with the specialized skills necessary for impactful contributions. Doctoral students contribute to advancing knowledge and improving healthcare systems, as evidenced by an increasing demand for doctorally prepared professionals in areas such as nursing and healthcare management (Pieper & Colwell, 2012). Doctoral degrees, including Ph.D. and Ed.D., cater to diverse academic and professional needs. While the Ph.D. emphasizes research and theory, Ed.D. focuses on practical applications in educational settings (Foster et al., 2023). The demand for doctoral qualifications is particularly high in academic fields, such as nursing and physician assistant programs, highlighting the role of these degrees in meeting workforce demands (Kayingo et al., 2022).

Furthermore, a Ph.D. enhances employment opportunities and career advancement by providing specialized knowledge that aligns with industrial needs (Germain, 2019). However, the doctoral journey poses challenges, including high attrition rates and issues related to student well-being, which underscore the need for supportive structures within PhD programs to enhance student experience and completion rates (Sverdlik et al., 2021).

In summary, doctoral degrees play a vital role in shaping scholars, researchers, and professionals across various disciplines, underscoring their importance in advancing both

academic and professional practice. In healthcare management, the skills and knowledge gained from a PhD are instrumental in addressing the management factors that affect healthcare service delivery. The expertise fostered by doctoral education directly contributes to the development of sustainable, efficient, and impactful healthcare systems, which is crucial for advancing Uganda's healthcare programs in WASH, immunization, and NTD interventions.

Master's Degree Level

A master's degree represents a significant advancement in educational attainment awarded upon completion of a rigorous course of study that demonstrates a high level of expertise in a specific field or professional practice. Building on a bachelor's degree, a master's equips individuals with specialized knowledge and skills essential to their chosen domain (Groenvynck et al., 2013). In healthcare management, a Master's degree is critical for navigating complex health systems and enhancing service delivery. Curricula at this level typically encompass interdisciplinary coursework in public health, business administration, and policy analysis, equipping graduates with a comprehensive understanding necessary for effective management and informed decision-making within healthcare settings (Clark, Casey, & Morris, 2015).

Numerous studies underscore the value of a master's degree in enhancing competencies in healthcare management. Drennan (2010) highlights that nursing students with master's-level education demonstrate improved critical thinking skills. Similarly, Zwanikken et al., (2016) found that master's programs in public health significantly bolster graduates' abilities in research and healthcare promotion. In Uganda, the importance of advanced degrees in health management is evident, as district health officers are required to hold master's degrees, underscoring the importance of formal education in healthcare leadership (Egger et al., 2005). Further research by

Ochonma et al., (2018) indicates that master's degree holders excel in human resource empowerment and communication, reflecting enhanced managerial capabilities compared with those with lower educational qualifications.

Pursuing a master's degree in health management empowers professionals with the essential knowledge and leadership skills needed to effectively manage healthcare systems. Graduates frequently report increased job satisfaction and career advancement as the degree prepares them for leadership roles and enables the implementation of data-driven policies in healthcare settings (Zwanikken et al., 2013). A key feature of Master's programs is their interdisciplinary approach, which enables graduates to address complex healthcare challenges by integrating knowledge from multiple fields. This approach fosters a holistic perspective by preparing students to tackle multifaceted healthcare issues and optimize service delivery. According to Smith and Adams (2019), such interdisciplinary education equips students with a nuanced understanding of healthcare delivery, thereby enhancing their ability to navigate and address the complexities of modern healthcare systems.

Furthermore, specialization options within master's programs further enhance graduates' contribution to the healthcare sector (Johnson, 2020). Specialized knowledge in areas such as healthcare management, public health, and clinical practice allows graduates to make targeted and impactful contributions to their respective fields, directly influencing program effectiveness in sectors such as the WASH, immunization, and NTD initiatives in Uganda. A master's degree also serves as a foundation for continuous professional and academic growth, often functioning as a stepping stone toward doctoral studies or other advanced qualifications. This level of education is

integral to engaging in research, securing executive roles, and contributing to healthcare system improvements and policy formulation (Alcalde-Rabanal et al., 2011; Antwi & Phillips, 2018).

By fostering expertise, leadership skills, and innovative thinking, a master's degree is pivotal for preparing professionals who can navigate the complexities of contemporary healthcare. Advanced education ultimately plays a crucial role in strengthening healthcare systems, fostering initiatives that ensure high-quality care, and shaping the future of healthcare delivery.

Bachelor's Degree

A Bachelor's degree is a foundational academic qualification conferred by universities or colleges that represents a significant milestone in an individual's educational journey. It typically requires three to four years of study, and provides students with a broad knowledge base in a specific field and essential skills for entry-level professional roles (Clark et al., 2015). In Uganda's public sector, a bachelor's degree is often required for management-level positions, reflecting its perceived value and importance in the workforce (Ministry of Public Service [MoPS], 2011). In healthcare management, the degree serves as an entry point, equipping graduates with competencies in leadership, knowledge management, ethical practices, and customer service that are essential for effective healthcare service delivery (Ochonma et al., 2018).

Despite its benefits, there is an ongoing debate about whether a bachelor's degree alone provides sufficient depth for creativity and effective communication of complex ideas, especially in comparison to higher qualifications (Arum & Roksa, 2011). Many healthcare managers in Uganda hold lower qualifications, such as diplomas, which may impart practical skills, but often lack the comprehensive knowledge and strategic perspective provided by a bachelor's degree. This gap in educational attainment can contribute to management challenges within Uganda's

healthcare sector, especially in the face of complex public health demands associated with WASH, UNEPI and NTD programs.

Scholars have identified several critical issues stemming from this shortfall, including uncoordinated cross-sectoral processes, restricted healthcare access, a lack of patient-centered consultations, and time limitations during interactions (Wang et al., 2018). Addressing these issues requires a robust educational foundation that combines practical healthcare skills with a strong grasp of management and policy. Konde-Lule et al., (2010) emphasized the need to enhance management capacity in Uganda's healthcare sector, highlighting the importance of investing in educational and training opportunities for healthcare managers. Similarly, McPake et al., (2015) underscored that effective management is crucial for improving healthcare delivery performance, especially in low-resource settings such as Uganda.

The value of a bachelor's degree in health management extends beyond immediate professional competency; it serves as a gateway to continuous learning and advanced educational pursuits, including postgraduate studies in health administration or policy. For example, a four-year bachelor's degree in health administration equips graduates with the specific competencies necessary for effectively managing healthcare organizations. This degree structure integrates knowledge from public health, business administration, and health policy, fostering a well-rounded perspective that prepares graduates to handle complex healthcare systems (Weldegebriel et al., 2016).

Additionally, integrating undergraduate public health education within a broader liberal education framework ensures that graduates develop an understanding of the diverse social determinants of health. This approach is essential for preparing future health leaders to navigate

the complexities of healthcare systems and drive systemic improvements (Kanji & Laronde, 2018; Kiviniemi & Mackenzie, 2017). The pursuit of a bachelor's degree has also been correlated with numerous long-term benefits, including increased income potential, enhanced well-being, and strengthened family cohesion (Merolla 2017; Walsemann et al., 2012). These outcomes illustrate the transformative potential of a bachelor's degree to contribute to both personal and professional growth.

In summary, a Bachelor's degree equips individuals with a solid foundation for addressing the dynamic challenges of healthcare management in Uganda, especially in areas critical to public health such as WASH, immunization, and NTD programs. By fostering a culture of continuous learning and promoting higher education, Uganda can strengthen its healthcare management, ultimately contributing to improved health outcomes and service delivery efficiency across the nation

Diploma-Level Education

The attainment of a diploma, which is a specialized academic recognition conferred by educational institutions is an important milestone reflecting completion of a focused program of study. Diplomas, typically requiring less time to complete than degree programs, are designed to impart specific skills and knowledge tailored to distinct job roles. In Uganda, diploma programs are often publicly funded, with a strategic focus on equipping civil servants in essential sectors like health and education with practical expertise (Jacob et al., 2009). These programs aim to strengthen the skill sets and competencies of civil servants, thereby enhancing their effectiveness within Uganda's healthcare system.

In Uganda's healthcare workforce, diploma-level education is common among professionals in key roles within UNEPI, WASH and NTD programs. Positions in nursing, midwifery, and health inspection frequently involve diploma-holding professionals who, despite their technical proficiency, may face challenges when promoted to managerial roles due to limited training in leadership and management (Ziegler et al., 1997). Addressing these gaps through targeted management training can significantly enhance the ability of diploma holders to manage and oversee healthcare programs effectively, thus improving program success.

However, healthcare managers with diplomas often encounter unique challenges, particularly in interactions with colleagues holding higher educational qualifications. According to Upper Echelon Theory, top managers with advanced degrees may perceive diploma holders as less qualified, potentially creating barriers to collaboration and networking (Hambrick & Mason, 1984). Such perceptions could hinder the effectiveness of healthcare delivery if they disrupt cooperative efforts across education levels. To counter this, fostering mutual respect and promoting understanding among professionals of diverse educational backgrounds is essential. Conversely, Network Theory (Borgatti & Halgin, 2011) emphasizes the role of professional networks in career advancement and knowledge exchange. Diploma-holding managers can benefit from networking initiatives that bridge educational gaps, allowing them to collaborate with and learn from colleagues with advanced training.

Despite these challenges, the contributions of diploma-holding managers to Uganda's healthcare system are invaluable. Diploma programs provide practical skills and specialized knowledge critical for frontline healthcare roles, ensuring the smooth operation of programs within UNEPI, WASH, and NTDs. Konde-Lule et al., (2010) underscore the importance of strong

management capacity within Uganda's healthcare sector, particularly in low-resource environments, where diploma-trained professionals often fulfill essential roles. Similarly, McPake et al., (2015) highlight the necessity of further management training to equip diploma holders with competencies that enhance social psychology and management skills, which are vital for efficient healthcare service delivery in Uganda's healthcare infrastructure.

Moreover, as leadership development in healthcare grows in recognition, management programs tailored to healthcare practitioners at the diploma level are increasingly needed. Current management training programs for healthcare professionals, such as physicians, often prioritize technical skill development over personal growth, yet a comprehensive curriculum that includes interpersonal skill development is critical (Frich et al., 2014; Sonnino, 2016). Diploma programs with curricula that balance technical, managerial, and interpersonal skills can effectively prepare healthcare practitioners for leadership roles, thereby supporting the operational demands and complex dynamics of Uganda's healthcare sector.

In summary, while diploma-level education equips healthcare professionals with essential technical skills, its integration with targeted management training and professional development is necessary to fully meet the management challenges within Uganda's healthcare programs. Enhancing the education and networking opportunities for diploma holders will support more effective healthcare service delivery in the WASH, immunization, and NTD programs, ultimately strengthening Uganda's public health outcomes.

Comparative analysis of the Educational Pathways

The Comparative Analysis of Educational Pathways in Uganda's healthcare management field highlights the distinct yet complementary roles of different academic qualifications, from diploma to PhD, in strengthening health service delivery, specifically within the WASH, UNEPI and NTD programs. Each educational level provides tailored competencies that are essential to the sector, forming a layered workforce equipped to meet diverse management needs. Diploma programs offer foundational, practical skills and job-specific knowledge necessary for operational roles in healthcare. Typically lasting one–two years, these programs enable quick integration into the workforce, supporting essential functions in healthcare delivery (Jacob et al., 2009). In Uganda, diploma qualifications are particularly relevant for entry-level positions and are frequently funded to strengthen key sectors such as health and education.

Bachelors' degrees extend this foundation, typically over three to four years, by covering broader aspects of healthcare systems, including policy, law, and management. This level equips graduates with the analytical and decision-making skills necessary for managerial roles and contributes to strategic planning in healthcare settings (Egger et al., 2005). This degree prepares professionals to develop and implement more comprehensive health strategies, thereby enhancing service delivery.

Master's degrees deepen specialized knowledge in areas such as strategic management and healthcare finance. These programs, usually one to two years in duration, prepare individuals for policy and leadership roles, equipping them with advanced capabilities to address complex healthcare challenges and drive impactful health interventions in areas such as the UNEPI, WASH, and NTD initiatives (Frich et al., 2014).

PhD programs represent the highest level of education and focus on rigorous research that contributes to both theory and practice. Spanning three to six years, PhD studies enable high-level decision making, policy innovation, and academic leadership within healthcare (Sanchez-Ramirez et al., 2018). PhD graduates play a pivotal role in generating knowledge and setting strategic directions in healthcare management (Lipponen et al., 2013).

Each educational tier contributes uniquely to health care management. Diploma and bachelor's graduates support day-to-day operations, while master's and Ph.D. holders bring strategic and research-driven perspectives essential for leadership and policy influence (Xu et al., 2018). The focus on research has become more pronounced from bachelor's to PhD levels, reflecting the increasing demand for evidence-based management practices (Tamás et al., 2020).

In summary, educational diversity in Uganda's healthcare management landscape underscores the need for targeted strategies that effectively leverage each qualification level. Diplomas ensure operational competency, bachelor's degrees offer a broad management foundation, master's degrees provide advanced specialization, and PhDs drive innovation and high-level strategies. This integrated approach is vital for optimizing health service delivery across Uganda's WASH, immunization, and NTD programs, and enhancing system-wide effectiveness and sustainability.

Education in Healthcare Management

Education in healthcare management is essential for developing managers capable of addressing the complex challenges of healthcare delivery, especially in low-resource settings, such as Uganda. In Uganda, healthcare managers often come from varied educational backgrounds and hold qualifications such as bachelors', a master's in public health (MPH), a master's in business

administration (MBA), or a doctorate in health management. Each qualification serves a specific role within healthcare organizations, while master's programs such as the MPH and MBA integrate medical, economic, and managerial perspectives to prepare leaders for operational decision-making. Doctoral programs emphasize advanced research skills and critical reasoning that fosters leadership, policy development, and organizational resilience (Figueroa et al., 2019). This diversity in educational pathways ensures that healthcare managers are well equipped to address multifaceted healthcare management challenges, ultimately enhancing patient outcomes and improving service delivery (Stefl, 2008).

Formal management education in healthcare imparts crucial skills to strategic planning, finance, and policy, enabling managers to make informed, evidence-based decisions that enhance both organizational stability and operational efficiency. During the COVID-19 pandemic, healthcare managers with formal management training were notably better prepared to respond to crises. Hølge-Hazelton et al., (2021) demonstrated that managers trained in strategic decision-making exhibited greater adaptability and confidence, which facilitated effective crisis management and minimized healthcare service disruptions. This capacity for adaptive, structured decision making in crises underscores the value of formal management education in strengthening leaders' resilience and overall system preparedness.

In Uganda's healthcare programs, particularly WASH, UNEPI, and NTD programs, education plays an indispensable role in healthcare management. Managers with a well-rounded educational foundation are better positioned to implement data-driven strategies, optimize resource use, and drive initiatives that improve public health outcomes across diverse and often resource-constrained settings.

Management Training

Management training in healthcare is essential for enhancing service delivery, particularly in resource-limited settings like Uganda, where health systems face constraints in resources, infrastructure, and personnel (Fulton et al., 2011). Such training is transformative, equipping managers with critical skills for decision-making, resource allocation, and patient-centered care through competency-based skill development (Kirkpatrick & Kirkpatrick, 2006; Knowles, 1980). In Uganda's healthcare context, customized training is necessary to address role-specific needs, ensuring effective health outcomes even in constrained environments. Strategies like task-shifting and skill-mix adjustments enable managers to better utilize workforce resources, effectively addressing staffing shortages and optimizing service delivery (Fulton et al., 2011). Tailored programs that enhance financial acumen, strategic planning, and ethical decision-making are crucial, providing managers with tools to navigate Uganda's complex healthcare landscape (Kakemam et al., 2020; Liang et al., 2020). Incorporating patient-centered approaches into training further promotes a focus on quality and inclusivity, fostering an environment that prioritizes patient needs and satisfaction (Kuipers et al., 2019).

However, research highlights that training alone is insufficient for achieving quality healthcare delivery in low-resource settings. A holistic approach is required, one that integrates supportive supervision, mentorship, and evidence-based practices to maximize training outcomes (Wakida et al., 2018). Supportive supervision, for instance, enhances technical competencies while developing managers' adaptability to apply skills in real-world settings. Given the infrastructural and funding challenges in Uganda, this integrated approach to management training is essential to enhance healthcare resilience and efficiency (Armstrong-Hough et al., 2018).

To meet the diverse needs of healthcare managers, training methodologies must be adaptable. Each training modality has distinct benefits, particularly within the Ugandan healthcare context. E-learning, for example, offers a flexible and scalable solution, especially valuable in remote areas, equipping managers with digital skills vital for resource management. However, Uganda's limited digital infrastructure poses significant barriers to the full implementation of e-learning (Car et al., 2018). Simulation-based training is especially beneficial for crisis management, as it allows healthcare managers to practice handling high-stakes scenarios such as maternal care emergencies and pandemic responses in a risk-free environment (Mosher et al., 2022; Smith et al., 2021;). Regular in-service training also ensures that managers stay updated on evolving health standards, policies, and technologies, though financial constraints remain a limiting factor (Omar et al., 2009).

Team-based training further enhances interprofessional communication, streamlining care coordination and improving patient outcomes (Hughes et al., 2016; Mianda & Voce, 2018). Recognizing the specific needs of different managerial roles, specialized training programs increasingly focus on competencies that directly impact Uganda's healthcare system. Given Uganda's budget constraints, financial management training is vital, enhancing managers' resource allocation skills to make the most of limited funds (Gapenski, 2016; Rogers et al., 2018). Cross-cultural competency training is also crucial in a culturally diverse setting like Uganda, helping managers create inclusive environments that improve patient care and staff relationships (Jongen et al., 2018; Truong et al., 2014). Additionally, disaster management training is indispensable in Uganda, where healthcare managers must ensure continuity of care during natural disasters and public health crises (Gesser-Edelsburg et al., 2020; Subbarao et al., 2008).

Professional development programs (PDPs) in healthcare are essential for ongoing adaptation to Uganda's dynamic health care environment. These programs not only enhance managerial competencies but also encourage networking, enabling healthcare managers to share knowledge, best practices, and innovative solutions (Munari et al., 2014). Training that incorporates a global perspective while focusing on local realities is invaluable, as it helps managers adapt international standards and frameworks to the Ugandan context, thus reinforcing Uganda's healthcare resilience (Figuerola et al., 2019; Harrison et al., 2019).

Mentorship and coaching are also central to effective management training, offering healthcare managers long-term, personalized guidance. Mentorship provides sustained developmental relationships, while coaching focuses on specific goal-oriented skill enhancements, both of which are essential in Uganda's healthcare context, where ongoing learning and adaptability are crucial for managing emerging health challenges (Eack et al., 2009; Hartenian, 2003;).

In summary, management training in Uganda's healthcare sector demands a comprehensive approach that combines foundational knowledge with practical applications. Training methodologies from e-learning to simulation-based and team training collectively develop proficient, adaptable healthcare managers who can drive significant improvements in health outcomes. Emphasizing a global perspective tailored to local contexts, this training prepares healthcare managers to meet the evolving needs of Uganda's healthcare sector, strengthening resilience and service quality across the health system

Innovation

Innovation, particularly in healthcare management, is essential to the development and execution of new concepts, technologies, and methods. Kelly and Young (2017) defined innovation as encompassing invention, application, and dissemination, focusing on generating and implementing new concepts and products within an organization. Branscomb and Auerswald (2002) describe innovation as the successful commercialization of new knowledge or technology-centric inventions. Weintraub and McKee (2019) suggest that an effective innovation strategy hinges on leveraging existing knowledge and the capability to initiate, sustain, and scale innovation.

Birnbaum et al., (2005) underscore the significance of innovation in healthcare, noting the imperative for healthcare organizations to adjust and adopt novel technologies to maintain competitiveness and improve healthcare delivery. Dyer et al., (2012) highlight the significance of various talents, including association, questioning, observation, networking, and experimentation, in facilitating disruptive innovation. Vrolijk (2010) emphasized the importance of adopting creative methodologies to address the intricate and dynamic requirements of healthcare systems. Côté-Boileau et al., (2019) advocate for healthcare organizations to embrace innovation and cultivate a culture that values creativity and experimentation.

Greenhalgh et al., (2004) conducted a systematic evaluation focusing on the dissemination of innovations within service organizations, providing valuable insights into the complexities of adopting and implementing innovation. Additionally, Tucmeanu et al., (2022) provide an in-depth analysis of the disruptive effects of the COVID-19 pandemic on digital orientation and pandemic response, exploring the role of digital orientation and the implementation of innovative practices

in healthcare institutions. Andersen and Grabowski (2020) recognized the obstacles and enablers that impact the implementation process of a research-derived innovation designed to promote familial participation in the self-management of type 2 diabetes.

Larisch et al., (2016) investigated the healthcare innovation system in the Stockholm region, thoroughly examining the essential structural and functional elements of this system and provided significant knowledge on how these elements effectively facilitate the linkages between management practices and the delivery of health services. Scholars such as Damanpour & Aravind (2012) and Tidd and Bessant (2014) have emphasized the centrality of innovation as a key catalyst for organizational performance and competitive advantage. The fundamental focus of this theme pertains to the conceptualization and execution of innovative concepts, procedures, commodities, or services that provide inherent worth to enterprises and their interested parties. The process of diffusion of innovation across organizational ecosystems is affected by a range of elements, including the organizational environment, leadership styles, and top management support (Atuahene-Gima, 2005; Yuan et al., 2016).

Walker, Damanpour & Devece (2011) note that organizations invest in innovation to enhance service delivery to their clientele and communities. The prevailing consensus is that innovation in healthcare can significantly improve the efficiency, effectiveness, quality, and affordability of healthcare services (Kimble & Massoud, 2017). Nevertheless, despite the continuous evolution of healthcare, the adoption of innovation can be sluggish because of individual and organizational resistance to change. The term "diffusion of innovation" refers to the communication pathways through which innovation spreads to recipient organizations (Cain & Mittman, 2002). In healthcare, innovation is crucial for striking a balance between cost

management and quality of care. Lehmann and Sanders (2002) argued that innovations in human resource management significantly enhance healthcare delivery. Likewise, research indicates that embracing healthcare innovation leads to a reduction in error rates, thus enabling healthcare organizations to mitigate high medical expenses, injuries, infections, and fatalities (Sobrio & Keller, 2007; Kimberley & Evanisko, 1981). Other studies have shown that innovations utilizing information technology, community health workers, or targeting clinically fragile patients result in significant cost savings (Smith et al., 2017).

Despite the potential benefits, inefficiencies and slow adoption of innovation persist in the healthcare industry (Prada 2008). However, it is essential to recognize that innovation, especially in healthcare, often faces challenges and complexities. Nevertheless, healthcare innovations have led to significant improvements in diagnostics, treatment, and service quality, resulting in increased life expectancy, enhanced access, reduced costs, and improved process efficiency (Guarcello & de Vargas, 2020). Moreover, innovation is a constant force in healthcare owing to the evolving burden of diseases, as demonstrated by the rapid response to the COVID-19 pandemic, accelerated vaccine development, and changes in patient care processes and technology.

Innovation in health management processes could potentially mediate the relationship between health managers' education levels and improvements in the delivery of health services. This research argues that while a higher level of education for health managers is positively associated with improved healthcare delivery, innovation plays a fundamental role in further strengthening this relationship. Education empowers individuals, enabling them to enhance their skills and qualities, which fosters proclivity towards better health outcomes (Raghupathi & Raghupathi, 2020). Likewise, the advancement of education can significantly influence innovation

as it equips creative individuals with the necessary tools to succeed (Biasi et al., 2021). This research argues that an educated and innovative healthcare manager is better equipped to navigate the multisectoral challenges of public health management and drive improvements in health outcomes.

Types of Innovation in Healthcare

Healthcare management is a crucial sector, in which innovation is essential for delivering effective care, achieving operational efficiency, and improving patient outcomes. Innovation within healthcare is a complex and multifaceted process that encompasses various approaches that significantly impact care delivery, organizational efficiency, and patient outcomes. A comprehensive understanding of the diverse stakeholders and influential factors is paramount for driving healthcare innovation. Singh and Lillrank (2015) emphasize the need to integrate business, political science, and healthcare perspectives to foster healthcare innovation. This multidisciplinary approach is crucial for holistic understanding and effective implementation of innovative healthcare practices. The role of middle managers in implementing healthcare innovation is critical. Birken et al., (2012) highlight their influence in translating strategic visions into operational realities within healthcare organizations. These managers act as essential links, facilitating the integration and adaptation of new methods and technologies at various organizational levels.

Thakur et al., (2012) argue that innovation in healthcare management can address inefficiencies, streamline operations, optimize resource allocation, and enhance communication. Wass and Vimarlund (2016) explored the potential of open innovation in healthcare, advocating a collaborative approach involving a wide range of stakeholders, including healthcare professionals,

researchers, patients, and technologists. Cluley et al., (2022) emphasize the importance of patient and public involvement in healthcare innovation development, ensuring that innovations align with patient needs and expectations, thereby increasing their acceptance and effectiveness.

Marone et al., (2020) outlined the collaborative dynamics required for technological advancements in healthcare, necessitating collaboration among healthcare professionals, researchers, legislators, and industry stakeholders. Management innovation, as explored by Walker et al., (2011) and Su et al., (2019), is essential for achieving organizational objectives in resource-limited environments. According to Omachonu and Einspruch (2010), process innovation is the key to improving the efficiency of healthcare service delivery and patient satisfaction. Berry (2019) and McColl-Kennedy et al., (2017) discussed product and service innovations, including the introduction of new healthcare products and services, or enhancements in the quality and delivery of existing services. Technological innovation, which involves the development and implementation of novel ideas and products, is crucial for advancing diagnostic and treatment methodologies. However, financial constraints, resistance to change, and risk aversion often hinder the timely integration of these advancements (Berwick 2003; Greenhalgh & Papoutsis 2019).

Product innovation in healthcare management has advanced medical technologies, pharmaceuticals, and devices. This innovation is integral to developing new therapies, diagnostic tools, and treatment options that significantly affect patient outcomes and all efficacy of healthcare services. Product innovation is crucial for the pharmaceutical industry. Research and development (R&D) drives the creation of new drugs and therapies, requiring a thorough understanding of the pharmaceutical landscape, including regulatory hurdles, patent laws, and market demands (Fu et al., 2022; Santos, 2022).

Medical device development is another vital aspect of product innovation in health care. This sector is significantly shaped by technological advancement and regulatory considerations. The development and commercialization of medical devices involve navigating a complex landscape of engineering innovation, clinical trials, and compliance with health regulations. Scholarly research offers comprehensive insights into the factors influencing medical-device innovation from conception to market entry (Bretaña & Flórez-Rendón, 2018).

The implications of product innovation also extend to health care services. The successful integration of innovative products and services into the healthcare system must align with patient needs and clinical effectiveness. Studies in this area have delved into the challenges of integrating these innovative solutions into the healthcare system, emphasizing the necessity of these innovations to enhance patient care without compromising clinical integrity (Burton et al., 2018; Miller et al., 2021). Practical perspectives on product innovation are provided through case studies on the development and implementation of novel diagnostic tools, highlighting the lifecycle of a healthcare product from initial idea generation to application in real-world clinical settings (Singh et al., 2022; Zippel & Bohnet-Joschko, 2017).

Understanding regulatory frameworks and market dynamics is crucial for successful innovation in health care. Studies investigating the impact of regulations on the pharmaceutical and medical device sectors provide insights into the complexities and challenges faced by innovators in these fields (Contardi, 2019; Okada et al., 2015). The emergence of digital service innovations, such as connected hearing devices and audiologists, has led to increased attention being paid to developing digital solutions in healthcare, offering new avenues for enhancing patient care and improving healthcare delivery (Luengen et al., 2021).

Service innovation in health care management significantly enhances the quality and delivery of services. Skálén et al., (2014) provide insights into the structured and emergent aspects of the service innovation process, especially regarding value proposition. Their research highlights the importance of flexibility and adaptability in creating innovative healthcare service offerings. Oke (2007) explored the relationship between incremental innovations and innovation performance in service companies, suggesting that even small incremental changes in service delivery can profoundly impact the overall performance and effectiveness of healthcare services. McDermott and Prajogo (2012) address the challenges inherent in studying service innovations, particularly in the healthcare sector, emphasizing the need for multifaceted and nuanced approaches. Miles (2008) underscores the importance of prioritizing service innovation in service organizations, including those in the healthcare sector, highlighting its critical role in driving positive changes and improvements in healthcare service delivery and management practices.

Therefore, the healthcare industry presents numerous opportunities for diverse forms of innovation, each capable of significantly enhancing patient care, operational efficiency, and the overall outcomes. The health care sector is ripe for transformative change through the amalgamation of disruptive, open, and patient-focused innovations. This synergy promises significant improvements in healthcare delivery, making it crucial for healthcare organizations to continuously integrate and adapt innovative approaches to meet evolving healthcare challenges and seize emerging opportunities.

Innovation and Health Service Delivery

Innovation in health service provision is integral to healthcare management, focusing on enhancing healthcare delivery, organizational efficiency, patient care, and global health outcomes.

The literature offers a comprehensive look at innovation's complexities and implications in healthcare, detailing the challenges, opportunities, and impacts of innovative practices. Skálén et al., (2014) emphasize creating new value propositions through service innovation, focusing on developing or integrating practices and resources in novel ways. This highlights the multidimensional nature of service innovation in health care, stressing the importance of creating value through innovative practices and resources.

Scarffe et al., (2022) explored the tension between centralization and innovation in health systems. Their work provides insights into the challenges and opportunities of centralizing administrative and fiscal responsibilities and their impact on health service innovation. Chandra et al., (2021) examined the dimensions of health service provision, including improved access, service quality, and public health capacity. Their research offers valuable perspectives on the multifaceted nature of health service provision and the role of innovation in addressing health care challenges. Novillo-Ortiz et al., (2018) discuss innovation as a driver of productivity and efficiency in health service provision within the knowledge society context. This study highlights the transformative impact of innovation on the delivery and management of healthcare services.

Kumar and Kearney (2022) underscores innovation's role in healthcare, focusing on developing new ideas, products, services, processes, and technologies to generate patient value and enhance the healthcare system. This finding highlights the transformative impact of innovation on the provision of healthcare services. Additionally, Wandie and Muathe (2022) asserted the potential of innovative solutions such as total quality management to enhance health service delivery and patient satisfaction. Kumar (2020) discussed the importance of value chain flexibility

in green service production in healthcare, emphasizing the need to adapt to changing patient demands.

Aljarallah (2023) investigated AI's role of AI in the quality management of healthcare facilities, and found a positive correlation between AI implementation and improved quality management practices. Similarly, Sony et al., (2022) explored the impact of medical cyber-physical systems on healthcare services, highlighting the potential of these systems in optimizing patient outcomes and service delivery procedures. Alбораie et al., (2021) present findings from a national survey on telemedicine advancements in Egypt, showing telemedicine's potential in revolutionizing healthcare services, especially in long-distance consultations and post-treatment care.

Mulenga et al., (2018) studied management practices in Zambian hospitals and identified critical behaviors that impact service delivery, including networking, resource management, and leadership style. This suggests that innovative management strategies can foster an efficient service provision. This suggests that embracing innovation is pivotal for healthcare organizations to enhance the efficiency, effectiveness, and quality of service delivery systems, resulting in improved patient outcomes and satisfaction. This requires a strategic focus on integrating advanced technologies, flexible management practices, and innovative leadership approaches to address the evolving needs of the health care sector.

Innovation and Health Service Improvement

The literature provides compelling evidence for substantial improvements in healthcare delivery resulting from innovation-driven strategies. Birnbaum et al., (2005) discuss the challenges faced by established companies when encountering disruptions from emerging technologies. This

analysis underscores the crucial role of innovation in enabling organizations, particularly in healthcare, to adapt to dynamic circumstances and improve service delivery. Birnbaum et al. (2005) highlight the pivotal role of innovation in ensuring the continued relevance and success of healthcare organizations.

Avgar et al., (2011) analyze the broad impacts of patient-centred care innovations on clinical and employee outcomes in hospitals. Their findings demonstrated the efficacy of strategies focused on patient care in improving healthcare service provision and yielding positive organizational outcomes. This research provides evidence of the tangible benefits of patient-centric innovations in health care. Tucmeanu et al., (2022) delve into the implications of digital orientation and innovation adaptation for effective IT project management in healthcare facilities. Their research underscores the importance of innovation in addressing the unique challenges posed by the COVID-19 pandemic and enhancing healthcare service provision. Tucmeanu et al., (2020) highlight the transformative power of innovation in healthcare crisis contexts.

Andersson et al., (2023) explored strategies for fostering an environment conducive to innovation within healthcare organizations. The authors emphasized the vital role of management in creating and maintaining an innovative culture, leading to improvements in service delivery. Andersson et al.'s study provides valuable strategies for nurturing innovation in healthcare settings. Varela-Rodríguez et al., (2022) investigate the implementation of a value-based healthcare project in a hierarchical tertiary hospital. Their study offered insightful observations by deploying a value-based healthcare initiative and highlighting the effectiveness of such approaches in transforming healthcare delivery and improving patient outcomes. Varela-Rodríguez et al., showcase the potential of novel strategies to reshape the healthcare landscape.

These sources collectively affirm the profound impact of innovative methods on improving health care delivery. The importance of embracing innovation is emphasized across various dimensions, including technological advancement, middle management engagement, patient-centered care, digital orientation, innovative culture cultivation, value-based approaches, and artificial intelligence utilization. Leveraging these innovative approaches can enable healthcare institutions to transform their service provision, leading to improved patient outcomes and satisfaction.

Organizational Culture

Management styles and organizational culture profoundly influence innovation processes within healthcare organizations. This research explores how these factors shape and foster innovation in the healthcare sector. Different management styles significantly impact the innovation landscape in health care. Transformational leaders, characterized by vision and inspiration, are crucial in nurturing an environment that is conducive to creativity and innovation (Sarros et al., 2008). Rehman et al., (2019) further illustrate how leadership styles directly affect organizational learning and innovative culture. Prasad and Junni (2016) highlight the moderating role of environmental dynamism in this context, suggesting that adaptable leadership can enhance innovation.

Organizational culture, with its shared values and beliefs, plays a significant role in the adoption of innovative practices. Valencia et al., (2011) emphasize that culture profoundly influences innovation adoption, while Siswanti and Muafi (2022) discuss the alignment between organizational culture and innovation strategies, underscoring the necessity of this synergy. The interplay between management styles and organizational culture is crucial for shaping healthcare

innovation. Koranteng et al., (2022) and Arfandi (2023) examine how this synergy impacts organizational outcomes, suggesting that effective leadership can cultivate an innovation-friendly culture.

Agyenim-Boateng and Ghansah (2019) and Lee et al., (2023) explored how transformational leadership promotes an innovative culture in various sectors. Ahmed et al., (2023) delve into the relationship between leadership styles, employee governance, and open service innovation, highlighting the importance of leadership in fostering innovation. Ethical leadership is instrumental in promoting sustainable practices within healthcare organizations. Moss et al. (2022) demonstrate how ethical leadership styles enhance green organizational culture and foster innovative green behaviour. Baarle et al., (2022) discuss the complexities of fostering a just culture within healthcare organizations, emphasizing the need for balanced leadership and culture to navigate these challenges effectively. Management styles and organizational culture are integral to fostering innovation in health care. The synergy between these elements shapes the innovative capacity of healthcare organizations, making it crucial for leaders to cultivate a culture that supports and encourages innovation.

Networks

In Uganda's healthcare sector, networks among healthcare professionals, organizations, and stakeholders are critical for addressing systemic challenges in programs related to WASH, UNEPI and NTDs. These interconnected relationships facilitate the exchange of knowledge, innovation, and resources, which are crucial for enhancing healthcare delivery and improving patient outcomes in resource-limited settings. The literature emphasizes that effective communication and collaboration among healthcare workers can significantly impact the quality

of care provided to patients, especially in contexts where resources are scarce (Sabot et al., 2020; Wensing et al., 2011). Diversity within healthcare networks, encompassing professional advice networks, knowledge transfer networks, virtual and communication networks, and social support networks, provides critical avenues for information exchange that enhance service delivery and boost patient care. The presence of diverse professional backgrounds within these networks can also enhance the breadth of knowledge and expertise available, which is particularly beneficial in addressing complex health challenges (Wensing & Grol, 2019).

Moreover, the effectiveness of healthcare networks in Uganda can be further augmented by leveraging technology and digital platforms. The use of virtual communication networks has been identified as a means to facilitate real-time information sharing and collaboration among healthcare professionals, which can lead to more timely and effective responses to public health issues (Williams et al., 2021). Furthermore, the establishment of interorganizational networks can promote the dissemination of best practices and innovations across different healthcare settings, thereby improving overall healthcare quality (Mu et al., 2010; Wensing & Grol, 2019). The interconnectedness of these networks not only enhances the capacity for knowledge transfer but also fosters a culture of continuous learning and improvement within the healthcare system.

Healthcare networks serve diverse functions within the Ugandan healthcare system. For instance, professional networks play a significant role in NTD programs by guiding field-specific practices and treatment protocols, while knowledge transfer networks are integral to the WASH sector, where rapid sanitation and hygiene innovations are essential. Communication networks and virtual platform streamline immunization efforts, aiding in vaccine distribution and cold chain

management. These networks embody a structural backbone for knowledge dissemination, facilitating improvements in quality, accessibility, and efficiency across health programs.

Customized training is essential for healthcare networks to function effectively, particularly in low-resource settings, such as Uganda. Task-shifting and skill mix adjustments, supported by focused management training, are vital in optimizing workforce utility, enabling managers to effectively address healthcare workforce shortages (Fulton et al., 2011). Training that enhances financial acumen, strategic planning, and patient-centered approaches empowers healthcare managers to leverage networks profficiently, aligning with the strategic needs of WASH, UNEPI, and NTD programmes (Kakemam et al., 2020; Liang et al., 2020).

Collaborative networks unite distinct groups within healthcare, facilitating the transfer of knowledge that is crucial for effective healthcare service delivery (Khanum et al., 2016). Karam et al., (2018) highlight the centrality of collaboration in addressing health system challenges, stressing that well-coordinated knowledge networks are foundational to modern healthcare management. Advancements in information and Communication Technology (ICT) have further enhanced these collaborative networks, particularly following the COVID-19 pandemic, where platforms such as Zoom became indispensable for maintaining connectivity. For Uganda's healthcare programs, such networks are essential, particularly in remote areas where ICT-enabled collaborations can bridge gaps in access, training, and policy compliance.

However, challenges such as complex power dynamics and unequal resource access can hinder the optimal functioning of health care networks (Rodrigues et al., 2015). Despite these obstacles, effectively managed networks have shown remarkable potential for improving healthcare delivery, elevating patient satisfaction, and optimizing cost efficiency. A prime example

is the collaborative effort between Uganda's Ministry of Water and the Ministry of Health on WASH programs, demonstrating substantial public health benefits that can be achieved through strategic networking.

Cybersecurity has become an essential aspect in the increasingly digitized realm of healthcare networks. Liu and Park (2012) emphasize the necessity of robust cybersecurity measures to safeguard sensitive patient data, which is especially crucial as Uganda's healthcare sector adopts more ICT-based collaborations. These cybersecurity concerns underscore the importance of secure data management frameworks, as they protect both the integrity of health information systems and the confidentiality of patient information, thereby reinforcing the trust and efficacy of health networks.

The efficiency and effectiveness of healthcare networks are closely tied to the availability and clarity of the governing policies. Studies have shown that well-defined policies can significantly improve network performance. Montenegro et al. (2011) emphasized that policy guidelines are essential for ensuring effective network operation, while Fanelli et al. (2020) found that policies could optimize healthcare network functions, thereby positively impacting service delivery. However, policy implementation is often hindered by complexity and lack of flexibility in adapting to specific local contexts, which remains a challenge within Uganda's healthcare landscape.

Grimshaw et al., (2012) argued that adaptive, context-specific policy frameworks are essential to address the diverse needs of healthcare networks. Policies that align with organizational goals allow networks to better coordinate healthcare delivery and service management, highlighting the role of evidence-based policies in improving network functionality.

Collaborative networks are particularly proficient at addressing complex challenges involving diverse healthcare professionals and organizations. According to Ferlie et al., (2010), networks are uniquely positioned to facilitate knowledge exchange and interdisciplinary collaboration, which are essential for improving patient care and health outcomes in Uganda's healthcare programs. Research demonstrates that networks, even in non-hierarchical environments, foster teamwork and problem-solving, which is critical in Uganda's health sector, where collaboration across professions and sectors is essential for public health advancements. However, networks may be less effective in tasks that require direct hierarchical authorization, as noted by Plastrik and Taylor (2006). Nonetheless, for multifaceted issues, such as those encountered in healthcare, where coordination across numerous stakeholders is needed, networks have proven invaluable in driving innovation and enhancing service quality.

Networks can function as moderators, enhance relationships among healthcare stakeholders, and amplify the effectiveness of healthcare delivery. This moderating role is especially relevant in the context of SEM analysis, where networks are anticipated to positively influence the relationship between health care management factors and health outcomes. Karim et al., (2020) underscore the importance of collaborative networks in fostering efficiency, surpassing conventional delivery models. For instance, mobile health (mHealth) networks have shown promise in Uganda by facilitating clinical decision support and feedback loops and improving healthcare delivery in resource-constrained environments (Källander et al., 2013).

Collaborative networks, including partnerships across the public and private sectors, also play a role in enhancing leadership, management skills, and mentorship opportunities. These networks contribute to developing a sustainable healthcare workforce by promoting knowledge-

sharing and building social capital (Prado et al., 2020). However, public sector networks face unique challenges such as differing organizational priorities and limited resource-sharing structures (Grafton et al., 2011). Overcoming these challenges is essential for the network effectiveness of Uganda's public health programs.

Intersectoral collaboration within Uganda's healthcare network, involving the governmental, private, and non-profit sectors, is vital for improving health outcomes and system efficiency. As noted by Rafiee et al., (2020), successful intersectoral coordination necessitates a focus on the social determinants of health and robust government support. Such coordination facilitates integrated solutions that address complex healthcare needs, particularly for Uganda's WASH, UNEPI, and NTD programmes. Promoting inter-sectoral collaboration also enhances global patient safety and health outcomes. Studies such as those by Nyberger et al., (2018) and Reeves et al., (2016) demonstrate that coordinated efforts among stakeholders in different sectors can significantly advance health service delivery, emphasizing knowledge dissemination, resource allocation, and effective response to public health emergencies. This integrated approach is essential in Uganda, where healthcare challenges require innovative multi-stakeholder solutions.

Healthcare networks are instrumental in fostering collaboration, knowledge sharing, and innovation, all of which are essential for optimizing Uganda's WASH, UNEPI, and NTD programs. Effective network management, cybersecurity, policy alignment, and intersectoral collaboration are critical for fully leveraging network potential for healthcare improvement. By addressing these areas, Uganda can achieve more efficient, accessible, and impactful health-service delivery. This research employs structural equation Modelling to examine how these

network dynamics can enhance healthcare outcomes, providing insights into strategic improvements in the Ugandan healthcare system.

Corruption

Corruption, which originates from the Latin term *corruptio*, signifies moral degradation and encompasses unethical actions by individuals in authority for personal gain (Bahoo et al., 2020; Johnston, 1996). Luo (2002) described corruption as a deviation from official responsibilities, which impacts both individual and institutional integrity. In healthcare management, corruption erodes the effectiveness, quality, and sustainability of health systems (Mauro, 1995; Tanzi & Davoodi, 1997).

Globally, corruption significantly undermines economic growth, diverts healthcare investments, and erodes public trust in health systems (North, 1990; Williams & Horodnic, 2018).

In healthcare, corruption manifests through bribery, embezzlement, procurement fraud, and informal payments, which degrade service delivery and distort health financing. Corruption is particularly entrenched in low- and middle-income countries (LMICs), creating obstacles for healthcare managers and policymakers (Clarke, 2019; Olken & Pande, 2011). The COVID-19 pandemic has intensified these challenges as corruption in vaccine procurement and distribution has further weakened health systems and diminished public trust globally (Kohler & Bowra, 2020).

In Uganda, corruption is systemic, affecting all levels of healthcare delivery and hindering progress toward Sustainable Development Goals (SDGs), particularly those related to health (SDG 3) and institutional integrity (SDG 16). The root causes of corruption in Uganda's healthcare system include weak regulatory enforcement, inadequate administrative procedures, and limited accountability (Kasozi et al., 2021; Nabukeera, 2016). Corruption in Uganda often manifests as

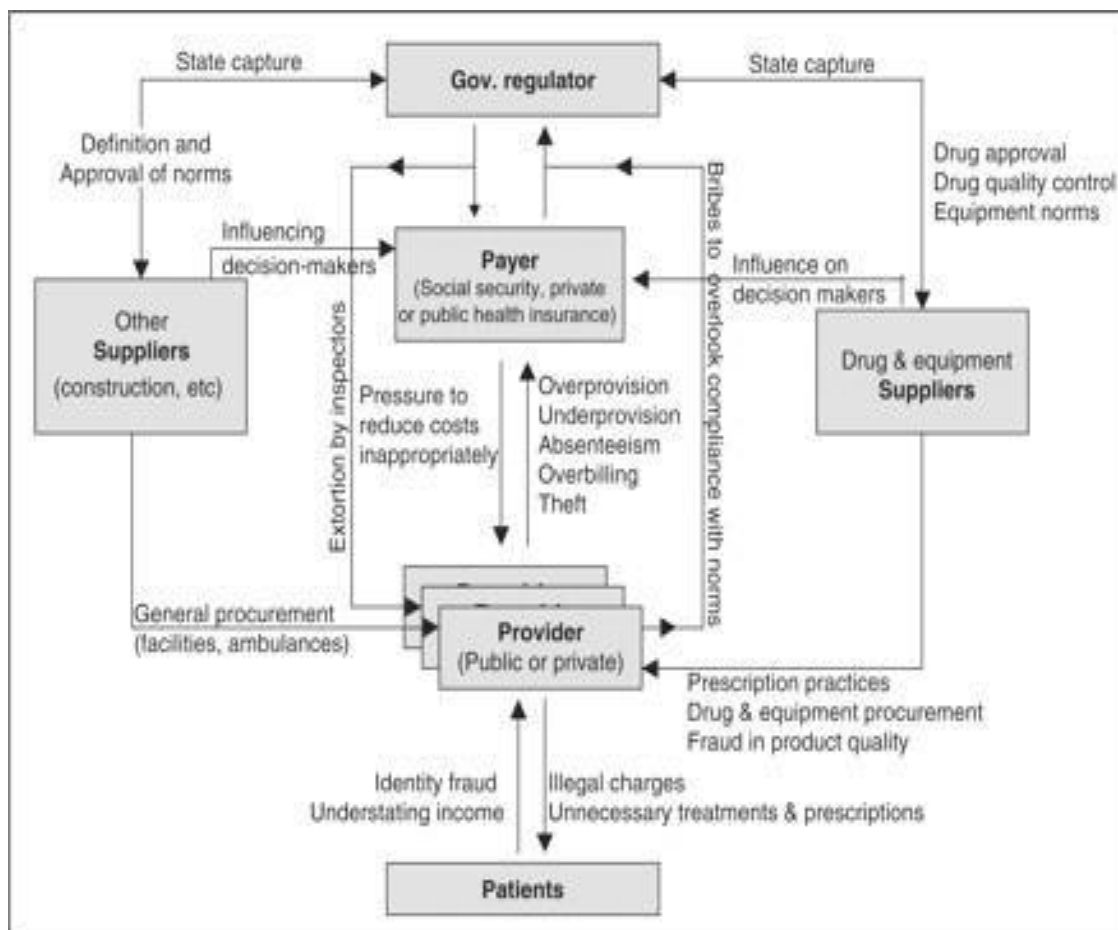
the misappropriation of resources meant for public health initiatives, such as vaccination programs and COVID-19 response funds, which directly impact service delivery and access (Human Rights Watch [HRW], 2013). Additionally, corruption contributes to high out-of-pocket healthcare costs, which disproportionately affects vulnerable populations (Turyamureba et al., 2023).

Institutional theory suggests that corruption can become embedded within organizational structures, transforming into informal norms that shape behaviors and expectations (Debski et al., 2018; Lessig, 2013). In Uganda, this institutionalized corruption creates environments in which unethical practices become routine, undermining governance and accountability. Navigating these challenges has become increasingly complex for healthcare managers, especially those lacking formal training. Research suggests that, while a higher level of education among healthcare managers can promote ethical standards, it requires supportive anti-corruption policies to counteract deeply ingrained corrupt practices (Alnahdi, 2020; Glaeser & Saks, 2006).

Corruption also disrupts collaborative networks, which are essential for effective healthcare management. These networks, involving government agencies, NGOs, and community health workers, are fundamental in resource-scarce settings such as Uganda. However, corruption discourages cooperation, impedes resource sharing, reduces network efficiency, and exacerbates healthcare inequalities (Jofre-Bonet et al., 2023). Public trust, the cornerstone of effective healthcare, is particularly vulnerable to corruption. When corruption erodes trust, individuals are less likely to seek care, comply with health interventions, or support public health initiatives, deepening health disparities (Habibov, 2016; Karić & Međedović, 2021).

Figure 4

Showing Key Actors in Health System Corruption



Note. Adapted from Vian, 2008; Savedoff & Hussmann, 2006

Measuring corruption within healthcare is inherently challenging owing to its covert nature and the subjective interpretations often associated with it. Tools such as the Corruption Perception Index (CPI) are frequently used, but are limited by their reliance on perceptions rather than objective metrics (Szymanski et al., 2021). Although the CPI offers insights into general corruption levels, it does not capture the specific nuances of corruption in healthcare. Muldoon et al., (2011) and Witvliet et al., (2013) emphasize that low CPI scores are associated with adverse health indicators, such as increased maternal and child mortality, underscoring the impact of corruption

on health outcomes. However, comprehensive methodologies that combine qualitative and quantitative approaches are needed to fully understand how corruption affects public trust and health outcomes in Uganda's healthcare system (Radević et al., 2022).

Furthermore, the relationship between perceived national corruption and health outcomes has been explored by Witvliet et al., who found that perceptions of corruption can adversely affect public health, suggesting that addressing corruption is essential for improving health outcomes (Witvliet et al., 2013). Their study indicates that perceptions of corruption can lead to decreased trust in healthcare systems, which in turn affects patient engagement and health-seeking behaviors. This highlights the importance of not only measuring corruption but also understanding its broader implications on public health and trust in healthcare institutions.

Addressing corruption in healthcare requires robust policy frameworks that emphasize transparency, accountability, and community engagement (Köhler & Dimancesco 2020). Effective policies include regular audits, stringent procurement oversight, and penalties for corruption in financial management. Strategies such as open contracting and community monitoring have been successful in reducing corruption and improving service delivery (Molina et al., 2016). In Uganda, anti-corruption policies must also address local factors, such as low remuneration and limited resources, which can drive corrupt behavior among healthcare staff. Community-based monitoring, supported by organizations such as the World Health Organization, can enhance transparency, promote accountability, and restore public trust (Köhler & Bowra, 2020).

