# ASSESSMENT OF FACTORS AFFECTING TUBERCULOSIS DATA QUALITYFOR CASE-BASED REPORTING IN LINDI MUNICIPALITY

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**MSc in Project Management Monitoring and Evaluation in Health Dissertation**

**Muhimbili University of Health and Allied Sciences**

**October 2020**

**Muhimbili University of Health and Allied Sciences**

**School of Public Health and Social Sciences**


# ASSESSMENT OF FACTORS AFFECTING TUBERCULOSIS DATA QUALITY FOR CASE-BASED REPORTING IN LINDI MUNICIPALITY

**By**

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**A Dissertation Submitted in (partial) Fulfillment of the Requirements for the Degree of Master of Science in Project Management Monitoring and Evaluation in Health of Muhimbili University of Health and Allied Sciences**

**October 2020**

## CERTIFICATION

The undersigned certifies that he has read and hereby recommends for acceptance by Muhimbili University of Health and Allied Sciences a dissertation entitled **"Assessment of factors affecting tuberculosis data quality for case-based reporting in Lindi Municipality**: in partial fulfillment of the requirements for the Degree of Master of science in Project Management Monitoring and Evaluation in Health of Muhimbili University of Health and Allied Sciences.

_____

**Prof. Angwara Denis Kiwara (Supervisor)**

**Date: _____**

## DECLARATION AND COPYRIGHT

I, **Dr. Mayega** Samson declare that this **dissertation** is my own original work and that it has not been presented and will not be presented to any other University for a similar or any other degree award.

Signature …… Date ……

## ACKNOWLEDGEMENT

This work was made possible because of the contributions and support of several people and institutions. I would like to give my sincere thanks to everyone but I will mention a few to represent others. First, I would like to thank my God for the strength and blessings that He has showered over me and my parents for funding my studies, from November, 2017 to September, 2020 at Muhimbili University of Health and Allied Sciences (MUHAS). I would also like to extend my gratitude to academic and non-academic staff of the School of Public Health and Social Sciences for their support and contribution in the development of this dissertation.

Moreover, I would like to acknowledge my supervisor Prof. Angwara Kiwara for his tireless efforts of supervision and guidance during the completion of this dissertation.

I also wish to acknowledge the Municipal medical officer of Lindi Municipal council for granting permission to conduct this study. I would like to extend my sincere gratitude to all members of the Council Health Planning and management Team and health workers, particularly the District Medical Officer, District Tuberculosis and leprosy Coordinator and, District and health facilities MTUHA/HMIS focal persons, District and health facilities health secretaries and all who participated in the study.

Apart from that, my special thanks should go to my whole family and friends who have given me a helping hand and a shoulder to lean on. Last but not least I would like to thank my colleagues; with whom I shared ideas; for their moral support and companionship.

## DEDICATION

This dissertation is dedicated to My Father Mr. Samson Kagwe and my mother Mrs. Hami Kagwe for making me accomplish all what I am today.

**ABSTRACT**

Tuberculosis (TB) epidemic is planned to be ended by the year 2035. This can be achieved through employing an accurate means of monitoring progress of interventions. A recording and reporting system, being of paramount importance has been in place since 2006. This system is meant to provide assistance on assessment of quality of Tuberculosis services offered, treatment outcome evaluation and TB notifications trends. Despite the presence of a full functional health management Information system for monitoring TB services, the data produced by this system is not of good quality as per 2018 DQA report by NTLP.

**Objective:** The aim of this study was to assess the factors affecting quality of data of a tuberculosis surveillance system for case-based reporting in Lindi Municipality.

**Methodology:** This study was a cross sectional study assessing TB data quality by using three dimensions namely data availability, Data completeness and data accuracy. Data were collected from all 11 facilities in Lindi Municipality offering Direct Observed Therapy whereby the focus was on all cases recorded in TB 03 facility registers a year before date of data collection, also one DOT nurse or clinician at the DOT center was provided with a validated RDQA tool for TB monitoring and reviewing available collected data, Adopted and modified questionnaires from MEASURE evaluation RHMIS Performance diagnostic tool was administered. Data from the questionnaires was analyzed quantitatively using Statistical Package for Social Scientists (SPSS) version 23, whereby frequency distribution tables were used to present data. Results: This study found out that majority (54.5%) of DOT providers from all facilities involved were female,30 years or older, 63.6% were educated to attain a certificate level. On level of data quality assessed data availability was 81.8%, completeness was 93% and on accuracy an underreporting of 5% was observed. Factors that influence data quality were found to be supportive supervision, more than five years of working experience, being trained on basic computer and TB HMIS. However, having budget for HMIS and being queried for delay of report was found to have no effect on Tb data quality.

