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**FACTORS AFFECTING THE AVAILABILITY OF TRACER HEALTH
COMMODITIES IN PUBLIC FACILITIES AT TANA RIVER COUNTY, KENYA**

Dr. Ayako Japheth Araka (B. Pharm)

Reg No. 221028870

Supervisor: DR. PETER N. KARIMI

College of Medicine and Health Sciences

EAC Regional Centre of Excellence for Vaccines, Immunization, and Health Supply Chain
Management

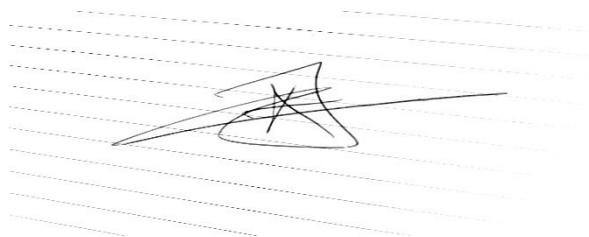
University of Rwanda

Master of Science in Health Supply Chain Management

July 2023

DECLARATION

I, Dr. Ayako Japheth Araka (B. Pharm) hereby declare that the thesis has been written by me without any external unauthorized help and that it has been neither presented to any institution for evaluation nor previously published in its entirety in parts. Any parts, words, or, ideas, of the thesis, however limited, which are quoted from or based on other sources, have been acknowledged as such without exception.



Signature

Date.....11th July 2023**Dr. Ayako Japheth Araka****Reg No. 221028870****University of Rwanda**

APPROVAL BY SUPERVISORS

This proposal is submitted for examination with our approval as research supervisors:

Signature  Date: 12/7/2023

DR. PETER N. KARIMI

Department of Pharmacology, clinical Pharmacy
and Pharmacy practice

University of Nairobi

School of Public health, University of Rwanda

ABSTRACT

Background: Delivery of quality healthcare is significantly based on the level of commitment among health facilities. The level of organization in this context includes building a strong system where there is continued availability of fundamental resources such as tracer commodities. Human resources, financing, health information provision, and technologies integrated into the care environment have been vital in defining improved care contexts where there is a higher level of commitment. However, there is a limited understanding of the availability of health tracer commodities as well as the underlying factors which influence their availability.

Objective: To investigate the factors affecting tracer health commodities availability in public health facilities at Tana River County.

Methods: This was a cross-sectional study conducted in health facilities in Tana River County. A census method was used where all 62 health facilities across different tiers of healthcare delivery were considered. A structured questionnaire and a checklist were used to collect data. Ethical approval to conduct the study was obtained from KNH-UON-ERC and permission requested from the managers of the respective facilities and respondents before the data collection. Data was analysed using both descriptive and inferential statistics. Statistical Package for Social Sciences version 26 was used during the analyses.

Results: The mean availability of the tracer commodities was 68.73% with a standard deviation of 14.41 and a range of 27% to 94.6%. In investigating human resource-related factors influencing availability, facilities that had personnel training on commodity management since employment ($\beta = 4.56$, 95%CI: 2.29 -11.21, $p=0.012$) and facilities that had pharmaceutical technicians dispensing commodities ($\beta = 2.85$, 95%CI: 1.29 – 5.21, $p=0.005$) were significant factors influencing the availability of tracer commodities. Financial factors investigated revealed that those who were in county hospitals ($\beta = 19.11$, 95%CI: 7.39 – 30.83, $p=0.002$) and facilities which has disbursement of budgetary allocation on time ($\beta = 12.08$, 95%CI: 3.11 – 23.57, $p=0.002$) had higher availability of tracer commodity,

Conclusion: There was moderate availability of tracer commodities which was influenced by training, personnel, level of the facility, and budget allocation on time. Thus, there is a need for regular training among tracer commodity dispensing officers. care personnel especially dispensing officers.

DEDICATION

I dedicate my dissertation work to my wife Annastancia Bosibori and my children Nina Felisters, Liam Francis, Leslie Moraa, Laurelle Tabitha, and Ivan Ayako. A special feeling of gratitude goes to my loving parents, Milkah Moraa and Isaac Ayako, whose words of encouragement and spur to persistence ring in my ears. To my sisters Tabitha Bitutu, Julia Buyaki, Lilian Bosibori, and Christine Kerubo, and not to forget my only brother Wycliffe Nyandusi and his wife Sylvia Bochaberi, who have never left my side and is very special to me.

I also dedicate this dissertation to my many friends and church family who have supported me throughout the process.

ACKNOWLEDGEMENT

I would like to deeply thank Dr. Peter Karimi, my research supervisor, for his guidance, enthusiastic encouragement, and useful critiques of this research.

I would also like to thank Dr. Domina Asingizwe our research coordinator for her advice and support in monitoring my progress on schedule. I would also like to thank Mr. Kelvin Wangira Nyongesa, Mrs. Rachel Habona Jillo, Mr. Miheso Kavere and Mr. Abdul Shambaro for their help in data collection and as my research assistants due to the vastness of my research area.

I would also like to thank the IT guru Joseph Lune Ngenzi for the technical work and for providing resource material for Moodle in running programs like Mendeley.

Finally, I would like to thank my parents and family for their support and encouragement during my studies.

ABBREVIATIONS AND ACRONYMS

KEMSA	Kenya Medical Supplies Authority
H&HN	Hospitals and Health Networks
RMNCAH	Reproductive maternal, newborn, child and adolescent health
MOH	Ministry of Health
SCM	Supply Chain Management
WHO	World Health Organization
UNICEF	United Nations Children Fund
SDG's	Sustainable Development Goals
UHC	Universal Health Coverage
TB	Tuberculosis
HIV	Human Immunodeficiency Virus
HC's	Health Centers
EMMS	Essential Medicines and Medical Supplies
NPD's	Non-Program Drugs
NPTD's	Non-Program Tracer Drugs
EM's	Essential Medicines
SSA	Sub-Sahara Africa
HCW	Health Care Worker
AIDS	Acquired Immunodeficiency Syndrome
ART	Antiretroviral Therapy
GDP	Gross Domestic Product
DFID	Department for International Development

OECD..... Organization for Economic Cooperation and Development

LMIC..... Low and Middle-Income Countries

MEDS..... Mission for Essential Drugs and Supplies

PPB..... Pharmacy and Poisons Board

PPOA..... Public Procurement and Oversight Authority

FBO's..... Faith-Based Organizations

AL..... Artemether Lumefantrine

COH..... Chief Officer Health

CECM..... County Executive Committee Member for Health

CDH..... County Director of Health

HPTU..... Health Products and Technology Unit

USD..... United States Dollar

AL..... Artemether Lumefantrine

OPERATION DEFINITION OF TERMS

Supply Chain Management – This is the process of handling goods and services, right from the raw materials for manufacturing the product through to the consumption by the consumer.

Health Products and Technology – This is the use of applications with organized knowledge and skills with the use of Vaccines, Medical devices, Medicines, procedures, and systems developed to solve a health problem and improve the quality of life.

Tracer Medicines List – This is a lean selected list of medicines that are representative of essential medicines that satisfy the priority and needs of healthcare of a given population.

Essential Medicines – They are a key component of primary healthcare and are essential for the treatment of common illnesses, the management of chronic conditions, and the prevention of diseases. They are an important tool in promoting health equity and reducing health disparities, particularly in low- and middle-income countries where access to healthcare is limited.

Essential Medicines and Medical Supplies – The presence and availability of medicines are those that satisfy the priority health care needs of the population. Which medicines are on the list depends on disease prevalence, current best evidence, and cost-effectiveness.

Kenya Essential Medicines List – This is a list developed by the Ministry of Health that satisfies the priority healthcare needs of the Kenyan population above all the list considers the efficacious, safe, and cost-effective of these medical products.

Public Health Facilities - Owned either by the National Government or the Tana River County Government.

Days out of stock - Refers to the number of days that a particular product or item is not available in stock due to it being depleted.

Lead time - Refers to the number of days it takes for a supplier or vendor to deliver a product or service to a customer, from the moment the order is placed to the moment it is received.

Fill rate – This is a measure of the quantities ordered Vs the order delivered, typically expressed as a percentage.