The persistence of corruption highlights the importance of management education that integrates ethical leadership and transparency into healthcare management curricula. Healthcare managers trained in financial oversight, strategic planning, and ethical leadership are better

equipped to maintain integrity and enforce anti-corruption policies effectively. Hølge-Hazelton et al. (2021) demonstrate that healthcare managers with formal training respond more effectively to crises, including corruption-related challenges, thereby enhancing public trust and strengthening institutional integrity. By investing in management education, Uganda can develop a cadre of healthcare leaders capable of fostering a culture of accountability and guiding the health system towards sustainability and equitable care.

Hypotheses Development

The primary aim of this research is to establish and rigorously evaluate a framework that explains how specific management factors affect health service delivery within key health programs in Uganda. This research focuses on WASH, UNEPI and NTD programs, as these initiatives are critical to Uganda's public health infrastructure. Given Uganda's unique healthcare challenges and systemic constraints, this research seeks to address the gap in the literature concerning how managerial education and training directly contribute to the improved delivery of health services. Studies like that of Tormusa and Idom (2016) have explored healthcare delivery broadly, yet there remains an insufficient understanding of how these management factors drive healthcare service improvements in Uganda's context.

This research aimed to fill this gap by examining two primary areas. First, it assessed the potential moderating roles of networks and corruption in the relationship between managerial education, management training, and health service delivery. Networks and corruption are particularly salient factors within the Ugandan healthcare context, where organizational interdependencies and accountability challenges significantly influence program efficacy. By investigating these moderating variables, this study provides insights into how networks can

support or hinder management effectiveness, and how corruption potentially undermines the relationship between managerial capacity and service delivery quality.

Second, it explores the mediating role of innovation as a mechanism through which the management level of education and training translates into improved health service delivery. The premise is that innovative management practices facilitated by well-educated and trained managers can substantially improve health program performance. Innovation in healthcare management may enable more effective resource allocation, streamlined service delivery, and enhanced responsiveness to public health needs, thereby transforming the impact of the WASH, Immunization, and NTD programs.

The urgency of this research is underscored by persistent issues within Uganda's health programs. For instance, the continued high prevalence of Bilharzia under the NTD program, recurring instances of vaccine theft and corruption in the immunization program, and low sanitation coverage rates in WASH initiatives, as highlighted by Parker, Allen, & Hastings (2008), illustrate the pressing need to identify and address the managerial determinants that contribute to these challenges. Consequently, this study proposes the following hypotheses to examine these dynamics in the Ugandan health sector:

H1: Managers' level of education has a positive effect on innovation in healthcare programs.

H2: Managerial training has a positive effect on innovation by healthcare programs.

H3: There is a positive relationship between innovation and the improved delivery of health services through health programs.

H4: The relationship between the management level of education and improved delivery of health services by health programs is moderated by collaborative networks.

H5: The relationship between the management level of education and improved delivery of health services by health programs is moderated by corruption.

These hypotheses aim to establish a clear link between management factors and health service delivery, thereby providing a nuanced understanding of the factors contributing to the improved delivery of health programs in Uganda.

Interplay between the management factors

The relationship between management education, managerial training, networks, and corruption and their combined impact on health service delivery is a complex and multifaceted issue that requires comprehensive investigation. In Uganda, where healthcare systems face numerous challenges, understanding this interplay is essential for improving the effectiveness of health programs such as WASH, UNEPI and NTD programs.

The education level and training of managers are crucial in shaping healthcare delivery. Research has demonstrated that a manager's educational attainment is a significant driver of organizational progress and a key determinant of healthcare performance outcomes (Brouns et al., 2010). This underscores the importance of formal education in empowering healthcare managers with the competencies needed for effective decision making and resource management. Management training, when incorporated into medical and healthcare education, has proven invaluable in equipping professionals with the skills to address the complex and dynamic challenges of healthcare management (Brouns et al., 2010). Continuous professional development, especially in areas such as disaster preparedness and response, is equally vital as it ensures that managers are well prepared to address the emergent needs of healthcare, especially in resource-constrained environments (Huang et al., 2011).

Corruption within healthcare systems presents a significant barrier to the delivery of health services, undermining access and effectiveness. Studies indicate that corruption has far-reaching adverse effects on health systems, diverting resources away from essential services and eroding public trust (Garcia, 2019). Addressing corruption in healthcare is therefore imperative for strengthening service delivery, and tailored anti-corruption measures have been shown to be effective in improving healthcare integrity and transparency (Hutchinson et al., 2020). Evidence-based anti-corruption strategies, as highlighted by Gaitonde et al., (2016), provide a critical foundation for creating accountable and effective healthcare systems.

The role of formal and informal networks further complicates the dynamics of health service delivery, particularly in regions with systemic challenges such as Uganda. Networks play a critical role in knowledge exchange, resource sharing, and collaboration across healthcare organizations; however, they are also susceptible to the influence of corruption. Studies from other regions have underscored the disruptive impact of corruption on healthcare networks, demonstrating that corruption can hinder collaborative efforts, distort governance, and ultimately reduce healthcare delivery (Ahmed & Abbas, 2022). By facilitating collaboration among healthcare entities, networks have the potential to improve healthcare delivery; yet, they must be managed with accountability to prevent corruption from undermining these efforts.

Despite the recognized importance of these factors, a cohesive model exploring how management education, management training, innovation, networks, and corruption interact to influence health-service delivery has not been fully explored, especially within the Ugandan context. This study seeks to bridge this gap by employing structural equation modeling (SEM) using AMOS, allowing for a robust examination of these relationships. By systematically assessing

these factors and their interactions, this research aims to provide a comprehensive framework for understanding and improving health program management in Uganda.

Management Level of Education and Innovation

The relationship between management education and innovation in healthcare management is critical for improving health service delivery, particularly in resource-limited settings like Uganda. Advanced education has consistently been shown to enhance innovative capacity among healthcare managers, providing them with the skills to implement effective strategies and to adapt to complex challenges. Birken et al., (2012) emphasize the importance of middle managers in facilitating healthcare innovation, where education plays a crucial role in equipping them to translate strategic plans into actionable practices and promote innovative solutions within their organizations.

Evidence from broader sectors reinforces the link between education and innovation. Studies by Johnson and Chuang (2010) and Biasi et al., (2021) demonstrate that higher education cultivates the skills necessary for innovation, a principle applicable to healthcare. Pan et al., (2020) further highlight that advanced education enhances innovation performance, with organizations employing highly educated professionals showing greater innovation capacity.

In Uganda's healthcare context, advanced education is critical to effectively harness innovative technologies and strategies. Kasika (2015) found that educational attainment improves managers' ability to leverage technology in health systems, which is essential for enhancing service delivery. Additionally, Thakur et al., (2012) and McColl-Kennedy et al., (2017) showed that healthcare innovations positively impact patient outcomes and operational efficiency. Thus, H1 posits that Managers' level of education has a positive effect on innovation in healthcare programs.

By equipping healthcare managers with the analytical, strategic, and technical skills essential for leading innovation, higher education supports improved health-service delivery. Continued empirical research is essential to deepen the understanding of this dynamic, supporting strategy that uses education as a catalyst for innovation in healthcare management.

Management Training and Innovation

The relationship between management training and innovation in healthcare programs is well documented, highlighting the role of structured training in enhancing innovation and improving patient outcomes. Training empowers healthcare managers to bridge information gaps, implement innovative practices, and support a culture of innovation within organizations (Birken et al., 2012). In particular, middle managers play a pivotal role in driving healthcare innovation, and targeted training strengthens their ability to effectively foster and sustain innovative programs.

Research further underscores the importance of digital and specialized management training in preparing healthcare professionals to create an increasingly digital landscape. Carter et al., (2018) found that digital medicine training programs enable healthcare providers to navigate emerging technologies, essential for modern healthcare delivery. Andersson et al., (2023) also emphasize that an innovative culture nurtured through training equips healthcare professionals with the skills needed to drive forward-thinking approaches within their organizations.

The positive impact of training on innovation is widely supported across various sectors. Dostie (2017) reported that firm-sponsored training significantly boosted innovation in German firms, whereas Na (2021) observed a similar effect in Malaysian SMEs. Børing (2017) and Sung and Kim (2021) further noted that training enhances innovative behavior in organizational

contexts, underscoring its relevance in healthcare settings. De Antonio (2020) demonstrated that training directly enhances innovation performance and supports organizational success.

In healthcare, structured innovation training has proven effective in strengthening innovative competencies. Abo et al., (2022) showed that training programs significantly enhance nurse managers' innovation skills, leading to improved healthcare delivery and patient outcomes. This body of research supports Hypothesis H2, which posits that Managerial training has a positive effect on innovation by healthcare programs. By equipping healthcare managers with the skills and knowledge needed for innovative practices, training fosters a proactive and adaptable culture within healthcare systems, which is essential for advancing service delivery.

Innovation and Improved Delivery of Health Services

The relationship between innovation and improved healthcare delivery has been a focal point in healthcare research, with consistent findings supporting a positive correlation between these factors. Thakur et al., (2012) emphasize that service innovations enable healthcare professionals to enhance operational efficiency, intelligence, and cost-effectiveness, essential elements of healthcare delivery. Sobrio and Keller (2007) added that incorporating innovative solutions minimizes errors and operational costs, aligning with earlier findings by Kimberley and Evanisko (1981) on the protective role of innovation in healthcare. Additionally, Thakur et al. (2012) underscore that innovation addresses sectoral inefficiencies, yielding transformative impacts on health-service delivery.

The role of innovation in improving healthcare program delivery has received significant scholarly attention. Varkey et al., (2006) and Omachonu and Einspruch (2010) illustrate that innovation supports effective resource management, mitigates staffing shortages, and meets rising

client demands. Figueroa et al., (2019) expand this understanding by highlighting the essential role of change management in integrating innovations within existing healthcare frameworks. Their findings underscore the need for skilled managers capable of coordinating new practices with established systems to optimize health outcomes.

This research identifies innovation as a mediating factor, whereby effective managerial training and innovative practices enhance health service delivery. MacKinnon (2012) highlighted the critical role of mediation in showing how management factors can leverage innovation to drive improvements in service delivery. Similarly, Al-Dhaafri et al., (2016) suggest that innovation fosters creativity within healthcare organizations and improves overall performance. Based on these insights, H3 posits that there is a positive relationship between innovation and the improved delivery of health services through health programs.

Moderation Effect of Network on the Management Level of Education

The intersection of network dynamics and management education is increasingly being recognized as critical for enhancing healthcare service delivery. Valero (2021) emphasizes that managers with higher educational attainment drive improved healthcare management practices, a view supported by Glickman et al., (2007), who linked advanced education in managers to better health outcomes. Ross and Mirowsky (1999) further argue that networks amplify the benefits of education by enhancing access to information and support, especially for those with higher cognitive and social skills developed through education.

In healthcare, networks are essential for coordinating services among providers, as Brown et al., (2016) and Sibbald et al., (2020) noted, fostering quality through shared leadership, common goals, and transparent communication. The World Health Organization (WHO, 2006b) similarly

emphasizes that effective workforce collaboration within networks underpins better healthcare delivery. Managers embedded in collaborative networks benefit significantly from the shared insights and expertise that these networks provide, enhancing the effectiveness of their educational qualifications in practice. Without such networks, managers may find it challenging to translate educational achievements into impactful healthcare delivery, potentially undermining service quality and outcome.

However, Cunningham et al., (2011) noted that the influence of networking on patient care improvements should not be overstated, noting that the strength of network connections matters. Nonaka (1994) and Szulanski (1996) underscored the role of strong network ties in effective knowledge transfer, a factor that the WHO (2021) links to better healthcare outcomes. This research proposes that collaborative networks potentially amplify the relationship between health managers' educational levels and improved delivery of health services by health programs. Conversely, weak networks may attenuate this link, thus limiting the positive impact of education on improved service delivery. Thus, we have H4 The relationship between the management level of education and improved delivery of health services by health programs is moderated by collaborative networks.

Moderation Effect of Corruption on Managers' Level of Education

Exploring the moderating role of corruption in the relationship between managers' educational levels and healthcare service delivery reveals a critical dynamic in healthcare management. While higher education among health care managers is associated with improved service delivery, pervasive corruption within the health care system may severely limit these positive impacts. Bouchard et al., (2012) illustrate how corruption can overshadow the benefits of

advanced education and training, undermining managers' efforts and reducing the effectiveness of healthcare services, particularly for vulnerable populations. This suggests that corruption can dilute the knowledge and skills gained through higher education regardless of the manager's competency level.

Bruckner (2019) provides compelling evidence linking corruption in healthcare systems to adverse health outcomes such as elevated child mortality rates, highlighting a direct correlation between corruption levels and reduced healthcare quality delivery. Luo (2002) and Teorell (2007) further emphasize that institutional environments can either encourage or curb corruption, with organizational cultures normalizing corrupt practices that weaken the integrity of healthcare organizations at all levels of decision-making. Thus, the presence of corruption functions as an inhibitor, reducing the capacity of well-educated managers to enact effective service delivery improvements.

Research by Akokuwebe & Adekanbi (2017) and Naher et al., (2020) reinforces the negative correlation between corruption and healthcare outcomes, where countries with high corruption levels suffer from lower healthcare quality and inefficiency (Gupta et al., 2001). This trend is especially pronounced in developing countries, where systemic vulnerability amplifies the effects of corruption (Nadpara & Samanta, 2015). These findings suggest that, for healthcare managers in corruption-prone environments, achieving service delivery improvements may be limited, as corruption poses substantial challenges to the operationalization of their education and training.

Thus, hypothesis H5 is formulated as follows: H5: Corruption moderates the relationship between the management level of education and the improved delivery of healthcare services. This

hypothesis posits that the positive effects of managerial education on healthcare service delivery are contingent upon the level of corruption; in highly corrupt settings, translating knowledge and skills into service delivery improvements becomes increasingly challenging.

This research highlights a significant gap in understanding the interplay between managerial education, and corruption in healthcare service delivery. While education equips healthcare managers with essential skills, corruption can impede these efforts, underscoring the importance of systemic reform to ensure that educational investments translate into measurable improvements in service delivery. The findings have critical implications for healthcare management in Uganda, where corruption and resource constraints challenge efforts to effectively leverage managerial education and training for enhanced healthcare delivery. Addressing these factors is essential for the sustainable improvement of health outcomes across the country's healthcare programs.

To empirically test the hypotheses, a quantitative survey methodology was implemented targeting healthcare program managers involved in Uganda's WASH, UNEPI and NTD programs. The data collected reflect the key theoretical constructs identified in the literature review, specifically focusing on the influence of managerial education, training, innovation, networks, and corruption on improved health service delivery. Structural equation Modelling (SEM) was chosen as the analytical tool given its capability to assess complex relationships and latent variables, making it particularly suited to the comprehensive nature of the research questions posed.

The theoretical and methodological alignment of this study draws on several key frameworks. The Upper Echelon Theory serves as a foundational lens, positing that the characteristics of top management, such as education and training, are instrumental in driving

innovation and enhancing service delivery in healthcare settings. Institutional Theory adds depth by examining how governance structures and corruption impact healthcare management practices and outcomes, highlighting the systemic barriers to effective service delivery. Network Theory underscores the role of collaborative networks in maximizing the benefits of managerial education and training, emphasizing the interconnectedness of entities within the healthcare system.

By integrating these theoretical insights with gaps identified in the literature, this research employs a robust methodological approach to explore the direct and indirect effects of management factors on healthcare service delivery in Uganda. The SEM framework enables this research to dissect the nuanced relationships between these factors, providing actionable insights relevant to healthcare management in Uganda and other similar contexts. This research ultimately aims to contribute to the body of knowledge on healthcare management by offering evidence-based recommendations to inform policies and practices aimed at enhancing healthcare delivery in Uganda (Kiberu et al., 2017).

Gaps and Contradictions in the Literature

The literature on healthcare management provides valuable insights into the effects of management education, training, innovation, networks, and corruption on healthcare delivery; however, significant gaps and contradictions remain that necessitate further research. Specifically, there is a limited understanding of how innovation might mitigate corruption, the role of management education in addressing unethical practices, and the influence of professional networks on transparency and accountability. These knowledge gaps restrict our understanding of how these factors collectively impact healthcare outcomes, especially in low-resource settings, such as Uganda.

Innovation is often highlighted as a driver of efficiency and quality in health care delivery. However, its potential to counteract corruption remains underexplored (Sommersguter-Reichmann et al., 2018). For example, research investigating how digital health technologies or data-driven management solutions might combat corruption could reveal ways to enhance transparency in health care. Thus, studies integrating innovation with anti-corruption initiatives could lead to transformative practices in healthcare management, promoting more ethical and effective healthcare systems.

Similarly, while some studies propose that management education may foster ethical standards (Gaitonde et al., 2016; Vian, 2019), there is limited evidence linking management training directly to reduced corruption in healthcare settings. Understanding the role of management curricula, specific training modules, and professional development in instilling anticorruption practices remains a gap in the literature. Exploring how these educational elements contribute to ethical healthcare management could yield actionable insights, particularly for training programs aimed at reducing corruption and enhancing health care delivery.

The role of professional networks in health care service delivery remains ambiguous. Although networks are recognized as facilitating knowledge sharing and collaboration, their potential to promote ethical standards and accountability, particularly in environments prone to corruption, is unclear (Yao et al., 2018). Research examining how networks might foster transparency and reduce corrupt practices is required. Additionally, contrasting findings on the impact of corruption on health outcomes (Lewis, 2019) indicate that further research is necessary to clarify this relationship, particularly through comparative studies across diverse healthcare systems and demographic contexts.

Addressing these gaps can contribute to a more transparent, efficient, and equitable healthcare landscape by providing insights into the complex interplay between innovation, education, networks, and corruption in healthcare. Developing rigorous methodologies to investigate these intricate relationships will enhance the effectiveness and accountability of health care systems worldwide.

Addressing the Gaps in the Literature

Addressing these gaps requires comprehensive research employing advanced methodologies, such as Structural Equation Modeling (SEM), to explore the intricate relationships between management education, training, innovation, networks, and corruption in healthcare. SEM is particularly suitable, as it provides a holistic view of interconnected variables, offering insights into their collective impact on healthcare delivery.

As Levine (2005) suggests, motivations underlying corruption often stem from moral or ethical frameworks, challenging the conventional view of corruption as unethical. Incorporating ethical considerations into management training can help healthcare professionals navigate morally complex situations, potentially reducing corruption. This aligns with calls to integrate ethics training as a core element of management curricula to address these moral complexities.

Cross-sector collaboration, such as the government-industry-university-research model discussed by Li et al., (2018), could also foster innovation within healthcare systems while promoting accountability. Collaborative innovation networks have been shown to enhance innovation and transparency (Wincent et al., 2010), potentially reducing corruption by fostering open communication and accountability. Integrating these collaborative models into healthcare

networks could provide practical insights into enhancing governance and reducing corrupt practices in healthcare delivery.

Another critical gap pertains to the types of corruption prevalent in health care. Wang (2019) distinguishes between organized versus disorganized corruption and collusive versus non-collusive corruption, offering a framework for developing more tailored anti-corruption strategies. This distinction is particularly relevant in healthcare, where targeted interventions may be required to effectively address different types of corruption. Further studies examining these distinctions could aid in the development of sector-specific anti-corruption policies to improve healthcare delivery.

Moreover, the integration of formal governance mechanisms with informal networks, as explored by Ganie-Rochman & Achwan (2016), highlights the need to address both policy frameworks and informal practices that influence healthcare delivery. Xie et al., (2022) further emphasize that governance mechanisms within innovation networks can impact collaborative efforts, with implications for corruption and management training. This underscores the need for empirical research to examine how management education, training, and governance intersect to influence healthcare delivery and transparency.

To address these gaps in the literature, future studies could use SEM to empirically analyze these relationships, yielding insights into effective strategies for mitigating corruption and enhancing healthcare management practices. Such insights are essential for informing policies and practices aimed at promoting ethical and transparent healthcare service deliveries. By supporting evidence-based policies, this research could contribute to improving healthcare delivery,

increasing public trust, and fostering a more resilient healthcare system in Uganda and other similar contexts.

CHAPTER 3: RESEARCH METHODS AND DATA COLLECTION

Chapter Introduction

This chapter outlines the research approach and design, and provides a comprehensive theoretical context that supports the objectives of the study. It begins by detailing the research philosophy, perspective, and key elements that shape the study's trajectory and focus. By employing a quantitative approach, this chapter introduces a carefully structured methodology that aligns with the research questions, the conceptual framework, and the hypotheses. Specifically, a survey methodology coupled with structural equation modeling (SEM) was selected to enable an in-depth analysis of the complex interactions among variables, allowing for both direct and indirect effect assessments. SEM was chosen here for its robustness in testing complex relationships and latent constructs, which are critical for comprehensively addressing the research questions.

The chapter subsequently describes the research strategy, target population, and sample-selection process. The decision to use a survey approach aligns with the study's aim of capturing nuanced insights from healthcare program managers involved in NTD, WASH, and UNEPI programs in Uganda. A clear delineation of the target population and sampling methodology ensures that the sample is representative of broader managerial practices in Uganda's healthcare sector. The research tools and variables of interest were then examined with explanations of the rationale behind their selection. Detailed operational definitions for each variable establish a strong foundation for the analysis, ensuring the reliability and validity of the research outcomes.

This chapter also emphasizes the critical role of systematic procedures and data collection methods. A thorough explanation of each methodological component creates a logical and effective research design that addresses the research questions, while ensuring methodological

rigor. By comprehensively addressing these elements, this chapter contributes significantly to the study's foundation, enabling it to produce meaningful insights and valuable contributions to healthcare management in low-resource settings.

Additionally, this research's design integrates theoretical frameworks to provide a grounded approach to the complex issues at hand. Upper Echelon Theory guides the investigation into how educational and managerial characteristics influence organizational innovation, especially in healthcare settings, where such qualities can drive enhanced service delivery outcomes. Institutional Theory highlights how systemic factors, including governance and corruption, shape healthcare management practices, necessitating strategies that address both formal and informal barriers to service provision. Network Theory underscores the importance of collaborative networks in maximizing the positive effects of management education and training, illustrating how interconnected healthcare networks facilitate better resource distribution and knowledge sharing practices. These theories collectively frame the study's approach, informing the development of hypotheses that explore management education, training, innovation, and the moderating roles of networks and corruption in health-service delivery.

By bridging these theories with identified gaps in the literature, this research fills critical knowledge gaps within the field. Existing research on healthcare delivery, such as that by Agarwal (2017), Carney (2011), Tormusa and Idom (2016), and Usak et al., (2020), has yet to fully examine how management-level factors intersect with structural issues such as corruption and collaboration to influence health outcomes. The survey methodology and SEM approach adopted here yielded empirical data on these relationships, specifically within the Ugandan context, where challenges in health program management persist despite multiple interventions.

This research focuses on four core questions.

1. How does management education affect innovation in healthcare programs and, subsequently, the delivery of health services in Uganda?
2. What is the influence of managerial training on nurturing innovation in Uganda's healthcare programs?
3. To what extent does innovation mediate the relationship between the management level of education and delivery of health services in Uganda's health programs?
4. How does corruption moderate the relationship between management education and training and the delivery of health services in Uganda's health programs?

In Uganda, various programs such as the NTD, WASH, and UNEPI programs have achieved notable progress but continue to encounter barriers related to logistics, resource limitations, and corruption. While these programs have led to significant achievements, such as near elimination of diseases such as trachoma, lingering challenges, including the spread of Bilharzia, issues with vaccine coverage, and poor sanitation coverage, underscore the need for further exploration into managerial factors affecting health service delivery. Specifically, the persistence of Bilharzia due to inefficiencies in mass treatment, resurgence of vaccine-preventable diseases, and ongoing sanitation issues highlight systemic gaps that hinder sustainable health outcomes. Addressing these challenges requires a high-level commitment, improved managerial oversight, and enhanced policy dissemination.

Challenges in the WASH sector, including inadequate sanitation coverage and weak local government oversight, emphasize the need for strong management practices. Likewise, NTD programs face issues of limited funding, integration difficulties, and inadequate human resources,

all of which call for strengthened health system capacities, monitoring, and evaluation. The pervasive influence of corruption, highlighted by Uganda's low ranking on Transparency International's Corruption Perceptions Index (2020), exacerbates these challenges, suggesting that governance issues are critical to health service delivery as technical and operational aspects of health programs.

The gaps in the literature concerning the role of innovation in mitigating corruption, the impact of management education on ethical practices, and the effect of professional networks on transparency underscore the need for empirical research using advanced methodologies such as SEM. By investigating these gaps, this study aimed to provide actionable insights into the management factors that contribute to improved healthcare delivery in Uganda.

In summary, this chapter lays out a detailed and theoretically grounded methodology that integrates insights from the literature to address the research questions effectively. By utilizing SEM to analyze the relationships between managerial education, training, innovation, networks, and corruption, this study aims to provide a comprehensive understanding of how these factors influence health service delivery in Uganda. The findings are expected to inform policies and practices that enhance healthcare management in similar contexts, ultimately contributing to improved health-service delivery across resource-constrained settings.

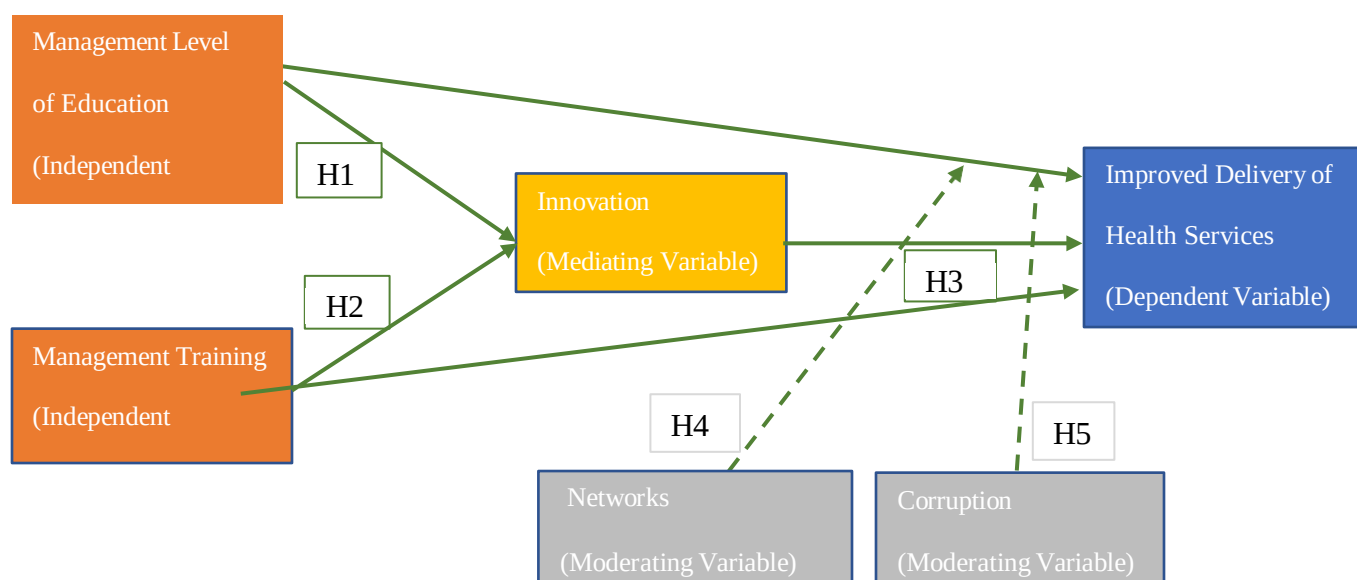
Research Focus

This research aims to develop and empirically test a comprehensive framework to assess the impact of critical managerial factors specifically, management education, managerial training, networks, and corruption on the improved delivery of healthcare services in Uganda. The research investigates the moderating effects of networks and corruption on these relationships, and explores

the mediating role of innovation. Through this holistic approach, the research sought to provide a nuanced understanding of how these interconnected factors collectively influence the effective delivery of healthcare services within three key health programs: WASH, UNEPI and NTDs. By addressing these relationships, this research aimed to inform policies and management practices that enhance the efficiency and sustainability of healthcare service delivery in Uganda and similar low-resource settings.

Figure 5

Research Hypothesis



This research proposes five hypotheses as follows;-

H1: Managers' level of education has a positive effect on innovation in healthcare programs.

H2: Managerial training has a positive effect on innovation by healthcare programs.

H3: There is a positive relationship between innovation and the improved delivery of health services through health programs.

H4: The relationship between the management level of education and improved delivery of health services by health programs is moderated by collaborative networks.

H5: The relationship between the management level of education and improved delivery of health services by health programs is moderated by corruption.

Research Approach and Design

Conceptual Foundation

To understand the design and potential contributions of this research, it is essential to discuss its conceptual foundation. Numerous studies have addressed the improvement of health service delivery (Agarwal, 2017; Carney, 2011; Tormusa & Idom, 2016; Usak et al., 2020); however, critical gaps remain, particularly in Ugandas' context. Various health programs aimed at mitigating public health threats, including WASH, UNEPI and NTDs have achieved success in certain areas, such as the near elimination of trachoma and river blindness. However, they face ongoing challenges in areas such as Bilharzia, immunization coverage, perceived corruption and sanitation improvement (Parker et al., 2008). This highlights the need to explore the managerial factors impacting these programs to better understand and address areas of deficiency.

For instance, Uganda's Bilharzia control program illustrates these deficiencies as inconsistent monitoring and ineffective behavior change strategies have hindered service delivery (Parker & Allen, 2011; Parker et al., 2008). Similarly, the resurgence of diseases such as measles and polio, attributed to insufficient vaccination coverage (Kamanda, 2010; Rwashana & Williams, 2008), along with lagging WASH indicators in both communities and health facilities (Chitonge

et al., 2020; Morgan et al., 2021; Nayebare et al., 2020), emphasizes the need for urgent policy interventions and management improvements. Given the significant investments in staff training, resource allocation, and service delivery improvements, examining the relationship between these investments and program delivery outcomes is crucial for achieving sustainable progress in health-service delivery.

Collaborative networks play a critical role in this context, as diverse stakeholder engagement can significantly influence health program outcomes (WHO, 2018). This research posits that collaborative networks may moderate the relationship between managerial factors such as education and training and improve the delivery of healthcare services. Although networks have the potential to enhance information sharing, skill development, and overall service delivery (Najafi-Tavani et al., 2018), Uganda continues to face challenges in optimizing cross-sector coordination, securing government commitment, and addressing gaps in advocacy and research (Buregyeya et al., 2020). Understanding the role of networks as potential moderators will shed light on how collaborative dynamics affect management factors in healthcare programs.

Corruption further complicates healthcare delivery in Uganda, severely impeding the success of health programs (Basheka, 2012; Basheka, 2017). Corruption disrupts the effective allocation of resources, misappropriates funds away from intended purposes, and undermines healthcare delivery efforts (WHO, 2020). Hunt (2010) reports that a significant portion of bribes within Uganda's healthcare sector involve accessing publicly funded medical services, compromising both accessibility and equity. Despite recognizing that networks and corruption significantly influence healthcare programs, the literature has yet to explore how corruption

moderates the effects of managerial education and training on healthcare delivery outcomes, specifically in Uganda.

In this research, innovation is hypothesized as a mediating variable in the relationship between managerial factors and the improvement of healthcare service delivery. It is proposed that staff with advanced education and continuous training will be more adept at implementing innovative processes, services, and organizational structures, thereby improving the overall program efficacy and service delivery. The primary objective of this study was to develop and empirically test a framework that examines the impact of management variables, particularly education and training, on the improved delivery of health services in Uganda. This framework evaluates the moderating effects of networks and corruption on these relationships and assesses whether innovation acts as a mechanism through which management attributes contribute to healthcare delivery improvements within Uganda's health programs.

By addressing these gaps, this research aims to provide a comprehensive analysis of how corruption, networks, and innovation interact with the managerial factors that influence healthcare delivery. These findings will contribute to the development of evidence-based policies and practices that enhance healthcare service delivery in Uganda and similar low-resource contexts, ultimately advancing more effective and equitable healthcare systems.

Research Process

The research process began with an extensive literature review to establish a firm theoretical foundation and identify key management factors influencing healthcare service delivery within Uganda's health programs. Using academic databases, such as ProQuest and Google Scholar, relevant constructs were isolated, including management education, management

training, innovation, corruption, and networks within healthcare delivery systems. The insights gained from this review shaped the development of the research questions, aims, and objectives, setting a clear direction for the research.

A quantitative research approach was chosen to empirically examine the relationships between the educational and training backgrounds of healthcare managers and the improved delivery of healthcare services across Uganda's WASH, UNEPI and NTD programs. This approach was deemed the most suitable for testing the theoretical framework using measurable and latent constructs within the scope of the identified management factors.

The research population consisted of government healthcare management staff directly involved in NTD, WASH, and UNEPI programs. Participants were drawn from the national and district levels of Uganda's healthcare system to ensure a comprehensive understanding of the management dynamics within these programs. The selection criteria were rigorous: individuals managing NTDs were identified through the specialized NTD departmental database, WASH managers were sourced from records in the Environmental Health Department, and immunization managers were selected from UNEPI databases. To minimize potential sampling bias and ensure representativeness, random sampling techniques were applied, aligning with best practices, as recommended by Taherdoost (2016).

Data collection employed a structured four-stage approach to develop a self-administered questionnaire. This process begins with a thorough review of the literature to identify relevant concepts and variables. An initial questionnaire draft was subjected to content validation by the research supervisor at UNICAF University to ensure conceptual accuracy and alignment with the objectives of the study. Subsequently, the questionnaire was pre-tested on a sample of participants

from other health programs to refine the question clarity and appropriateness. Feedback from this pre-testing stage informed us of the final adjustments, resulting in a refined survey instrument. Invitations to participate, along with formal consent forms, were extended to NTD, WASH, and UNEPI program managers, with participant identification facilitated by the Ministry of Health and program-specific databases. Finalized questionnaires were distributed online to managers at both national and district levels.

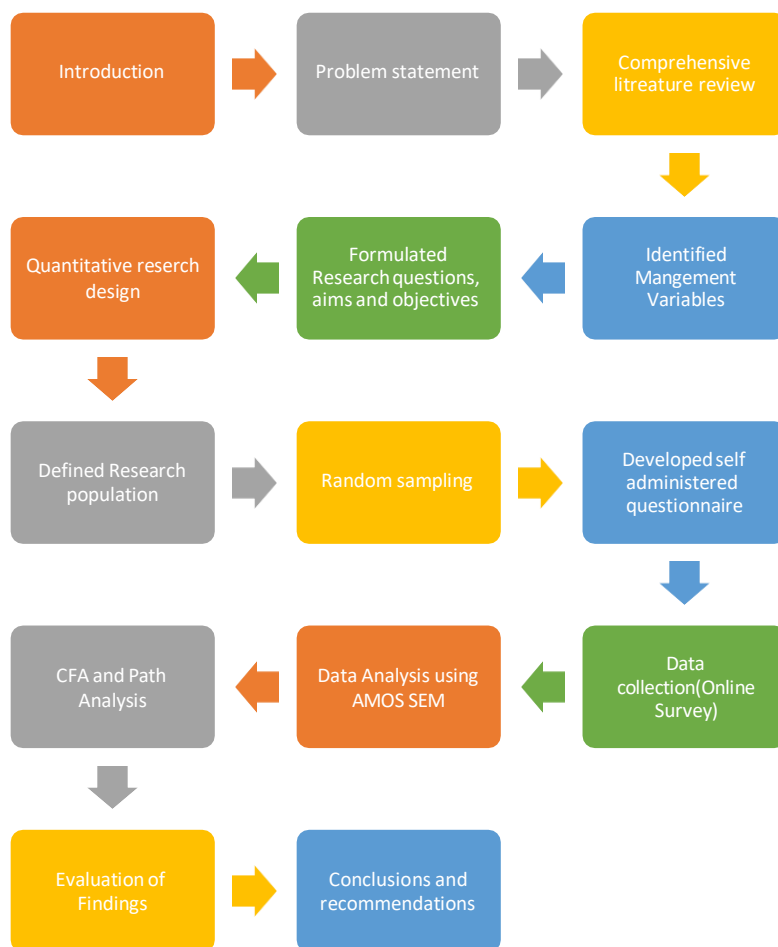
This research employed AMOS structural equation Modeling (SEM) for its analytical framework, chosen for its efficacy in handling complex relationships and latent constructs such as management education, training, perceived corruption, networks, and improved healthcare service delivery (Cheng, 2001). SEM enables the simultaneous testing of multiple interdependencies and is, therefore, ideal for this study's conceptual model, which integrates these latent variables. Confirmatory factor analysis was initially conducted to assess the model's fit indices, followed by SEM to determine the path coefficients and evaluate the significance of the hypothesized relationships. This approach allowed for a comprehensive examination of the interactions between management education, training, network dynamics, and corruption, offering critical insights into their effects on healthcare service delivery within the health programs.

The structured research process employed aims to generate valuable insights into the management factors that influence healthcare service delivery in Uganda. By rigorously addressing the complex dynamics of managerial education, training, innovation, networks, and corruption, these findings are expected to inform policies and practices. The research outcomes hold the potential to enhance program effectiveness, address corruption, and underscore the

importance of robust management training within Uganda's healthcare framework, thus contributing to more effective healthcare delivery across the three critical health programs.

Figure 6

Research Process Flow Chart



Research Philosophies

Research philosophies form the conceptual backbone of academic inquiry, establishing a framework for what to investigate, how to approach phenomena, and how to interpret findings (Bryman, 1988). These guiding philosophies or paradigms embody overarching worldviews that profoundly shape the approach and scope of research (Acquah, 2015; Afarikumah, 2014). In disciplines such as management, research typically seeks to address existing problems or generate new knowledge within a structured framework that encompasses research philosophy, design, and methodology (Creswell, 2014; Hughes & Sharrock, 2016). Central to this framework are two foundational components, epistemology and ontology.

Epistemology concerns itself with theories and methods of knowledge acquisition, and addresses fundamental questions regarding the nature, scope, and sources of knowledge. This component shapes the researcher's approach to understanding and exploring the subject matter (Crotty, 1998; Petty et al., 2012). In the context of this research, epistemology informs the approach to assessing how various managerial factors influence healthcare service delivery in Uganda. On the other hand, ontology focuses on the nature of reality, studying what exists and the relationships between different entities in the world (Petty et al., 2012; Raddon, 2010). While epistemology examines how we come to know what we know, ontology addresses what actually exists. Together, these elements provide the foundation for the philosophical stance of this research.

Creswell (2014) identifies four primary research paradigms: positivism, constructivism, transformationalism, and pragmatism. Petty et al., (2012) emphasize that positivism and constructivism are particularly prominent. This research adopts a positivist approach, prioritizing

objectivity, quantifiability, and generalizability, to investigate the impact of management factors on healthcare service delivery in Uganda. Positivism is an empirical scientific paradigm that focuses on observable and measurable phenomena. Within this paradigm, researchers strive for objectivity and methodological rigor by employing systematic methods based on established theories and empirical research (Assalahi, 2015; Creswell, 2014; Petty et al., 2012). Positivism typically involves deductive reasoning and quantitative data collection such as surveys and statistical analyses (Ates, 2008; Easterby-Smith et al., 2015). This positivist stance reflects a commitment to structured quantitative methods and objective ontology.

This research employs a quantitative approach to explore the management factors influencing healthcare service delivery in Uganda, focusing on identifying, quantifying, and clarifying the relationships among these factors. Within the philosophical landscape, positivism is the best fit, and is characterized by empirical, objective, and quantitative research methods (Creswell, 2014; Gemma, 2018). This study applies structural equation Modelling (SEM) techniques and confirmatory factor analysis to investigate the complex interplay between the identified management factors and their impact on healthcare delivery.

Comparison with Other Paradigms

Interpretivism focuses on individuals' subjective meanings and experiences by employing qualitative methods to gain deep insights into their perspectives (Creswell, 2007). While it offers a context-rich understanding, interpretivism often lacks generalizability and may introduce researcher bias. Critical Theory critiques existing power structures within organizations, often using qualitative methods to explore issues of social justice (Alvesson & Willmott, 1992). Although it provides a critical lens, it may face resistance in organizational contexts owing to its

challenging stance. Post-positivism blends quantitative and qualitative techniques, balancing objectivity with context-sensitivity. However, it can be complex to design and execute, particularly when fully integrating both the methodological approaches, it is also not suited to situations where the researcher is well known to the participants as it may introduce bias.

Justification for Positivist Approach

This research adopts a positivist paradigm owing to its structured methodology, empirical rigor, and alignment with the research focus on management factors affecting healthcare service delivery in Uganda. The positivist approach is particularly suited for investigating complex service delivery systems, where uncovering causal relationships can inform and enhance policy frameworks for healthcare management. Given the emphasis on areas critical to public health, specifically WASH, UNEPI and NTD programs, the need for robust, data-driven insights is paramount. Positivism, with its emphasis on observable and measurable facts and quantitative data collection, enables an objective and systematic examination of how managerial factors influence health care delivery. This methodology aligns with the research focus on large-scale, structured data collection and Structural Equation Modeling (SEM), both of which facilitate reliable, valid, and applicable findings across diverse healthcare settings.

By prioritizing objective measurements, hypothesis testing, and replicable results, the positivist paradigm allows for rigorous exploration of the relationships between management factors and healthcare service delivery. This empirical approach is especially valuable for management studies as it provides a foundation for informed policy recommendations based on reliable data (Godfrey & Hill, 1995). Structured and replicable positivist methods further

contribute to a consistent and dependable knowledge base that is essential for advancing management practices that effectively address Uganda's healthcare challenges (Terre et al., 2006).

Moreover, large sample sizes and random sampling techniques often associated with positivist research enhance the generalizability of the findings. This broad applicability is critical for shaping healthcare policies that can respond to systemic challenges in service delivery, particularly in resource-limited contexts, such as Uganda (Creswell, 2008). By following a positivist framework, this research aimed to generate clear, actionable insights into the factors influencing healthcare service delivery across WASH, UNEPI, and NTD programs. Ultimately, this approach supports the development of effective evidence-based management practices that can improve healthcare delivery, contributing to public health advancements in Uganda.

Case Studies

A study investigating the impact of managerial training on healthcare service delivery in Kenya revealed a positive correlation between advanced managerial training and improved patient satisfaction (Lin et al., 2012; Terzić-Šupić et al., 2015). The findings align with existing literature that emphasizes the role of effective managerial training programs in enhancing healthcare service delivery. By equipping managers with the skills necessary to optimize operations and lead teams effectively, these programs contribute to better patient experiences and more efficient healthcare systems. This case study demonstrates the tangible benefits of investing in managerial capacity-building within resource-constrained healthcare systems.

Research on collaborative networks in Nigeria highlighted the critical role of inter-organizational collaboration in fostering healthcare innovation. The study found that robust collaborative networks promote innovative practices and improve service delivery outcomes

(Hamlin et al., 2022; Hsieh et al., 2017). By facilitating resource sharing, knowledge exchange, and joint problem-solving, these networks address systemic challenges and enhance the adaptability of healthcare systems. This underscores the importance of fostering collaboration through formal structures and trust-building initiatives, particularly in contexts where resources are limited but collective action can drive significant improvements.

The impact of corruption on healthcare service delivery during the COVID-19 pandemic in South Africa provided critical insights into the relationship between governance and healthcare outcomes. Research revealed a significant association between corruption and poorer healthcare delivery, particularly in resource allocation and service provision (Bombard et al., 2018). The study underscores the detrimental effects of corruption on healthcare systems, particularly during crises when efficient resource management is vital. It highlights the need for transparency and accountability mechanisms to mitigate the negative impacts of corruption and ensure equitable healthcare delivery during emergencies.

These case studies illustrate the broader relevance of the findings from this research to other contexts, emphasizing the critical role of management factors in healthcare service delivery. By focusing on managerial training, collaboration, and governance, these examples provide actionable insights for improving healthcare systems in resource-limited settings. The positivist approach adopted in this research, with its emphasis on empirical evidence and objective analysis, is particularly suited for investigating these complex dynamics. By applying Structural Equation Modeling (SEM) to test hypothesized relationships, this study provides quantifiable insights into the factors affecting healthcare service delivery in Uganda. The findings contribute to the understanding of management dynamics in Uganda's healthcare programs and support the

development of evidence-based practices to enhance service delivery across WASH, UNEPI, and NTD programs

Research Design

The research design encompasses a range of processes necessary to meet the objectives of the research, including the measurement, collection, analysis, and interpretation of the data (Easterby-Smith et al., 2015). To examine management factors affecting health service delivery in Uganda, with a specific focus on WASH, UNEPI, and NTD programs, Structural Equation Modeling (SEM) was selected as the primary analytical method. AMOS SEM, known for its capacity to handle complex relationships between observed and latent variables, enables the study of the intricate interrelations between management factors and service delivery outcomes. It is particularly well suited for theory testing within a multivariate context, allowing researchers to specify hypothesized relationships before estimating and analyzing data through a confirmatory approach (Hair et al., 2010; Kline, 1998, 2011). SEM's use of Confirmatory Factor Analysis (CFA) helps validate that the observed variables effectively represent specific constructs in the research model, reinforcing the methodological rigor necessary for studying management factors in healthcare delivery (Martínez-López et al., 2013).

To achieve this, an understanding of the underlying research philosophy is vital, as it informs methodological choices and the overall research framework (Abu-Alhaija, 2019). In this research, the positivist paradigm is adopted, as it aligns with the goal of objectively analyzing the relationships between the management factors and health service delivery. The positivist approach, combined with quantitative survey methods, supports systematic data collection and statistical

analysis to identify causal relationships within organizational settings, thus facilitating data-driven insights for healthcare management.

Positivism plays a well-established role in management research, particularly in generating objective, generalizable findings based on quantitative data. For example, Godfrey and Hill (1995) employed quantitative methods to explore strategic management outcomes, illustrating how positivist approaches enable a thorough analysis of unobservable factors affecting organizational performance. Similar quantitative strategies, which often involve large sample sizes and statistical testing, are applicable to healthcare management contexts, where correlational designs help uncover dependencies between management factors and health outcomes (Terre Blanche et al., 2006). Correlational studies allow researchers to analyze trends and patterns, an approach that aligns with this research's objective of elucidating the impact of managerial factors on WASH, UNEPIU, and NTD program delivery in the healthcare sector in Uganda.

3.4.1 Quantitative Survey Strategy

A quantitative survey strategy forms the foundation of this research by providing a systematic framework for data collection, measurement, and analysis tailored to the objectives of the research (De Vaus, 2001). Guided by positivist principles and structured for rigor and objectivity (Saul, 2019), this quantitative approach emphasizes the reliability and generalizability of findings derived from numerical data. A deductive methodology enables the identification of trends and empirical relationships critical to understanding the management factors affecting healthcare service delivery in Uganda (Saha, 2022; Williams, 2011).

Quantitative methods offer a disciplined structure for analyzing the relationships between management practices and health outcomes, ideal for assessing cross-sectional data from diverse

healthcare settings in Uganda. This structure supports the analysis of WASH, UNEPI and NTD programs, allowing for reliable and broadly applicable insights. Unlike qualitative methods, which delve into personal narratives (Kroll et al., 2005), quantitative surveys offer a standardized framework conducive to statistical testing and trend comparison.

Surveys play a central role in the quantitative methodology of this study by providing critical insights into the attitudes, behaviors, and practices of healthcare managers and stakeholders. The survey instrument was carefully designed for clarity, neutrality, precision, minimization of bias, and enhancement of data validity. Representative sampling achieved through random techniques ensures that the findings are generalizable across the healthcare population in Uganda. Survey items were developed with meticulously selected indicators that reflect each construct, establish convergent validity, and capture the nuances of management factors impacting health-service delivery (Hair et al., 2019).

To analyze the complex relationships between managerial factors and health service delivery, this research employs structural equation Modeling (SEM). The capacity of SEM to model both direct and indirect effects among latent constructs provides deeper insights into the structural dynamics of healthcare management, uncovering the underlying mechanisms that impact program delivery effectiveness (Hair et al., 2019). This approach is particularly suitable for exploring the structural relationships across WASH, UNEPI, and NTD programs, allowing for the precise identification and quantification of the contributions of various management factors to healthcare delivery outcomes.

The data collection process was integral to ensuring the validity and success of this research. Careful selection of data collection instruments and strategies is crucial for maintaining

the integrity and reliability of findings, which is a priority when assessing management factors in Uganda's resource-limited healthcare settings (Gelard, 2024; Orlando & Sihombing, 2022). Figure 7 is a flow chat of the quantitative survey process.

Figure 7

The Quantitative Survey Flow Chart



The quantitative approach adopted in this research establishes a robust and objective framework for analyzing the complex dynamics of health service management in Uganda. By integrating rigorous survey design, representative sampling, and advanced statistical analysis, this study aims to generate valuable insights into the management factors influencing health service

delivery across WASH, UNEPI and NTD programs. The methodological rigor embedded in this approach aligns with the research's positivist philosophical stance, ensuring that the research not only fulfills its objectives but also meaningfully contributes to the field of healthcare management.

Summary of Key Points

This research employs a comprehensive quantitative research approach, with data collection and analysis underpinned by structured surveys, statistical analyses, and structural equation Modeling (SEM). Carefully designed survey instruments and representative sampling methods enhanced the quality and generalizability of the results. SEM's application allows for a nuanced exploration of the relationships between management factors and health service delivery, providing a deeper understanding of the structural dynamics that affect program effectiveness. This quantitative strategy is well aligned with the research objectives, reinforcing the critical role of methodological rigor in addressing the research questions and advancing health care management in resource-constrained settings.

The insights derived from this research will be instrumental in improving health service delivery, particularly by illuminating the management factors that drive the effectiveness of health care programs in Uganda. Through its strategic focus and empirical depth, this research highlights the importance of data-driven methodologies in contributing to sustainable health system improvements and effective healthcare policies.

Research Design and Approach

This research employed a quantitative research design to systematically examine the management factors influencing healthcare service delivery in Uganda, in the WASH, UNEPI and NTD programs. The quantitative approach chosen for its objectivity, reliability, and capacity to

generalize findings facilitates a structured analysis of key variables hypothesized to impact healthcare outcomes, namely management education, training, innovation, networks, and corruption. By utilizing structured survey instruments and rigorous statistical analyses, this research aims to quantify and clarify the relationships among these variables within the Ugandan healthcare context.

This study specifically hypothesizes that collaborative networks and the prevalence of corruption influence health-service delivery outcomes. Innovation is posited to mediate this relationship, with the expectation that higher levels of management education and continuous management training will enhance healthcare program delivery through the adoption of novel processes, services, and organizational structures. The application of structural equation Modeling (SEM) further enables an in-depth analysis of these hypothesized relationships, providing insights that contribute to the advancement of healthcare management practices in Uganda.

Data Collection Methodology

Data were collected through a self-administered questionnaire designed following a rigorous four-stage process to ensure precision, relevance, and alignment with the research objectives.

