EVALUATING THE IMPLEMENTATION EFFICIENCY OF ANTIMICROBIAL STEWARDSHIP PROGRAMS IN REDUCING THE BURDEN OF ANTIMICROBIAL RESISTANCE AT DAR ES SALAAM REGIONAL REFERRAL HOSPITALS

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By

Berthania Paul Magesa

A Dissertation submitted in (Partial) Fulfilment of the Requirements for the degree of Master of Science of Project Management, Monitoring and Evaluation in Health (PMMEH) of Muhimbili University of Health and Allied Sciences.

October 2024

CERTIFICATION

The undersigned certify that they have read and hereby recommend for acceptance by the Muhimbili University of Health and Allied Sciences a dissertation entitled; **"Evaluating the Implementation Efficiency of Antimicrobial Stewardship Programs(ASPs) in Reducing the Burden of Antimicrobial Resistance at Dar es Salaam regional referral hospitals"** in (partial)fulfilment of the requirements for the degree of Master of Science of Project Management, Monitoring and Evaluation in Health (PMMEH) of Muhimbili University of Health and Allied Sciences.

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Date: _____

DECLARATION AND COPYRIGHT

I, **Berthania Paul Magesa,** declare that this **dissertation** is my original work and that it has not been presented and will not be presented to any other university for similar or any other degree award.

Signature……. Date…….

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Finally, I would like to express my gratitude to my classmates who took the initiative to comfort me and support me in completing my studies.

DEDICATION

I dedicate this work to my Family, my late brother Reguregu Michael Magesa, whose passing left a void in my heart but courage carried me through the tough times and gave me strength and resilience to fight for the future we envisioned for both of us. To my beloved parents Mr. Paul Magesa and Mrs. Bunka Regina Matogolo who have always believed in me, prayed for me and with me to achieve every milestone that I set.

ABSTRACT

Background: Antimicrobial resistance (AMR) is a global public health concern affecting hospital and community-acquired infections. It increases the risk of disease spread, severe illness, and death. Multidrug-resistant, extensively drug-resistant, and pan drug-resistant bacteria complicate infection treatment. Antimicrobial Stewardship Programs (ASP) aim to curb drug resistance by enhancing the appropriate use of antimicrobials. Despite implementation in Tanzanian hospitals, AMR burden remains high. This study aims to evaluate the efficiency of ASPs and their impact on treating infections.

Objectives: To evaluate the implementation efficiency of antimicrobial stewardship programs in reducing the burden of AMR at Dar es Salaam Regional Referral Hospitals.

Methodology: This study utilized an exploratory qualitative case study design to investigate experiences and practices across three regional referral hospitals in Dar es Salaam. 11 participants were purposively selected based on their relevance to the research objectives. Data were collected through semi-structured key informant interviews and supplemented by document reviews to gain a comprehensive understanding of each case. Interviews were audio-recorded, transcribed verbatim, and analyzed using Braun and Clarke's (2006) thematic analysis method. This systematic approach involved coding and identifying patterns across the data, enabling the extraction of meaningful themes to provide insights into the studied phenomena.

Results: The findings of this study highlighted four themes, (1) Adherence to ASP policies and Guidelines, (2) Implementation of ASP in improving healthcare outcomes, (3) Institutional support and facilitators of ASP, and (4) Challenges and Barriers in Program Implementation. Implementing Antimicrobial Stewardship Programs (ASP) in these RRHs to some extent improved adherence to clinical guidelines and reduced prescription errors. Enhanced diagnostic accuracy and targeted empirical treatments led to better patient outcomes. Success was driven by supportive leadership and

comprehensive training, though challenges like funding limitations, high workloads, and coordination issues remained.

Conclusion and recommendation: The implementation of Antibiotics for Prevention (ASP) at Temeke, Mananyamala and Amana hospitals significantly improved antibiotic use and patient care, despite challenges like funding, workloads, and coordination, emphasizing the need for effective leadership and training. The National AMR multi-sectoral Coordination Committee should make efforts to prioritize management while integrating ASP with other programs like IPC. In collaboration with other implementing partners, the Ministry of Health should offer financial support to healthcare facilities to strengthen ASP efforts and interventions.

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ABBREVIATIONS

AMR	Antimicrobial Resistance
ASP	Antimicrobial Stewardship Programs
AST	Antimicrobial Susceptibility Testing
AWaRE	Action, Watch Reserve
CME	Continuous Medical Education
ICU	Intensive Care Unit
IPC	Infection, Prevention and Control
IP'S	Implementing Partners
IRB	Institutional Review Board
KII	Key Informant Interview
LMIC	Low and Middle Income Countries
MENA	Middle East and Northern America
MOI	Medical Officer In-Charge
MUHAS	Muhimbili University of Health and Allied Sciences
NAP	National Action Plan
NHIF	National Health Insurance Fund
QA	Quality Assurance
RRH	Regional Referral Hospitals
SSA	Sub Saharan Africa
STG's	Standard Treatment Guidelines
USA	United States of America
WHO	World Health Organization

DEFINITION OF TERMS

Antibiotic resistance	Is defined as the resistance of microorganisms to an antimicrobial agent to which they were at first sensitive. This occurs when the disease-causing organisms change over time and no longer respond to antimicrobial drugs (1)
Antimicrobial Stewardship Programs	Are systems-wide or organizational approaches to health care that use evidence-based interventions to encourage the proper use of antibiotics (2)
Barriers	Are a situation or obstruction that separates things or people, hinders communication, or impedes progress.
Efficiency	Is the quality of being efficient, i:e, Accomplishing project tasks or activities resourcefully.
Facilitators are	situations or things that supports and enables implementation
Implementation	Is the process of executing plans, procedures and activities.
Interventions	Are a mix of program components or tactics intended to influence behavior or enhance the health of a population as a whole.
Stewardship	Is leading, overseeing, or managing an activity. in particular, the cautious and accountable administration of something entrusted to one's care.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Antimicrobial resistance (AMR) is a significant global burden that challenges public health, healthcare systems, and economies worldwide. The emergence and spread of AMR have been recognized as a critical threat, impacting both hospital and community-acquired infections. (3) Evidence shows that globally AMR was directly responsible for 1.2 million deaths and associated with 4.95 million deaths in 2019 (4).

Since AMR is a naturally occurring and transmissible survival mechanism in bacteria, widespread antibiotic use contributes to a sharp rise in the global burden of AMR, endangering the drugs' potential therapeutic benefits.(5) Worldwide tactics have been devised to maintain the efficacy of current antibiotic agents (6).

Antimicrobial Stewardship Programs(ASP)have been a major institutional strategy to reduce AMR since 2015 when the Global Action Plan on AMR was initiated (7). ASP can be a systemic or organizational approach to health care that uses evidence-based interventions to support the appropriate use of antibiotics (8). These programs typically involve a multidisciplinary approach, engaging all healthcare professionals to ensure comprehensive and coordinated efforts in optimizing antimicrobial use (9).

Antimicrobial stewardship programs (ASPs) have the potential to prolong the effective life of antibiotics and improve their utilization, all the while researching and creating novel antibiotics. It focuses on maximizing the use of antibiotics including monitoring and disclosing data on antibiotic use and resistance, educating patients about resistance and the best ways to prescribe medication, and limiting the use of specific medications without authorization (5) for optimal antibiotic use.

The feedback loop between prescribers, dispensers and laboratory testing allows for interventions and discussions with prescribers, educational initiatives, and peer

comparisons among health facility workers to improve and align prescribing practices with established guidelines (10).

Antibiotic stewardship has several advantages, such as better patient outcomes, fewer adverse events, increased rates of antibiotic susceptibilities to specific antibiotics, and optimal resource use throughout the continuum of care (11).

AMR in common hospital pathogens is being addressed in Tanzania, but rates are still rising (12). This study will comprehend how healthcare professionals view the successful application of ASP, allowing the government and policymakers to create interventions that are well suited and coordinated to ensure the efficiency of these programs**.**

1.2 Description of Intervention

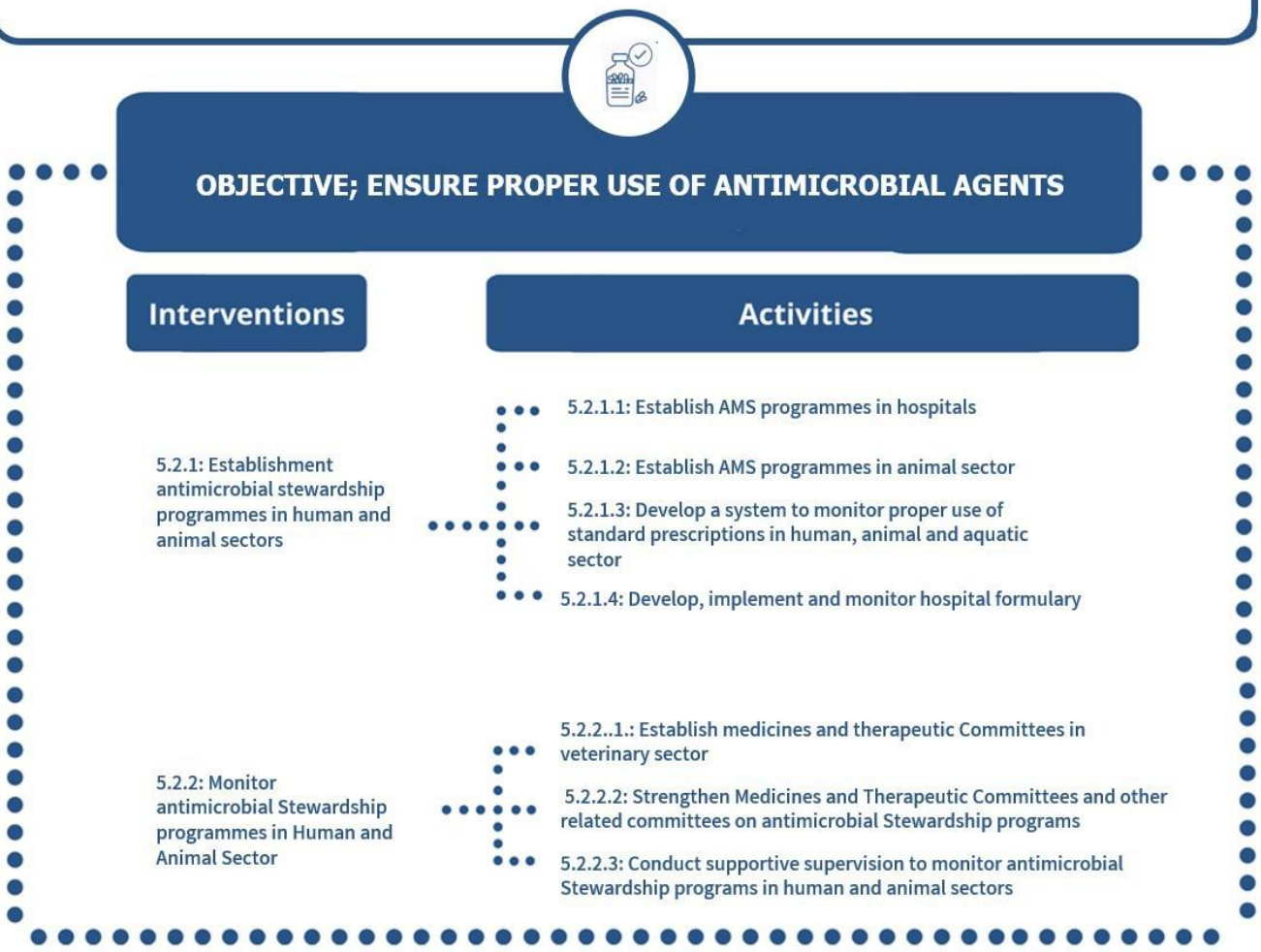
Tanzania like other countries has also joined hands in the fight against AMR by implementing the launching five-year Nation Action Plan (NAP) on AMR in 2017. The current NAP on AMR was launched in 2023. Strategic objective five of the current national action plan aims at Optimizing the use of Antimicrobial agents in both humans and animals. Antimicrobial Stewardship is the second priority area of the two under this objective (13).

