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**Title: Optimization of Patient Flow at the Outpatient Department of
University Teaching Hospital in Lusaka, Zambia.**

A

Proposal Presented

**In Partial Fulfillment For Requirement Of The Program
Master Of Business Administration - Healthcare Management
(MBAHCM)**

BY

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DECLARATION

I, **MUBITA MUYUNDA**, declare that this dissertation titled "***Optimization of Patient Flow at the Outpatient Department of the University Teaching Hospital in Lusaka, Zambia***," is my own original work and has been conducted in conformity with copyright regulations and University of Lusaka's academic writing rules and research ethics guidelines. The references and citations of all the information from this document are adequately acknowledged and duly listed. It has not been submitted or offered for a Degree in this or any other University.

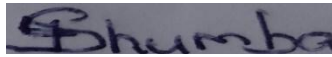
I have been supervised by **Dr. Shumba Florance**, who has provided guidance and oversight throughout the research process.

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Date: 13th March, 2025

Supervisor Signature:



Date: 15th March, 2025

DEDICATION

I dedicated this dissertation to my beloved wife, Chipso Mooya Chiwele and my lovely daughter, Tapelo Mubita. Your unwavering love and support have been my greatest source of strength and motivation. I further dedicate this work to Healthcare Workers in the country for their commitment to patient care.

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ABSTRACT

This study investigates the factors contributing to inefficiencies in patient flow at the Outpatient Department (OPD) of University Teaching Hospital (UTH) in Lusaka, Zambia, aiming to propose solutions to optimize service delivery.

Tertiary healthcare facilities like UTH face significant challenges such as long waiting times, overcrowded waiting areas, and inefficient triage systems contributing to delayed care and increased strain on resources. Despite the critical importance of efficient patient flow for quality healthcare delivery, little has been done to optimize this process in Zambia. This research aims to fill this knowledge gap by exploring the specific challenges faced at UTH's OPD.

The objectives aim at investigating factors contributing to patient flow inefficiencies and developing recommendations for improvement capturing the perspectives of healthcare providers and patients. The research uses a mixed-methods approach, combining qualitative methods such as in-depth interviews and focus group discussions with quantitative data from surveys and observations aiming for a comprehensive understanding of patient flow dynamics.

The study's population consists of 50 healthcare providers and 1,000 patients from UTH's OPD, with a calculated sample size of 322 participants. Data collection involves surveys, interviews, focus groups, and documentary analysis. The study revealed inefficiencies that included bottlenecks identified at registration, consultation, and pharmacy stages. Long waiting times, averaging 30-60 minutes at registration and over an hour at the pharmacy were found. Patient satisfaction was low, with 75.1% expressing dissatisfaction with the registration process. Healthcare providers highlighted staffing shortages and poor coordination as challenges.

Recommendations: Increase staffing levels, implement technology-driven solutions, and improve resource allocation. Engage healthcare workers as key stakeholders in these undertakings so as to enhance healthcare service delivery in hospitals.

Keywords:

Optimisation; Patient Flow; Outpatient Department; University Teaching Hospital; Bottlenecks; Waiting Time; Efficiency.

CHAPTER ONE: INTRODUCTION

1. Introduction

This chapter presents background information to the study, statement of the problem, objectives of the study, research questions and significant of the study.

1.1 Background

The history of patient flow management at outpatient departments (OPDs) in healthcare institutions traces back to the early 20th century when hospitals began formalizing outpatient services. Initially, OPDs were designed to offer care for less severe medical conditions, creating a structured mechanism to segregate patients based on severity of their conditions (Anderson, 2001). Over time, increasing complexity of medical care and surge in patient numbers, driven by population growth and epidemiological transitions, necessitated the development of systems to manage patient flow effectively. Early approaches primarily relied on manual scheduling and triage processes, often characterized by inefficiency and long wait times (Johnson & Clark, 2005).

With the advent of modern healthcare systems, technological solutions such as appointment scheduling software and electronic health records (EHRs) were introduced to streamline operations (Smith et al., 2010). Despite these advancements, challenges such as overcrowding, misallocation of resources, and delays have persist, highlighting the need for further innovations in patient flow optimization. In developing countries like Zambia, the burden on OPDs has been exacerbated by limited healthcare resources and a high prevalence of communicable diseases, underscoring the importance of effective patient flow management.

Outpatient departments (OPDs) face challenges that hinder the efficient delivery of healthcare services. Overcrowding is a persistent issue, overwhelming facilities and leading to long wait times and strained resources. This is compounded by the misallocation of resources such as human resource, equipment, and consumables creating bottlenecks and inefficiencies. Delays in service delivery further exacerbate

these problems, as prolonged waiting times for consultations, diagnoses, or treatments negatively affect patient outcomes and satisfaction.

In Zambia, limited healthcare resources remain a critical challenge. Insufficient funding, inadequate personnel, and a lack of infrastructure often prevent healthcare systems from meeting the growing demands of their populations. The high prevalence of communicable diseases, such as malaria, tuberculosis, and HIV/AIDS, places additional burden on healthcare systems, overwhelming OPDs and reducing their ability to manage patient flow effectively.

Patient flow management systems, which are crucial for ensuring smooth operations, are often inadequate, leading to inefficiencies and suboptimal patient experiences. While technological solutions like appointment scheduling software and electronic health records (EHRs) have been introduced to streamline operations, these tools are underutilized or inefficiently implemented. Strained healthcare infrastructure, characterized by insufficient facilities, outdated equipment, and limited space, further hinders the capacity of healthcare institutions to accommodate and care for patients effectively. These challenges underscore the need for innovative approaches.

Optimizing patient flow at OPDs is crucial for enhancing the overall efficiency of healthcare delivery systems. When patient flow is streamlined, it reduces waiting times, minimizes overcrowding, and improves the quality of care, thereby enhancing patient satisfaction and outcomes (Nguyen et al., 2017). From a societal perspective, efficient OPDs enable equitable access to healthcare services, especially in resource-constrained settings.

Efficient patient flow also has economic implications. By reducing the time patients spend at healthcare facilities, productivity losses for individuals and their families are minimized. Moreover, optimized systems allow healthcare providers to allocate resources more effectively, reducing operational costs and enhancing the sustainability of healthcare institutions (Baker et al., 2013). Furthermore, improved patient flow can significantly impact public health outcomes by facilitating timely diagnosis and treatment.

Methods such as digital appointment systems, Lean Six Sigma practices, and queue management systems, have been widely implemented (Jones et al., 2018). While these techniques have shown promise in controlled settings, their real-world application often falls short of expectations. Factors such as insufficient staff training, resistance to change, and technological limitations hinder their effectiveness.

Empirical studies on patient flow optimization have produced diverse findings, reflecting the complexity of this issue. Conventional studies have emphasized the effectiveness of operational strategies such as Lean and Six Sigma methodologies. For instance, a study by (Martin et al., 2015) demonstrated that implementing Lean principles in a Canadian hospital reduced average patient wait times by 30%. The researchers used a mixed-methods approach, combining quantitative data analysis with qualitative interviews to assess the intervention's impact. Conversely, unconventional studies have challenged traditional paradigms. For example, (Gupta et al., 2019) found that incorporating AI-driven predictive models significantly improved patient flow in Indian OPDs. Using machine learning algorithms, the study predicted peak patient arrival times and optimized resource allocation, resulting in a 40% reduction in wait times. However, the study also highlighted challenges such as data privacy concerns and the need for robust infrastructure. Additionally, studies have examined the socio-cultural dimensions of patient flow. A qualitative study by Moyo et al. (2021) in Zimbabwe revealed that cultural beliefs and communication barriers significantly impacted patient flow at rural OPDs. The findings underscore the importance of integrating socio-cultural considerations into optimization strategies.

While the literature provides valuable insights, several gaps remain. First, most studies focus on high-resource settings, with limited research addressing the unique challenges faced by OPDs in low- and middle-income countries (LMICs) like Zambia. Second, there is a lack of comprehensive frameworks that integrate technological, operational, and socio-cultural dimensions of patient flow optimization. Third, existing research often overlooks the long-term sustainability of proposed solutions, focusing instead on short-term gains.

In Zambia, the University Teaching Hospital (UTH) faces significant challenges in managing patient flow, with long waiting times and overcrowding being common issues. According to OPD registry data, UTH serves over 1,000 outpatients monthly, placing immense strain on its resources. Empirical studies from similar settings, such as Olanrewaju et al. (2018) in Nigeria and Akinyemi et al. (2017) in South Africa, have shown that inefficiencies in patient flow lead to prolonged waiting times, reduced patient satisfaction, and increased resource utilization. Despite these challenges, there is limited research focusing on optimizing patient flow in Zambian

healthcare facilities, highlighting the need for this study. These gaps highlight the need for further research to develop strategies that address the complexities of patient flow optimization in resource-constrained settings. This study aims to address these gaps by investigating patient flow optimization strategies at the University Teaching Hospital in Lusaka, Zambia.

By examining the interplay between operational efficiency and patient satisfaction this research seeks to contribute to the broader discourse on healthcare service delivery optimization. These findings could inform policymakers, healthcare providers, and researchers, paving the way for sustainable improvements in OPD management.

1.2 Statement of the research problem

In Zambia, the patient flow process within healthcare facilities presents significant challenges that hinder efficient healthcare service delivery. Long waiting times, overcrowded waiting areas, and inefficient triage systems contribute to delays in care provision, compromising patient experiences and straining healthcare resources. Despite the critical importance of efficient patient flow for quality healthcare delivery, there is a notable gap in addressing these challenges within our facilities.

The social need for optimizing patient flow in healthcare facilities is evident, as it directly impacts the timely access to healthcare services for individuals in Lusaka. The consequences of inefficient patient flow include prolonged wait times, dissatisfaction among patients and healthcare providers, poor clinical outcomes and increased resource utilization. Therefore, this research aims to investigate the specific factors contributing to inefficient patient flow at the Outpatient Department (OPD) of University Teaching Hospital (UTH) in Lusaka, Zambia, with the intention of identifying evidence-based solutions to enhance healthcare service delivery in similar settings.

1.3 General objectives

To investigate factors contributing to inefficiencies in patient flow and develop recommendations to optimize service delivery at the Outpatient Department (OPD) of University Teaching Hospital (UTH) in Lusaka, Zambia.

1.3.1 Specific objectives

- i. To assess the current patient flow processes and identify bottlenecks within the OPD of UTH.
- ii. To determine the impact of inefficient patient flow on waiting times and resource utilization at UTH OPD.
- iii. To explore the perspectives and experiences of healthcare providers regarding challenges in managing patient flow at UTH.
- iv. To investigate patient perceptions and satisfaction levels regarding the efficiency of patient flow processes.

1.4 Research questions

- i. What are the current patient flow processes, and what bottlenecks can be identified within the Outpatient Department (OPD) of the University Teaching Hospital (UTH)?
- ii. How does inefficient patient flow impact waiting times and resource utilization at the UTH OPD?
- iii. What are the perspectives and experiences of healthcare providers regarding challenges in managing patient flow at UTH?
- iv. How do patients perceive and what are their satisfaction levels regarding the efficiency of patient flow processes at UTH OPD?

1.5 Significance of the study

The study aimed at alleviating common challenges such as long waiting times, overcrowded facilities, and inefficient triage systems. These challenges not only compromise patient experiences but also strain healthcare resources and impede timely access to care.

Improving patient flow is essential for enhancing healthcare service delivery and ensuring equitable access to quality care, particularly in low-income countries like Zambia (Zambia Ministry of Health, 2018). By identifying and addressing barriers to efficient patient flow, this study has the capacity to contribute significantly to the effectiveness and sustainability of healthcare delivery systems. UTH is Zambia's largest public hospital, serving patients from Lusaka and other regions of the country including neighbouring countries. As such, it faces immense pressure in managing patient volumes and delivering timely care. Furthermore, the hospital handles significant patient loads daily, particularly at the OPD, presenting numerous challenges in patient flow management. Optimizing patient flow at UTH could significantly improve healthcare delivery not only at UTH but also in other healthcare facilities across Zambia facing similar challenges such as Ndola, Kitwe and Levy Mwanawasa Teaching Hospitals

1.6 Scope of the study

The study investigates optimization of patient flow at the Outpatient Department (OPD) of University Teaching Hospital (UTH) in Lusaka, Zambia. This research encompassed various stages of the patient flow process, including registration, triage, consultation, treatment, and discharge at OPD. It did not extend to healthcare facilities or delve into broader healthcare system issues beyond patient flow optimization. Additionally, the study focused on patients accessing general medical services and not specialized health services.

1.7 Definition of key terms and concepts

Patient flow: The movement of patients through healthcare facilities from entry to exit (Bowers et al., 2014).

Optimization: The process of making patient flow more efficient and effective (Cattani et al., 2016).

Healthcare facilities: Institutions providing medical services to patients, including hospitals, clinics, and health centers.

Bottlenecks: Points of congestion or delays in patient flow (Akinci & Eski, 2017).

Efficiency: The ability to achieve desired outcomes with minimal waste (Holden & Clark, 2019)."

CHAPTER TWO: LITERATURE REVIEW

2. Introduction

This chapter discusses the theoretical and empirical foundations of the study on Optimization of Patient Flow at Outpatient Departments in healthcare institution.

2.1 Theoretical literature

Our study that focused on optimization of patient flow at the Outpatient Department of UTH, several theoretical frameworks were applied to examine the factors influencing patient flow dynamics. Below are three theories—one suggesting a positive impact, another indicating a negative impact, and the third proposing no impact—on the optimization of patient flow at the hospital.

2.1.1 Positive Impact: The Theory of Constraints (TOC)

The Theory of Constraints (TOC) was developed by Dr. Eliyahu M. Goldratt in his 1984 book *The Goal: A Process of Ongoing Improvement* (Goldratt, 1984). The theory posits that every system, whether in business, healthcare, or manufacturing, has at least one constraint that limits its performance. In the case of the University Teaching Hospital's Outpatient Department, the constraint could be related to limited medical staff, inefficient triage processes, insufficient space, or inadequate technological systems utilization. TOC argues that by identifying and addressing these constraints, organizations can significantly improve their overall performance.