The initial stage involved identifying relevant concepts and variables derived from the theoretical framework. These were carefully formulated into questionnaire items, ensuring that they comprehensively captured the constructs of management education, training, innovation, networks, and corruption in the context of health service delivery in WASH, UNEPI, and NTD programs.

To enhance the validity of the questionnaire, the research supervisor provided a comprehensive review of the initial draft. This step focused on refining the questions to align rigorously with the

research objectives and hypotheses, ensuring that each item effectively captured the intended variable within the conceptual framework.

The questionnaire was pretested with a sample of participants from a comparable health program. This pre-test aimed to refine question clarity, relevance, and readability, addressing any ambiguities that might hinder accurate responses. Feedback from this stage was instrumental in improving the coherence and appropriateness of the questionnaire for the target participants.

Based on insights gained during the pre-testing phase, the questionnaire was finalized, incorporating adjustments to optimize clarity and response accuracy. It was then distributed electronically to a randomly selected sample health managers across Uganda's health programs. To enhance response rates and reduce non-response bias, follow-up emails were sent to participants who were assured of confidentiality and anonymity. These assurances were critical to fostering an environment in which participants felt comfortable providing honest and accurate responses. The structured methodology adopted in the questionnaire development and distribution ensured that data collection was thorough, methodologically sound, and effectively tailored to address the study's research questions on the impact of management factors on health service delivery.

Analytical Techniques

Data analysis in this research employs Structural Equation Modeling (SEM), an advanced approach well-suited to exploring the intricate relationships among both measured and latent constructs in healthcare management. SEM is particularly effective in validating theoretical models and examining the interdependencies between factors influencing healthcare service

delivery, thus providing a robust platform for this research focus on management factors in Uganda's healthcare programs.

The analytical process begins with Confirmatory Factor Analysis (CFA) to validate the measurement model. CFA is instrumental in testing the relationships between the observed variables and their respective latent constructs, thereby verifying that each construct is accurately measured. This initial step is essential as it enhances the validity of the research findings by ensuring alignment between the theoretical model and observed data (Oudshoorn et al., 2022; Park et al., 2016). Previous studies have demonstrated the effectiveness of CFA in assessing factor structures, providing strong evidence of the reliability and validity of complex constructs in healthcare contexts (Soydan et al., 2022; Sudarsono et al., 2022). Through CFA, this research refines its constructs, confirming that variables such as management education, training, and innovation are properly represented by their respective factor loadings, which is a crucial step before advancing to SEM.

Following CFA, SEM was used to analyze path coefficients, revealing the significance and strength of the hypothesized relationships within the conceptual framework. The ability of SEM to integrate factor analysis with multiple regression allows for the simultaneous examination of multiple interconnected constructs such as management education, training, innovation, networks, and corruption (Bouhaleb & Smida, 2018; Cemaloğlu & Duykuluoğlu, 2022). This integration is particularly beneficial in healthcare research, where a variety of variables interact to influence the outcomes. By employing SEM, this research investigates both direct and indirect effects, providing a nuanced understanding of how management factors affect healthcare delivery in Uganda (Mora-Magaña et al., 2020; Pamuk & Atlı, 2016). SEM's ability to model latent variables, unobservable

constructs inferred from measurable indicators, further enhances the validity of this analysis, particularly as it pertains to abstract management variables, such as educational background and innovation capabilities (Bondevik et al., 2019; Zhao et al., 2022). SEM also accounts for measurement errors, strengthening the reliability of the results and making it a preferred choice for examining complex, data-intensive models (Bock et al., 2016; Zakaria et al., 2021).

Ensuring Validity and Reliability

This research implemented several rigorous measures to ensure the validity and reliability of its findings. Non-response bias was minimized through follow-up communications and improved accessibility facilitated by government-supported Internet access, reducing potential response disparities (Perkins et al., 2020). Random sampling further supported representativeness, ensuring that the sample accurately reflected the broader healthcare management population in Uganda, thereby enhancing the generalizability of the results (Kuha et al., 2018). SEM's capacity to account for measurement error provides more accurate estimates of variable relationships, further strengthening construct reliability (Alramdhan, 2022; Li, 2018).

The ability of SEM to assess mediation and moderation effects is especially relevant for this research's exploration of how variables, such as networks and corruption, interact with management factors to impact healthcare service delivery (Lantto et al., 2020; Noviani et al., 2019). By capturing both direct and indirect pathways, this approach offers a comprehensive analysis of how management education, training, and innovation contribute to the overall delivery of healthcare services in Uganda.

In summary, the analytical methodology used in this research, anchored by SEM and reinforced by CFA, enables a rigorous, multifaceted exploration of the research questions. These

techniques not only facilitate precise measurement and validation of the constructs but also allow for a sophisticated examination of the intricate dynamics among management factors affecting healthcare service delivery. This methodological rigor ensures that the findings meaningfully contribute to the discourse on healthcare management and inform strategies to improve health outcomes in Uganda.

Population and Sample

Survey research is a vital method in quantitative analysis, especially in healthcare management studies that seek to understand the complex factors that impact service delivery. This research targeted health managers in Uganda's WASH, UNEPI and NTD programs, as reported by the Ministry of Health (MOH, 2021). The sampling strategy is critical in ensuring that the survey findings accurately represent the broader population; therefore, this study employed a simple random sampling approach. This method was selected to minimize selection bias and enhance the generalizability of the findings across the healthcare management field (Lee et al., 2017).

To ensure methodological rigor, the sampling process followed a multistep approach. The population was first clearly defined and consisted of 435 health managers recorded in the official MOH database. This precise identification of the population, as suggested by Kim et al., (2023), is essential for maintaining the sampling accuracy. Each manager was assigned a unique identifier from 1 to 435, ensuring an equal selection probability for all potential participants.

Sample size determination was also rigorously considered. A sample size of 200 was established based on structural equation modeling (SEM) requirements, aligning with best practices suggesting a minimum of 100–200 participants for complex models (Schlager, 2017). This approach meets both statistical power and generalizability requirements, critical for

examining intricate relationships in healthcare management (Breznau, 2018; Davis & Wilfahrt, 2023). However, for enhanced statistical power and representation, a sample calculator confirmed that 205 participants would achieve optimal reliability (Davis & Wilfahrt, 2023). Selecting a sample size aligned with these guidelines ensures that the research can effectively support the complexity of the model and generate robust insights into the healthcare delivery variables of interest.

A random number generator was used for sample selection to identify 205 unique participant IDs to ensure unbiased selection (Reddy & Delaurentis, 2016). This randomization strengthens the validity of the findings by upholding the equal probability principle for each manager. Subsequently, the selected participants received invitations, consent forms, and online questionnaires to ensure ethical compliance and ease of participation (Chakraborty & Sharma, 2019). Addressing non-response bias is critical in quantitative studies, particularly in online surveys, which often yield lower response rates than traditional methods. To counter this, a calculated oversampling strategy was used. An initial distribution of 293 surveys targeted a response rate of 70%, aiming to secure at least 200 complete responses. This approach is well-supported by research indicating that online surveys average a lower response rate, with variations based on population and methodology (Hughes et al., 2014; Mina et al., 2014). Through systematic sampling and targeted follow-up, this research ensured data reliability and representativeness, addressing non-response bias effectively. This methodological rigor supports the goal of generating robust insights into management factors impacting healthcare service delivery in Uganda.

This comprehensive sampling strategy aimed to ensure that the sample represented Uganda's broader population of health managers. By implementing randomization and follow-up measures, the research minimized sampling bias and maximized response rates, thus enhancing the reliability and generalizability of the findings. Selecting an appropriate sample size is a crucial aspect of survey research, particularly in SEM, where model complexity requires a robust sample for precise estimation. The literature suggests sample size ratios between 5:1 and 20:1 for estimated parameters (Schlager, 2017). This study's sample size of 200 participants reflects these recommendations, balancing methodological rigor with feasibility (Breznau, 2018).

In summary, the rigorous sampling strategy and methodological sample size determination underscore this research commitment to methodological rigor in survey research. By accurately representing the population of health managers in Uganda's healthcare system, this research aimed to provide meaningful insights into the managerial factors affecting health service delivery in NTD, WASH, and UNEPI programs, contributing significantly to evidence-based healthcare management practices.

Addressing Non-Response Bias

Non-response bias, arising when certain individuals or groups are less likely to participate in a survey, poses a significant risk to the validity and representativeness of research findings, especially in healthcare management where comprehensive stakeholder perspectives are crucial. To mitigate this risk, this research undertook a systematic follow-up strategy to enhance the response rates and reduce potential bias. A sequence of follow-up communications was deployed to encourage participation among the slow-responders. One week after the initial survey invitation, a reminder email was sent emphasizing the importance of the survey and the potential impact of

respondents' input on healthcare management practices. The literature suggests that well-timed reminders can markedly improve response rates by re-engaging potential participants and reinforcing the relevance of research (Nulty, 2008; Shih & Fan, 2008).

After two weeks, a second reminder was issued that underscored the unique contributions that participants' insights could make to policy and practice improvements. This message framed participation as an opportunity for respondents to directly influence health management in Uganda, a strategy shown to foster a sense of personal investment in research outcomes (Dillman et al., 2014). Finally, three weeks after the invitation, a concluding reminder was sent, stressing the impending survey closure. This communication thanked those who had participated and reiterated the importance of every response, creating a subtle urgency known to boost response rates (Curtin et al., 2000).

Each follow-up was designed to be polite, concise, and motivational, aiming to reduce the perceived participant burden and encourage engagement. The emphasis on the confidentiality and anonymity of responses addressed privacy concerns, fostering a supportive environment for candid participation. Given that the target participants, Ugandan healthcare managers, had consistent access to the government-provided Internet, these structured follow-ups were expected to significantly enhance response rates, thereby minimizing non-response bias and ensuring a representative sample.

The literature corroborates the effectiveness of a systematic follow-up in achieving higher participation. Davern et al., (2010) emphasize that explicitly addressing non-response bias informs researchers about potential biases in specific survey items, while Beebe et al., (2006) note the particular importance of non-response bias in surveys targeting diverse populations.

Analytical Approach and Methodological Rigor

To rigorously analyze the data collected, this research integrates AMOS structural equation Modeling (SEM), leveraging its advanced capabilities to explore complex interrelationships between latent and observed constructs in healthcare management. SEM, utilizing the maximum likelihood estimation (MLE) method, enables a reliable analysis of variance linked to observable factors, offering a robust framework for testing the hypothesized relationships within this research's conceptual model.

In deploying simple random sampling, determining an appropriately sized sample, and implementing sophisticated statistical techniques, this research's methodological rigor ensured that the findings were accurate, reliable, and valid. By integrating systematic follow-up procedures to address potential biases and employing SEM to analyze intricate management factors, this research was positioned to produce findings that are representative, generalizable, and valuable to the field of healthcare management in Uganda. The insights generated offer practical implications for optimizing health program management and advancing health service delivery within the country.

Study Population

This research focused on health managers within Uganda's government health sector, specifically overseeing programs for NTDs, WASH and UNEPI at both national and district levels (See Figure 8). The sample population included a wide range of healthcare professionals, including physicians, health managers, nurses, midwives, clinical officers, pharmacy technicians, pharmacists, and medical specialists with managerial roles. This diversity ensures a comprehensive representation of the healthcare management system in Uganda. Participants' educational

qualifications ranged from nursing certifications and diplomas to bachelor's, master's, and doctoral degrees, offering insight into how different levels of training and expertise impact health management outcomes.

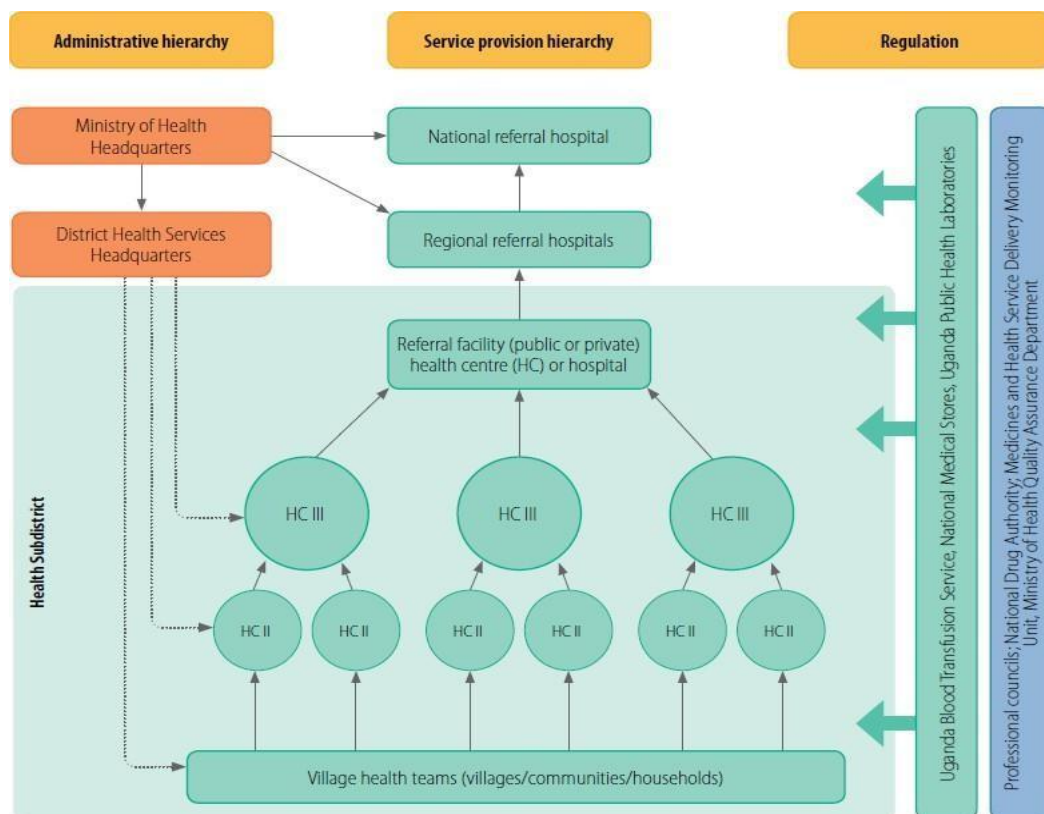
A random sampling approach was used to select participants to ensure representativeness and to minimize sampling bias. Questionnaires were distributed electronically to selected health managers across the NTD, WASH, and UNEPI programs, capturing perspectives from managers operating at various levels within Uganda's healthcare structure. The inclusion of diverse managerial roles within the sample provides a broad perspective on the challenges and practices inherent in managing these public health programs.

The research acknowledged potential limitations, notably the reliance on self-reported data, which can introduce a response bias (Podsakoff et al., 2003). To mitigate this, rigorous follow-up measures and assurances of confidentiality were employed to foster honest responses. Follow-up reminders were systematically issued to maximize response rates, ensuring that the data reflected Uganda's varied healthcare environments. This approach enhanced both the validity and reliability of the findings, making them more reflective of the actual factors influencing health-service delivery across diverse contexts in Uganda.

Electronic dissemination of questionnaires has enabled efficient, broad geographical reach and timely data collection which are key advantages of nationwide research (Dillman et al., 2014). Although potential biases related to Internet access were considered, this challenge was minimized by the fact that all health managers had government-provided Internet access, ensuring a representative sample. Follow-up reminders helped mitigate non-response bias, enhancing the overall quality of the data collected.

The insights gathered from health managers provide valuable contributions to the management of the NTD, UNEPI, and WASH programs. The participants' diverse professional backgrounds and experience levels captured a comprehensive view of health management challenges, with implications for policy and practice improvements in Uganda's healthcare sector. Age diversity among participants allows for additional generational insights into leadership styles and decision-making processes, adding depth to the findings (Ng & Feldman, 2012). Leveraging age and professional diversity in health management can enhance organizational performance and inform age-inclusive strategies for effective public health programme management (Li et al., 2021).

By capturing the perspectives of health managers directly involved in managing NTD, immunization, and WASH programs, this research offers a nuanced understanding of health management factors in Uganda's public health sector. The data collection process, informed by methodological rigor and strategic sampling, ensured that the findings were both representative and insightful. These contributions are valuable for policymakers and practitioners aiming to optimize health service delivery in developing countries. The findings of this research are expected to inform future research and practice, potentially improving the management and effectiveness of public health programs in Uganda and other comparable settings.

Figure 8*Levels of the Uganda Healthcare System*

Note. Adapted From Waweru Et Al., (2019)

Inclusion Criteria

This research targeted individuals actively involved in managing healthcare programs within Uganda's public health sector. The inclusion criteria focused on roles integral to the oversight and management of health programs, such as program managers, medical directors, professional managers, and senior health personnel. Participants were required to hold positions that directly influenced programmatic outcomes, ensuring that insights reflected the operational

realities of healthcare delivery in Uganda. Additionally, the participants were required to provide informed consent, reinforcing the ethical integrity and reliability of the data collected.

Exclusion Criteria

Clear exclusion criteria were applied to maintain the relevance and ethical rigor of the study. Individuals who had retired from active services or were no longer involved in managing targeted health programs were excluded. Individuals with mental impairments that could hinder their ability to provide informed consent were excluded. This approach safeguarded this research's objective of gathering data from those with current and applicable insights into program management and service delivery.

Accessibility

A structured identification and engagement approach was used to ensure accessibility for the target population. The official health management database of the Ministry of Health served as the primary source for identifying qualified participants. Additionally, the Uganda Medical Association's database was consulted to capture newly appointed staff not yet reflected in the ministry's records. For accuracy, the NTD, UNEPI, and WASH program databases were cross-referenced to ensure the inclusivity of contract-based personnel essential to these programs. Participant engagement was initiated through an emailed survey invitation that directed recipients to a consent form outlining the study's voluntary and anonymous participation protocols.

Engagement Process

The engagement process in this research was meticulously structured to ensure the relevance and integrity of the data. Upon consent to participate, individuals were asked to confirm their program affiliations. If a participant's role did not align with managerial positions within the

NTD, WASH, or immunization programs, their participation was acknowledged and the survey was concluded. A comprehensive survey was administered to those meeting the criteria and designed to capture detailed insights aligned with the research objectives.

The inclusion and exclusion criteria, paired with a targeted accessibility strategy, were integral in maintaining the validity of the research. These measures ensured that only individuals with relevant managerial experience in health programs were included, thereby enhancing the quality and applicability of the findings. By focusing on current program managers capable of providing informed insights, this research prioritizes perspectives that are most likely to shed light on the factors influencing healthcare service delivery in Uganda. This strategic approach, supported by a structured engagement process, is essential for capturing diverse and well-informed viewpoints in the healthcare sector.

In summary, careful planning and implementation of the participant engagement process were foundational to the robustness of this research. By selecting participants who met the stringent criteria, the research was able to gather reliable data from knowledgeable professionals actively involved in managing the NTD, UNEPI, and WASH programs.

Materials/Instrumentation

The primary research instrument in this research was a comprehensive questionnaire that was carefully crafted to capture the intricate dynamics of health management in Uganda's public health sector. Divided into two sections, the instrument targeted demographic variables and key constructs relevant to the research objectives. The first section comprised six demographic questions designed to contextualize respondents' perspectives, focusing on specific health programs managed (NTDs, WASH, or UNEPI), age, gender, tenure in the managerial role, total

years of health service, and number of subordinates. These variables were chosen because of their potential impact on management styles and effectiveness within Uganda's healthcare system.

The second section contained twenty-one questions addressing core constructs such as management educational background, management training, innovation, perceived corruption, networking, and service delivery outcomes. This section was designed to align with the research objective of exploring how management factors influence health-service delivery in Uganda. The questions focused on examining the role of education, training, and professional networks in shaping health managers' decision-making and program delivery outcomes, particularly in relation to the WASH, NTD, and UNEPI programs.

To capture nuanced perceptions, the questionnaire employed a seven-point Likert scale ranging from "1 = strongly disagree" to "7 = strongly agree." The selection of this scale is well supported in the survey research literature, as it enhances data granularity and allows for a refined analysis of participants' attitudes and perceptions (DeWees et al., 2020; Jebb et al., 2021). A seven-point format strikes an ideal balance between response variability and measurement precision, which is crucial in studies with limited sample sizes (Şimşek, 2023). Compared to the five-point scale, the seven-point scale mitigates response bias by encouraging respondents to carefully consider their answers instead of defaulting to a neutral midpoint. This is particularly advantageous in contexts where capturing a full spectrum of attitudes is essential, as emphasized by Carifio and Perla (2007) and Pe et al., (2018).

The robust methodological foundation of the seven-point Likert scale was reinforced by Jebb et al., (2021), who emphasized its effectiveness in yielding nuanced data in social and psychological research. Moreover, Norman (2010) argues that parametric statistics, supported by

the central limit theorem, are valid for Likert-scale data even with small sample sizes, thus enhancing the reliability and validity of findings derived from this approach. This methodological choice aligns with established practices and ensures consistency across studies, thus enhancing the reliability of the results in this research context.

In quantitative research, particularly within a positivist paradigm, questionnaires play a vital role in systematically exploring the relationships between variables. The methodological structure of this research enabled collection of data from a diverse group of participants, supporting the development of reliable statistical data and facilitating rigorous inferences (Bell, 1995). By employing a structured Likert scale, the research ensured that the collected data supported statistical regressions, comparative analyses, and hypothesis testing. This design was informed by a thorough analysis of relevant literature, ensuring that the questionnaire was both theoretically sound and empirically robust.

Furthermore, the researcher's extensive experience within the NTD sector over the past two decades substantiates the choice of a questionnaire as a data collection tool. This approach mitigates the power dynamics inherent in alternative methods such as interviews, which could influence respondents' openness and engagement. Therefore, the questionnaire design reflects a careful alignment with the research objectives and methodological rigor. The demographic section provides an essential context, while the targeted managerial questions offer detailed insights into the factors affecting health service delivery in Uganda. The use of a seven-point Likert scale enhances the depth of data collection and aligns with best practices in empirical research, ensuring that the findings are both robust and relevant.

The questionnaire design underscores the research's commitment to capturing the complex facets of health management in Uganda. The instrument was strategically designed by incorporating diverse constructs to uncover the interplay between managerial factors, education, and management challenges within health programmes. This approach moves beyond surface-level analysis, enabling the research to provide deep insights into managerial dynamics in the healthcare sector. The selection of a questionnaire as the primary research tool exemplifies a strategic approach to data collection that balances comprehensive data needs with the realities of conducting field research.

In summary, the design and deployment of this questionnaire, thoughtful integration of a seven-point Likert scale, and strategic approach to participant engagement collectively underscore the research methodological rigor. These elements ensure that the findings contribute valuable insights to the field of health management, particularly in developing nations such as Uganda. The insights derived from this research are anticipated to inform health policy and management strategies, ultimately enhancing the effectiveness of health service delivery in Uganda.

Reliability and Validity

Ensuring reliability and validity in research is crucial for establishing the integrity and credibility of findings. Reliability refers to the consistency of a measurement tool, or its ability to yield stable results across similar conditions (Nunnally, 1979). In this research, reliability was assessed using Cronbach's alpha, a widely accepted statistic for measuring internal consistency. This alpha value ranges from 0.0 to 1.0, with higher scores indicating stronger internal consistency among the items that comprise a scale. Generally, an alpha of 0.70 or higher is deemed acceptable (Nunnally, 1979), but it is essential to recognize this threshold is not absolute.

Yong and Pearce (2013) caution that rigid adherence to any alpha threshold may overlook context-specific nuances. For instance, while a Cronbach's alpha above 0.70 is generally desirable, a lower value may be justifiable in exploratory research or studies with complex constructs. Consequently, this research adopted a flexible approach, allowing for a more critical evaluation of data reliability even when alpha values were moderate. This approach is particularly relevant given the diverse variables involved in assessing management factors, including educational background, training, innovation, and corruption perceptions. Each construct's context and complexity were carefully considered, ensuring robust measurement practices.

Conversely, validity, refers to the degree to which a measurement tool accurately captures the intended construct. It is essential for verifying that the instrument not only yields consistent results but also meaningfully represents the underlying phenomena under investigation. Several forms of validity were evaluated in this study. First, content validity ensures that the questionnaire comprehensively covers all facets of the constructs under investigation, such as management factors and service delivery variables. This was achieved through research supervisor review and alignment with established literature. Second, construct validity assesses whether the measurement tool accurately reflects the theoretical constructs it aims to measure. This research employed confirmatory factor analysis (CFA) to verify that items within each construct loaded appropriately, ensuring that each variable, such as management training or networking, aligned well with its theoretical underpinning. And finally criterion-related validity which evaluates how well the instrument's results correlate with external criteria. Concurrent validity was verified through the consistency of findings with similar research in health management and service delivery.

The relationship between reliability and validity is intrinsic; a tool must be reliable to be valid, but reliability alone does not guarantee validity. For example, a consistent measurement tool that does not accurately reflect the concept it intends to measure lacks validity. Therefore, this research's rigorous assessment of both reliability and validity ensures a robust framework, capable of producing credible and generalizable findings. In summary, this research's rigorous approach to reliability and validity aligns with established research standards, ensuring robust, credible, and actionable insights into the factors affecting health service delivery in Uganda. By carefully assessing both consistency and accuracy in measurement, this research lays a solid foundation for subsequent analyses and provides a reliable basis for policy recommendations in health management.

Addressing Potential Issues with Cronbach's Alpha

Achieving reliability and validity is essential to support the credibility of findings. When the initial calculations of Cronbach's alpha fell below the desired threshold, systematic steps were undertaken to enhance the scale's reliability, including item analysis, scale refinement, and recalculating alpha. Initially, each item within the scale was examined to identify those with low item-total correlations, which can lower the overall alpha score. Items that did not contribute significantly to measuring the intended construct were either revised or removed. As Wang et al. (2017) and Erten and Özdemir (2020) demonstrated, a thorough item analysis can reveal problematic questions and refine scales by focusing on clarity and relevance.

Once problematic items were identified, they were revised to better capture the intended construct. This refinement may include rewording items or adding context to increase the clarity. Research shows that carefully refining items improves the internal consistency of the scale, as seen

in studies by Duyan et al., (2022) and Maulina et al., (2019), where modifications led to high Cronbach's alpha scores, indicating strong internal consistency. After adjustments, recalculating Cronbach's alpha ensured that the reliability improvements were effective. For instance, Muhammad (2023) demonstrated that item revisions increased the Cronbach's alpha, confirming the enhanced reliability of the measurement tool. This iterative process is vital to confirm that modifications positively impact the tool's internal consistency and ensure robust measurement.

Following reliability assessment, construct validity, specifically convergent validity, was addressed to evaluate the effectiveness of the research tool. Convergent validity was tested through factor loadings, composite reliability, and average variance extracted (AVE), which together determine whether items correlate highly with their designated constructs (Fornell & Larcker, 1981). High factor loadings indicated strong convergent validity, confirming that the items accurately represented their constructs. Yong and Pearce (2013) highlighted the importance of these metrics for demonstrating convergent validity, ensuring that constructs such as managerial training and networking are meaningfully represented within the research.

In summary, addressing issues with Cronbach's alpha through item analysis, scale refinement, and recalculation is critical for refining measurement tools for reliability and validity. By ensuring convergent validity, this research strengthens its capacity to generate credible and insightful findings on the factors influencing health service delivery in Uganda. These methodological steps not only enhance the robustness of the research instrument, but also uphold the overall integrity of the research outcomes.

Addressing Potential Issues with Factor Loadings

In SEM, ensuring that factor loadings meet established thresholds is critical for validating the constructs within a model. When initial factor loadings fall below acceptable levels, a systematic process of item refinement and validation is necessary to enhance construct validity. This process involves multiple stages, including reviewing conceptual alignment, conducting Confirmatory Factor Analysis (CFA), and evaluating composite reliability and Average Variance Extracted (AVE). The initial step entails reviewing items with low factor loadings to determine their conceptual alignment with the designated constructs (Hair et al., 2010). Each item is assessed to ensure that it accurately represents the theoretical framework underlying the construct. Items that appear conceptually misaligned are either revised for clarity or removed from the model if necessary. These refinements ensure that each item meaningfully contributes to the construct it is intended to measure, thereby strengthening construct validity and enhancing the overall quality of the measurement model (Martínez-López et al., 2013).

Following item refinement, CFA is conducted to validate the revised factor structure. CFA is a critical step for verifying that items load appropriately on their intended constructs and that each factor adequately represents its theoretical domain (Hair et al., 2019). This analysis substantiates the validity of the measurement model by confirming that constructs are consistently and accurately captured within the dataset. Through this step, the research ensures that the constructs remain robust and their items strongly align with the intended factors, thereby providing a firm foundation for subsequent analysis (Kline, 2011).

In addition to CFA, composite reliability and Average Variance Extracted (AVE) are calculated to further assess the cohesiveness and validity of the constructs. Composite reliability

evaluates the internal consistency of the items within each construct, with high values indicating strong reliability of the measurement instrument (Fornell & Larcker, 1981). Concurrently, AVE assesses the proportion of variance captured by a construct relative to the variance due to measurement error. Meeting the recommended thresholds for both metrics affirms that the constructs capture meaningful variance from the observed items, thereby reinforcing the validity of the findings (Hair et al., 2019).

High factor loadings, composite reliability, and AVE collectively confirm that each construct in the model is conceptually sound and empirically valid. This rigorous process underpins the empirical integrity of the research, providing a robust foundation for analyzing management factors affecting health service delivery in Uganda's WASH, UNEPI, and NTD programs. By ensuring the reliability and validity of each construct, this research enhances the credibility of its findings and contributes valuable insights into healthcare management (Saul, 2019; Williams, 2011).

Methodological Rigor

This research's methodological rigor, focusing on reliability and validity, ensured that constructs related to management factors in Uganda's WASH, UNEPI, and NTD programs were both accurately and consistently measured. By employing Cronbach's alpha and Confirmatory Factor Analysis (CFA), this research strengthens the credibility of its findings, enabling robust insights into the factors impacting health-service delivery. Reliability, assessed through Cronbach's alpha, measures the internal consistency of the survey items with a threshold of 0.70, ensuring acceptable reliability. This consistency is critical for establishing that survey items effectively capture complex constructs such as managerial training and innovation. Validity,

particularly construct validity, was confirmed using CFA, where high factor loadings indicate that items accurately represent their intended constructs, enhancing the empirical foundation of the research.

This rigorous approach provides reliable and actionable insights that support evidence-based decision making and strategic improvements in health management. Ensuring methodological rigor in measuring constructs strengthens the applicability of the findings to policy and practice, facilitating improvements in Uganda's health programs. Through rigorous application of reliability and validity measures, this research ensured the precision and consistency of its constructs and contributed valuable insights to the field of health management. By focusing on robust measurement techniques, this research upholds high methodological standards essential for informing impactful health policies.

Potential Electronic Questionnaire Challenges

In Uganda, improving Internet access is a government priority, reflected in initiatives such as the national broadband policy and public Wi-Fi hotspots aimed at improving the health management infrastructure. Despite these advancements, significant disparities have persisted between urban and rural areas. Urban health managers generally benefit from faster and more reliable connections, while rural managers face connectivity challenges, which can delay data reporting and compromise the quality of health information essential for timely decision-making (Kiberu et al., 2017; Nabukenya et al., 2023). These connectivity gaps became especially pronounced during the COVID-19 lockdown, underscoring how rural Internet limitations affected service delivery and exacerbated healthcare inaccessibility (Bose et al., 2023).

Online surveys are becoming increasingly valuable for health managers in assessing healthcare delivery, patient satisfaction, and performance metrics. However, their effectiveness relies on managers' access and ability to complete them without technical barriers. While most managers possess basic digital literacy, there are likely variations in digital proficiency that could impact their ease of navigation and the completion of the survey. Such differences in digital comfort levels could influence the data quality and response rates.

To mitigate these challenges, this research employed several strategies, including pre-survey communication, flexible completion times, follow-up reminders, and pre-testing. These measures were specifically designed to enhance accessibility and engagement, ensuring that Internet access challenges and digital literacy variations do not hinder participation or data reliability. By proactively managing these potential barriers, this research secured effective participation from health managers across different regions, contributing to a robust dataset that accurately reflects the diverse contexts of healthcare management in Uganda.

Participant Follow Up

Effective pre-survey communication was essential to prepare participants by providing them with detailed instructions on the survey's importance, objectives, and access procedures. This preparatory outreach aimed to reduce potential confusion, ensuring that participants were well informed and prepared, thus enhancing engagement and reducing dropout rates (McCoy et al., 2021). Participants were given up to one month to complete the survey, a generous timeframe designed to accommodate variable internet connectivity and busy schedules. Allowing flexibility in survey completion helped minimize incomplete submissions due to technical interruptions,

enabling participants to respond when internet stability was the most reliable. Patel et al., (2023) underscore the effectiveness of flexible deadlines in enhancing online survey participation rates.

Regular follow-up reminders were sent to the non-responders to maintain survey visibility and encourage completion. This approach aligns with the findings of Williams et al., (2021), who noted that reminders are instrumental in keeping surveys on respondent's minds, which improves response rates. Additionally, a pilot test was conducted with a different subset of health managers to identify and rectify potential technical and accessibility issues before full distribution. Feedback from the pilot informed the necessary adjustments to the survey instruments and instructions, ensuring a seamless experience for all respondents. Pilot testing is a best practice in survey methodology as it proactively addresses potential obstacles (Creswell, 2022).

In summary, these measures including pre-survey communication, extended completion timeframes, follow-up reminders, and pilot testing, demonstrate a comprehensive strategy for addressing Internet access challenges. These proactive steps improved participation rates and enhanced data quality, ensuring that all health managers, regardless of connectivity constraints, had a fair opportunity to contribute to this research.

Operational Definition of Variables

Independent Variable: Improved Delivery of Health Services

In this research, “improved delivery of health services” is operationally defined as the reduction in the gap between potential and actual health service delivery within Uganda's health programs. This conceptualization is based on the framework of Berman et al., (2011), which describes improved health service delivery by minimizing the discrepancy between achievable outcomes with current financial resources and technologies, and the actual performance observed

at various healthcare levels. This research posits that the educational background and management training of health managers are instrumental in bridging this gap, thereby enhancing service delivery.

Additionally, the research hypothesizes that the relationship between managerial education, training, and service delivery is mediated by innovation in management and moderated by collaborative networks and corruption within the health sector. Specifically:

H3: There is a positive relationship between innovation and the improved delivery of health services through health programs.

H4: The relationship between the management level of education and improved delivery of health services through health programs is moderated by collaborative networks.

H5: The relationship between the management level of education and improved delivery of health services by health programs is moderated by corruption.

To quantitatively assess “improved delivery of health services,” the research adopts the methodology by Shamsuddoha & Ali (2006), where participants evaluate their perceptions of service delivery improvements on a seven-point Likert scale (1 = Strongly Disagree, 7 = Strongly Agree). This scaling approach facilitates a nuanced analysis of perceptions related to service improvements in Uganda’s health programs, providing a structured and measurable framework for assessing key factors influencing health service delivery.

By linking theoretical constructs to practical, quantifiable outcomes, this operational definition facilitates an analysis that can yield actionable insights for policy and strategic decision making. This approach ensures that the research contributes to both academic discourse and the

practical management and improvement of health services within Uganda's healthcare sector, thereby providing a foundation for evidence-based improvements in health service delivery.

Dependent Variable: Management Level of Education

In this research, "management level of education" is defined as the highest formal management educational qualification attained by individuals in managerial roles within Uganda's healthcare programs, specifically those managing programs under WASH, NTDs and UNEPI. This variable is based on the International Bureau of Education's International Standard Classification of Education (ISCED), which categorizes educational levels according to the depth of knowledge, skills, and competencies acquired (IBE, 2016).

The research adopts the methodology outlined by Shamsuddoha & Ali (2006) to measure the "management level of education." Participants assessed the perceived benefits of their educational background through a seven-point Likert scale, where 1 represents "Strongly Disagree" and 7 represents "Strongly Agree." This scale was used to examine the following hypotheses.

H1 Managers' level of education positively influences innovation in healthcare programs.

H4 Collaborative networks moderate the relationship between the management level of education and the improved delivery of health services.

H5 Corruption moderates the relationship between the management level of education and improved delivery of health services.

Using a seven-point Likert scale to measure the management level of education provides a quantifiable method for assessing how variations in educational attainment among health managers impact program effectiveness and innovation. This approach also enables the research to explore

how these relationships are influenced by external factors, such as collaborative networks and corruption, offering a comprehensive perspective on the role of education in enhancing healthcare service delivery in Uganda. This operationalization aligns with the research objectives by enabling an empirical assessment of the role of education in health program management, thereby providing valuable insights into the educational factors that affect the sustainability and impact of health services in resource-constrained settings.

Dependent Variable: Management Training

In this research, "management training" is defined according to the framework of Sheeba and Christopher (2020), who conceptualize it as the systematic development of knowledge and skills essential for enhancing performance in managerial roles. This definition underscores that continuous training is vital for equipping health managers to adapt to the evolving demands of the healthcare sector. Continuous training not only prepares managers for sectoral reforms, but also bolsters their capacity to integrate newly acquired knowledge into decision-making processes. Ayeleke et al., (2016) further affirm that management training is essential for strengthening the capabilities of health managers within healthcare systems.

To empirically measure "management training," this research employs the methodology recommended by Shamsuddoha and Ali (2006). Participants assessed the perceived benefits of their management training through a seven-point Likert scale, where 1 represents "Strongly Disagree" and 7 represents "Strongly Agree." This scaling approach facilitates an in-depth analysis of the impact of management training on managerial effectiveness and capacity for innovation within healthcare programs. The data gathered were instrumental in testing the following hypotheses.

H2: Management training has a positive effect on innovation by healthcare programs.

By examining this relationship, this research aimed to elucidate the broader implications of management training for enhancing the effectiveness and innovation capacity of healthcare programs. Understanding the role of training in fostering innovation and improving health service delivery is crucial for developing targeted strategies to enhance healthcare management performance in Uganda. By emphasizing training as a core determinant of managerial success, this research underscores the importance of empowering health managers to lead effectively in a dynamic and often resource-constrained healthcare environment.

Dependent Variable: Innovation

In this research, "innovation" is defined as the systematic creation and implementation of new or enhanced products, practices, or methods specifically aimed at overcoming operational and strategic challenges within healthcare programs. This definition draws on the framework proposed by Basu and Green (1997), which conceptualizes innovation as an organization's capacity to generate, refine, and apply novel solutions to improve processes and outcomes. In healthcare program management, innovation serves as a conduit through which educational attainment and management training translate into improvements in health service delivery.

To measure innovation, this research utilized the empirically validated methodology of Greenberger et al., (2003), Shamsuddoha and Ali (2006), and refined by Prasad et al., (2022). Respondents were asked to assess the impact of innovation on health service delivery in their respective programs using a seven-point Likert scale ranging from 1 (Strongly Disagree) to 7 (Strongly Agree). This scale allows us to capture the nuanced perceptions of health managers

regarding the role of innovation in their organizational contexts, providing a structured approach for quantitative analysis.

The data collected were critical for evaluating the following hypotheses:

H1: Managers' level of education has a positive effect on innovation in healthcare programs.

H2: Managerial training positively influences innovation in healthcare programmes.

H3: Innovation has a positive relationship with the improved delivery of health services by health programs.

Through this methodological approach, this research aimed to establish robust empirical support for innovation as a mediating variable. This mediating role underscores the importance of innovation in converting educational and training resources into measurable improvements in health care outcomes. By highlighting the transformative potential of innovation in health care management, this research provides valuable insights into the mechanisms that drive improved service delivery and ultimately strengthen the operational efficacy of healthcare programs in Uganda.

This focus on innovation contributes to academic discourse and offers practical implications for policymakers and healthcare managers seeking to elevate the delivery of health services through continuous improvement and adaptation.

Dependent Variable: Network

In this research, "network" is operationally defined as a structured alliance of interconnected teams or individuals collaborating on shared objectives through mutual trust to achieve common healthcare goals. This definition aligns with the framework proposed by The

Health Foundation (THF, 2014) which regards networks as systems that facilitate idea exchange and foster collaboration within and across organizational boundaries.

To quantitatively assess the role of networks, this research adopted the measurement approach outlined by Shamsuddoha and Ali (2006). Respondents were asked to evaluate their networks' effectiveness in enhancing healthcare service delivery using a seven-point Likert scale ranging from 1 (Strongly Disagree) to 7 (Strongly Agree). This scaling captures the perceived impact of network participation on health care outcomes, allowing for a comprehensive analysis of how collaboration within networks influences service delivery.

The data collected were instrumental in testing the following hypotheses.

H4 The relationship between the management level of education and improved delivery of health services by health programs is moderated by a collaborative network. This hypothesis underscores the potential of networks as influential components of the healthcare organizational structure, contributing to optimized service delivery. By exploring the moderating role of networks, this research sought to provide insights into how collaborative efforts among healthcare professionals can enhance the effectiveness of health service delivery, particularly within Uganda's healthcare programs. Understanding these dynamics is critical for informing strategies that leverage networks to improve outcomes in health management practices, ultimately contributing to more effective and sustainable health care systems in Uganda.

Dependent Variable: Perceived Corruption

In this research, "perceived corruption" is operationalized as the perceived misuse of authority by public officials for personal gain, including any acts of power abuse in public roles for individual benefit. This aligns with the Bahoo et al., (2020) framework, which emphasizes the

challenges in directly measuring corruption, especially through self-report surveys. Therefore, this research focuses on perceived corruption, acknowledging that individuals' perceptions of corruption substantially impact their professional behavior and decision making in healthcare management.

This research employed the methodology of Shamsuddoha and Ali (2006) to measure perceived corruption. Respondents evaluated the perceived impact of corruption on efforts to improve health service delivery within their management roles using a seven-point Likert scale ranging from 1 (Strongly Disagree) to 7 (Strongly Agree). This approach enables a nuanced assessment of the following hypotheses.

H5 The relationship between the management level of education and improved delivery of health services by health programs is moderated by corruption.

By applying this framework, this research aimed to clarify how perceived corruption influences the relationship between managerial education, training, and healthcare service delivery outcomes. Understanding the role of perceived corruption is essential for developing effective strategies to mitigate its effects and enhance the efficiency and integrity of healthcare management practices in Uganda. This approach not only addresses the challenges inherent in measuring corruption, but also provides valuable insights into how perceptions of corruption may shape healthcare management effectiveness, supporting more informed policy and strategic decisions.

In summary, this expanded operational definition of perceived corruption, alongside those for management training, innovation, and networks, lays a strong foundation for examining critical factors in Uganda's healthcare management context. This comprehensive framework is designed to yield findings with practical implications, advancing both academic understanding and real-

world applications within resource-limited health systems, such as Uganda. These insights are expected to inform strategic initiatives aimed at improving health service delivery and emphasizing the importance of rigorously defined constructs in fostering effective healthcare management practices.

Study Procedures and Ethical Assurances

This research received ethical approval from the University Research and Ethics Committee (UREC), Vector Control Division Research and Ethics Committee (VCDREC), and Uganda's Ministry of Health, adhering to established ethical guidelines and protocols. Given the research focus on health managers at the national and district levels, with some questions addressing sensitive issues such as corruption, strict measures were implemented to maintain confidentiality and anonymity. All participant data were securely stored and accessible only to the researcher, and all individual responses were anonymized to protect their identities. This approach encourages candid participation by minimizing concerns over potential repercussions.

The research utilized self-administered online questionnaires distributed to health managers involved in NTD, UNEPI and WASH programs. The researcher's professional role as the National Trachoma Program Officer and the WASH focal point enabled direct engagement with the participants. The final list of participants was validated using the Ministry of Health's NTD, UNEPI, and WASH program databases. Invitations were sent through professional networks and association leadership channels to enhance response rates. Responses were systematically downloaded and input into SPSS for analysis, with incomplete or substantially missing data excluded to maintain quality. The data entry was carefully reviewed to ensure accuracy and consistency.

Data analysis included calculating descriptive statistics (means, standard deviations, and frequency distributions) to identify and address outliers and coding errors. This thorough analysis process is integral to ensuring reliable and valid results, thereby reinforcing the research contribution to healthcare management knowledge, specifically within NTD, Immunization, and WASH programs. By upholding rigorous ethical standards and applying systematic data collection and analysis procedures, this research ensures that the findings are not only credible but also offer meaningful insights into healthcare management challenges in Uganda. This robust ethical and methodological framework enhances the impact and relevance of this research, providing valuable and trustworthy contributions to healthcare management practices.

Pretesting

In academic research, pretesting is essential for ensuring the validity and reliability of research instruments, particularly in specialized contexts, such as healthcare management. This phase acts as a preliminary test for evaluating the effectiveness of data collection tools, as evidenced by Pratt et al., (2000). In this research, pretesting was pivotal for assessing the clarity, relevance, and comprehensiveness of the questionnaire items. The pretesting involved fourteen program managers from the Malaria and TB programs, who were outside the main research's target population, ensuring that feedback was unbiased. This process allowed the researcher to identify and rectify issues related to question clarity, language appropriateness, and the structural flow of the questionnaire, thus refining the data-collection instrument for optimal functionality in the main research.

Pretesting also offers insights into logistical elements such as response rates, completion times, and data collection efficiency, which are crucial for planning large-scale research.

Understanding these aspects beforehand enabled the researcher to anticipate and mitigate challenges and ensure smoother execution of the main study. The refinements derived from the pre-test enhanced the survey's reliability and validity, strengthened the quality of the research instrument, and contributed to the research rigor and credibility.

Pretesting is widely recognized in academic research and is fundamental for refining research design and improving data-collection methodologies (Pan & Rivers, 2023). By systematically addressing potential obstacles, researchers can enhance the quality of survey instruments, thus laying a solid foundation for reliable and robust research findings. This comprehensive preparatory step underscores the research's commitment to producing high-quality, credible insights.

Key Informants

Key informants played a pivotal role in this research by providing specialized knowledge essential to the research success. These individuals, occupying senior executive positions within Uganda's health sector, possess deep expertise in government policies and practices related to WASH, UNEPI and NTD programs. Notable key informants included the Commissioner for Policy and Planning and national-level Program Managers. Their insights offered invaluable perspectives on both operational and strategic aspects of healthcare management in Uganda. Selection of informants was based on their expertise and strategic roles, ensuring that their input was directly relevant to the research objectives, particularly in understanding the management of NTD, UNEPI, and WASH programs. The contributions of key informants were essential at multiple stages of the research process:

Informants' feedback during the questionnaire development phase ensured the clarity, relevance, and cultural appropriateness of survey items. Their input helped refine the survey instrument by addressing potential issues in question clarity, item relevance, and comprehensiveness. The contextual understanding provided by informants was invaluable in interpreting quantitative data. Their insights into local health practices, socio-economic factors, and operational challenges enriched the research by situating findings within the specific healthcare context of Uganda. This expertise helped clarify the nuanced interactions between managerial education, training, corruption, and healthcare delivery quality.

Informants contributed to the identification of critical variables, ensuring that the research captured the key factors affecting healthcare management effectiveness. Their input enabled the research to focus on significant aspects of the relationship between managerial factors and health service delivery outcomes. The informants' endorsement and authority facilitated access to research participants, improving response rates and data quality. Their support was especially important in building trust, which is essential for data collection in healthcare settings.

The involvement of key informants significantly enhanced the validity and reliability of the study by providing expert insights and feedback. Their contributions enriched the research's depth, supporting a rigorous exploration of healthcare management dynamics in Uganda. This approach not only strengthens the immediate findings but also lays a solid foundation for future research and practical applications in healthcare management.

Ethical Assurances

This research was approved by the University Research and Ethics Committee (UREC), Vector Control Division Research and Ethics Committee (VCDREC), and Uganda's Ministry of

Health, ensuring adherence to strict ethical protocols. Research involving human participants, particularly healthcare managers, requires careful ethical planning with a focus on informed consent, confidentiality, anonymity, and protection from harm. Prior to participation, each respondent reviewed a consent form detailing the purpose, potential risks, and voluntary nature of the research. Participants consented by selecting “yes,” knowing they could withdraw at any time without consequences.

Given the sensitivity of certain survey topics, particularly those related to corruption, protective measures were prioritized. Personal identifiers were not recorded, and both quantitative and demographic data were anonymized and stored securely in an encrypted, password-protected database accessible only to the researcher. These steps are critical for ensuring data confidentiality and safeguarding the privacy of the participants. Furthermore, the researcher's significant professional roles in Uganda's health programs prompted the adoption of a self-reflective approach to minimize potential biases and enhance objectivity in data analysis and interpretation (Guillemin & Gillam, 2004).

Ethical Considerations

The ethical considerations in this research extend beyond regulatory compliance to uphold participant welfare and research integrity. Oversight from the UREC, VCDREC, and the Ministry of Health provided a rigorous ethical framework, affirming that the research design, methodology, and data collection conformed to established standards. The participants were fully informed of the voluntary nature of the research and their right to withdraw at any time. The comprehensive consent forms outlined the research objectives, procedures, potential risks, and confidentiality

measures. The participants had opportunities to seek clarification before consenting and ensuring fully informed participation.

To maintain privacy, all data were anonymized and personal identifiers were removed to prevent any link between responses and individual participants. Data security was upheld through encrypted password-protected storage, with access restricted to the researcher. Methodological rigor, including structured online surveys and Structural Equation Modeling (SEM), ensured objectivity and reliability of data interpretation. Transparent communication with participants and stakeholders further upheld ethical standards. Participants were provided with contact information for the research team and institutional review boards, allowing for prompt reporting and resolution of concerns. Ethical sensitivity was extended to the survey design, with noninvasive questions approved by the research supervisor to minimize discomfort.

By adhering to these comprehensive ethical standards, the research ensured the participant protection, research integrity, and reliability of the findings. This ethical commitment underscores responsible research practices in healthcare management, fostering trust in the research contributions to healthcare management.

Mitigating Potential Bias

Recognizing the researcher's dual role as a National Trachoma Program Officer and WASH/NTD collaboration focal point, this research implemented comprehensive strategies to mitigate bias and uphold research integrity. A key strategy was the adoption of a self-reflective approach in which the researcher engaged in continuous critical self-assessment to monitor how professional experience could influence outcomes. This reflexive process, consistent with

Guillemin and Gillam (2004), ensures transparency in recognizing positionality and its possible impact on research.

To maintain methodological rigor, the research utilized validated data collection and analysis tools and adhered to best practices to reduce personal bias. A thorough literature review and consistent application of standardized methods strengthened objectivity, reflecting ethical research standards, particularly in protecting participants' confidentiality (Guillemin & Gillam, 2004). Furthermore, the research process emphasized transparency by providing participants with comprehensive informed consent documents that outlined the research goals, processes, and potential risks. This transparency, as emphasized by Canario et al., (2022), is essential in fostering trust, especially in sensitive fields such as healthcare management.