ASP targets to ensure the use of standard prescriptions, develop hospital formulary, audit antimicrobial prescribing, prepare and share antibiogram data, train health personnel, supportive supervision, and establish therapeutical committees in hospitals (13).

The country has successfully established ASP in 16 hospitals and although the prevalence of AMR is still high, Tanzania has conformed to WHO targets of AWaRE categorization of Antibiotics (14) this suggests that the country is making more efforts to reduce the burden of AMR.

STRATEGIC OBJECTIVE 5

PRIORITY ACTION: ANTIMICROBIAL STEWARDSHIP



1.3 Problem Statement

One of the biggest issues facing the world today is antimicrobial resistance (AMR), which is gradually spreading to every continent and posing a threat to food safety, environmental health, socioeconomic development, and global health(15) where Sub-Saharan Africa (SSA) and South Asia accounts for the highest rates of AMR-related mortality (235 and 215 deaths per 10,000, respectively) (16). ASP is thought to be predominantly well conceptualized in high-income countries, However, the efficiency of current ASP models remains unclear for low- and middle-income countries (LMICs)(7) as they may jar with local constraints and practices, and could have limited traction without adequate understanding of the context of implementation.

Despite the global recognition of the threat posed by antimicrobial resistance (AMR), the implementation and efficiency of antimicrobial stewardship programs (ASPs) in Tanzania remain a critical concern. The intended goals of enforcement and effective interventions on the rational use of antibiotics are still not being accomplished, despite the country's current rules, laws, and regulations.

The prevalence of antibiotic dispensing without prescriptions, high rates of multi-resistant gram-negative organisms, and variations in adherence to prescribing guidelines across healthcare facilities in Tanzania(17) underscore the challenges in regulating antibiotic access and use, addressing resistant organisms, and ensuring consistent and appropriate antimicrobial prescribing practices which are all under the umbrella of ASP.

The implementation of ASP still takes a gradual improvement. ASP activities are only implemented in zonal and regional referral Hospitals even after six years of launching the NAP AMR (13) but the efficiency of these programs remain questionable.

This supports the need for rigorous in-depth understanding and evaluation of the efficiency of hospital ASP in reducing the burden of AMR and enhancing patient outcomes.

1.4 Conceptual Framework

ASPs are intended to minimize AMR, enhance patient outcomes, and maximize the use of antibiotics. By encouraging the prudent use of antibiotics, enhancing patient outcomes, lowering microbial resistance, halting the spread of infections caused by multidrug-resistant organisms, and lowering treatment costs, they hope to lessen the detrimental effects of antimicrobial resistance (AMR). The conceptual framework below indicates how interventions to reduce AMR are linked to outcomes through ASP.

The facility on its own can be a potential facilitator or barrier to the efficient implementation of ASP. This framework to mention a few depicts facilitators (surveillance systems, use of technology and inter disciplinary communication) and challenges (facility infrastructures, facility management and competency) as shown from literature as well as the WHO policy guideline and practical toolkit for implementation and establishment of ASP's in LMIC. It also depicts that the implementation efficiency also depends on guidelines and policies of both national and institutional as well as individual factors as healthcare personnel perception and practices, level of education and willingness to follow the recommended treatment guideline and individual factors associated with patients or relatives.

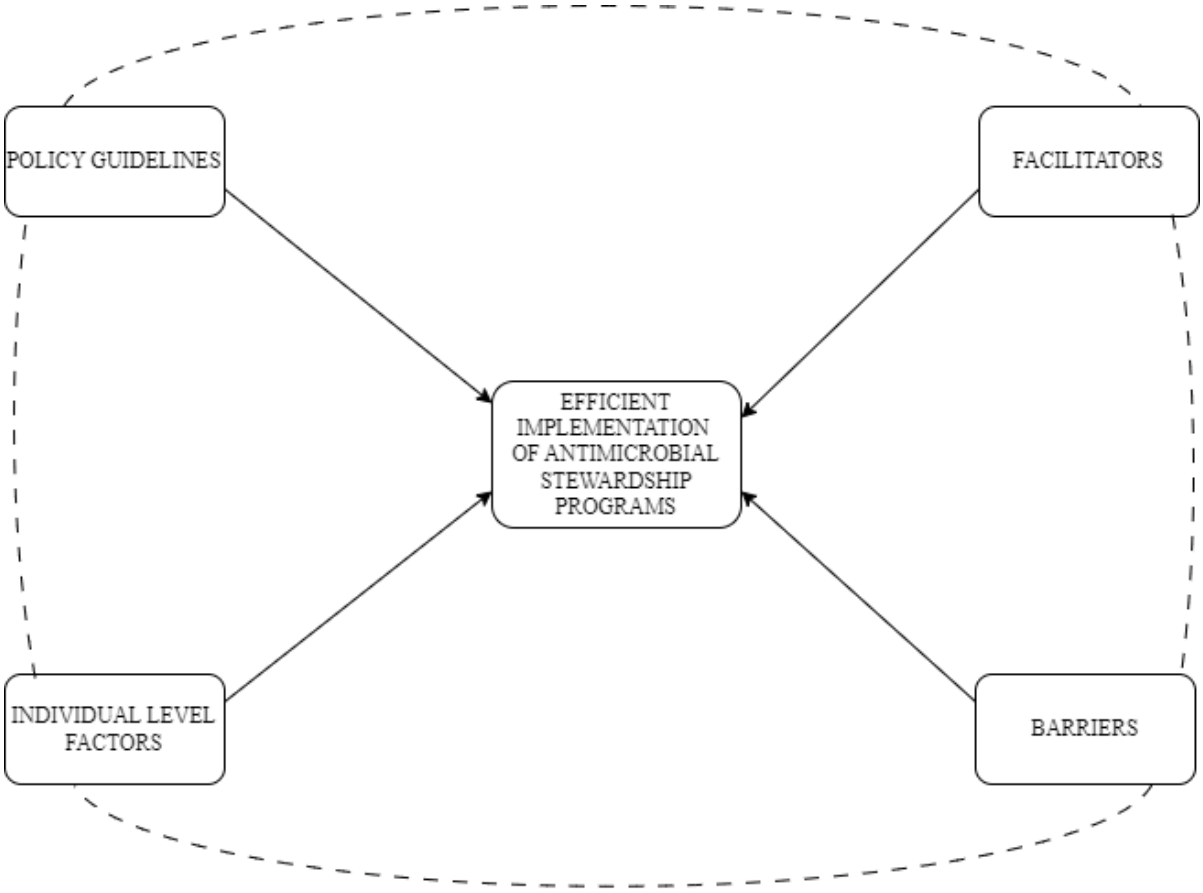


Figure 1: Conceptual framework

1.5 Rationale

As part of global efforts to reduce the burden of AMR, Tanzania has been making enormous efforts, although the rates of AMR in common hospital pathogens keep on increasing. By examining the findings of this study, we will have a better understanding of the conception healthcare personnel have towards the implementation of ASP effectively. With this understanding, policymakers, the ministry, and the government at large can develop and model interventions that will enhance the effective implementation of these programs and in turn reduce the burden of AMR in the country.

1.6 Research Questions

1.6.1 Main Research Question

What is the implementation efficiency of ASP's in addressing AMR in Dar es Salaam RRHs?.

1.6.2 Specific Research Questions

1. How are guidelines and policies adhered in the implementation of the programs?
2. How do individual factors affect the implementation of the programs?
3. What are the facilitators of efficient ASP implementation at the facility level?
4. What are the facility-related barriers to the successful implementation of the programs in Dar es Salaam RRHs?

1.7 Objectives.

1.7.1 Broad Objective.

To evaluate the implementation efficiency of ASPs in reducing the burden of Antimicrobial resistance in Dar es Salaam RRH's.

1.7.2 Specific Objectives.

1. To explore the implementation of ASP policies and guidelines in Dar es Salaam RRH's.
2. To evaluate the individual factors affecting the implementation of ASP's in Dar es Salaam RRH's.
3. To explore the facility related facilitators of efficient ASP's in Dar es Salaam RRH's
4. To explore the facility barriers to efficient implementation of ASP's in Dar es Salaam RRH's.

CHAPTER TWO

2.0 LITERATURE REVIEW.

The global rise of antimicrobial resistance (AMR) has prompted healthcare systems worldwide to adopt Antimicrobial Stewardship Programs (ASPs) as a strategy to mitigate the misuse of antibiotics. The World Health Organization (WHO) provides a practical toolkit to guide the implementation of ASPs, requiring countries to align their ASP strategies with national healthcare goals, while also ensuring continuous monitoring and evaluation (16). However, the implementation of ASPs faces a variety of challenges, ranging from resource limitations to lack of coordination among healthcare professionals. This literature review explores the key issues that affect the successful adoption and effectiveness of ASPs globally.

2.1 Policy and guideline adherence in implementing Antimicrobial Stewardship Programs.

One of the major issues in ASP implementation is ensuring that strategies are tailored to local healthcare settings and AMR epidemiology. The WHO's guidance emphasizes the need for national alignment, but in practice, this is difficult to achieve across countries with diverse healthcare infrastructures. For example, while the U.S. successfully implemented ASPs as early as 2001, demonstrating a significant reduction in AMR through adherence to recommended guidelines for empirical therapy (17), the situation is more complex in lower-income countries. In Colombia, a marked reduction in broad-spectrum antibiotic use was observed after the introduction of ASPs, but these successes hinged on local adaptations and strict monitoring mechanisms (19). The challenge, therefore, is the ability of healthcare systems to design ASPs that are both aligned with national policies and adaptable to local AMR patterns, particularly in resource-constrained settings.