In OPD, the theory emphasizes the need for focusing on the bottleneck or the point where the flow of patients is most disrupted. For instance, if patient registration or initial medical assessment is the bottleneck, the implementation of streamlined procedures, better staff allocation, or upgraded technology could lead to a faster, more efficient patient flow. Goldratt's approach encourages organizations to continuously improve by addressing the most pressing constraints first, followed by subsequent improvements.

The TOC theory can be applied to this study in the sense that the University Teaching Hospital can pinpoint the primary constraints in its outpatient operations and devise solutions to overcome them. For example, if there is a shortage of doctors during peak hours, it could hire additional part-time physicians, or if patients are spending too much time waiting for tests, the hospital could introduce better

scheduling systems or more testing equipment. Thus, TOC suggests that by systematically addressing constraints, the hospital will optimize patient flow in its OPD.

2.1.2 Negative Impact: The Parkinson's Law

Parkinson's Law, first articulated by British naval historian and author Cyril Northcote Parkinson in 1957, states that "work expands to fill the time available for its completion" (Parkinson, 1957). This theory can be applied to the Outpatient Department to understand how inefficiencies may arise in the system. Parkinson argued that administrative work in organizations often grows uncontrollably because of unnecessary procedures, bureaucracy, or poorly managed workflows. In the context of healthcare, patient flow can be negatively impacted when hospital staff and departments follow inefficient or outdated processes, leading to delays and overcrowding.

Parkinson's Law suggests that, in the absence of external pressure or clear guidelines, the OPD staff may inadvertently extend patient care time, creating bottlenecks and hindering patient flow. For instance, if there is no strict regulation on the time allotted for patient consultations, doctors may spend more time with each patient than necessary, leading to an inefficient use of time and a backlog of patients waiting for care. Additionally, administrative processes such as patient registration, insurance verification, or payment could also take longer than necessary due to bureaucratic inefficiencies.

In this study, Parkinson's Law suggests that, despite the efforts to optimize patient flow, there may be an inherent tendency within the hospital to complicate processes and tasks, leading to delays and poor management of the patient experience. Ineffective scheduling, lack of coordination between departments, and redundant administrative procedures lead to a waste of resources and a negative impact on patient flow. As a result, addressing Parkinson's Law may require the hospital to streamline its operations, eliminate unnecessary steps, and focus on improving operational efficiency.

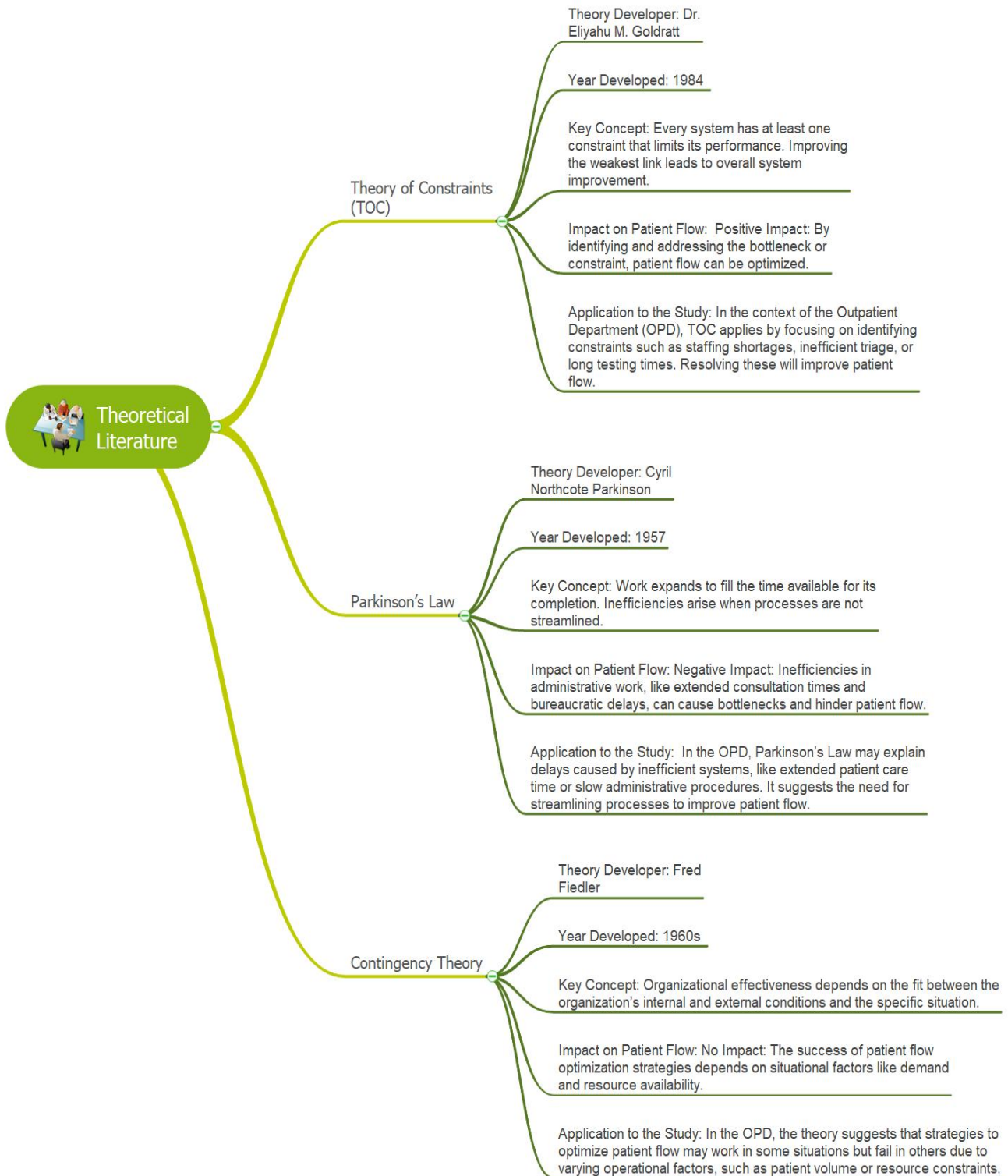
2.1.3 No Impact: The Contingency Theory

The Contingency Theory, developed by management theorists Fred Fiedler in the 1960s, argues that there is no one-size-fits-all approach to organizational effectiveness. Instead, it posits that the optimal course of action depends on the internal and external conditions of the organization and the environment in which it operates (Fiedler, 1964). This theory suggests that the effectiveness of different management practices depends on various situational factors, such as the level of patient demand, staff capacity, organizational culture, and available resources.

For patient flow in the Outpatient Department, the Contingency Theory could suggest that attempts to optimize patient flow may not always yield consistent or predictable results. The theory highlights the idea that there is no universal solution to managing patient flow because the optimal strategies would depend on specific circumstances, such as the hospital's operational capacity, budget constraints, and patient demographics. For instance, a strategy that works well during low patient volume periods may not be as effective during peak hours or when there is an unexpected surge in patient numbers.

The Contingency Theory, therefore, argues that while optimization strategies may improve patient flow in some situations, they may have little or no impact in others. The hospital may try various strategies to improve patient flow—such as increasing staff, enhancing infrastructure, or improving scheduling systems—but the success of these initiatives would depend on the hospital's unique circumstances. Thus, the theory suggests that interventions to optimize patient flow may have no significant or lasting impact if they are not adapted to the hospital's specific challenges.

Figure 1: Summary of theoretical literature



Source: (Goldratt, 1984)

2.2 Empirical literature

2.3 Global studies

The optimization of patient flow in outpatient departments (OPDs) has been the focus of various empirical studies globally, particularly in countries outside of Africa. These studies aim to address challenges such as long waiting times, overcrowding, and resource mismanagement in healthcare institutions. One significant study by (Holden et al., 2015) in the United Kingdom investigated how Lean management principles could enhance patient flow in outpatient clinics. The study focused on key variables such as patient waiting times, consultation duration, and patient satisfaction. The results highlighted a significant reduction in patient waiting times and an improvement in patient satisfaction after implementing Lean techniques, such as streamlining administrative processes and minimizing non-value-added steps. (Holden et al. 2015) recommended the widespread adoption of Lean management in healthcare settings, especially in outpatient clinics, to ensure smoother patient flows and improved resource utilization.

Similarly, a study by (Sweis et al. 2019) in the United States analyzed the use of simulation modeling to optimize patient flow in an OPD. They utilized variables like patient arrival rates, staff availability, and appointment scheduling practices. By using simulation models, the study identified key bottlenecks in the patient flow process and suggested that reducing the appointment duration for specific non-urgent cases could significantly reduce waiting times. The results indicated that optimizing the scheduling system and improving the communication between medical staff and patients could alleviate congestion and reduce patient waiting time by 25%. They recommended that healthcare institutions adopt predictive modeling tools to better anticipate patient demand and adjust staffing levels accordingly.

A study by Naylor et al. (2017) conducted in Canada focused on the impact of digital health solutions on improving patient flow in outpatient settings. The study primarily examined variables such as the use of electronic health records (EHRs), patient portals, and digital appointment systems. Naylor et al. (2017) found that the implementation of these digital solutions not only improved the accuracy of patient

data but also streamlined appointment scheduling, resulting in reduced patient wait times and enhanced overall flow. The study recommended that healthcare institutions invest in digital solutions to ensure that outpatient departments function more efficiently and to improve the patient experience.

In a different context, a study conducted in Australia by McCarthy et al. (2018) examined the impact of staffing levels and team collaboration on patient flow in outpatient settings. The researchers focused on variables such as the number of available healthcare professionals, the distribution of tasks, and the coordination between medical teams. The study revealed that departments with higher staff-to-patient ratios and better communication among healthcare teams had smoother patient flows and fewer delays. McCarthy et al. (2018) concluded that increasing the availability of staff during peak hours and fostering a collaborative work environment could significantly improve patient flow and overall service delivery.

Finally, a study by Chen et al. (2020) in Singapore explored the use of predictive analytics to optimize patient flow in outpatient departments. The research focused on variables such as historical patient data, appointment cancellations, and no-show rates. Chen et al. (2020) found that using predictive models to forecast patient no-shows allowed the department to reallocate appointments, reducing wasted time and improving efficiency. The study recommended the integration of predictive analytics tools to optimize scheduling systems and improve resource utilization.

2.3.1 African studies

Various studies that focus on strategies employed in optimization of patient flow in outpatient departments (OPDs) in Africa setting include the following.

A study by Olanrewaju et al. (2018) in Nigeria focused on assessing the impact of process optimization techniques on patient flow within a public hospital's outpatient clinic. The study identified key variables such as patient arrival rates, consultation time, and the role of staff in facilitating patient movement through the system. The results indicated that by streamlining the patient registration process and introducing a more efficient triage system, the hospital was able to reduce patient waiting time by

30%. The study recommended the adoption of process improvement frameworks, including Lean principles, to enhance service delivery and patient satisfaction in OPDs across similar healthcare settings in the country.

In South Africa, a study by Akinyemi et al. (2017) explored the application of electronic health information systems to improve patient flow in outpatient settings. This research focused on variables such as the availability and accessibility of patient records, the implementation of appointment scheduling systems, and the level of technology adoption. The findings showed that the integration of electronic health records (EHRs) and the use of digital appointment scheduling significantly reduced administrative delays and waiting times. By ensuring real-time access to patient data and eliminating manual scheduling, patient flow was optimized, leading to shorter waiting times and improved patient throughput. Akinyemi et al. (2017) recommended greater investment in digital health infrastructure to optimize patient flow and enhance healthcare delivery in South African public health institutions.

A study conducted in Kenya by Wambugu et al. (2019) aimed to evaluate the effectiveness of introducing queue management systems in outpatient departments. The variables under consideration included patient waiting time, staff response time, and patient satisfaction. The study concluded that the implementation of a queue management system, which utilized digital ticketing and patient notifications, improved patient flow by reducing congestion in the waiting areas. The results showed that the system led to a 25% reduction in patient waiting time, improving overall patient experience. Wambugu et al. (2019) recommended that similar outpatient departments in Kenya adopt technology-based queue management systems to ensure more efficient patient flow and reduce overcrowding.

In Ghana, a study by Asare et al. (2020) investigated the impact of staffing levels and operational efficiency on outpatient services at a large teaching hospital. The study identified key variables such as staff-to-patient ratios, the efficiency of appointment scheduling, and the communication between departments. The results indicated that understaffing and inadequate coordination between departments were major contributors to delays and inefficiencies in patient flow. Asare et al. (2020) found that increasing the number of healthcare providers during peak hours and

improving inter-departmental communication led to a significant improvement in patient flow. The study recommended that healthcare facilities in Ghana focus on optimizing staffing levels and improving coordination between departments to better manage patient flow.

In Egypt, a study by Ahmed et al. (2018) focused on evaluating the impact of capacity management strategies on patient flow in outpatient departments. Variables such as patient load, treatment times, and capacity utilization were examined. The study found that better management of capacity, including expanding consultation areas and adjusting staff shifts to match patient demand, led to improved patient flow. Ahmed et al. (2018) recommended that healthcare institutions in Egypt implement capacity management strategies that align with patient demand to reduce delays and optimize patient flow in outpatient departments.