Structured online surveys and robust quantitative methodologies, notably Structural Equation Modeling (SEM), were employed to ensure impartiality in the data interpretation. SEM's capacity to model complex relationships among variables allows for a rigorous, unbiased examination of the data (Guillemin & Gillam, 2004). Transparency was reinforced by openly discussing the study's limitations, facilitating peer review, and enabling future replication. This openness in the research process strengthened the validity and safeguarded against biases that could arise from the researcher's background. Continuous review by the research supervisor provided another layer of scrutiny, offering critical feedback and helping to identify any unnoticed biases. Such a review, essential to academic rigor, ensured objectivity and reinforced the credibility of the findings.

In summary, the integration of reflexivity, ethical transparency, rigorous quantitative methods, and supervisor feedback safeguarded potential biases, ensuring that the conclusions of

the research was credible and valuable. This methodological rigor highlights the researcher's commitment to ethical standards and delivers robust insights into the healthcare management factors affecting service delivery in Uganda. The unbiased and transparent approach offers a significant academic contribution, aligning with the highest standards of scholarly research.

Data Collection and Analysis

To investigate management factors affecting health service delivery in Uganda, this research employed a survey-based, quantitative design aligned with Creswell's (2012) recommendations for positivist research, enhancing the reliability and validity of findings (Wahyuni, 2012). Surveys are widely recognized as effective for large-scale data collection, providing insights across populations (Hiebl & Richter, 2018), and offer scalability and ease of administration, especially through online methods (Swar et al., 2017).

The survey instrument used a seven-point Likert scale ranging from 1 ("strongly disagree") to 7 ("strongly agree") to capture nuanced responses from health managers, aligning with best practices in psychometric scaling (Givon & Shapira, 1984; Viswanathan et al., 2004). A seven-point scale balances response variability and reliability, which is vital for robust statistical analysis (Preston & Colman, 2000). This approach allows for the quantifiable exploration of variables and their relationships (Bell, 1995) and enables generalization across findings (Jupp & Norris, 1993).

The research framework incorporated latent variables, central to examining complex constructs such as healthcare management factors. Latent variables, inferred through a series of observable indicators, enabled a deeper investigation into health management dynamics within Uganda (Yalçın & Baykal, 2019). Analyzing these constructs involved understanding each

question's loading and the variance explained by responses, aligning with psychometric rigor and the quantitative nature of this research (Michael et al., 2022).

Data Cleaning Procedures

Data cleaning is essential in ensuring statistical integrity and accuracy, with detailed procedures followed to enhance the quality of analysis (Kishore, 2018). Initially, the dataset was inspected for missing values using SPSS. Literature suggests a manageable threshold of under 5% for missing data (Feng et al., 2018), and in this research, minor gaps were resolved using mean and median imputation, preserving data integrity and minimizing bias (Dziadkowiec et al., 2016). Outliers were identified and assessed using descriptive statistics and boxplots. Any outliers verified as legitimate were handled with data transformation techniques to reduce their potential distortion of statistical results, maintaining representativeness within the target sample.

Normalization and scaling ensured data comparability across variables, and data normality was verified via skewness and kurtosis statistics supplemented by histograms and probability plots, aligning with requirements for SEM (Structural Equation Modeling). Data consistency checks were also conducted, including range and logical checks to confirm coherence between data points, such as age and experience alignment. These verifications reinforced dataset reliability, essential for the rigor of the forthcoming SEM analysis. Post-cleaning, the data were imported into AMOS, with precise specification of constructs and measurement models to ensure alignment with study hypotheses.

The data cleaning process meticulously addressed missing values, outliers, normalization, and consistency, preparing a dataset that was both clean and reliable for analysis. These robust methodological steps ensured data integrity, contributing significantly to the credibility and

applicability of findings in Uganda's healthcare management field. This rigorous approach supports the validity of research outcomes, advancing knowledge and offering practical implications within healthcare delivery management.

Survey Instrumentation:

This research employed a structured questionnaire with a seven-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree), to capture nuanced responses from health managers. The questionnaire focused on six constructs identified through a comprehensive literature review: management level of education, management training, innovation, networks, perceived corruption, and improved healthcare service delivery. Each construct was designed to address specific dimensions within healthcare management, aligned with the research positivist paradigm, to enhance reliability and validity (Wahyuni, 2012). This structured format allows systematic data collection across multiple dimensions, thereby improving response consistency and comparability.

The questionnaire design was strategically aligned with the objectives of the study. For example, questions on management education and training assess the educational background and professional development of healthcare managers, whereas sections on innovation and networking capture the adoption of new practices and collaborative efforts within healthcare programs. The sections addressing corruption and healthcare delivery focus on perceived barriers and facilitators affecting service delivery. These questions provide a robust framework for investigating the factors influencing healthcare management in Uganda. The seven-point Likert scale enables a detailed statistical analysis, offering a deeper examination of the relationships among the constructs, including education, training, innovation, and corruption.

Secondary Data

Secondary data were gathered through an extensive literature review, drawing from academic and professional databases, including Google Scholar, ProQuest, and the UNICAF Library, which offer access to peer-reviewed research on management, healthcare innovation, and service delivery. This review informed the theoretical framework and grounded the research in established knowledge about the management factors affecting healthcare delivery.

The literature review explored critical constructs, including education, training, innovation, networking, and corruption in healthcare. Evidence has consistently shown that advanced education and continuous training correlate positively with improved healthcare delivery (Clausen et al., 2018; Hussey & Hughes, 2020). Innovation, notably through practices such as telemedicine and electronic health records, has been shown to significantly enhance healthcare delivery efficiency (Maphumulo & Bhengu, 2019). Effective networking fosters knowledge exchange and resource sharing, contributing to service improvement (Blau et al., 2022). Conversely, corruption is a well-documented barrier that leads to resource misallocation and increased costs, undermining service quality (Martinussen & Rydland, 2020; Mashrafi, 2024).

Insights from these studies informed both the survey design and hypothesis development. For instance, hypotheses regarding the impact of education on healthcare outcomes have been formulated based on consistent literature findings (Liu, 2024; Magumba, 2023). Specific survey items, such as those assessing the relationship between training and innovation, have been developed based on insights into the role of management education in fostering adaptive practices (Hasan et al., 2019; Koce et al., 2019).

Application of Secondary Data Insights

The literature review provided foundational insights essential for identifying and defining key constructs, and informed the survey's measurement scales, enhancing both the reliability and validity of the research. Constructs such as management education, innovation, networking, and corruption were operationalized based on validated scales from prior studies, with Cronbach's alpha and factor loadings used to ensure item reliability and construct coherence. These measures reinforced the accuracy and internal consistency of the survey items, which was crucial for structural equation modeling (SEM) analysis in this research.

Based on best practices from previous research, insights into survey design, pretesting, and instrument refinement were applied throughout the development process to ensure clarity, relevance, and precision (Malakoane et al., 2020; Mathonsi, 2023). Pre-testing identified and resolved potential ambiguities, confirming construct alignment and thereby optimizing the instrument for reliable data collection. This step further ensured that the constructs adequately captured the complex factors influencing healthcare management practices in Uganda's NTD, WASH, and UNEPI programs.

This integration of secondary data into the survey design provides both theoretical and methodological rigor. By grounding the primary data collection within the established literature, this research provides a robust framework for hypothesis testing and SEM analysis, positioning the research to make meaningful contributions to both theory and practice. Additionally, high-quality peer-reviewed sources identified during the review facilitated the construction of a solid theoretical foundation while highlighting emerging trends and gaps within the healthcare management literature. This dual approach enhances the robustness, credibility, and relevance of

the research to the Ugandan healthcare context, offering a framework for future research and targeted improvements in health service delivery systems.

Data Analysis Methods

This research employed Structural Equation Modeling (SEM) techniques, utilizing Confirmatory Factor Analysis (CFA) to assess model fit indices and validate the proposed theoretical model. SEM was particularly appropriate for this research because of its capacity to examine complex relationships between multiple latent constructs, making it well suited to the intricate management factors impacting healthcare service delivery. CFA and path analysis were conducted using a specialized software selected for its ability to rigorously handle latent variable structures. SEM's robust handling of latent constructs allowed for a nuanced investigation into the relationships among key factors, namely management education, training, innovation, networking, perceived corruption, and healthcare service delivery improvements.

Following Hair et al., (1998), factor loadings were set at a threshold of 0.5, ensuring the robustness and reliability of the model by including only indicators with substantial contributions to the constructs. Although factor analysis presents challenges such as difficulties in factor naming and split loadings, these issues were addressed through model refinement and rigorous statistical validation, resulting in a model that closely aligns with the research questions and hypotheses. The research design effectively balances empirical rigor with the complexities of analyzing latent constructs. SEM and path analysis provide a robust framework for assessing both direct and indirect relationships among constructs, contributing to a comprehensive understanding of how managerial factors influence healthcare service delivery. This methodological rigor enhances the

interpretative power of the research, ensuring that the relationships among the constructs are both statistically significant and meaningful.

By employing CFA, the research validated the measurement model, affirming that the constructs were both reliable and valid in the research context. SEM analysis confirmed the hypothesized relationships between the variables and provided insights into the strength and direction of these associations. These insights are critical for understanding the effects of the management factors on healthcare service delivery outcomes, thereby offering evidence-based guidance for interventions in the healthcare management field.

SEM and path analysis establish a rigorous statistical framework for interpreting the relationships among multiple latent constructs. This approach ensures that the findings are valid, generalizable, and insightful, thus providing a solid empirical foundation for practical strategies aimed at enhancing healthcare service delivery. This research contributes significantly to academic and practical knowledge in healthcare management by leveraging SEM's ability to elucidate complex interdependencies within the Ugandan healthcare context.

Structural Equation Modeling (SEM)

This research utilized Structural Equation Modeling (SEM) for data analysis, recognizing its robust capability to handle complex latent constructs and provide insights into intricate relationships among variables (Hoyle, 1995). SEM's comprehensive approach included key stages designed to ensure rigorous analysis, starting with Confirmatory Factor Analysis (CFA) to validate the measurement model and assess model fit indices. As this research is theory-driven with specific hypotheses regarding the relationships among constructs, SEM's ability to evaluate both

measurement and structural models offer an ideal framework for exploring how managerial factors impact healthcare service delivery in Uganda.

The Confirmatory Factor Analysis (CFA) validated the measurement model by confirming that the observed variables accurately represented their latent constructs, a critical step in theory-driven research (Hair et al., 2019). CFA ensured that each latent construct was statistically robust, thereby establishing the validity and reliability of the survey instrument. This process involved a systematic approach beginning with the specification of variables, where both observed and latent variables were defined in alignment with the theoretical framework guiding the research. This step was essential to ensure conceptual clarity and consistency across the model's constructs.

The data identification phase followed, which assessed the dataset's suitability for SEM. This involved verifying data completeness and normality to ensure it met the assumptions required for SEM analysis. Only data that adhered to these conditions were included, thereby safeguarding the accuracy of subsequent analyses. Next, model estimation was conducted using maximum likelihood estimation, a technique that optimizes parameter estimation and enhances the statistical robustness of the model. This step provided the foundation for accurate measurement and analysis of the constructs.

Model evaluation then assessed the model's fit to the data using standard fit indices, including Chi-square, RMSEA, CFI, and TLI. These indices confirmed whether the hypothesized model accurately represented the empirical data. A well-fitting model not only substantiated the theoretical framework but also enhanced the reliability of the findings. The rigorous application of these evaluation techniques reinforced the validity of the measurement model and its constructs.

Path analysis within the SEM framework quantified the path coefficients and tested the significance of hypothesized relationships, enabling a detailed examination of both direct and indirect relationships among variables. This comprehensive approach provided insights into the interactions among management education, training, innovation, networking, and perceived corruption. By analyzing latent variables derived from observable data, this research gained a deeper understanding of the strength and direction of each construct's influence on healthcare service delivery.

To ensure robustness, factor loadings were set with a minimum cut-off of 0.5, consistent with Hair et al., (1998). In certain cases, a threshold of 0.3 was adopted, as recommended by Young and Pearce (2013), when the context justified a more lenient criterion. SEM's capacity to model multiple latent relationships made it particularly suitable for investigating the interdependencies among the variables in this study. This ability to explore complex constructs and their interactions enabled the research to provide nuanced insights into the management factors influencing healthcare service delivery.

Selection of SEM Using AMOS

Structural Equation Modeling (SEM) was selected for this research due to its capacity to model complex relationships, analyze latent variables, and account for both direct and indirect effects (Hair et al., 2019; Kline, 2011). This renders SEM an optimal methodology for examining the management factors influencing healthcare delivery. Its ability to address multilayered interactions among variables such as managerial education, training, innovation, networking, and corruption is particularly appropriate for the intricate nature of healthcare management. SEM

facilitates the simultaneous analysis of interdependent variables, providing a comprehensive understanding of the dynamics at play (Martínez-López et al., 2013).

One of SEM's primary strengths is its ability to incorporate latent variables—constructs that cannot be directly measured but are inferred from observable indicators (Fornell & Larcker, 1981; Hair et al., 2010). This feature is essential for capturing factors such as managerial education, perceived corruption, and networking, which are pivotal in understanding healthcare outcomes. By incorporating latent variables, SEM enhances construct validity, ensuring that the theoretical underpinnings of these factors are robustly represented and accurately assessed (Kline, 2011).

SEM also excels in its capacity to analyze both direct and indirect effects, providing insights into complex pathways that traditional regression techniques often fail to capture (Byrne, 2016). For instance, SEM can elucidate how managerial education impacts innovation not only directly but also indirectly through intermediary factors such as training and networking. This ability to map mediated pathways is instrumental in uncovering the nuanced relationships that drive healthcare service delivery (Hair et al., 2019).

To ensure the accuracy and reliability of the model, SEM incorporates robust model fit indices such as the Comparative Fit Index (CFI) and Root Mean Square Error of Approximation (RMSEA) (Hu & Bentler, 1999). These indices evaluate the model's ability to represent the observed data accurately, thereby strengthening the credibility and validity of the research findings. A strong model fit is critical in healthcare management research, where the quality of the data and the reliability of interpretations can significantly influence policy and practice (Hair et al., 2019; Kline, 2011).

Additionally, SEM accounts for measurement errors, which enhances the precision of parameter estimates (Fornell & Larcker, 1981). This is particularly important in healthcare management, where biases or response inconsistencies could compromise data quality. By explicitly modeling measurement errors, SEM ensures that the findings are both reliable and valid, thereby providing a robust foundation for drawing meaningful conclusions (Martínez-López et al., 2013).

The utilization of SEM, supported by Confirmatory Factor Analysis (CFA), provided this research with a rigorous and multidimensional framework for analyzing complex interactions among key variables in healthcare management. Through the careful implementation of SEM, this study generated reliable insights into the structural relationships underlying healthcare service delivery, contributing to both academic discourse and practical advancements in healthcare management practices within the Ugandan context.

In summary the use of SEM, supported by CFA, provided this research with a rigorous, multidimensional framework for analyzing complex interactions among key variables in healthcare management. Through careful implementation of SEM, this research generated reliable, valid insights into the structural relationships underlying healthcare service delivery, contributing to both academic discourse and practical advancements in health management practices within the Ugandan context (Hair et al., 2019; Kline, 2011).

Comparison with Multiple Regression Analysis

Structural Equation Modeling (SEM) was chosen over multiple regression analysis because of its distinct advantages in handling complex, multidimensional data involving both observed and latent variables. This research focuses on constructs such as managerial education, perceived

corruption, and innovation, elements that are inherently abstract and inferred through multiple indicators. Unlike multiple regression, which can only process directly measured observed variables, SEM accommodates latent constructs, ensuring a comprehensive and theoretically grounded analysis (Hoyle, 1995). This capability makes SEM, used with AMOS software, particularly advantageous for examining healthcare management factors that impact service delivery in Uganda.

One of SEM's strengths of SEM is its ability to assess both direct and indirect effects in a single model, which is necessary in this research. For instance, SEM can assess the direct influence of managerial education on healthcare delivery while simultaneously evaluating the indirect effects mediated by innovation and those moderated by networking and corruption. This layered analysis provides a richer understanding of the pathways that shape health care outcomes. By contrast, multiple regression typically assesses only direct relationships and is limited to analyzing one dependent variable at a time, thus failing to capture the integrative complexity needed for this research.

Another significant advantage of the SEM is its ability to handle measurement errors. SEM explicitly models measurement errors, resulting in more accurate parameter estimates and enhancing the validity of findings. However, multiple regression assumes error-free measurements, which can skew results if this assumption is not met. SEM's use of fit indices, including Chi-square, RMSEA, CFI, and TLI, allows for a comprehensive evaluation of model fit. These indices enable researchers to make data-informed adjustments, a robustness in validation that multiple regression lacks, ultimately enhancing SEM's suitability of SEM for exploring nuanced relationships among management variables in healthcare.

AMOS provides a user-friendly graphical interface that simplifies path diagram specification and modification. This intuitive feature enables clear representation of complex structural relationships, which is particularly useful in research involving multiple latent constructs and interdependencies. Additionally, AMOS's compatibility with SPSS enhances workflow efficiency, enabling seamless data management, analysis, and interpretation. This integration is critical in settings in which efficiency and accuracy are paramount, such as in this research. AMOS's reliance on maximum likelihood estimation (MLE) also supports the research's rigor. MLE's robustness of the MLE in delivering unbiased parameter estimates is especially beneficial in research scenarios with limited sample sizes, providing greater reliability in situations where larger samples are challenging to obtain.

In summary, SEM with AMOS offers substantial advantages over multiple regression in modeling intricate relationships and accounting for latent variables. Its ability to analyze complex pathways, integrate both direct and indirect effects, and model measurement errors ensure that the findings are theoretically sound and empirically robust. By choosing SEM, this research delivers nuanced analysis of how management factors namely education, training, and innovation interact with networking and corruption to impact healthcare delivery in Uganda. Consequently, SEM with AMOS offers a more powerful and reliable framework than multiple regression, yielding insights that are critical for informing healthcare management strategies and improving service delivery in the Uganda healthcare context.

Confirmatory Factor Analysis (CFA)

Before analyzing the hypothesized relationships, CFA was performed to ensure the adequacy of the measurement model and to validate the constructs central to this research (Barclay,

2024). CFA serves as a foundational step in Structural Equation Modeling (SEM) by verifying that observed variables reliably represent latent constructs, which is critical for ensuring accurate interpretation in subsequent model testing (Terzioglu et al., 2022). Confirming these relationships, the CFA supports the structural integrity of the analysis and strengthens the validity of the theoretical constructs that underlie healthcare management factors within the Ugandan context.

SEM enables a detailed examination through path coefficients, which indicate the strength and direction of the relationships between variables. These coefficients provide essential insights into the direct and indirect effects of management practices on healthcare delivery (Smalls et al. 2014). This detailed analysis of relational dynamics helps to identify specific areas where management interventions could most effectively improve healthcare service delivery, offering practical leverage points for policy adjustments and management strategies.

Although multiple regression analysis can effectively analyze relationships among observed variables, it has significant limitations when dealing with complex latent constructs (Akkuş, 2016). Unlike SEM, multiple regression does not incorporate latent variable analysis or measurement error correction, often leading to biased estimates that can compromise the validity of the findings (Beran & Violato, 2010). By contrast, SEM integrates both factor and path analyses, allowing for a comprehensive analysis of complex interdependencies among multiple variables. This integration makes SEM more appropriate for examining intricate healthcare management structures, as it accounts for latent constructs that are crucial to understanding multifaceted systems, such as healthcare delivery.

To mitigate sampling bias, a random sampling approach was employed to ensure a representative sample of healthcare managers across Uganda (Beran & Violato, 2010). The survey

instrument was pretested to ensure clarity and relevance, with feedback incorporated to reduce potential measurement bias and improve data accuracy (Akkuş, 2016). Additionally, SEM's ability to simultaneously model multiple variables strengthen the analysis by controlling for potential confounding variables. This simultaneous modeling capability allows for the isolation of each predictor's specific effect, thus addressing confounding influences more effectively than alternative methods (Beran & Violato, 2010).

In summary, the use of SEM in this research is justified by its ability to model complex relationships among latent constructs while robustly addressing biases and confounding variables. Compared with methodologies such as multiple regression, SEM provides a more comprehensive and reliable framework for examining how management factors affect healthcare delivery outcomes in Uganda. The methodological rigor of SEM ensures that the research findings are not only valid and accurate, but also offer meaningful insights into the dynamics of healthcare management, providing a robust basis for policy and practice improvements.

Validity and Reliability Metrics

To ensure the reliability and validity of the findings, this research employed multiple robust metrics across key dimensions including internal consistency, convergent validity, discriminant validity, and model fit. This approach provides a comprehensive framework to rigorously evaluate the constructs integral to healthcare management in Uganda. Cronbach's alpha was calculated for each construct to assess internal consistency with a threshold of 0.70, as recommended by Nunnally (1979). Constructs such as managerial education, training, and innovation were measured using Cronbach's alpha to confirm reliable internal correlations among the items, underscoring the consistency of responses within each construct.

Convergent validity was assessed by examining factor loadings on the intended constructs, with loadings above 0.50, indicating strong convergent validity (Hair et al., 2012). For instance, items designed to assess innovation within healthcare settings are expected to load significantly on the innovation construct, reinforcing the precision and alignment of survey items with theoretical expectations. The Fornell–Larcker criterion was used to confirm discriminant validity. According to this approach, the square root of the average variance extracted (AVE) for each construct should exceed the inter-construct correlations (Fornell & Larcker, 1981). Constructs such as managerial education and innovation demonstrated no cross-loadings, affirming their distinctiveness and supporting construct validity by ensuring that each variable represents unique aspects of the healthcare management framework.

Model Fit Indices

A combination of indices was used to evaluate model fit. Chi-square Statistic: Assesses model fit but is sensitive to sample size, often complemented by other indices. Root Mean Square Error of Approximation (RMSEA): RMSEA values below 0.08 indicate a reasonable model fit, accommodating model complexity (Browne & Cudeck, 1993). Comparative Fit Index (CFI): Measures the fit of the target model relative to an independent baseline model, with values close to 1 indicating a good fit. Akaike Information Criterion (AIC): It is applied to optimize model selection by balancing model fit with complexity and minimizing overfitting (Akaike, 1974).

By combining Cronbach’s alpha for internal consistency, comprehensive validity checks, and a diverse set of fit indices, this research established a firm analytical foundation. This methodological rigor ensured that the findings were both reliable and valid, providing significant

insights into the factors influencing healthcare service delivery in Uganda and advancing knowledge in healthcare management.

Description of Data

The data analysis in this research follows a dual-methodological approach, combining both descriptive and explanatory elements to provide a comprehensive understanding of the factors influencing healthcare management in Uganda. The descriptive aspect, primarily drawn from factor analysis, reveals patterned relationships among variables, which aids in establishing theoretical foundations and generalizability of findings. Confirmatory Factor Analysis (CFA) plays a key role in this descriptive component by evaluating whether the observed variables reliably represent the hypothesized latent constructs. Thus, CFA serves as a preliminary step to validate the measurement model by confirming the adequacy of the relationships between the observed variables and their latent counterparts. This validation ensures that measurement properties, including reliability and validity, accurately capture the influence of each construct within the dataset.

The explanatory aspect of this research employs structural equation Modeling (SEM), a comprehensive method for testing causal relationships within the hypothesized framework. SEM's dual components, the Measurement Model and the Structural Model, allow it to holistically examine the interconnectedness of variables. The Measurement Model assesses the properties of the observed variables, emphasizing internal consistency, reliability, and validity to confirm that they accurately represent their respective latent constructs. SEM's Structural Model, on the other hand, delineates the hypothesized causal pathways among these constructs, estimating both direct and indirect effects simultaneously. This approach offers an in-depth understanding of the

relationships within the data, going beyond what multiple regression analyses can achieve by accommodating multiple dependent and independent variables simultaneously.

SEM's integrated capacity to model both direct and indirect effects among latent variables enhances the methodological rigor of this research. Thus, the combined use of CFA and SEM not only validates the measurement model, but also allows a nuanced exploration of the hypotheses of the research, providing a robust framework for understanding the factors influencing healthcare service delivery. This methodologically robust approach enables a holistic view of latent constructs and their interplay, significantly contributing to both theoretical and practical insights into healthcare management.

Data Transformation and Preparation for SEM

Prior to the SEM, meticulous data transformation and preparation were performed to ensure compatibility and integrity. Variables were standardized, allowing for comparability across different scales, which is a crucial requirement for SEM analysis that assumes variables are on a consistent scale (Tabachnick & Fidell, 2019). This standardization step was followed by exporting the cleaned data from SPSS to AMOS, ensuring that the data format was fully compatible with the SEM analytical framework and enhancing the efficiency and accuracy of the SEM process (Byrne, 2016).

These preparatory steps underscore the rigorous approach adopted in this research to optimize data reliability, validity, and overall robustness. By addressing key issues related to missing data, outliers, and data consistency, this research ensures the integrity of the findings, and establishes a replicable process for future research in healthcare management. Through its comprehensive methodological framework, this research advances both academic knowledge and

practical applications in healthcare management, making significant contributions to the understanding of the factors that drive effective healthcare service delivery in Uganda.

Chapter Summary

This chapter established a rigorous methodological framework grounded in a positivist paradigm, setting a solid foundation for the research. Developed through a thorough review of the relevant literature, the methodology combines both theoretical insights and empirical rigor to investigate the management factors influencing healthcare service delivery in Uganda. The chapter outlined key aspects of the data collection process, notably the use of a seven-point Likert scale to capture nuanced responses. This scale choice enhances data reliability and validity, which are essential for accurately assessing latent constructs central to this research.

A significant portion of the chapter is dedicated to the analytical methods employed: CFA and SEM. CFA was used to validate the measurement model to ensure that the observed variables adequately represented their latent constructs. SEM facilitated the exploration of complex relationships, allowing for the simultaneous analysis of multiple dependent and independent variables. This methodological choice was particularly suited to the research objective of examining intricate causal pathways within healthcare management. The robustness of SEM, complemented by SPSS and AMOS software, provided the analytical strength required to effectively test the proposed hypotheses.

In contrast to the previous chapters, which developed the theoretical foundation and research context, this chapter focuses on preparing for empirical analysis. The chapter's systematic approach to methodology, data collection, and analysis ensures the reliability and validity of the research findings and also seamlessly bridges the theoretical constructs with practical, data-driven

insights. The next chapter will apply this framework, leveraging SPSS and AMOS to analyze the collected data and empirically validate the research hypotheses, thus enabling a thorough exploration of the management factors affecting healthcare delivery.

This chapter demonstrates a comprehensive integration of theory and methodology, underscoring the research's commitment to methodological rigor and reliability. By establishing a strong methodological base and employing sophisticated analytical tools, this study makes a meaningful contribution to healthcare management, particularly in the context of Uganda.

CHAPTER 4: FINDINGS

Chapter introduction

Chapter 5 builds directly on the insights presented in previous chapters, particularly a detailed analysis of how management education and training impact healthcare service delivery within Uganda's health programs. This chapter shifts from the empirical and theoretical exploration of management factors, including education, training, innovation, networks, and corruption, to a comprehensive discussion of the broader implications of these findings for policy and practice. The analysis in Chapter 4 highlights the critical roles of managerial education and training in fostering innovation within healthcare programs while examining the moderating effects of networks and corruption on service delivery outcomes. Chapter 5 synthesizes these findings and presents recommendations for health program managers, policymakers, and stakeholders in Uganda's healthcare sector.

In this chapter, we delve into the practical implications of this research and provide actionable recommendations for enhancing healthcare service delivery based on the study's results. The focus is on how to effectively leverage managerial education, training, and innovation to address the key challenges identified in Uganda's healthcare programs, such as corruption and network inefficiencies. Additionally, this chapter explores strategies to mitigate obstacles, such as weak intersectoral coordination and pervasive corruption, which undermine the effectiveness of healthcare programs.

Finally, Chapter 5 outlines a roadmap for applying the insights gained from this research to strengthen Uganda's health systems. The conclusions drawn contribute to the broader discourse on healthcare management, particularly within resource-constrained settings, and emphasize the

crucial role of strategic management in achieving sustainable improvements in health service delivery.

Statistical Analyses used

Confirmatory Factor Analysis (CFA)

CFA and SEM are rigorous statistical techniques widely used in social sciences and healthcare research to validate theoretical constructs and investigate intricate relationships among variables. In this research, CFA was employed to verify whether the observed variables accurately reflected the latent constructs underlying the hypothesized model. CFA is particularly well suited for examining the validity and reliability of constructs such as management education, training, networks, and corruption within Uganda's healthcare context. In contrast, SEM provides a broader analytical framework that incorporates both measurement and structural models to examine the direct and indirect pathways among these constructs, offering a comprehensive lens through which to assess their influence on healthcare service delivery.

Steps in Confirmatory Factor Analysis (CFA)

The Confirmatory Factor Analysis (CFA) process adhered to a structured, multi-step approach to rigorously evaluate the validity of latent constructs. The initial step encompassed model specification, wherein hypothesized relationships between observed variables and latent constructs were delineated based on theoretical insights from management and healthcare delivery literature (Sita, 2023). This step established the foundational structure for the analysis by mapping variables, namely managerial education, innovation, and perceived corruption, to their respective latent constructs. This theoretical grounding ensured that the measurement model reflected the key constructs relevant to healthcare service delivery.

Subsequently, model identification was conducted to ensure the model was identifiable, a prerequisite for parameter estimation in CFA. This process involved verifying that there were a sufficient number of observed variables per latent construct, consistent with established guidelines (Ismail et al., 2018). Ensuring model identification is critical for accurate estimation of parameters and the stability of the results. This meticulous verification guaranteed that the model met the necessary statistical requirements for further analysis.

Following identification, model estimation was performed using AMOS software. Parameters were estimated through Maximum Likelihood Estimation (MLE), which is valued for its robustness in handling model complexity and statistical properties (Esfarjani et al., 2018; Lemma, 2023). MLE facilitated precise estimation of the relationships between observed variables and latent constructs, providing a strong foundation for evaluating the model's validity. This step is a cornerstone of the CFA process, allowing for rigorous testing of the hypothesized measurement model.

The evaluation of model fit ensued, with various indices calculated to determine the congruence between the hypothesized model and the observed data. Key fit indices included the Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), and chi-square tests, which are standard metrics in CFA (Fadaie, 2023). Meeting acceptable thresholds for these indices confirmed the robustness of the constructs and their operationalization within the research context. A well-fitting model indicates that the data supports the theoretical relationships proposed in the measurement model.

Finally, model modification was conducted where necessary to improve model fit. Guided by modification indices and theoretical relevance, adjustments were implemented to enhance the

model's accuracy while preserving its theoretical integrity (Xia & Yang, 2018). This iterative refinement process ensured that the measurement model was both well-fitting and aligned with the theoretical framework, providing a valid and reliable foundation for further analysis.

Steps in Structural Equation Modeling (SEM)

Building on the Confirmatory Factor Analysis (CFA) framework, Structural Equation Modeling (SEM) extends the analysis by encompassing the structural model, which defines the causal relationships among latent variables central to the research hypotheses. In this research, SEM was employed to explore the complex interdependencies among constructs, such as the pathways linking management training to innovation and corruption to service delivery efficacy. This approach facilitated a comprehensive analysis of how these factors influence healthcare service delivery in Uganda.

The SEM process commenced with model specification, wherein both the measurement and structural models were defined in alignment with the theoretical framework (Chalwe et al., 2023). This step involved conceptualizing how variables, such as networks, managerial training, and innovation, contribute to healthcare service delivery. Theoretical insights guided the development of the hypothesized relationships, ensuring that the model accurately reflected the dynamics of healthcare management in the Ugandan context.

Model identification followed, ensuring that the structural model was suitable for robust parameter estimation. This phase, analogous to the identification process in CFA, involved verifying that the number of parameters to be estimated did not exceed the available data points. Proper identification is crucial for the stability and reliability of parameter estimates in SEM, particularly when analyzing complex datasets with numerous interrelated constructs.

Once the model was identified, parameters were estimated using Maximum Likelihood Estimation (MLE) in AMOS. MLE, valued for its robustness and efficiency in handling complex interrelationships, facilitated precise computation of the relationships among the variables (McNeish & Wolf, 2023). This stage was pivotal for testing the hypothesized pathways and assessing their strength and significance within the dataset, providing critical insights into the structural relationships among management factors.

The evaluation of model fit was a key step in SEM, where indices such as the Comparative Fit Index (CFI) and Root Mean Square Error of Approximation (RMSEA) were calculated to determine the model's congruence with the empirical data (Hoofs et al., 2017). These fit indices, alongside the chi-square test, provided evidence of the model's validity. Where necessary, adjustments were made to refine the model, ensuring that it accurately represented the observed data while adhering to theoretical expectations.

Model modification was performed to enhance the model's fit when the evaluation indicated potential areas for improvement. Adjustments were guided by theoretical rationale and supported by modification indices, ensuring alignment between the hypothesized model and observed relationships in the data (Falk & Muthukrishna, 2023). This iterative process strengthened the validity of the structural pathways, providing a robust foundation for the study's findings.

The application of CFA and SEM in this research was critical for addressing the research questions and testing hypotheses related to the management factors influencing healthcare service delivery in Uganda. By integrating measurement validation with structural pathway analysis, these

methodologies enabled a rigorous examination of the interrelationships among variables. The insights derived from this analysis contribute to both theoretical advancements and practical applications in healthcare management, offering valuable guidance for improving service delivery in resource-limited settings.

Fit Indices in SEM

Fit indices are essential for evaluating the adequacy and robustness of models in Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM), particularly in research involving complex latent constructs. This study employs several key fit indices to systematically assess model fit, ensuring that the hypothesized relationships are supported by the data and providing confidence in the validity of the theoretical framework.

The Chi-Square Test (χ^2) is a frequently utilized metric for assessing the overall fit of a model. It compares the observed covariance matrix with the expected covariance matrix generated by the model. A non-significant result typically indicates a good model fit; however, the χ^2 test is highly sensitive to sample size, which can result in significant outcomes even for well-fitting models (Ximénez et al., 2022). Given that this research involves 206 respondents, the sensitivity of the χ^2 statistic is carefully considered when interpreting results, with an emphasis on complementary fit indices.

The Root Mean Square Error of Approximation (RMSEA) is one of the most informative fit indices, particularly for evaluating model parsimony. RMSEA values below 0.08 are indicative of an acceptable model fit, while values under 0.05 suggest an excellent fit (Islam, 2023). Because RMSEA accounts for model complexity, it is particularly valuable in this research, which involves multiple latent constructs such as management education, innovation, and perceived corruption.

The Comparative Fit Index (CFI) compares the fit of the proposed model to a null model that assumes no relationships among variables. A CFI value greater than 0.90 generally signifies a good fit, while values exceeding 0.95 indicate an excellent fit (Guan & Han, 2019). Unlike the χ^2 test, CFI is less sensitive to sample size, making it a reliable measure for datasets of moderate to large size, such as the one in this study. Similarly, the Tucker-Lewis Index (TLI) evaluates model fit relative to a baseline model, penalizing complexity by adjusting for the number of estimated parameters. TLI values above 0.90 indicate a good fit, with values nearing 1.0 representing excellent fit (Guan & Han, 2019). TLI is especially crucial in this research, which balances model complexity and the inclusion of constructs like networks and corruption. The Standardized Root Mean Square Residual (SRMR) quantifies the standardized difference between observed and predicted correlations. SRMR values below 0.08 are considered indicative of a good fit (Martin, 2010). This index is particularly valuable in this study as it directly assesses the model's ability to reproduce observed data, complementing other indices by providing insight into discrepancies at the correlation level.

It is imperative to interpret these indices collectively to obtain a comprehensive assessment of model adequacy. Relying on a single index may result in an incomplete evaluation. For instance, while RMSEA focuses on residuals, indices such as CFI and TLI assess model fit relative to a baseline model. A well-fitting model will demonstrate favorable results across multiple indices, thereby confirming its explanatory power and parsimony (Marsh et al., 2014).

In summary, CFA and SEM are vital methodologies in healthcare management research, particularly for studies involving latent constructs, such as this research's focus on management factors affecting health service delivery in Uganda. The utilization of multiple fit indices provides

a rigorous evaluation of model fit, ensuring the validity of the theoretical constructs and their relationships. By interpreting these indices holistically, this research advances understanding in healthcare management and offers insights that are both theoretically rigorous and practically applicable.

Trustworthiness of Data

Primary data were systematically collected through a questionnaire developed following a comprehensive review of the literature. The questionnaire was pretested to confirm its reliability and appropriateness for capturing key variables, such as management education, management training, innovation, networks, corruption, and healthcare service delivery improvement. Adopting the online survey approach advocated by Swar et al., (2017) enabled efficient hypothesis testing while aligning with Creswell's (2012) guidelines for quantitative research, a method particularly suitable for the positivist paradigm recommended by Wahyuni (2012). This approach ensured the reliability and validity of the findings through a structured and objective methodology.

The questionnaire utilized a 7-point Likert scale, a method supported by Givon and Shapira (1984), for its versatility in supporting a broad range of statistical analyses and capturing nuanced responses. This scale is particularly advantageous because it allows for comprehensive data capture and maintains robust correlation coefficients even with moderate sample sizes. Malhotra (2004) highlighted the efficacy of formalized questionnaires in systematically obtaining data, which aligns well with the structured approach of this research to examine relationships among latent variables. By carefully linking each question to a specific latent construct, the research assessed the variance explained by the responses, thereby validating the conceptual framework underpinning each construct.

Given the focus on latent variables derived through multiple indicators, the survey design was grounded in rigor. This approach is crucial for studies reliant on constructs that cannot be directly observed but instead require indirect measurement through respondents' perceptions and experiences. Consequently, a meticulous approach was taken from the pre-testing phase to the deployment of formal data analysis, ensuring both reliability and validity. Pretesting served as an iterative process to refine the questions, thus enhancing clarity and reducing potential biases that could compromise the data accuracy.

Ensuring the trustworthiness of the data requires stringent methodological rigor, encompassing design, collection, and analysis. This research followed a structured process, beginning with questionnaire development and extending through robust statistical analysis, executed in a manner that adhered to best practices in quantitative research. The thorough implementation of the 7-point Likert scale, grounded in validated research tools, contributes significantly to the integrity of the data. Each element, from scaling to response variance analysis, reinforces the accuracy of the measured constructs.

The integrity of the research data was further supported through methodical pre-testing, adherence to theoretical frameworks, and the use of established statistical tools, ultimately enhancing the credibility and trustworthiness of the findings. By aligning design rigor with methodological robustness, this research establishes a credible foundation for analyzing and interpreting findings on healthcare management practices in Uganda. This approach advances academic understanding and offers practical insights for improving healthcare delivery in resource-limited settings.

Skewness and Kurtosis

This research conducted skewness and kurtosis tests to assess the normality assumption, a fundamental aspect of robust statistical analysis, especially in SEM studies where normality impacts model fit and parameter estimation (Howell, 2013). Skewness evaluates the symmetry of the data distribution by analyzing the alignment between the mode, median, and mean. A symmetric distribution, where these measures align, suggests a balanced dataset, while asymmetry or skewness indicates deviation from the central mean (Tabachnick & Fidell, 2007). In contrast, kurtosis measures the peak height or flatness of the distribution and assesses the concentration of data around the mean. Distributions with a more pronounced peak (leptokurtic) exhibited a smaller standard deviation, whereas those that were flatter (platykurtic) tended to have a larger standard deviation (Tabachnick & Fidell, 2013).

To verify normality, skewness and kurtosis coefficients were scrutinized within the recommended thresholds. Haar et al., (2010) and Byrne (2010) suggest that skewness values outside ± 2 and kurtosis outside ± 7 indicate deviation from normality. However, Kline (2011) allows for slightly wider ranges, with skewness thresholds of ± 3 and kurtosis thresholds of ± 10 , which are more suitable for larger or diverse datasets. In this research, skewness and kurtosis values fell within these acceptable limits, with the highest skewness observed at -2.568 for the variable "years spent in healthcare." No cases with zero standard deviation were noted, confirming the absence of missing responses and affirming data completeness.

Subsequent data analyses were performed using AMOS to ensure that the sample size and statistical power met the assumptions necessary for SEM. This validation of data normality lays a robust foundation for further analytical procedures. The adherence to the normality assumption,

supported by skewness and kurtosis metrics, facilitated reliable interpretations, ensured statistical rigor, and enhanced confidence in the research findings.

In summary, assessing skewness and kurtosis was a critical step in confirming the normality assumption, which is essential for the accuracy of SEM analyses(See Table 1). This methodological rigor validates the suitability of the data for the advanced analyses required in this research, underpinning the reliability and validity of the findings and supporting robust conclusions on the management factors affecting healthcare service delivery in Uganda.

Table 1

Test For Skewness and Kurtosis

		Health Program	Gender	Age	Years in Health Management	Years worked in the health sector?	No of Staff under your supervision?
N	Valid	206	206	206	206	206	206
	Missing	0	0	0	0	0	0
Mean		2.00	1.35	2.34	2.57	2.81	2.79
Median		2.00	1.00	2.00	3.00	3.00	4.00
Mode		2	1	3	3	3	4
Std. Deviation		.666	.479	.686	.700	.495	1.323
Skewness		-.005	.613	-	-1.320	-2.568	-.341
				.568			
Std. Error of Skewness		.169	.169	.169	.169	.169	.169
Kurtosis		-.725	-1.640	-	.299	5.759	-1.684
				.765			
Std. Error of Kurtosis		.337	.337	.337	.337	.337	.337
Range		2	1	2	2	2	3
Minimum		1	1	1	1	1	1
Maximum		3	2	3	3	3	4

Reliability and Validity of Data

This research rigorously assessed both the external and internal validity of the collected data, ensuring the credibility and relevance of the findings in the context of healthcare management for WASH, UNEPI, and NTD programs in Uganda. External validity refers to the extent to which

the results can be generalized to the target population of health program managers in Uganda, whereas internal validity concerns the reliability and accuracy of the measurement instruments. Both forms of validity are essential in establishing the robustness of the findings, which ultimately inform policy recommendations and management practices within Uganda's healthcare system. To assess the reliability of the research instruments, this research used Cronbach's alpha. Cronbach's alpha, ranging from 0 to 1, measures internal consistency and indicates how closely related a set of items is as a group (Gliem & Gliem, 2020). A higher Cronbach's alpha coefficient, closer to 1.0, reflects greater internal consistency within a scale, a crucial factor in ensuring that items within constructs such as management education, training, and innovation reliably capture their intended dimensions.

This measure was calculated using the formula $\alpha = rk / [1 + (k - 1) r]$, where k represents the number of scale items and r is the average inter-item correlation. Both the number of items and average correlation between them influenced the alpha value. According to George and Mallery (2003), Cronbach's alpha can be interpreted as follows:

$\alpha > .9$ is excellent, $\alpha > .8$ is good, $\alpha > .7$ is acceptable, $\alpha > .6$ is questionable, $\alpha > .5$ is poor, $\alpha \leq .5$ is unacceptable.

For this research, Cronbach's alpha value was .801, categorizing it as good and confirming internal consistency across constructs, as supported by Dilcen et al., (2022). The detailed results are presented in the accompanying table, demonstrating that the constructs measured were reliable indicators of the underlying management factors. This research extended its methodological rigor by carefully assessing both forms of validity to support the research objectives:

The findings of this study are generalizable to a broader population of healthcare managers in Uganda owing to the representative sampling strategy employed. This sample included a diverse range of participants across the WASH, Immunization, and NTD programs, ensuring the relevance of the results to the national health care landscape. Internal validity was ensured using a reliable measurement tool, as evidenced by the high Cronbach's alpha score. This reliability metric demonstrates that the measurement items consistently reflect the intended constructs such as corruption, networking, and innovation, thus ensuring that the responses accurately represent the underlying dimensions.

Rigorous assessment of data reliability and validity contributes to the credibility and applicability of the findings of the research (see tables 2 and 3). High internal consistency, coupled with a deliberate sampling approach to enhance external validity, ensures that research outcomes are both trustworthy and meaningful for healthcare policy and management in Uganda. This approach reinforces the methodological rigor, providing a robust foundation for analyzing the impact of managerial factors on healthcare service delivery in the Ugandan context. Therefore, by employing Cronbach's alpha to evaluate internal consistency and conducting comprehensive validity checks, this research ensured that its conclusions are scientifically sound and actionable.

Table 2

Reliability Statistics

Reliability Statistics		
Cronbach's Alpha	N of Items	
.801	21	

Table 3*Item Total Statistics*

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Education 1	79.56	200.999	.177	.801
Education2	76.38	170.861	.719	.769
Education3	79.18	197.065	.176	.803
Education4	76.37	171.775	.701	.770
Education5	80.56	208.658	-.150	.806
Education6	76.30	174.951	.711	.772
Training	81.21	199.200	.276	.797
Training 2	77.63	164.585	.636	.772
Training 3	81.39	200.903	.327	.797
Training 4	77.26	166.855	.653	.771
Training 5	79.60	198.369	.113	.808
Training 6	76.56	180.989	.652	.778
Innovation1	79.64	204.389	.014	.810
Innovation 2	76.63	176.616	.689	.774
Corruption1	79.83	205.508	-.001	.809
Corruption 2	76.87	188.632	.321	.795
Network 1	80.27	205.084	.006	.809
Network 2	79.66	205.515	.002	.808
Network3	76.68	181.146	.590	.780
Delivery 1	78.58	196.596	.091	.816
Delivery 2	76.28	183.208	.552	.783

Results**Demographic Characteristics**

The respondents were 206 healthcare managers working within Uganda's WASH, UNEPI, and NTD programs in the Ministry of Health. The demographic characteristics of the sample provide a critical context for understanding the composition of the respondents.

Table 4*Sociodemographic Characteristics*

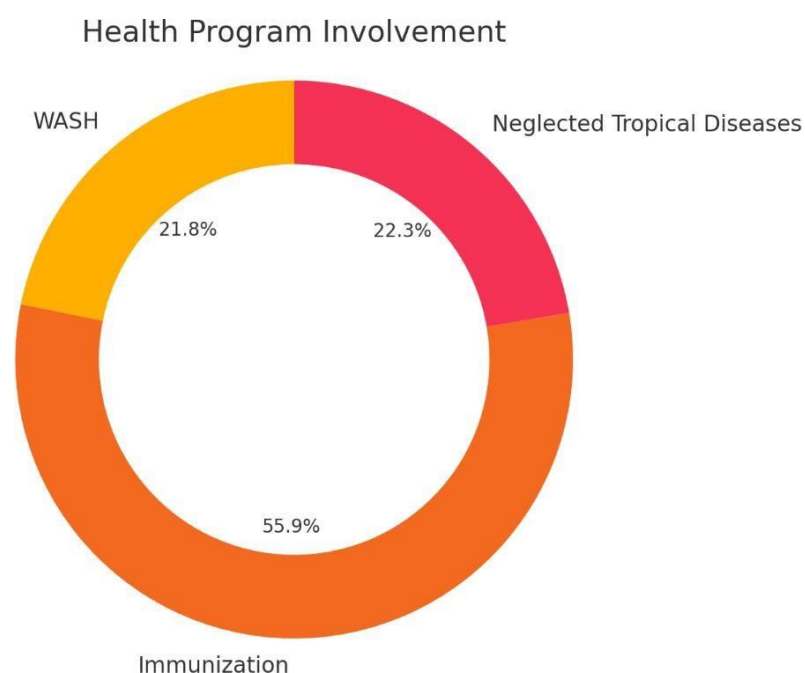
Health Program		Frequency	Percent	Valid Percent
Valid	WASH	45	21.8	21.8
	Immunization	115	55.8	55.8
	Neglected Diseases	46	22.3	22.3
	Total	206	100.0	100.0
Gender		Frequency	Percent	Valid Percent
Valid	Male	133	64.6	64.6
	Female	73	35.4	35.4
	Total	206	100.0	100.0
Age		Frequency	Percent	Valid Percent
Valid	20 – 30	25	12.1	12.1
	31 – 40	85	41.3	41.3
	above 40	96	46.6	46.6
	Total	206	100.0	100.0
Years in Health Management		Frequency	Percent	Valid Percent
Valid	1 – 3	25	12.1	12.1
	4 – 6	39	18.9	18.9
	above 6 years	142	68.9	68.9
	Total	206	100.0	100.0
How many years have you worked in the health sector?		Frequency	Percent	Valid Percent
Valid	1 – 3	9	4.4	4.4
	4 – 6	22	10.7	10.7
	above 6 years	175	85.0	85.0
	Total	206	100.0	100.0
How many staff are under your supervision?		Frequency	Percent	Valid Percent
Valid	1- 5	58	28.2	28.2
	5-10	32	15.5	15.5
	10-15	12	5.8	5.8
	More than 15	104	50.5	50.5
	Total	206	100.0	100.0

Health Program Distribution

Of the total sample, 55.8% worked within the UNEPI program, while 22.3% worked in the NTD program. The remaining 21.8% of the participants worked in the WASH program(see figure 9).

Figure 9

Showing Health Programs of respondents



Gender Distribution

The majority of the respondents were male, accounting for 64.6% of the sample, while females accounted for 35.4%.

Age Distribution

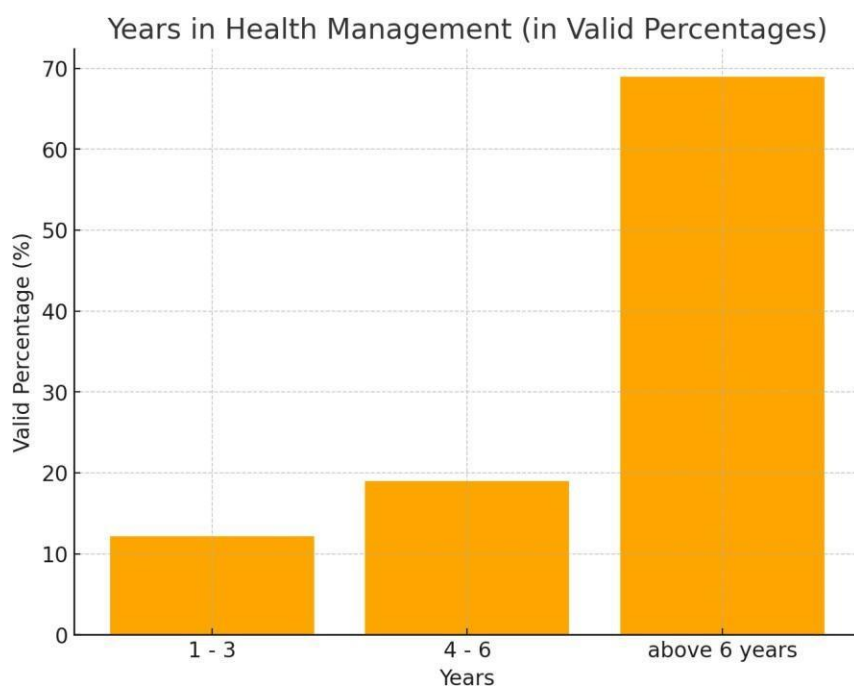
The age distribution of the respondents were relatively older. Nearly half (46.6%) of the respondents were over 40 years old, while 41.3% were aged 31-40. Only 12.1% of the participants were between 20 and 30 years of age.