The success of ASPs is closely tied to the collaboration of multidisciplinary teams within hospitals. Studies from high-resource settings such as Australia highlight the

importance of coordination among infectious disease specialists, pharmacists, and clinical microbiologists in achieving positive outcomes, including reduced hospital stays, lower costs, and decreased mortality rates (18). However, this level of collaboration is not always possible in lower-resource settings where there is a lack of trained personnel and coordination mechanisms. For instance, in Kenya, while ASP policies focus heavily on standard treatment guidelines, there is often insufficient emphasis on building laboratory capacity and ensuring the availability of diagnostic tools necessary for evidence-based prescribing (18). This gap demonstrates that without robust health system strengthening and capacity building, particularly in laboratories, the full benefits of ASPs may not be realized.

In Tanzania, a positive example of capacity building comes from the collaboration between Mbeya Zonal Referral Hospital and the University of South Carolina, which facilitated the creation of standard treatment guidelines and raised awareness of AMR among healthcare personnel (19). The MTaPS initiative further supported this by achieving a 75% increase in healthcare worker capacity (12). These examples underscore the importance of not only developing guidelines but also ensuring that healthcare workers are adequately trained to implement them.

While guidelines are central to ASPs, their adoption and adherence pose significant challenges in many settings. In some countries, ASPs have been effective in enhancing adherence to antimicrobial guidelines, as seen in Singapore, where the use of broad-spectrum antibiotics decreased by 49% following ASP implementation (19). However, adherence can be difficult when guidelines are not fully adapted to the local context or when healthcare professionals lack awareness and training on best practices.

Moreover, in Kenya, the lack of hospital formularies that reflect local AMR patterns created a disconnect between prescribed guidelines and the actual needs of the healthcare setting (20). This issue points to the necessity of not only developing ASP guidelines but also ensuring that they are localized, regularly updated, and based on current AMR data.

Sustaining the effectiveness of ASPs over time requires continuous monitoring and evaluation mechanisms, yet this is another area where many healthcare systems fall short. The WHO toolkit advocates for regular evaluation to ensure that ASPs remain effective (16), but in practice, such monitoring is often inadequate. For instance, the success of ASPs in reducing AMR in the U.S. has been partly attributed to the ongoing monitoring of antimicrobial use and resistance patterns (17). In contrast, many hospitals in LMICs lack the necessary infrastructure for routine surveillance, which limits the long-term impact of ASPs.

The sustainability of ASPs also depends on the ability to adapt guidelines based on evolving AMR data. In Tanzania, the development of tailored guidelines, combined with a blended learning approach for ASP education, has been an effective strategy for ensuring the relevance and impact of ASPs over time (21). This approach highlights the need for continuous adaptation and capacity building to ensure that ASPs remain effective in addressing emerging AMR trends.

2.2 Individual factors affecting Implementation of ASP

Individual-level factors, including the knowledge, attitudes, and behaviors of both healthcare professionals and patients often influence the successful implementation of Antimicrobial Stewardship Programs (ASPs). In a narrative review evaluating ASPs in primary care settings, medical personnel expressed skepticism about the utility of audit data, citing the complexity of reports and the perceived lack of impact on prescribing patterns (22). This lack of trust in data systems and the cumbersome nature of feedback mechanisms can diminish the willingness of healthcare providers to engage with ASP recommendations.

Patient expectations and misconceptions also play a critical role in undermining ASP efforts. In a study conducted in India, patients and their families frequently perceived that immediate antibiotic administration was synonymous with high-quality care (23). This expectation creates pressure on healthcare providers to prescribe antibiotics, even when they may not be necessary. Furthermore, pharmaceutical industry practices,

including the promotion of antibiotics to healthcare professionals in smaller hospitals, exacerbate the over-prescription of antimicrobials. Physicians and pharmacists often receive commissions for prescribing certain drugs, which fuels the empirical use of antibiotics and undermines ASP objectives (24).

Hierarchical structures within healthcare settings also influence the effectiveness of ASPs. A systematic review in Latin America revealed that junior medical staff were often reluctant to question the prescribing decisions of senior physicians due to the hierarchical nature of medical practice (25).This reluctance can prevent open dialogue about antimicrobial prescribing practices and limit adherence to ASP guidelines. The deference to seniority, coupled with the assumption that senior doctors have more knowledge, creates an environment where inappropriate prescribing patterns may go unchallenged (26).

These individual factors reflect the broader challenge of aligning personal beliefs, behaviors, and organizational culture with evidence-based practices in antimicrobial stewardship. Addressing these factors requires targeted educational interventions, increased transparency in pharmaceutical relationships, and cultural shifts within healthcare institutions to empower all staff to participate in ASP activities.

2.3 Facilitators of Effective Antimicrobial Stewardship Programs.

The successful implementation of ASPs is influenced by several key facilitators, including data-driven decision-making, laboratory capacity, education and training, and strong governance frameworks.

Accurate and comprehensive surveillance data on antimicrobial use and resistance is crucial for monitoring trends and guiding appropriate interventions. The availability of such data enables healthcare providers to tailor antimicrobial therapies based on local resistance patterns, reducing the reliance on broad-spectrum antibiotics (27).

Laboratory capacity is another important facilitator. In resource-limited settings, improving laboratory infrastructure and enhancing access to reliable microbiology services are essential for supporting ASPs. A study highlighted that in settings where

microbiology laboratories are equipped to provide timely and accurate antibiogram data, ASP implementation was significantly more effective (28).This is especially important in low-income settings, where the lack of robust laboratory services often forces healthcare providers to make empiric prescribing decisions, increasing the likelihood of inappropriate antibiotic use (20).

Education and training programs aimed at healthcare providers are also crucial for ASP success. In a study conducted in Barbados, the implementation of ASP was facilitated by comprehensive training for all staff, which improved knowledge and adherence to stewardship protocols (6). This study emphasized the importance of educating not only physicians but also pharmacists, nurses, and other healthcare workers to foster a culture of stewardship across the entire healthcare facility. Additionally, strong collaboration between clinical and laboratory teams, as well as the development of facility-specific treatment guidelines based on local AMR data, plays a key role in driving successful ASP outcomes (16).

National policies and clinical governance frameworks are also essential facilitators of effective ASPs. In Australia, for example, national guidelines and sectoral clinical governance frameworks have provided healthcare providers with the necessary tools and resources to implement stewardship programs (27). In many high-income countries, ASPs are further supported by continuous surveillance programs, which ensure that interventions remain data-driven and adaptable to changing resistance patterns (29).

A systematic review of studies from the U.S., Germany, and other high-income countries highlighted the effectiveness of audit and feedback mechanisms in reducing inappropriate antibiotic prescriptions (30). The review found that in hospitals where ASP interventions, such as prospective audits, feedback, and guideline adherence, were implemented, there was a significant reduction in inappropriate antibiotic use, with decreases of up to 50% in some settings.

2.4 Barriers to Successful Implementation of Antimicrobial Stewardship Programs.

Despite the existence of facilitators, several barriers continue to impede the successful implementation of ASPs. One of the most significant barriers is the lack of awareness among healthcare providers regarding AMR and the urgency of stewardship efforts. A study in Kenya highlighted that many healthcare workers remain unaware of the implications of AMR and do not view antimicrobial stewardship as a priority (16). This lack of awareness is compounded by insufficient access to continuous medical education (CME) on stewardship practices, particularly in LMICs, where healthcare workers may not have regular opportunities to update their knowledge (31).

Financial constraints also pose a major barrier to ASP implementation. A study conducted in Indonesia highlighted the high costs associated with ASP implementation, including the costs of bacterial culture testing and antimicrobial surveillance systems (32). In many hospitals, especially in resource-limited settings, the cost of diagnostic tools and the infrastructure needed to implement ASPs is prohibitively expensive (7). As a result, many healthcare providers continue to rely on empiric prescribing, contributing to the overuse of broad-spectrum antibiotics.

Institutional support for ASPs is often lacking in LMICs. Hospitals may prioritize profit generation over stewardship efforts, particularly when faced with financial pressures to maximize patient turnover and revenue. A study in Tanzania identified that ASP implementation was hindered by insufficient support from hospital management and limited engagement of healthcare workers in ASP activities (15). Moreover, the absence of strong institutional policies and frameworks further exacerbates these challenges, as healthcare workers may not feel empowered or incentivized to adhere to stewardship protocols.

Hierarchical structures and cultural resistance to change are additional barriers to ASP implementation. Senior physicians often exert significant influence over prescribing practices, and junior healthcare providers may feel uncomfortable questioning their decisions, even when those decisions conflict with ASP guidelines. This hierarchical

dynamic can undermine stewardship efforts, as junior staff may continue to follow inappropriate prescribing patterns out of deference to their senior colleagues (33).

Lastly, the lack of reliable diagnostic services, including microbiology labs, presents a major challenge to ASP implementation (34). In many LMICs, hospitals lack the necessary laboratory capacity to perform bacterial culture testing and provide accurate antimicrobial susceptibility data (35). This forces healthcare providers to make empiric treatment decisions without the benefit of evidence-based data, increasing the likelihood of inappropriate antibiotic use (11).

CHAPTER THREE

3.0 METHODOLOGY.

3.1 Study Design.

This was a multi-site case study design using a qualitative approach. Each hospital was evaluated as an independent case. This enabled the researcher to gather and compare information within the case and across the cases.

3.2 Study Setting.

This study was conducted in three Dar es Salaam Regional Referral Hospitals (RRH) which are Temeke RRH, Amana RRH, and Mwananyamala RRH. These hospitals serve the majority of residents in almost all the region's districts according to their geographical location. They are providing regional-level referrals to a minimum of 310 public and private hospitals, health centers, dispensaries, and clinics around them and they also receive referrals from the Pwani Region from districts such as Mkuranga and Kisarawe. The hospitals provide outpatient service to about 1500,1200 and 1800 patients as well as a bed capacity of 304, 341, and 254 respectively. These hospitals were capacitated to start the implementation of ASP.

3.3 Study Population

The study involved the hospital antimicrobial stewardship team from each case which included but was not limited to a doctor, pharmacist, nurse, clinical microbiologist or laboratory microbiologist, and ASP champions.

3.4 Sampling Size and Selection

Purposive sampling was used to collect and recruit participants in this study from the selected RRHs. A total of 21 participants to be selected. However, this number was subjected to change during the fieldwork, two hospitals had limited number of ASP team members and the other had no team, thus a total of 11 participants were interviewed for this study. In this study, participants were selected to provide in-depth perspectives on the implementation of Antimicrobial Stewardship Programs (ASPs) in Dar es Salaam regional hospitals. The selection process identified individuals with direct

experience and insights into the functioning and challenges of these programs and involved in the daily implementation or oversight of ASPs. Participants were initially identified through hospital management teams, who provided a list of potential candidates based on their involvement with ASPs. The selection of hospital administrators, pharmacists, Laboratory personnel, and physicians ensured a diverse set of perspectives on ASP implementation.