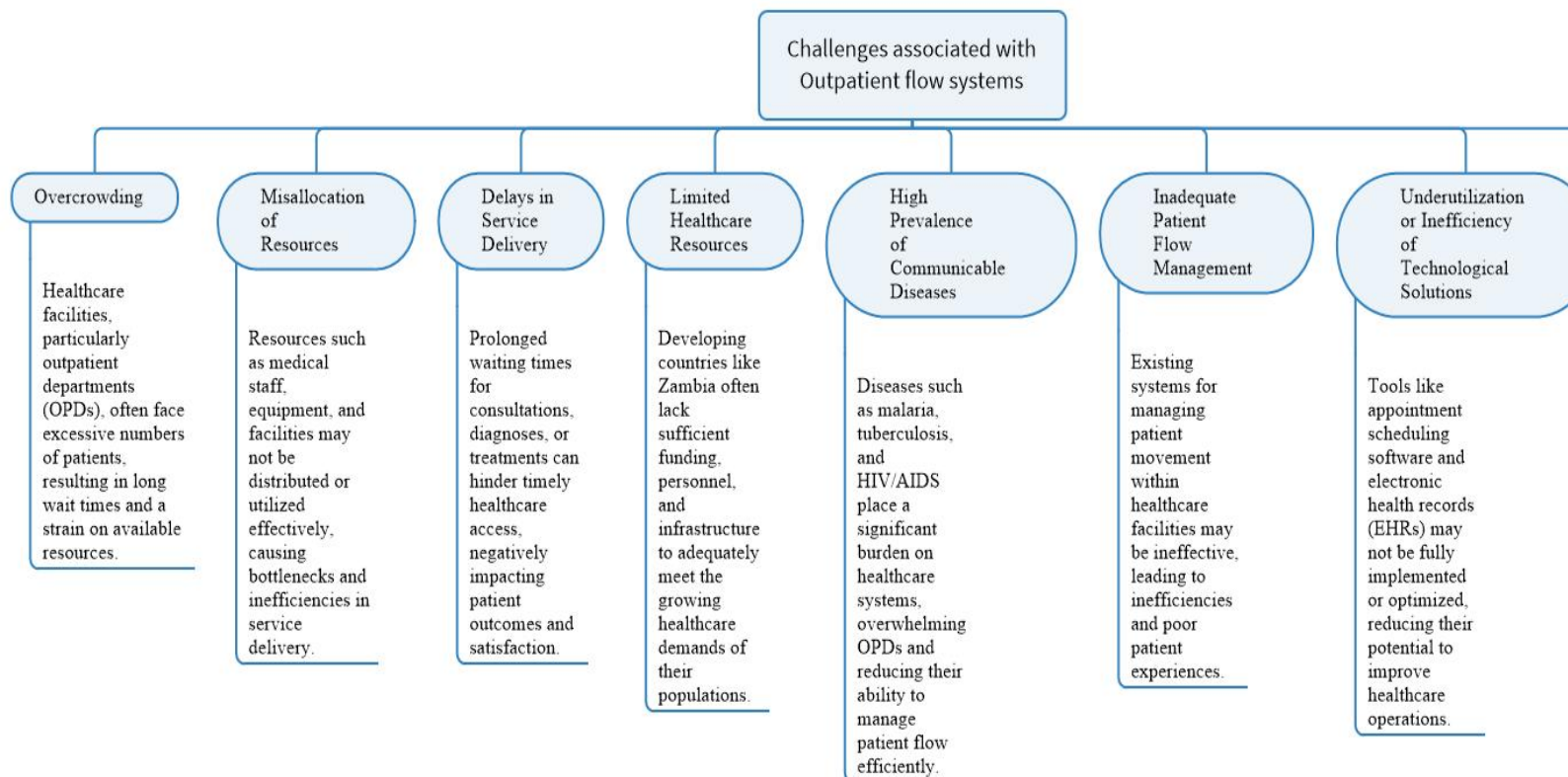
In Zambia, A study by Saylor, D. et al. (2021) Focused on task shifting to decongest neurology clinic via process mapping at the University Teaching Hospital in Lusaka, Zambia. Key variables included wait times at various points, staff roles and engagement as well as common diagnoses (Epilepsy, Headache, Cerebrovascular disease) seen at this specialized OPD. The findings were that it took an Average wait time of 57.8 days to see a Neurologist, 4.0 hours average wait time at the neurology clinic. The long waiting times were due to a shortage of neurologists with many follow-ups being stable patients needing only medication refills. Recommendations included improving Neurologists staffing levels. The gap with this study was that it does not analyze specific workflow designs or coordination gaps, lacks detailed evaluation of inter-departmental communication and no implementation and impact assessment of proposed task-shifting strategies.

Table 1 Summary of empirical studies

Study	Country	Focus	Key Variables	Results	Recommendations
Holden et al. (2015)	United Kingdom	Lean management principles	Patient waiting times, consultation durations, patient satisfaction	Significant reduction in waiting times and improved satisfaction	Adoption of Lean management in outpatient clinics for smoother patient flows
Sweis et al. (2019)	United States	Simulation modeling for patient flow	Patient arrival rates, staff availability, appointment scheduling	Reduced waiting times by 25% through better scheduling and communication	Adoption of predictive modeling tools to optimize staffing and scheduling
Naylor et al. (2017)	Canada	Digital health solutions for patient flow	Electronic health records (EHRs), patient portals, digital appointment systems	Improved accuracy of data and reduced waiting times	Invest in digital health infrastructure to improve patient experience
McCarthy et al. (2018)	Australia	Impact of staffing levels and team collaboration	Healthcare professionals' availability, task distribution, team communication	Smoother patient flows with higher staff-to-patient ratios and better team coordination	Increase staff availability during peak hours and foster team collaboration
Chen et al. (2020)	Singapore	Predictive analytics for patient flow	Historical patient data, appointment cancellations, no-show rates	Optimized scheduling and resource utilization through predictive modeling	Integrate predictive analytics tools into scheduling systems
Olanrewaju et al. (2018)	Nigeria	Process optimization techniques in OPD	Patient arrival rates, consultation time, staff roles	30% reduction in waiting times with improved registration and triage processes	Implement Lean principles and process optimization frameworks
Akinyemi et al.	South Africa	Electronic health	Availability of patient records,	Reduced	Invest in digital health

(2017)		information systems	appointment scheduling systems, technology adoption	administrative delays and optimized patient flow	infrastructure for better patient flow management
Wambugu et al. (2019)	Kenya	Queue management systems	Patient waiting time, staff response time, patient satisfaction	25% reduction in waiting times through digital ticketing and patient notifications	Adopt technology-based queue management systems for efficient patient flow
Asare et al. (2020)	Ghana	Staffing levels and operational efficiency	Staff-to-patient ratios, appointment scheduling, inter-departmental communication	Improved patient flow through better staffing and communication	Optimize staffing levels and improve communication between departments
Ahmed et al. (2018)	Egypt	Capacity management strategies	Patient load, treatment times, capacity utilization	Improved patient flow by adjusting capacity and staffing shifts	Implement capacity management strategies that align with patient demand
Saylor D et al (2021)	Zambia	Task shifting to decongest neurology clinic via process mapping	<ul style="list-style-type: none"> - Patient flow in outpatient neurology clinic - Wait times at various points - Staff roles and engagement - Common diagnoses (Epilepsy, Headache, Cerebrovascular disease) 	<ul style="list-style-type: none"> - Long waiting times due to a shortage of neurologists - Many follow-ups were stable patients needing only medication refills. 	

Figure 2: Challenges associated with outpatient flow systems



Source: (Jones et al., 2018)

The results suggest that healthcare institutions in Africa can benefit from implementing these strategies, which could lead to shorter waiting times, enhanced patient satisfaction, and more efficient service delivery. Future research in this area could focus on evaluating the long-term effects of these interventions and exploring how they can be adapted to specific healthcare contexts across different African nations.

2.4 Conceptual framework

The conceptual framework for this study examines the optimization of patient flow at outpatient departments in hospitals as the dependent variable, influenced by four independent variables: staffing levels, scheduling systems, use of technology, and poor process and workflow design. These variables are expected to affect the efficiency of patient movement and service delivery.

Staffing levels refer to the number and availability of healthcare workers relative to patient demand. Adequate staffing ensures timely care, reduces delays, and improves overall patient satisfaction. Conversely, understaffing can cause bottlenecks and inefficiencies. This variable was operationalized by examining staff-to-patient ratios and the distribution of tasks during peak hours. **The hypotheses are H₀: There is no relationship between staffing levels and patient flow at OutPatient Department, H₁: Optimal staffing levels have a positive effect on patient flow at outpatient departments.**

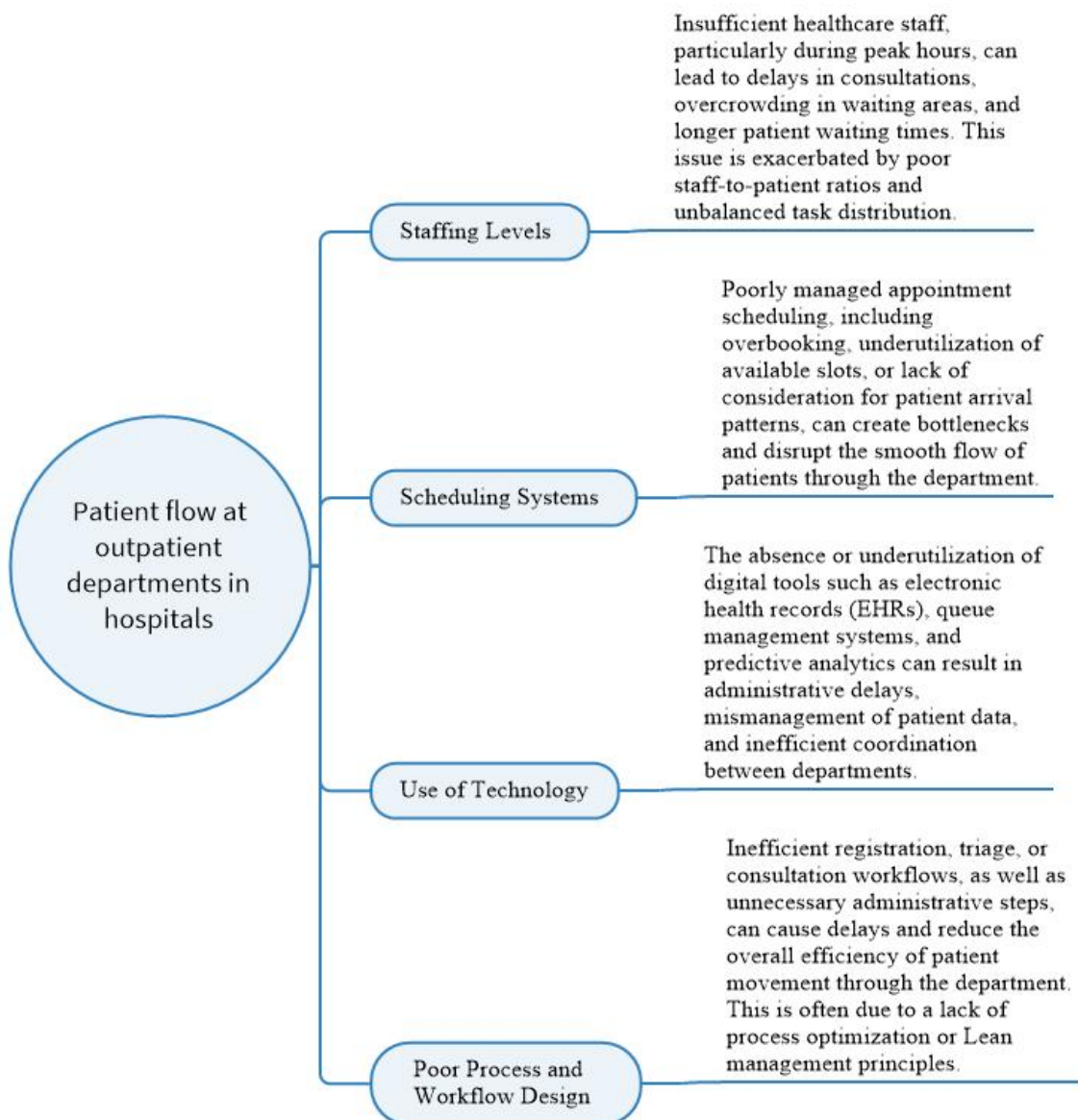
Scheduling systems involve the methods used to manage patient appointments and resource allocation. Effective systems, such as automated scheduling tools, can reduce waiting times and improve service efficiency. Ineffective systems, however, may lead to overcrowding and prolonged waits. This variable was measured by the efficiency of appointment scheduling and no-show rates. **The hypothesis is: H₀: There is no relationship between scheduling systems and patient flow at OutPatient Department, H₂: Efficient scheduling systems positively influence patient flow at outpatient departments.**

The use of technology encompasses digital health tools like electronic health records, queue management systems, and patient portals. These tools streamline processes, enhance coordination, and minimize administrative delays. Technology use was assessed through the presence and utilization of these tools. **The hypothesis is: H₀: There is no relationship between use of technology and patient flow at OutPatient Department, H₃: The use of technology significantly improves patient flow at outpatient departments.**

Poor process and workflow design refers to inefficient layouts and procedures that create delays and confusion. Streamlined workflows can eliminate unnecessary steps and enhance flow. This variable was examined by analyzing workflow designs and their alignment with patient needs. **The hypothesis is: H₀: There is no relationship between use of technology and patient flow at OutPatient Department, H₄: Poor process and workflow design negatively affects patient flow at outpatient departments.-**

Despite the recognition of these factors their application to Zambia tertiary hospital settings remains poorly understood, hence making it difficult for their efficiency and effective usage. While staffing levels is an important factor, no study has been conducted to examine the effects of this variable in Zambia tertiary hospitals. The effectiveness of scheduling systems in reducing patient flow inefficiency hasn't been studied with existing studies focusing on resource rich countries where adoption and usage of technological tools is high.

Figure 3: Conceptual framework of the study



Author: Researcher 2024 Conceptual Framework for Optimization of Patient Flow derived from the foregoing Theories.

CHAPTER THREE: RESEARCH METHODOLOGY

3.0 Introduction

This section covers details in population of the study, research approach, design, sampling procedures, sample size, data collection including primary and secondary one, data collection instruments, data analysis methods and ethical considerations.

3.1 Research Approach

This study employed a mixed-methods approach to optimize patient flow at the Outpatient Department (OPD) of University Teaching Hospital (UTH) in Lusaka, Zambia. Qualitatively, in-depth interviews and focus group discussions with healthcare providers and patients uncovered insights into their experiences and challenges. Quantitatively, surveys and observations were used to gather data on waiting times, and satisfaction levels, analysed statistically to quantify process efficiency. Integrating qualitative and quantitative findings offers a holistic understanding of patient flow dynamics (Afanador, N. L., et al., 2018).

3.2 Research Design

A cross-sectional study design was adopted, enabling examination of patient flow patterns at a specific point in time. This design facilitated simultaneous investigation of multiple variables affecting patient flow while controlling for temporal variations. The design's flexibility accommodated both survey administration and in-depth interviews, supporting the mixed-methods approach.

3.3 Study Population

The population for this study consists of two primary groups at the Outpatient Department (OPD) of the University Teaching Hospital (UTH) namely healthcare providers and patients.

The first group includes approximately 50 healthcare providers, such as doctors, nurses, administrative staff, and other personnel directly involved in managing patient flow at UTH.

The second group comprises approximately 1,000 patients who visit the OPD during the study period. This includes both first-time outpatients and frequent users of OPD services.