Years in Health Management

Regarding experience in health management, 68.9% of the respondents had been in management roles for more than six years, underscoring the presence of a highly experienced cohort. A smaller proportion (18.9%) had been in health management for 4-6 years, whereas only 12.1% had 1-3 years of experience (See figure 10).

Figure 10

Showing Years Respondents Have Spent in Healthcare Management Roles



Years in the broader health sector

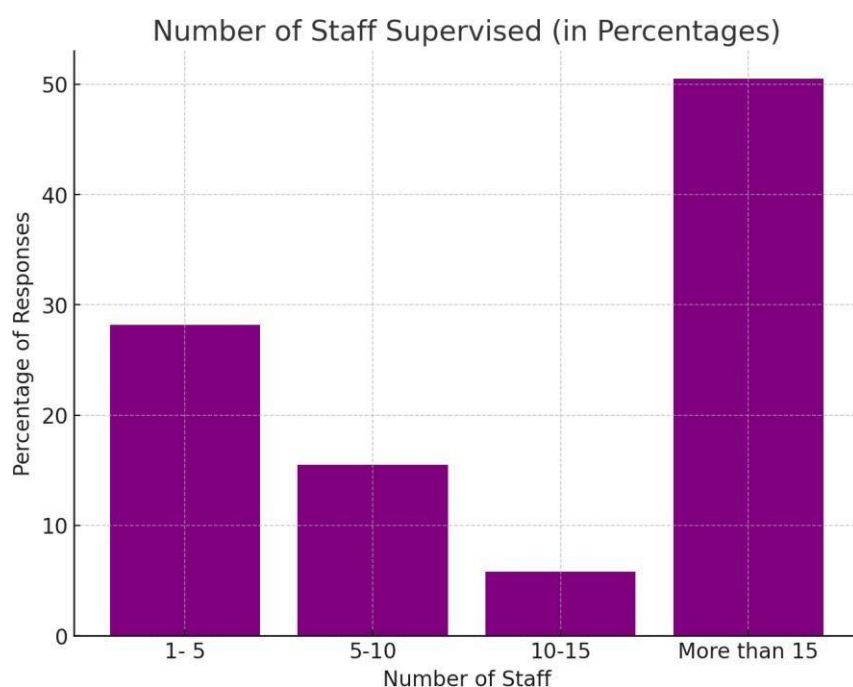
A significant majority of the respondents (85.0 %) indicated that they had worked in the healthcare sector for more than six years. Only 4.4% of the respondents reported having less than three years of experience.

Staff Supervision

When asked about the number of staff under their supervision, 50.5% of managers were responsible for more than 15 staff members. A further 28.2% managed between 1-5 staff, while smaller proportions oversaw 5-10 staff (15.5%) and 10-15 staff (5.8%).

Figure 11

Number of Staff Supervised by Respondents

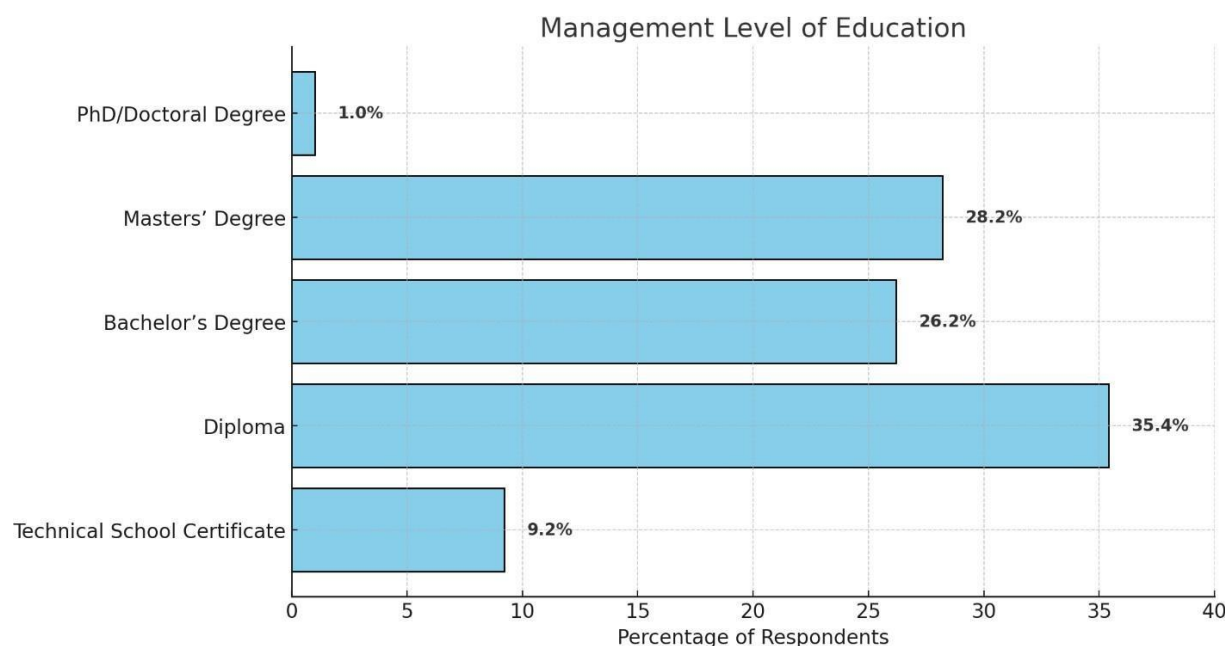


Management Level of Education

The educational backgrounds of the respondents varied significantly, offering insight into the qualifications of healthcare managers in Uganda's health programs

Figure 12

Showing Health Manager's Level of Education



The data revealed that 33% of respondents held a diploma as their highest educational qualification. A bachelor of science (BSc) degree was the next most common, with 27.2% of respondents holding this qualification, while 24.8% had attained a master of Science (MSc) degree in science. In contrast, Bachelor of Arts (BA) degrees (1.5%), Master of Arts (MA) degrees (1.0%), and Master of Business Administration (MBA) degrees (1.9%) were far less common. Only 1% of the respondents held a Ph.D.

Educational Impact on Health Program Delivery

Respondents were also asked to assess the impact of their highest educational qualifications on their ability to manage health programs effectively. A significant proportion (50.5%) of respondents strongly agreed that their educational background greatly enhanced their managerial capabilities. Additionally, 34.5% of the respondents agreed with this statement, highlighting the

perceived importance of education in driving effective healthcare delivery and program implementation.

Only a small proportion (0.5%) of respondents maintained a neutral stance and neither agreed nor disagreed about the influence of their qualifications on their managerial effectiveness.

Table 5

Benefit of Highest Education

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
Frequency	10	7	3	1	10	71	104
Percent	4.9	3.4	1.5	0.5	4.9	34.5	50.5
Valid Percent	4.9	3.4	1.5	0.5	4.9	34.5	50.5

A significant majority of respondents, 50.5%, strongly agreed that their highest qualification has been beneficial in improving the delivery of their health program. In addition, 34.5% of respondents agreed with the statement. When combined, 85% of respondents either agreed or strongly agreed that their education positively influences their work, highlighting the perceived importance of academic qualifications in healthcare management. A smaller portion of the sample expressed neutrality or disagreement. Only 0.5% of respondents neither agreed nor disagreed, while 9.7% of respondents did not perceive their qualifications as significantly beneficial. Of this group, 4.9% strongly disagreed, 3.4% disagreed, and 1.5% somewhat disagreed with the statement.

The survey also explored whether the highest educational qualifications of healthcare managers were in management or clinical/health-related disciplines. A substantial majority of respondents (76.2%) reported that their highest educational qualification was in a clinical or

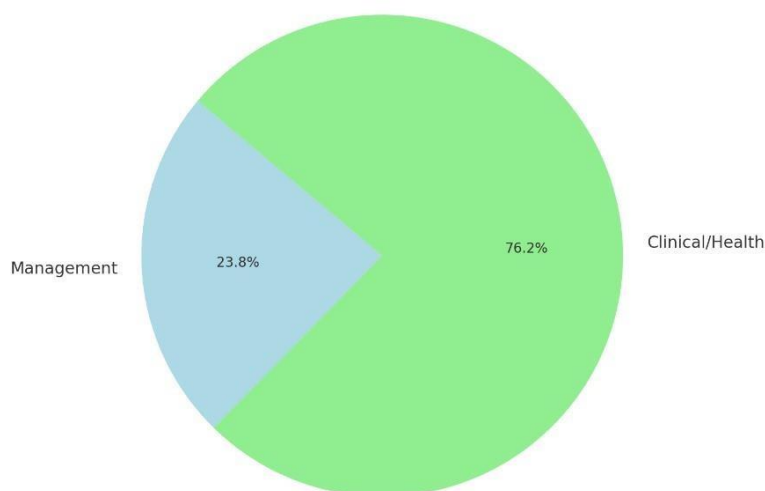
health-related field, suggesting that most healthcare managers in the sample possess a strong foundation in health sciences.

In contrast, 23.8% of respondents indicated that their highest qualification was in management.

Figure 13

Clinical vs Management qualifications

Distribution of Educational Qualifications: Management vs. Clinical/Health



Benefit of Type of Education

The data examines respondents' perceptions of the value their highest educational qualification brings to improving the delivery of health programs. A majority of respondents, 54.4%, strongly agreed that their highest educational qualification significantly contributes to improving the performance of their health programs. Additionally, 28.6% of respondents agreed that their educational qualifications positively impact program performance. Combined with those who strongly agreed, a total of 83% affirmed that their educational background is beneficial for

health program management, indicating a broad recognition of the importance of education in this field.

A smaller group, comprising 4.4% of respondents, somewhat agreed with the statement, reflecting a moderate but still positive view of the role of education in improving program performance. In contrast, 6.8% of respondents strongly disagreed, and 3.4% disagreed that their highest qualifications have significantly benefited their ability to enhance program performance. An additional 2.4% somewhat disagreed.

Table 6

Benefit of Type of Education

Highest education type beneficial to Improving the health program		Frequency	Percent	Valid Percent
Valid	Strongly disagree	14	6.8	6.8
	Disagree	7	3.4	3.4
	Somewhat disagree	5	2.4	2.4
	Somewhat agree	9	4.4	4.4
	Agree	59	28.6	28.6
	Strongly agree	112	54.4	54.4
	Total	206	100.0	100.0

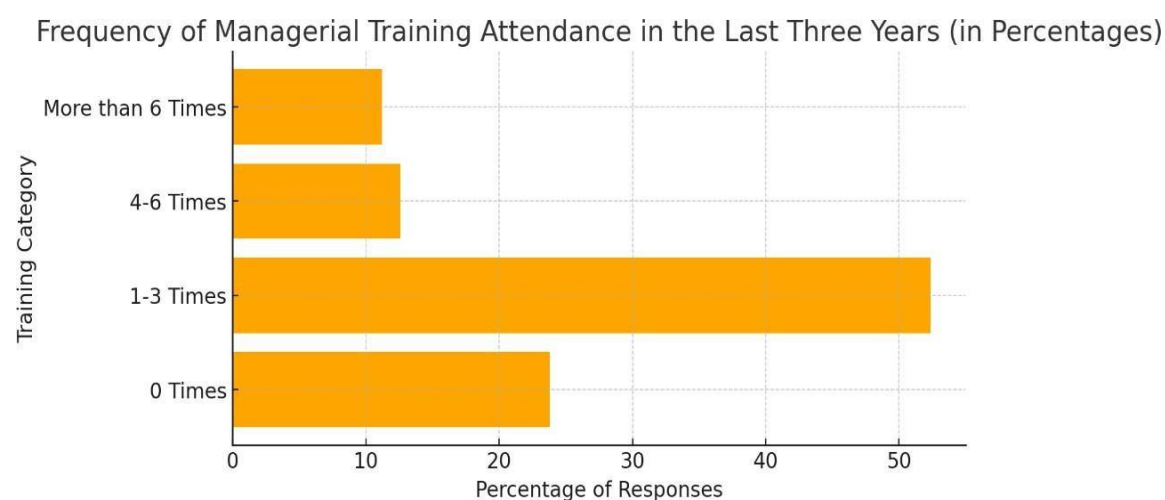
The research also examined respondents' perceptions of the impact of their educational qualification type on their effectiveness in health management roles. A significant portion of the sample, 117 respondents (56.8%), strongly agreed that their educational type plays a crucial role in effectively managing healthcare programs. Additionally, 49 respondents (23.8%) agreed with this view, further highlighting the importance placed on higher education in health management. A small fraction of the sample, 1%, expressed disagreement with the idea that higher qualifications enhance management capabilities.

Table 7*Benefit of Highest Education Type*

Quency	Fre	rongly	St	Di	mewhat	So	either	N	mewhat	So	gree	A	rongly	St
		disagree	agree		disagree		agree nor disagree		agree				agree	
Cent	Per	8	5.	4.		2.9		1		5.3	3.8	2	.8	56
id Percent	Val	8	5.	4.		2.9		1		5.3	3.8	2	.8	56

Management Training

The data presents the frequency of managerial training attendance among healthcare managers over the past three years. The largest proportion of respondents, 52.4%, reported attending managerial training sessions 1-3 times in the last three years. A notable portion of the sample, 23.8%, indicated that they had not attended any managerial training during this period. A smaller group of respondents demonstrated a higher level of engagement, with 12.6% attending training 4-6 times, and 11.2% attending more than 6 training sessions over the past three years.

Figure 14*Impact of Management Training Frequency*

The survey aimed to understand healthcare managers' perceptions of how the frequency of managerial training influences their ability to improve the service delivery in their health

programs. The majority of respondents expressed a positive view regarding the current frequency of managerial training. Specifically, 33.0% agreed, and 24.3% strongly agreed that the current training frequency contributes to improving their health program performance. Together, these responses indicate that 57.3% of the sample perceives regular management training as an important factor in enhancing their professional capabilities and service delivery.

Conversely, a substantial portion of respondents expressed a negative view of the current training frequency. Notably, 17.0% strongly disagreed, and 12.6% disagreed that the current frequency of training is beneficial, totaling 29.6% of the sample. An additional 2.4% somewhat disagreed, suggesting that nearly one-third of respondents do not find the existing training frequency effective in improving their management of health programs. Furthermore, a small segment of respondents (1.9%) neither agreed nor disagreed, indicating neutrality or ambivalence. An additional 8.7% somewhat agreed, reflecting a more moderate but still positive assessment of the training frequency's impact. The data reveals a range of perspectives on the effectiveness of current management training frequencies. While a majority of respondents (57.3%) recognize the benefits of regular managerial training, a significant minority (29.6%) do not find the current frequency to be effective in enhancing their management capabilities.

Table 8

Perceived Impact of Management Training Frequency on Health Programs

Frequency of management training beneficial to improving the health program.		Frequency	Percent	Valid Percent
Valid	Strongly disagree	35	17.0	17.0
	Disagree	26	12.6	12.6
	Somewhat disagree	5	2.4	2.4
	Neither agree nor disagree	4	1.9	1.9
	Somewhat agree	18	8.7	8.7
	Agree	68	33.0	33.0
	Strongly agree	50	24.3	24.3
	Total	206	100.0	100.0

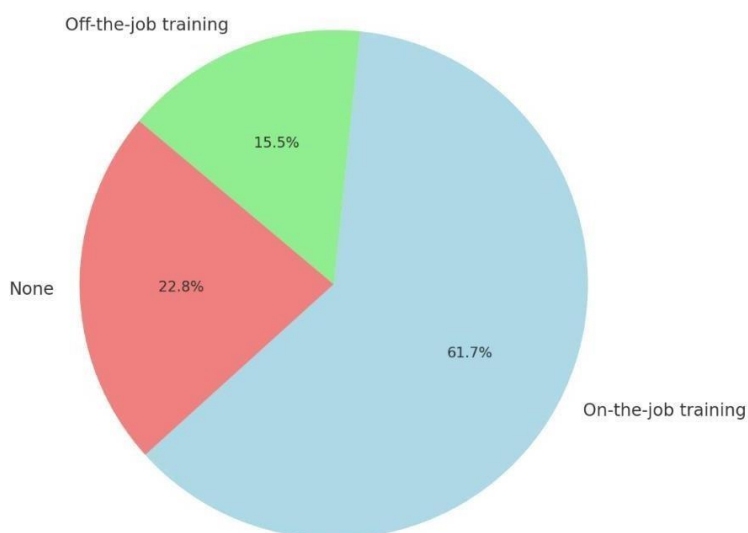
Types of Managerial Trainings

The data explores the types of managerial training undertaken by healthcare managers over the past three years, distinguishing between on-the-job and off-the-job training. A majority of respondents (61.7%) reported participating in on-the-job training during this period. In contrast, 15.5% of respondents indicated they had participated in off-the-job training, which typically includes structured learning environments such as workshops, seminars, or academic courses outside of the workplace. Notably, 22.8% of respondents reported not having undertaken any managerial training in the past three years.

Figure 15

Type of Managerial Training Undertaken

Types of Managerial Training Undertaken in the Last Three Years



Benefits of Training Approaches

The following table presents the distribution of responses, highlighting respondents' views on the benefits of various training approaches. This data illustrates the diversity of training experiences among healthcare managers and their perceived impact on professional effectiveness (See table 9).

Table 9

Benefit of Type of Training

Type of management training is beneficial in improving my health program		Frequency	Percent	Valid Percent
Valid	Strongly disagree	24	11.7	11.7
	Disagree	21	10.2	10.2
	Somewhat disagree	5	2.4	2.4
	Neither agree nor disagree	11	5.3	5.3
	Somewhat agree	12	5.8	5.8
	Agree	73	35.4	35.4
	Strongly agree	60	29.1	29.1
	Total	206	100.0	100.0

A significant majority of respondents held a positive view of their managerial training approaches, with 35.4% agreeing and 29.1% strongly agreeing that the type of training they received was beneficial in improving the performance of their health programs. Together, these responses account for 64.5% of the sample, suggesting that most healthcare managers perceive a strong positive correlation between the training approaches they underwent and their professional effectiveness in managing health programs.

A smaller portion of respondents, 5.3%, neither agreed nor disagreed with the statement, indicating ambivalence regarding the training's effectiveness. Additionally, a notable segment expressed a negative view of the training approach impact. Specifically, 11.7% strongly disagreed, 10.2% disagreed, and 2.4% somewhat disagreed that their training was beneficial. These negative

responses, totaling 24.3%, suggest that nearly a quarter of healthcare managers did not find their training approaches effective in improving health program delivery.

Managerial Training Methods

The research examined the primary methods employed by health programs to conduct managerial training, providing insights into the most commonly used training methods and their perceived effectiveness among healthcare managers. The most commonly used managerial training method, as reported by 46.6% of respondents, is mentorship. Following mentorship, seminars and workshops were the next most frequently utilized methods, with 41.3% of respondents identifying them as the primary approach in their health programs. These structured, short-term training events focus on specific topics or skills, offering an intensive learning experience. Team-building exercises were reported by 8.7% of respondents as the primary training method. Coaching was identified by 2.9% of respondents as the primary training method, while internships were the least utilized, with only 0.5% of respondents reporting this as their main training approach.

Table 10

Managerial Training Methods

Most commonly used managerial training method		Frequency	Percent	Valid Percent
Valid	Mentorship	96	46.6	46.6
	Coaching	6	2.9	2.9
	Seminar/workshop	85	41.3	41.3
	Internship	1	.5	.5
	Team building	18	8.7	8.7
	<u>Total</u>	<u>206</u>	<u>100.0</u>	<u>100.0</u>

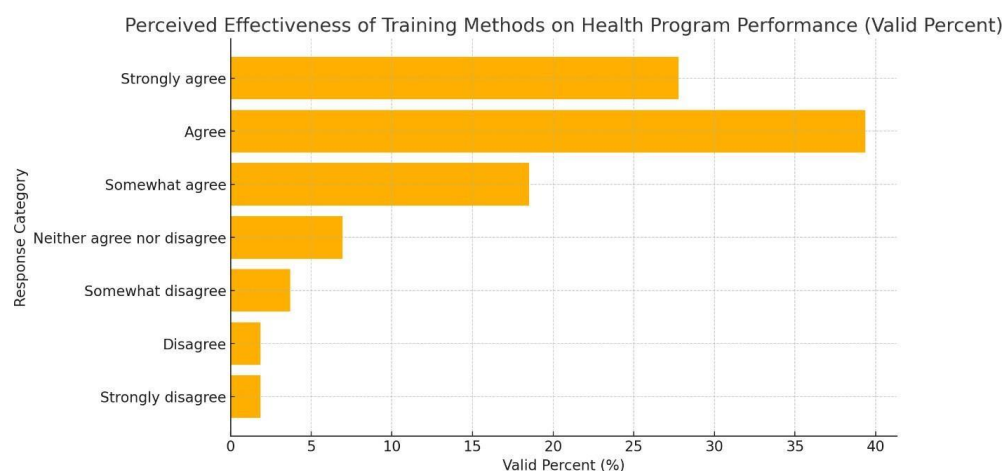
Perceived Effectiveness of Training Methods

The survey explored healthcare managers' perceptions of the effectiveness of managerial training methods in enhancing health program delivery in Uganda's health sector. A significant majority of the respondents (43.2%) agreed that the training methods employed in their health programs positively influenced their performance, with an additional 30.1% strongly agreeing. Combined, 73.3% of the respondents expressed confidence in the effectiveness of the training methods, underscoring the perceived value of key approaches, such as workshops and mentoring, in enhancing managerial capabilities and program outcomes.

A further 15.5% of the respondents somewhat agreed, indicating a generally positive view of the impact of the training, although potentially with some reservations. A smaller proportion of the respondents held neutral or negative views. Specifically, 3.9% neither agreed nor disagreed, suggesting ambivalence regarding the effectiveness of training methods. In contrast, 7.3% of the sample expressed dissatisfaction, 2.9% strongly disagreed, 2.9% disagreed, and 1.5% somewhat disagreed.

Figure 16

Effectiveness of Training Method

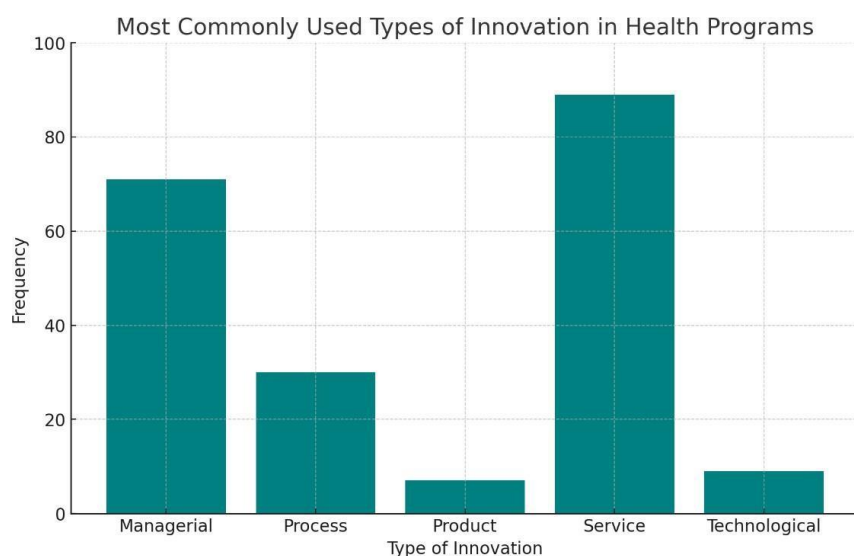


Innovation

Figure 17 shows the most commonly used types of innovation in healthcare programs, offering insight into the specific innovations most frequently utilized.

Figure 17

Most Commonly Used Type of Innovation



The data revealed that service innovation is the most frequently utilized, with 43.2% of respondents identifying it as the predominant form of innovation in their health programs. Managerial innovation was the second most cited type, reported by 34.5% of the respondents. Process innovation, identified by 14.6% of the respondents, focuses on improving workflows and procedures within healthcare programs. Technological innovation, reported by 4.4% of the respondents, reflects the adoption of new technologies to enhance healthcare delivery. Product innovation, the least utilized form of innovation, was identified by 3.4% of the respondents. Technological innovation, reported by 4.4% of the respondents, reflects the adoption of new technologies. Product innovation, at 3.4%, is the least utilized form of innovation in healthcare programmes.

Impact of Innovation

A significant proportion of respondents (31.1 %) strongly agreed that innovation has improved the delivery of their health programs, with an additional 41.7% agreeing. Collectively, 72.8% of respondents viewed innovation as having a positive impact on health program delivery, indicating a broad consensus on its value in healthcare. Additionally, 15.0% of the respondents somewhat agreed that innovation had a beneficial effect. A smaller group (2.9 %) neither agreed nor disagreed, reflecting ambivalence regarding the impact of innovation on health programs. On the other hand, 4.9% strongly disagreed, 3.4% disagreed, and 1.0% somewhat disagreed, totaling 9.3% of the respondents with negative perceptions (See table 11).

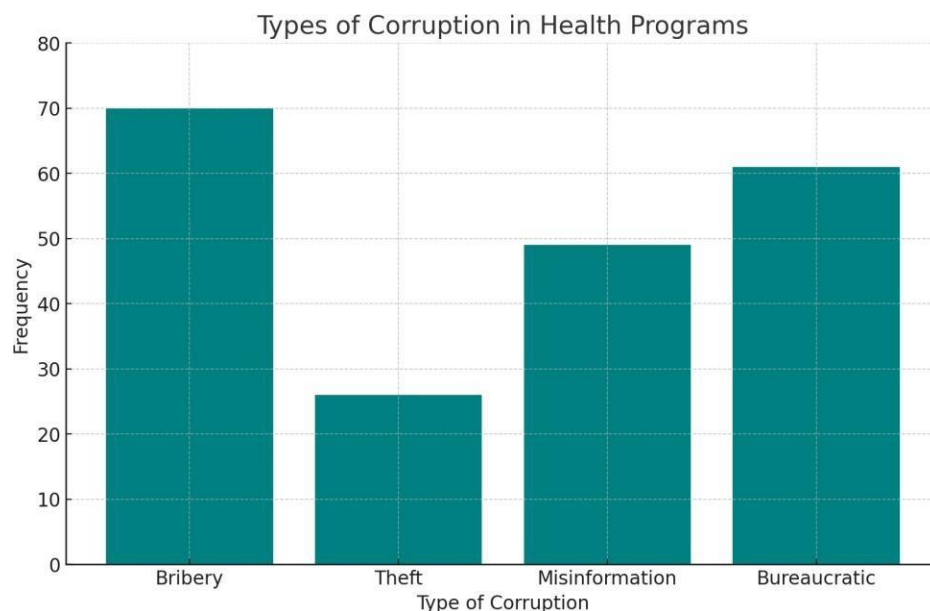
Table 11

Perceived Impact of Innovation

Innovation has improved performance of your health program		Frequency	Percent	Valid Percent
Valid	Strongly disagree	10	4.9	4.9
	Disagree	7	3.4	3.4
	Somewhat disagree	2	1.0	1.0
	Neither agree nor disagree	6	2.9	2.9
	Somewhat agree	31	15.0	15.0
	Agree	86	41.7	41.7
	Strongly agree	64	31.1	31.1
	Total	206	100.0	100.0

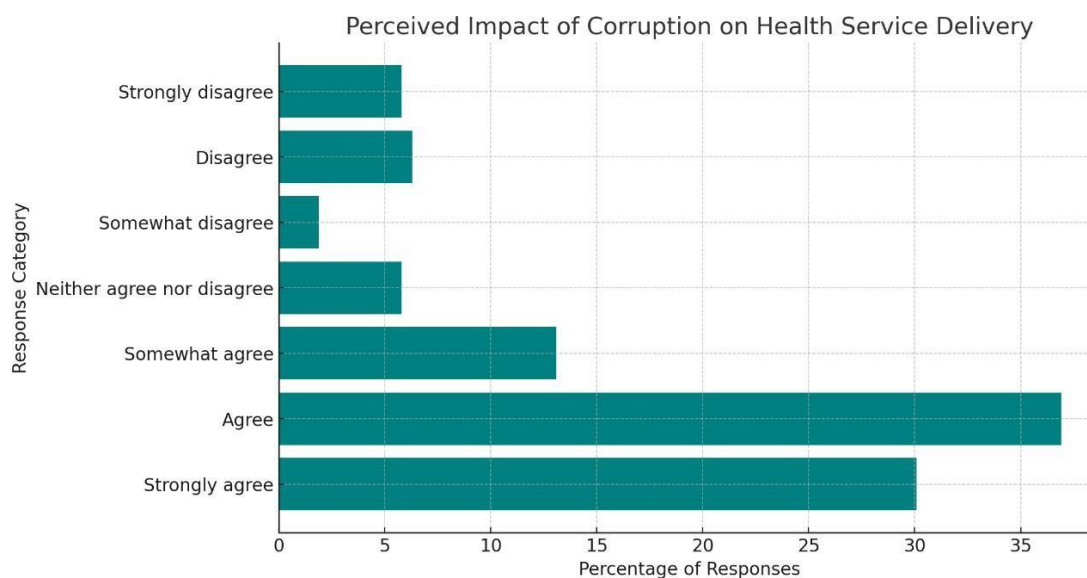
Perceived Corruption as a Moderator

This research sought to identify the predominant forms of corruption within the Ministry of Health. The findings are presented in Figure 18.

Figure 18*Types of Corruption in Health Programs*

Bribery was identified as the most prevalent form of corruption, accounting for 34.0% of the reported cases. Bureaucratic corruption was reported by 29.6% of the respondents, making it the second most common form of corruption. Misinformation accounted for 23.8% of reported cases, while theft was the least common, but still notable, reported in 12.6% of cases.

The research then inquired into perceptions of corruption as detrimental to the relationship between the management level of education and improved service delivery. A substantial majority of respondents viewed corruption as a major barrier to improved health service delivery. Specifically, 36.9% of respondents agreed and 30.1% strongly agreed that corruption hinders the delivery of health services. These figures represent 67% of the sample, highlighting the broad consensus that corruption significantly impairs the performance of health programmes. Additionally, 13.1% of the respondents somewhat agreed, indicating that while they acknowledge the negative effects of corruption, they may perceive its impact as less severe or context-dependent.

Figure 19*Negative Impact of Corruption*

Conversely, a smaller proportion of respondents expressed neutral or dissenting views. Specifically, 5.8% neither agreed nor disagreed, potentially reflecting ambivalence or uncertainty regarding the extent to which corruption affects their health programs. Furthermore, 6.3% disagreed, 5.8% strongly disagreed, and 1.9% somewhat disagreed, collectively accounting for 14% of the respondents who did not perceive corruption as a significant problem within their programs.

Networks in Health Programs

The research then explored the types of networks used by the health programs.

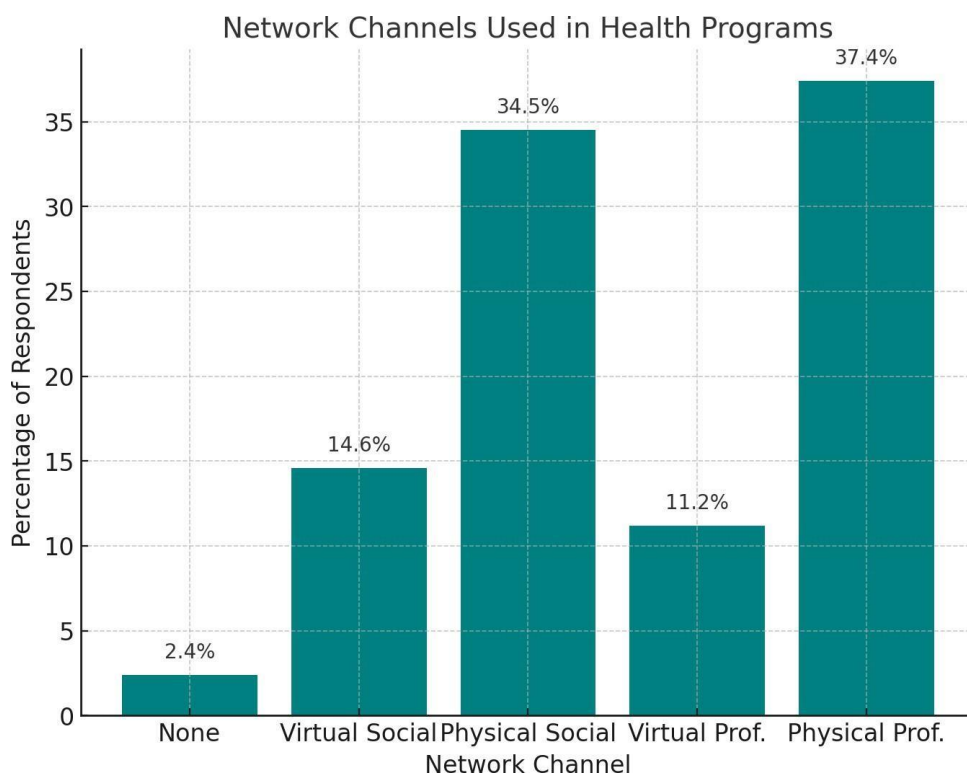
Table 12*Type of Network Used*

Type of network used		Frequency	Percent	Valid Percent
Valid	None	4	1.9	1.9
	Service implementation	109	52.9	52.9
	Information diffusion	11	5.3	5.3
	Problem solving	36	17.5	17.5
	community capacity building	46	22.3	22.3
	Total	206	100.0	100.0

Service implementation networks were the most frequently utilized, with 52.9% of the respondents identifying them as the primary network type within their health programs. Community capacity-building networks accounted for 22.3% of network usage. Problem-solving networks represented 17.5%, while information diffusion networks were the least utilized, reported by 5.3% of the respondents. Additionally, a small fraction of respondents (1.9%) indicated that they did not use any network in their programs.

Network Channels Used

The most commonly used network channel was the physical professional network, with 37.4% of respondents identifying this as their primary form of networking. Physical social networks, used by 34.5% of respondents, were the second most common channel. Virtual social networks were utilized by 14.6% of the respondents, indicating moderate adoption of digital tools for informal communication. Virtual professional networks were less frequently used, with only 11.2% of respondents citing this as their primary network channel. Additionally, a small fraction of respondents (2.4%) reported not using any networking channels.

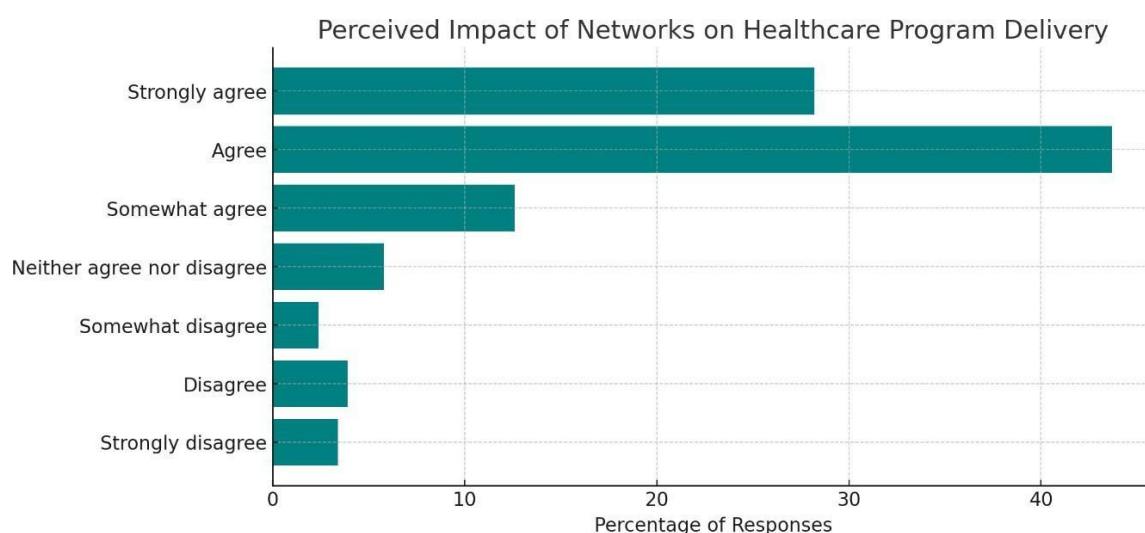
Figure 20*Network Channels Used***Network Influence on Service Delivery**

The survey assessed healthcare managers' perceptions of the extent to which their networks contribute to improving service delivery within health programs. The data revealed that a significant portion of respondents (43.7%) agreed that their networks positively influenced the performance of healthcare programs, while an additional 28.2% strongly agreed with this statement. Combined, these responses accounted for 71.9% of the sample, demonstrating a broad acknowledgment of the beneficial impact of networks in healthcare. An additional 12.6% of respondents somewhat agreed, indicating recognition of the positive role of networks. A small number of respondents expressed neutral or negative views. Specifically, 5.8% neither agreed nor disagreed, reflecting an indecision regarding the influence of networks on service delivery.

Additionally, 3.4% strongly disagreed, 3.9% disagreed, and 2.4% somewhat disagreed, representing 9.7% of respondents who did not perceive networks as beneficial to healthcare program performance.

Figure 21

Impact of Network Channels



Improved Health Services Delivery

This research sought to learn the perspectives of healthcare program managers regarding the most important attributes required to enhance the delivery of healthcare services. The survey identified key attributes, such as effectiveness, safety, access, timeliness, equitability, integration, and efficiency, each contributing differently to the overall healthcare quality framework. The majority of respondents (26.7%) identified effectiveness as the most crucial attribute for delivering quality healthcare services. Additionally, 26% of the respondents emphasized the importance of integrated services, while 12.6% highlighted access as a critical attribute. Safety was selected by 10.2% of the respondents. Timeliness was viewed as a less critical attribute, with only 6.8% of the

respondents considering it a key factor. Equitability and efficiency were selected by 8.7% of the respondents. Access was identified by 12.6% of respondents.

Figure 22

Improved Healthcare Delivery Attributes



The research progressed by asking respondents to evaluate the degree to which the identified quality delivery attributes enhanced the performance of health programs. The analysis, detailed in the table below, presents respondents' perspectives on the influence of these attributes on health care program outcomes. The data highlight how specific quality dimensions are

perceived as contributing to the overall performance and effectiveness of healthcare service delivery.

Table 13

Attributes Enhance Service Delivery

Attribute has improved service delivery		Frequency	Percent	Valid Percent
Valid	Strongly disagree	7	3.4	3.4
	Disagree	6	2.9	2.9
	Somewhat disagree	4	1.9	1.9
	Neither agree nor disagree	2	1.0	1.0
	Somewhat agree	17	8.3	8.3
	Agree	70	34.0	34.0
	Strongly agree	100	48.5	48.5
	Total	206	100.0	100.0

A total of 82.5% of respondents agreed that their selected attributes had significantly improved service delivery. Specifically, 48.5% of respondents strongly agreed and 34.0% agreed that their chosen attributes positively influenced the performance of healthcare programs. Additionally, 8.3% of respondents somewhat agreed, acknowledging a positive impact, albeit to a lesser extent or in more specific contexts. A small minority of respondents were neutral or disagreed. Approximately 1.0% of the respondents neither agreed nor disagreed, indicating ambivalence or uncertainty regarding the impact of their selected attributes on service delivery. Meanwhile, 3.4% strongly disagreed, 2.9% disagreed, and 1.9% somewhat disagreed, collectively representing 8.3% of the respondents who did not perceive a positive impact from the attribute.

SEM Analysis

Structural equation Modelling (SEM) analysis requires development and evaluation of both measurement and structural models. Measurement models delineate the relationships between

latent and observed variables, while structural models explicate the interactions among latent variables (Albright & Hun, 2008). Confirmatory Factor Analysis (CFA) was used to evaluate the measurement model (Albright & Hun, 2008). The data, initially processed using SPSS, were subsequently imported into Amos Graphics, version 2.0. Within AMOS, the SEM model was defined by naming latent variables, specifying covariates, listing measured variables, assigning error terms, and conducting various analyses including maximum likelihood estimation, standardized estimates, and modification indices. Upon running the model, no identification issues were encountered when the AMOS maximum likelihood method was used (Arbuckle, 2008). However, some factor loadings for the education and training variables were initially suboptimal, necessitating their removal to enhance model fit.

The SEM model encompasses six latent variables: managerial education level (education), managerial training (training), innovation, networks, corruption, and improved delivery of health services (delivery). A total of 206 responses were scrutinized to ascertain the factor loadings of potential variables and their effectiveness in measuring the intended constructs. The model, fine-tuned for critical paths, underwent a comprehensive suitability assessment using sample data.

Both the measurement and structural models were evaluated using AMOS version 2.0. This software facilitates the visualization of statistical relationships, with latent variables represented by ellipses and observed variables represented by rectangles. Regression and correlation equations are depicted using single and double arrows, respectively. The measurement model comprises 21 observed variables corresponding to the latent variables of education, management training, innovation, networks, corruption, and improved service delivery. These variables were organized into six factors: Factor 1 and Factor 2: 'Education 1 to Education 6,' Factor 3: 'Innovation 1 and

Innovation 2,' Factor 4: 'Corruption 1 and Corruption 2,' Factor 5: 'Network 1 to Network 3,' Factor 6: 'Delivery 1 and Delivery 2.' Each observed variable was exclusively associated with its respective factor and was accompanied by uncorrelated error terms (e1–e26). Notably, the corruption variable underwent inverse scoring as per AMOS specifications (Bowen, Govender, & Edwards, 2014).

The meticulous process of error checking and managing missing values post-data collection is both time-consuming and laborious yet crucial. Proper data handling at this stage is imperative to avoid suboptimal model fitting (Tabachnick & Fidell (2001). A thorough examination and adjustment of the factor loadings ensured the reliability and validity of the measurement and structural models, contributing to a robust analysis of the relationships among the key variables in this research. SEM analysis facilitated a comprehensive understanding of the relationships between managerial education, training, innovation, networks, corruption, and healthcare service delivery. By leveraging advanced statistical techniques and rigorous data handling processes, this study ensured the reliability and validity of the findings.

Results of the Confirmatory Factor Analysis (CFA)

Confirmatory Factor Analysis (CFA) was used to evaluate the fit of the proposed model to the sample data. This involved examining both observed and latent variables along with their factor loadings. Measurement models play a crucial role in assessing latent variables based on observed variables, ensuring both reliability and validity. Standard measures for evaluating measurement models, such as reliability and variance extracted (Hair et al., 1998), were used alongside goodness-of-fit indices, including the goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), normalized goodness-of-fit index (NFI), and comparative fit index (CFI), to ascertain

overall model fit. Relative Chi-Square (CMIN/DF): According to Krause et al. (2000), a relative chi-square value below 3 indicates a good fit. Tucker-Lewis Index (TLI): Schumacker (2002) suggests that the TLI should exceed 0.90 for an acceptable model. Root Mean Square Error of Approximation (RMSEA): Values below 0.05 are generally indicative of a good fit (Hair et al., 2012; Hair, 2010; Schumacker, 2002). Akaike Information Criterion (AIC): A comparison of AIC values across various models provides additional insight into model suitability.

The statistical measures demonstrated the reliability and convergent validity of the measurement model, confirming its appropriateness for the subsequent SEM analysis. Indicators such as chi-square, CMIN, CFI, TLI, RMSEA, factor loadings, Cronbach's alpha, composite reliability, average variance extracted (AVE) for convergent validity, and tests for discriminant validity were used. For this study, CFA was conducted using AMOS 2.0. Items exhibiting low factor loadings (<0.50) specifically Education1, Education3, and Education5 were deleted to enhance the model's fit. Additionally, the Modification Index (MI) and covariant error terms were examined carefully.

To assess the overall model fit, indices, including CMIN/DF, GFI, CFI, TLI, Standardized Root Mean Square Residual (SRMR), and RMSEA, were used, with all values falling within acceptable ranges (Hu & Bentler, 1998; Ullman, 2001). Specifically, a CMIN/DF value below 3 signifies a good fit (Kline, 1998; Marsh & Hocevar, 1985). RMSEA: Values above 0.1 are deemed poor, between 0.08 and 0.1 are borderline, and below 0.05 are excellent (MacCallum et al., 1996). The CFA results indicated an RMSEA of 0.077, a CFI of 0.942, and a GFI of 0.917, implying a good fit with the data. These findings corroborate the alignment of the data with the theoretical framework underpinning the selected health programmes of the Ministry of Health.

The rigorous application of the CFA and subsequent SEM analysis confirmed the robustness of the proposed model. The model's fit indices reflect a strong alignment between the theoretical constructs and the observed data. This alignment underscores the validity of the research framework and the reliability of the findings, providing a solid foundation for further analysis and interpretation within the context of healthcare program delivery by the Ugandan Ministry of Health. Table 24 shows the fit indices, including CMIN/DF, RMSEA, NFI, and GFI, all of which indicate good model fit. The model, encompassing variables such as managerial education, training, innovation, corruption, networks, and improved quality delivery, yielded a CMIN/DF of 2.227, an SRMR of 0.153, and a GFI of 0.917, indicating a good fit (Hu & Bentler, 1998). The CFI was 0.942, aligning with the West et al. (2012) and Fan et al. (1999) standards for a near-perfect fit (See table 14).

Table 14

CMIN/DF

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	44	135.835	61	.000	2.227
Saturated model	105	.000	0		
Independence model	14	1381.522	91	.000	15.182

The analysis demonstrated that the CMIN/DF value was < 3 , indicating good model fit, as suggested by Kline (1998). The ratio of discrepancy to degrees of freedom is a critical measure for assessing the fit between the hypothesized model and observed data. A CMIN/DF value below 3 indicates a well-fitted model, reinforcing the validity of the hypothesized relationships. Additionally, Marsh and Hocevar (1985) suggested that CMIN/DF values of less than five are also reflective of a well-adjusted model. This further validates the appropriateness of the model within

the research context, aligning it with established thresholds for robust SEM analysis. The consistent alignment of these metrics with the recommended standards underscores the reliability and robustness of model fit. Adherence to these fit indices, particularly the CMIN/DF value, confirmed the good fit of the model with the observed data. This robust model fit indicates that the hypothesized relationships among the variables are well-supported, providing a solid foundation for further analysis and interpretation in the context of healthcare program delivery.

Table 15

Showing RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.153	.917	.857	.533
Saturated model	.000	1.000		
<u>Independence model</u>	<u>.947</u>	<u>.386</u>	<u>.291</u>	<u>.334</u>

Jöreskog and Sörbom (1984) and Tanaka and Huba (1985) highlighted the critical role of the Goodness-of-Fit Index (GFI) in Structural Equation Modelling (SEM) analysis. The GFI is essential for determining how well a model replicates the observed data, especially under a maximum likelihood estimation. This index measures the degree of discrepancy between predicted and observed covariances, indicating how well the model fits the data. An ideal GFI value of 1 signifies that the model perfectly reproduces the observed data with no discrepancy.

To evaluate model fit, Hu and Bentler (1998) suggested a GFI value exceeding 0.9 indicates a good fit between the proposed model and the observed data. Kline (2005) further clarifies this criterion, noting that GFI values greater than 0.95 are typically regarded as evidence of a robust model fit. Such high GFI values denote strong consistency between the model and observed data, reinforcing the validity of the model in representing the underlying theoretical

constructs. Therefore, in the context of this research, the GFI value serves as a pivotal measure in affirming the model's alignment with empirical data. Rigorous evaluation of the GFI, along with other fit indices, ensures that the proposed model accurately represents the observed data, providing a solid foundation for further analysis and interpretation. This robust model fit is crucial for validating the hypothesized relationships among variables, contributing significantly to the credibility and reliability of the research findings

Table 16

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.902	.853	.943	.913	.942
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

AMOS software facilitates baseline comparisons, including standard, saturated, and independent models, each automatically adjusted during the analysis process. Among these, the Normed Fit Index (NFI), also known as delta 1 (Bollen, 1989), is particularly important. NFI offers a scale ranging from a poorly fitting independent model to a well-fitting saturated model. A value of 1 in the NFI signifies a perfect fit, whereas values below 0.9 often suggest that the model could benefit from further refinement (Bentler & Bonett, 1980). Another critical index is the Tucker-Lewis Index (TLI), also known as the Bentler-Bonett Non-Normed fit index (NNFI). TLI typically ranges from 0 to 1, although it can exceed this range. A high TLI value approaching 1 denotes a very good fit, with 1 representing a perfect alignment between the model and the observed data.

The Comparative Fit Index (CFI) was also integral to SEM analysis. CFI varies between 0 and 1, with values close to 1 indicating a strong fit and a value of 1 denoting a perfect fit with the observed data (Hu & Bentler, 1999). In this research, a CFI value of 0.942 indicated a strong model fit. According to a study by West et al., (2012), CFI values below 0.95 are generally indicative of a good model fit. Normed Fit Index (NFI): Values close to 1 indicate a well-fitting model, with values below 0.9, suggesting the need for further refinement. Tucker-Lewis Index (TLI): Values approaching 1 denote a very good fit, with values above 0.9 generally considered acceptable. Comparative Fit Index (CFI) values near 1 indicate a strong fit, with values above 0.95, which are typically regarded as very good.

These indices collectively offer a comprehensive understanding of the model's fit with observed data, providing unique insights into different aspects of model fit. In the context of this research, these values collectively suggest that the model exhibits a strong fit with the data, affirming its suitability for analyzing relationships within the health program context. The robust fit indices, including the CFI value of 0.942, reinforce the validity and reliability of the model, ensuring that the hypothesized relationships are well supported by empirical data. This strong model fit is crucial for drawing accurate and meaningful conclusions regarding the factors that influence healthcare program delivery.

Table 17

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.077	.050	.095	.005
Independence model	.263	.251	.275	.000

The Root Mean Square Error of Approximation (RMSEA) is an important index in Structural Equation Modelling (SEM), quantifying the discrepancy between the observed and expected covariance matrices per degree of freedom (Chen, 2007). RMSEA is pivotal for evaluating model fit as it provides a nuanced understanding of how well the hypothesized model fits the observed data. For instance, MacCallum et al., (1996), RMSEA values are interpreted as follows: Values above 0.1: Indicate a poor fit. Values between 0.08 and 0.1: suggest a marginal fit. Values between 0.05 and 0.08: indicate an acceptable fit. Values below 0.05: are generally considered indicative of a good fit.

In addition to the RMSEA value, confidence interval metrics (LO 90 and HI 90) were also essential. These intervals represent the lower and upper bounds of the 90% confidence interval, respectively, and provide a range within which the true RMSEA value is likely to fall. Another critical aspect is the PCLOSE value, which is the p-value for testing the null hypothesis that the RMSEA is not greater than 0.05. An RMSEA value below 0.05, combined with a significant PCLOSE value typically indicates a good model fit (MacCallum et al., 1996). Given the statistical results obtained in this research, the RMSEA value falls within the range considered to be indicative of a good fit. This suggests that the variables incorporated in the SEM analysis aligned well with the observed data, thereby enhancing the credibility and reliability of the findings.

The inclusion of RMSEA, along with its confidence intervals and PCLOSE values, provides a comprehensive evaluation of the model's fit, ensuring a robust analysis and interpretation of the SEM results. By adhering to these rigorous standards, this research confirms that the hypothesized relationships are well supported by empirical data, contributing to a deeper

understanding of the factors influencing healthcare program delivery. The strong model fit, evidenced by RMSEA and other fit indices, reinforces the validity of the research framework and its findings.