TABLE OF CONTENTS

FACTORS AFFECTING THE AVAILABILITY OF TRACER HEALTH COMMODITIES IN PUBLIC FACILITIES AT TANA RIVER COUNTY, KENYA	i
DECLARATION	ii
APPROVAL BY SUPERVISORS	iii
ABSTRACT.....	iv
DEDICATION.....	v
ACKNOWLEDGEMENT	vi
TABLE OF CONTENTS.....	x
LIST OF TABLES.....	xiii
LIST OF FIGURES	xiv
CHAPTER ONE: INTRODUCTION.....	1
1.1. Context	1
1.2. Background	1
1.3. Problem statement	2
1.3. Research Questions	3
1.4. Objectives.....	4
1.4.1. Broad objectives.....	4
1.4.2. Specific objectives	4
1.5. Significance of the study	4
1.6. Limitations	4
1.7. Delimitations	5
CHAPTER TWO: LITERATURE REVIEW	6
2.1. Introduction	6
2.2. Tracer health commodities	6
2.3. Human Resource Factors and availability of tracer commodities.....	7
2.4. Health financing factors and availability of tracer commodities	9
2.5. Summary of literature review.....	11
2.6. Conceptual framework	12
CHAPTER THREE: METHODOLOGY	14
3.1. Introduction	14
3.2. Research Design.....	14
3.3. Study Area.....	14

3.4.	Target and Study Population	14
3.5.	Inclusion and Exclusion Criteria	15
3.5.1.	Inclusion Criteria	15
3.5.2.	Exclusion.....	15
3.6.	Sample.....	15
3.6.1	Sample Size	15
	All 62 health facilities owned by the government or Faith Based Organisations in Tana River County were considered. They included One (1) County Referral Hospital, Two (2) Sub-County Hospitals, Four (4) Heath Centres, and Fifth Five (55) Dispensaries.	15
3.7.	Study Tools	15
3.8.	Recruitment of Research Assistants.....	16
3.9.	Data Quality Control.....	16
3.10.	Pretesting	16
3.13.	Recruitment and Consenting	17
3.14.	Data Collection Procedure.....	17
3.15.	Data Analysis.....	17
3.16.	Ethical Consideration	18
	CHAPTER FOUR: RESULTS	19
4.1.	Sociodemographic characteristics	19
4.2.	Availability of tracer health commodities in public health facilities	19
4.3.	Human resource-related factors affecting the availability of tracer health commodities.....	21
4.3.1.	Regression analysis of Human resource factors influencing the availability of Tracer commodities	22
4.4.	Financing-related factors affecting the availability of tracer health commodities....	22
4.4.1.	Regression analysis of financial factors influencing the availability of tracer commodities.....	23
	CHAPTER FIVE: DISCUSSION, CONCLUSION, AND RECOMMENDATIONS.....	25
5.1.	Availability of tracer commodities.....	25
5.2.	Human resource factors associated with the availability	26
5.3.	Financing-related factors affecting the availability of tracer health commodities....	27
5.4.	Conclusions	28
5.5.	Recommendations	28
5.5.2.	Recommendations for Further Research.....	28
	REFERENCES	29
	APPENDICES	33

Appendix II: Consent Form	37
Appendix III: Questionnaire	39
Appendix IV: Checklist:	42
Availability of Tracer Medicines	42
Appendix V: Dummy Tables	44
Appendix VI: Similarity Report.....	46

LIST OF TABLES

Table 4.1 Sociodemographic Characteristics.....	19
Table 4.2: Availability of Tracer Health Commodities in Public Health Facilities.....	20
Table 4.3: Human resource factors influencing the availability of tracer commodities.....	21
Table 4.3.1. Regression analysis of human resource factors influencing the availability of tracer commodities.....	22
Table 4.4: Finance-related factors influencing the availability of tracer commodities.....	23
Table 4.4.1: Regression analysis of facility and financial factors influencing the availability of tracer commodities.....	24
Table 4.5: Multiple regression analysis of factors influencing availability of tracer commodities.....	24

LIST OF FIGURES

Figure 1: Conceptual Framework (.....) 12

CHAPTER ONE: INTRODUCTION

1.1.Context

To treat common diseases for adults, children, and emergencies, governments at the national and regional levels need to ensure that supply chains effectively reach the community or clients, considering the seven rights; right cost, right quality, right product, right place, right quantity, right time, right conditions, and affordable for the right client-to treat various health conditions[1]. However, there is little evidence on the factors that improve or limit product availability at the community level to achieve effective scale-up and reduce morbidity and mortality.

Tracer health items are essential products in a health system that defines the delivery of quality health care. Key factors that determine healthcare delivery include human resources, healthcare financing, information technologies, leadership, and governance. The World Health Organization (WHO) has stated that the provision of healthcare products is critical to the prevention of major diseases, including communicable and non-communicable diseases. The Global Plan of Action for communicable and non-communicable diseases emphasizes the need to ensure at least 80 percent availability of tracer commodities in public and private settings to ensure quality care [2][3].

1.2.Background

Tracer health commodities are essential products in a healthcare setting that define the delivery of quality healthcare. The key factors which define healthcare delivery include human resources, health financing, information technologies, leadership as well as governance [4]. World Health Organization (WHO) has identified that the provision of health tracer commodities is vital in the prevention of major diseases including both communicable and non-communicable diseases. The global action plan highlights the need to ensure at least 80 percent availability of tracer health commodities in both public and private facilities for the provision of quality care [3].

The quality and level of medical supplies define the commitment and willingness among individuals to improve efficiency and quality care delivery. The sustainable development goals (SDGs) has remained committed to the integration of better processes that define the improved quality of care [5]. Research has established that despite the improvement in the provision of quality care across different sections of the world, the provision of medicines and availability

has been largely limited especially in low-income countries such as Kenya. Approximately 30-50 percent of the global population doesn't have access to essential medical drugs [6], [5],[7]. The United Nations Children's Fund (UNICEF) has identified three major elements in the supply of medicines which include uninterrupted, sustainable, and affordable quality medicines [8]. Ensuring medicines, safety, effectiveness, and Quality is key to achieving universal health coverage. It has also been noted that one in ten medicines circulating in low-middle-income countries are either fake or substandard with Africa accounting for 42% of global fake drugs [9].

The unavailability of health commodities in public health facilities denies patients an essential component of quality health services. This is a common occurrence in developing countries and Kenya is not an exception. Many factors contribute to this predicament including inadequate financial resources, logistical challenges, and inadequate human resources among others. Tana River County is expansive and has many challenges regarding the provision of adequate medicine in public health facilities. This study intends to determine the factors that influence the supply chain to deny people these essential commodities.

1.3.Problem statement

The WHO global health plan has effectively stressed the need to ensure 80% of essential medicines and health products should be available to achieve the intended quality of care [4]. The provision of essential medicine is fundamental in helping improve the quality of healthcare. However, the inability to understand the extent of availability of essential medicines presents a difficult context in improving care. Low-income countries have been characterized by poor stocking and prioritization of medicines and supplies (8,9,12). The availability of tracer medicines in Sub-Saharan Africa was 76.3% in Ethiopia (12), 48.5% in Malawi (3), and 70% in Tanzania (9).

Devolution in Kenya has seen a focus on healthcare within the county context which has brought a different dimension to the availability of essential commodities. Patients accessing health facilities increased when Kenya devolved health services, notably following the introduction of UHC, according to a study in Nyeri County, one of the UHC trial counties. AL (Artemether Lumefantrine) was the only one below 55% availability and this is attributed to the low endemicity of malaria within the region,[10]. Other tracer commodities were above the

recommended 80% by WHO. In another study done in Kisumu, the essential medicines availability improved by 3.4% for twenty (20) tracer medicines since the inception of the pilot UHC in Kisumu County and the patients felt like a 79.5% improvement and despite the pull system still, the health care workers noted stock outs implying that leadership and governance was a challenge. In another study done in Embu County about the availability of essential medicines and the factors influencing them in public health facilities, the recommendation was that there is a need to allocate more resources to commodity availability and commodity management training. In another study in Bungoma County, it was found that the average medicines availability was 63.35% and the average out-of-stock days for the county was 51 days. The major recommendation was that they needed better inventory management and training on the other hand storage space above all resource allocation hence the need for better leadership. From the quantification report done by the Tana River County government and World Bank a financing gap, half-yearly allocation of funds instead of quarterly was observed and poor documentation caused frequent stockouts for tracer commodities.[11]

The limited access to tracer essential commodities resulting from regular stockouts had a significant influence on poor health delivery outcomes. The regular medicine stock in Sub-Saharan Africa has been associated with higher morbidity and mortality of major diseases such as Malaria, TB, and HIV. Therefore, limited information is available on tracer commodities within the county context, and variation of availability even in the UHC pilot counties means each county varies in terms of commodities availability which means the recent UHC rollout may not achieve its objectives if leadership and governance are not addressed in all the 47 counties, Therefore, this study seeks to bridge this gap and help understand the availability of tracer commodities within the devolution units ahead of UHC implementation and how best we can address them.

1.3.Research Questions

- i. What is the availability status of tracer health commodities in public health facilities in Tana River County, Kenya?
- ii. What are the human resource-related factors affecting the availability of tracer health commodities in public health facilities?
- iii. What are the health financing-related factors affecting the availability of tracer health commodities in public health facilities?

1.4 Objectives

1.4.1. Broad objectives

To establish the factors affecting tracer health commodities availability in public health facilities at Tana River County.

1.4.2. Specific objectives

- i. To determine the level of availability of tracer health commodities in public health facilities in Tana River County, Kenya
- ii. To determine human resource-related factors affecting the availability of tracer health commodities in public health facilities in Tana River County, Kenya.
- iii. To establish the health financing-related factors affecting the availability of tracer health commodities in public health facilities in Tana River County, Kenya.

1.5. Significance of the study

The findings from this study will be crucial in helping understand the factors that influence the availability of tracer commodities. The findings will serve as a foundation for further investigation into reasons why the availability of tracer commodities in the health industry is challenging. From the previous studies, it was very clear that leadership and governance alongside health financing play a key role in the availability of tracers and essential medicines. Challenges like inventory management and a system to manage inventory, human resource capacity building, and overall achievement of better treatment outcomes. Health practitioners and management would benefit from it as well. The findings will aid government and non-governmental organizations in the development and implementation of policies for establishing effective planning and availability of tracer commodities in public healthcare organizations.