3.5 Data Collection Technique

In-depth Interview was used to collect data. The researcher distributed introductory letters to the respective sites and requested interview appointments with the participants at their convenience availability.

3.6 Data Collection Process

Informed consent was given and permission to audio-record was requested. The interview was an iterative process with the researcher prompting follow-up questions according to the previous question asked to explore the hospital's strategies, factors, and barriers for the efficient implementation of ASP in the respective hospital. The length and duration of the interview were based on the discussion that was carried out and the longest interview was 28 minutes. Additionally, the researcher employed the use of document review such as hospital formularies that were available at the facility**.** Interview data was then transcribed and used for analysis. Data checking was performed at the end of each day to ensure completeness and consistency. In case of any incomplete information, the researcher called the respondent to make necessary adjustments.

3.7 Data Collection Tools

An IDI guide was used to collect information from the participants. The interview was conducted in a Kiswahili language with occasionally switching to English language for a few scientific terms. In the case of language mixing, relevant data was translated into English language for report writing. Some of the interview guide questions were adopted from the literature (17).

3.8 Pretesting of the Tools

After obtaining the ethical clearance, pretesting of the tools was done at the field where Amana was selected and 3 participants who were not included in the study population were requested for interview. This allowed the researcher to know if there are any ambiguities in the interview questions or any clarity that was needed before the commencement of the study. After pretesting, two Questions were omitted from the Guide, age of the participant and highest level of education since they added no new information to the information given.

3.9 Data Analysis

The data collected in this study was analyzed using thematic analysis following the approach described by Braun and Clarke (2006). The six steps of their method were meticulously followed, including familiarization with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and, finally, producing the report. To preserve the richness and accuracy of the participants' responses, the analysis was conducted in Kiswahili, the language used during data collection. Direct quotes were then translated into English for the purpose of report writing. During coding, words and sentences conveying similar meanings were grouped and labeled as codes. An inductive coding approach was applied, where codes were generated from each transcript using the structural coding method suggested by Saldana (2019). As the analysis progressed, these codes were linked to form sub-themes, which were further refined into broader themes. This process was conducted both within individual cases and across cases to identify patterns. Newly emerging codes were integrated throughout the analysis to ensure flexibility and comprehensiveness. The sub-themes were categorized into overarching themes, which were then interpreted with respect to the study's research questions. NVivo software (version 11) was used to aid in the organization and analysis of the data.

3.10 Trustworthiness

To preserve the study's credibility, a triangulation process was employed, in which the views and responses of the respondents were contrasted with existing literature. To

ensure Transferability and that the results could apply to many people, times, contexts, and circumstances, extensive descriptions of the technique, research setting, and data collection experience were used. Furthermore, audio recordings, field notes, and transcription files were kept until the conclusion of the study to guarantee conformance. The recorded audiotapes were accessed by the researcher only and in case of secondary access the researcher had to draft a non-disclosure agreement for anyone who needed access to the audiotaped records, this ensured that the data provided from these sites were strictly confidential and well handled**.** Lastly, to promote dependability, attempts were undertaken to demonstrate that the research study's conclusions are reliable and consistent.

3.11 Ethical Issues

The Institutional Review Board (IRB) at Muhimbili University of Health and Allied Sciences (MUHAS) was contacted to obtain ethical clearance. The medical officers in charge of each hospital granted permission to conduct the study. Before the interview started, an informed consent form was given, which the interviewees signed. Respondents were guaranteed absolute confidentiality for the information gathered. To ensure Anonymity, all participants were assigned pseudonyms (Participant 1, 2, 3…), and any identifying information was removed from transcripts. The data were stored securely, and only the research team had access to the raw data. However, participants in this study were healthcare professionals in known hospital ASP teams, which may have limited complete anonymity of participants.

CHAPTER FOUR

4.0 FINDINGS

4.1 Overview

This section entails findings from the qualitative study on the implementation efficiency of antimicrobial stewardship programs (ASPs) in reducing the burden of antimicrobial resistance at Dar es Salaam regional referral hospitals. The study involved In-depth interviews with a diverse group of healthcare professionals across three hospitals. The aim was to explore the implementation of ASP policy guidelines, evaluate individual factors affecting their implementation, identify facility-related facilitators, and understand the barriers to efficient ASP implementation.

4.2 Social Demographic Characteristics

This study included eleven (11) healthcare professionals from three Regional Referral hospitals in Dar es Salaam, each contributing unique perspectives based on their roles and experiences. Below is a summary of the socio-demographic characteristics of the participants from each hospital.

Table 1: Summary of Social Demographic Characteristics

S/N	Hospital	Role	Gender	Responsibilities
01	Amana	Pharmacist	Male	Overseeing antibiotic dispensing, ASP policy adherence
02		Pharmacist	Female	Monitoring antibiotic prescriptions
03		Doctor	Female	Quality Services
04		Nurse	Female	Administering antibiotics, observing ASP compliance
05		Lab Personnel	Male	Conducting diagnostic tests, providing data on antibiotic resistance patterns
06		Lab Personnel	Male	Conducting diagnostic tests, providing data on antibiotic resistance patterns
07	Temeke	Lab Personnel	Male	Conducting microbiological tests, reporting on resistance trends
08		Lab Personnel	Male	Laboratory manager and team chairperson
09	Mwananyamala	Pharmacist	Male	Antibiotic dispensing, ASP guideline implementation
10		Doctor	Female	Leading clinical decisions related to antibiotic prescribing.
11		Lab Personnel	Female	Conducting diagnostic tests

4.3 Analysis of Themes

The following sections delved into the detailed findings, organized by themes and subthemes, highlighting the key insights and practical implications for improving ASP efficiency in Dar es Salaam's regional referral hospitals.

The interviews provided rich insights into the varying levels of awareness, adherence, and challenges associated with ASPs. These findings were organized into four main themes: (1) Adherence of guidelines and policies in implementing ASP, (2) Implementation of ASP in improving healthcare outcomes, (3) Institutional Support and Facilitators for ASP success, and (4) Challenges and Barriers in Program Implementation. Each theme is further divided into subthemes and codes that capture the perspectives of the participants. The table below is a summary of the Themes.

Table 2: Summary of Themes and Subthemes

Codes	Subtheme	Theme
Awareness of ASP, Training received, Knowledge gap, principles and objectives, Sources of knowledge (training, workshops)	Awareness of ASP Guidelines	Adherence to Antimicrobial Guidelines and Policies
- Adherence to ASP protocols	Compliance with Standard Treatment Guidelines (STGs)	
- Variation in compliance across departments		
- Fear of penalties (NHIF)		
- Knowledge gaps		
- Training sessions		
- Attitude toward ASP		
- Role of audits		
Increase in culture tests, development of antibiograms, empirical treatment, patient management, treatment outcomes	Improvement in prescribing patterns	Implementation of ASP in Improving healthcare outcomes
Prescription errors, prescription reviews, training,	Enhanced diagnostic accuracy	
Feedback sessions, antibiotic tracking, identification of challenges and issues, reporting system	Regular monitoring and feedback	

Sharing resistance trends		
- Support from hospital management	Role of Leadership	Institutional Support and Facilitators for ASP Success
- Leadership engagement in ASP activities		
Accountability mechanisms Active participation, follow-up,I10Active participation, follow-up, Accountability, meetings, supervision meetings, supervision		
- Funding for diagnostic tools	Financial and Resource Availability	
- Availability of culture and sensitivity testing supplies		
- External partnerships (MTaPS)	Collaborations and External Support	
- Partner support for training		
- External funding		
- Technical assistance for ASP development		
- Delays in procurement	Resource and Funding Limitations	Challenges and Barriers in ASP Implementation
- Limited availability of diagnostic tools		
- Stockouts of antibiotics		
Lack of familiarity with guidelines	Individual resistance on ASP	
Perception that ASP is for pharmacists only		
Ingrained habits		
- High workload in hospital wards	Time Constraints and Workload	
- Shortage of dedicated ASP team members		
- Overburdened staff		
- Shortage of clinical microbiologists	Logistical Challenges	
- Insufficient ongoing training		
- Inadequate pre-service training		

4.4 Adherence to Antimicrobial Guidelines and policies.

Antimicrobial Stewardship Programs (ASPs) protocols are designed to guide healthcare providers in making informed, evidence-based decisions about antibiotic use. Ensuring compliance with these guidelines is critical to preventing the overuse and misuse of antibiotics, which are major drivers of antimicrobial resistance (AMR) worldwide. This theme examines the extent to which healthcare professionals at Dar es Salaam's regional referral hospitals follow standard treatment guidelines (STGs) and hospital formularies, as well as the factors that influence guideline adherence.

4.4.1 Awareness of ASP guidelines

Awareness of Antimicrobial Stewardship Program (ASP) guidelines among healthcare professionals is critical for ensuring that stewardship practices are followed correctly. Healthcare workers' understanding of the guidelines forms the foundation of ASP implementation. In Dar es Salaam's RRHs, while many healthcare workers had some awareness of ASPs, the depth of understanding varied, particularly based on their participation in ASP training sessions. Awareness of guidelines, objectives, and core ASP principles determines how effectively they are able to implement the practices outlined in the policies.

> *"AMS programs primarily deal with how antimicrobials are used, considering the priorities set by the new AMS guidelines. We focus on the right choice of antimicrobials for specific pathogens to avoid resistance." (Participant 07, Pharmacist)*

While these programs may have been in place for several years, providing ample data for analysis, they seemed to be relatively new, or rather their implementation seemed to be not known to healthcare workers at Mwanayamala Hospital.

> "*I have heard about ASP, but I can't say if we implement it or not, what I heard is, that there was someone who was supposed to form the team…. I have never*

been to any meeting concerning ASP here at the hospital" (Participant 10, Lab Microbiologist).

4.4.2 Compliance with standard treatment guidelines

Compliance with Standard Treatment Guidelines (STGs) is essential to the success of ASPs in reducing inappropriate antimicrobial use. The degree to which healthcare workers adhere to these guidelines reflects the effectiveness of training and monitoring processes. In the RRHs, compliance with STGs varied across departments.

> *"In surgical wards, there was overuse of ceftriaxone and penicillin, which are no longer effective. Right now, people follow those standard treatment guidelines because we as a team emphasize it. Errors in drug prescription have greatly reduced."*

Several factors influence healthcare professionals' adherence to ASP guidelines and policies. These include knowledge gaps due to inconsistent training, attitudes toward ASP and logistical barriers such as the availability of diagnostic tools. Training and ongoing education were seen as vital in improving compliance, but variations in participation among healthcare workers was mentioned not to be uniform, and their personal experience in prescribing antibiotics impacted adherence levels.