**Recommendations:** The RCHMT and implementing partner(s) should further invest in conducting supportive supervisions and arrange trainings on data management as they have found to have an influence in production of data of good quality.

**Conclusion:** The overall quality of data is good, and most of the factors that have been revealed to have effect on Tb data quality are modifiable. If they are addressed the quality of TB data will improve more.

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## ABBREVIATIONS

| | |
|---|---|
| CCHP | *Comprehensive Council Health Plan* |
| CDC | *Centre for Diseases Control* |
| CHMT | *Council Health Management Teams* |

| | |
|---|---|
| DHIS | *District Health Information System* |
| DOT | *Direct Observed Therapy* |
| DQA | *Data Quality Assessment* |
| ETL | *Electronic Tuberculosis and Leprosy Database* |
| HMIS | *Health Management Information System* |
| MOHCDGEC | *Ministry of Health Community Development Gender Elderly and Children* |
| MTUHA | *Mfumo wa Taarifa za Uendeshaji Hudumaza Afya* |
| MUHAS | *Muhimbili University of Health and Allied Sciences.* |
| NGO | *Non-Governmental Organization* |
| NTLP | *National Tuberculosis And Leprosy Program* |
| PRISM | *Performance Routine Information System* |
| RDQA | *Routine Data Quality Assessment* |
| RHIS | *Routine Health Information System* |
| RHMIS | *Routine Health Management Information System* |
| RHMT | *Regional Health Management Team* |
| TB | *Tuberculosis* |
| USAID | *United States Agency for International Development* |
| WHO | *World Health Organisation* |

## DEFINITIONS OF TERMS

**Data-**This refers to collected information or facts.

Data Quality- Data quality is the ability of a given data set to serve an intended purpose, being accurate, consistent and available in a timely manner.

**Data Management-**This refers to the process whereby required information is collected, collated analyzed, reported and used as well as ensuring that their accessibility, reliability and timeliness is ensured to satisfy the needs of the data user.

**Data Accuracy-**Data will be considered accurate if the same value in the register is recorded in the ETL data base for each of the data element during the study period.

**Data Completeness-**For data to be considered complete there will be an assessment of the number of data element recorded against the total expected data elements in both the TB 03-unit register and the ETL database.

# CHAPTER ONE

## 1.0 INTRODUCTION

### 1.1 Background

Tanzania has used paper-based reporting system since her independence in 1961.The collected data are routinely used in monitoring patients' progress while receiving treatment, diseases surveillance as well as resources allocation and utilization in order to attain the desired outcomes and impacts.

These data are mainly obtained from different points of care at the health facility. The commonest one being the OPD, TB unit, and Laboratory or microscopy unit; the healthcare providers at these units are normally the one responsible for routinely recording these data while undertaking their usual healthcare activities using standard patients forms/cards & registers. The collected information is then copied to summary forms which are sent to the data focal person at the district before being entered into the DHIS 2 database whereby they are aggregated and become available to whoever has access to the database. For TB data, normally they are captured by the DOT provider at the facility whereby she fills the patient records on both the patient card and the register (TB 03 register), the District Tuberculosis and Leprosy Coordinator then pass to these facilities on the 5$^{th}$ day of every month to collect this information, he then enters them into the electronic tuberculosis and leprosy database. On a quarterly basis the district health information focal person conducts data quality audits(DQAs), to check for the correctness of the collected data.

This centralized mode of reporting structure is encouraging the data producers not to use the produced data for data informed decision making at their locality. Effective recording and reporting of data are critical in the care of patients with TB and overall control of the disease.

The global TB epidemic is targeted to be ended by 2035, in order to achieve this there is a need of employing an accurate and timely monitoring of the progress as the result of efforts being done to achieve the stated targets globally, regionally and locally, This can be attained through addressing the hitches that the reporting and recording system especially the paper-based system is facing.

In 2006 the World Health Organization (WHO) released the Stop TB strategy, its release was accompanied with an introduction of a revised version of Tuberculosis(TB) recording and reporting system ranging from forms to registers, this surveillance system is of paramount importance, as it is through which an assessment of quality of TB services offered, treatment outcome evaluation and TB notifications trends can well be studied; also an integration of TB with HIV services can easily be assessed. This surveillance system was designed in a manual as well as an electronic format.