1.6. Limitations

The application of devolution in the healthcare sector makes it varies across different counties based on the attention given by each county government. It's important to understand what happens in each county for decision-making and making health delivery services uniform country-wide now that UHC has been rolled out. In the previous studies, the results were only

limited to the study area and selected facilities. Time was also limited to be able to achieve results. Thus, the findings from the study might not be representative of the availability of tracer health commodities in the whole country only limited to Tana River County.

1.7. Delimitations

The structure of county facilities is similar countrywide and thus the study was carried out across all the public health facilities in Tana River County. The study targeted all healthcare workers at all levels of service not limited to County and Sub- County health management teams, procurement managers, and hospital administrators. The study was focused on all facilities within the county using an electronic Google form questionnaire.

CHAPTER TWO: LITERATURE REVIEW

2.1.Introduction

This chapter includes literature on tracer health commodities as well as factors affecting their availability. A literature search was done using Cochrane, Google Scholar, and Hinari. The references were organized using Mendeley Desktop. The key terms used included tracer medicines, tracer commodities, and the availability of health tracer commodities.

2.2.Tracer health commodities

A "tracer commodity" is a product that has been chosen as a program indicator for monitoring product availability at facilities. Instead of monitoring all products, only a small subset of the total number of products needed to deliver a service is chosen for program-level monitoring [12]. According to WHO, groups trace essential medicines into; anaesthetics, preoperative medicines and medical gases, medicines for pain and palliative care, antiallergics and medicines used in anaphylaxis, antidotes and other substances used in poisonings, anticonvulsants/antiepileptics, anti-infective medicines and antimigraine medicines (3).

Tracer medications are drugs that meet the health needs of a community and should always be available, enabling a health system that is always functioning properly. They were chosen based on the evidence available about safety, efficacy, and significance to public health and cost-effectiveness. To avoid stockouts, these three important drugs must be obtained regularly including penicillin, insulin, smallpox, and polio vaccine (5).

The prescription of medicines to patients and clients of health institutions is related to the provision of health services globally. A constant pharmaceutical supply is vital to effective care, hospital confidence, and staff work satisfaction and self-esteem. The goals and objectives of a healthcare system are to improve health quality and health equity while maximizing available resources [13]. An analysis of ten important medications indicated insufficient commodity supply at all levels of the health system in Central African countries. To investigate supply chain characteristics that influence medication availability in Sub-Saharan Africa, a project termed supply chains for community case management was created [13].

Availability of tracer commodities in low resource settings has been poor majorly due to the poor health system and supply chain management practices. A cross-sectional study conducted in Ethiopia by Demessie et al. (2020) found that health facilities had 12 tracer medicines. The average frequency of stockout of tracer medicines was 75 percent. Further, logistic records

were accessible in eight health facilities, and none of them used stock cards. Bin cards were found in 77.8% of tracer medicines, with 86 percent of them being updated [12].

A survey conducted in Ethiopia in 24 health centers revealed that 85.4 percent of non-program tracer drugs (NPTDs) and tracer medicines from program sources were available. The storage condition was 71.8 percent adequate. Bin cards were used by the majority of NPTDs, and the majority of NPTDs had stock record accuracy of less than 10%. The majority of the HCs (88.5%) used a computer system to manage NPDs. Not all workers involved in the handling of medicines waste were aware of the possible risks of hazardous drugs in 12 of the 22 HCs, and 11 (45.8%) of the HCs kept pharmaceutical wastes for 6 to 12 months. The findings also established that the average stock-out days were 48.8 days [14].

In another cross-sectional study which was conducted in Ethiopia, it was indicative that, essential drugs were generally available in 91 percent of cases. During the six months, the average days out of stock for tracer drugs in health facilities was 30.5 days. During the six months, the average frequency of stock out was 0.8. In the examined health facilities, the gap between physical the count and a stock record count of important drugs ranged from 0% to about 60%. Over the course of six months, the six health facilities lost a total of 1337.6 USD due to pharmaceutical expiration. Overall, many necessary drugs were readily available during the data-collecting period. Although it was identified that medicine stockout in the last six months has been significantly higher creating investor management issues [15].

According to a study conducted in Uganda, factors associated with drug availability included drug requisitions, poor logistics distribution, the push of medical products, distribution delays, supplying essential medicines with short expiry dates, and low-usage drugs were identified as some of these factors [16]. Lack of uniformity in supply delivery schedules, failure to recognize the specific characteristics of different health facilities, and a lack of good governance and coordination of Ethiopia's national system, among other things, have all been cited as limiting the availability of Essential Medicines and Medical Supplies (EMMS) [14].

2.3.Human Resource Factors and availability of tracer commodities

In public health institutions, health workers are regarded as critical to providing high-quality care. Bigdeli et al., (2013) investigated access to medications from the standpoint of the health system, examining existing access frameworks. While human resources are one of the

foundations of health systems, the World Health Organization (WHO) only mentions medicine prescribing and dispensing as a core function of health workers. The importance of vital medicine training for health workers cannot be overstated. Health staff must be able to estimate demand and prioritize the demands they get from their institutions [17].

WHO asserts that one of the most important limitations to accomplishing health and development goals is a global scarcity of qualified health workers. The labour shortage is exacerbated by a disparity in worker distribution across countries and a general lack of staffing in rural and distant locations. Health staff is frequently undertrained and underpaid, with little support and equipment, and as a result, are unmotivated. In addition to the low number of health workers providing care, when there is a staff shortage, the quality of services suffers, which undermines patients' trust in the health system. Inadequate health indicators and outcomes are inextricably linked to a mix of poor care quality and limited access to healthcare services [4].

Pharmaceutical care is directly responsible for providing medication-related care that is meant to improve the quality of life of a patient. Preventing overdose, subtherapeutic doses, adverse drug reactions, prescription errors, and ignored indications are all part of pharmaceutical care. In Sub-Saharan Africa (SSA), where 25% of the world's sickness occurs, a lack of pharmacists and limited access to medications complicate disease management [18]. According to a study conducted in Malawi, Rwanda, and Ethiopia more than 95 percent of Community Health Workers who manage health products in Malawi and Rwanda had received supply chain training, whereas only 10% of CHWs in Ethiopia had. Even those CHWs who had been trained in supply chain themes in all three nations were frequently uninformed of standard operating procedures or did not have them readily available for reference. Standard operating procedures were available to 47 percent of CHWs in Malawi, compared to 4 percent in Ethiopia and Rwanda [19].

A study conducted by Lubinga et al. showed that a key challenge in national attempts to increase access to medications and tier 2 service delivery is a lack of qualified pharmacy professionals at the tier 3 service delivery level to manage medicines and supply chains. The demand for pharmacy and pharmaceutical services has risen dramatically, particularly since the onset of the HIV/AIDS epidemic, indicating the need for a comprehensive and long-term expansion of the pharmaceutical workforce in low-income nations [20]. They believe that addressing human resource constraints at the hospital level will improve logistics information flow, supply chain function, and medicines management, resulting in increased public health

facility medicine availability, community access to essential medicines, and better health outcomes.

Task shifting may save money and medical personnel in Uganda during an ART follow-up, as well as help alleviate healthcare worker crises. In absence of licensed employees, clinical healthcare workers such as community health assistants and nursing aid assistants handle pharmacy logistics and supply chain. Diverting cadres from their primary role of direct patient care has harmed them. Inexperienced hospital attendants or lay community people are sometimes assigned to pharmacy duties, resulting in unfavourable patient outcomes and system inefficiencies [20][21].

The majority of the research found that a lack of skilled health professionals in commodity supply chain management is a barrier to the acute scarcity of vital medications in public health institutions. This is primarily due to the supply chain commodities management curriculum not being included in all healthcare personnel's professional training [22].

2.4. Health financing factors and availability of tracer commodities

Having tracer commodities available in a hospital setting in low-income countries has been largely affected by financial implications. In many regions of the world, insufficient budgets are a primary cause of vital medicine stockouts [23]. A study conducted in Kenya investigating factors associated with the availability of tracer medicines revealed that inadequate financing was a major significant factor associated with the availability of tracer commodities [24]. Over 70% of pharmaceuticals are supported by the government in many high-income nations, however public medicine spending in low and middle-income countries (LMIC) does not cover the majority of the population's fundamental needs. Patients in these countries pay between 50 and 90 percent of the cost of medicines [4]. The World Bank classifies Kenya as a middle-income country. Because of the widespread use of user fees at government health facilities, as well as additional out-of-pocket expenditures for NGO and other private health facilities, health care in Kenya is relatively expensive.

A study conducted in Kenya, on the availability of tracer essential medicines, found that sixty percent of study respondents knew how much money was given to their facilities, while 39.8% did not. The findings further revealed that a small drawing right set for some facilities was considered as an obstacle to proper stocking and ordering of critical medications, with insufficient and delayed financial allocations being a primary issue influencing the availability

of tracer essential drugs. Rather than assigning predetermined drawing rights to each facility, it was necessary to allocate a budget based on the actual demands. There was a substantial link between the budget allocated and the availability of tracer critical drugs. Budgetary allocation was statistically significant in impacting the availability of tracer critical drugs [10].