> *"Most of the time, compliance with guidelines is better when people attend training sessions. However, sometimes staff miss these because of shift schedules, and it impacts how well they follow the guidelines." (Participant 02, Doctor)*

In non-surgical wards, adherence to standard treatment guidelines has been better. For outpatients, it was noted that prescribers were more careful to follow the guidelines for patients using Insurance cards due to the fear of NHIF not reimbursing the hospital if the treatment guideline was not followed, However the same is not so in patients using Cash.

> *"Here we have a challenge, especially for cash patients, but for insured patients, there is a specific procedure. Insured patients have more control because of the fear of deductions, where there is a special room number 44 upstairs, those people... although they use it, it's not just antibiotics; it means all drugs. It means drugs that are looked at very carefully because if you make a mistake, it becomes an error. So, there is a special room where they cross-check the drug before it is submitted to the NHIF; they review if the drug was dispensed correctly. Cash patients remain with pharmacists because they are in the last stage; they go and use it; they cross-check if there is accuracy, if there is a challenge, then the doctor will be given feedback to make adjustments to that prescription, yeah."* (*Participant* 03, Pharmacist)

Training sessions are the primary source of information on ASPs, although these sessions are not uniformly attended due to various challenges some being carried out online, challenges in staff shifts, and the like, this resulted in knowledge gaps among some members. For instance, a participant at Amana when asked about awareness and training said,

> *"It's a program that has been put in place... it focuses on reducing bacterial resistance in the use of drugs……, I don't know if it makes sense, but most of the time we just sit in meetings, now another thing I would like to say, many online meetings seem to be unnecessary, imagine a day without a bundle or someone does their own thing, but also, sometimes my big phone is broken, I use a small one, so I find I have missed the meeting…"* (Participant 06, pharmacist)

4.5 Implementation of ASP in Improving healthcare outcomes

The implementation of Antimicrobial Stewardship Programs (ASP) has notably improved the quality of services and the approach to empirical treatment within these hospitals, facility initiatives such as lowering cost have also added to this improvement, and the shift towards increased use of culture and sensitivity tests has greatly enhanced diagnostic accuracy, which has somehow led to targeted treatments. More sophisticated

techniques, like prospective audit and feedback, have been used as the program has developed to further improve antibiotic use. Adherence to current recommendations and ongoing education have improved quality and clinical practices.

Establishing a committed team and gaining leadership commitment to supply required resources marked the beginning of the Antimicrobial Stewardship Programs (ASPs) implementation process. Educating healthcare professionals on proper prescribing techniques and launching fundamental interventions like formulary limitations and antibiotic audits.

4.5.1 Improvement in prescribing patterns

One of the key outcomes of ASP implementation in Dar es Salaam RRHs has been the improvement in prescribing patterns. By focusing on following standard treatment guidelines and utilizing culture and sensitivity testing, healthcare professionals are more cautious in their choice of antibiotics, resulting in fewer prescription errors and more appropriate use of antibiotics. The data shows a marked reduction in empirical treatments, particularly in departments where ASP guidelines were actively reinforced.

> *"Previously, as a general practitioner, I would prescribe antibiotics without strict adherence to guidelines. Since ASP began, there is now an emphasis on following protocols such as the hospital formulary and Antibiogram based on culture results. These guidelines have greatly improved the hospital's service quality and awareness of ASP"* (Participant 02, Doctor).

4.5.2 Enhanced Diagnostic accuracy

ASP implementation has significantly improved diagnostic accuracy in the regional referral hospitals. The increased use of culture and sensitivity tests has allowed healthcare workers to better target antibiotics to the specific pathogens involved in infections, leading to more effective treatment outcomes. This shift has reduced the reliance on broad-spectrum antibiotics and facilitated more precise and efficient empirical treatments, especially in critical departments like intensive care units.

"We reduced the cost of culture tests from 20,000/= to 10,000/=, making it easier for patients to afford, and now we do 2,500 to 3,000 tests annually. This has greatly improved diagnostic accuracy." (Participant 09, Lab Scientist)

4.5.3 Regular Monitoring and feedback

Regular monitoring and feedback mechanisms are crucial for ensuring the ongoing success of ASPs. These activities allow ASP teams to track antibiotic use, identify patterns in resistance, and provide corrective feedback to prescribers. In the studied hospitals, feedback was delivered during weekly or quarterly meetings, where prescription errors and resistance patterns were discussed and adjustments were made to prescribing practices.

"We do weekly therapeutic committee meetings where we give feedback on resistance levels. This helps raise awareness and make corrections in antibiotic use." (Participant 09, Lab Scientist)

At Amana Hospital, feedback is collected during CME meetings, where issues are discussed, and quick corrections are implemented. However, the feedback process can be slow, highlighting the need for more efficient M&E mechanisms.

"*Because we usually do CME meetings; if there is something we have seen that is hot and needs quick corrections, we usually present it at our CME meetings, which mostly reach many people."* (Participant 03, Pharmacist)

4.5.4 Improvement in Clinical Practice

One of the most substantial changes has been the reduction in prescription errors due to better adherence to standard treatment guidelines (STGs). Before ASP implementation, there were frequent errors related to incorrect dosages and inappropriate antibiotic prescriptions in which most of the time pharmacists were left to correct them. With ASP in place, there has been a concerted effort to train healthcare providers on the importance of following these guidelines, resulting in a notable decrease in errors.

Although these trainings are mostly in-house and part of ASP team efforts, they have proven to be efficient in decreasing errors.

> "*.. there was non-compliance with guidelines, for example, the STGs (Standard Treatment Guidelines) were not followed, so if you don't follow that, it's an error; it means you will prescribe the wrong dose, and such things, and medicines and doses that are not supposed to be prescribed. So now, these things have greatly reduced automatically, and now, many prescriptions are correct."* (Participant 03, Pharmacist)

4.5.5 Role of Leadership in ASP

Leadership plays a pivotal role in the success of Antimicrobial Stewardship Programs. At Temeke Hospital, the supportive leadership has been instrumental in driving the ASP's success. The Medical Officer in-charge(MOI) is the guardian of the ASP team while incorporating the activities with IPC to ensure maximum efficiency of both programs and that they both receive necessary support to facilitate its implementation.

> *"the major factor is the support from the director, which plays a big role in the team's activeness. The director is like a guardian because in anything related to ASP, we involve them, and they provide significant support. This support has strengthened the committee, and that's why every quarter we have a report on environment sterility, checking environments, and swapping areas to see what's there"* (Participant 08, Lab Scientist)

> *"For instance, we encourage doctors through our clinical services coordinator, who is a member of our team. They engage doctors in meetings and monitor current practices, such as the use of empirical treatments and prescription audits. The committee ensures these activities are carried out effectively."* (Participant 01, Lab Scientist)

4.6 Institutional Support and facilitators of ASP implementation

In hospitals, the commitment of leadership, availability of resources, and collaboration among different departments significantly influence the effectiveness of stewardship efforts. The presence of strong institutional backing ensures that ASPs are well-integrated into the hospital's routine operations and that healthcare workers receive the necessary training, tools, and encouragement to adhere to stewardship protocols.

4.6.1 Role of leadership

Leadership plays a vital role in the success of ASPs by driving institutional commitment, resource allocation, and compliance enforcement. Support from hospital management ensures that the ASP teams have the necessary resources and backing to implement guidelines and enforce compliance. In hospitals with strong leadership engagement, there was higher adherence to guidelines, more regular monitoring, and better coordination of ASP activities.

> *"The major factor is the support from the director, which plays a big role in the team's activeness. The director provides significant support, strengthening the committee." (Participant 08, Lab Scientist)*

4.6.2 Financial and resource support

Adequate funding allows hospitals to purchase diagnostic tools, provide training, and ensure the availability of antibiotics. In Dar es Salaam RRHs, external support from partners like MTaPS has been instrumental in securing financial and technical resources. However, funding limitations still affect the long-term sustainability of ASP activities.

> *"We had IPs who supported us with training and laboratory commodities. This external support was critical in ensuring that ASP activities could continue." (Participant 08, Lab Scientist*)

Collaborations with external partners, such as MTaPS, have been pivotal in the implementation of ASPs. These partnerships have provided not only financial resources but also technical expertise and training. External support helped hospitals to set up

diagnostic tools, develop guidelines, and train healthcare professionals, all of which contributed to the improved efficiency of ASPs.

> *"MTaPS supported us with training and supplies, including laboratory commodities and antibiotics for testing. This collaboration made a big difference in our ASP." (Participant 08, Lab Scientist)*

4.7 Challenges and Barriers to ASP implementation

This theme explores in detail how the successful implementation of Antimicrobial Stewardship Programs (ASPs) has encountered several obstacles and difficulties. A significant impediment to the program's inception and sustainability being the scarcity of resources, which includes inadequate finance and inadequate staff. A lack of knowledge regarding antibiotic resistance and ingrained prescribing practices among healthcare professionals have also hampered progress by creating resistance to change. Moreover, ASP has encountered logistical difficulties due to the complexity of healthcare systems and variations in procedures among various institutions.

4.7.1 Individual Resistance to ASP

Resistance to change among healthcare workers, especially prescribers, is a significant barrier to ASP implementation. Some professionals prefer empirical treatments based on their experience rather than relying on ASP guidelines or culture results. This resistance often stems from a lack of awareness, deeply ingrained habits, and doubts about the effectiveness of ASP protocols.

> *"Doctors still prescribe drugs based on experience rather than culture results. Some skip drugs that can be effective because they believe they no longer work." (Participant 01, Lab Scientist.*

While experience is seen as a s better quality in healthcare it sometimes hinders the implementation of ASP programs, Doctors and prescribers sometimes resort to empirical treatment due to the experience they have and rather not in the results they have obtained from the laboratory.

> "*..my view is still with the doctors because they are the main prescribers of drugs. Sometimes you know when people want to change, they take time. You can provide culture results and patients still receives other types of drugs…" (Participant* 01, Lab Scientist)

Furthermore, some healthcare workers have no faith in the quality of lab results that are given at their hospital, to be specific, culture results, it was noted in Mwananyamala that most doctors do not order culture because of the perception that that most culture results come with no growth, thus they would rather not wait for five days for results while they can just treat the patient.

> *"Most of the time, there is no growth on blood cultures, maybe in neonates or pus swabs from the wounds……now you are telling me that there is no growth, that means that the patient is not sick while I see the patient suffering…. what should I do? I will give the patient antibiotics."* (Participant 11, doctor)

The Challenge Extents not only to medical personnel but also to patients themselves or relatives, due to insufficient technology that all these hospitals are using, the Turn Around Time(TAT) for culture samples is four to seven days, and most patients don't like spending a lot of time in the hospital, thus they will request for antibiotics and never follow-up on the culture results.