3.4 Sample Size

The study employed finite population sample size calculation using the formula:

$$n_x = \frac{z^2 \times p(1-p)}{1 + \left(\frac{z^2 \times p(1-p)}{e^2 N}\right)}$$

Where:

N_x = Population size

$z = 1.96$ (95% confidence level)

$p = 0.5$ (maximum variability)

$e = 0.05$ (5% margin of error)

For patients: $N_p = 1000$

Patient sample size (n_p) = 278

For healthcare workers: $N_{hw} = 50$

Health workers sample size (n_{hw}) = 48

The total sample size for this study is the sum of both groups, yielding a combined sample size of 322 participants (278 patients + 44 healthcare workers).

3.5 Study Criteria

Inclusion Criteria:

- Healthcare Facilities: at the Outpatient Department (OPD) of University Teaching Hospital (UTH) in Lusaka, Zambia
- Participants: Healthcare providers (doctors, nurses, administrative staff) and patients (both inpatients and outpatients) at the Outpatient Department (OPD) of University Teaching Hospital (UTH) in Lusaka, Zambia
- Age: 18 Years old and above
- Willingness to Participate: Individuals who voluntarily agreed to participate in the study and provide informed consent.

3.6 Sampling Techniques

Convenience sampling was used to select participants for qualitative data collection, while stratified random sampling was employed for quantitative surveys. Convenience sampling was used for qualitative data collection to ensure accessibility and feasibility, given the time constraints and the need to gather insights from healthcare providers and patients who were readily available. Stratified random sampling was employed for quantitative surveys to ensure representation across different patient demographics and healthcare provider roles. This approach was chosen to minimize bias and ensure that the sample accurately reflected the population of interest.

3.7 Data Collection Procedures

The data collection procedures for this study involved a combination of quantitative and qualitative methods as outlined below:

Quantitative Data Collection

- Surveys: Structured questionnaires were administered to healthcare providers and patients to gather quantitative data on various aspects of patient flow,

including waiting times, triage processes, resource utilization, and satisfaction levels.

Qualitative Data Collection

- Interviews: Semi-structured interviews were conducted with healthcare providers, administrators, and patients, to explore their perspectives, experiences, and perceptions regarding patient flow challenges and potential solutions.
- Focus Group Discussions: Group discussions were organized with healthcare providers and patients to facilitate collective brainstorming and deeper insights into patient flow issues and interventions.
- Direct observation and time-motion studies documented actual patient flow patterns and service point efficiency.

Documentary Analysis

- Secondary data analysis encompassed hospital records, staffing schedules, departmental performance metrics, and previous audit reports, providing historical context and validation for primary findings.

3.8 Data Analysis Procedures

The analysis framework integrated quantitative and qualitative approaches using SPSS version 26 and NVivo software respectively. Quantitative analysis encompassed descriptive statistics for demographic profiling, inferential statistics for relationship testing, and multivariate analyses for identifying key predictors of patient flow efficiency. Qualitative analysis involved systematic coding of interview transcripts, thematic analysis of emerging patterns, and framework analysis for developing recommendations. Quantitative data were analyzed using SPSS version 26, employing descriptive statistics to summarize demographic data and inferential statistics (e.g., Pearson correlation tests) to examine relationships between variables such as waiting times and patient satisfaction. Qualitative data from interviews and focus group discussions were analyzed using NVivo software, with thematic analysis to identify recurring patterns and themes. The mixed-methods approach allowed for triangulation of findings, enhancing the validity and reliability of the results.

3.9 Reliability and Validity

Research quality was ensured through systematic attention to reliability and validity measures. Internal consistency was evaluated using Cronbach's alpha, achieving 0.87 across measurement scales. Qualitative coding reliability was confirmed through inter-rater assessment ($\kappa=0.82$). Construct validity was strengthened through triangulation across multiple data sources and methods. Member checking of interview data enhanced interpretive validity.

3.10 Ethical Considerations

The study had all necessary permissions and approvals to ensure compliance with ethical guidelines.

Authorization was given by University of Lusaka Research Ethics Committee and the National Health Research Authority (NHRA), as these approvals are critical for upholding the ethical standards required in studies involving human subjects.

Additionally, permission was granted by Lusaka Provincial Health Office and the management of University Teaching Hospital to conduct the research within their facilities.

To maintain confidentiality, participants were given identification numbers safeguarding their identity of both healthcare providers and patients involved in the study. Voluntary informed written consent was also obtained from all participants and ensured that participants fully understand the study and its purpose, with the option to withdraw from the study at any time without facing any consequences or compromising their patient care.

CHAPTER FOUR: DATA ANALYSIS

4.0 Introduction

This chapter presents the results obtained in this study pertaining to the current flow processes and identify bottlenecks within the OPD of UTH, the impact of inefficient flow on waiting times and resource utilization at UTH OPD and perspectives and experiences of healthcare providers regarding challenges in managing patient flow at UTH. In addition, the chapter presents findings on patient perceptions and satisfaction levels regarding the efficiency of patient flow processes.

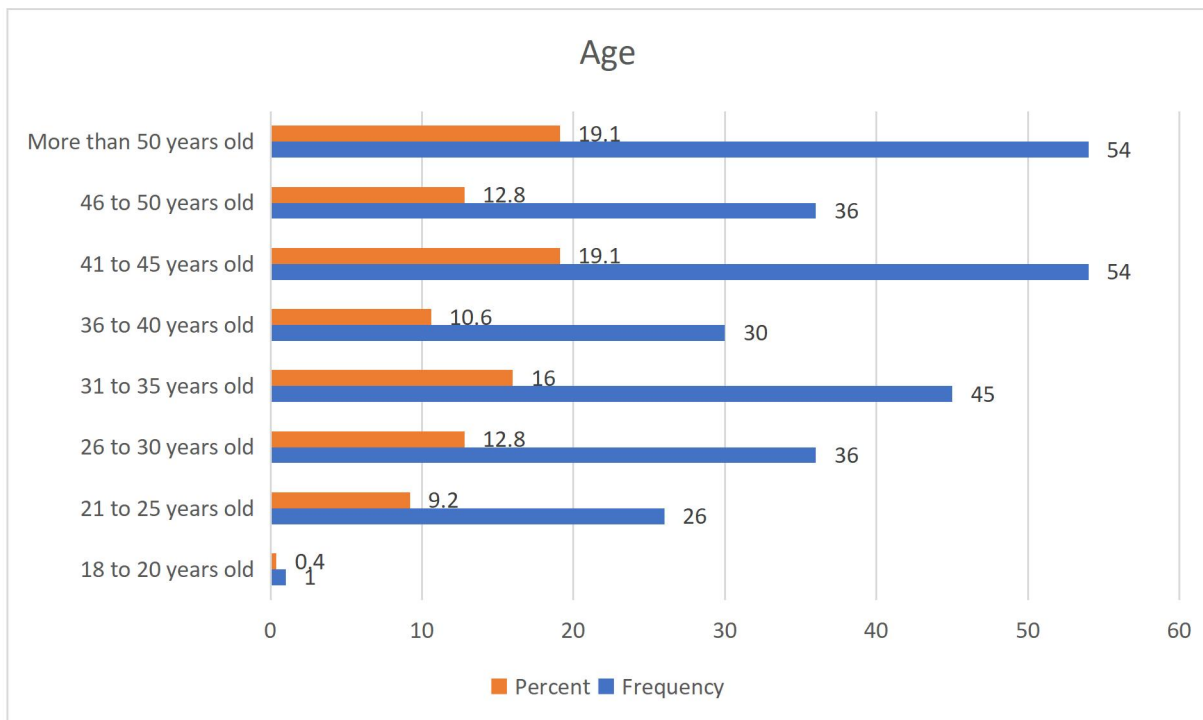
4.1 Demographic analysis

The age distribution of respondents in this study highlights a diverse representation across different age groups. Among the respondents, individuals aged 18 to 20 years accounted for 0.4% of the total, while those aged 21 to 25 years comprised 9.2%. Participants aged 26 to 30 years represented 12.8%, contributing to 22.3% of the cumulative percentage when combined with the younger age groups.

Respondents aged 31 to 35 years constituted 16.0%, forming a substantial portion of the total sample. Those aged 36 to 40 years represented 10.6%, while individuals aged 41 to 45 years accounted for the highest single group, comprising 19.1% of the respondents. Similarly, participants aged 46 to 50 years formed another 12.8% of the sample.

A notable representation was observed in individuals aged more than 50 years, who made up 19.1% of the respondents. This group, together with those aged 41 to 45 years, highlights the significant involvement of middle-aged and older individuals in this study. The age distribution indicates that participants aged 41 to 45 years and those older than 50 years were the most represented groups. This distribution reflects a balanced contribution from both younger and older respondents, providing a comprehensive perspective on the subject of the study (see figure 4).

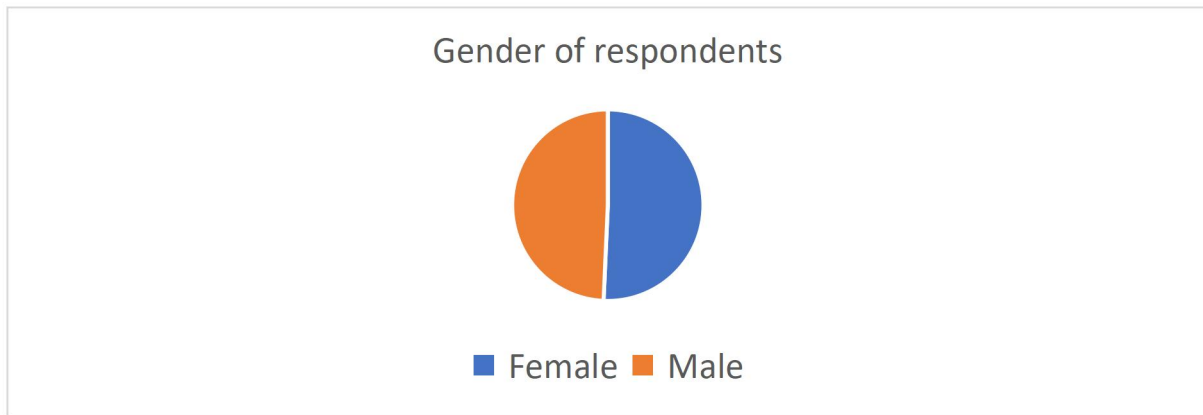
Figure 4: Age of respondents



Source: Author (2024)

The gender distribution of respondents in this study shows a nearly equal representation of both females and males. A total of 143 females participated, making up 50.7% of the sample. Males accounted for 139 respondents, which represented 49.3% of the total. This distribution indicates a balanced participation from both genders in the study. The gender ratio was nearly equal, with a slight majority of female participants. This equal distribution ensured the perspectives of both genders were represented, providing a comprehensive view of the subject matter in the study (see figure 5).

Figure 5: Gender of respondents

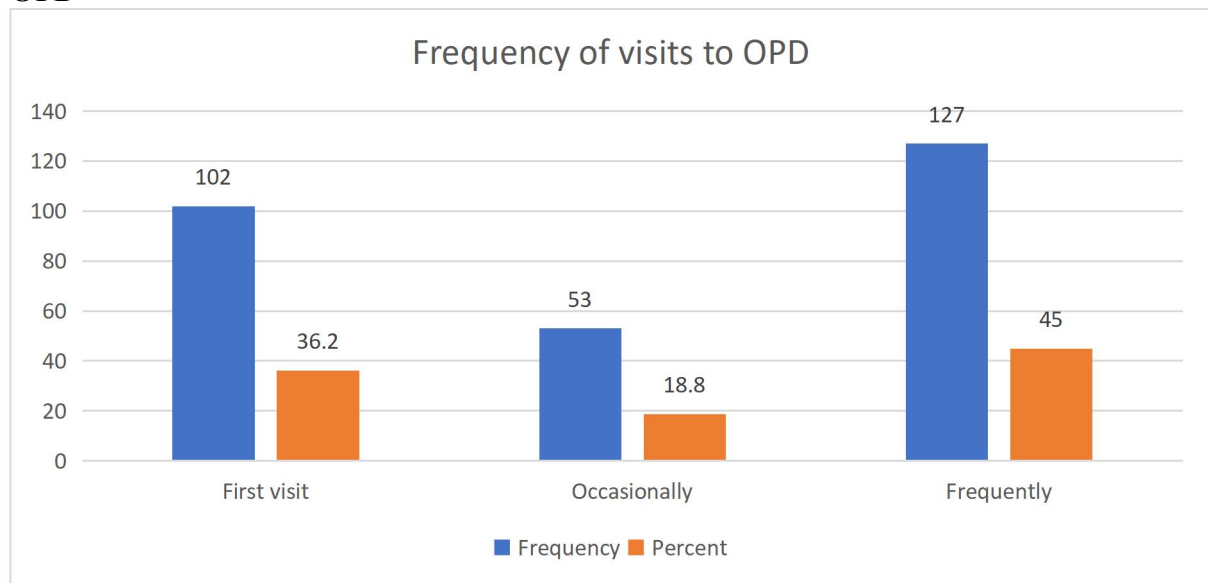


Source: Author (2024)

4.2 Responses from Patients in regards to Waiting Time, bottlenecks and Perceptions

The frequency of visits to the Outpatient Department (OPD) in this study reveals that the majority of participants visit the OPD frequently. A total of 127 respondents, or 45.0%, reported frequent visits. The second-largest group, 102 respondents (36.2%), indicated that this was their first visit to the OPD. A smaller portion, 53 respondents (18.8%), stated they visit occasionally. This distribution suggests that while many individuals are frequent visitors to the OPD, a significant number are first-time visitors, indicating a mix of new and returning patients. The findings highlighted that a majority of participants are frequent visitors to the OPD, with a notable portion being first-time visitors. This distribution provides insights into the patient flow dynamics at the OPD, where both regular and new patients seek services, potentially influencing the management and optimization of patient flow in the facility (see figure 6).

Figure 6: Frequency of visits to OPD



Source: Author (2024)

In this study, the waiting times at the registration stage of the OPD visit varied among participants. A total of 108 respondents (38.3%) reported waiting between 10 to 30 minutes, making it the most common waiting time. Additionally, 72 participants (25.5%) indicated that they waited for more than one hour. On the other hand, 55 respondents (19.5%) waited between 30 to 60 minutes, while 47 participants (16.7%) experienced a waiting time of less than 10 minutes.