Countries should ensure availability, non-discriminatory physical, economic, and informational accessibility as well as cultural and ethical acceptability of health care. General standards for health services, goods, and facilities must be met without discrimination to preserve everyone's right to health. Everyone's right to health demands affordable health care. This fundamental human right will be infringed upon without effective financial support for healthcare costs. Deficient systems have economic, emotional, and physiological consequences. Patient and family stress is known to be caused by out-of-pocket medical expenses [22].

Kenya Medical Supplies Authority (KEMSA) and Mission for Essential Drugs and Supply (MEDS) are the two key organizations responsible for providing essential medical supplies in Kenya. KEMSA is a government-owned corporation tasked with supplying necessary pharmaceuticals to all public health facilities, institutions, non-governmental organizations, and faith-based organizations (FBOs). MEDS, on the other hand, supplies medications to both FBOs and public health facilities. Before the devolution of health care, the Kenya Medical Supplies Agency procured medicines on behalf of the government (KEMSA). Hospitals place quarterly orders with KEMSA [25].

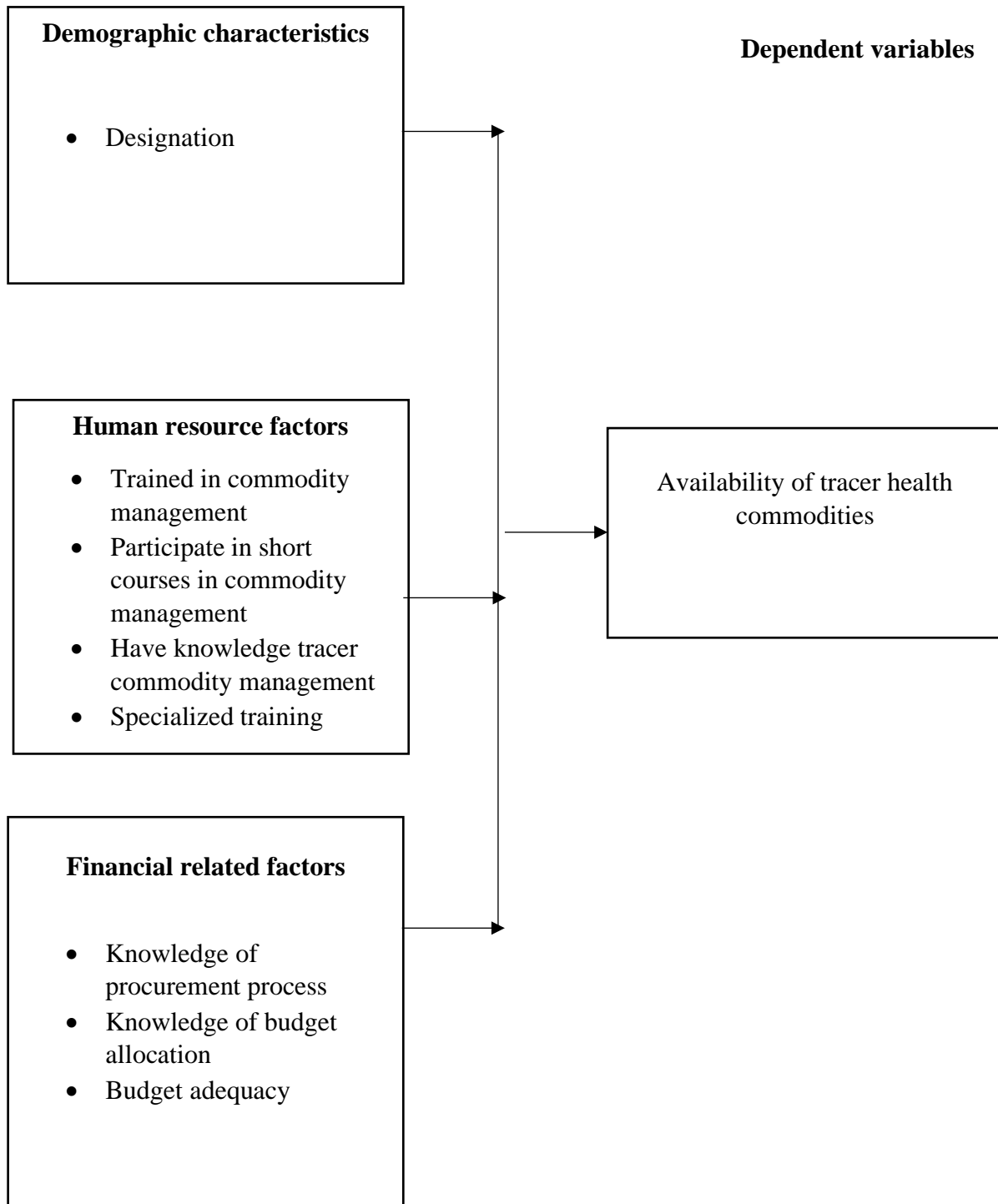
The standard order forms contain a limited number of essential medicines and supply orders which explains the lower rate of availability of tracer health commodities [26]. Due to the huge number of healthcare facilities in Kenya today, an adequate supply of essential medicines required has not been fulfilled. The demand thereof in Kenya exceeds the supply due to factors such as stringent procurement guidelines set by the Public Procurement and Oversight Authority (PPOA), and regulatory functions on procurement by the Pharmacy and Poisons Board (PPB). Suppliers therefore must ensure to comply with the two stated bodies to provide drugs with minimal interruptions [10]. Noncompliance with the two regulatory institutions makes the suppliers have inadequate stock to sell to the public health facilities. Inconsistent demands by health facilities are also a key factor that influences supplier stock levels.

2.5. Summary of literature review

The ability to provide quality healthcare is dependent on the level of preparedness within a healthcare facility. The underlying key components that define the quality of care include the availability of resources. The findings have shown that tracer commodities have remained a major challenge to care delivery with most of the facilities lacking essential medicines limiting the ability to provide quality care. The key factors identified affecting the availability of tracer commodities include human resource factors and health financing. Commitment to improved quality of care is fundamental to a high level of sustainability in healthcare.

2.6. Conceptual framework

Independent variables



Source (Author, 2022)

Figure 1: Conceptual Framework

Independent Variables

It is a variable that stands alone and is not modified by the other variables you are trying to measure. In this research, we will consider the following variables for this study.

(a) Demographic characteristics, which include:

- ❖ Designation
- ❖ Years of experience
- ❖ Specialized education

(b) Human resource factors These include the following:

- ❖ Training in commodity management
- ❖ Participation in short courses in commodity management
- ❖ Knowledge in the management of labeling materials

(c) Financial factors, which include the following:

- ❖ Source of funding
- ❖ Knowledge of suppliers of labeling materials
- ❖ Knowledge of the procurement process
- ❖ Knowledge of how budgetary resources are allocated.
- ❖ Part of the planning process

Dependent Variables

An independent variable is a variable that you manipulate, control, or vary in an experimental study to examine its effects. We will consider the following variables for this study.

- ❖ **Availability of tracer health commodities**

CHAPTER THREE: METHODOLOGY

3.1.Introduction

The chapter explained the data collection, analysis, and reporting procedures. So, the researcher presented the methodologies and tools that were used to collect and evaluate data on supply chain management practices on service quality in Tana River County.

3.2.Research Design

The study design was cross-sectional. This design was appropriate in this case because it provided an understanding by comparison and collaboration of the relevant documents and data from the key informants of the study population about the availability of tracer essential health commodities [27][28].

3.3.Study Area

The study took place in Tana River County health facilities. Tana River County is one of six in the Coast region. It is bounded on all sides by Kitui, Garissa, Isiolo, Lamu, and Kilifi counties. A total of 15 electoral wards and three administrative sub-counties (Bura, Galole, Garsen) make up the County. The County has a total area of 38,862.2 square meters and covers about 35km of the coastal strip, it's a Semi-Arid County. The County has a population of 352,891 A total of 62 healthcare facilities are within the county 1 being a County Referral Hospital, 2 Sub-County hospitals, and 4 Heath Centres (out of the 4, 1 is a Faith Based Organization (FBO) facility) and 55(out of the 55 facilities 3 of them are Faith Based Organization (FBO) facilities) are dispensaries. For the study, I included all the facilities within the county [29], [30]

3.4.Target and Study Population

The target population was all the health facilities within Tana River County and the study population was those facilities owned by the government or Faith-based organizations. These facilities provide the majority of the residents with healthcare services. Therefore, they provided sufficient data required to answer the study questions. The respondents were healthcare workers directly involved in the supply chain management of health commodities. They included health Facility in-charges, Procurement officers, the county director of health, pharmacy assistants, pharmaceutical technologists, accountants, the health committee chairman, CECM Health, Pharmacists, and Medical superintendents. These individuals are appropriate because they had relevant knowledge about the issues under study.

3.5. Inclusion and Exclusion Criteria

3.5.1. Inclusion Criteria

1. All public health facilities within Tana River County.
2. Health facilities that had been operational for more than nine months. This is considered because it is sufficient for county governments to have released funds, procurement process followed, and tracer commodities delivered.
3. Health facilities where the respondents consent to participate in the study.