CFA for Management Level of Education

In this segment of the research, Confirmatory Factor Analysis (CFA) was conducted using AMOS software to assess the six variables associated with the management level of education. The initial model test yielded a high chi-square value of 502.038 with nine degrees of freedom and a significance level of 0.000, indicating inadequate fit between the model and observed data. Additionally, the CMIN/DF ratio was 55.782, significantly surpassing the recommended threshold of less than five, which is necessary for an acceptable model fit. Other indices, such as the Tucker-Lewis Index (TLI) at 0.044 and the Root Mean Square Error of Approximation (RMSEA) at 0.517, further highlight the need for model refinement.

To address the model's poor fit, adjustments were made based on the modification indices generated by AMOS. Key modifications include introducing covariances between specific error terms, specifically between e4 and e6, e2 and e6, and e2 and e4. These adjustments led to a substantial improvement in the model's fit, as reflected by a reduced chi-square value of 2.495 with six degrees of freedom and a probability level of 0.869, suggesting an excellent fit. Further optimization involved removing factors with low loadings (below 0.30), resulting in the exclusion of Education 1, Education 3, and Education 5 from the model. These iterative modifications were essential for ensuring that the model represented the data more accurately, thereby enhancing the reliability of the analysis.

These modifications resulted in a substantially improved model fit, confirming that the refined model aligned well with the observed data. This enhancement underscores the iterative nature of SEM, in which model testing and refinement are critical for achieving robust and meaningful results. Through these adjustments, the study established a solid foundation for further analysis and interpretation within the context of healthcare management in Uganda, specifically regarding the impact of the management level of education on health service delivery in the WASH, Immunization, and NTD programs.

Table 18

Standardized Regression Weights

Variable label	Estimate
Education 2	.794
Education 4	.904
Education 6	.876

The assessment of the model's fit was further substantiated by the composite reliability, which was 0.767. This measure is pivotal in determining the extent to which measured variables accurately represent their corresponding latent constructs. A composite reliability score above the threshold of 0.7 suggests a good level of consistency within the constructs, reinforcing the model's robustness. The model exhibited standardized loadings above 0.7, indicating strong reliability and convergent validity. These high loadings are essential as they reflect the strength and significance of the relationship between the latent constructs and their observed variables. Such substantial loadings affirm that the constructs are well-represented by their observed variables, respectively.

Collectively, these results, encompassing composite reliability and high standardized loadings, indicate that the model possesses sound psychometric properties. This lends credence to

the reliability and validity of the findings derived from SEM analysis. This demonstrates that the model is not only statistically sound, but also psychometrically robust, ensuring that the results obtained are reliable and can be confidently used for further interpretation and discussion within the research context. These robust metrics underscore the strength of the model to accurately reflect the underlying theoretical constructs, thereby enhancing the overall quality and credibility of the research.

4.4.3 CFA for Management Training

Confirmatory Factor Analysis (CFA) was employed to examine the variables related to management training. Six variables were included in this analysis. Using the AMOS software, the initial CFA results presented a chi-square value of 49.311 with nine degrees of freedom and a probability level of 0.000, suggesting a suboptimal fit of the original model to the data. Additionally, the Tucker-Lewis index (TLI) was 0.858, Root Mean Square Error of Approximation (RMSEA) was 0.148, and the CMIN/DF ratio was 5.479, further indicating the need for modifications to enhance the model's fit. In response to these initial findings, the researcher made adjustments after closely examining modification indices. The variables with the highest indices of change were identified as potential alterations. Variables with low factor loading (less than 0.5) were excluded. Consequently, variables training 1, 5, and 6 were removed from the model based on this criterion. Following these modifications, revised CFA was conducted for the remaining three variables. This modified analysis yielded a chi-square value of 2 with 1 degree of freedom and a probability of 0.000. The perfect fit of the modified model was evidenced by a Comparative Fit Index (CFI) value of 1. In this case, the chi-squared statistic indicates a precise fit of the model to the data, suggesting that the remaining variables are representative of the management training

construct. These adjustments and subsequent results underscore the importance of iterative model refinement in CFA to achieve a model that accurately reflects the underlying constructs being measured. The final model, with a CFI of one, demonstrated a robust fit, reinforcing the reliability and validity of the findings related to management training in this research.

Table 19

Standardized Regression Weights for Management Training

Variable	Estimate
Benefitofmanagerial	.901
Typeofmanagerial	.648
Extentoffrequency	.870

CFA for Innovation

CFA was conducted using AMOS software to assess the relationship between the two measures of innovation. Given the limited number of measurable variables, it was necessary to impose constraints on the parameters within the model to facilitate the analysis (Kline, 2011; Gaskin, 2019). The CFA results indicated a good fit of the model to the data, as evidenced by the chi-squared statistic. The Goodness-of-Fit Index (GFI) was 1, indicating a perfect fit. This suggests that the model, despite its simplicity due to the constraint of having only two variables, effectively captures the essence of the innovation construct, as it pertains to this study.

The implications of these results are significant, affirming that the proposed model accurately represents the relationships between the underlying constructs of innovation and observed variables. This offers a comprehensive and reliable understanding of the innovation construct within the context of this research. A high GFI value reinforces the model's credibility, suggesting that it aptly encapsulates the dimensions of innovation being examined. This strong fit

underscores the robustness of the model, ensuring that the results obtained are both reliable and valid for further interpretation and discussion within the research context.

By confirming the validity of the innovation construct through CFA, this research provides a firm foundation for exploring the role of innovation in health care management and its impact on service delivery. The methodological rigor applied in this analysis highlights the importance of properly constrained models in achieving accurate and meaningful results, particularly when dealing with a limited number of measurable variables.

CFA for Corruption

In this research, rigorous CFA was conducted on a dataset comprising two variables related to corruption, utilizing AMOS software. The analysis yielded good results with a CMIN/DF ratio of 0.822. This value was significantly below the acceptability threshold of 2, suggesting a strong fit of the model to the observed data and affirming its validity. The model's fit was further corroborated through various key goodness-of-fit metrics: Goodness-of-Fit Index (GFI): a value of 0.843 was recorded, indicating a high degree of compatibility between the proposed model and the empirical data. Root Mean Square Error of Approximation (RMSEA): At 0.000, it denotes an excellent fit between the model and the observed covariance structure. Tucker-Lewis Index (TLI): Demonstrated a remarkably high value of 24.9, reinforcing the congruence between the model and the observed data.

To enhance the reliability of the measurement model, a composite reliability coefficient was calculated, which yielded a value of 0.5. This coefficient is important for ensuring that the latent factors representing corruption are accurately measured. Moreover, normalized weights exceeding 0.5 were observed, further attesting to the internal convergence reliability and validity

of the measurement model. These weights, which are above the recommended threshold, underscore the robustness of the model in capturing the nuances of the corruption construct within the context of this study.

The CFA results highlight the model's strong fit and reliability for measuring corruption-related variables. The combination of a low CMIN/DF ratio, high GFI, excellent RMSEA, and robust TLI values collectively affirmed the validity and reliability of the model. Composite reliability and high normalized weights further strengthen the model's fit, ensuring that the corruption construct is accurately represented. These findings provide a solid foundation for further analysis and interpretation within the broader context of the study and provide valuable insights into the role of corruption in healthcare management.

CFA for Network

CFA for network was conducted using AMOS software to scrutinize three variables related to networking. The initial analysis yielded a chi-square value of 51.83 with one degree of freedom and a probability of 0.000. These findings suggest that the original model did not adequately align with the observed data, indicating the need for model refinement. Efforts to enhance the model fit involve strategic modifications. One significant adjustment was to introduce covariance between variables e1 and e2 to account for their potential interrelationships. Additionally, variable Network 3 was excluded from the analysis because of its negligible contribution to the overall model fit. These modifications were instrumental in refining the measurement model and improving its fit with observed data.

The revisions led to notable improvements in various fit indices: CMIN/DF Ratio: The revised model displayed a CMIN/DF ratio well below the recommended threshold of 2,

corroborating the improved fit. Root Mean Square Error of Approximation (RMSEA): A low value of 0.006 was registered, reflecting strong congruence between the model and the observed covariance matrix. Goodness-of-Fit Index (GFI): Reinforced the model's acceptability, affirming the reliability of the measurement model. The attainment of acceptable levels in key metrics, such as CMIN/DF, RMSEA, and GFI, marked a significant improvement in the model's fit compared to the original version. These results underscore the model's capability to accurately depict the interactions among network-related variables, thereby providing valuable insights into the networking aspects within the scope of the research. The refined model, with its robust fit indices, ensured a reliable and valid representation of the networking construct, enhancing the overall quality and validity of the research findings.

CFA for Delivery of Health services

In this research, Confirmatory Factor Analysis (CFA) was performed on two variables pertaining to improved healthcare delivery using the AMOS software. The limited number of measured variables necessitated constraining the parameters in the model to ensure a robust analysis. The results from this constrained model were in good agreement with the observed data, confirming the acceptability of the model. The primary objective of the proposed model is to explore the factors that influence the delivery of health services by health programs. The desirable attributes of the model, including reliability and convergent validity, were evident in the analysis. These attributes are crucial as they signify the model's ability to accurately reflect the underlying constructs related to healthcare delivery.

Based on the results obtained, the proposed model is deemed appropriate for further analysis and exploration in the context of health-program management. CFA confirmed the

original model's acceptability for the two measured variables related to healthcare delivery. Importantly, the demonstration of reliability, convergent validity, and overall goodness-of-fit underlines the suitability of the model for subsequent analyses. These findings support the utility of the model for enhancing knowledge and understanding in the field of health program management, particularly in the dimensions of improved healthcare delivery.

Explanation of Modifications

In developing and evaluating a structural equation Modelling (SEM) analysis, it is crucial to construct both measurement and structural models. Measurement models capture the relationships between the observed and latent variables, whereas structural models elucidate the interactions among the latent variables (Albright & Hun, 2008). Confirmatory Factor Analysis (CFA) was employed to evaluate the measurement model, which was conducted using AMOS Graphics version 20 after the initial data processing in SPSS 20.

The process involved specifying latent variables, covariates, and observed variables; assigning error terms; and employing maximum likelihood estimation, standardized estimates, and modification indices for analysis. No identification issues were encountered during the model run (Arbuckle, 2008). However, the factor loadings for some variables related to education and training were initially below the acceptable threshold of 0.5, necessitating modifications to improve model fit.

The proposed SEM model comprises six latent variables: managerial education level, managerial training, innovation, networks, corruption, and improved quality delivery of health services. Using a sample of 206 responses, the initial CFA yielded poor fit indices, including a chi-square value of 502.038 (nine degrees of freedom, $p = 0.000$), a CMIN/DF ratio of 55.782, a

Tucker-Lewis Index (TLI) of 0.044, and an RMSEA of 0.517. These results indicate that some modifications were necessary to align the model with the underlying data and improve its overall reliability.

Rationale for Modifications

To address initial suboptimal model fit, several targeted modifications were implemented based on the modification indices generated by AMOS. A key adjustment involved introducing covariances between specific error terms, such as e4 and e6, e2 and e6, and e2 and e4. These modifications accounted for unmodeled correlations between measurement errors that were not initially captured in the model. By addressing these unmodeled relationships, the adjustments significantly improved the model's overall fit, ensuring a more accurate representation of the underlying constructs.

Another critical modification involved the elimination of variables with factor loadings below 0.30, including Education1, Education3, and Education5. These variables contributed minimally to the measurement model, reducing its reliability and precision. Their exclusion was necessary to enhance the accuracy and strength of the constructs, ensuring that only variables with strong associations were retained. This step improved both the reliability and validity of the model by eliminating weak indicators that could have introduced noise and undermined the model's robustness.

These adjustments resulted in substantial improvements in the model's fit indices. The chi-square value decreased to 2.495 (with six degrees of freedom), indicating a significant improvement in fit. Other key fit indices, including the CMIN/DF ratio, Tucker-Lewis Index (TLI), and Root Mean Square Error of Approximation (RMSEA), fell within acceptable ranges, further

confirming that the revised model better represented the empirical data. By addressing the limitations of the initial model, these modifications enhanced the validity, reliability, and overall performance of the theoretical constructs, ensuring that the model aligned more accurately with the data.

Interpretation of Fit Indices

Structural equation Modelling (SEM) requires a comprehensive evaluation of both the measurement and structural models using a range of fit indices. These indices collectively assess the extent to which the proposed model aligns with the empirical data. In this research, key fit indices, including the chi-square statistic (χ^2), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and Root Mean Square Error of Approximation (RMSEA), were employed to gauge the model's performance. Each of these indices serves as a critical metric for determining whether the hypothesized relationships among the variables are adequately supported by the data.

Chi-Square Statistic (χ^2)

Initial Model: The initial SEM model yielded a chi-square value of 502.038 with nine degrees of freedom and a probability level of 0.000, indicating poor model fit. After modifications, the chi-square value improved dramatically to 2.495 with six degrees of freedom, suggesting a significant improvement in the model fit. A non-significant chi-square value ($p > 0.05$) typically indicates a good fit. However, the chi-square test was highly sensitive to sample size. In large samples, even minor model misspecifications can lead to significant chi-square results. Therefore, while the chi-square statistic is a foundational measure, it should be interpreted alongside other fit indices for a more accurate assessment of the model fit, particularly in large datasets.

Comparative Fit Index (CFI):

Initial Model: The CFI for the initial model was below acceptable thresholds, highlighting the inadequacies of the model. Post-modification, the CFI improved to 1.0, indicating an excellent fit. CFI compares the fit of the hypothesized model with that of an independent or null model. Values close to or above 0.95 reflect a good fit between the hypothesized model and the data. A perfect CFI value of 1.0 suggests the revised model fits the data exceptionally well, supporting the hypothesized relationships with high precision.

Tucker-Lewis Index (TLI): Initial Model: The initial TLI value of 0.044 reflected a poor model fit. Revised Model: After adjustments, the TLI value increased significantly, indicating a marked improvement in the model fit. Interpretation: TLI values above 0.90 are generally considered acceptable, with values closer to 1.0, indicating a stronger fit. The substantial improvement in the TLI in the revised model demonstrates the adequacy of the modifications, affirming that the model better captures the underlying data structure.

Root Mean Square Error of Approximation (RMSEA): The RMSEA for the initial model was 0.517, indicating a poor fit. Revised Model: RMSEA improved significantly, dropping to 0.005, which is indicative of a near-perfect fit. RMSEA values less than 0.08 indicate an acceptable fit, while values below 0.05 represent a close fit of the model to the data. The significant reduction in RMSEA underscores the improvements made through the model refinement, confirming that the revised model closely approximates the true population structure.

Contextual Interpretation in Healthcare Management

The interpretation of these fit indices must be contextualized within the domain of healthcare management, particularly given the characteristics of the sample of 206 healthcare

managers in Uganda. The theoretical framework guiding this research posits relationships among key variables, such as managerial education, managerial training, innovation, networks, corruption, and healthcare service delivery. The post-modification fit indices strongly support the theoretical propositions, validating the effectiveness of the model adjustments in aligning with the hypothesized constructs.

Alignment with Theoretical Expectations.

The significant improvement in the fit indices following the modifications is consistent with the theoretical framework. These results suggest that higher levels of managerial education and training are positively associated with improved innovation and service delivery. These findings align with the existing literature that underscores the importance of educational qualifications and training in enhancing managerial capacity and driving better health outcomes.

Moreover, the fit indices support the theoretical model, which positions innovation and networks as mediating factors, with corruption acting as a moderating variable that influences healthcare service delivery. The strong fit of the revised model highlights the complex interplay of these factors in healthcare management in low-resource settings.

Comparison with Previous Research

The improved fit indices in this research align with the benchmarks set in previous SEM research, supporting the iterative model refinement process advocated by Albright and Hun (2008) and Arbuckle (2008). These scholars emphasize that model adjustments are essential for achieving robust fit indices, which, in turn, validate the underlying relationships among latent constructs. Consistent with these standards, this research's enhancements in chi-square, CFI, TLI, and RMSEA confirm the effectiveness of refinement in capturing complex relationships among key

variables such as managerial education, training, innovation, and service delivery in healthcare. These refined indices underscore the model's alignment with theoretical expectations and observed data, underscoring the reliability and robustness of the research.

These findings echo previous research emphasizing the critical role of managerial competencies in driving innovation and improving service delivery, especially in resource-constrained healthcare systems. For instance, Agrawal and Madaan (2021) highlight the importance of managerial competencies, demonstrating how these factors contribute to service enhancement and operational efficiency in healthcare settings. In the Ugandan context, where resources are limited, the development of competencies through education and training plays a vital role in fostering innovation, supporting the findings of this research on the systemic impact of management training on healthcare outcomes. This relationship also aligns with the work of Johnston et al., (2015), who used multivariable models to evaluate healthcare systems, underscoring the necessity of comprehensive modeling approaches to capture the interplay among multiple variables simultaneously.

This research further resonates with the broader healthcare management literature, particularly regarding the roles of innovation and networks as drivers of improved health outcomes. Park et al., (2017) and Vuillermoz et al., (2017) found that professional networks and ongoing managerial training significantly impact healthcare efficiency and service delivery, especially in constrained environments. The current research extends this perspective within Uganda's healthcare system, emphasizing that networks facilitate knowledge-sharing and resource allocation, while innovation, shaped by managerial education and competencies, enhances service

delivery. These findings demonstrate how systemic factors, including corruption management, influence healthcare delivery, as noted by Wang et al. (2022) and Koskimäki et al., (2021).

In line with previous SEM applications, this study's iterative model refinement improved the fit indices, highlighting the importance of a rigorous methodological approach. These fit enhancements validate the inclusion of multiple variables that together shape healthcare service delivery, reflecting a holistic perspective critical in SEM research (Daşkın, 2019; Yalman & Sancar, 2022). By integrating managerial competencies, education, and systemic factors, such as corruption and networks, this research offers an empirically grounded understanding of healthcare dynamics in Uganda.

In summary, this research's refined SEM model reflects a robust methodological alignment with prior research, reinforcing the significance of managerial competencies in fostering innovation and improving healthcare service delivery in resource-limited settings. This research contributes to the discourse on effective healthcare management by demonstrating how systemic factors impact service outcomes. This rigorous approach to SEM reinforces the credibility of the findings and provides a valuable framework for policy recommendations aimed at strengthening health care management in Uganda.

Summary of the Measurement Models

The analysis of the measurement models presented in Table 31 confirms that all constructs satisfy the established criteria for model acceptance, with standardized loadings of observed variables falling within acceptable ranges, as recommended by Young and Pearce (2013). These standardized loadings display statistical significance, offering robust evidence for convergent validity in line with the guidelines of Fornell and Larcker (1981). Reliability estimates for each

construct also meet the acceptable standards identified by Tabachnick and Fidell (2001), underscoring the model's robustness and reliability and ensuring consistent and valid measurements.

Key fit indices, including the chi-square, Tucker-Lewis Index (TLI), Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), and Goodness-of-Fit Index (GFI), indicate a strong fit between the hypothesized model and observed data. This suggests that the model accurately captures the latent constructs of interest, specifically, management education, management training, innovation, networks, corruption, and healthcare service delivery. The inclusion of 21 observed variables across these constructs facilitates a comprehensive evaluation of the factors influencing healthcare delivery, thereby providing a holistic understanding of the research context.

The model demonstrates high convergent validity, with statistically significant loadings exceeding the threshold and reliability estimates that confirm the internal consistency of the constructs. The strong fit statistics corroborate the suitability of the model for the sample data, laying a robust foundation for further analysis and interpretation. This measurement model effectively captures the complexity of the constructs under study, providing a reliable basis for the subsequent SEM analysis.

Suboptimal Factor Loading

In Confirmatory Factor Analysis (CFA), addressing suboptimal factor loadings is a critical step in enhancing model fit and overall robustness. Variables with low factor loadings contribute less to the representation of latent constructs and can introduce measurement error, reducing the model's reliability and validity. While statistically driven practices such as variable removal are

necessary, they must be carefully balanced with theoretical considerations to avoid excluding indicators of substantial conceptual importance.

Justification for Variable Removal

The removal of variables with factor loadings below 0.50 improves the statistical properties of the model by refining its structure and ensuring that only meaningful indicators are retained. Low-loading variables dilute the explanatory power of latent constructs, introducing error and diminishing overall model reliability. By adhering to established standards in Structural Equation Modeling (SEM) literature, such as those proposed by Hair et al., (1998), the exclusion of low-loading variables ensure high construct validity and strengthens the model's parsimony. This approach aligns with the objective of creating a statistically robust measurement model that accurately reflects the underlying theoretical framework.

Although the removal of low-loading variables enhances model fit, it is crucial to ensure that the process does not compromise the inclusion of theoretically significant indicators. To balance statistical rigor with theoretical integrity, several strategies were implemented. Model comparison involved assessing fit indices such as the chi-square ratio (CMIN/DF), Goodness-of-Fit Index (GFI), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and Root Mean Square Error of Approximation (RMSEA). Comparing these indices between the original and modified models provided quantitative validation of the modifications, ensuring that the refined model retained both robustness and explanatory power. Additionally, factor loadings were reevaluated across subsamples or using cross-validation techniques to verify the generalizability of the adjustments and to minimize sample-specific biases.

Specific Steps in Variable Refinement

The process of addressing low factor loadings commenced with the identification of variables with loadings below the 0.50 threshold. Such loadings suggested weak correlations with their respective latent constructs, potentially introducing measurement error and undermining model reliability. Retaining these variables could compromise the model's explanatory power, as supported by SEM guidelines (Hair et al., 1998). Consequently, their removal was justified on statistical grounds, enabling the development of a more parsimonious model structure focused on strong indicators. However, statistical adjustments were not made in isolation; theoretical relevance was rigorously evaluated for each low-loading variable. This step ensured that variables essential to understanding nuances in constructs such as managerial education or innovation were not excluded purely on statistical grounds. In cases where theoretically significant variables exhibited low loadings, alternative strategies to enhance their representation were explored before final exclusion decisions were made. Model Reevaluation and Outcomes

Subsequent to the exclusion of variables with low factor loadings, the model underwent reevaluation to assess the impact of these modifications. Comparative analyses revealed significant improvements in fit indices, including CMIN/DF, GFI, CFI, TLI, and RMSEA. These enhancements demonstrated a substantial increase in model fit, validating the removal of low-loading variables without compromising the model's theoretical integrity. The refined model maintained its alignment with the research objectives, preserving its conceptual coherence while achieving greater statistical precision.

The refinement of the CFA model through the elimination of variables with suboptimal factor loadings was a meticulously balanced process that prioritized both statistical precision and

theoretical rigor. By integrating a statistically informed approach with a comprehensive theoretical evaluation, this research developed a robust and valid measurement model that effectively represents the latent constructs under investigation. The improvements in fit indices further substantiated the appropriateness of these modifications, ensuring that the model adjustments strengthened its alignment with the research objectives. This methodical refinement provides a strong foundation for subsequent SEM analysis, contributing to a more comprehensive understanding of the management factors influencing healthcare service delivery in Uganda.

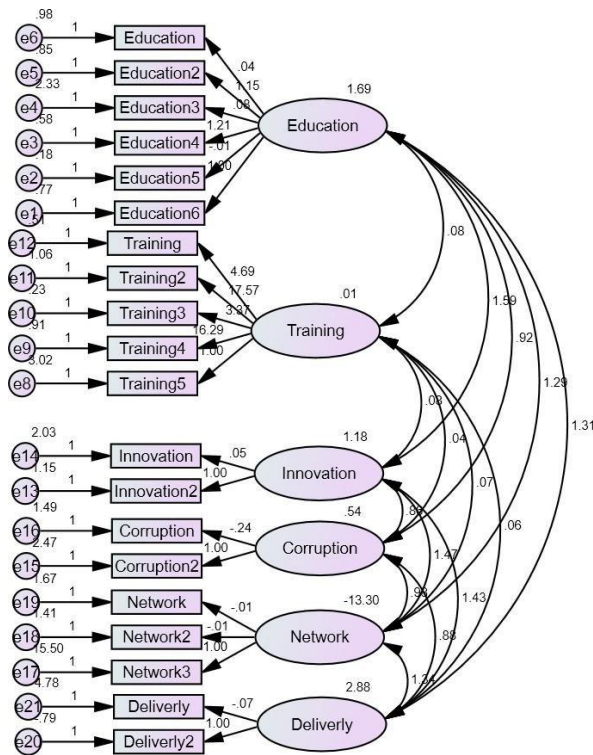
Table 20

Standardized Regression Weights for All Measured Variables

Variable			Estimate
Benefit of highest type	<---	Education	.885
Benefit of highest	<---	Education	.885
Education benefit	<---	Education	.848
Type of managerial	<---	Training	.643
Extent of frequency	<---	Training	.891
Innovation	<---	Innovation	.685
Type of innovation	<---	Innovation	.501
Corruption	<---	Corruption	.532
Type of corruption	<---	Corruption	.648
Network enhances	<---	Network	.692
Common network	<---	Network	.562
Delivery improved	<---	Delivery	.660
Deliverly attribute	<---	Delivery	.389
<u>Benefit of managerial</u>	<---	<u>Training</u>	<u>.914</u>

Table 21*Covariances*

			Estimate	S.E.	C.R.	P
Education	<-->	Training	2.020	.258	7.814	***
Education	<-->	Innovation	1.778	.126	14.072	***
Education	<-->	Corruption	.733	.149	4.909	***
Education	<-->	Network	1.437	.119	12.069	***
Education	<-->	Delivery	1.775	.140	12.683	***
Training	<-->	Innovation	1.419	.185	7.662	***
Training	<-->	Corruption	.671	.200	3.357	***
Training	<-->	Network	1.307	.179	7.288	***
Training	<-->	Delivery	1.426	.199	7.152	***
Innovation	<-->	Corruption	.418	.121	3.453	***
Innovation	<-->	Network	1.148	.078	14.654	***
Innovation	<-->	Delivery	1.330	.089	14.975	***
Corruption	<-->	Network	.270	.121	2.236	.025
Corruption	<-->	Delivery	.668	.124	5.401	***
Network	<-->	Delivery	1.151	.090	12.759	***
e3	<-->	e5	.323	.107	3.028	.002

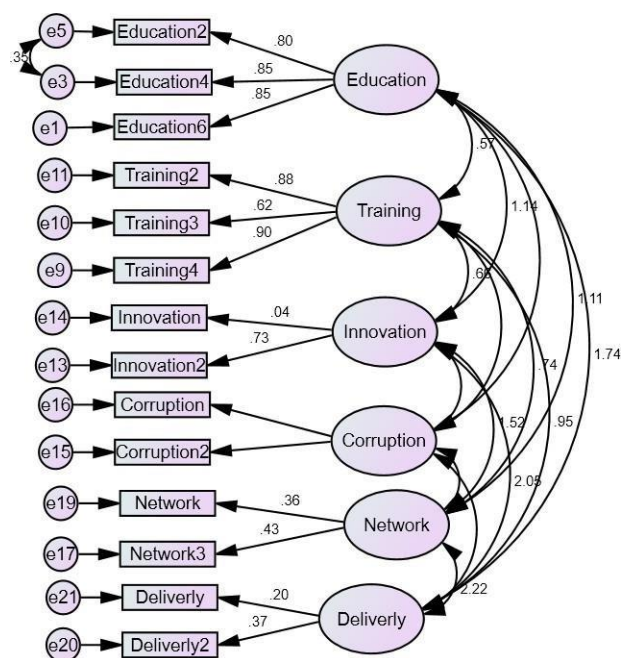
Figure 23*Initial Measurement Model*

The a priori hypothesized model demonstrated a strong fit with the empirical data, as substantiated by the findings of this research. To further enhance model accuracy, an in-depth examination of the path coefficients and factor loadings was conducted. The primary objective of this refinement process is to identify and remove elements with low loadings, thereby improving the model's overall goodness-of-fit and theoretical validity. A meticulous review of the indicator loadings on their respective constructs revealed elements with loadings below the 0.3 threshold. Indicators with loadings below this threshold were flagged for potential exclusion, as their minimal

contribution to construct validity and model coherence could compromise the overall integrity of the model. By applying this criterion, the analysis identified factors that were less integral to the model's structural efficacy, and prioritized them for removal.

In addition to analyzing factor loadings, a modification index was employed to pinpoint the model parameters with a high propensity for modification. This index served as a diagnostic tool, highlighting parameters that, if modified or excluded, could significantly enhance the model fit. By strategically eliminating elements with both low loadings and high modification indices, the measurement model was refined to achieve stronger alignment with the observed data. This refinement process improves the model's accuracy, interpretability, and reliability of subsequent analyses, thus providing a more precise representation of the underlying constructs and their interrelations.

The rigorous approach to model refinement, incorporating path estimation reviews, indicator loadings, and modification indices, culminated in a measurement model that more accurately reflects the theoretical framework underlying this research. The enhanced model fit reinforces the reliability and validity of the subsequent analytical procedures, contributing to a nuanced understanding of the relationships within the SEM framework. Ultimately, the refined model supports a robust and insightful analysis of management factors affecting health service delivery within the WASH, immunization, and NTD programs in Uganda, strengthening the overall quality and impact of the research.

Figure 24*Improved Measurement Model***Structural Model Test**

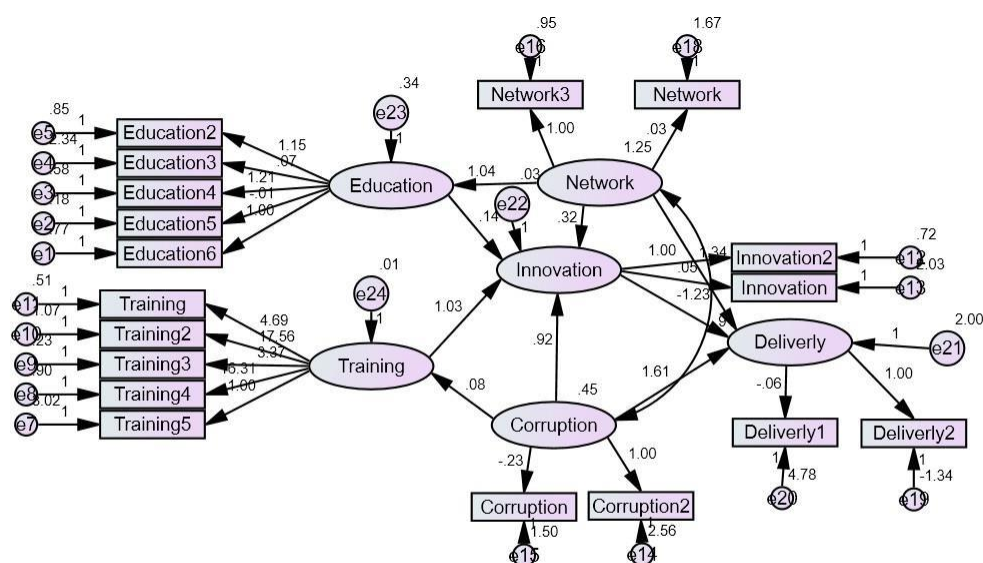
The robust fit observed in the measurement model results establishes a solid foundation for the subsequent structural model analysis using SEM. This structural model graphically represents the relationships among the six latent factors integral to the research, capturing the hypothesized relationships with both direct and indirect effects, and accounting for the intercorrelations among

variables. Comprehensive path diagrams were constructed in AMOS to ensure the inclusion of all the proposed relationships within the structural framework.

The structural model fit indices further confirmed its efficacy with the following results: CMIN/DF = 2.56, GFI = 0.876, NFI = 0.96, TLI = 0.869, CFI = 0.899, and RMSEA = 0.087. The chi-square to degrees of freedom ratio (CMIN/DF) of 2.56 aligns well with the recommended threshold established by Krause et al. (2000), suggesting a good fit between the model and the sample data. Additionally, the values of GFI, CFI, and TLI fell within the acceptable limits outlined by Schumacker (2002), further substantiating the model's fit to the observed data.

Collectively, these fit indices indicate that the model provides an accurate representation of sample data. The correlation coefficients, detailed in the accompanying table, reveal strong and meaningful interrelationships within the structural model, supporting the presupposition that the model effectively captured the hypothesized relationships. The directionality and magnitude of these correlations, coupled with robust fit indices, offer substantial evidence of the validity of the model. The congruence between the model and observed data reinforces the reliability and validity of the structural model, enhancing confidence in its capacity to elucidate the complex relationships among latent factors.

Validation of the structural model through these fit indices and interrelationships confirms its utility as a robust framework for understanding the dynamics of health service delivery management factors in Uganda, specifically within the WASH, immunization, and NTD programs. This rigorous evaluation of the structural model underscores its significance in providing insightful and accurate analysis, contributing substantially to the research findings and advancing the understanding of the intricate interactions among the latent constructs in this research.

Figure 25*The Structural Model***Model Fit Summary**

CMIN

Table 22*Model Fit Summary*

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	43	238.044	93	.000	2.560
Saturated model	136	.000	0		
Independence model	16	1549.241	120	.000	12.910

Table 23*RMR, GFI*

Model	RMR	GFI	AGFI	PGFI
Default model	.185	.876	.818	.599
Saturated model	.000	1.000		
<u>Independence model</u>	<u>.850</u>	<u>.394</u>	<u>.313</u>	<u>.347</u>

Table 24*Baseline Comparisons*

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.846	.802	.900	.869	.899
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Table 25*Parsimony-Adjusted Measures*

Model	PRATIO	PNFI	PCFI
Default model	.775	.656	.696
Saturated model	.000	.000	.000
<u>Independence model</u>	<u>1.000</u>	<u>.000</u>	<u>.000</u>

Table 26*NCP*

Model	NCP	LO 90	HI 90
Default model	145.044	103.302	194.466
Saturated model	.000	.000	.000
<u>Independence model</u>	<u>1429.241</u>	<u>1305.950</u>	<u>1559.938</u>

Table 27*FMIN*

Model	FMIN	F0	LO 90	HI 90
Default model	1.161	.708	.504	.949
Saturated model	.000	.000	.000	.000
<u>Independence model</u>	<u>7.557</u>	<u>6.972</u>	<u>6.370</u>	<u>7.609</u>

Table 28*RMSEA*

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.087	.074	.101	.000
Independence model	.241	.230	.252	.000

Table 29*AIC*

Model	AIC	BCC	BIC	CAIC
Default model	324.044	331.820	467.142	510.142
Saturated model	272.000	296.596	724.591	860.591
Independence model	1581.241	1584.134	1634.487	1650.487

Table 30*ECVI*

Model	ECVI	LO 90	HI 90	MECVI
Default model	1.581	1.377	1.822	1.619
Saturated model	1.327	1.327	1.327	1.447
Independence model	7.713	7.112	8.351	7.727

Table 31*HOELTER*

Model	HOELTER .05	HOELTER .01
Default model	101	110
Independence model	20	22

Correlation Metrics for the Constructs

The findings indicate that all correlations, except H4, are positive and statistically significant, thereby supporting four of the five hypotheses. Although H4 demonstrated a positive association, it did not reach statistical significance, suggesting a weaker influence relative to the other hypothesized relationships. The positive correlations observed in these constructs underscore

the interdependence among variables, highlighting their collective role in enhancing health service delivery through targeted health programs.

Tables 10, 11 and 12 show standardized direct, indirect, and total effects among the constructs, which aligns with the hypothesized directionality of these relationships. This consistency reinforces the understanding that each factor plays a critical role in strengthening health care delivery. By visually articulating both the direct and indirect path coefficients, the table provides an empirical basis for evaluating the healthcare delivery model. These coefficients offer valuable insights into the specific mechanisms by which each factor influences others, ultimately contributing to the quality and effectiveness of health care services.

The model effectively captures complex interactions among variables, facilitating a deeper understanding of the underlying mechanisms. The significant positive correlations, standardized effects, and path coefficients collectively provide a comprehensive view of how these integrated components contribute to improved health-service delivery. This thorough analysis elucidates the nuanced relationships and interactions within the model, advancing a more profound understanding of the drivers of effective healthcare delivery.

The correlation metrics and path coefficients demonstrated significant positive interactions between constructs, validating the hypothesized relationships and underscoring their critical role in enhancing healthcare service delivery. By examining both direct and indirect effects, this research provides a nuanced perspective on the relationships between variables, revealing how different factors synergistically improve health program outcomes. This detailed research underscores the robustness of the model and its capacity to reveal the complexities of healthcare

management, ultimately contributing to a more comprehensive understanding of effective healthcare delivery.

Table 32

Total Effects

	Network	Corruption	Training	Education	Innovation	Delivery
Training	1.434	-.635	.000	.000	.000	.000
Education	1.114	.000	.000	.000	.000	.000
Innovation	1.834	-.745	-.120	-.411	.000	.000
Delivery	1.360	-.323	-.181	-.619	1.507	.000
Quality attribute	-.070	.017	.009	.032	-.078	-.052
Extent of quality attribute	1.360	-.323	-.181	-.619	1.507	1.000
Type of network	.020	.000	.000	.000	.000	.000
Extent of network	1.000	.000	.000	.000	.000	.000
Type of corruption	.000	-.193	.000	.000	.000	.000
Extent of corruption	.000	1.000	.000	.000	.000	.000
Most common innovation	.070	-.028	-.005	-.016	.038	.000
Extent of innovation	1.834	-.745	-.120	-.411	1.000	.000
Frequency of managerial	.414	-.184	.289	.000	.000	.000
Extent of frequency	1.555	-.689	1.084	.000	.000	.000
Type of managerial training	.297	-.132	.207	.000	.000	.000
Extent of type of managerial	1.434	-.635	1.000	.000	.000	.000
Extent of highest education	1.279	.000	.000	1.148	.000	.000
Type of education	.081	.000	.000	.073	.000	.000
Extent of highest education	1.344	.000	.000	1.206	.000	.000
Rating of type of education	1.114	.000	.000	1.000	.000	.000

Table 33

Direct Effects

	Network	Corruption	Training	Education	Innovation	Delivery
Training	1.434	-.635	.000	.000	.000	.000
Education	1.114	.000	.000	.000	.000	.000
Innovation	2.464	-.821	-.120	-.411	.000	.000
Delivery	-1.404	.799	.000	.000	1.507	.000
Quality attribute	.000	.000	.000	.000	.000	-.052
Extent of quality attribute	.000	.000	.000	.000	.000	1.000

Typeofnetwork	.020	.000	.000	.000	.000	.000
Extentofnetwork	1.000	.000	.000	.000	.000	.000
Typeofcorruption	.000	-.193	.000	.000	.000	.000
Extentofcorruption	.000	1.000	.000	.000	.000	.000
Mostcommoninnovation	.000	.000	.000	.000	.038	.000
Extentofinnovation	.000	.000	.000	.000	1.000	.000
Fequencyofmanagerial	.000	.000	.289	.000	.000	.000
Extentoffrequency	.000	.000	1.084	.000	.000	.000
Typeofmanagerialtraining	.000	.000	.207	.000	.000	.000
Extentoftypeofmanagerial	.000	.000	1.000	.000	.000	.000
Extenthighesteducation	.000	.000	.000	1.148	.000	.000
Typeofeducation	.000	.000	.000	.073	.000	.000
Extentofhighesteducation	.000	.000	.000	1.206	.000	.000
Ratingoftypeofeducation	.000	.000	.000	1.000	.000	.000

Table 34*Indirect Effects*

	Network	Corruption	Training	Education	Innovation	Deliverly
Training	.000	.000	.000	.000	.000	.000
Education	.000	.000	.000	.000	.000	.000
Innovation	-.629	.076	.000	.000	.000	.000
Deliverly	2.764	-1.123	-.181	-.619	.000	.000
Qualityattribute	-.070	.017	.009	.032	-.078	.000
Extentofqualityattribute	1.360	-.323	-.181	-.619	1.507	.000
Typeofnetwork	.000	.000	.000	.000	.000	.000
Extentofnetwork	.000	.000	.000	.000	.000	.000
Typeofcorruption	.000	.000	.000	.000	.000	.000
Extentofcorruption	.000	.000	.000	.000	.000	.000
Mostcommoninnovation	.070	-.028	-.005	-.016	.000	.000
Extentofinnovation	1.834	-.745	-.120	-.411	.000	.000
Fequencyofmanagerial	.414	-.184	.000	.000	.000	.000
Extentoffrequency	1.555	-.689	.000	.000	.000	.000
Typeofmanagerialtraining	.297	-.132	.000	.000	.000	.000
Extentoftypeofmanagerial	1.434	-.635	.000	.000	.000	.000
Extenthighesteducation	1.279	.000	.000	.000	.000	.000
Typeofeducation	.081	.000	.000	.000	.000	.000
Extentofhighesteducation	1.344	.000	.000	.000	.000	.000
Ratingoftypeofeducation	1.114	.000	.000	.000	.000	.000

Item-Effect Analysis

The research conducted an in-depth analysis of the total and indirect effects of various constructs, as outlined in Hypotheses (H1 to H5). The results are presented in the table below:

Table 35

Test for Hypothesis

Constructs	Hypothesis		Indirect effect	Results
Education and Innovation	H1	+sig	+sig	Partial mediation
Training and Innovation	H2	+sig	+sig	Partial mediation
Innovation and Delivery	H3	+sig	+sig	Supported
Education and Network	H4	Not sig	+sig	Not Supported
Education and corruption	H5	+sig	+sig	Partial mediation

Key:

- **+sig:** Positive and statistically significant
- **Not sig:** Not statistically significant

Hypothesis Testing and Path Analysis

The table reveals that the relationships between Management Education and Innovation (H1), Management Training and Innovation (H2), and Education and Corruption (H5) exhibit partial mediation, with both the total and indirect effects showing positive significance. This indicates that these relationships are mediated by additional factors within the model beyond the specific mediating effect of innovation and the moderating role of corruption. Furthermore, the direct relationship between Innovation and Delivery (H3) is supported by statistically significant positive effects on both the total and indirect paths.

Conversely, the relationship between Education and Network (H4) lacks statistical significance in its total effects, despite a positive indirect effect. This result suggests that the direct

influence of education on network may not be as impactful as hypothesized. These findings provide insights into the relationships among constructs within the model, highlighting how factors such as Education, Training, and Innovation collectively shape outcomes related to improved healthcare delivery, networking, and corruption in the context of health service management. The observed partial mediation in multiple relationships underscores the complexity of these dynamics, calling for a nuanced approach to understanding the various elements that enhance the effectiveness of health programs.

Detailed Analysis of Hypotheses

The analysis of the hypothesized relationships between management factors and healthcare program outcomes provided nuanced insights into their interconnections, particularly through the evaluation of direct and indirect effects. Hypothesis H1, which posited a positive relationship between managers' education levels and innovation, was strongly supported. The analysis revealed statistically significant positive total and indirect effects, confirming that advanced education positively influences innovation in healthcare programs. Consequently, the null hypothesis (H0) for H1 was rejected, highlighting the critical role of education in fostering innovative practices within healthcare systems.

Similarly, Hypothesis H2, which postulated that managerial training positively influences innovation, was also confirmed. The data indicated statistically significant positive total and indirect effects, demonstrating that training is a vital factor in enhancing innovation within healthcare programs. This finding reinforces the importance of equipping healthcare managers with the necessary skills to drive creative and effective solutions, leading to the rejection of the

null hypothesis for H2. It underscores the role of professional development in fostering innovation in healthcare management.

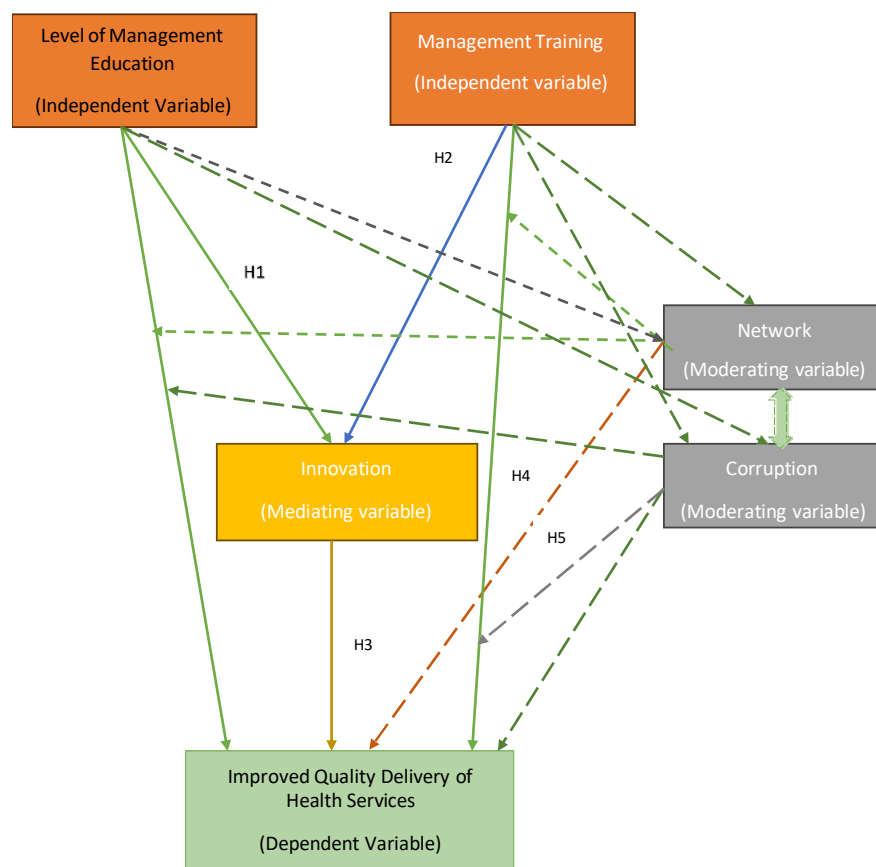
Hypothesis H3, which examined the relationship between innovation and the improved healthcare delivery, was validated through the analysis. Both total and indirect effects were statistically significant and positive, affirming the hypothesis that innovation directly contributes to improved healthcare delivery. This finding emphasizes the value of adopting innovative practices to achieve better healthcare outcomes, thus providing robust support for rejecting the null hypothesis for H3. It elucidates the crucial role that innovation plays in improving healthcare service delivery.

In contrast, Hypothesis H4, which proposed a relationship between management education and collaborative networks, was not supported by the total effects. While a positive indirect effect was observed, the direct relationship between education and networks lacked statistical significance. This suggests that the influence of collaborative networks on education may be insufficient to directly improve healthcare service delivery. Consequently, the null hypothesis for H4 could not be rejected. However, the positive indirect effects observed warrant further investigation into the moderating role of collaborative networks, indicating that future research should explore this relationship in greater depth.

Finally, Hypothesis H5, which posited that corruption moderates the relationship between management education and improved healthcare service delivery, was supported. The analysis revealed statistically significant positive total and indirect effects, indicating partial mediation. This finding elucidates the complex interplay between management education and corruption, which significantly impacts health outcomes. It underscores the necessity to address corruption as

an impediment to effective healthcare delivery, leading to the rejection of the null hypothesis for H5.

Overall, the analysis provided robust support for H1, H2, and H3, partial support for H5 through mediation, and no support for H4's total effects. While the direct effects of education on collaborative networks in H4 did not demonstrate significance, the observed indirect effects suggest that future research should further investigate the potential moderating role of networks in healthcare delivery. By comprehensively assessing both direct and indirect path coefficients, this research offers a more nuanced understanding of the dynamics underlying healthcare program management. These findings provide valuable insights for policymakers and healthcare managers seeking to optimize service delivery, particularly in resource-limited settings.

Figure 26*Conceptual Model***4.5.1 Analysis of the Conceptual Model**

The conceptual model developed in this research (see figure 26) provides a structured framework for analyzing the complex dynamics of healthcare management in Uganda. It offers insights into how improved managerial education and training, mediated by innovation and moderated by contextual factors, such as networks and corruption, can address existing challenges and enhance healthcare service outcomes.

Managerial education and training serve as foundational components of this model, directly influencing healthcare managers' competencies and capacity to improve service outcomes. This

research confirms that both education levels and targeted training programs play critical roles in improving healthcare delivery. These findings align with the literature, underscoring the importance of managerial competencies in achieving healthcare efficiency and improved service delivery (Bloom et al., 2021). Given the systemic challenges faced by Uganda's healthcare sector, well-educated and professionally trained managers are crucial drivers of health program success.

Networks and corruption serve as moderating variables in the model, influencing the extent to which managerial education and training translate into health care delivery improvements. Networks that encompass are expected to enhance communication and resource-sharing. However, the findings suggest that in the Ugandan context, networks may lack the structural coherence or strategic alignment necessary to significantly amplify the impact of managerial education on healthcare delivery outcomes. This finding is consistent with Provan & Kenis (2008), who emphasize that network effectiveness depends on structural governance and alignment with organizational goals.

Conversely, corruption has emerged as a significant barrier that impedes the positive effects of education and training. Corruption, manifested through practices such as bribery, bureaucratic inefficiencies, and conflicts of interest, distorts resource allocation and undermines trust within healthcare systems. This aligns with prior research (Vian, 2008; Mauro, 1995), which highlights the detrimental impact of corruption on healthcare delivery. The model illustrates that, while managerial education can contribute to improved healthcare delivery outcomes, its effectiveness is significantly constrained in corrupt environments. Addressing corruption holistically is essential for creating an environment in which managerial factors can translate into improved healthcare delivery.

Innovation serves as a critical mediating factor bridging the gap between managerial education and healthcare delivery outcomes. As health care managers gain education and training, their capacity to drive innovation within health programs increases, leading to enhanced service delivery. This role of innovation is essential, especially in resource-constrained settings where adaptability and efficiency are paramount (Guarcello & de Vargas, 2020). By facilitating the adoption of new practices and technologies, innovation amplifies the impact of managerial competencies on service delivery, positioning it as a key lever for healthcare improvements in Uganda.

The model's ultimate aim is to improve healthcare delivery, positioned as the dependent variable, influenced by managerial education, training, innovation, and the moderating factors of networks and corruption. Health service delivery captures the overall impact of management practices on health care delivery outcomes. While managerial education and innovation drive improvements, corruption imposes a significant constraint, underscoring the need for targeted anti-corruption measures to realize the full benefits of enhanced management practices.

In summary, the model offers a nuanced perspective on healthcare management in Uganda with practical implications for policy and future research. Addressing systemic corruption is essential for unlocking the full potential of managerial education and training. Additionally, strengthening innovation within healthcare programs can enable greater adaptability and service quality, ultimately enhancing delivery.

Evaluation of Findings

This research investigated the interactions among management education, training, innovation, networks, corruption, and healthcare service delivery within Uganda's healthcare

programs. Utilizing Structural Equation Modeling (SEM) and Confirmatory Factor Analysis (CFA), a conceptual model was developed and evaluated to elucidate how these factors influence healthcare delivery. The findings contribute to the understanding of management practices in resource-constrained settings, offering insights into theoretical implications, methodological contributions, and practical recommendations.