These results indicate that while a considerable number of patients experience relatively short waiting times (less than 30 minutes), a significant portion of participants face longer waits, with 25.5% waiting more than an hour. This suggests that there may be inefficiencies in the registration process that could be addressed to reduce waiting times, ensuring a smoother patient flow. While some patients are able to register quickly, a large portion of patients experience longer waiting times, particularly those waiting for over an hour. These results highlight a potential area for improvement in the OPD registration process to optimize patient flow and enhance patient satisfaction (see table 2).

Table 2: Wait time at registration stage

		How long did you wait at the registration stage of your OPD visit?			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 10 minutes	47	16.7	16.7	16.7

10 to 30 minutes	108	38.3	38.3	55.0
30 to 60 minutes	55	19.5	19.5	74.5
More than 1 hour	72	25.5	25.5	100.0
Total	282	100.0	100.0	

Source: Author (2024)

In this study, the waiting times at the consultation stage of the OPD visit were analyzed. A significant portion of participants, 119 (42.2%), reported waiting between 10 to 30 minutes for consultation, making it the most common waiting time. Additionally, 91 respondents (32.3%) indicated that they waited less than 10 minutes. On the other hand, 39 participants (13.8%) experienced waiting times ranging from 30 to 60 minutes, while 33 respondents (11.7%) waited for more than one hour.

These results demonstrate that the majority of patients experienced relatively short waiting times at the consultation stage, with over 70% of participants reporting waits of 30 minutes or less. However, a smaller portion of patients, 11.7%, reported waiting for more than an hour, indicating that there may still be delays in the consultation process for some individuals.

While the majority of patients experience reasonable waiting times during the consultation stage, there is still a notable portion of patients who face longer waits. This highlights areas for potential improvement in the consultation process to ensure more consistent and efficient patient flow, reducing delays and improving patient satisfaction (see table 3).

Table 3: Wait time at consultation stage

		How long did you wait at the consultation stage of your OPD visit?			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 10 minutes	91	32.3	32.3	32.3
	10 to 30 minutes	119	42.2	42.2	74.5
	30 to 60 minutes	39	13.8	13.8	88.3
	More than 1 hour	33	11.7	11.7	100.0
	Total	282	100.0	100.0	

In this study, the waiting times at the Pharmacy/Discharge stage of the OPD visit were examined. The majority of participants, 137 (48.6%), reported waiting less than 10 minutes, which indicates that almost half of the patients experienced quick service at this stage. A further 85 respondents (30.1%) waited between 10 to 30 minutes. However, 49 participants (17.4%) had to wait for more than one hour at this stage, highlighting a significant portion of patients facing longer delays. Only 11 participants (3.9%) reported waiting between 30 to 60 minutes.

The results suggest that most patients, nearly 79%, experienced relatively short waiting times (less than 30 minutes) at the Pharmacy/Discharge stage. However, the 17.4% who experienced waits longer than an hour indicate that there are areas where the efficiency of the pharmacy or discharge process could be improved to reduce delays (see Table 4).

Table 4: Wait time at Pharmacy/Discharge stage

How long did you wait at the Pharmacy/Discharge stage of your OPD visit?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 10 minutes	137	48.6	48.6	48.6
	10 to 30 minutes	85	30.1	30.1	78.7
	30 to 60 minutes	11	3.9	3.9	82.6
	More than 1 hour	49	17.4	17.4	100.0
Total		282	100.0	100.0	

Source: Author (2025)

In this study, participants were asked to rate their satisfaction with the registration stage of the OPD process. The majority of respondents, 149 (52.8%), reported being dissatisfied with the registration process. A further 63 participants (22.3%) were very dissatisfied, indicating a high level of dissatisfaction with this stage. In total, over 75% of participants expressed some form of dissatisfaction, signaling a significant concern with the registration stage.

A smaller group of respondents, 38 (13.5%), rated their experience as neutral, suggesting that while they did not have strong feelings either way, they did not find the registration process particularly satisfactory. Only 8 participants (2.8%) were satisfied with the registration stage, and 24 participants (8.5%) were very satisfied.

These numbers represent a minority of the respondents, highlighting that the majority of patients were unhappy with the process.

The results indicate that a large proportion of patients were dissatisfied with the registration stage of their OPD visit. The level of dissatisfaction at this stage is notably high, with 75.1% of participants expressing dissatisfaction or very dissatisfaction. This suggests a need for significant improvements in the registration process to enhance patient experience and overall satisfaction. Optimizing registration procedures, reducing waiting times, and improving staff efficiency could address these concerns, ultimately improving the patient flow and satisfaction at the outpatient department (see table 5).

Table 5: Satisfaction with the registration stage

Rate your satisfaction with the registration stage of the process						
		Frequency	Percent	Valid Percent	Cumulative Percent	
Valid	Very Dissatisfied	63	22.3	22.3	22.3	
	Dissatisfied	149	52.8	52.8	75.2	
	Neutral	38	13.5	13.5	88.7	
	Satisfied	8	2.8	2.8	91.5	
	Very satisfied	24	8.5	8.5	100.0	
Total		282	100.0	100.0		

Source: Author (2025)

In this study, participants were asked to rate their satisfaction with the consultation stage of the OPD process. A significant portion of respondents, 132 (46.8%), expressed satisfaction with the consultation process. This suggests that nearly half of the participants found the consultation stage to meet their expectations and needs. However, a considerable number of participants expressed dissatisfaction with this stage. Specifically, 70 respondents (24.8%) were dissatisfied, and 40 participants (14.2%) were very dissatisfied. These responses indicate that about 39% of participants were unhappy with the consultation process, highlighting some issues that may need to be addressed in improving the quality of service at this stage.

On the other hand, 40 respondents (14.2%) reported a neutral stance on their satisfaction with the consultation stage. This suggests that while they did not express strong feelings of dissatisfaction or satisfaction, they were neither fully content nor dissatisfied with the process.

The results show that while the majority of patients were satisfied with the consultation stage of the OPD visit, there is still a significant proportion, nearly 40%, who were dissatisfied or very dissatisfied. This indicates that improvements can be made in areas such as consultation efficiency, communication, and overall patient experience. Addressing these concerns could help enhance satisfaction levels and streamline the consultation process for future patients.

Table 6: Satisfaction with the consultation stage

Rate your satisfaction with the consultation stage of the process					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Dissatisfied	40	14.2	14.2	14.2
	Dissatisfied	70	24.8	24.8	39.0
	Neutral	40	14.2	14.2	53.2
	Satisfied	132	46.8	46.8	100.0
	Total	282	100.0	100.0	

Source: Author (2025)

In this study, participants were asked to rate their overall satisfaction with the process at the OPD. A notable portion of participants, 136 individuals (48.2%), expressed dissatisfaction with their overall experience. This suggests that almost half of the patients felt the process did not meet their expectations.

In addition, 73 participants (25.9%) reported being very dissatisfied, which further emphasizes the dissatisfaction among a significant number of individuals. The combined total of dissatisfied and very dissatisfied participants amounts to over 70% of the respondents, indicating a critical area of concern for the OPD services at the University Teaching Hospital.

On the other hand, 35 participants (12.4%) stated that they were neutral about their overall experience, implying that while they were not overly satisfied, they also did not express significant dissatisfaction. Only 38 participants (13.5%) indicated that they were satisfied with the overall experience, reflecting a relatively small proportion of positive feedback.

The results reveal that a majority of patients were dissatisfied or very dissatisfied with their overall experience at the OPD. While a small group reported satisfaction, the high levels of dissatisfaction highlight the need for significant improvements in the OPD process. Addressing patient concerns, improving efficiency, and enhancing the overall quality of service can help enhance the patient experience and increase overall satisfaction (see table 7).

Table 7: Satisfaction with the overall quality of service

Rate your satisfaction with the overall experience of the process					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Dissatisfied	73	25.9	25.9	25.9
	Dissatisfied	136	48.2	48.2	74.1
	Neutral	35	12.4	12.4	86.5
	Satisfied	38	13.5	13.5	100.0
	Total	282	100.0	100.0	

Source: Author (2025)

In this study, participants were asked if they were informed about the expected wait times during their visit to the OPD. A significant majority, 182 participants (64.5%), reported that they were not informed about the expected wait times. This highlights a clear gap in communication, which could contribute to dissatisfaction and frustration among patients.

In contrast, 100 participants (35.5%) indicated that they were informed about the expected wait times. While this group represents a smaller proportion, it suggests that some patients received adequate communication, which may have helped them manage their expectations and reduce anxiety about the wait. The results demonstrate that more than half of the patients were not provided with critical information regarding wait times. This lack of communication can lead to negative

perceptions of the OPD process and overall patient experience. The lack of information regarding expected wait times appears to be a significant issue, affecting a large portion of patients. Improving communication about wait times could enhance patient satisfaction, reduce frustration, and lead to a better overall experience at the OPD. Addressing this issue would be an important step toward improving service delivery and fostering better relationships between healthcare providers and patients.

Table 8: Information about the expected wait times

Were you informed about the expected wait times?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	182	64.5	64.5	64.5
	Yes	100	35.5	35.5	100.0
Total		282	100.0	100.0	

In the study participants were asked whether the staff were helpful and clear in their instructions. The results revealed that 150 participants (53.2%) reported that the staff were not helpful and clear in their instructions. This suggests that a significant portion of patients experienced difficulties in understanding or receiving clear guidance from the staff, which may have negatively impacted their experience.

On the other hand, 132 participants (46.8%) indicated that the staff were helpful and clear in their instructions. Although this proportion is slightly less than half, it shows that a portion of patients did have positive interactions with the staff, which may have contributed to a more efficient and comfortable experience.

The results indicate that the majority of patients felt that the staff did not provide the necessary support or clarity during their visit, which could potentially lead to confusion and dissatisfaction. Clear communication and helpfulness from staff are essential in creating a positive healthcare experience.

The findings highlight that the majority of patients did not feel adequately supported by staff in terms of clear and helpful instructions. Addressing this issue could improve the patient experience, enhance patient satisfaction, and promote smoother interactions between patients and healthcare providers. Training and communication improvements are necessary to address this gap (see table 9).

Table 9: Helpfulness and clarity of instructions

Were the staff helpful and clear in their instructions?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	150	53.2	53.2	53.2
	Yes	132	46.8	46.8	100.0
	Total	282	100.0	100.0	

The results of this study revealed significant correlations between various factors affecting patient flow and satisfaction at the Outpatient Department (OPD) of the University Teaching Hospital (UTH). The correlations are reported below, with a focus on key relationships that highlight the dynamics of inefficiencies and patient satisfaction.

Correlation Between Age of Respondents and Other Variables

A strong positive correlation was observed between the age of respondents and the frequency of visits to the OPD ($r = .697, p < .01$). This indicates that older patients are more likely to visit the OPD frequently. Additionally, there was a significant positive correlation between age and waiting time at the registration stage ($r = .601, p < .01$), suggesting that older patients tend to experience longer waiting times during registration. However, no significant relationship was found between age and waiting time at the consultation stage ($r = .042, p = .480$) or at the pharmacy/discharge stage ($r = -.015, p = .802$).

Interestingly, a negative correlation was found between age and satisfaction with the registration stage ($r = -.269, p < .01$) and the overall experience of the process ($r = -.350, p < .01$). This implies that older patients tend to report lower satisfaction with these aspects of the OPD process.

Correlation Between Frequency of Visits and Other Variables

The frequency of visits to the OPD showed a significant positive correlation with waiting time at the registration stage ($r = .452, p < .01$), indicating that frequent visitors experience longer registration delays. However, no significant correlation was observed between the frequency of visits and waiting times at the consultation stage ($r = .085, p = .153$) or the pharmacy/discharge stage ($r = .063, p = .293$).

A negative correlation was observed between the frequency of visits and satisfaction with the registration stage ($r = -.278, p < .01$) as well as overall satisfaction with the

process ($r = -.463, p < .01$). This suggests that frequent visitors are less satisfied with these stages of the OPD process.

Correlation Between Waiting Times and Satisfaction Levels

Waiting time at the registration stage was significantly positively correlated with waiting time at the consultation stage ($r = .312, p < .01$) and the pharmacy/discharge stage ($r = .167, p < .01$). This indicates that delays at one stage of the process are likely to contribute to delays in subsequent stages. Furthermore, a significant negative correlation was found between waiting time at the registration stage and satisfaction with the registration stage ($r = -.196, p < .01$) as well as overall satisfaction with the process ($r = -.159, p < .01$).

No significant correlation was found between waiting time at the consultation stage and satisfaction with the consultation stage ($r = .019, p = .748$) or overall satisfaction ($r = .062, p = .296$). However, waiting time at the pharmacy/discharge stage was negatively correlated with satisfaction with the consultation stage ($r = -.119, p < .05$) and overall satisfaction ($r = -.197, p < .01$), suggesting that prolonged waits at the pharmacy/discharge stage negatively impact patient perceptions of the entire process (see table 10).