The electronic surveillance systems utilize computer technology to facilitate the capture, transfer and reporting of the WHO-recommended data elements, Electronic surveillance system offers several potential advantages over the traditional paper based used in many low resources settings, these advantages are such as improved data quality and increased security in data storage.

In Tanzania, the electronic TB and leprosy web-based software was introduced with similar features as the DHIS 2 which is an electronic Health management system that has undergone evolution through passing a series of revisions to get the currently used DHIS 2 database/software. Previously it was referred to as Mfumo wa Taarifa za Uendeshaji Huduma za Afya (MTUHA). The DHIS 2 database was piloted in Tanzania between 2008 and August 2009 in Kibaha and Bagamoyo districts, its rollout throughout the country was completed in December 2013.

Many countries including Tanzania are struggling to improve case detection and reporting on diseases, Tuberculosis included, but these efforts are facing an array of challenges in quality and timeliness of the thereof reports submitted.

## 1.2 Problem Statement

WHO recommends that all programmatic activities or indicators carried out to fight Tuberculosis epidemic, should be well documented in both the electronic and the manual format. This reporting and recording system was introduced in 2006 by the WHO through the STOP TB strategy, Tanzania has adopted both reporting systems and it is disseminated to primary healthcare delivery points/facilities.

However, the produced data is not of good quality in terms of timeliness, completeness accuracy and consistency. This is as evidenced by the RDQA conducted in 13 regions of the Tanzania mainland by the MOHCDGEC through NTLP which showed that instructions on how to fill the TB 03-unit register were not followed. Both the registers and the ETL database were not filled timely; with an incomplete filling of the registers, the most affected being the outcome evaluation column. The factors that are associated with this poor performance in both the manual and electronic systems were not assessed thus less is known about them.

Therefore, this study aimed at assessing the factors associated with tuberculosis data quality for case-based reporting in Lindi municipality which was not among the 13 regions involved in the previous RDQA by the MOHCDGEC through NTLP.

### 1.3 Conceptual Framework

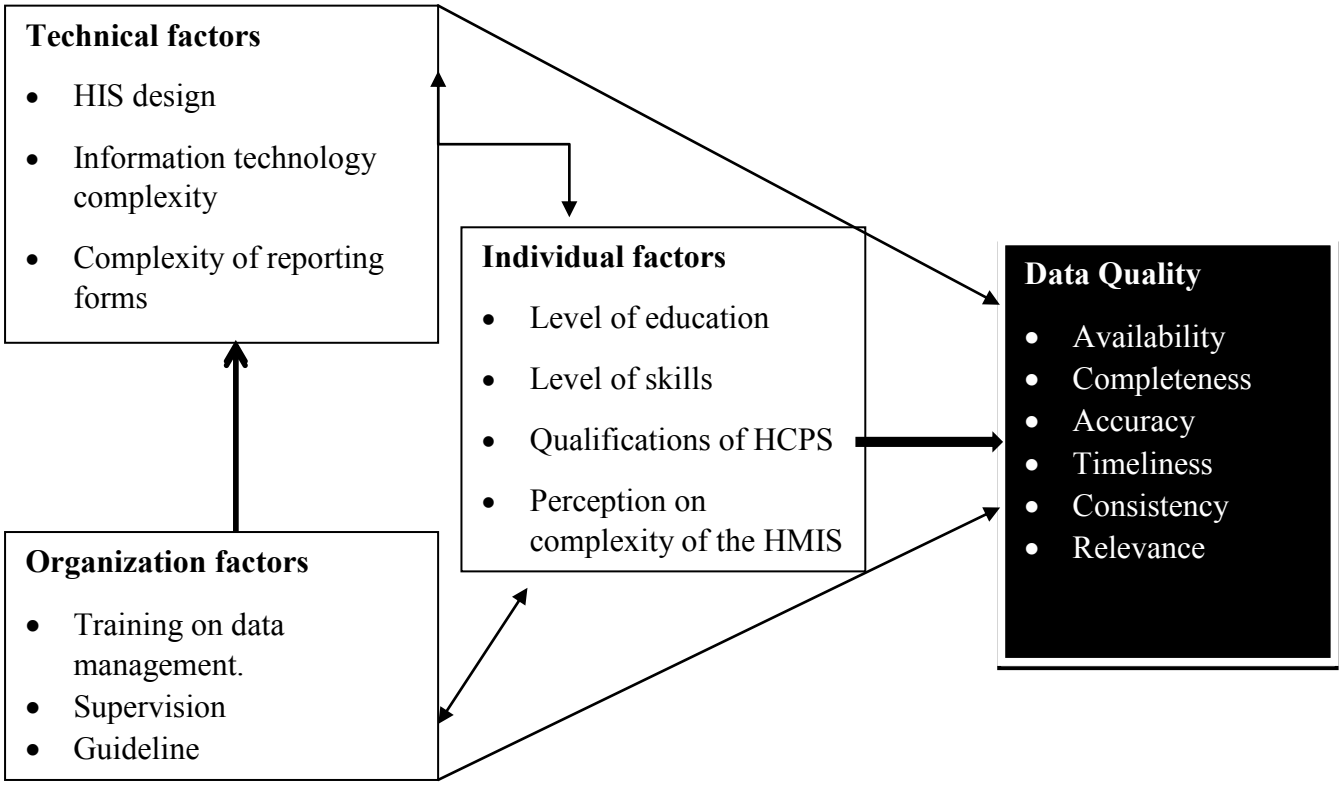
In 2011, MEASURE evaluation under USAID assistance developed a conceptual framework responsible for designing, improving and evaluating a routine Health Information system termed as the Performance of Routine Information System Management (PRISM), This framework shows a list of factors responsible for affecting quality of data produced in a RHMIS system, it is important since it poses a room for modification of these factors to get data of desired quality.