The research confirmed several hypotheses, providing robust support for the proposed relationships. First, the analysis validated a positive relationship between management education and innovation (H1). This finding aligns with Damanpour's (1991) assertion that education serves as a critical driver of organizational innovation by equipping managers with the knowledge and skills necessary to foster creative solutions within healthcare programs. Similarly, the hypothesis that managerial training enhances innovation (H2) was supported. This result corroborates findings by Yoon et al., (2015), emphasizing the role of training in equipping managers with practical tools to implement innovative practices effectively.

Innovation was also found to positively impact healthcare delivery (H3), underscoring its central role in enhancing the quality and efficiency of healthcare services. This outcome supports prior research by Smith et al., (2017), highlighting the transformative potential of innovation in addressing healthcare challenges. Additionally, the moderating effect of corruption on the relationship between education and healthcare delivery (H5) was confirmed. This finding aligns with Nabukeera's (2016) assertion that corruption acts as a significant barrier to effective healthcare management, even as education attempts to promote efficiency and accountability.

Conversely, the hypothesis that networks moderate the relationship between education and healthcare delivery (H4) was not supported. This result suggests that factors such as organizational

culture or resource availability may exert a stronger influence on service delivery outcomes than collaborative networks. This finding aligns with Provan and Kenis (2008), who argue that the effectiveness of networks is often contingent on contextual factors, including the quality of organizational relationships and access to critical resources.

In summary, this research provides strong empirical evidence for the role of education, training, and innovation in improving healthcare delivery, while highlighting the challenges posed by corruption. The lack of support for H4 invites further investigation into the contextual factors that moderate the impact of networks on service delivery. These findings contribute to both theory and practice, offering actionable insights for policymakers and healthcare managers aiming to optimize healthcare delivery in Uganda and similar settings.

Contextual Interpretation

The findings of this research are firmly situated within the context of Uganda's healthcare management landscape, where education and training are essential for developing managerial competencies but are frequently impeded by systemic barriers such as corruption. While collaborative networks were hypothesized to play a significant role in enhancing healthcare service delivery, their limited impact underscores the challenges of network functionality in resource-constrained settings. This observation aligns with Provan and Milward's (1995) findings on the inefficacy of networks in poorly coordinated systems, suggesting that such networks necessitate robust governance and strategic orientation to realize their potential.

Integration with Literature

This research assessed the impact of key managerial factors namely education, training, innovation, networks, and corruption, on healthcare delivery within Uganda's health programs.

The results confirm a positive correlation between education and innovation, consistent with Camelo-Ordaz et al., (2005), who emphasized the role of educational background in fostering organizational innovation. Similarly, Shortell et al., (2000) and Wagner et al., (2001) highlighted the importance of higher education in equipping managers with skills to enhance clinical efficiency and improve healthcare services.

Managerial training also emerged as a significant contributor to innovation, providing managers with practical tools to address operational challenges effectively. Innovation was found to mediate the relationship between education, training, and improvements in healthcare delivery. This aligns with Basu and Green's (1997) assertion that innovation is a critical driver of organizational effectiveness and Nonaka and Teece's (2001) emphasis on fostering organizational learning to adapt and integrate knowledge effectively. In Uganda's resource-constrained healthcare context, promoting innovation through targeted education and training programs is essential for addressing systemic challenges and achieving meaningful improvements in service delivery outcomes.

While collaborative networks were expected to moderate the relationship between education and healthcare delivery, their effects were not statistically significant. This supports Provan and Kenis's (2008) assertion that effective networks rely on governance, trust, and coordination, factors that may be underdeveloped in Uganda's healthcare system. Turrini et al., (2010) similarly highlight "network failure" as a frequent issue in poorly resourced systems, where logistical rather than strategic goals predominate. Although 52.9% of networks in Uganda focused on service implementation and 37.4% on professional collaboration, their limited strategic

orientation may have constrained their impact, reducing their ability to amplify the effects of managerial education on service delivery.

In contrast to collaborative networks, corruption emerged as a significant moderator, with findings consistent with Vian (2008) and Mauro (1995), who documented its detrimental effects on healthcare delivery. Corruption disrupts resource allocation, erodes trust, and undermines accountability, thereby diminishing the positive effects of managerial education. This underscores the critical need for robust governance mechanisms and anti-corruption measures to improve healthcare service delivery in Uganda. Transparent fund management and ethical oversight are essential for ensuring that investments in managerial education translate into tangible improvements.

The demographic profile of respondents further contextualizes the findings within the framework of Upper Echelons Theory (UET), which posits that managerial characteristics influence organizational outcomes (Hambrick & Mason, 1984). The observed gender imbalance, with 64.6% of respondents being male, reflects broader global trends in health leadership (Betron et al., 2019). Moreover, over 85% of respondents had more than six years of management experience, aligning with UET's emphasis on the role of managerial experience in shaping strategic decisions and operational priorities (Finkelstein et al., 2009).

The research highlights a strong positive relationship between managerial education, training, and innovation, consistent with Camelo-Ordaz et al., (2005) and Shortell et al., (2000). Higher education equips managers with evidence-based management skills that enhance problem-solving and clinical outcomes. Similarly, continuous managerial training fosters innovation by

enabling managers to overcome operational barriers, allocate resources efficiently, and cultivate a culture of creativity (Brown et al., 2020).

This research explicates the complex interplay between managerial factors and healthcare delivery outcomes. While collaborative networks exhibited limited moderating effects, corruption emerged as a significant barrier, emphasizing the need for robust governance mechanisms to mitigate its impact. By focusing on education, training, and innovation, this study provides actionable insights for improving healthcare management in Uganda and similar resource-limited settings.

This research enriches both theoretical and practical discourse by integrating frameworks such as Upper Echelons Theory, institutional theory, and network theory with empirical findings on healthcare management in Uganda. The findings revealed a positive correlation between managerial education, training, and innovation, underscoring the value of investing in professional development to enhance healthcare outcomes. However, corruption remains a pervasive barrier that moderates the benefits of managerial education on service delivery. This highlights the necessity of implementing anti-corruption strategies alongside efforts to strengthen managerial competencies and governance structures.

These findings offer valuable guidance for policymakers by providing a foundation for targeted interventions aimed at strengthening healthcare delivery in resource-limited settings. By shedding light on the interplay of education, training, innovation, and governance within Uganda's healthcare system, this research broadens the understanding of factors critical to effective healthcare management. The insights are also relevant to similar global contexts, where addressing systemic challenges can lead to substantial improvements in healthcare outcomes.

Chapter Summary

This chapter employed AMOS version 20 to conduct a comprehensive analysis of data collected from health program managers in Uganda, focusing on three primary healthcare programs: WASH, UNEPI and NTDs. The chapter evaluated the impact of management factors, specifically education and training, on healthcare service delivery. Furthermore, it examined the mediating role of innovation and the moderating effects of collaborative networks and corruption, providing an in-depth understanding of how these dynamics influence healthcare delivery.

To validate the conceptual model, Confirmatory Factor Analysis (CFA) was utilized to ensure the structural alignment of the model with the collected data. Subsequently, Structural Equation Modeling (SEM) was employed to test the research hypotheses and examine the direct and indirect effects of managerial education and training on healthcare service delivery. The findings from the analysis are as follows.

The analysis confirmed H1, which postulated a positive relationship between management education and innovation in healthcare programs. Higher levels of education significantly enhanced the capacity for innovation, consistent with extant literature suggesting that well-educated managers are better equipped to foster and implement innovative practices, thereby improving healthcare outcomes. Similarly, H2, which proposed a positive relationship between managerial training and innovation, was supported. The findings underscore the importance of continuous professional development in equipping healthcare managers with essential skills to develop and implement novel solutions, ultimately addressing healthcare challenges effectively.

H3, which hypothesized a positive relationship between innovation and healthcare service delivery, was also validated. Innovation emerged as a critical mediator between management

education, training, and service delivery outcomes, with a standardized direct effect measured at 0.184. This underscores innovation's vital role in driving improvements in healthcare service delivery and highlights the necessity to foster innovation through effective managerial practices.

Conversely, H4, which proposed that collaborative networks moderate the relationship between education and healthcare delivery, was not supported. Although networks are present within healthcare programs, their influence was not statistically significant, suggesting the need for further investigation into the conditions under which networks might enhance service delivery. This finding reflects the complexity of network functionality, particularly in resource-limited healthcare systems.

In contrast, H5, which posited that corruption moderates the relationship between education and healthcare delivery, was confirmed. The findings revealed that corruption significantly undermines the effectiveness of managerial education and training in improving healthcare outcomes. Corruption partially mediates this relationship, highlighting the necessity of robust anti-corruption measures to maximize the potential gains from management education and training. Without addressing corruption, the systemic barriers it creates will continue to limit the effectiveness of healthcare programs. The policy implications of these findings are substantial.

Advanced managerial education and consistent training are crucial for enhancing healthcare service delivery, both directly and indirectly, through fostering innovation. Investments in the education and professional development of healthcare managers are essential for achieving improved service outcomes. Furthermore, the significant negative impact of corruption

underscores the necessity of implementing systemic reforms and anti-corruption measures to ensure that managerial efforts translate into enhanced healthcare delivery.

This chapter emphasizes the critical role of management factors in shaping healthcare delivery in Uganda. It presents evidence-based recommendations for policymakers and practitioners, highlighting the need for strategic interventions that prioritize managerial education, professional training, and innovation while addressing corruption. These findings contribute to a comprehensive framework for enhancing healthcare management practices and achieving optimal healthcare outcomes in resource-limited settings.

CHAPTER 5: IMPLICATIONS, RECOMMENDATIONS, AND CONCLUSIONS

Chapter Introduction

Chapter 5 builds directly on the insights presented in the earlier chapters, particularly the in-depth analysis of the impact of management education and training on health service delivery in Uganda's health programs. The chapter transitions from the empirical and theoretical exploration of management factors, such as education, training, innovation, networks, and corruption, to a comprehensive discussion of the broader implications of these findings for policy and practice. The previous chapter analyzed the roles of managerial education and training in driving innovation within healthcare programs while also considering the moderating effects of networks and corruption on service delivery outcomes. Chapter 5 synthesizes these findings and offers concrete recommendations for health program managers, policymakers, and stakeholders in Uganda's healthcare sector.

In this chapter, we delve into the practical implications of this research and provide actionable recommendations for improving health service delivery based on the study's results. The focus will be on how to leverage managerial education, training, and innovation to address the challenges identified in Uganda's health programs, such as corruption and inefficient networks. Furthermore, this chapter will explore strategies to mitigate the obstacles identified in the research, such as disjointed intersectoral coordination and pervasive corruption, which undermine the success of health programs.

Finally, Chapter 5 provides a roadmap for how the insights gained from this research can be applied to strengthen health systems in Uganda. The conclusions drawn reflect the study's contribution to the broader discourse on healthcare management, particularly in resource-limited

settings, and emphasize the critical role of strategic management in achieving sustainable improvements in health service delivery.

Implications by Research Question

This research investigated the influence of management education on innovation in healthcare programs and, consequently, the delivery of health services in Uganda. The findings reveal a strong positive correlation between the educational attainment of healthcare managers and enhanced service delivery. This aligns with studies by Shortell et al., (2000) and Wagner et al., (2000), as well as Njinyah (2017), who posit that higher education enables managers to adopt broader perspectives and make informed decisions. Managers with advanced educational qualifications are better equipped to address complex healthcare challenges, foster environments conducive to innovation, and implement effective healthcare programs. These findings underscore the critical role of educational advancement in shaping healthcare outcomes, providing a clear pathway for policy and practice to improve healthcare service delivery in Uganda.

The implications for healthcare practices and policies are significant. The positive correlation between managerial education and improved healthcare outcomes emphasizes the necessity for healthcare organizations to prioritize recruiting and developing highly educated healthcare managers. Improved educational qualifications enable managers to adopt innovative practices, addressing persistent healthcare challenges more effectively. Policy initiatives should incentivize advanced education through tailored workshops, seminars, and degree programs. These initiatives would foster a culture of lifelong learning and professional growth, equipping managers to navigate complex healthcare systems, adapt to changes, and drive sustainable improvements in service delivery.

Empirical examples illustrate how advanced education can lead to substantial improvements in healthcare outcomes. For instance, a healthcare program led by a manager with a master's degree in Public Health implemented evidence-based practices that reduced maternal mortality by 25% over two years (Mukanya et al., 2023). Another program, led by a manager with expertise in health management, developed a mobile health application that reduced missed HIV/AIDS appointments by 40%, improving treatment adherence (Horvath et al., 2021). Similarly, a rural healthcare program managed by a Ph.D.-educated leader improved disease detection and treatment through training initiatives, reducing mortality from malaria and tuberculosis by 30% (Haldane et al., 2019). These case studies underscore the transformative potential of advanced managerial education in addressing Uganda's healthcare challenges.

To sustain these improvements, Uganda's healthcare system must prioritize continuous professional development to maintain managerial expertise in a rapidly evolving sector. Continuous learning programs, as emphasized by Rawas (2023), are essential for equipping managers to stay abreast of emerging trends and best practices. Tailored capacity-building programs would enable healthcare managers to leverage local resources and devise region-specific solutions, particularly in resource-limited settings (McGivern et al., 2015). This research affirms that advanced education and continuous development are foundational for enhancing healthcare innovation and service delivery in Uganda, providing a roadmap for policymakers to integrate education into healthcare management policies.

The second research question examined the influence of managerial training on innovation within Uganda's healthcare programs and its subsequent impact on health-service delivery. The

findings indicate that managerial training exerts a positive and significant effect on healthcare managers' capacity to foster innovation. This observation aligns with extant literature, including studies by Côté-Boileau (2022) and Damanpour and Aravind (2012), which emphasize that training enhances managers' ability to surmount barriers, cultivate a problem-solving culture, and allocate resources strategically to support novel initiatives. Continuous learning and development have been identified as fundamental for promoting innovation in healthcare organizations, as highlighted by Lyng et al., (2021).

The implications for healthcare service delivery in Uganda are substantial. Managerial training functions as a catalyst for innovation, equipping managers with the requisite skills to implement new processes, services, and organizational structures. This research underscores the significance of creating supportive environments for innovation by promoting technological advancements, fostering interdisciplinary collaboration, and establishing platforms for disseminating innovative practices (Persaud & Murphy, 2020; Sooampon et al., 2021). Embedding innovation as a core focus within healthcare organizations ensures that training translates into measurable improvements in service delivery.

This research elucidates the strategic role of managerial training in linking effective management practices with improved health outcomes. By investing in training programs, healthcare organizations can foster a culture of learning and innovation, ultimately strengthening service delivery and benefiting the Ugandan population (Andersson et al., 2023; Birken et al., 2012). The findings advocate for sustained investments in training programs tailored to the needs of Uganda's healthcare sector, emphasizing the importance of managerial training as a strategic

tool for sustainable improvements in healthcare delivery. Role of Innovation as a Mediator in Healthcare Delivery (RQ3)

The third research question investigated the extent to which innovation mediates the relationship between managerial education and the improved delivery of health services in Uganda's healthcare programs. The findings indicate that innovation functions as a substantial mediator in this relationship. Managers with higher levels of education are more likely to cultivate environments that support innovation, which subsequently enhances service delivery. This suggests that managerial education provides not only theoretical knowledge but also practical skills for implementing innovative strategies that improve healthcare outcomes (Mohammed et al., 2020).

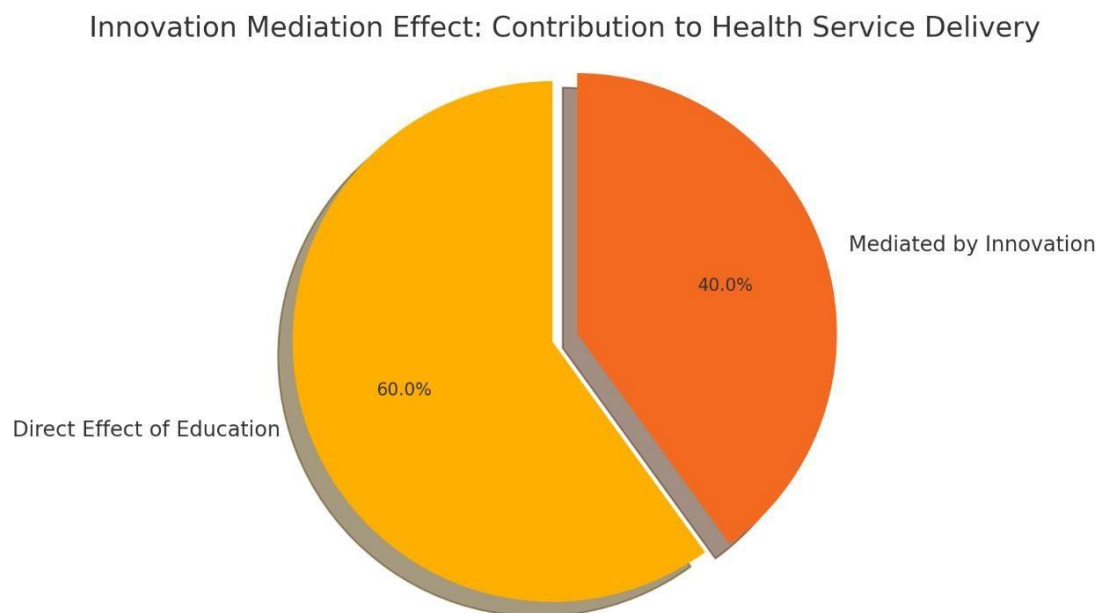
Regression analysis confirmed the mediating effect of innovation, demonstrating a significant indirect pathway from managerial education to health-service delivery through innovation (see figure 27). Managers with advanced educational qualifications exhibit a greater propensity to foster a culture of innovation that enhances the quality and efficiency of healthcare services. These results demonstrate that the positive impact of education on service delivery is amplified when managers actively promote innovative practices within healthcare programs.

The findings underscore the importance of integrating innovation into healthcare management practices. By equipping managers with the skills to implement innovative solutions, healthcare organizations can achieve substantial improvements in service delivery outcomes. This research emphasizes the need for healthcare systems to prioritize innovation as a central component of managerial education and training, ensuring that managers are prepared to adapt to evolving challenges and utilize innovative strategies to improve healthcare outcomes.

In summary, the findings elucidate that innovation serves as a critical mechanism through which managerial education enhances health service delivery. By cultivating innovative capacity through advanced education, Uganda's healthcare system can substantially improve service efficiency and efficacy. Innovation functions as a mediator between educational attainment and improved outcomes, underscoring the necessity to prioritize innovation within health programs. These insights support policies that promote advanced education for healthcare managers, with an emphasis on integrating innovation into healthcare delivery strategies. Equipping managers with innovative approaches enables them to address complex challenges effectively, thereby fostering a more responsive and efficient healthcare system.

Figure 27

Innovation's Mediating Effect



Research Question 4 (RQ4) investigated the moderating effect of corruption on the relationship between managerial education, training, and health service delivery in Uganda's healthcare programs. The findings indicated that corruption significantly diminishes the positive

impact of advanced education and training on healthcare delivery. This moderation effect elucidates how pervasive corruption impedes the efficacy of managerial competencies, exacerbating the extant challenges in Uganda's healthcare system. By diminishing the potential benefits of management reforms, corruption compromises the capacity of healthcare managers to deliver high-quality services.

The analysis suggests that corruption functions as a substantial impediment to the application of advanced education and training. Managers possessing advanced qualifications and innovative strategies frequently encounter systemic obstacles that constrain their effectiveness. Resources allocated for critical healthcare needs such as infrastructure development, medical supplies, or health worker training are often misappropriated or diverted through corrupt practices. This misallocation of resources impedes managers' efforts, hindering their ability to achieve intended service delivery goals. These findings corroborate existing literature, including Vian (2014) and Weintraub and McKee (2018), which emphasize how corruption impairs managerial effectiveness by distorting the implementation of best practices in healthcare.

Corruption not only results in financial mismanagement and resource diversion but also erodes public trust in the healthcare system. Managers must navigate an environment where professional priorities are frequently misaligned due to corrupt influences. This undermines their ability to implement training and knowledge effectively, further compromising healthcare delivery outcomes. As Lyng et al., (2021) note, the presence of systemic corruption creates significant challenges for healthcare managers, compelling them to balance their roles against external pressures that undermine their strategies for improvement.

This research demonstrates that corruption undermines the anticipated benefits of managerial education and training by creating systemic barriers that impede managers from fully applying their skills and insights. The widespread misappropriation of resources and the absence of accountability mechanisms hinder even the most competent managers from implementing substantive improvements in service delivery. These findings corroborate those of Tucmeanu et al., (2022), who emphasize that addressing corruption is crucial for enabling healthcare managers to effectively leverage their training and education. Recommendations for Policy and Reform To mitigate the deleterious effects of corruption, targeted policy reforms are imperative. Implementing robust accountability mechanisms, ensuring transparent resource allocation, and fostering an ethical culture within the healthcare system can attenuate corruption's influence. Such measures would enable well-trained healthcare managers to fully utilize their skills and competencies, ultimately facilitating sustainable improvements in health service delivery. Addressing corruption is not merely a complementary strategy but a prerequisite for realizing the full potential of educational and training initiatives in Uganda's healthcare programs.

Implications by Hypotheses

This research underscores the critical importance of managerial education in improving innovation within healthcare programs. Hypothesis 1 posits that healthcare managers with higher educational attainment are better equipped to drive innovation by leveraging advanced competencies such as critical thinking, strategic decision-making, and adaptability. These qualities are essential for addressing complex healthcare challenges and implementing innovative solutions to improve service delivery (Khadka et al., 2013; Willems & Bracke, 2018). The findings affirm

that education enhances these managerial capabilities, enabling healthcare leaders to navigate the complexities of their systems effectively.

A significant implication of these findings is the necessity to prioritize professional development programs tailored specifically for healthcare managers. Continuous training sessions and workshops focused on practical competencies, such as leadership, resource optimization, and strategic decision-making, are essential for preparing managers to address evolving challenges. Such programs should be structured to provide managers with the tools necessary to drive innovation, adapt to sectoral changes, and implement transformative healthcare strategies.

Incentivizing higher education among healthcare managers is equally crucial. Establishing scholarships, grants, and career advancement opportunities can motivate managers to pursue advanced education, thereby fostering a workforce capable of leading innovation in healthcare. Higher education equips managers with the ability to engage in strategic planning, adopt new technologies, and apply evidence-based practices, ultimately contributing to more efficient and effective healthcare delivery. Policymakers and institutions must prioritize these incentives to develop a robust pipeline of qualified healthcare leaders.

Integrating innovation into healthcare management education programs is another essential strategy. Educational curricula must include modules on innovation, strategic planning, and technological adoption to ensure that healthcare managers are prepared to address real-world challenges. Case studies and practical examples should be utilized to demonstrate the applicability of innovative practices, bridging the gap between theoretical knowledge and practical healthcare service delivery (Dikic et al., 2019). This alignment of education and practice empowers managers to implement strategies that drive systemic improvements.

These findings have broader implications for healthcare systems, particularly in resource-limited settings. Managers with advanced education are better positioned to lead innovative efforts that enhance service delivery. This aligns with existing literature emphasizing the role of education in fostering leadership, strategic vision, and innovation within healthcare systems (Shortell et al., 2000; Wagner et al., 2001; Willems & Bracke, 2018). Empirical evidence from this research supports targeted investments in training and higher education, reinforcing the critical need for educational and professional development initiatives to strengthen healthcare management and service outcomes.

The research also validates the higher echelons theory, which emphasizes the influence of managerial education on innovation. The findings provide a strong case for healthcare institutions and policymakers to invest in educational advancements for their management teams, demonstrating a clear link between higher education, innovation, and improved healthcare delivery (Wagner et al., 2001; Willems & Bracke, 2018).

In summary, advancing the educational qualifications of healthcare managers is vital for fostering innovation and improving service delivery. This emphasis on education aligns with global healthcare objectives, including sustainability, adaptability, and excellence in service delivery. Continuous efforts to enhance the educational attainment of healthcare managers are essential for sustaining improvements, fostering innovation, and ensuring that healthcare systems remain resilient and responsive to evolving challenges. The findings affirm that education is a fundamental enabler of healthcare innovation, with significant implications for the long-term success of healthcare

Hypothesis 2 (H2):

Hypothesis 2 posits that managerial training significantly enhances innovation within healthcare programs. This hypothesis suggests that training programs equip managers with essential skills and competencies necessary to foster innovative practices, ultimately contributing to improved healthcare delivery. Empirical evidence supports this assertion, indicating that training in areas such as strategic planning, resource allocation, and problem-solving directly enhances the capacity for innovation in healthcare organizations. Managerial competencies in communication and teamwork are particularly critical for implementing innovation, especially in primary healthcare settings where adaptable solutions are required to address complex service delivery challenges (Oliveira, 2023).

The findings of this research confirm that managerial training has a significant positive impact on innovation within Uganda's healthcare programs. In resource-constrained environments such as Uganda, where adaptive strategies are essential, trained managers are better equipped to implement innovative practices that enhance healthcare service delivery. Training empowers managers to overcome barriers to innovation, foster a culture of creative problem-solving, and engage in calculated risk-taking. This aligns with the work of Fanelli et al., (2021), who identified that trained healthcare managers play a pivotal role in creating workplace environments conducive to innovation, making managerial training a strategic imperative for healthcare providers.

Continuous management training programs are essential for cultivating innovative thinking, risk-taking, and problem-solving abilities among healthcare managers. These programs should emphasize practical competencies, equipping managers with the tools necessary to navigate the complexities of healthcare delivery. Interactive methods such as workshops, simulations, and

case studies can bridge the gap between theoretical knowledge and practical application, creating a more adaptable and innovative management workforce (Babawarun, 2024). Tailoring training to the specific challenges faced by healthcare managers in Uganda ensures its relevance and impact.

Investing in human capital through regular and effective training activities is critical for improving healthcare service delivery. Allocating sufficient resources for such programs is vital, with strategies that include collaborations with international organizations to integrate global best practices while addressing local healthcare challenges. These partnerships enable healthcare managers to adapt innovations to the Ugandan context, ensuring training is both locally relevant and globally informed (Kryzhanivska et al., 2021).

Another critical component of effective training implementation is establishing robust evaluation and feedback mechanisms. These mechanisms assess the impact of training on immediate managerial competencies and longer-term improvements in healthcare innovation and service delivery. Regular feedback allows for continuous refinement of training programs, ensuring that they evolve to address the dynamic needs of healthcare systems effectively (Dikic et al., 2019). This iterative approach enhances training effectiveness and aligns outcomes with healthcare priorities.

The importance of professional development for healthcare management teams is underscored by these findings. Continuous training empowers managers to promote innovation and address critical challenges in Uganda's healthcare sector. Given the complexity of healthcare delivery in resource-limited environments, fostering innovation through targeted managerial training is a strategic necessity. This approach aligns with global healthcare goals and offers a pathway to overcoming the unique challenges of Uganda's healthcare system, enabling improved

outcomes across healthcare programs (Irer et al., 2016). The research corroborates theoretical frameworks such as the Upper Echelons Theory, which postulates that trained managers are more adept at fostering organizational climates conducive to innovation. This substantiation supports the development of strategic initiatives aimed at cultivating a well-trained management workforce to drive systemic improvements in healthcare delivery. By integrating training as an essential component of managerial roles, Uganda's healthcare system can enhance its resilience and adaptability to meet evolving healthcare needs.

Healthcare policies in Uganda should prioritize structured managerial training as a fundamental element for sustaining innovation in service delivery. This strategic focus can enhance healthcare outcomes by ensuring that trained managers remain adaptable and equipped to address the unique challenges faced by Uganda's healthcare programs, such as those in WASH, UNEPI, and NTDs. Investing in comprehensive and continuous training programs fosters individual competencies and establishes an organizational culture that actively supports innovation and sustainable service delivery improvements.

In summary, this research underscores the critical role of managerial training in fostering innovation within healthcare programs. Structured training programs provide a robust foundation for promoting innovation, enabling healthcare managers to drive sustainable improvements in service delivery across Uganda's healthcare system. This investment in training is essential for developing an adaptable and skilled workforce capable of cultivating an organizational climate responsive to both present and future healthcare challenges.

Hypothesis 3 (H3):

Hypothesis 3 posits that innovation is a critical driver for enhancing healthcare service delivery, suggesting that healthcare programs that incorporate innovative practices are more likely to achieve improved outcomes. Innovations such as technological advancements, novel processes, or creative problem-solving approaches have been demonstrated to significantly improve the efficiency and quality of healthcare services. The extant literature strongly supports this hypothesis, indicating that innovation enhances both the reach and responsiveness of healthcare systems (Balasubramanian et al., 2015; Milojević, 2024).

The findings of this research validate Hypothesis 3, confirming that innovation plays a pivotal role in improving healthcare delivery. Programs that adopt innovative approaches consistently report enhanced efficiency, greater accessibility, and improved responsiveness to patient needs. For instance, the integration of technologies such as electronic health records (EHRs) and telemedicine platforms has been demonstrated to increase operational efficiency and improve patient satisfaction (Milojević, 2024; Omaghomi, 2024). These findings underscore the importance of embedding innovation within the organizational structure of healthcare programs to create a more dynamic and effective healthcare environment (Greenhalgh & Papoutsis, 2019).

Cultivating an organizational culture that encourages innovation is essential for fostering continuous improvement. Healthcare organizations must establish environments that promote experimentation, interdisciplinary collaboration, and receptiveness to new ideas. Such a culture not only supports the development and implementation of innovative practices but also strengthens the organization's capacity to adapt to emerging health trends and patient demands. This aligns with the broader understanding that an innovation-oriented culture drives systemic advancements

in healthcare delivery (Persaud & Murphy, 2020; Weintraub & McKee, 2018). Promoting innovation necessitates active efforts to establish supportive structures within healthcare organizations. Leadership plays a pivotal role in fostering environments where novel ideas are encouraged and rewarded. The establishment of innovation hubs, committees, and regular forums for collaboration provides healthcare managers and staff with platforms to share ideas and best practices. These initiatives reinforce a culture of continuous improvement and ensure that innovation becomes an integral component of organizational behavior (Cochrane, 2017; Gambirasio, 2023).

Investments in advanced technologies and research are fundamental for driving innovation in healthcare delivery. Tools such as EHRs, telemedicine platforms, and mobile health (mHealth) solutions enhance service efficiency and expand accessibility, particularly in resource-limited settings like Uganda. Pilot projects that evaluate innovative practices are invaluable for identifying effective strategies and scaling them across health systems. Allocating resources to these initiatives enables healthcare organizations to assess and refine practices before widespread implementation, ensuring both efficacy and sustainability (Milojević, 2024; Omaghomi, 2024).

Sustaining innovation requires embedding adaptability and learning into organizational strategies. This encompasses not only the adoption of new technologies but also process improvements, staff training, and the development of new care delivery models. By committing to continuous learning and flexibility, healthcare organizations can proactively address emerging challenges and ensure sustained improvements in service delivery. Integrating innovation into the core strategic framework strengthens organizational resilience and positions healthcare programs to meet evolving needs effectively (Maruthappu et al., 2015).

The validation of Hypothesis 3 aligns with a growing body of research emphasizing the fundamental role of innovation in effective healthcare systems, particularly in addressing entrenched challenges in resource-constrained settings like Uganda (Mendonça et al., 2022). Programs that embrace innovation not only experience immediate improvements in efficiency and outcomes but are also better equipped to adapt to future demands. A continuous, embedded process of innovation ensures that healthcare systems remain resilient and responsive to dynamic healthcare needs (Persaud & Murphy, 2020; Cherop et al., 2022).

Healthcare programs that prioritize innovation as an ongoing organizational process achieve more sustainable improvements compared to those viewing innovation as a one-time intervention. Organizations that foster environments prioritizing and rewarding innovation build robust systems capable of consistently enhancing service delivery and patient outcomes over the long term (Milligan & Berta, 2021). This underscores the necessity of integrating innovation into the strategic priorities of healthcare systems.

In summary, the findings affirm that innovation is central to the effective delivery of healthcare services. By fostering a culture of innovation, investing in advanced technologies and research, and promoting adaptability, Uganda's healthcare system can address pressing challenges and achieve significant improvements in service delivery. These strategies emphasize that innovation should not only be a cornerstone of healthcare improvement efforts in Uganda but also a global priority in similar resource-constrained contexts.

Hypothesis 4 (H4):

Hypothesis 4 posits that collaborative networks enhance the positive effects of managerial education on healthcare service delivery. These networks are theorized to foster knowledge

sharing, promote best practices, and enable professional collaboration among healthcare managers. Such collaboration is often considered essential for improving healthcare systems by facilitating partnerships across various stakeholders and promoting cohesive healthcare delivery (Balasubramanian et al., 2015; Omaghomi, 2024). However, the findings of this research challenge this assumption, revealing that collaborative networks do not significantly amplify the impact of managerial education on service delivery within Uganda's healthcare programs.

The lack of significant empirical support for Hypothesis 4 suggests that while collaborative networks offer communication and professional support, they do not sufficiently strengthen the direct effects of managerial education on healthcare delivery. This outcome highlights practical limitations in Uganda's context, where structural and systemic barriers often hinder the efficacy of collaborative networks (Bakht, 2024; Lutfiyya et al., 2019). Challenges such as organizational boundaries, resource constraints, inadequate communication infrastructure, and resistance to collaboration frequently obstruct the functionality of these networks (Maghsoudi et al., 2020; Yao et al., 2018). Furthermore, informal or underdeveloped networks may lack the cohesion and operational strength needed to influence managerial practices meaningfully (Young et al., 2021).

To address these challenges, healthcare programs in Uganda must prioritize the development of robust collaborative networks to facilitate communication, resource sharing, and collective problem-solving. Establishing digital platforms can enable real-time collaboration and the exchange of best practices, even in geographically remote areas (Smythe, 2023; Tu, 2024). By dismantling internal silos and fostering interdisciplinary teamwork, healthcare organizations can create a culture of collaboration that transcends individual managerial skills. Structured governance models that prioritize shared goals and collective accountability can further enhance

the functionality of these networks by reducing reliance on rigid hierarchies (Pechacek et al., 2015; Vlaanderen et al., 2021).

Future research should explore the conditions under which collaborative networks can significantly influence healthcare service delivery. This includes investigating the dynamics of network structures, leadership roles within networks, and resource allocation strategies. Additionally, understanding regional disparities, infrastructural limitations, and specific healthcare priorities is essential to tailoring network strategies to Uganda's unique healthcare challenges (Byfield & Ferrari-Bridgers, 2022; Martin & Dixon-Woods, 2022). Policymakers and healthcare leaders should integrate these insights into strategic planning to address disparities and optimize the potential of collaborative networks for improving healthcare outcomes (Britto et al., 2018; Srinivasan & Uddin, 2017).

The findings of this research align with broader discussions in the literature about the challenges of measuring the impact of collaborative networks on organizational outcomes. Although theoretical frameworks often emphasize the importance of networks in pooling resources and expertise (Zaccaro et al., 2020), practical applications in low-resource settings like Uganda frequently fall short of expectations. Contextual factors, including logistical challenges, resource scarcity, and geographic barriers, often limit collaboration among healthcare managers. Integrated networks, while effective in other healthcare systems, require tailored approaches to overcome local obstacles in Uganda (Wibowo, 2023). Given the constrained practical impact of collaborative networks in Uganda, policymakers and healthcare leaders must critically evaluate their structure, functionality, and objectives to ensure alignment with the country's healthcare needs. Enhancing these networks will necessitate addressing logistical, cultural, and resource barriers. Strategic

investments in communication technologies, leadership development, and cross-sector collaboration frameworks tailored to Uganda's challenges are essential for optimizing the utility of collaborative networks. Leadership that emphasizes innovation can direct collaborative efforts toward achieving substantive healthcare improvements.

Despite the mixed findings, further research is necessary to identify the conditions that facilitate or inhibit successful collaboration within healthcare networks. Policymakers should prioritize evidence-based strategies to optimize network effectiveness, enabling these frameworks to function as mechanisms for improving healthcare delivery. While collaborative networks hold theoretical promise, this research demonstrates that they currently do not play a significant moderating role in enhancing the impact of managerial education on service delivery in Uganda. Addressing the barriers to effective networking is crucial to ensuring these networks fulfill their potential. By fostering robust collaborative frameworks, Uganda's healthcare system can better leverage the capabilities of networks to enhance healthcare delivery outcomes.

Hypothesis 5 (H5):

Hypothesis 5 posits that corruption significantly moderates the relationship between managerial education and healthcare service delivery in Uganda, effectively diminishing the positive impact of advanced managerial education on health outcomes. Corruption, manifesting in forms such as resource diversion, bureaucratic inefficiencies, and unethical practices, reduces the efficacy of managerial competencies and obstructs optimal service delivery. This hypothesis reflects the broader understanding in the literature that while managerial education is vital for healthcare improvements, its benefits are severely curtailed in corrupt environments (Fanelli et al., 2021).

The findings of this research confirm that corruption significantly undermines the relationship between managerial education and improved healthcare service delivery. Corruption diverts resources intended for healthcare improvement, introduces inefficiencies, and fosters unethical decision-making, directly harming health outcomes. These practices negate the potential benefits of managerial training, resulting in reduced access to services and poorer healthcare outcomes (Dikic et al., 2021; Dikic et al., 2019). Resources that could enhance service quality are often redirected to corrupt practices, highlighting the detrimental role of corruption in healthcare management.

These findings are consistent with global research identifying corruption as a significant impediment to healthcare progress. For example, Radević et al., (2022) underscore the pervasive impact of corruption in hindering healthcare advancements worldwide, while Ngozi (2014) highlights how conflicts of interest and bureaucratic corruption obstruct effective health program management. This research extends the literature by empirically demonstrating that corruption not only diminishes the benefits of advanced managerial education but also creates significant barriers to achieving meaningful healthcare improvements (Fanelli et al., 2020; Marques, 2024).

Addressing corruption in healthcare systems necessitates the implementation of robust anti-corruption frameworks within organizations. These frameworks should encompass clear accountability mechanisms, stringent auditing processes, and transparent governance protocols. Such measures ensure that resources are allocated appropriately and enable healthcare managers to operate within an ethical system that supports their efforts to improve service delivery (Kingu et al., 2016; Kingu et al., 2022). Additionally, training healthcare leaders in ethical decision-making and establishing ethics committees within organizations can foster a culture of integrity,

further mitigating the impact of corruption on healthcare delivery (Balasubramanian et al., 2015; Milojević, 2024).

Integrating anti-corruption training into managerial education programs is also critical. Modules focusing on corruption awareness, ethical governance, and responsible decision-making equip healthcare managers with the skills to identify and combat corruption in their organizations. Policymakers should promote organization-wide awareness of the detrimental impact of corruption on health outcomes, prioritizing ethical practices across healthcare management and staff (Greenhalgh & Papoutsis, 2019; Omaghomi, 2024; Weintraub & McKee, 2018).

Realizing the full benefits of managerial education requires a combined focus on educational advancements and anti-corruption initiatives. Addressing corruption ensures that educated managers can apply their skills effectively in environments free from systemic barriers. Governance reforms targeting systemic vulnerabilities are essential to fostering transparency and ensuring that the benefits of improved management practices are not negated by corrupt activities (Gambirasio, 2023; Herd et al., 2018). The broader implications of these findings underscore that corruption constitutes a significant impediment to realizing the potential of management education in healthcare systems. While management education is fundamental to improving healthcare service delivery, its effectiveness is substantially diminished when systemic corruption remains unaddressed. This moderating effect of corruption necessitates comprehensive policy measures that enhance the educational qualifications of healthcare managers and implement robust anti-corruption frameworks to ensure that educational investments yield tangible improvements in healthcare outcomes.

In summary, this research elucidates that while education equips healthcare managers with the requisite skills for effective service delivery, corruption severely undermines these benefits. For Uganda's healthcare programs to achieve sustained improvements, policymakers must implement rigorous anti-corruption frameworks to establish an ethical and transparent operational environment. This integrated approach ensures that the potential of well-educated healthcare managers is fully realized, fostering substantive improvements in healthcare delivery and establishing a system that effectively serves its population.

Implications by Construct

Education and Training

This research elucidates the critical correlation between the education and training of healthcare managers and the efficacy of healthcare service delivery in Uganda, particularly across the WASH, UNEPI, and NTD programs. Advanced education equips healthcare managers with foundational knowledge, analytical skills, and strategic competencies essential for managing these multifaceted programs. In a healthcare sector characterized by rapid technological advancements and shifting public health priorities, robust educational foundations empower managers to make evidence-based decisions that drive systemic improvements, ultimately strengthening Uganda's healthcare system (Mutale et al., 2017).

Beyond foundational education, the research underscores the significance of continuous professional development for healthcare managers. Continuous training enhances professional relevance and fosters adaptability, innovation, and problem-solving all essential qualities for addressing the evolving challenges of WASH, UNEPI, and NTD programs. Embedding a culture of lifelong learning within healthcare management ensures that managers remain prepared to

implement innovative solutions, thereby elevating the quality and accessibility of healthcare services across Uganda.

The societal and systemic benefits of investing in healthcare management education extend beyond individual organizations, with implications for the broader public health system and societal welfare. An educated management workforce contributes to improved healthcare outcomes, which are vital for sustainable development in under-resourced regions. Managers trained in the intricacies of public health programs are more effective in orchestrating initiatives that reduce disease burdens and expand access to care (Matthews et al., 2021).

Advanced education is associated with enhanced service delivery outcomes, particularly in resource-constrained settings, reinforcing the role of management education in building healthcare resilience and efficiency (Buchan et al., 2019). Moreover, investment in healthcare management education has the potential to address systemic inequities and promote health equity in Uganda. By incorporating diversity and inclusivity into training programs, these initiatives can foster culturally competent leadership responsive to the needs of marginalized and underserved populations. Inclusive leadership is crucial for bridging healthcare access gaps, reducing disparities, and ensuring equitable service delivery to vulnerable demographic groups disproportionately affected by WASH, UNEPI, and NTD challenges (Glazer et al., 2018).

This research also advocates for a commitment to ongoing education and comprehensive training as essential for building managerial capacity to meet Uganda's healthcare demands. Continuous education facilitates innovation and ensures long-term sustainability in service delivery across vital health programs. However, adopting innovative practices requires a supportive policy framework that evaluates cost-effectiveness and long-term impacts, ensuring

that healthcare innovations are both sustainable and meaningful for health outcomes across programs such as WASH and NTD interventions (Silva et al., 2018).

The findings identify significant gaps in Uganda's current healthcare management training models, where short-term in-service programs predominate. While these programs offer immediate benefits, they lack the depth necessary to equip managers for long-term leadership, particularly in managing complex public health programs. This research calls for more comprehensive training models that address operational and strategic aspects of healthcare management, effectively preparing managers for current and future challenges (Pillay, 2008).

Strategic policy and investment are necessary to support advanced education for healthcare managers. Allocating resources to expand training programs is critical for fostering innovation and sustaining excellence in healthcare services, particularly in the context of Uganda's unique challenges. Policymakers must prioritize the development of training programs that equip healthcare managers to manage WASH, UNEPI, and NTD programs effectively. Investment in managerial education is a strategic imperative to reinforce Uganda's healthcare capacity to overcome persistent obstacles such as resource limitations, high disease burden, and disparities in access.

In summary, this research emphasizes the indispensable role of continuous education and comprehensive training in equipping healthcare managers with the skills to enhance healthcare delivery and drive innovation in Uganda. Combining advanced education with targeted professional development enables managers to address the complexities of WASH, UNEPI, and NTD programs, contributing to broader public health improvements and addressing healthcare inequities. Ultimately, advancing the education and skill development of healthcare managers is a

strategic means of fostering resilient, efficient, and equitable healthcare systems capable of meeting Uganda's evolving needs sustainably.

Implication for Innovation

Innovation is crucial in enhancing healthcare service delivery, particularly within Uganda's WASH, UNEPI and NTD programs. This research demonstrates that integrating advanced technologies, methodologies, and care models enables healthcare organizations to meet increasing demands for healthcare in resource-limited settings (Birnbaum et al., 2005). Innovation facilitates healthcare systems' adaptation to complex and rapidly evolving healthcare landscapes, addressing Uganda's unique challenges with more efficient, accessible, and high-quality service delivery.

The adoption of innovative technologies, such as digital health tools, artificial intelligence, and data analytics, optimizes resource allocation, improves clinical decision-making, and enhances patient healthcare access. Advancements in care models, such as telemedicine and remote health services, are particularly impactful for rural and underserved populations in Uganda, transforming traditional healthcare delivery structures to improve responsiveness and accessibility. Research indicates that innovation influences not only clinical outcomes but also broader determinants of health, creating comprehensive care models that address both medical and social factors (Szanton et al., 2016). In the Ugandan context, these models contribute to addressing public health challenges across WASH, UNEPI, and NTD programs, promoting sustainable population-wide health improvements.

To sustain innovation, healthcare organizations require structured support, including dedicated innovation committees, funding, and collaboration-promoting environments. This research underscores the role of healthcare managers in fostering an innovation culture by

establishing collaborative networks and resource channels (Länsisalmi et al., 2006). A structured framework for innovation in Uganda's healthcare sector will institutionalize novel approaches, embedding adaptability and resilience into the core of healthcare management.

This research identifies strengthening innovation as a strategic priority for healthcare management in Uganda, particularly to enhance WASH, UNEPI, and NTD program outcomes. Support for innovation, through committed leadership, financial investment, and adaptable organizational frameworks, enables healthcare systems to address current needs and anticipate future challenges. Prioritizing innovation positions Uganda's healthcare sector for sustained improvement, resilience, and adaptability. In conclusion, this research affirms the critical role of innovation in healthcare, advocating for resource allocation and organizational structures that foster collaborative, sustainable, and adaptive practices. A focus on innovation will not only improve immediate healthcare outcomes in Uganda but will also strengthen the sector's resilience and preparedness for future public health demands.

Network Implications

The findings of this research challenge the initial assumptions regarding the moderating role of collaborative networks in enhancing the relationship between managerial education and health service delivery in Uganda. Contrary to Hypothesis H4, which posited that collaborative networks would amplify the positive impact of managerial education on service delivery, the data indicate no significant moderating effect. This suggests that the presence of collaborative networks does not substantially influence or strengthen the relationship between healthcare managers' educational level and service delivery outcomes.

While collaborative networks are prevalent in healthcare, with 52.9% of service implementation networks and 37.4% of professional networks reported, their impact on linking managerial education to improved service delivery appears limited. This implies that, although networks may facilitate general resource sharing and collaboration, they do not inherently enhance the benefits of managerial education for improving healthcare services. This finding is critical as it suggests that networks alone may not be sufficient to maximize the advantages of higher educational levels among managers in terms of service quality improvements.

Interestingly, the research revealed a paradox: 43.7% of respondents acknowledged the importance of networks in enhancing service delivery; however, this appreciation appears to focus on the general utility of networks in healthcare management rather than their specific role in linking education to service delivery outcomes. This distinction is crucial for understanding the complex and potentially context-specific functions of the networks. Although networks facilitate communication, knowledge exchange, and coordination, their capacity to directly augment the outcomes of managerial education is limited. This implies that the effectiveness of collaborative networks in healthcare may be influenced by factors such as organizational culture, resource allocation, and network quality rather than merely their existence. Implications for Healthcare Program Design and Policy

These findings necessitate a reevaluation of the conceptualization and utilization of collaborative networks within healthcare programs. While networks provide value for professional development, knowledge dissemination, and service coordination, their role as moderators between education and health service delivery improvement appears more limited than initially hypothesized. This underscores the need for further investigation to elucidate the conditions under

which networks can effectively enhance the impact of managerial education on service delivery. Factors such as leadership style, organizational structure, inter-professional collaboration, and network engagement levels may be crucial in determining whether networks can effectively strengthen this relationship.

For healthcare organizations and policymakers, the findings suggest that, while enhancing collaborative networks remains valuable for general management, targeted strategies are required to optimize the specific impact of management education on service delivery. Thus, strengthening networks alone may be insufficient. Instead, the focus should be on creating an enabling environment that facilitates meaningful collaboration. This may involve fostering collaborative organizational cultures, ensuring robust resource support for networks, and cultivating leadership capabilities that enable managers to effectively leverage these networks.

In summary, this research provides a nuanced understanding of the role of collaborative networks in healthcare management, emphasizing the importance of examining the conditions under which networks influence healthcare outcomes. These findings underscore the need for strategic investments not only in network development but also in managerial education and broader organizational support systems. Future research should investigate the direct and indirect mechanisms through which networks, education, and contextual variables collectively affect healthcare service delivery. Through such investigations, healthcare managers and policymakers can design targeted interventions that harness the full potential of collaborative networks to improve healthcare service delivery outcomes.

Implications for Perceived Corruption

Corruption presents a critical barrier to healthcare delivery particularly in developing nations, where it is deeply entrenched (Onwujekwe et al., 2019). This research highlights that corruption significantly weakens the positive impact of managerial education on healthcare service delivery. Advanced managerial education equips healthcare leaders with skills to enhance service delivery; however, corruption can erode these benefits by misallocating resources and undermining public trust (Lewis, 2006; Onwujekwe et al., 2019).

Robust anti-corruption measures are essential for healthcare systems. Effective frameworks must incorporate clear accountability mechanisms, transparency protocols, and ethical governance to ensure that the benefits of management education directly improve service outcomes (Mackey et al., 2018). For instance, the Ministry of Health can strengthen oversight, introduce whistleblower protection, and improve supervision to foster an environment where ethical behavior is encouraged and corruption is actively discouraged.

Community involvement in monitoring healthcare services has demonstrated efficacy in holding providers accountable, particularly in low-income and middle-income settings. Evidence indicates that community-based monitoring can significantly reduce corrupt practices, ensuring that resources are utilized as intended (Mackey et al., 2018). Additionally, global health bodies, such as the WHO and World Bank, advocate for governance reforms that establish accountability structures in healthcare systems. However, for these strategies to succeed, they must be supported by political commitment and standardized enforcement mechanisms (Kohler et al., 2022). Promoting ethical governance is essential for mitigating corruption in healthcare. Managerial

training should incorporate anti-corruption education that emphasizes ethical decision-making and the deleterious effects of corruption on health systems (Kohler, 2019).

Furthermore, institutional reforms focused on transparency and accountability can facilitate the prevention of resource misallocation and promote equitable healthcare distribution (Wierzyńska et al., 2020). Regular audits and accessible reporting mechanisms further support the early detection of corrupt practices and the maintenance of system integrity. In conclusion, corruption has significant implications for healthcare service delivery and undermines both health outcomes and public trust. Addressing corruption necessitates comprehensive governance reform, community engagement, and institutional accountability. Through the integration of these anti-corruption measures, Uganda's healthcare system can fully realize the benefits of management education, leading to equitable and sustainable improvements in service delivery.

Interaction Between Networks and Corruption

Collaborative networks are instrumental in enhancing transparency and accountability in healthcare management, particularly in developing nations, such as Uganda. These networks facilitate collective action, resource sharing, and shared responsibility, which can mitigate the effects of perceived corruption and strengthen healthcare governance (Witvliet et al., 2013). However, without adequate oversight, these networks may inadvertently become conduits for corrupt practices, thus necessitating a nuanced approach to governance.