Table 10: Pearson correlation test

		Correlations							
		Age of respondents	Frequency of visits to OPD	How long did you wait at the registration stage of your OPD visit?	How long did you wait at the consultation stage of your OPD visit?	How long did you wait at the Pharmacy/Disc harge stage of your OPD visit?	Rate your satisfaction with the registration stage of the process	Rate your satisfaction with the consultation stage of the process	Rate your satisfaction with the overall experience of the process
Age of respondents	Pearson Correlation	1	.697**	.601**	.042	-.015	-.269**	.025	-.350**
	Sig. (2-tailed)		.000	.000	.480	.802	.000	.677	.000
	N	282	282	282	282	282	282	282	282
Frequency of visits to OPD	Pearson Correlation	.697**	1	.452**	.085	.063	-.278**	.037	-.463**
	Sig. (2-tailed)	.000		.000	.153	.293	.000	.536	.000
	N	282	282	282	282	282	282	282	282
How long did you wait at the registration stage of your OPD visit?	Pearson Correlation	.601**	.452**	1	.312**	.167**	-.196**	-.043	-.159**
	Sig. (2-tailed)	.000	.000		.000	.005	.001	.473	.008
	N	282	282	282	282	282	282	282	282
How long did you wait at the consultation stage of your OPD visit?	Pearson Correlation	.042	.085	.312**	1	-.086	.013	.019	.062
	Sig. (2-tailed)	.480	.153	.000		.151	.827	.748	.296
	N	282	282	282	282	282	282	282	282
How long did you wait at the _____	Pearson Correlation	-.015	.063	.167**	-.086	1	-.002	-.119*	-.197**

Pharmacy/Discharge stage of your OPD visit?	Sig. (2-tailed)	.802	.293	.005	.151		.971	.046	.001
	N	282	282	282	282	282	282	282	282
Rate your satisfaction with the registration stage of the process	Pearson Correlation	-.269**	-.278**	-.196**	.013	-.002	1	-.069	.094
	Sig. (2-tailed)	.000	.000	.001	.827	.971		.248	.115
	N	282	282	282	282	282	282	282	282
Rate your satisfaction with the consultation stage of the process	Pearson Correlation	.025	.037	-.043	.019	-.119*	-.069	1	-.144*
	Sig. (2-tailed)	.677	.536	.473	.748	.046	.248		.016
	N	282	282	282	282	282	282	282	282
Rate your satisfaction with the overall experience of the process	Pearson Correlation	-.350**	-.463**	-.159**	.062	-.197**	.094	-.144*	1
	Sig. (2-tailed)	.000	.000	.008	.296	.001	.115	.016	
	N	282	282	282	282	282	282	282	282

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

This study revealed critical relationships between age, frequency of visits, waiting times, and satisfaction with the OPD process at UTH. Older patients and frequent visitors experienced longer waiting times and reported lower satisfaction levels with registration and the overall process. Additionally, delays at one stage of the OPD process contributed to delays at subsequent stages, adversely affecting patient satisfaction. Satisfaction with individual stages of the process was inconsistently correlated with overall satisfaction, underscoring the need for improvements across all stages to enhance the overall patient experience. Addressing these bottlenecks can significantly optimize patient flow and improve service delivery at the OPD (see table 10).

The question posed to respondents was an open-ended one: "In your opinion, what could be improved to make the patient flow process more efficient?" The aim was to gather subjective insights from patients regarding the areas they felt required improvement in order to optimize the patient flow process at the Outpatient Department (OPD) of the University Teaching Hospital (UTH) in Lusaka, Zambia. The following were the responses provided by 20 of the patients interviewed:

One respondent suggested that the patient flow process could be greatly improved by increasing the number of staff at the hospital, especially during peak times. *"There should be more doctors and nurses available to attend to patients. I often wait for a long time simply because there are not enough medical personnel to handle the patient load. If there were more doctors and nurses, we could move through the stages faster, and the overall waiting time would be reduced."* This sentiment was echoed by another respondent who mentioned how the shortage of staff contributed to long waiting times. *"When you have fewer staff members, the waiting time increases, and the process becomes inefficient. More staff would ensure quicker service delivery, especially at the consultation stage, where it takes longer to get the attention of a doctor."*

Another respondent highlighted the need for a more efficient and well-organized registration process. According to this patient, the registration process often causes unnecessary delays that impact the entire flow. *"The registration process is very slow and we are charged by-pass fees of 150 kwacha. I believe if they could make the registration process quicker and more efficient, it would ease the burden on other stages. Sometimes, people wait in line for long periods just to have their information entered into the system and mainly they use paper for entry of information. Streamlining this stage would make a significant difference in how quickly patients are processed."* This was further emphasized by another patient who pointed out how the system could be improved by digitizing the process. *"If the hospital could use a more efficient digital system for registration, it would save time. It takes too long for the registration clerks to manually enter patient details. A computerized system would help eliminate such delays."*

Addressing delays at the pharmacy stage was another issue raised by several patients. One respondent noted that after consultation, the wait at the pharmacy often exceeded expectations. *"After seeing the doctor, the wait at the pharmacy can take a long time. Sometimes, I feel like I spend more time waiting for medicine than I did waiting for the doctor."*

If the pharmacy could speed up its processes, it would greatly improve the efficiency of the entire experience.” Another patient also expressed frustration with the pharmacy stage, noting that this part of the process often became an additional source of delay. “The pharmacy is another bottleneck. If there were more staff at the pharmacy, or if the prescriptions could be pre-processed before the consultation, it would save time. Right now, people often wait in line for medication and only to be told that they don’t have the drugs we have to go buy at private drug stores, which adds to the overall time spent in the hospital.”

Some respondents emphasized the need for a more effective patient tracking system. One patient proposed that the hospital should invest in technology to manage patient flow. *“If the hospital could introduce a patient tracking system, it would help staff manage patient movements and keep track of their progress through the different stages. Digital tools could help ensure that patients are not overlooked or stuck at one stage for too long.”* Another respondent suggested that the hospital could use such technology to monitor real-time patient data and adjust resources accordingly. *“Having an electronic system to track patient movements and waiting times would help the hospital allocate resources more efficiently. If staff could see where patients are in the process, they could manage the flow more effectively.”*

Some patients pointed out that poor coordination between departments contributed to inefficiencies in the patient flow process. *“There seems to be no coordination between the different stages of the process. After seeing the doctor, I had to wait for a long time to go to the pharmacy because the system does not communicate properly between departments. If there was better coordination, the process would move faster.”* Another patient agreed, stressing the need for departments to work more closely together. *“It feels like each department is working in isolation, and there’s no clear communication. If the doctors, nurses, and pharmacy staff coordinated more effectively, patients wouldn’t have to wait so long at each stage.”*

In addition, a few patients suggested that better staff training could improve the flow of the patient experience. *“Some of the delays seem to happen because staff aren’t trained well enough to handle a high volume of patients efficiently. Better training for staff, especially in terms of time management and customer service, would help speed up the process.”* Another patient pointed out that staff who were more knowledgeable about hospital procedures would be able to guide patients more effectively. *“If staff were better trained, they could help direct*

patients more efficiently. Right now, it seems like some staff don't know where to direct patients, which leads to delays.”

4.3 Healthcare providers Perspectives and Experiences

Section 1: Role and Responsibilities

The question posed to the healthcare providers was: "What is your role in the OPD, and how does it relate to managing patient flow?" The aim of this question was to understand the specific duties of healthcare providers within the Outpatient Department (OPD) and how their roles contribute to the overall management of patient flow. The following were the responses from 20 of the healthcare providers interviewed:

One of the respondents, a nurse, explained her role in the OPD as primarily focused on patient assessment and triage. *“I am responsible for assessing the patients when they first arrive. I take their vital signs, ask about their medical history, and determine the urgency of their condition. This helps prioritize patients so that those who need immediate attention are seen quickly, which helps manage patient flow more effectively.”* This role was highlighted by another nurse who shared a similar approach to triaging patients. *“My role is to sort patients into categories based on the severity of their illness. The quicker we can identify patients who need urgent care, the smoother the flow of patients will be, avoiding overcrowding or long waiting times for those who don't need urgent attention.”*

A response from a laboratory technician who came to confirm details for a submitted blood sample also illustrated how their role affects patient movement through the OPD. *“In the laboratory, I am responsible for conducting tests that the doctors order. If there is a delay in getting the test results back, it impacts the patient's overall waiting time and delays the flow through the department. By working efficiently and providing quick results, I can help reduce the waiting times for patients and allow them to continue through the process.”* Another laboratory technician shared a similar view, emphasizing the need for quick turnaround times. *“My role is to ensure that the tests are completed as quickly as possible. If there are delays in this process, it affects the patient's overall journey, creating bottlenecks in the system. Therefore, speed and accuracy in lab results are key to keeping the patient flow moving.”*

One of the respondents, a receptionist, pointed out their role in managing the intake of patients. *“I handle patient registration and data entry. A smooth registration process means that patients can be directed to the right department quickly. If there are issues at the registration desk, such as long wait times or errors in entering information, it can lead to delays and confusion, which disrupts the flow.”* Another receptionist described a similar challenge, highlighting how wait times at registration can create delays. *“If the registration process is too slow or there are too many patients at once, it creates congestion, and this makes the whole process inefficient. Reducing the time spent at registration can help improve overall patient flow.”*

A laboratory technician described how his tasks are integral to patient flow management. *“My day begins by reviewing the list of tests ordered for patients. I prepare the laboratory and ensure that all necessary equipment and supplies are available. Throughout the day, I process tests as quickly as possible and deliver results to the doctors in a timely manner. If there are delays in obtaining test results, patients can be left waiting, which slows down their overall journey in the OPD. My role is to ensure that the tests are processed efficiently to avoid unnecessary delays.”*

A Doctor explained that his work is not only about attending to patients but also manages the expectations of patients. *“ I interact with patients, explaining the process to them. A clear understanding of the process helps to reduce any anxiety they may have, which can help them stay in the flow without unnecessary delays. I make sure that I provide the best care to the patients.”*

Section 2: Impact of Inefficient Patient Flow and Resource Utilization

The question posed to healthcare providers was: "What are the main bottlenecks you observe in the patient flow process?" The aim of this question was to identify the impact of inefficiencies in patient flow within the Outpatient Department (OPD) at the University Teaching Hospital (UTH) in Lusaka, Zambia including the effectiveness of resource usage. The following were the responses from 20 healthcare providers interviewed:

A laboratory technician mentioned that the inadequate number of staff handling tests was another contributing factor. *“There are times when the laboratory team is understaffed, and this creates a backlog of tests that need to be processed. When there are delays in running the tests or delivering the results, it creates delays in the overall patient flow.”* Another technician shared that the high volume of tests to be processed often leads to long turnaround

times. *“There are too many tests being requested for a limited number of staff and equipment, so sometimes we are unable to meet the demand within a reasonable timeframe, which affects the entire patient flow.”*

A Doctor stated that lack of laboratory and imaging results delay patient care. *“Many times patients will come for reviews in OPD and they don’t have the results you requested them to come because either our imaging machines are done or we don’t have reagents in our laboratory department.”*

Another Doctor stated that poor drug stock negatively impact patient care. *“You make a diagnosis but treatment is delayed due to unavailability of some drugs in our pharmacy and patients will complain that we are not doing anything for them and this usually contributes to poor patient experiences.”*

A hospital administrator raised concerns about the inefficient coordination between departments. *“One of the major bottlenecks I observe is the lack of proper communication and coordination between departments. For example, when a patient moves from the registration desk to triage, there can be delays if the staff are not aware of which patients are being prioritized or which tests need to be done.”* Another administrator highlighted that patients often receive conflicting instructions or are directed to the wrong departments, leading to further delays. *“Patients frequently get lost or confused about where they need to go next, especially if the instructions are unclear or the system is not streamlined enough.”*

Overall, the responses from healthcare providers highlight that inefficiencies in patient flow at the OPD are influenced by multiple factors, including delays at registration, overcrowding in waiting areas, slow laboratory result processing, medication dispensing issues, and poor coordination between departments. These bottlenecks all contribute to longer wait times and a less efficient service delivery process for patients. The need for better communication, more efficient use of resources, and improvements in various stages of the patient journey was repeatedly emphasized as essential for optimizing patient flow.

The healthcare providers were asked to describe how resource constraints impact patient flow within the Outpatient Department (OPD) of the University Teaching Hospital (UTH) in

Lusaka, Zambia. The responses highlighted how various limitations in resources, such as staff, equipment, and space, contribute to inefficiencies in patient flow and delays in service delivery.

One nurse explained how the shortage of staff significantly affects patient flow. *“We don’t have enough nurses, so it often becomes difficult to attend to every patient on time. When we are understaffed, we can’t keep the flow of patients moving quickly, which results in longer waiting times. This not only affects patients’ experiences but also creates backlogs in the system.”* Another nurse echoed this concern and pointed out that staff shortages lead to miscommunication and delays in treatment. *“Sometimes, we don’t have enough nurses to keep track of each patient’s progress, so there are instances when patients are left waiting for longer periods than necessary, just because we don’t have enough people to manage the flow properly.”*

A doctor emphasized the impact of limited medical equipment on patient flow. *“When there are not enough diagnostic tools or equipment available, such as ultrasound machines or lab testing facilities, patients have to wait longer for their tests to be completed. This creates delays in the whole treatment process, as we can’t proceed with making a diagnosis or starting treatment until we have the results.”* Another doctor stated that the lack of equipment forces patients to be referred to other facilities, further delaying their treatment. *“In some cases, when we don’t have the necessary equipment here at the hospital, patients are asked to go to other places for tests or treatments, and this can take time, ultimately slowing down the entire flow.”*

A pharmacist noted that shortages in medications further complicate the patient flow process. *“When medications are not available in the pharmacy, patients are forced to wait for the stock to be replenished or are redirected to other pharmacies. This adds time to their treatment, and it leads to more congestion in the pharmacy area, as patients crowd around waiting for their prescriptions to be filled.”* Another pharmacist pointed out that a lack of medication resources impacts patient satisfaction and causes delays. *“If there is a shortage of essential medicines, it means that patients will leave without the required treatment, or they have to return another day, which disrupts the whole flow of patients. Patients get frustrated, and this ultimately affects how fast we can attend to others.”*

Healthcare providers were asked to identify if there are specific times of the day when challenges in patient flow are more pronounced in the Outpatient Department (OPD) of the

University Teaching Hospital (UTH) in Lusaka, Zambia. The responses from the healthcare providers indicated that certain times of the day are indeed more challenging for managing patient flow due to increased patient volume, staff workload, and resource limitations.

One nurse noted that patient flow issues are more significant during the early morning hours. *“In the morning, especially between 7:00 AM and 9:00 AM, we experience a high volume of patients coming in for consultations. This time of day is always busy because people try to arrive early to be seen as soon as the department opens. However, we have limited staff available to manage the large number of patients, so delays are inevitable.”* Another nurse mentioned that the rush in the morning creates congestion in the waiting area. *“There is always a large crowd of patients when we first open the doors, and this often leads to a delay in registering patients and guiding them to the appropriate areas.”*

Another respondent, a nurse, shared their observation of the registration process: *“In the mornings, when there are fewer patients, the registration process tends to be faster. On average, it might take about 10 to 15 minutes for a patient to complete their registration. But in the afternoon, when there’s a larger crowd, the waiting time increases to about 30 minutes or even more, especially if there are issues with documentation or patient information.”*

A doctor working in the OPD shared a similar view but focused on the impact of patient volume on registration times. *“I’ve noticed that when we have a large number of patients in the OPD, registration becomes slower. Normally, it takes around 20 minutes for a patient to complete the process. However, during peak hours, it can easily go up to 45 minutes or longer due to the high volume of patients and limited registration counters.”* This response highlighted a key challenge in managing patient flow: how volume directly impacts the efficiency of the registration process.