3.5.2. Exclusion

Any facility that is manned by one person because he/she may be on leave during the study period meaning the facility will be closed.

3.6. Sample

3.6.1 Sample Size

All 62 health facilities owned by the government or Faith Based Organisations in Tana River County were considered. They included One (1) County Referral Hospital, Two (2) Sub-County Hospitals, Four (4) Health Centres, and Fifty Five (55) Dispensaries.

3.6.2. Sampling Technique

A census method was used where all 62 health facilities were investigated.

3.7. Study Tools

The study adopted a structured research questionnaire and an observational checklist. The structured questionnaire included both open and closed-ended questions. Section one of the questionnaire included characteristics of the study respondents who were in-charge in those facilities. Section two of the questionnaire included information on the availability of the tracer health commodities, section three included human resource-related factors and section four included financial-related factors affecting the availability of tracer commodities. A checklist was also used to observe tracer commodities availability in each of the facilities investigated. The checklist was filled by the health facility's main pharmacist with the research assistant counter-checking the accuracy of the responses.

3.8. Recruitment of Research Assistants

The principal investigator used the help of two research assistants to collect information from the sample population. The research assistants were both enrolled pharmaceutical technologists. They were trained on how they will collect data from the study sites using the study tools. This was essential in ensuring that valid, reliable, and accurate data will be obtained. The two assistants were conversant with the geography of the county to enable them to trace the location of the health facilities. Their main role was to collect the data using the questionnaire and checklist and relay the same to the principal investigator. To confirm that data was collected from the respective sites, the principal investigator contacted the health facility in charge before and after the visit using a mobile phone. They were requested to give the details regarding when the visit occurred.

3.9. Data Quality Control

The hospital managers or in-charges in all of the facilities were required to sign a participation sheet that was developed by the researcher containing the name of the facility and the signature of the respondents. This was done to control misinformation and ensure that research assistants reach every facility and collect data. To eliminate duplicate results, the forms were serial numbered. The data was reviewed weekly to ensure accuracy. Continuous data entry was done into a password-protected Epi-data database.

3.10. Pretesting

Pretesting of the data collection tools was done in the Hola County referral hospital because it has several health workers that are of the same qualification (Pharmacy). The respondents in this exercise were excluded from the main study. Ten respondents were included when assessing the questionnaire. The checklist was pretested in the same facility.

3.11. Validity

To ensure internal validity the comments of the respondents used during pre-testing were taken into consideration after two rounds. External validity was achieved by including all the health facilities within the county.

3.12. Reliability

The reliability of the tools was assessed by subjecting them to respondents in two different facilities before the study. The answers given showed whether the tools can be applied to different study populations and achieve the same objectives. Any inconsistencies will be addressed.

3.13. Recruitment and Consenting

The data collection process began immediately after ethical clearance and permission were granted from Tana River County. The researcher recruited a research assistant who helped in the data collection process in the targeted 62 facilities. In each, facility, the researcher sought permission from the facility in charge to allow data collection. Once the permission was granted, the researcher sought informed consent from specific personnel as identified. This was done by explaining the study to the potential participants. Then they were taken through the consenting process and eventually requested to sign the form. The key informants will include facility in-charges, procurement officers, accountants, pharmacists, pharmaceutical technologists, and medical superintendents. Consent was also sought from every participant who agree to participate in the study. Once the consent is signed, data collection was done using a structured questionnaire and checklist.

3.14. Data Collection Procedure

Once consent was obtained, the researcher or his assistants will approach the health facilities. They first reported to the person in charge, explain the study and seek permission to collect the data. After obtaining the permission, they visited the different sections that are involved in managing the supply chain of health commodities. In all these sections, an explanation was provided regarding the study and consent sought from the participants.

The person in charge of the pharmacy was requested to provide data on the availability of tracer commodities. The collection was done using the checklist and asking the necessary questions. The data on the human resource factors were collected from the person in charge of the health facilities. They also provided data on finances. The procurement officers and the accountants provided data on finances and the purchases of medicines.

3.15. Data Analysis

Data were analyzed using STATA Version 14. Descriptive statistics were employed and results were summarized in proportions. Tables were used to present the results.

3.16. Ethical Consideration

3.16.1. Permission

The study sought approval from the KNH-UoN Ethics Committee which reviewed the ethical aspects of the study and NACOSTI permission to collect data. Permission to conduct the study was also sought from the University of Rwanda. Approval was sought from the Tana River County administration to ensure that there is compliance with laid down research procedures and access to patient information within the county.

3.16.2. Confidentiality and privacy

Confidentiality, anonymity, and privacy were fully guaranteed throughout the study. No personal information was captured in this study to ensure that participation in the study is anonymous.

3.16.3. Voluntariness

Participation in the study was voluntary and no coercion was done to any individual to decline to participate in the study. Those who did not consent were excluded from the study.

3.16.4. Covid-19 protocol.

All the Covid-19 prevention guidelines were observed to control cross-infection among research assistants. The research assistant wore face masks and maintained a one-meter distance. The research assistants had hand sanitizers which they used in each interaction with the study participants.

3.16.5. Handling data

Strict confidentiality and anonymity were observed when collecting, storing, and processing data, and in the handling of the results. Collected data in questionnaires and a checklist was stored under lock and key. This document will be stored for a period of five years and after which they will be discarded.

CHAPTER FOUR: RESULTS

4.1.Sociodemographic characteristics

The sociodemographic characteristics are summarised in **Table 4.1** The average age of the respondents was 33.48 (SD±6.6) years and the range was 24 to 58 years The overall participants' mean work experience was 6.8 (SD± 5.95) years and in the respective health facilities was 3.53 (SD±3.02) years.

Table 4.1 Sociodemographic Characteristics (n=60)

Characteristics	Categories	Frequency	Percentage
Gender	Male	41	68.3
	Female	19	31.7
Job Title	CHV	3	5.0
	Pharm Tech	7	11.7
	Nurse	43	71.7
	Clinical officer	7	11.7
Education Level	Diploma	47	78.3
	Higher Diploma	4	6.7
	Degree	3	5.0
	Certificate	6	10.0

From the results, it was observed that majority of the respondents were male (41, 68.33%) and nurses predominated (43,71.67%). Most (47,78.3%) of the participants were diploma holders.

4.2.Availability of tracer health commodities in public health facilities

The mean availability of the tracer commodities was 68.73% with a standard deviation of 14.41 with a range of 27% to 94.6%. Fifty-seven (95%) facilities had stock control cards in place (**Table 4.2**). Fifty-four (90%) were using the stock cards and Forty (66.67%) had them updated meaning that the entries matched the physical stocks. The average lead time was 39 days with a standard deviation of 10.7 days and a range of 22 to 90 days. The fill rate was at 56.8% and the range of 30% to 70 % while the standard deviation was 10.3 days. All the facilities in the county used the manual system of commodity management.

Table 4.2: Availability of Tracer Health Commodities in Public Health Facilities (n=60)

Tracer commodity	Frequency	Percent
Adrenaline Injection 1mg/ml	24	40
Albendazole Tab. 400mg	59	98.33
Amoxicillin Capsules, 250Mg/500Mg	20	33.33
Amoxicillin Dispersible Tablets, 250mg	49	81.67
Benzylopenicillin Injection 1 MU OR 5 MU	46	76.67
Chlorhexidine gel, 7.1% (as digluconate) (20 g tube)	51	85
Gentamicin Injection, 40mg/2ml	25	41.67
Hydrocortisone Injection 100mg	59	98.33
Magnesium Sulphate Injection, 500mg/mL (50%), 10mL	20	33.33
Metronidazole Tablet, 400Mgs/200Mgs	29	48.33
Nystatin oral suspension 100IU/ml	47	78.33
ORS Co-Pack (4 sachets of low osmolarity ORS (500ml formulation) + 10 tablets of dispersible zinc sulfate tablets 20mg)	55	91.67
Oxytocin Injection 10 I.U.	46	76.67
Paracetamol Syrup/Suspension, 120mg/5ml	40	66.67
Paracetamol Tablets, 500mg	33	55
Sodium chloride, 0.9% (isotonic), (500mL bottle)	52	86.67
Sodium hypochlorite solution 4-6%	39	65
Tetracycline Eye Ointment,1%, 3.5g tube	42	70
Autoclaving Tape, 3/4''	45	75
Catheter, Foley's, 18FG 30mL 2-way	38	63.33
Cord Clamp	52	86.67
Cotton Gauze Plain, 36" x 100yds, 1,500g	58	96.67
Cotton Wool, Absorbent, 400g	49	81.67
Gloves, Latex, Examination, Medium	58	96.67
Gloves, Surgical, Size 7.5 (Sterile)	36	60
IV cannula 18G	48	80
IV cannula 20G	43	71.67
Maternity Pad, 26cm x 9cm x 1cm	51	85
Nasal Prongs for Oxygen Delivery, Adult Size	5	8.33
Nasal Prongs for Oxygen Delivery, Paediatric Size	6	10
Solusets for Fluids	27	45
Surgical Blade with Handle, Size 23	42	70
Suture Nylon No.2/0,3/8 Circle, 45mm, 100cm, RCN	46	76.67
Suture Polyglactin 2/0 75cm on 40Mm ½ Circle RBN	27	45
Syringe 2mL + needle 23G x 1"	53	88.33
Syringe 5mL + needle 21G x 1.5"	56	93.33
Zinc Oxide Strapping, 7.5cm x 4.5m	56	93.33

4.3. Human resource-related factors affecting the availability of tracer health commodities.

Human resource factors affecting the availability of tracer commodities were assessed as shown in **Table 4.3**. The findings revealed that 27(45%) respondents had trained in commodity management in the last 6 months while 36(60%) had trained in commodity management since employment. Half of the participants acknowledged that the training was very relevant. The majority (53, 88.33%) of the participants who dispensed health commodities were community health volunteers.