In this study, timeliness, availability, accuracy completeness will be studied since consistency has already been established in the routine DQAs conducted, and relevance of the collected data has already established since the tools used are the one from the WHO, in this case timeliness, availability, accuracy and completeness are dependent variables as their values can be determined by the independent variables (The factors affecting data quality).

Previous studies have shown that presence of guidelines,supportive supervision, higher academic qualifications influences production of data of good quality and the vice versa is true.Also this conceptual framework theorizes that as the HMIS become complex the odds of producing data of good quality gets reduced automatically**.**

Tuberculosis Data recording and reporting system being one of the RHIS, this framework is suitable to evaluate its Performance**.** It consists of tools for measuring performance and identifying technical, individual and organizational factors that determines quality of data. It hypothesizes that modifying the factors affecting production of data quality will eventually improve the quality of the produced data. (Aqil et al, 2009).

**Figure 1: conceptual framework on factors affecting data quality**




**Source:** Adopted and modified from Measure Evaluation, 2007

### 1.4 Rationale

Having a proper recording and reporting system is of paramount importance in monitoring activities and programmatic indicators aiming at combating Tuberculosis epidemic especially on monitoring individual cases and monitoring progresses of different interventions. The aim of this study was to assess the level of quality of data produced in the Tuberculosis surveillance systems (Both manual and electronic) for case-based reporting and identify the factors influencing them so that they can be addressed in order to produce data of good quality, to be used in making informed decisions.

Also, the results obtained from this study will help to improve the performance of the RHIS (Tuberculosis reporting and recording system) in Tanzania, since the objective of this study is to identify the factors associated with data quality, especially those linked to environmental, organizational, technical and behavioral human resources.

This study is also a requirement as part of the partial fulfillment of my studies in Master of Science in project management Monitoring and evaluation in health.

### 1.5 Main research question

What are the factors affecting quality of data of a tuberculosis surveillance system (both manual and electronic) for case-based reporting in Lindi municipality?

#### 1.5.1 Specific research questions

1. What is the level of data quality of a tuberculosis surveillance system for case-based reporting in Lindi municipality?
2. What are the individual factors affecting tuberculosis data quality for case-based reporting in Lindi municipality?
3. What are the technical factors affecting tuberculosis data quality for case-based reporting in Lindi municipality?
4. What are the organisational factors affecting tuberculosis data quality for case-based reporting in Lindi municipality?

### 1.6 Main Objective

To assess factors affecting quality of data of a tuberculosis surveillance system (both manual and electronic) for case-based reporting in Lindi municipality

#### 1.6.1 Specific objectives

1. To assess the level of data quality of a tuberculosis surveillance system for case-based reporting in Lindi municipality.
2. To assess the individual factors affecting tuberculosis data quality for case-based reporting in Lindi municipality.
3. To assess the technical factors affecting tuberculosis data quality for case-based reporting in Lindi municipality
4. To assess the organisational factors affecting tuberculosis data quality for case-based reporting in Lindi municipality.

# CHAPTER TWO

## 2.0 LITERATURE REVIEW

### 2.1 Introduction

This chapter various literatures regarding the factors that determine the quality of case-based tuberculosis data will be reviewed and the gap from previous study is ought to be established..