Another doctor shared similar observations, highlighting that patient flow becomes problematic after the morning rush as the day progresses. *“After the initial rush in the morning, the workload doesn’t ease up because, at certain points in the day, there’s a lull between 11:00 AM and 1:00 PM where staff may not be as focused due to fatigue, but the number of patients coming in for follow-up consultations or additional tests increases. That mid-day period sees a shift in the workload, and at times it can be overwhelming to manage both new and returning patients.”* Another doctor mentioned that there is often a bottleneck

in the afternoon due to a lack of coordination between departments. *“In the afternoon, particularly around 2:00 PM to 4:00 PM, delays can be experienced due to the coordination of patients who need further testing or medications. The pharmacy and laboratory departments are often crowded, making it difficult to manage patient flow effectively at that time.”*

Section 3: Communication and Coordination

Healthcare providers were asked to describe how effective the communication between different departments is in managing patient flow at the Outpatient Department (OPD) of University Teaching Hospital (UTH) in Lusaka, Zambia. The responses from healthcare providers indicate that communication plays a crucial role in managing patient flow, but there are challenges that hinder its effectiveness.

One nurse mentioned that while communication is generally good, there are times when it is not as smooth as it should be. *“In my experience, communication between departments works well, especially when it comes to coordinating patient referrals. However, there are times when there is a delay in getting information, especially when it comes to lab results or when the pharmacy is out of stock of certain medications. This can slow down patient flow and frustrate patients who are waiting for their treatment.”* Another nurse echoed similar concerns, noting that communication breakdowns tend to happen when there is a high volume of patients. *“When there are many patients, sometimes the information is passed along too slowly. For example, if a patient needs to see a specialist, the referral may take time to reach the right department, causing delays in care.”*

A doctor also commented on the importance of communication between departments but emphasized the need for improvement. *“Communication is usually effective when it’s between the doctor’s office and the lab or pharmacy, but there are moments when things slip through the cracks, particularly when there is no clear protocol for following up on missing test results or prescriptions. This delay in getting the necessary information from one department to another can create bottlenecks.”* Another doctor described how issues with communication often arise when patients are referred to multiple departments for different procedures. *“When patients need to see multiple specialists or get various tests, the coordination between departments becomes more difficult. There are often delays in information sharing, which can cause a delay in getting the patient to the next step in their care plan.”*

Healthcare providers were asked to describe any coordination gaps that hinder efficient patient flow at the Outpatient Department (OPD) of University Teaching Hospital (UTH) in Lusaka, Zambia. The responses provided by the healthcare providers highlighted several gaps in coordination that contribute to inefficiencies in patient flow.

One nurse noted that coordination between the different departments is often disrupted, especially during peak hours when patient numbers are high. *“There are times when the departments are not fully aware of the patient's status. For example, if a patient has been referred to the laboratory for tests but the results are delayed, the doctor may not be able to proceed with treatment. This lack of communication between departments causes delays in the patient's care process.”* A doctor echoed similar concerns, stating that coordination issues arise when there is insufficient follow-up on referrals between departments. *“Sometimes, referrals to specialists or other departments get lost in the system, and by the time the patient is seen, their condition may have worsened. This is especially true when the process of transferring patient information is not properly managed.”*

Section 4: Recommendations

Healthcare providers were asked to provide recommendations on how to improve patient flow at the Outpatient Department (OPD) of University Teaching Hospital (UTH) in Lusaka, Zambia. Their responses highlighted several key areas for improvement, reflecting a shared concern for streamlining processes and ensuring a more efficient patient experience.

One nurse emphasized the need for better coordination between departments, suggesting that an integrated communication system would make a significant difference. *“There should be a more coordinated system where information is shared in real-time between departments. For example, if a patient has been referred for a test, the laboratory should be able to update the doctor's team immediately once the results are available. This would reduce the waiting time and improve the overall flow of patients.”* Another nurse highlighted the importance of improving patient registration and check-in processes. *“If the registration process could be streamlined to reduce the time spent on initial paperwork, patients could move to their next step much quicker. Maybe having dedicated staff to assist with registration could help speed up this part of the process.”*

A doctor suggested implementing more efficient triage systems to prioritize patient care. *“We need a better triage system that can quickly categorize patients based on the urgency of their condition. If patients who need immediate care are identified early on, it will allow those with*

less urgent needs to wait while more critical cases are attended to first. This would ensure that the most urgent patients are seen without unnecessary delays.” Another doctor echoed the sentiment, recommending an overhaul of the patient flow process, specifically during peak hours. *“During busy times, like in the mornings or after lunch, patient flow is really disrupted. Having more staff during these peak hours, or even implementing a shift system, could help. There needs to be enough manpower to handle the patient load more efficiently.”*

In addition to technological upgrades, a nurse recommended improving patient education. *“We should educate patients more on the processes at the OPD, such as the steps they need to follow when they arrive and what they can expect. If patients understand the process better, they’re less likely to be confused or anxious, which can slow things down.”* Another healthcare provider suggested expanding the use of dedicated patient flow coordinators. *“It would be helpful to have specific staff members assigned to oversee the flow of patients throughout the OPD. They could manage the schedules, ensure that patients are directed to the right areas, and assist with any bottlenecks in real-time.”*

Healthcare providers were asked if they had observed any successful strategies in other departments or institutions that might be applicable to improving patient flow at the Outpatient Department (OPD) of University Teaching Hospital (UTH) in Lusaka, Zambia. The responses gathered reflected a range of observations from different healthcare contexts, with providers sharing strategies they felt could be implemented to improve efficiency at UTH.

One doctor highlighted the use of a fast-track system in other institutions as a strategy that could be beneficial at UTH. *“In other hospitals, I’ve seen fast-track systems that prioritize patients with less complex conditions, allowing them to be seen quickly without waiting for more urgent cases. This could be implemented here to reduce the waiting time for those who do not need urgent care and ensure that the more critical patients are managed effectively.”*

A nurse also mentioned a similar strategy, suggesting that designated ‘quick-care’ areas could be a solution. *“A strategy that has worked well elsewhere is setting up specific areas for quick consultations for patients with common conditions or follow-up visits. This could alleviate the congestion in the main areas and allow the doctors to focus on more complicated cases.”*

The responses reflect a strong consensus on the need for better coordination, more efficient use of technology, and improved staffing during peak times. Healthcare providers shared

several strategies from other institutions that they felt could be adapted and implemented at UTH, with the goal of optimizing patient flow and improving the overall quality of service delivery. From technological advancements to staffing solutions and patient education, these insights provide valuable recommendations for improving patient flow at the OPD.

Healthcare providers were asked if they had any additional comments or suggestions related to patient flow at the Outpatient Department (OPD) of University Teaching Hospital (UTH) in Lusaka, Zambia. The responses gathered provided further insights into the challenges faced and possible solutions that could enhance patient flow and optimize service delivery at UTH.

One doctor shared their concern about the lack of adequate waiting areas for patients, which exacerbates congestion and delays. *“One issue that often goes unnoticed is the inadequate waiting spaces for patients. Patients are forced to wait in overcrowded areas, which not only creates a discomforting environment but also slows down the entire process. I think more organized, dedicated spaces for patients would improve the flow.”* This was echoed by a nurse who added that the physical environment plays a critical role in patient satisfaction and the overall efficiency of the department. *“It’s important to recognize that the patient experience is shaped not only by how fast they are seen but also by the environment they are in. If there were more space and a more comfortable waiting area, patients would feel less stressed and the process would feel less overwhelming.”*

Another doctor shared their concern about the lack of involvement in the development and deployment of Smartcare Electronic Health Records System (HER) which negatively affects uptake of the system. *“Smartcare system seems to be a good technology, just it delays the pace at which we see patients and it also doesn’t provide freestyle usage, its too rigid to use. You cant even find other diagnosis or certain medical terms or drugs in that system. It would be good if Health workers who are on the ground are actively involved in its development rather than only by people in the offices who may not be fully aware of what happens on the ground in healthcare facilities.”*

4.4 Observations by the Investigator

Stage 1: Registration Area

The observation made is that time took for registration range between 20 to 60 minutes. Some patients that didn't come with referral letters took long to register as they were asked to explain reasons for coming directly to UTH. Some had to pay a bypass fee of 150 kwacha. This caused a delay for the patients to receive care by Healthcare providers. Emergency conditions received prompt care with some receiving medical attention to stabilize their conditions before files were opened and this resulted in good outcomes for the patients.

Stage 2: Triage and Consultation

Time it took for patients to be attended to differed based on conditions patient had. Emergency conditions were attended to promptly. Triage was done smoothly with competent Healthcare providers allocating very sick patients to be seen first. The time it took for patients being attended to by senior Healthcare providers was shorter and this resulted in shortened waiting time. Observed delays were with patients that didn't have complete documentations including imaging and laboratory results. Many Healthcare providers were using paper documents and this delayed care for patients. Junior Doctors were seen accessing hospital laboratory results through the straight from their phones. Overall patients were satisfied with shorter waiting time due to technological applications.

Stage 3: Pharmacy/Discharge

Patients often wait an average of 30 to 45 minutes at the pharmacy before receiving their medications. This is primarily due to the high volume of prescriptions that need to be processed, combined with the limited number of pharmacy staff available at peak times.”

At discharge, patients sometimes wait more than an hour to receive their final instructions or prescriptions. This delay is usually caused by incomplete documentation or the time it takes for the doctor to finalize the discharge notes. This suggests that administrative inefficiencies play a critical role in prolonging the discharge process.

In many cases it was observed that the pharmacy experiences delays due to stockouts of certain medications. Patients are often asked to wait while staff check for alternatives or coordinate with other pharmacies, which significantly increases their waiting time. For some they would be told to go buy medication from private drug stores due to stockouts. This resulted in poor perception and dissatisfaction by patients and healthcare providers

CHAPTER FIVE: DISCUSSION

5.0 Introduction

This chapter discusses the results obtained in the study in relation to results obtained by other researchers in the empirical literature reviewed.

5.1 Findings

5.1.1 The current patient flow processes and identify bottlenecks within the OPD of UTH

The evaluation of patient flow processes at the University Teaching Hospital (UTH) revealed significant inefficiencies at various stages. Key challenges included long queues and limited staffing at the registration stage, exacerbated by manual processes and resource shortages. These findings align with Olanrewaju et al. (2018), who observed similar issues in Nigerian public hospitals, where streamlined registration and efficient triage systems reduced waiting times by 30%. The delays at UTH's consultation stage, linked to high patient volumes and complex cases, are consistent with the observations of McCarthy et al. (2018) in Australia, where increased staff availability during peak hours improved patient flow.

Prolonged waiting times at the pharmacy and discharge stages at UTH, caused by administrative inefficiencies and supply chain issues, resonate with findings by Sweis et al. (2019), who demonstrated that optimized scheduling and better communication reduced delays by 25% in U.S. outpatient settings. Coordination gaps between departments, highlighted as a critical bottleneck at UTH, echo Akinyemi et al. (2017)'s findings in South Africa, where integrating electronic health records (EHRs) improved interdepartmental communication and patient flow. These comparisons underscore the multifaceted nature of bottlenecks at UTH, highlighting the need for targeted interventions such as resource allocation, process automation, and improved communication systems.

Currently there are efforts to deploy use of SmartCare electronic health record system (EHR) but Healthcare providers feel this system is not flexible enough to allow them to efficiently attend to patients. Hence, request to be involved in its development.

5.1.2 The impact of inefficient patient flow on waiting times and resource utilization at UTH OPD

Inefficient patient flow processes at UTH OPD significantly increased waiting times, with patients experiencing delays of 20 to 50 minutes before triage and over an hour during peak times. This is comparable to findings by Holden et al. (2015) in the UK, where Lean management reduced waiting times by streamlining administrative processes. At UTH, prolonged waits at the pharmacy and discharge stages were resource-intensive, mirroring Chen et al. (2020)'s study in Singapore, which showed predictive analytics reduced no-show rates and optimized scheduling.

The study also found that registration inefficiencies, with 75.1% dissatisfaction, strained staff and infrastructure, paralleling Olanrewaju et al. (2018)'s observations in Nigeria of resource-intensive manual processes. The cascading effect of delays across stages, identified at UTH, aligns with Sweis et al. (2019), who noted that delays in one stage could compound inefficiencies downstream. These findings emphasize the importance of adopting technology-driven solutions and resource optimization to address inefficiencies, reduce waiting times, and enhance patient satisfaction.

5.1.3 The perspectives and experiences of healthcare providers regarding challenges in managing patient flow at UTH

Healthcare providers at UTH highlighted staffing shortages, insufficient infrastructure, and poor interdepartmental coordination as critical challenges. These perspectives align with McCarthy et al. (2018), who emphasized the role of staff-to-patient ratios and team collaboration in Australia. At UTH, peak-time congestion overwhelmed staff, consistent with Naylor et al. (2017)'s findings in Canada, where digital solutions alleviated strain by streamlining appointment systems.

Providers at UTH also identified manual processes and miscommunication as barriers, echoing Akinyemi et al. (2017), who noted that EHRs improved coordination and reduced errors in South African OPDs. The consensus at UTH on the need for integrated information systems reflects Chen et al. (2020)'s recommendation for predictive analytics to optimize resource allocation. These comparisons highlight systemic issues requiring improved staffing, infrastructure, and communication protocols to enhance patient flow management.

5.1.4 Patient perceptions and satisfaction levels regarding the efficiency of patient flow processes

Patient perceptions at UTH revealed widespread dissatisfaction, particularly with the registration stage, where 75.1% expressed frustration over long queues and insufficient staffing. This aligns with findings by Olanrewaju et al. (2018), who reported dissatisfaction with manual registration processes in Nigerian public hospitals. At UTH, dissatisfaction extended to the consultation stage, with 40% of patients citing rushed consultations and delays, similar to McCarthy et al. (2018)'s findings in Australia, where better communication improved patient satisfaction.

Negative feedback regarding the pharmacy and discharge stages at UTH, including prolonged waiting times and medication shortages, parallels Sweis et al. (2019)'s observations in the U.S., where better scheduling and communication reduced delays. The lack of clear communication about expected waiting times at UTH aligns with Holden et al. (2015), who found that transparent processes improved patient satisfaction. These findings underscore the need for improved communication, resource allocation, and staff training to enhance the patient experience at UTH.