> *"One challenge is that patients themselves find it difficult to wait for the results, you know, the Turnaround Time (TAT) for culture and sensitivity is a bit longer than other tests, so patients sometimes feel it's difficult to wait…. TAT remains high because we use conventional manual methods, so we do everything manually, so we don't have automation so far, so that's the challenge"* (Participant 09, Lab Scientist)

4.7.2 Time constraints and workload

Healthcare providers are often overwhelmed with their routine duties, making it difficult to consistently engage in AMS activities. The AMS team members, who are already

responsible for patient care, find it challenging to allocate additional time for ward rounds, prescription reviews, and data collection for audits and antiprogram development.

> *"The big thing is that we are in the hospital to save the patient's life, so we are busy treating the patient, but some of these things we sometimes forget, and even as a team, we sometimes don't do our duties because we are in different departments, so it is difficult to connect us. I think that's the biggest thing that has troubled us, that we are busy with our work areas, and the implementation of this team has been difficult for us."* (Participant 03, Pharmacist)

The high workload has reduced the effectiveness of AMS efforts. AMS teams strive to maintain their activities, often extending their working hours without additional compensation. Additionally, all three hospitals do not have clinical microbiologists who are supposed to chair these ASP teams according to the NAP-AMR, Temeke for instance faces a deficiency of four team members who had to relocate to other hospitals and thus all the workload lies in the hands of three ASP Team members.

> *"One challenge is responsibilities. For example, AMS members are supposed to be on ward rounds every morning, but due to time constraints, we only manage to do it on Friday, Also, the number of staff can be an issue; if one staff member goes on leave, or is transfers there is a lot to do in the department, including routine activities" (*Participant 08, Lab Personnel)

Furthermore, this has been a primary challenge at Mwananyamala which has failed to initiate the ASP program because most healthcare workers are not ready to commit extra working hours to perform ASP activities, and thus This hospital does not have a functional ASP team.

4.7.3 Resource and funding limitation

Despite external support, resource and funding limitations remain a significant challenge to the full implementation of ASPs. Hospitals frequently experience delays in the procurement of necessary diagnostic tools and stockouts of antibiotics. These limitations hamper the ability of ASP teams to perform adequate surveillance and limit the effectiveness of stewardship interventions.

"…Nothing works without money. We need supplies for documentation and other things, and sometimes we work extra hours without reimbursement. We proposed including ASP duties in official letters to motivate team members, we have requested a budget in the new plan to conduct quarterly evaluations of resistance and other aspects. Hopefully, in the coming year, I hope we will be better supported." (Participant 07, Pharmacist)

4.7.4 Logistical Challenges

Logistical challenges, such as delays in procurement, inadequate supply chains, and the lack of automated diagnostic systems, hinder the efficient implementation of ASPs. These challenges make it difficult to maintain a consistent supply of antibiotics, diagnostic tools, and other resources essential for ASP operations. As a result, hospitals struggle to maintain continuous monitoring and reporting activities.

> *"Challenges often involve procurement and access to supplies like microbiology tools and culture media…. because we in government hospitals depend on MSD, and you find that MSD doesn't have those discs or it takes a while to get them, which also leads to having fewer drugs, you cannot do good sensitivity, you can't prepare good Antibiogram, so that's the challenge we face with procurement"* (Participant 01, Lab Scientist)

CHAPTER FIVE

5.0 DISCUSSION

5.1 Discussion

This chapter aims to interpret and contextualize the findings presented in the previous chapter, drawing comparisons with existing literature to highlight the significance, implications, and limitations of the Antimicrobial Stewardship Programs (ASP) implemented at Dar es Salaam RRHs, it will provide a comprehensive understanding of the implementation efficiency of ASPs in reducing antimicrobial resistance (AMR) and improving healthcare outcomes.

5.1.1 Adherence to Antimicrobial Guidelines and Policies

Awareness of ASP guidelines is foundational for effective antimicrobial stewardship. In this study, the varying levels of awareness among healthcare workers demonstrated that while some were well-informed about ASP protocols, others lacked a deep understanding of these guidelines. This inconsistency suggests that the current training efforts may not be reaching all staff effectively, or that some healthcare workers may not be prioritizing ASPs in their practice. A study in Kenya (18) reported similar findings where awareness of ASPs was inconsistent across healthcare workers, largely due to irregular training sessions and poor dissemination of guidelines.

Awareness gaps can lead to suboptimal antimicrobial use, which contributes to the rise in antimicrobial resistance (AMR). Therefore, consistent and comprehensive education is essential, emphasis on the need for frequent and structured ASP training, particularly in low- and middle-income countries (LMICs), where healthcare workers often face multiple competing priorities (21). Additionally, stressing on the importance of continuous professional development to maintain awareness of ASPs the reliance on online training, which was not well attended by all staff in this study, mirrors global challenges in ensuring consistent participation in ASP education(36).

Prior to ASP enforcement, there was a high reliance on empirical treatments, leading to the overuse of broad-spectrum antibiotics. This aligns with research from Tanzania

(17)**,** which showed that before the introduction of ASPs in Tanzania, adherence to STGs was low, particularly for pediatric patients. Similarly, another study reported that ASPs led to a marked improvement in guideline adherence in US hospitals by providing prescribers with targeted feedback (10). The persistence of non-compliance in certain departments may be tied to insufficient monitoring or the perception that STGs are too restrictive, an issue highlighted by Limato et al in Indonesia(7). This suggests that while ASPs can improve adherence, they must be supported by continuous monitoring and education, as well as efforts to address prescribers' concerns about the practicality of STGs in high-pressure environments.

5.1.2 Implementation of ASP in Improving healthcare outcomes.

ASP implementation has clearly led to improvements in prescribing patterns in the RRHs, particularly by reducing empirical treatments and focusing on guideline-based prescribing. These improvements mirror findings from a study in US, where ASPs in US hospitals significantly reduced the use of broad-spectrum antibiotics, leading to better-targeted therapies and fewer adverse drug events (37).

This shift in prescribing patterns is critical in the fight against AMR. According to Pierce et al, improved prescribing patterns are one of the most direct was to combat AMR (16). The impact of ASPs on the quality of services and empirical treatment has been substantial. The increased use of culture and sensitivity tests has improved diagnostic accuracy and patient management. This aligns with findings in Malaysia were the majority of recommendations made during the first year of the antimicrobial stewardship program's implementation were to stop antimicrobial therapy of some drugs, the most often auto-discontinued antimicrobials being vancomycin, amoxicillin/clavulanate, meropenem, and piperacillin/tazobactam (32).

Hall et al, who observed that in hospitals with active ASPs, there was a substantial increase in diagnostic testing, leading to more precise and effective treatments (38). This study showed that healthcare workers are increasingly relying on diagnostic data to

guide their antimicrobial choices, reducing the reliance on empirical treatments and improving patient outcomes.

Weekly and quarterly feedback sessions have been instrumental in improving compliance with ASP guidelines. This is consistent with findings from Germany, where it was demonstrated that feedback loops in ASPs significantly improve prescriber adherence to guidelines by providing real-time data on prescription patterns and resistance trends (37).

In many hospitals, delays in providing feedback can reduce its impact on prescribing behaviors, as noted by Fabre et al, ensuring that feedback is integrated into daily practice, rather than only in periodic meetings, may help further improve compliance and better patient outcome (25).

5.1.3 Institutional Support and Facilitators for ASP success.

Leadership plays a major role in the success of ASPs, particularly by ensuring that the necessary resources and support structures are in place. In this study, the active involvement of hospital leadership in ASP activities was associated with better compliance and resource allocation. This finding is supported by Barlam et al, who noted that hospitals with strong leadership support for ASPs saw higher levels of engagement among healthcare workers and better overall program outcomes (24).

Leadership is critical not just for providing financial support but also for fostering a culture of accountability and continuous improvement. It was found in Australia that ASPs in hospitals with engaged leadership were more likely to receive the resources needed for sustainability, including training and diagnostic tools (26). This study reinforces the importance of leadership in driving the success of ASPs, particularly in resource-constrained setting.

The availability of financial and technical resources is critical for ASP implementation, highlights from this study depicts the role of external partners like MTaPS in providing

the necessary financial and diagnostic resources to support ASP activities. This finding aligns with the work of Jeff et al, who noted that external funding and partnerships are often essential in LMICs, where government resources may be insufficient to sustain ASPs (11).

The technical assistance and funding provided by MTaPS played a crucial role in setting up diagnostic tools and training healthcare workers. This mirrors findings from Nathwani et al, who noted that partnerships with non-governmental organizations were key to the successful rollout of ASPs (39).

External collaborations not only provide financial support but also offer valuable expertise and training, which are essential for building the capacity of healthcare workers in LMICs. However, as noted by Pierce et al, ensuring the sustainability of these collaborations is critical. Hospitals must develop strategies to maintain ASP activities even after external partners have phased out their support (21).

5.1.4 Challenges and Barriers to ASP Implementation

Resistance to the implementation of ASPs by healthcare workers was highlighted as a barrier identified in this study, particularly among physicians who preferred to rely on empirical treatment based on personal experience rather than adhering to ASP guidelines. This type of resistance is often tied to deeply ingrained clinical habits and a reluctance to change, even when evidence supports the new protocols. Hierarchical dynamics in hospitals, where senior clinicians resist challenges to their prescribing patterns, contributed to non-compliance with ASPs in Latin American hospitals (25).

These study findings showed that some healthcare workers perceived ASP guidelines as limiting or irrelevant, especially in cases where empirical treatments had worked previously. A study done in Asia identified similar resistance in their study, where physicians preferred to make quick treatment decisions in high-pressure environments, viewing the time required for ASP protocols as a hindrance (40). Addressing these

attitudes requires targeted education that highlights the importance of ASPs in improving patient outcomes and combating antimicrobial resistance (AMR), as noted by Harun et al (33). Changing entrenched prescribing behaviors will require a cultural shift within healthcare institutions, where ASPs are viewed as integral to patient safety rather than as an added administrative burden

Time constraints and heavy workloads were major challenges to the full engagement of healthcare workers in ASP activities in this study. This issue is particularly pronounced in resource-limited settings like Dar es Salaam's RRHs, where healthcare professionals often face overwhelming patient loads, leaving little time for participation in ASP-related activities such as training sessions, audits, and feedback meetings. Heni et al**,** found similar issues in their study, noting that overburdened staff frequently deprioritized ASP participation due to competing demands (32).

High workloads result in reduced compliance with ASP guidelines, as healthcare workers are more likely to default to quicker empirical treatments rather than following time-consuming diagnostic and prescription protocols. A study in Nepal also reported that healthcare workers in hospitals with higher patient loads were less likely to adhere to ASP protocols, which is consistent with these findings (36). Moreover, the lack of dedicated ASP personnel exacerbates this problem. Without sufficient staff to support ASP activities, responsibility falls on already overworked healthcare workers, which limits the program's effectiveness (27)**.**

Resource and funding limitations emerged as significant barriers to the effective implementation of Antimicrobial Stewardship Programs (ASPs). These findings revealed delays in the procurement of diagnostic tools, stock outs of key antibiotics, and limited availability of laboratory supplies—all of which hindered ASP activities. These challenges are common in low- and middle-income countries (LMICs), where healthcare budgets are often constrained (41). Morency et al, found similar issues in Indonesian hospitals, where inconsistent funding delayed the availability of essential supplies for ASPs(34) .