### 2.2 Theoretical Literature Review

John Snow Inc. and Measure defined information quality according to the following characteristics: coverage, accuracy comprehensiveness/timeliness, collection frequency and information communication process (Aqil, Lippeveld & Hozumi, 2009; Hotchkiss, Aqil, Lippeveld, & Mukooyo, 2010).

Quality Information therefore is comprehensive, accurate, specific and useful as information is derived from transformation of data, the quality of information will mean the quality of data, which equates to the validity, timeliness, accuracy among other elements.

The PRISM framework explains the critical factors in RHIS performance as Organizational (Availability of resources), Technical (Complexity of the collection tools in their format and procedures for use and complexity of technology used) and behavioral (staff motivation and competence associated with RHIS tasks).

The Tuberculosis recording and reporting system have been subjected to different Routine Data Quality Assessment, the recent being one conducted by NTLP through MOHCDGEC which revealed that it was poorly performing, the reason for this underperformance was linked to insufficient staff and implementing support activities such as supervision as well as low staff motivation(NTLP DQA report,2017)..

**Limitations of the Theory.**

It assumes single dimension cause-and-effect relationship thus it become difficult to find relationship between complex dynamics interacting components that occurs within the social systems.

**How to overcome this;**

Multiple factors will be examined at a time through employing multivariate mode of data analysis.

Therefore, the Technical, organization and behavioral factors interacts with individuals who produces data, and an alteration in these components will result into alteration in the quality of data to be produced.

## 2.3 Empirical Literature Review

### 2.3.1 The level of data Quality of the Tuberculosis Routine Health Information System.

Routine health information system refers to a structure that collects, analyses, stores and communicates health and health related information to be used in making decision, planning and performance improvement, The PRISM framework explains that the quality of the data produced and the use of the produced data is mainly determined by organizational, technical and behavioral factors, the routine health information system being the backbone of the entire health system, This means the factors affecting it will also affect the health system and subsequently the health outcome of the entire population(Aqil,Lippeveld,Hozumi,2009).

Data quality is multidimensional with five main attributes that defines it, such as timeliness, completeness relevance, completeness and accuracy (Lippeveld, Sauer born, Bodart,2000).

Chen, Hailey, Wang and Yu (2013) found that completeness, accuracy and timelines were the commonly used attributes for measuring data quality.

Simba and Mwangu (2006) conducted a study to assess factors influencing HMIS in Tanzania which found that 64.2% of data were completely filled with completeness being higher in government facilities compared to privately owned health facilities, Simba´s study assessed only completeness and timeliness, along with these, this study will evaluate additional two attributes of data quality.

Therefore, this study will assess the level of data quality so as appropriate action should be taken to address the gap or measure to maintain good performance in case the system will be performing well.

### 2.3.2 Technical factors affecting tuberculosis data Quality for case-based reporting.

This refers to the technology and set of expertise used in creation, administration and improvement of HIS, they refer to how complex the reporting tools, procedural manuals, design of HIS and complexity of HIS (Aqil, Lippeveld and Hozumi, 2009).

Nyamtema (2010) revealed that complexity of HIS (that is a non-user friendly HIS) has an influence/effect on data quality.

Mwangu and Simba (2006) found out that knowledge on HMIS basic concepts results to improvement in quality of data produced however from the same study it was found that there was a relationship between training in HMIS and Improved quality of data however in this study only completeness and timeliness were the attributes assessed,Our current study went far more to assess four attributes of data quality.

Another study conducted in Ethiopia revealed that departments with standard and clearly defined indicators, skilled human resources and a well-established reporting format and staff trained to properly use HIS has an increased likelihood of producing data of good quality (Teklegiorgis, Tedesseke and Tereffe,2016).

Therefore, this study will reveal the technical factors associated production of data of good quality in Lindi municipality for appropriate actions to be taken, since little is known about the technical factors associated with production of data quality in Lindi municipality.

### 2.3.3 The Behavioral/Individual factors affecting Tuberculosis data quality for case-based reporting.

Motivation, competency and confidence level in performing RHIS tasks are behavioral factors influencing performance of RHIS (Aqil, Lippeveld and Hozumi,2009), this similar study revealed that having knowledge on HIS is found to enhance self-efficacy and competency in performing Routine Health Information System tasks.