5.1.5 Recommendations for optimizing patient flow and enhancing service delivery at UTH OPD

Based on the findings, several recommendations were proposed. Increasing staffing levels during peak times was identified as crucial, echoing McCarthy et al. (2018)'s recommendation to address staff shortages in Australia. Deploying technology-driven solutions, such as EHRs and automated registration systems, to streamline processes aligns with Naylor et al. (2017) and Akinyemi et al. (2017), who highlighted the role of digital solutions in improving patient flow.

Improving interdepartmental coordination at UTH through integrated communication systems mirrors Chen et al. (2020)'s findings in Singapore, where predictive analytics enhanced efficiency. Enhancing resource availability and providing training programs for healthcare providers were also emphasized, consistent with Olanrewaju et al. (2018), who advocated for resource optimization and staff training in Nigerian OPDs. These recommendations aim to address inefficiencies, reduce waiting times, and enhance service delivery, ultimately improving patient satisfaction at UTH OPD.

CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

6.0 Introduction

This chapter provides conclusions and recommendations based on the results obtained in the study.

6.1 Results and conclusions

6.1.1 The current patient flow processes and identify bottlenecks within the OPD of UTH

The findings revealed significant inefficiencies at multiple stages of the patient flow process. Long queues of patients at the registration stage was caused by low numbers of healthcare providers as well as usage of manual processes creating delays. The consultation stage showed moderate satisfaction levels with delays linked to high patient volumes and the complexity of cases, especially for those requiring further follow-ups or referrals. At the pharmacy and discharge stages, prolonged waiting times were caused by administrative inefficiencies, inadequate technological support and poor supply chain issues.

6.1.2 The impact of inefficient patient flow on waiting times and resource utilization at UTH OPD

Inefficient patient flow increased waiting time for the patients with some experiencing delays up to 50 minutes before consultation and an hour at the pharmacy. These delays strained resource that included limited staffing and infrastructure with high patient load. Correlation analysis indicated that longer waiting time negatively affected patient perception and satisfaction levels. This shows the importance of streamlined processes.

6.1.3 The perspectives and experiences of healthcare providers regarding challenges in managing patient flow at UTH

Healthcare providers identified poor staffing levels, limited space and infrastructure and limited usage of technological tools as critical challenges. Manual processes and unclear referral procedures caused inefficiencies. Healthcare providers stressed

the need for technological driven systems, improved staffing levels and adequate supply of equipments and consumables to enhance patient flow avoiding delays.

6.1.4 Patient perceptions and satisfaction levels regarding the efficiency of patient flow processes

Patients expressed dissatisfaction with registration and consultation waiting time with 75.1% and 40% respectively rating their experience as poor. Pharmacy and discharge stages was also poorly rated mainly due to prolonged waiting and drug shortages coupled with referrals to purchasing their own medication from private drug stores. This negatively impacted satisfaction levels.

6.2 Recommendations

1. Increase Staffing Levels:

- **Findings:** Long queues and delays at registration and consultation stages were linked to inadequate staffing levels
- **Recommendation:** Deploy additional personnel at key stages of the patient flow process especially at consultation stage. This will reduce waiting time and cation of patient in their hospital experience at OPD.

2. Implement Technology-Driven Solutions:

- **Findings:** Adopting Usage of manual processes at registration and documentation stages caused delays negatively impacting patient experience.
- **Recommendation:** Introducing electronic health records (EHR) and automated registration systems will streamline processes. Enforcement of use of Smartcare system adoption will reduce manual errors, enhance operational efficiency and improve coordination between departments. Involve Healthcare providers in its development to increase adoption and utilization. This can significantly reduce waiting time, improving patient experiences and outcomes.

3. Enhance Resource Availability:

- **Finding:** Inadequate resources such consultation rooms, medications, medical equipment, and medication caused prolonged waiting times

- **Recommendation:** Ensure adequate allocation of resources for renovation of consultation rooms to increase space for patients, improve inventory management, and repair of nonfunctional equipment or buying of new equipment. Furthermore ensure sufficient availability of sufficient healthcare consumables and pharmacy dispensing points.

4. **Train Healthcare Providers on Communication and Time Management:**

- **Finding:** Healthcare providers reported challenges with high patient volumes and communication with patients especially patients that felt they needed more time with healthcare providers.
- **Recommendation:** Conducting routine training on good communication, time management and patient handling so as to improve service delivery and ultimately patient care and satisfaction.

5. **Improve Patient Education and Expectations:**

- **Finding:** Lack of communication regarding patient waiting time together process involved including triaging led to frustration among patients
- **Recommendation:** Provide clear and simplified communication to patient on expected waiting time together with the processes involved including prioritization of very sick and emergency condition over stable patients. Furthermore implementing interactive system or technological applications for patients to track their progress and waiting times could further enhance patient satisfaction.

6. **Monitor and Evaluate the Impact of Changes:**

- **Finding:** Ongoing inefficiencies speaks volume to the need for continuous improvement
- **Recommendation:** Regularly monitor and evaluate the impact of implemented changes, encouraging feedback from patients and healthcare providers to ensure sustained and continuously improving patient flow.

6.3 Areas for Future Research

Future research should focus on several key areas to further enhance the understanding and implementation of patient flow optimization strategies in resource-limited healthcare settings like UTH OPD:

i. Evaluating the Long-Term Impact of Patient Flow Optimization Strategies

Future studies should assess the sustainability and effectiveness of interventions such as task shifting, digital queue management systems, and optimized scheduling in improving patient flow. Research should track long-term patient satisfaction, healthcare provider workload, and overall hospital efficiency to determine whether these strategies yield lasting benefits.

ii. Investigating the Feasibility of Digital Health Solutions for Patient Flow

Technological advancements such as electronic health records (EHRs), automated appointment systems, and real-time queue tracking have the potential to streamline outpatient processes. Future research should evaluate the feasibility, challenges, and cost-effectiveness of integrating these digital health solutions within Zambia's public healthcare sector.

iii. Analyzing the Impact of Staffing Models on Patient Flow Efficiency

There is a need for further research on how different staffing models, including flexible workforce deployment and task redistribution, impact patient flow efficiency. Studies should assess whether alternative staffing strategies, such as increasing support staff or training non-specialist healthcare workers for triage duties, can effectively reduce waiting times without compromising care quality.

iv. Exploring the Role of Interdepartmental Coordination in Reducing Patient Flow Bottlenecks

Inefficiencies in communication and coordination between departments often contribute to delays in patient movement. Future studies should examine how interdepartmental collaboration, standardized referral protocols, and improved communication systems can enhance the continuity of care and optimize patient transitions across different units within hospitals.

v. **Investigating Patient-Centered Approaches to Reducing Wait Times**

While operational improvements are critical, future research should also focus on patient-centered interventions, such as self-service check-ins, patient education on expected wait times, and real-time feedback mechanisms. Understanding how patient engagement and expectations influence perceived wait times and satisfaction could help in developing more human-centered solutions.

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2. Data Collection Tool for Healthcare Providers:

Semi-Structured Interview Guide

Section 1: Role and Responsibilities

What is your role in the OPD, and how does it relate to managing patient flow?

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Describe your typical day in terms of patient flow management tasks.

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Section 2: Challenges in Patient Flow

What are the main bottlenecks you observe in the patient flow process?

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How do resource constraints impact the flow patient?

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Are there specific times of the day when patient flow challenges are more pronounced?

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Section 3: Communication and Coordination

How effective is the communication between different departments in managing patient flow?

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Are there any coordination gaps that hinder efficient patient flow?

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Section 4: Recommendations

What changes would you recommend to improve patient flow at the OPD?

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Have you observed any successful strategies in other departments or institutions that might be applicable here?

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Any additional comments or suggestions related to patient flow?

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3. Data Collection Tool for Observations by the Investigator:

Observation Details:

Date and time of observation:.....

Observer's name:.....

Stage 1: Registration Area

Average waiting time for registration (recording the time taken for 10 patients and calculate the average)

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Number of staff present at registration:

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.....
Any observed bottlenecks (e.g., long queues, limited staff):
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Stage 2: Triage and Consultation

Average waiting time before triage (recording the time taken for 10 patients):
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Average time spent in consultation with healthcare providers (recording time for 10 patients):
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Observed delays or issues
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Stage 3: Pharmacy/Discharge

Average waiting time at the pharmacy/discharge:
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Any bottlenecks or issues observed
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Additional Observations:
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Thank you very much for you participation


APPENDICES

SIMILARITY REPORT

4.46% Similarity total
31.06% AI total

Identical - 0.06%
Changed text - 4.14%

#24459153 - University of Lusaka - 18 Jan 2025, 10:30 AM



UNIVERSITY OF LUSAKA

School of Postgraduate Studies

Title: Optimization of Patient Flow at the Outpatient Department of University Teaching Hospital in Lusaka, Zambia.

A
Proposal Presented
In Partial Fulfillment For Requirement Of The Program
Master Of Business Administration - Healthcare Management (MBAHCM)

PAGE 35 OF 82

0% - Likely AI
0% - Highly Likely AI

AI Detector Report

31.06% Potentially AI generated

Highlighted sentences have the lowest perplexity and were likely generated by AI

- Likely - 13.87%
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How to Interpret AI Detector Results?

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NATIONAL HEALTH RESEARCH AUTHORITY
The Health Research Act
(Act No. 2 of 2013)



CERTIFICATE OF REGISTRATION

THIS IS TO CERTIFY THAT

Muyunda Mubita

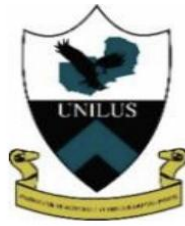
has been registered as a Health Researcher

Dated this 7th December 2023

Registration number NHRAR-R-1152/10/12/2023



A/DIRECTOR AND CHIEF
EXECUTIVE OFFICER
PROF. VICTOR CHALWE



UNIVERSITY
OF
LUSAKA

SCHOOL OF POSTGRADUATE STUDIES

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UNILUS-RESEARCH ETHICS COMMITTEE

Ref no: FWA00033228-7010/24

Date: 25th October 2024

STUDENT NAME: mubita muyunda

Optimization of Patient Flow at the Outpatient Department of University Teaching Hospital in Lusaka, Zambia.

The above research was submitted to the research ethics committee for review. The study has no major ethical problems and is approved subject to the following:

1. The study cannot be changed without express permission of the UNILUS research ethics committee.
2. Approval from the necessary authority should be sought.

The committee wishes you success in your work.



Professor Kasonde Bowa

MSc(Glasgow),M.Med(UNZA),FRCS(Glasgow),FACS,FCS,DPH(LSTMH),MPH(UCL)

Chairman- UNILUS REC

Professor of Urology and Consultant Urologist

Deputy Vice-Chancellor – Research and Innovation

Executive Dean - School of Medicine and Health Sciences



NATIONAL HEALTH RESEARCH AUTHORITY

Lot No. 18961/M. off Kasama Road. Chalala. P.O. Box 30075. LUSAKA
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NHRA-1708/16/11/2024

26th November 2024

The Principal Investigator,
mubita muyunda,
university of Lusaka,

Dear mubita muyunda,

Re: Request for Authority to Conduct Research

The National Health Research Authority Is in Receipt of Your Request for Authority to Conduct Research Titled “**Optimization of Patient Flow at the Outpatient Department of University Teaching Hospital in Lusaka, Zambia.**”

I wish to inform you that following submission of your request to the Authority, our review of the same and in view of the ethical clearance, this study has been **approved** on condition that:

1. The relevant Provincial and District Medical Officers where the study is being conducted are fully appraised.
2. Progress updates are provided to NHRA bi-annually from the date of commencement of the study.
3. The final study report is cleared by the NHRA before any publication or dissemination within or outside the country.
4. After clearance for publication or dissemination by the NHRA, the final study report is shared with all relevant Provincial and District Directors of Health where the study was being conducted, University leadership, and all key respondents.

Yours sincerely,

National Health Research Authority

Prof Victor Chalwe,
Acting Director/Chief Executive Officer

All correspondence should be addressed to the
Provincial Health Director
Telephone: +260 211 256813
Fax: +260 211 256814
Telephone: +260 211 256815
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+260 963 908260



REPUBLIC OF ZAMBIA
MINISTRY OF HEALTH

In Reply please quote:

File No:
LSKPHO/101/8/1

Lusaka Provincial Health Office
P.O. Box 32573
LUSAKA

5th December, 2024

Dr. Mubita Muyunda
University of Lusaka
LUSAKA
mubitayuyu@gmail.com
0950790865

PERMISSION TO CONDUCT RESEARCH

My office is in receipt of your letter requesting for permission to conduct a study titled "**Optimizing of Patient flow at the Outpatient Department of University Teaching Hospital in Lusaka, Zambia**"


My office is glad to inform you that it has no objection to your request provided that;

1. The relevant Institution Director where the study is being conducted are fully appraised;
2. Progress updates are provided to Lusaka Provincial Health Office and the District Health Office biannually from the date of commencement of the study;
3. The final study report is cleared by NHRA before any publication or dissemination within or outside the country;
4. After clearance for publication or dissemination by NHRA, the final study report is shared with all relevant Provincial and District Directors of Health where the study was being conducted.

Kindly ensure minimum interruption in health service delivery at selected health facilities.

By copy of this letter, the District Health Office / Institution are advised to allow you undertake the above-mentioned research and provide you with the relevant support.

Yours faithfully,


Dr. Simulyamaña Aspha Choonga
Provincial Health Director
LUSAKA PROVINCE

CC: District Health Director – Lusaka



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University Teaching Hospital (Adult)

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SENIOR MEDICAL SUPERINTENDENT

Our Ref:

Your Ref:

MO/9513

16th December, 2024

Dr. Mubita Muyunda
University Teaching Hospital
LUSAKA

REQUEST FOR AUTHORITY TO CONDUCT RESEARCH AT UTH

Reference is made to your letter 6th December, 2024, read with the above captioned subject.

I write to inform you that, your request to conduct research on "Optimization of Patient Flow at the Outpatient Department" at the University Teaching Hospitals - Adult Hospital, has been approved.

You are kindly informed.

Dr. Charles Mbewe
Head - Clinical Care
UNIVERSITY TEACHING HOSPITALS – ADULT HOSPITAL