Table 4.3: Human resource factors influencing the availability of tracer commodities

Human resource factor	Frequency	Percent
Trained in commodity management in the last 6 months	27	40
Trained in commodity management since employment	36	60
Duration since the last training		
1 - 2 years	9	25.0
3 - 4 years	22	61.1
5 years and above	5	13.9
Number of times participants had been trained		
3-4 times	29	48.3
More than 5 times	13	21.7
1-2 times	18	30.0
Qualification of the person dispensing health commodities		
Pharmaceutical technicians	7	11.7
Community Healthy volunteer	53	88.3

4.3.1. Regression analysis of Human resource factors influencing the availability of Tracer commodities

Regression analysis was conducted to investigate the association between availability of medicines and human resource factors using linear regression analysis (**Table 4.3.1**). This is appropriate since the availability of medicines is a continuous variable.

Further analysis was performed to investigate determinants of the availability of tracer health commodities using linear regression. Availability of tracer commodities was 4.56 times higher in facilities which had personnel who had trained in commodity management since employment, ($\beta = 4.56$, 95%CI: 2.29 - 11.21, $p=0.012$). The findings also revealed that facilities that had pharmaceutical technologists dispensing commodities had 2.85 times increase in their availability of tracer commodities, $\beta = 2.85$, 95%CI: 1.29 – 5.21, $p=0.005$. as shown in **Table 4.3.1**

Table 4.3.1. Regression analysis of human resource factors influencing the availability of tracer commodities

Human resource factors	Beta(95%CI)	P value
Trained in commodity management in the last 6 months	2.375(-4.29 - 8.21)	0.470
Trained in commodity management since employment (4.56(2.29 - 11.21)	0.012
Number of times trained	2.24(-1.29 - 5.21)	0.235
Responsible for dispensing (Pharmaceutical technicians)	2.85(1.29 - 5.21)	0.005

4.4. Financing-related factors affecting the availability of tracer health commodities.

Different categories of the level of care influenced the amount received. Fifty-three (88.33%) facilities were Level two which are also called Dispensaries while four (6.67%) were Level 3 also known as Health centers. In addition, two (3.33%) were level 4 facilities also called sub-county hospitals and there was one (1.76%) level 5 also known as the County Referral Hospital. The average amount allocated to each facility for the purchase of commodities was Kshs

679,592. The range was from Kshs 211,230 to Kshs 2,867,794. The standard deviation was Kshs 663,874 which shows a wide variation in the amount allocated to these health facilities. No facility received an adequate budgetary allocation for the purchase of health commodities and the disbursement was done half yearly.

Table 4.4: Finance-related factors influencing the availability of tracer commodities

	Frequency	Percent
Level of care facility		
Dispensary	53	88.1
Health center	4	5.9
Sub county hospital	2	4.0
County referral	1	2.0
Average amount, Median (IQR) Ksh	679,592 (211, 230 – 2,867, 794)	
Budgetary allocation adequacy		
No	55	91.7
Yes	5	8.3
Receiving budgetary allocation		
No	5	8.3
Yes	55	91.7

4.4.1. Regression analysis of financial factors influencing the availability of tracer commodities

Linear regression analysis was conducted to investigate the relationship between financial factors and availability of tracer commodities as shown in **Table 4.4.1**. The findings showed that county and sub-county-level health facilities had higher availability of tracer commodities at 19.11%, $\beta = 19.11$, 95%CI: 7.39 – 30.83, $p=0.002$. Facilities that had disbursement of budgetary allocation on time had a 12.08% increase in their availability of tracer commodity, $\beta = 12.08$, 95%CI: 3.11 – 23.57, $p=0.002$ as shown in **Table 4.4.1**.

Table 4.4.1: Regression analysis of facility and financial factors influencing the availability of tracer commodities.

Factors	Beta(95%CI)	P value
Type of facility		
Health center	0.03(-10.01 - 13.43)	0.773
County hospitals	19.11(7.39 -30.83)	0.002
Financial factors		
Budgetary allocation adequacy	1.44(-10.04 - 12.93)	0.804
Receive budgetary allocation on a time	12.08(3.11 - 23.57)	0.039

4.5. Multiple regression analysis of factors influencing availability of tracer commodities.

Multiple regression analysis identified that training in commodity management since employment and county/sub-county level health facilities were significant factors influencing availability of tracer commodities. Facilities that had dispensing personnel who had trained in commodity management since employment had higher availability of tracer commodities by 3.22%, $\beta = 3.22$, 95%CI: 1.45 – 11.61, $p = 0.002$. County/sub-county level health facilities had higher availability of tracer commodities by 20.52%, $\beta = 20.52$, 95%CI: 4.25 – 36.79, $p = 0.014$ as shown in **Table 4.5**.

Table 4.5: Multiple regression analysis of factors influencing availability of tracer commodities.

Factors	Beta(95%CI)	P-value
Trained in commodity management since employment	3.22(1.45 - 11.61)	0.002
Responsible for dispensing (Pharmaceutical technicians)	-2.11(-6.31 - 5.12)	0.132
County/Sub County level facilities	20.52(4.25 - 36.79)	0.014
Receive budgetary allocation on a time	-3.31(-14.02 - 7.40)	0.642

CHAPTER FIVE: DISCUSSION, CONCLUSION, AND RECOMMENDATIONS

DISCUSSION

5.1. Availability of tracer commodities

The findings showed that the availability of tracer commodities was moderate considering their use in a hospital setting. These findings are comparable to a study conducted in Ethiopia which found that the average availability of tracer commodities was 64.8% with a stock-out rate of 64.9% [31]. Most health facilities have moderate amounts of tracer commodities for several reasons, including limited funding, limited storage space, limited demand, and supply chain challenges. While having moderate amounts of these commodities can be challenging, it is essential to ensure that health facilities can provide high-quality medical care to those in need. Health facilities must balance the need to have enough tracer commodities on hand with the need to operate within budget constraints and storage limitations.

The availability of tracer commodities was higher compared to those from another study in Ethiopia which found that the overall mean availability, mean duration, and average frequency of stock out of tracer drugs (last 6 months) were 74.7%, 48.8 days, and 1.43, respectively. On average, 77.8% of the tracer drugs had bin cards, of which, 86% were updated. The discrepancy between physical count and stock-keeping records ranged from 0% to 100%. The causes of stock out were inadequate supply, lack of recording forms, and their inconsistent use [12]. These findings illustrate that records are a critical component of medical facilities and are essential in providing medical care to patients. In hospitals, bins are commonly used as tracer commodities to track the movement of fluids or substances within the body. The availability of these bins in hospitals is crucial to ensure high-quality medical care. The present findings were higher compared to another study in Ethiopia which found that the availability of essential drugs was 91% [15]. The higher availability in this study was associated with the study setting.

The availability of tracer commodities was evaluated in county hospitals including level-one facilities which were experiencing challenges in procuring medical supplies. However, in their study, they included a referral facility that is expected to have high availability of tracer commodities. The availability of tracer commodities in health facilities can vary significantly between main referral health facilities and local lower-tier health facilities. The factors that impact the availability of these commodities are complex and multifaceted, including funding, infrastructure, the availability of trained healthcare professionals, the cost of these

commodities, and political and social factors. It is essential to address these factors to ensure that all people, regardless of their income level, have access to the high-quality medical care that they need.

5.2.Human resource factors associated with the availability.

Institutions that had healthcare personnel trained in commodity management since employment had a high level of availability of these tracer commodities. Training promotes individual knowledge level and ability to make informed choices relating to the procurement of these commodities. An individual who understands the importance of tracer commodities and when to report reduced stock is likely to control the rate of stock out and improve availability. These findings are comparable to a report published by the World Health Organization which reported that global scarcity of qualified health workers limits the general accomplishment of health and development goals. The report further explained that health workers are usually undertrained, underpaid, and lack resources, which makes them unmotivated. When there is a staff shortage, patients' trust in the healthcare system is undermined in addition to the low number of health professionals offering care. A combination of poor care quality and restricted access to healthcare providers is intimately connected to inadequate health indicators and outcomes [4]. Similar findings were obtained from a study by Lubinga et al. which showed that a key challenge in national attempts to increase access to medications and tier 2 service delivery is a lack of qualified pharmacy professionals at the tier 3 service delivery level to manage medicines and supply chains [20]. A recent study in Kenya by Munga et al. investigating the availability of tracer medicines established that the lack of training of healthcare workers in commodity management affected the availability of the commodities [10].