These limitations create logistical barriers to diagnostic testing, surveillance, and antibiotic prescribing, leading to over-reliance on empirical treatments. Thomson et al, also emphasized that inadequate funding restricts ASP teams from conducting regular audits and monitoring, which are crucial for maintaining high compliance (42).

Logistical challenges, including delays in the procurement of diagnostic tools, inadequate laboratory infrastructure, and slow turnaround times for culture and sensitivity tests, significantly impeded the implementation of ASPs in this study. These challenges are not unique to Dar es Salaam's hospitals but are common in healthcare systems across LMICs. Hollingsworth noted that logistical delays, particularly in the supply chain for diagnostic materials, often force healthcare workers to rely on empirical treatments, which undermines the goals of ASPs (22).

The lack of automation in laboratory processes also contributed to prolonged turnaround times for diagnostic results in this study, which made it difficult for clinicians to wait for culture results before initiating treatment. Another study highlighted that improving laboratory capacity through automation and better procurement processes is crucial for the success of ASPs, as timely and accurate diagnostics form the backbone of stewardship efforts (43). Addressing these logistical issues will require investments in both infrastructure and supply chain management, as well as more efficient coordination between hospitals and procurement agencies, to ensure that essential diagnostic tools are available when needed (44).

CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATION

6.1 CONCLUSION

The implementatSion of Antimicrobial Stewardship Programs at Temeke and Amana hospitals has significantly enhanced the quality of antibiotic use and patient care. The initiation phase, supported by comprehensive training and governmental assistance, was critical in equipping healthcare providers with the necessary skills. The adherence to clinical guidelines improved substantially, leading to reduced prescription errors and more effective use of antibiotics. The impact on the quality of services and empirical treatment was notable, with better diagnostic accuracy and targeted treatments. Improvements in clinical practice were evident, and the role of leadership was pivotal in driving the success of these programs. Continuous monitoring and evaluation ensured ongoing improvement and achievement of program goals.

However, challenges such as individual factors, funding limitations, time constraints, and coordination issues were significant barriers. Addressing these challenges is crucial for the sustainability and expansion of ASPs. The findings from this study provide valuable insights into the effectiveness of ASPs and offer lessons for other healthcare facilities aiming to implement or enhance antimicrobial stewardship.

6.2 RECOMMENDATIONS

Given the evident importance of this program, it is apparent that it should be supported to ensure its sustainability and efficiency**.** To sustain and enhance the effectiveness of Antimicrobial Stewardship Programs (ASP), the following is recommended;

A. NATIONAL AND MINISTRY LEVEL

1. **Financial Support**: This recommendation is directly informed by the study's findings that highlighted financial constraints as a major barrier to effective ASP implementation. Participants expressed concerns about the reliance on external funding, such as support from partners like MTaPS, and the absence of sustained

internal financial support, Thus, the Ministry of Health should allocate dedicated financial resources to healthcare facilities implementing ASPs. This support should extend beyond regional referral hospitals to include smaller, local facilities, ensuring a broader reach and impact.

2. **Program Integration:** Given the evidence that ASPs are more effective when integrated rather than implemented as standalone initiatives, the Ministry of Health should work to integrate ASPs with other relevant programs, such as Infection Prevention and Control (IPC). This recommendation stems from other studies done, that observed that healthcare facilities where ASPs were integrated with other initiatives, such as IPC, demonstrated better outcomes.
3. **Priority and Guidance:** The need for stronger guidance and prioritization of ASPs was frequently mentioned this study. ASPs were not given sufficient priority, and there was no clear institutional mandate driving their implementation. The facilities lacked the infrastructure or support to carry out such surveillance. A clear directive from the National AMR Multisectoral Coordination Committee and established surveillance systems would provide healthcare facilities with the tools needed to monitor antibiotic use and resistance more effectively. Therefore, the National AMR Multisectoral Coordination Committee should prioritize ASPs in healthcare facility management. This committee should also guide facilities in establishing AMS surveillance programs at the facility level to monitor and improve antibiotic use and resistance patterns.

B. FACILITY LEVEL

4. **Performance Indicators and Reporting:** The absence of performance indicators to track progress of ASP made it difficult to evaluate their impact. Regular monitoring through performance indicators and reporting would help healthcare facilities identify gaps in program implementation and areas for improvement. This suggests that healthcare facilities should develop specific performance indicators for their AMS activities. Regular activity reports on the

implementation and progress of these programs should be produced to track trends and identify areas for improvement.

5. **Communication and Coordination:** The study highlighted poor communication and coordination between different hospital departments as a barrier to ASP success. Establishing regular communication mechanisms, such as multidisciplinary meetings and feedback loops, would facilitate alignment between departments and improve ASP outcomes in healthcare facilities.

Future research should focus on conducting longitudinal studies to evaluate the long-term impact of Antimicrobial Stewardship Programs (ASPs) on antibiotic usage, resistance patterns, and patient outcomes, particularly in low-resource settings. Additionally, there is a need to explore context-specific barriers and facilitators to ASP implementation across various healthcare levels, such as district versus regional hospitals, to tailor interventions effectively. Studies evaluating different models of integrating ASPs with programs like Infection Prevention and Control (IPC) would provide valuable insights into optimizing these efforts.

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8.0 APPENDICES

8.1 Appendix 1(a); Consent form- English version

Index Number……...

Introduction

I am Berthania Magesa, a student from Muhimbili university of health and allied sciences (MUHAS). I am conducting a study titled "Evaluating the implementation efficiency of antimicrobial stewardship programs in reducing the burden of antimicrobial resistance at Dar es salaam regional referral hospitals"

Participation in the study

You are kindly requested to participate in this study. If you agree to participate in this study your Information was taken and used for the purpose of this research only. Your participation will not implicate your job and your response won't be connected with your personal identity.

Confidentiality

You are strongly assured of the confidentiality of the information obtained that will only be used for the purpose of this research and anonymity will highly be observed when collecting and compiling data.

Risk to participants

No anticipated risk or harm that may result from participating in this study.

Right to participate in the study

Your participation is absolutely voluntary and there is no penalty for refusing to participate.

Contact Person

Berthania Magesa (0710408246) is the key contact person in case of any queries about this study, if you have any concerns about your rights as a participant you may contact the chairman of the university senate research and publications, MUHAS P.O.BOX 65001, Dar es salaam.

Telephone;2150302-6

Signing of the consent

If you agree to participate in this study, please sign in this consent form.

I have read and understood the contents of this form and I have been given satisfactory explanations with all my questions answered. I therefore consent to participate in this study.

Signature of interviewee.....Date.....

Signature of interviewer.....Date.....

8.2 Appendix I (b): Consent form- Swahili version

Namba ya utambulisho…….

Utangulizi

Mimi naitwa Berthania Magesa, ni mwanafunzi kutoka chuo kikuu cha afya tiba na sayansi shirikishi Muhimbili, Ninafanya utafiti kuhusu " Tathmini ya ufanisi wa program za uwakili wa antibiotic katika kupunguza tatizo la usugu wa dawa katika hospitali za rufaa za mkoa wa Dar es Salaam"

Kushiriki katika utafiti huu

Tafadhali unaombwa kushiriki katika utafiti huu, mara tu utakaporidhia una hakikishiwa kuwa taarifa zako na maelezo utakayotoa yatatumika kwa makusudio na malengo ya utafiti huu tu.

Usiri wa taarifa

Unahakikishiwa tena kuwa taarifa zozote zitakazopatikana kutoka kwako wakati wa utafiti huu zitapewa usiri mkubwa sana na hazitatumika kwa malengo mengine yeyote tofauti na utafiti hisika

Adhari za utafiti huu kwa mshiriki

Hakuna adhari au madhara yeyote yatakayo kupata kutokana na kushiriki katika utafiti huu.

Haki ya kushiriki katika utafiti huu

Ushiriki wako katika utafiti huu ni wa hiari kabisa, unayo haki ya kushiriki au kutokushiriki katika utafiti huu bila kulazimishwa, pia unayo haki ya kukataa kuendelea kushiriki wakati wowote unapojiskia kufanya hivyo

Mawasiliano

Wasilina na Berthania Magesa kwa simu namba 0710408246 wakati wowote

utakapokuwa na maswali au jambo lolote lenye kuhitaji ufafanuzi.

Kukubali kushiriki

Ukikubali kushiriki tafadhali thibitisha kwa kujaza na kusaini sehemu ya fomu hapa chini

Mimi nimesoma/nimesomewa na kuelewa yaliyomo kwenye fomu hii maswali yote yamejibiwa vizuri.Hivyo ninakubali mwenyewe kwa hiari yangu bila kushurutishwa au kushawishiwa kushiriki katika utafiti huu.

Sahihi ya mhojiwa.....tarehe.....

Sahihi ya mhoji.....tarehe.....

8.3 Appendix 2(a) Key informant interview guide – English version

KEY INFORMANT INTERVIEW GUIDE

INTRODUCTION

I would like to take this opportunity to thank you for taking time to participate in this interview. You should be assured that your response was confidential and that it will only be used for the purpose of this study. Please feel free to answer all questions with utmost openness and any time you wish to stop the interview I was obliged to do as you wish without causing you any consequences.

PARTICIPANT DEMOGRAPHICS

Name of interviewer (Initials)……

Date of Interview……

Name of Hospital…….

Participant Number (TEM 01, MWAN 01 or AMA 01)……

Participant's cadre……

Age……

Gender……

Highest level of Education…….

How long have you worked here?.....

INTERVIEW QUESTIONS

1. What do you know about antibiotic stewardship program

Probe:

· Meaning of antibiotic stewardship

· Responsible persons for antibiotics stewardship

· Activities performed under the umbrella of antibiotics stewardship

· How have you been involved in the implementation of antibiotic stewardship activities

2. Does your facility receive any budgeted financial support for Antimicrobial stewardship programs?

Probe:

Salary, training, resources, mentorship, supervision and Information Technology

3. What is your overall perception or experience about the antibiotic stewardship?
Probe: How antibiotic stewardship have impacted the quality of delivery of antibiotics? have you noticed changes in delivery of antibiotics? How have they changed?
4. Does your facility produce antibiotic susceptibility reports (either monthly or yearly)?

Probe:

Who produces the reports, How is the report used and how is it perceived by medical personnel?

5. Does your facility have facility specific treatment guideline based on the national guideline to assist with antibiotic selection for common clinical conditions?
6. Does your facility have antibiotics that require pre authorization before prescribing? Who does the pre authorization?
7. Does your facility conduct antibiotic reviews and give feedback to prescribers?
8. What do you think facilitates the implementation of ASP at your facility?
9. Are there any challenges that are encountered while implementing ASP at your facility?