Collaborative networks support transparency by fostering open communication and knowledge-sharing among stakeholders. Such structures promote a culture of transparency that is vital for robust governance. However, the efficacy of networks in promoting transparency depends significantly on the integrity of their members and the governance mechanisms in place (Muldoon

et al., 2011). Without these safeguards, networks may fail to achieve the intended improvements in health care delivery.

Although networks can drive collaboration, they may also facilitate corruption if inadequately managed. For instance, the "rotten barrel" theory posits that networks containing corrupt individuals can propagate unethical practices (Merrington, 2020). In Uganda, anecdotal evidence indicates that corruption is sometimes culturally normalized, further complicating efforts to maintain the integrity of collaborative networks (Mugumya, 2020). In such instances, networks may institutionalize corrupt behaviors and undermine healthcare service improvements. The dual potential of networks necessitates strong governance to maximize their positive impact while minimizing corruption risk. Effective frameworks supported by Uganda's Anti-Corruption Act (2009) are essential for promoting ethical behavior, transparency, and accountability within healthcare.

Healthcare managers play a crucial role in fostering environments where whistleblowers are protected and ethical standards are upheld, deterring corruption, and promoting long-term system sustainability. In conclusion, collaborative networks demonstrate considerable potential for enhancing healthcare delivery; however, their implementation in environments susceptible to corruption necessitates rigorous governance. Through the incorporation of anti-corruption measures and the cultivation of a culture characterized by transparency and accountability, Uganda's healthcare system can harness the advantages of its networks while mitigating the risk of corruption. This strategic approach is essential for ensuring that networks function as constructive forces in healthcare management, rather than as mechanisms that perpetuate unethical practices.

Study Limitations

This research on the management of health programs in Uganda offers valuable insights into the influence of managerial education, training, innovation, networks, and perceived corruption on healthcare service delivery. However, limitations of this research merit acknowledgment. First, the reliance on quantitative methods, specifically Structural Equation Modeling (SEM), provides measurable, generalizable data, but may not fully capture the nuanced dynamics underlying management factors and healthcare outcomes. Quantitative methods enable the identification of significant relationships, yet they lack depth to explore the contextual and interpersonal mechanisms that drive these associations (Renjith et al., 2021).

Incorporating qualitative approaches in future research such as focus groups or in-depth interviews, could enrich the understanding by capturing the lived experiences of healthcare providers and managers. However, qualitative methods introduce potential biases, especially when researchers are known to respondents, which could lead to a social desirability bias. Employing anonymous data collection or involving external researchers may mitigate such biases and enhance data validity (Nyström et al., 2018; O'Cathain et al., 2008).

This research's focus on healthcare programs in Uganda also limits the generalizability of the findings to other country contexts. Healthcare systems vary widely across countries and are shaped by distinct policies, cultural factors, governance structures, and resource allocations, all of which influence management practices and health outcomes. While insights from Uganda are valuable, they may not be directly applicable to healthcare systems in different national or regional contexts. Replicating this research in diverse healthcare environments could strengthen its

applicability and provide comparative insights into the role of management education and training across different healthcare systems (Curry et al., 2013; Kumar, 2020).

While SEM is robust in analyzing complex relationships, it relies on the assumptions of normality, linearity, and homoscedasticity. Although bootstrapping was employed to address non-normal data, future research may benefit from non-parametric approaches to enhance robustness (Yang et al., 2015). Some variables were removed to improve the model fit, achieving a more parsimonious model, but potentially sacrificing some nuanced information. Balancing statistical rigor with comprehensive representation remains a challenge, and future studies should consider alternative approaches to retaining detailed insights (Girling, 2023; Pereira et al., 2022).

The findings on Hypothesis 4, regarding the moderating role of collaborative networks on the relationship between managerial education and health service delivery, revealed no significant moderating effect. This suggests that other factors, such as organizational culture, resource availability, and external incentives, may be more influential in determining network effectiveness in health care management. Further research should consider these variables to elucidate the complex dynamics that impact network utility in healthcare settings (Li, 2023).

In summary, this research advances the understanding of the relationship between management factors and healthcare service delivery in Uganda, emphasizing the importance of managerial education, training, innovation, collaborative networks, and anti-corruption measures. However, acknowledging its limitations, such as the need for qualitative insights and cross-context validation, highlights areas for future research. By integrating quantitative and qualitative approaches and expanding studies to various healthcare contexts, researchers can construct a more

comprehensive framework that further reflects the complex determinants of healthcare service quality, thus supporting effective management strategies in Uganda and beyond.

Recommendations for Application

This research underscores the significance of comprehensive education for healthcare managers to promote innovation, ethical governance, and effective decision-making within Uganda's healthcare system. Management programs should emphasize core competencies such as strategic leadership, ethics, and accountability, thereby equipping managers to address complex challenges in resource-constrained settings (Andersson et al., 2022). The implementation of innovative pedagogical approaches, including problem-based and student-centered learning, facilitates active engagement and fosters a culture of innovation and ethical integrity (McCarthy, 2023; Shah et al., 2020). These methodologies ensure that healthcare managers are adequately prepared to lead effectively and uphold the principles of ethical governance.

Healthcare management education must prioritize the development of practical skills in digital health, artificial intelligence, and healthcare informatics among managers. These competencies enable managers to implement technology-driven solutions that enhance patient care, optimize operations, and improve accessibility (Kaznacheeva et al., 2020; Sooampon et al., 2021). Interdisciplinary learning promotes creative problem-solving and adaptability to emerging healthcare challenges, ensuring that healthcare managers can innovate effectively within a rapidly evolving healthcare landscape.

The dynamic nature of healthcare necessitates ongoing professional development to maintain managers' knowledge of advancements in medical technology, management practices, and policy changes. CPD initiatives, facilitated through collaborations with academic institutions

and professional associations, should encompass executive leadership courses and certifications in specialized areas of healthcare management. Flexible learning modalities, such as e-learning, enable healthcare managers to balance professional development with their responsibilities, ensuring continuous skill enhancement (Byungura et al., 2022; Nyiringango, 2024). Promoting

Collaborative networks among healthcare organizations, academic institutions, and industry stakeholders are essential for enhancing training quality, diversifying perspectives, and promoting best practices. The incorporation of interprofessional education (IPE) into training programs develops team collaboration skills, which are critical for addressing complex healthcare challenges and improving patient outcomes (Lutfiyya et al., 2019; Reeves et al., 2017). These partnerships strengthen healthcare managers' capacity to lead in multidisciplinary environments.

Effective governance and ethical leadership are fundamental to improving service delivery in Uganda's healthcare sector. Training programs must emphasize ethical leadership, transparency, and accountability, enabling managers to navigate ethical dilemmas and uphold integrity in healthcare operations. Policies such as whistleblower protection and systematic monitoring foster an environment where ethical practices are prioritized, reducing corruption risks and building public trust (Klitgaard, 1988; Mann, 2010). Strong governance frameworks ensure the alignment of managerial practices with organizational and national health goals.

Strengthening research infrastructure and fostering a culture of knowledge sharing are critical for advancing healthcare management. Collaborations between healthcare organizations and academic institutions can facilitate continuous research, data sharing, and the development of evidence-based policies. Digital knowledge-sharing platforms enhance managers' access to current best practices, supporting informed decision-making and improving healthcare outcomes (Horváth

et al., 2022). This approach ensures that healthcare managers remain equipped with cutting-edge insights to address emerging challenges.

Collaboration with academic institutions is vital for building managerial capacity, advancing research, and developing specialized training programs tailored to Uganda's specific healthcare challenges. Partnerships between professional bodies and academia can enhance managers' skills in areas such as resource management and strategic planning. These collaborations also support the development of innovative solutions, enabling managers to apply evidence-based practices effectively within healthcare systems (Frenk et al., 2010; Tiwari et al., 2014).

Addressing gaps in Uganda's digital healthcare infrastructure is critical for modernizing healthcare systems. Investments in telemedicine, electronic health records (EHR), and secure communication platforms can enhance accessibility, operational efficiency, and patient outcomes. Training healthcare managers in digital literacy and implementing a national health IT strategy are essential steps for effective technology integration and data security (Brown et al., 2016; Mohammed et al., 2021). These advancements can transform healthcare delivery and ensure sustainability in resource-limited settings.

Collaboration across sectors such as public health, finance, education, and agriculture is essential for addressing Uganda's complex healthcare challenges. Intersectoral partnerships facilitate resource sharing, integrated policy development, and efficiency in service delivery. Coordinated efforts with education and social services can address the broader determinants of health, reduce disparities, and improve population health outcomes (Aud et al., 2016; Phipps & Masuda, 2018). This holistic approach ensures that healthcare interventions align with broader societal goals, enhancing the overall impact of healthcare programs.

Counterarguments to Recommendations

Critics posit that establishing comprehensive management education and research and development (R&D) programs within Uganda's Ministry of Health necessitates substantial financial investment, potentially diverting resources from frontline healthcare services. Given Uganda's budgetary constraints, they assert that these funds would be more appropriately allocated to immediate healthcare needs rather than to initiatives yielding long-term benefits. However, strategic incremental investments in education can engender significant long-term improvements in service delivery and resource management. Prioritizing cost-effective programs that provide immediate, high-impact benefits can render such investments feasible. Collaborations with academic institutions, many of which are government-funded, can further mitigate financial burdens, enhancing the sustainability of educational initiatives.

Infrastructure limitations, particularly in rural areas of Uganda, present challenges to implementing technology-driven innovation programs. Reliable electricity, internet connectivity, and data management systems, essential for digital health solutions such as telemedicine and electronic health records (EHRs), are often insufficient. While these constraints are significant, targeted investments in regions with existing infrastructure can establish a foundation for broader technological adoption. Additionally, low-tech solutions like mobile health (mHealth) platforms can serve as effective interim measures. These approaches facilitate immediate improvements in healthcare access and delivery while paving the way for future advancements as infrastructure develops (Bozhenko, 2022).

Healthcare workers in Uganda often face heavy workloads, leading critics to argue that incorporating continuous professional development (CPD) requirements could detract from

essential patient care and operational efficiency. This concern highlights the potential for low adoption rates of CPD initiatives. To address these challenges, professional development programs should be integrated into existing workflows and emphasize incremental skill-building. Collaboration with academic institutions and international organizations can support the implementation of manageable and sustainable training programs that enhance staff capacity without overwhelming current personnel (Rahman et al., 2022).

Introducing new technologies, management practices, and collaborative research initiatives may encounter resistance from healthcare professionals accustomed to traditional methods. Organizational inertia and skepticism could impede the adoption of innovative processes. Effective change management strategies are necessary to overcome these barriers. Engaging stakeholders in decision-making and providing evidence of the benefits of collaboration can foster acceptance. Leadership must champion these innovations, demonstrating how they can ultimately reduce workloads and enhance patient care, thus addressing concerns about disruption (Anishchenko & Oharenko, 2023).

The adoption of digital health technologies raises concerns about data privacy and cybersecurity, particularly in contexts where regulatory frameworks for data governance are underdeveloped. Critics caution that mishandling patient data could lead to ethical violations and a loss of trust. Addressing these issues requires Uganda to establish robust regulatory frameworks for data protection and privacy, drawing from international best practices. Embedding ethical oversight into healthcare policies and developing transparent governance models will ensure the safe handling of patient information and mitigate these concerns effectively.

Critics raise concerns regarding the sustainability of R&D programs, particularly those heavily dependent on external funding or international collaborations. The termination of donor funding could potentially compromise these programs, resulting in incomplete or underfunded initiatives. To ensure long-term viability, R&D efforts must be integrated into national health policy and supported through a combination of government funding, private sector engagement, and international partnerships. Developing local research capacity and fostering a culture of innovation will reduce dependence on external actors and ensure the sustainability of research initiatives over time (Jancsics, 2019).

In summary, the counterarguments to these recommendations highlight challenges such as financial constraints, infrastructure limitations, capacity shortages, and ethical concerns. These issues underscore the necessity of balancing the immediate priorities of Uganda's healthcare system with long-term investments in education, innovation, and R&D. Pragmatic solutions, such as incremental implementation, capacity-building efforts, and the establishment of robust governance frameworks, can address these challenges. By adopting this balanced approach, Uganda's Ministry of Health can develop a more resilient, efficient, and innovative healthcare system that addresses both current demands and future needs.

Recommendations for Future Research

While this research provides valuable quantitative insights, there remains a need for qualitative studies to explore the specific challenges faced by healthcare managers in Uganda. In-depth interviews and focus groups can elucidate the sociocultural and operational barriers that impact healthcare delivery. Such research can provide a nuanced understanding of issues such as

governance and informal networks, offering actionable insights for policy and program design that align with the complex realities of Uganda's healthcare system.

Corruption remains a significant barrier to effective healthcare delivery in Uganda, underscoring the need for research into the efficacy of current anti-corruption strategies. Participatory action research and case studies can assess the practical implementation and enforcement of these policies within healthcare organizations. Understanding the obstacles to policy enforcement could inform the development of more robust governance frameworks that prioritize transparency, accountability, and ethical leadership (Kimbowa et al., 2022).

This research highlighted gaps in the adoption of digital health solutions, particularly in underserved areas. Future research should investigate the infrastructural, cultural, and financial barriers to implementing technologies such as telemedicine and electronic health records. Mixed-methods approaches, incorporating surveys and interviews, can provide comprehensive insights into these challenges. For example, recent telehealth initiatives in maternal health in Uganda (Kamulegeya et al., 2022) demonstrate the potential of such solutions. Further exploration, particularly in the context of the COVID-19 pandemic, can identify strategies to enhance digital health adoption and expand access to care (Chitungo et al., 2021; Ndejjo, 2023).

Although this research found limited evidence supporting the role of collaborative networks in enhancing healthcare delivery, their potential remains significant. Future research should examine the factors that enable or hinder the effectiveness of such networks within Uganda's healthcare context. Network analyses and case studies of successful collaborations can provide insights into how virtual professional networks and resource-sharing models can address

Uganda's unique healthcare challenges (Akintunde et al., 2021). This could inform the design of more impactful and tailored collaborative initiatives.

Cross-country comparative studies can offer valuable perspectives on best practices for managing healthcare challenges in resource-constrained settings. Research into the impact of management education on healthcare delivery in other low- and middle-income countries can identify strategies that might be adapted to the Ugandan context. By integrating quantitative and qualitative data, such studies can highlight common obstacles and successful solutions, enriching global knowledge on healthcare management and offering practical lessons for Uganda.

Sustainability of R&D Programs

To ensure long-term innovation in Uganda's healthcare system, research should focus on sustainable models for research and development (R&D) programs. Future studies could investigate self-sustaining R&D frameworks that minimize dependence on external funding and examine successful public-private partnerships in comparable contexts. Insights into effective funding strategies and locally supported initiatives can inform the establishment of robust, sustainable R&D programs that drive continuous improvement in healthcare delivery (Kimbowa et al., 2022).

In summary, future research in these areas is essential for addressing the persistent management challenges in Uganda's healthcare system. Qualitative exploration of managerial challenges, evaluations of anti-corruption measures, studies on digital health adoption, assessments of collaborative networks, cross-country comparisons, and investigations into sustainable R&D programs can provide the evidence necessary to inform policies and strategies that enhance healthcare delivery. These efforts will contribute to a more efficient, innovative, and

equitable healthcare system in Uganda, aligning with both national priorities and global health objectives.

Counterarguments to the Research Hypothesis

Addressing counterarguments enhances the depth of this research by engaging with potential critiques and contextualizing the findings within the complexities of Uganda's healthcare system. This analysis not only strengthens the academic rigor of the research but also enhances its practical applicability by offering balanced perspectives on education, training, innovation, collaboration, and corruption in healthcare management.

While higher education is widely recognized as a foundation for managerial competence, critics argue that it alone does not guarantee innovation (Schalkwyk et al., 2019). Practical experience, creativity, leadership, and adaptability are equally important for identifying challenges and implementing innovative solutions in healthcare (Yardley et al., 2015). Critics contend that formal education often fails to foster these attributes, which are vital for driving innovation (Caprara et al., 2011). However, this research underscores the necessity for a holistic approach to education, integrating academic learning with experiential practice (Mejia et al., 2022). Programs should incorporate methodologies such as problem-based learning, mentorship, and real-world case studies to ensure that theoretical knowledge translates into practical applications (Ssewanyana & Ibrahim, 2012). Furthermore, recruitment strategies should consider not only academic credentials but also personal attributes such as critical thinking and creativity (Rodin et al., 2020). When coupled with a supportive organizational culture that values leadership and continuous professional development, these elements can amplify the transformative potential of education in healthcare innovation (Tanaka & Son, 2019).

Standardized managerial training programs often face criticism for their generic nature, which may overlook the unique healthcare challenges in Uganda (Goy et al., 2022). Sociocultural contexts, infrastructural limitations, and institutional barriers can diminish the relevance of generalized training models (Turyamureba, 2023). This research emphasizes the importance of contextually tailored training programs that address Uganda's specific healthcare realities (Marriott et al., 2015). For example, localized case studies and simulations rooted in Uganda's healthcare challenges can improve training relevance and efficacy (Chamane et al., 2019). Feedback mechanisms that adapt training curricula to evolving public health issues ensure that managers acquire practical skills aligned with their environment (Presley et al., 2023). Tailoring training content to reflect local contexts not only improves its applicability but also strengthens healthcare managers' capacity to foster innovation effectively (Yardley et al., 2013).

Although innovation is a key driver of healthcare service improvements, it carries potential risks such as service disruptions, resistance to change, and increased costs, particularly in resource-constrained settings like Uganda (Murray, 2018). The introduction of novel technologies or processes can strain budgets and infrastructure, potentially creating inefficiencies instead of improvements (Turyamureba et al., 2023). To mitigate these risks, this research advocates a phased, cautious approach to implementing innovations (Akena, 2023). Pilot testing and iterative evaluations enable managers to refine strategies based on empirical outcomes, minimizing disruptions while ensuring alignment with local needs (Munif et al., 2023). Broad stakeholder engagement, including contributions from healthcare workers, community leaders, and patients, can foster acceptance and reduce resistance (Singh et al., 2018). This approach ensures that

innovation is both sustainable and tailored to Uganda's healthcare system, enhancing its long-term impact on service delivery (Dubouloz et al., 2010).

Collaborative networks have the potential to enhance healthcare delivery by facilitating knowledge sharing, resource pooling, and professional support (Bussell & Hagman, 2017). However, challenges such as power imbalances, conflicting interests, and lack of trust among stakeholders can hinder their effectiveness (Wearne et al., 2012). These issues are particularly pronounced in Uganda, where diverse stakeholders possess varying levels of influence, resources, and priorities (Magumba, 2018). This research highlights the need for robust governance structures to maximize the potential of collaborative networks (Dhital et al., 2015). Clear frameworks outlining roles, responsibilities, and decision-making processes can reduce power imbalances and align stakeholders toward common goals (Kassam et al., 2012). Additionally, trust-building initiatives such as joint workshops and team-building activities are critical for fostering mutual respect and effective collaboration. In Uganda's resource-constrained environment, such strategies can ensure that networks function cohesively and contribute meaningfully to healthcare delivery.

Corruption remains a significant barrier to healthcare delivery, undermining the positive impacts of managerial education and training. Critics argue that anti-corruption reforms often face resistance from entrenched norms and vested interests, particularly in systems with limited oversight mechanisms. To address these challenges, a comprehensive and incremental approach is necessary. This research highlights the importance of strict enforcement of anti-corruption regulations alongside ethical training for healthcare managers. Digital tools such as financial tracking systems and electronic health records can enhance transparency and reduce opportunities for corruption. Additionally, visible anti-corruption achievements, such as streamlined

procurement processes and whistleblower reporting channels, can build trust and demonstrate commitment to reform. Sustained progress requires continuous monitoring, stakeholder engagement, and adaptable strategies to foster a culture of accountability and transparency in Uganda's healthcare sector.

By addressing these counterarguments, this research offers a nuanced understanding of the interplay between education, training, innovation, collaboration, and corruption in Uganda's healthcare management system. Engaging with opposing viewpoints not only validates the research findings but also enhances their relevance to both academic and practical contexts. This balanced analysis provides valuable insights for policymakers, healthcare leaders, and practitioners, guiding the development of context-specific strategies to improve healthcare delivery in Uganda. By navigating these complexities, this research supports a pathway toward a more resilient, effective, and equitable healthcare system.

Conclusion

This research provides a comprehensive analysis of the complex interrelationships among management education, training, innovation, collaborative networks, and corruption, evaluating their collective impact on enhancing healthcare service delivery across WASH, UNEPI, and NTD programs in Uganda. The findings offer substantive insights into the academic and practical domains of healthcare management, presenting actionable recommendations that can inform management strategies, policy formulation, and organizational reforms in resource-constrained healthcare environments.

A significant contribution of this research lies in its examination of the influence of management education and training on improving healthcare service delivery, utilizing structural equation modeling and integrating three theoretical frameworks. By corroborating existing theoretical models with empirical evidence, this research confirms a positive correlation between managerial capacity building and enhanced healthcare outcomes. In Uganda, where resource limitations and managerial expertise deficits often impede service delivery, the necessity for continuous professional development of healthcare managers is paramount. These findings advocate for contextually appropriate training programs tailored to address the specific challenges encountered by healthcare managers, thus emphasizing the importance of strategic investments in human capital.

Furthermore, this research underscores innovation as a crucial catalyst for service delivery improvements. The positive relationship identified between innovation and healthcare delivery outcomes highlights the potential for implementing novel technologies, refined management practices, and patient-centered approaches. In Uganda, where systemic inefficiencies frequently hinder service delivery, innovation presents a critical pathway for surmounting these barriers and achieving sustainable improvements. This research aligns with the broader literature advocating for a culture of innovation that is essential for fostering long-term progress in healthcare.

Corruption emerged in this research as a significant impediment to effective healthcare delivery, with findings demonstrating its detrimental impact on resource allocation, public trust, and service delivery. This research underscores the urgent necessity for anti-corruption measures within healthcare management frameworks, advocating for the integration of transparency and accountability mechanisms to mitigate unethical practices. Moreover, incorporating anti-

corruption strategies within healthcare management education is essential for strengthening a system that resists unethical influences. Contrary to expectations, the anticipated moderating effect of collaborative networks on the relationship between management education and service delivery was found to be limited. While professional and social networks are utilized to some extent, the limited use of virtual networking options represents a missed opportunity for enhanced coordination and knowledge-sharing. The expansion of digital platforms for collaboration could significantly improve operational efficiency, especially when geographical and logistical challenges inhibit traditional networking. Facilitating broader virtual collaboration within Uganda's health programs has the potential to yield considerable improvements in management practices and service delivery.

The implications of this research are multifaceted and provide evidence-based guidance for policymakers, healthcare managers, and academic institutions. It advocates for tailored educational programs for managers, promotion of innovation, robust anti-corruption measures, and strengthened collaborative networks, both physical and virtual. This research proposes a comprehensive framework to improve healthcare delivery and align educational, managerial, and governance strategies to address the unique challenges within Uganda's healthcare context.

This research contributes to the current literature on healthcare management in resource-constrained settings, offering specific insights applicable to a diverse range of stakeholders, from government agencies to healthcare organizations. It serves as a blueprint for programs focused on enhancing healthcare management, fostering innovation, and promoting equitable and effective service delivery. Ultimately, this research calls for an integrated approach that aligns education,

management, and governance to improve healthcare outcomes, providing a model for other low-resource settings to advance their healthcare systems.

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APPENDICES

APPENDIX A: Tool

MANAGEMENT FACTORS AFFECTING HEALTH SERVICE DELIVERY IN UGANDA: A STRUCTURAL EQUATION MODELLING ANALYSIS OF THE WASH, IMMUNIZATION, AND NTD PROGRAMS

Introduction

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This research critically examines management factors affecting quality delivery of health service delivery by health programs in Uganda. The collected data will provide the main data set for this study, whose findings are expected to contribute to development and health management capacity building. Your participation is not obligatory, if you choose to participate, please fill in this questionnaire following the instructions provided. The information provided will be treated with the strictest confidence and anonymity.

Please kindly answer the following questions by ticking the right response.

The questionnaire

THEME 1: The profile of participants

Which health program do you mainly work with?

a) WASH ☐ b) Immunization ☐ c) Neglected Tropical Diseases ☐

2. What is your gender? a) Male ☐ b) Female ☐

3. How old are you? a) 20 – 30 ☐ b) 31 – 40 ☐ c) above 40 ☐

4. How many years have you served in a health management position?

a) 1 – 3 ☐ b) 4 – 6 ☐ c) above 6 years ☐

5. How many years have you worked in the health sector?

a) 1 – 3 ☐ b) 4 – 6 ☐ c) above 6 years ☐

6. How many staff are under your supervision? a) 1- 5 ☐ (b) 6-10 ☐ (c)

11-15 ☐ (d) More than 15 ☐

THEME 2: Level of education

7. What is your highest level of education? a) Secondary or Technical ☐ool

b) Diploma ☐ c) Bachelor's Degree ☐ d) Masters ☐ e) PhD. ☐

8. Based on '7' above, please, provide the extent to which your highest level of education is beneficial to your performance in managing your health program (please fill only the row that corresponds to your highest level of education).

Factors	1	2	3	4	5	6	7
My secondary education has benefited me to improve the performance of my health program (1= not at all; 7 = to a great extent)							
My diploma level of education has benefited me to improve the performance of my health program (1= not at all; 7 = to a great extent)							
My degree level of education							

has benefited me to improve the performance of my health program (1= not at all; 7 = to a great extent)							
My Masters level of education has benefited me to improve the performance of my health program (1= not at all; 7 = to a great extent)							
My PhD level of education has benefited me to improve the performance of							

my health program (1= not at all; 7 = to a great extent)							

THEME 3: Type of education

9. Please, tick the type of education that best describes your highest level of education in “8” above. a) ☐ Secondary or Technocal school diploma b) ☐ BSc c) ☐ BA d) ☐ MSc

☐ MA d) ☐ BA e) ☐ PhD

10. Based on “9” above, please, provide the extent to which your highest education type is beneficial to your ability to improve the performance of your health program.

Factors	1	2	3	4	5	6	7
My secondary/Technica l diploma education has benefited me in improving the							

performance of my health program; (1= not at all; 7 = to a great extent)							
My science (BSc) education has benefited me in improving the performance of my health program (1= not at all; 7 = to a great extent)							
My arts (BA) education has benefited me in improving the performance of my health program; (1= not at all; 7 = to a great extent)							
My degree level of education							

has benefited me in improving the performance of my health program; (1= not at all; 7 = to a great extent)							
My Masters level of education has benefited me in improving the efficiency of my organisation; (1= not at all; 7 = to a great extent)							
My PhD level of education has benefited me in improving the performance of my health program (1= not at all; 7 = to a great extent)							

11. Was your highest educational qualification in a management or clinical/Health related subject?

a) Management

b) Clinical/ Health

12. Based on your answer above, rate the extent to which your highest qualification has been beneficial in helping you improve the performance of your program (1= not at all; 7 = to a great extent)

Factors	1	2	3	4	5	6	7
My management qualification has been beneficial in improving the performance of my health program; (1= not at all; 7 = to a great extent)							
My Clinical/Health qualification has							

been beneficial in improving the performance of my health program (1= not at all; 7 = to a great extent)							

Theme 4: Managerial training

Please answer the following questions on the management training by ticking either 1-7 on the table below;

13. How many times have you attended managerial training in the last three years ☐ a) 0

b) 1-☐mes c) 4-☐mes d) more than 5-☐mes

14. Based on “13” above, please, provide the extent to which the frequency of management training is beneficial to your ability to improve the performance of your health program.

Factors	1	2	3	4	5	6	7
My lack of managerial training has benefited me in improving the performance of my health program; (1= not at all; 7 = to a great extent)							
My 1-3 times managerial training has benefited me in improving the performance of my health program (1= not at all; 7 = to a great extent)							

My 4-6 times managerial training has benefited me in improving the performance of my health program; (1= not at all; 7 = to a great extent)							
My more than 5 times managerial training has benefited me in improving the performance of my health program; (1= not at all; 7 = to a great extent)							

15. Which type of managerial training have you undertaken in the last 3 years?

a) ☐ None b) On-the-job training ☐ c) Off-the-job training ☐

16. If you have chosen b or c above, please, provide the extent to which the type of management training is beneficial to your ability to improve the performance of your health program

Factors	1	2	3	4	5	6	7
My on-the-job training has benefited me in improving the performance of my health program; (1= not at all; 7 = to a great extent)							
My off-the job training has benefited me							

in improving the performance of my health program (1= not at all; 7 = to a great extent)							

17. Which is the most commonly used managerial training method in your health program

- a) Mentorship b) Coaching c) Simulation d) Seminar/workshop
e) Internship f) Team building g) No particular method

18. Based on “17” above, please, provide the extent to which the selected training method is beneficial to your ability to improve the performance of your health program.

Factors	1	2	3	4	5	6	7
The mentorship method of managerial training has benefited me in improving the							

performance of my health program; (1= not at all; 7 = to a great extent)							
The coaching method of managerial training has benefited me in improving the performance of my health program (1= not at all; 7 = to a great extent)							
The simulation method of managerial training has benefited me in							

improving the performance of my health program; (1= not at all; 7 = to a great extent)							
The seminar/workshop method of managerial training has benefited me in improving the performance of my health program; (1= not at all; 7 = to a great extent)							
The internship method of managerial training has							

benefited me in improving the performance of my health program; (1= not at all; 7 = to a great extent)							
The team building method of managerial training has benefited me in improving the performance of my health program; (1= not at all; 7 = to a great extent)							

Theme 5: innovation

19. Which is the most commonly used type of innovation in your health program?

a) Managerial innovation ☐ b) Process innovation ☐ c) Product innovation ☐ d) Service innovation ☐
 e) Technological innovation ☐

20. Please indicate the extent to which the selected type of innovation in “19” above has improved the performance of your health program by ticking either 1-7 on the table below;

Factors	1	2	3	4	5	6	7
Managerial innovation has been useful in improving the performance of my health program(1= not at all; 7 = to a great extent)							
Process innovation has been useful in improving the performance of my health							

program; [1 = not at all; 7 = to a great extent]							
Product innovation has been useful in improving the performance of my health program; (1= not at all; 7 = to a great extent)							
Service innovation has been useful in improving the performance of my health program; (1= not at all; 7 = to a great extent)							
Technological innovation has							

been useful in improving the performance of my health program; (1= not at all; 7 = to a great extent)							

Theme 6: Corruption

Corruption is defined as the misuse of public resources for private gain and in healthcare is mainly through bribery(unofficial payments and inducements to obtain a service or product), Theft(drug pilferage, theft of supplies, stealing public funds) Misinformation(misleading patients for private gain, collusion fraud, prescription fraud)

21. Which of these is the most common type of corruption encountered in your organization?

- a) ☐ bribery b) ☐ Theft c) ☐ Misinformation d) ☐ Bureaucratic corruption

22. Please indicate the extent to which the selected type of corruption “19” above has degraded the performance of your health program by ticking either 1-7 on the table below;

Factors	1	2	3	4	5	6	7
Bribery has retarded the performance of my health program; (1= not at all; 7 = to a great extent)							
Theft has retarded the performance of my health program; (1= not at all; 7 = to a great extent)							
Misinformation has retarded the performance of my health program; (1= not							

at all; 7 = to a great extent)							
Bureaucratic corruption has retarded the performance of my health program; (1= not at all; 7 = to a great extent)							

THEME 7: Networks

23. Which of these is the most common type of network used by your organization?

- a) Service implementation network ☐ b) information diffusion network ☐
 c) Problem solving network ☐ d) community capacity building network ☐
 e) None ☐

24. Which network channel do you mainly use in your work?

- a) Virtual Social network ☐ b) Physical social network ☐ c) Virtual professional network ☐
 d) Physical professional network ☐ e) None ☐

25. Please indicate the extent to which the selected network above enhances the performance of your health program by ticking either 1-7 on the table below;

Factors	1	2	3	4	5	6	7
Virtual social networks have enhanced the performance of my health program; (1= not at all; 7 = to a great extent)							
Physical social networks have enhanced the performance of my health program; (1= not at all; 7 = to a great extent)							

Virtual professional networks have enhanced the performance of my health program; (1= not at all; 7 = to a great extent)							
Physical professional networks have enhanced the performance of my health program; (1= not at all; 7 = to a great extent)							
Lack of a network has enhanced the performance of							

my health program; (1= not at all; 7 = to a great extent)							

THEME 8: QUALITY SERVICE DELIVERY OF HEALTH PROGRAMS

26. Which quality delivery of health service attribute do you consider as the most important?

- ☐ a) Effectiveness ☐ b) Safety ☐ c) Access ☐ d) Timeliness
☐ e) Equitable ☐ f) Integrated ☐ g) Efficiency

27. Please indicate the extent to which the selected quality delivery attribute in “26” above has improved the performance of your health program by ticking either 1-7 on the table below;

Factors	1	2	3	4	5	6	7
Effectiveness has been useful in improving the performance of my health program(1= not at all; 7 = to a great extent)							
Safety has been useful in improving the performance of my health							

program; [1 = not at all; 7 = to a great extent]							
Access has been useful in improving the performance of my health program; (1= not at all; 7 = to a great extent)							
Timeliness has been useful in improving the performance of my health program; (1= not at all; 7 = to a great extent)							
Equitability has been useful in improving the performance of my health program; (1= not at all; 7 = to a great extent)							
Integration has been useful in improving the performance of my health program; (1= not at all; 7 = to a great extent)							

Efficiency has been useful in improving the performance of my health program; (1= not at all; 7 = to a great extent)							

Thanks for Participating

APPENDIX B: Gate Keeper Letter**Gatekeeper letter**

Address: Commissioner Planning, finance & Policy

Date: 07-Sep-2022

Subject: Doctoral research permission

Dear Doctor

I am a doctoral student at Unicaf University Zambia. As part of my degree I am carrying out a study on management factors affecting health service quality delivery of health programs in Uganda

I am writing to enquire whether you would be willing to give permission to conduct this research. Subject to approval by Unicaf Research Ethics Committee (UREC) this study will be using self administered questionnaires sent online and in person.

The aim of the research is to develop a framework exploring how innovation mediates the effect between management factors (management level of education and training) on the quality of service delivery for health programs while also exploring the moderation effect of network and corruption. The research supervisor is Dr. Sam Njinyah, a renowned academic in the management field. In order to collect participant data, I hereby request your permission to use the contacts of potential participants from the Ministry of Health database. This is to request that you countersign this letter or issue a letter granting permission for the research to proceed.

Thank you in advance for your time and for your consideration of this project. Kindly please let me know if you require any further information or need any further clarifications.

Yours Sincerely,

Gilbert Baayenda

Student's Name: Gilbert Baayenda

Student's E-mail: baayendag@gmail.com

Student's Address and Telephone: Plot 43 Kira road, 0776777516

Supervisor's Title and Name: Dr. Sam Njinyah

Supervisor's Position: Faculty

APPENDIX B: Informed Consent Form



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Informed Consent Form

Part 1: Debriefing of Participants

Student's Name: Gilbert Baayenda

Student's E-mail Address: baayendag@gmail.com

Student ID #: 1905D8379804

Supervisor's Name: Dr. Sam Njinyah

University Campus: Unicaf University Zambia (UUZ)



Program of Study: DBA

Research Project Title: An examination of management factors affecting health service quality delivery of health programs in Uganda.

Date: 07-Sep-2022

Provide a short description (purpose, aim and significance) of the research project, and explain why and how you have chosen this person to participate in this research (maximum 150 words).

The aim of the research is to develop a framework exploring how innovation mediates the effect between management factors (management level of education and training) on the quality of service delivery for health programs while also exploring the moderation effect of network and corruption. Improvement in the management of health programs is important for the development of the economy. This will complement existing studies that have evaluated the performance of health programs by arguing management training and education could have a greater or lesser effect on the quality service of health program delivery if we consider some moderating factors. We also contribute by exploring the role of institutions (corruption) and network as a moderator on the relationship between management training and level of education on the quality of service delivery of health programs. Corruption could stand as a barrier for highly trained and education experts to demonstrate their skills to drive the performance of health programs. On the other hand, by developing a network with different stakeholder, educated and well-trained managers could exploit the benefits of this network to improve the delivery of health programs.

The above named Student is committed in ensuring participant's voluntarily participation in the research project and guaranteeing there are no potential risks and/or harms to the participants.

Participants have the right to withdraw at any stage (prior or post the completion) of the research without any consequences and without providing any explanation. In these cases, data collected will be deleted.

All data and information collected will be coded and will not be accessible to anyone outside this research. Data described and included in dissemination activities will only refer to coded information ensuring beyond the bounds of possibility participant identification.

I, Gilbert Baayenda, ensure that all information stated above is true and that all conditions have been met.

Student's Signature: Gilbert Baayenda



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Informed Consent Form

Part 2: Certificate of Consent

This section is mandatory and should to be signed by the participant(s)

Student's Name: Gilbert Baayenda

Student's E-mail Address: baayendag@gmail.com

Student ID #: 1905D8379804

Supervisor's Name: Dr. Sam Njinyah

University Campus: Unicaf University Zambia (UUZ)

Program of Study: DBA

Research Project Title: An examination of management factors affecting health service quality delivery of health programs in Uganda.

I have read the foregoing information about this study, or it has been read to me. I have had the opportunity to ask questions and discuss about it. I have received satisfactory answers to all my questions and I have received enough information about this study. I understand that I am free to withdraw from this study at any time without giving a reason for withdrawing and without negative consequences. I consent to the use of multimedia (e.g. audio recordings, video recordings) for the purposes of my participation to this study. I understand that my data will remain anonymous and confidential, unless stated otherwise. I consent voluntarily to be a participant in this study.

Participant's Print name:

Participant's Signature: _____

Date: _____

If the Participant is illiterate:

I have witnessed the accurate reading of the consent form to the potential participant, and the individual has had an opportunity to ask questions. I confirm that the aforementioned individual has given consent freely.

Witness's Print name:

Witness's Signature: _____

Date: _____

APPENDIX D: REAF-DS



REAF_DS - Version 3.1 AP



**UNICAF UNIVERSITY
RESEARCH ETHICS APPLICATION FORM
DOCTORAL STUDIES**

UREC USE ONLY:
Application No:
Date Received:

Student's Name: Gilbert Baayenda

Student's E-mail Address: baayendag@gmail.com

Student's ID #: R1905D8379804

Supervisor's Name: Dr. Sam Njinyah

University Campus: Unicaf University Zambia (UUZ)



Program of Study: UUZ: DBA Doctorate of Business Administration



Research Project Title: An examination of management factors affecting health service quality delivery of health programs in Uganda.

1. Please state the timelines involved in the proposed research project:

Estimated Start Date: 20-Sep-2022

Estimated End Date: 10-May-2023

2. External Research Funding (if applicable):

2.a. Do you have any external funding for your research?

☐ YES

☒ NO

If YES, please answer questions 2b and 2c.

2.b. List any external (third party) sources of funding you plan to utilise for your project. You need to include full details on the source of funds (e.g. state, private or individual sponsor), any prior / existing or future relationships between the funding body / sponsor and any of the principal investigator(s) or co-investigator(s) or student researcher(s), status and timeline of the application and any conditions attached.

2.c. If there are any perceived ethical issues or potential conflicts of interest arising from applying or and receiving external funding for the proposed research then these need to be fully disclosed below and also further elaborated on, in the relevant sections on ethical considerations later on in this form.

3. The research project

3.a. Project Summary:

In this section fully describe the purpose and underlying rationale for the proposed research project. Ensure that you pose the research questions to be examined, state the hypotheses, and discuss the expected results of your research and their potential.

It is important in your description to use plain language so it can be understood by all members of the UREC, especially those who are not necessarily experts in the particular discipline. To that effect ensure that you fully explain / define any technical terms or discipline-specific terminology (use the space provided in the box).

The aim of the research is to develop a framework exploring how innovation mediates the effect between management factors (management level of education and training) on the quality of service delivery for health programs while also exploring the moderation effect of network and corruption". The research problem is based on a lack of studies exploring the mechanism and contingent variables through which management factors could influence the delivery of health programs especially in Uganda where despite the evaluation of the success of such programs, factors affecting their success have not been examined. Q1. What is the relationship between management training and management experience on the quality delivery of health service by health programs in Uganda? Q2. What is the mediation effect of innovation on the relationship between management level of education and management training on the quality delivery of health services by health programs in Uganda? Q3. What is the moderation effect of network and corruption on management level of education and management training on the quality delivery of health services by health programs in Uganda? Q4. How can the relationship between management level of education and management training on the quality delivery of health services by health programs in Uganda be best understood? Hypotheses: Seven hypotheses will be developed from the framework. H1a: Managers level of education will have a positive effect on the innovation of healthcare programs. H1b: Managerial training will have a positive effect on innovation of healthcare programs. H1c: There is a positive relationship between innovation in healthcare and quality of service in healthcare programs. H2a: The relationship between management level of education and quality of service delivery for health programs is moderated by collaborative network. H2b: The relationship between management level of education and quality of service delivery for health programs is moderated by corruption. H3a: The relationship between management training and quality of service delivery for health programs is moderated by collaborative network. H3b: The relationship between management training and quality of service delivery for health programs is moderated by corruption. These hypotheses will address the direct effect of management training and education on the quality of service delivery for health programs, the mediation effect of innovation and the moderation effect of network and corruption. The expected result will be to confirm the significance of the hypotheses.



3.b. Significance of the Proposed Research Study and Potential Benefits:

Outline the potential significance and/or benefits of the research (use the space provided in the box).

Improvement in the management of health programs is important for the development of the economy. This will complement existing studies that have evaluated the performance of health programs by arguing management training and education could have a greater or lesser effect on the quality service of health program delivery if we consider some moderating factors. We also contribute by exploring the role of institutions (corruption) and network as a moderator on the relationship between management training and level of education on the quality of service delivery of health programs. Corruption could stand as a barrier for highly trained and education experts to demonstrate their skills to drive the performance of health programs. On the other hand, by developing a network with different stakeholder, educated and well-trained managers could exploit the benefit of this network to improve the delivery of health programs.

4. Project execution:

4.a. The following study is an:

- ☒ experimental study (primary research)
- ☐ desktop study (secondary research)
- ☐ desktop study using existing databases involving information of human/animal subjects
- ☐ Other

If you have chosen 'Other' please Explain:



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4.b. Methods. The following study will involve the use of:

Method	Materials / Tools
Qualitative:	☐ Face to Face Interviews
	☐ Phone Interviews
	☐ Face to Face Focus Groups
	☐ Online Focus Groups
	☐ Other *
Quantitative:	☐ Face to Face Questionnaires
	☒ Online Questionnaires
	☐ Experiments
	☐ Tests
	☐ Other *

*If you have chosen 'Other' please Explain:

5. Participants:

5 a. Does the Project involve the recruitment and participation of additional persons other than the researcher(s) themselves?

- ☒ YES If YES, please complete all following sections.
- ☐ NO If NO, please directly proceed to Question [7](#).



5 b. Relevant Details of the Participants of the Proposed Research

State the number of participants you plan to recruit, and explain in the box below how the total number was calculated.

Number of participants

The total number was calculated based on the number of health managers in the NTD(5), immunization(5) and WASH programs(5) at the Ministry headquarters. Number of District Health Officers(143) District WASH Managers(143) Districts NTD Managers(143) District immunization Managers(143).

Describe important characteristics such as: demographics (e.g. age, gender, location, affiliation, level of fitness, intellectual ability etc). It is also important that you specify any inclusion and exclusion criteria that will be applied (e.g. eligibility criteria for participants).

Age range From To

Gender ☒ Female
☒ Male

Eligibility Criteria:

- Inclusion criteria
- Exclusion criteria

Disabilities

Other relevant information (use the space provided in the box):

The researcher is National program officer for Trachoma and has access to the participants at the national, district and subdistrict level. The researcher also has access to the health workforce database but will still obtain ethics clearance from the Research and Ethics committee of the Ministry of Health also known as the VCD REC which is housed in the vector borne disease control division where the researcher is based.

5 c. Participation & Research setting:

Clearly describe which group of participants is completing/participating in the material(s)/ tool(s) described in 5b above (use the space provided in the box).

The participants will include the disease specific program managers for Neglected Tropical Diseases(NTDs), Immunization and WASH programs at both the national and subnational(district) levels. These health managers include Doctors, Nurses, Midwives, Medical Entomologists, Vector control officers, Environmental Health officers and allied health professionals holding a health manager role. All participants will make use of online questionnaires to provide data for the study.

5 d. Recruitment Process for Human Research Participants:

Clearly describe how the potential participants will be identified, approached and recruited (use the space provided in the box).

There is a national data base for health workers for which the researcher has access and will obtain ethics approval. Potential participants will be selected from the workplace database and an information and consent form will be sent out by email. This will be easy because the researcher is the National Health coordinator for some health programs. All participants will be availed the online questionnaire in line with current COVID-19 prevention protocols.

5 e. Research Participants Informed Consent.

Select below which categories of participants will participate in the study. Complete the relevant Informed Consent form and submit it along with the REAF form.

Yes	No	Categories of participants	Form to be completed
☒	☐	Typically Developing population(s) above the maturity age *	Informed Consent Form
☐	☒	Typically Developing population(s) under the maturity age *	Guardian Informed Consent Form

* Maturity age is defined by national regulations in laws of the country in which the research is being conducted.



5 f. Relationship between the principal investigator and participants.

Is there any relationship between the principal investigator (student), co-investigators(s), (supervisor) and participant(s)? For example, if you are conducting research in a school environment on students in your classroom (e.g. instructor-student).

☒ YES

☐ NO

If YES, specify (use the space provided in the box).

Though the researcher works in the healthcare system, he/she exercises no professional influence or control over potential participants in the study

6. Potential Risks of the Proposed Research Study.

6 a. i. Are there any potential risks, psychological harm and/or ethical issues associated with the proposed research study, other than risks pertaining to everyday life events (such as the risk of an accident when travelling to a remote location for data collection)?

☐ YES

☒ NO

If YES, specify below and answer the question 6 a.ii.

6 a.ii Provide information on what measures will be taken in order to exclude or minimise risks described in 6.a.i.

6 b. Choose the appropriate option

		Yes	No
i.	Will you obtain written informed consent form from all participants?	☒	☐
ii.	Does the research involve as participants, people whose ability to give free and informed consent is in question?	☐	☒
iii.	Does this research involve participants who are children under maturity age? If you answered YES to question iii, complete all following questions. If you answered NO to question iii, do not answer Questions iv, v, vi and proceed to Questions vii, viii, ix and x.	☐	☒
iv.	Will the research tools be implemented in a professional educational setting in the presence of other adults (i.e. classroom in the presence of a teacher)?	☐	☒
v.	Will informed consent be obtained from the legal guardians (i.e. parents) of children?	☐	☒
vi.	Will verbal assent be obtained from children?	☐	☒
vii.	Will all data be treated as confidential? If NO, explain why confidentiality of the collected data is not appropriate for this proposed research project, providing details of how all participants will be informed of the fact that any data which they will provide will not be confidential.	☒	☐
viii.	Will all participants /data collected be anonymous? If NO, explain why and describe the procedures to be used to ensure the anonymity of participants and/or confidentiality of the collected data both during the conduct of the research and in the subsequent release of its findings.	☒	☐



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	Yes	No
ix. Have you ensured that personal data and research data collected from participants will be securely stored for five years?	☒	☐
x. Does this research involve the deception of participants? If YES, describe the nature and extent of the deception involved. Explain how and when the deception will be revealed, and who will administer this debrief to the participants:	☐	☒

6 c. i. Are there any other ethical issues associated with the proposed research study that are not already adequately covered in the preceding sections?

☐ Yes ☒ No

If YES, specify (maximum 150 words).

6.c.ii Provide information on what measures will be taken in order to exclude or minimise ethical issues described in 6.c.i.

6 d. Indicate the Risk Rating.

☐ High ☒ Low



7. Further Approvals

Are there any other approvals required (in addition to ethics clearance from UREC) in order to carry out the proposed research study?

☐ YES ☒ NO

If YES, specify (maximum 100 words).

8. Application Checklist

Mark ✓ if the study involves any of the following:

- ☐ Children and young people under 18 years of age, vulnerable population such as children with special educational needs (SEN), racial or ethnic minorities, socioeconomically disadvantaged, pregnant women, elderly, malnourished people, and ill people.
- ☐ Research that foresees risks and disadvantages that would affect any participant of the study such as anxiety, stress, pain or physical discomfort, harm risk (which is more than is expected from everyday life) or any other act that participants might believe is detrimental to their wellbeing and / or has the potential to / will infringe on their human rights / fundamental rights.
- ☐ Risk to the well-being and personal safety of the researcher.
- ☐ Administration of any substance (food / drink / chemicals / pharmaceuticals / supplements / chemical agent or vaccines or other substances (including vitamins or food substances) to human participants.
- ☐ Results that may have an adverse impact on the natural or built environment.

9. Further documents

Check that the following documents are attached to your application:

		ATTACHED	NOT APPLICABLE
1	Recruitment advertisement (if any)	☐	☒
2	Informed Consent Form / Guardian Informed Consent Form	☒	☐
3	Research Tool(s)	☒	☐
4	Gatekeeper Letter	☒	☐
5	Any other approvals required in order to carry out the proposed research study, e.g., institutional permission (e.g. school principal or company director) or approval from a local ethics or professional regulatory body.	☐	☐



REAF_DS - Version 3.1

10. Final Declaration by Applicants:

- (a) I declare that this application is submitted on the basis that the information it contains is confidential and will only be used by Unicaf University for the explicit purpose of ethical review and monitoring of the conduct of the research proposed project as described in the preceding pages.
- (b) I understand that this information will not be used for any other purpose without my prior consent, excluding use intended to satisfy reporting requirements to relevant regulatory bodies.
- (c) The information in this form, together with any accompanying information, is complete and correct to the best of my knowledge and belief and I take full responsibility for it.
- (d) I undertake to abide by the highest possible international ethical standards governing the Code of Practice for Research Involving Human Participants, as published by the UN WHO Research Ethics Review Committee (ERC) on <http://www.who.int/ethics/research/en/> and to which Unicaf University aspires to.
- (e) In addition to respect any and all relevant professional bodies' codes of conduct and/or ethical guidelines, where applicable, while in pursuit of this research project.



I agree with all points listed under Question 10

Student's Name: Gilbert Baayenda

Supervisor's Name: Dr. Sam Njinyah

Date of Application: 07-Sep-2022

Important Note:

Save your completed form (we suggest you also print a copy for your records) and then submit it to your UU Dissertation/project supervisor (tutor). **In the case of student projects, the responsibility lies with the Faculty Dissertation/Project Supervisor.** If this is a student application, then it should be submitted via the relevant link in the VLE. Please submit only electronically filled in copies; **do not** hand fill and submit scanned paper copies of this application.