The cadre of healthcare professionals dispensing medicines was a key predictor of the availability of tracer commodities. In health facilities where pharmaceutical technicians were responsible for dispensing tracer commodities, availability was higher. These findings are consistent with those from Uganda which established that the availability of tracer commodities was influenced by the personnel handling the commodities [32]. The ability to know when to restock or when there is an impending shortage is dependent on individual awareness and the ability to improve efficiency. Lack of skilled health professionals in commodity supply chain management is a major barrier to the availability of vital medications in public health institutions [22].

5.3.Financing-related factors affecting the availability of tracer health commodities.

The level of the health facilities influenced the availability of tracer commodities with county hospitals (sub-county and county hospitals) showing a higher availability of tracer commodities. The level of hospital defines the urgency of care which outlines the greater need for tracer commodities. These findings are comparable to a study done in Nyeri County by Munga et al. which found that lower-tier hospitals (level 1 -3) had lower availability of tracer commodities compared to higher-tier hospitals (level 4 and level 5). The prioritization of high-level hospitals was mainly informed by high emergency cases and the fact that they also act as referral facilities [10]. Further, Aynoshe et al., also found that high-level facilities had a high level of availability of tracer commodities than lower-level facilities [31]. Higher-level hospitals may have more resources and funding to invest in quality improvement initiatives, including medication safety programs that incorporate the use of tracer medicines. These hospitals may also have a larger volume of patients and medications, which could increase the need for tracer medicines.

Facilities that receive budgetary allocation on time had a high rate of availability of tracer commodities. The financial aspect is essential in the availability of tracer commodities. These commodities need to be effectively procured before they are availed to the hospital. A study in Kenya found that inadequate financing is a major significant factor associated with the availability of tracer commodities. Most high-income countries subsidize over 70% of pharmaceuticals, whereas public medical spending in low and middle-income countries (LMIC) falls short of meeting the majority of the population's basic needs [33]. Between 50% and 90% of the price of medicines is covered by patients in these nations [4]. Another study in Kenya revealed that there was a substantial link between the budget allocated and the availability of tracer-critical drugs. Budgetary allocation was statistically significant in impacting the availability of tracer critical drugs [10]. The availability of finances can certainly impact the availability of tracer commodities in healthcare settings. Tracer commodities are typically used as part of quality improvement initiatives, and such initiatives require funding to be implemented effectively. Without adequate funding, hospitals may struggle to procure tracer commodities and other necessary resources to support medication safety programs.

5.4. Conclusions

- The availability of tracer health commodities was above 50% of the recommended during the study.
- On Human Resources, the training of the health personnel on commodity management was found to be a significant factor influencing the availability of tracer commodities.
- On Health Financing the Level of care of that facility was found to influence the availability of tracer commodities.

5.5. Recommendations

5.5.1 Recommendations for Policy and Practice

The study recommended that regular training for changes in treatment guidelines and updates that are relevant to the work should be given to the medical staff to ensure quality service provision.

5.5.2. Recommendations for Further Research

The study recommends further research be conducted to investigate.

1. The link between procurement procedures and the efficiency in the availability of tracers' health commodities
2. The effect of integration of health IT in ensuring efficiency in the availability of tracers' health commodities.

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APPENDICES

Appendix

I:

Ethical

Approval



UNIVERSITY OF NAIROBI
FACULTY OF HEALTH SCIENCES
P O BOX 19676 Code 00202
Telegrams: varsity
Tel: (254-020) 2726300 Ext 44355

KNH-UoN ERC

Email: uonknh_erc@uonbi.ac.ke
Website: <http://www.erc.uonbi.ac.ke>
Facebook: <https://www.facebook.com/uonknh.erc>
Twitter: @UONKNH_ERC https://twitter.com/UONKNH_ERC



KENYATTA NATIONAL HOSPITAL
P O BOX 20723 Code 00202
Tel: 726300-9
Fax: 725272
Telegrams: MEDSUP, Nairobi

Ref: KNH-ERC/A/405

12th October, 2022

Dr. Japheth Ayako Araka
Reg No. 221028870
School of Public Health-Health Supply Chain Management
College of Medicine & Health Sciences
University of Rwanda



Dear Dr. Araka,

RESEARCH PROPOSAL: FACTORS EFFECTING AVAILABILITY OF TRACER HEALTH COMMODITIES IN PUBLIC FACILITIES AT TANA RIVER COUNTY KENYA (P385/05/2022)

This is to inform you that KNH-UoN ERC has reviewed and approved your above research proposal. Your application approval number is **P385/05/2022**. The approval period is 12th October 2022 – 11th October 2023.

This approval is subject to compliance with the following requirements;

- i. Only approved documents including (informed consents, study instruments, MTA) will be used.
- ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by KNH-UoN ERC.
- iii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to KNH-UoN ERC 72 hours of notification.
- iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH-UoN ERC within 72 hours.
- v. Clearance for export of biological specimens must be obtained from relevant institutions.
- vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
- vii. Submission of an executive summary report within 90 days upon completion of the study to KNH-UoN ERC.

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) <https://research-portal.nacosti.go.ke> and also obtain other clearances needed.

Yours sincerely,



DR. BEATRICE K.M. AMUGUNE
SECRETARY, KNH-UoN ERC

- c.c. The Dean, Faculty of Health Sciences, UoN
 The Senior Director, CS, KNH
 The Assistant Director, Health Information Dept., KNH
 The Chairperson, KNH- UoN ERC
 The Director, School of Public Health-Health Chain Management, University of Rwanda
Supervisors: Dr. Peter N Karimi, Dept of Pharmacy, UoN/University of Rwanda
 Dr. Shital M Maru, Dept of Pharmacy, UoN/University of Rwanda



REPUBLIC OF KENYA

Ref No: 651153



NATIONAL COMMISSION FOR
SCIENCE, TECHNOLOGY & INNOVATION

Date of Issue: 21/November/2022

RESEARCH LICENSE



This is to Certify that Dr. Japheth Araka Ayako of University of Rwanda, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Tanariver on the topic: FACTORS EFFECTING AVAILABILITY OF TRACER HEALTH COMMODITIES IN PUBLIC FACILITIES AT TANA RIVER COUNTY, KENYA. for the period ending : 21/November/2023.

License No: NACOSTI/P/22/21614

651153

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR
SCIENCE, TECHNOLOGY &
INNOVATION

Verification QR Code



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See overleaf for conditions

THE SCIENCE, TECHNOLOGY AND INNOVATION ACT, 2013 (Rev. 2014)

Legal Notice No. 108: The Science, Technology and Innovation (Research Licensing) Regulations, 2014

The National Commission for Science, Technology and Innovation, hereafter referred to as the Commission, was established under the Science, Technology and Innovation Act 2013 (Revised 2014) herein after referred to as the Act. The objective of the Commission shall be to regulate and assure quality in the science, technology and innovation sector and advise the Government in matters related thereto.

CONDITIONS OF THE RESEARCH LICENSE

1. The License is granted subject to provisions of the Constitution of Kenya, the Science, Technology and Innovation Act, and other relevant laws, policies and regulations. Accordingly, the licensee shall adhere to such procedures, standards, code of ethics and guidelines as may be prescribed by regulations made under the Act, or prescribed by provisions of International treaties of which Kenya is a signatory to
2. The research and its related activities as well as outcomes shall be beneficial to the country and shall not in any way:
 - i. Endanger national security
 - ii. Adversely affect the lives of Kenyans
 - iii. Be in contravention of Kenya's international obligations including Biological Weapons Convention (BWC), Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO), Chemical, Biological, Radiological and Nuclear (CBRN).
 - iv. Result in exploitation of intellectual property rights of communities in Kenya
 - v. Adversely affect the environment
 - vi. Adversely affect the rights of communities
 - vii. Endanger public safety and national cohesion
 - viii. Plagiarize someone else's work
3. The License is valid for the proposed research, location and specified period.
4. The license any rights thereunder are non-transferable
5. The Commission reserves the right to cancel the research at any time during the research period if in the opinion of the Commission the research is not implemented in conformity with the provisions of the Act or any other written law.
6. The Licensee shall inform the relevant County Director of Education, County Commissioner and County Governor before commencement of the research.
7. Excavation, filming, movement, and collection of specimens are subject to further necessary clearance from relevant Government Agencies.
8. The License does not give authority to transfer research materials.
9. The Commission may monitor and evaluate the licensed research project for the purpose of assessing and evaluating compliance with the conditions of the License.
10. The Licensee shall submit one hard copy, and upload a soft copy of their final report (thesis) onto a platform designated by the Commission within one year of completion of the research.
11. The Commission reserves the right to modify the conditions of the License including cancellation without prior notice.
12. Research, findings and information regarding research systems shall be stored or disseminated, utilized or applied in such a manner as may be prescribed by the Commission from time to time.
13. The Licensee shall disclose to the Commission, the relevant Institutional Scientific and Ethical Review Committee, and the relevant national agencies any inventions and discoveries that are of National strategic importance.
14. The Commission shall have powers to acquire from any person the right in, or to, any scientific innovation, invention or patent of strategic importance to the country.
15. Relevant Institutional Scientific and Ethical Review Committee shall monitor and evaluate the research periodically, and make a report of its findings to the Commission for necessary action.