Now, before we close this interview, do you have any additional information you would like to share with regards to antimicrobial stewardship programs? Or if you have any recommendations.

8.4 Appendix 2(b) Key informant interview guide – Swahili version

KEY INFORMAT INTERVIEW

UTANGULIZI

Awali ya yote, Naomba nitumie fursa hii kukushukuru kwa ushiriki wako katika mahoiano haya. Naomba uwe na hakika kwamba taarifa zako zitatumika kwa ajili ya utafiti huu tu na zitakuwa za siri. Uwe huru kujibu maswali yote kwa uwazi na kama utahitaji kusitisha mahojiano unaweza kufanya hivyo bila kupata adhari zozote.

TAARIFA ZA MSHIRIKI

Jina la Mhojaji (Kwa herufi za mwanzo)…….

Tarehe ya mahojiano…….

Jina la hospitali……..

Namba ya Ushiriki (TEM 01, MWAN 01 au AMAN 01)……..

Kada ya mshiriki……

Umri……

Jinsia……

Kiwango cha juu cha elimu……..

Ni muda gani tangia umeanza kazi mahali husika……..

MASWALI YA MAHOJIANO

1. Unafahamu nini kuhusu programu za uwakili wa antibiotiki?

Uliza kuhusu

- Maana ya uwakili wa antibiotiki
- Muhusika wa program
- Shughuli zinazofanyika chii ya mamvuli wa program hizi
- Umehusikaje katika kutekeleza program hizi

2. Taasisi yako inapokea msaada wowote wa kifedha katika kufanikisha program hizi?

   Ulizia

   (posho, rasilimali, mafunzo,usimamizi, ushauri na teknolojia)
3. Mtazamo wako kwa ujumla kuhusu program hizi ukoje?

   Uliza(kama zimeaidia kuongea ubora wa huduma na afya za wagonjwa kwenye upande wa utoaji dawa, je umebadilika)
4. Je taasisi yako inatoa ripoti ya usugu wa dawa kwa bacteria (kwa mwezi au mwaka)
5. Je Taasisi yako inafata miongozo ya kutibu kulingana na miongozo ya taifa katika kutoa dawa kwa magonjwa yanayojirudia rudia?
6. Taasisi yako ina toa dawa ambazo zinahitaji kupata idhini kabla ya kutolewa? Nani anahidhinisha ?
7. Taasisi yako ina toa ripoti za uhakiki wa dawa na kurudisha mrejesho kwa watoa dawa?
8. Ni nini unadhani vinawezesha utekelezaji wa program hizi kwa ufanisi katika taasisi yako?
9. Na vitu gani vinakwamisha utekelezaji wa program hizi?

Kabla hatujamaliza, Una swali au mchango mwingine wowote ama mapendekezo kuhusu program hizi?

8.5 Appendix 3 (a) Ethical clearance letter

UNITED REPUBLIC OF TANZANIA

MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

OFFICE OF THE DIRECTOR – RESEARCH, PUBLICATIONS

AND INNOVATION

Ref. No.DA.282/298/01.C/2103 Date: 18/03/2024

MUHAS-REC-03-2024-2103
BERTHANIA PAUL MAGESA
MUHAS

RE: APPROVAL FOR ETHICAL CLEARANCE FOR A STUDY TITLED: ASSESSING THE IMPLEMENTATION EFFICIENY OF ANTIMICROBIAL STEWARDSHIP PROGRAMS IN REDUCING THE BURDEN OF ANTIMICROBIAL RESISTANCE IN DAR ES SALAAM REGIONAL REFERRAL HOSPITALS.

Reference is made to the above heading,

I am pleased to inform you that the Chairman has on behalf of the University Senate, approved ethical clearance of the above-mentioned study, on recommendations of the Senate Research and Publications Committee meeting accordance with MUHAS research policy and Tanzania regulations governing human and animal subjects research.

APPROVAL DATE: 18/03/2024
EXPIRATION DATE OF APPROVAL: 18/03/2025

STUDY DESCRIPTION:
Purpose:

The purpose of this qualitative case study is to determine the implementation efficiency of antimicrobial Stewardship programs in reducing the burden of Antimicrobial resistance in Dar es Salaam Regional Referral Hospitals.

The approved protocol and procedures for this study is attached and stamped with this letter, and can be found in the link provided: https://irb.muhas.ac.tz/storage/Certificates/Certificate%20-%2015326.pdf and in the MUHAS archives.

The PI is required to:

1. Submit bi-annual progress reports and final report upon completion of the study.
2. Report to the IRB any unanticipated problem involving risks to subjects or others including adverse events where applicable.
3. Apply for renewal of approval of ethical clearance one (1) month prior its expiration if the study is not completed at the end of this ethical approval. You may not continue with any research activity beyond the expiration date without the approval of the IRB. Failure to receive approval for continuation before the expiration date will result in automatic termination of the approval for this study on the expiration date.
4. Obtain IRB amendment (s) approval for any changes to any aspect of this study before they can be implemented.
5. Data security is ultimately the responsibility of the investigator.
6. Apply for and obtain Data Transfer Agreement (DTA) from NIMR if data will be transferred to a foreign country.
7. Apply for and obtain Material Transfer Agreement (MTA) from NIMR, if research materials (samples) will be shipped to a foreign country.
8. Apply for and obtain permission to publish the results from National Institute for Medical Research The application should be before submitting to a publisher and not concurrently through the email publications@nimr.or.tz.
9. Any researcher, who contravenes or fail to comply with these conditions, shall be guilty of an offence and shall be liable on conviction to a fine as per NIMR Act No. 23 of 1979, PART III section 10 (2)
10. The PI is required to ensure that the findings of the study are disseminated to relevant stake holders.
11. PI is required to be versed with necessary laws and regulatory policies that govern research in Tanzania. Some guidance is available on our website https://drp.muhas.ac.tz/.

20/03/24

Dr. Kasusu Nyamuryekung'e

Ag. Chairperson, MUHAS Research and Ethics Committee

Muhimbili University of Health and Allied Sciences
DIRECTOR
Research, Publications & Innovations
Box 65001

8.6 Appendix 3 (b) Permission letters

THE UNITED REPUBLIC OF TANZANIA
MINISTRY OF HEALTH

AMANA REGIONAL REFERRAL HOSPITAL

Telegram "HEALTH", DODOMA
Phone No.: +255 026 – 2323267
Email: ps@afya.go.tz

P.O. Box 25411
DAR ES SALAAM
Phone: 022—2861903

REF. NO. MoHCDGEC/ARRH/R.1/VOL II/54

Date: 02/05/2024

Director, Postgraduate Studies,
MUHAS,
P.O. Box 65001,
DAR ES SALAAM.

Re: PERMISSION FOR DATA COLLECTION

Refer to your letter dated 25th March, 2024 which requested us to Berthania Paul Magesa to conduct research and collect data in our institution.

We are here to acknowledge your request with the following conditions, that she must submit the results of her research after completion of analysis in order the hospital to make use of data's to solve hospital problems.

Regards.

For:
MEDICAL OFFICER I/C
AMANA REGIONAL REFERAL HOSPITAL
P. O. Box 25411
DAR ES SALAAM

Dr. Rose Ntambuto
FOR: MEDICAL OFFICER INCHARGE
AMANA REGIONAL REFERRAL HOSPITAL

(All Correspondence should be directed to Medical Officer Incharge)
Email: amana@amanarrh.go.tz, Website: www.amanarrh.go.tz

3

THE UNITED REPUBLIC OF TANZANIA
MINISTRY OF HEALTH

Telephone Address:

Telephone: 022-2760500

Mwananyamala Regional
Referral Hospital,
P.O.Box 61665
Dar es Salaam.

RE: NO.: MA. 239/240/01/95

DATE: 27rd May, 2024

Director,
Muhimbili University of Health and Allied Science,
P.O.BOX65001,
DAR ES SALAAM.

RE: BERTHANIA PAUL MAGESA TO CONDUCT HER RESEARCH IN MWANANYAMALA REGIONAL REFERRAL HOSPITAL

The captioned subject refers

2. May you be informed that your request to research Titled **Assessing the Implementation Efficiency of Antimicrobial Stewardship Progwams in ''Reducing the Burden of Antimicrobial Resistance in Dar es salaam** in Tanzania 'at Mwananyamala'' start to 28th May, 2024 to 25 June, 2024 is asserted.

3. The Institution charges **100,000/=**, as a Research fee. The payments are to be made upon reporting.

4. May she report to the Administration and HR department head for further instruction.

Thanks.

For: MEDICAL OFFICER INCHARGE
MwananyamalaRegionalReferralHospital
P O Box 61665
DAR-ES-SALAAM

Atugonza kyaruzi
RESEARCH COORDINATOR
FOR: MEDICAL OFFICER INCHARGE
MWANANYAMALA REGIONAL REFERRAL HOSPITAL

COPY:
Head of Nursing Department - **MWANANYAMALA REGIONAL REFERRAL HOSPITAL**

Student - **Berthania Paul Magesa**

JAMHURI YA MUUNGANO WA TANZANIA
WIZARA YA AFYA.
HOSPITAL YA RUFAA YA MKOA YA TEMEKE
Baruapepe:temekerh@afya.go.tz,S.L.P 45232 Dar es Salaam,Simu 0222856007

Kumb. Na. TRRH/RSC/9/10/01/21 **Tarehe: 16/05/2024**

Ndg. Berthania Paul Magesa
Muhimbili University and Allied Sciences
S.L.P 65001
DAR ES SALAAM.

YAH: OMBI LA KUFANYA UTAFITI "FACTOR INFLUENCING MENTAL ILLNESS AMONG YOUTH" (RESEARCH)

Tafadhali husika na somo tajwa hapo juu.

2. Nimepokea barua yako ya tarehe 25 Machi, 2024 kuhusu ombi lako la kufanya Utafiti (Research) katika Taasisi yetu, kuhusu **"Assessing the implementation Efficiency of Antimicrobial Stewardship Programs in 'Reducing the Burden of Antimicrobial Resistance in Dar es Salaam Regional Referral Hospitals."**

3. Ombi lako limekubaliwa, utatakiwa kulipa ada kiasi cha **Tshs. 100,000/=** Hivyo wasiliana na mhasibu wa mapato wa Hospitali **Ndg. Lusajo Nsajigwa** kwa namba **0717 959495** ili akupatie control Number kwa ajili ya malipo ya ada hii ili uweze kuruhusiwa kufanya utafiti.

4. Asante kwa ushirikiano.

Dkt. Husna Msangi
Kny: MKURUGENZI
HOSPITALI YA RUFAA YA MKOA YA TEMEKE

Nakala: CSCO/Lab Manager - ***Tafadhali hakikisha taarifa ya utafiti inabaki hospitalini***