National Commission for Science, Technology and
Innovation(NACOSTI),
Off Waiyaki Way, Upper Kabete,
P. O. Box 30623 - 00100 Nairobi, KENYA
Telephone: 020 4007000, 0713788787, 0735404245
E-mail: dg@nacosti.go.ke
Website: www.nacosti.go.ke

Appendix II: Consent Form

The Study Title: **FACTORS AFFECTING AVAILABILITY OF TRACER HEALTH COMMODITIES IN PUBLIC FACILITIES AT TANA RIVER COUNTY, KENYA.**

Introduction

My name is Dr. Japheth Ayako, a student at University of Rwanda undertaking a Master of Science in Health Supply Chain Management.

Participation in the study

Your participation in this study will be on a voluntary basis, and you may decide to withdraw from the study at any stage without any penalty. The study is purely descriptive, non-invasive, and will not attract any cost to your part.

Study Procedure

I, the principal investigator, together with my research assistants, will give you a full explanation of the procedure before you participate in this study. You will be required to answer the questions as asked in the questionnaire. The research assistants will help in making any clarifications regarding the questions. The completion of this questionnaire will take approximately 25 minutes of your time.

Confidentiality

Your identity will be protected with utmost confidentiality during the study. There are no identifiers that you will provide.

Risks and or discomforts

There are no known risks in the participation in the study. You are encouraged to discuss any discomfort or distress with the research assistant openly.

Benefits during the study

The study will help in documenting the availability of tracer health commodities in each of the health facilities. This will be essential in planning and provision of care services within the county while assessing each facility.

Harm during the study

The study is purely descriptive and will not cause any physical harm to you.

Communication

In case of any clarifications or queries during and after the study, you are free to contact me: Japheth Ayako on my Phone at +254 720 086921 or my Supervisor: Dr. Karimi on: 0722 436019. You may also contact the Chair, KNH-UoN ERC email: uonknherc@uonbi.ac.ke or +254 721 257746, (020) 318262 Ext.28250.

Thank you.

Signature

(Participant) Date.....

I confirm that I have clearly explained to the participant the nature of the study and the contents of this consent form in detail, and the participant has decided to participate voluntarily without any coercion or under pressure.

Signature (Researcher).....Date.....

Appendix III: Questionnaire

Facility Name.....

MFL Code.....

QUESTIONNAIRE

Please respond to all the questions

Section A: Demographic characteristics

1. What is your age?.....

2. What is your gender?

Male [0] Female [1]

3. What is your academic qualification?

Diploma [0] Higher diploma [1] Degree [2] Post graduate [3] Certificate [4]

4. What is your designation?

CHV [0] Pharmacist [1] Pharm. Tech [2] Nurse [3] Clinical officer [4]

5. How many years have you worked in this facility?

6. How many years have you handled issues with Commodity management previously.....

Section B: Human Resources

7. Have you attended short course on commodity management in the last six months?

Yes [1] No [0]

8. Have you attended any short course on commodity management since employment?

Yes [1] No [0]

9. If yes what period back did you take the training?

1-2 Yrs. [0] 3-4 Yrs. [1] 5 and above Yrs. [2]

10. If yes, on No.8 Above then how many times?

1-3 times [0] 4-6 times [1] More than 6 times [2]

11. Kindly indicate how relevant the training was to you?

Very relevant [0] Relevant [1] Somehow relevant [2] Not relevant [3]

12. Who does commodity dispensing at the facility?

Pharmacist [0] Pharm. Tech [1] Nurse [2] Community Health Volunteer [3]

Please rate the following

	I Disagree	Neutral	I Agree
13. There is need for health commodity management training in a health facility	1	2	3
14. Commodity management training improves quality of healthcare	1	2	3
15. Commodity management training ensures availability of essential medicines	1	2	3
16. Commodity management training ensures efficient storage and distribution of essential medicines	1	2	3
17. Commodity management training ensures rational use of essential drugs	1	2	3

Section C: Finance

18. What is the level of care of your facility?

Level 2 [1] Level 3 [2] Level 4 [3] Level 5 [4]

19. What allocation of budget for essential medicines does your facility get? (Kshs.).....

20. Do you consider the budgetary allocation to your facility to be adequate according to the quantification needs?

Yes [1] No [0]

21. Does your facility get disbursements of its budgetary allocation for essential medicines?

Yes [] No [0]

22. If yes how often is the budgetary allocation

Quarterly [1] Half yearly [2] Yearly [3] Never [3]

Section D: Availability of tracer medicines

23. Availability of Bin Cards Yes [1] No [0]

24. Are they in Use Yes [1] No [0]

25. Are they updated according to physical stocks Yes [1] No [0]

26. Which was the last Month you generated an Order?

27. Which month was the delivery received according to order?

28. What was the lead time in days for the order?

29. What was the percentage Fill rate for the order?

30. Commodity management system Manual [0] Electronic [1]

Appendix IV: Checklist:**Availability of Tracer Medicines**

	TRACER COMMODITY	YES	NO	DAYS OUT OF STOCK
1.	Adrenaline Injection 1mg/ml			
2.	Albendazole Tab. 400mg			
3.	Amoxicillin Capsules, 250Mg/500Mg			
4.	Amoxicillin Dispersible Tablets, 250mg			
5.	Benzyl penicillin Injection 1 MU OR 5 MU			
6.	Chlorhexidine gel, 7.1% (as digluconate) (20 g tube)			
7.	Gentamicin Injection, 40mg/2ml			
8.	Hydrocortisone Injection 100mg			
9.	Magnesium Sulphate Injection, 500mg/mL (50%), 10mL			
10.	Metronidazole Tablet, 400Mgs/200Mgs			
11.	Nystatin oral suspension 100IU/ml			
12.	ORS Co-Pack (4 sachets of low osmolarity ORS (500ml formulation) + 10 tablets of dispersible zinc sulphate tablets 20mg)			
13.	Oxytocin Injection 10 I.U.			
14.	Paracetamol Syrup/Suspension, 120mg/5ml			
15.	Paracetamol Tablets, 500mg			
16.	Sodium chloride, 0.9% (isotonic), (500mL bottle)			
17.	Sodium hypochlorite solution 4-6%			
18.	Tetracycline Eye Ointment, 1%, 3.5g tube			
19.	Autoclaving Tape, 3/4''			
20.	Catheter, Foley's, 18FG 30mL 2-way			

21.	Cord Clamp			
22.	Cotton Gauze Plain, 36" x 100yds, 1,500g			
23.	Cotton Wool, Absorbent, 400g			
24.	Gloves, Latex, Examination, Medium			
25.	Gloves, Surgical, Size 7.5 (Sterile)			
26.	IV cannula 18G			
27.	IV cannula 20G			
28.	Maternity Pad, 26cm x 9cm x 1cm			
29.	Nasal Prongs for Oxygen Delivery, Adult Size			
30.	Nasal Prongs for Oxygen Delivery, Paediatric Size			
31.	Solusets for Fluids			
32.	Surgical Blade with Handle, Size 23			
33.	Suture Nylon No.2/0,3/8 Circle, 45mm, 100cm, RCN			
34.	Suture Polyglactin 2/0 75cm on 40Mm ½ Circle RBN			
35.	Syringe 2mL + needle 23G x 1"			
36.	Syringe 5mL + needle 21G x 1.5"			
37.	Zinc Oxide Strapping, 7.5cm x 4.5m			

The percentage of tracer medicines available in the facility

(Number available*100/ 37) _____

Appendix V: Dummy Tables

Dummy Table 1: Demographic characteristics

	Frequency	Percentage
Demographic factors		
Age of respondents (yrs.)		
<30- 20		
31-40		
41-50		
>51		
Designation		
Pharmacist		
Pharm. tech		
Nurse		
Clinical officer		
Other		
Academic qualification		
Postgraduate		
Degree		
Higher diploma		
Diploma		
Other		

Dummy Table 2: Human resource factors

Trained on commodity management	Frequency Percent	
Yes	xx	xx
No	xx	xx
Total	xx	xx
Number of times trained		
1 – 2 times		
3 – 6 times		
More than 6 times		

	Disagree n (%)	Neutral n (%)	Agree n (%)
There is need for health commodity	Xx	Xx	Xx
management training in a health facility	Xx	Xx	Xx
Commodity management training improves quality of healthcare	Xx	Xx	Xx
Commodity management training ensures availability of essential medicines	Xx	Xx	Xx
Commodity management training ensures efficient storage and distribution of essential medicines	Xx	Xx	Xx
Commodity management training	xx	xx	xx

Appendix VI: Similarity Report

FACTORS EFFECTING AVAILABILITY OF TRACER HEALTH COMMODITIES IN PUBLIC FACILITIES AT TANA RIVER COUNTY, KENYA.

ORIGINALITY REPORT

13%	7%	6%	6%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

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Availability of Tracer Drugs and Implementation of Their Logistic Management Information System in Public Health Facilities of Dessie, North-East Ethiopia

", Integrated Pharmacy Research and Practice, 2020

Publication

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