Another study conducted in South Africa found out that ability to interpret and use data is coupled with confidence in performing HIS tasks and subsequently lead to production of data of good quality and eventually using them (Nicol, Bradshaw, Phillips, Dudley,2013).

Similarly, another study conducted in Tharaka North's county in Kenya revealed that motivating staff for the job well done in terms of giving incentives as well as staff competency has an influence on HIS performance (Akinyi et al.2015)

Therefore, this study will reveal the behavioral factors associated production of data of good quality in Lindi municipality for appropriate actions to be taken, since little is known about the behavioral factors associated with production of data quality in Lindi municipality.

### 2.3.4 The Organizational Factors affecting Tuberculosis data quality for case based reporting.

Availability of finances, supportive supervision, training, governance, availability of resources, organizational culture to use of information are some of the organizational factors that influences Performance of RHIS (Aqil, Lippeveld and Hozumi,2009).

Teklegiorgis, Tadesse, Mirutse&Terefe (2016) conducted a study in Ethiopia with the findings that directives from supervisors, organization culture and decision based on evidence have influence on the quality of data, This is similar to the results of a PRISM evaluation conducted in Uganda in 2010, which showed that managers efforts to encourage a culture of information use has an influence on HIS Performance by influencing competency and motivation similar study found that presence of a staff responsible for HIS has an influence on production of data of good quality and use of Information (Hotckins,Aqil,lippeveld,Mukooyo,2010).

Another study conducted in Tanzania found that supportive supervision and queries have no influence on the quality of data produced.[3]This is contrary to another study conducted in Uganda which found that there was a relationship between supportive supervision and frequencies of supportive supervision on the quality of data produced (Chebuert, Odhiambo,2016).

As it has revealed above, fewer studies specifically assessed the quality of tuberculosis data. Tuberculosis has its own recording and reporting system, at this juncture it is important to assess the level of data quality for this system as well as the factors that influences the quality of data to be produced. Therefore, this study will reveal the organizational factors associated production of data of good quality in Lindi municipality for appropriate actions to be taken, since little is known about the Organizational factors associated with production of tuberculosis data quality in Lindi municipality.

# CHAPTER THREE

## 3.0 RESEARCH METHODOLOGY

### 3.1 Study Design

This study adopted a descriptive cross section design, employing quantitative approach, this approach was selected since it emphasizes detailed contextual analysis of limited number of events/conditions and their relationships.

### 3.2 Study Site

All 11 health facilities offering Direct Observed Therapy (DOT) in Lindi municipality were involved, all these (11) study sites have similar TB prevalence, similar socioeconomic status of its clients and employs the same RHMIS, also data recording system is being managed with similar organizational structure.

### 3.3 Study Population

All staff working at DOT sites were subjected to a structured questionnaire to ascertain the factors associated with the quality of data produced, I decided to use them since they are the one participating in TB data management, thus they are in good position to offer more accurate and reliable information required.

All cases 370 recorded in TB 03 facility registers in the year 2019 were reviewed. Data for these cases in TB facility registers and corresponding TB patient cards were assessed for concordance with data in ETL database.

### 3.4 Inclusion criteria

- All DOT providers who have worked at these facilities for the duration of 12 months prior to the date of data collection.).
- Cases reported/notified between Jan & Dec 2019.

### 3.5 Exclusion criteria

- Providers served for less than 12 months at the facilities where data collection was carried out.
- Cases that were transferred out prior to treatment completion.

### 3.6 sample size

Lindi municipality was selected since it was not involved in the RDQA conducted by the NTLP, All DOT providers across all 11 DOT centers were approached to respond to the questionnaires, since it is believed that they are in position to offer reliable information and they are knowledgeable about the subject matter.

All cases (370) recorded in TB 03 facility registers in the year 2018 were reviewed from all (11) DOT sites in Lindi municipality. Data for these cases in TB facility registers and corresponding TB patient cards was assessed for concordance with data in ETL database.

### 3.7 Variables

#### 3.7.1 Independent variables

*Technical factors :(* HIS design, Information technology complexity and Complexity of reporting forms).

*Organization factors: (*Training on data management, Supervision by CHMT, Presence of Guideline).

*Individual factors: (*Level of education, Level of skills, Qualifications of HCPs, Perception on complexity of the HMIS).

#### 3.7.2 Dependent variable

*Data Quality :(*Availability, Completeness, Accuracy, Consistency, Relevance and Timeliness).

### 3.8 Sampling Procedure

No sampling was done since the study was a census.

### 3.9 Data collection tools

#### 3.9.1 Questionnaire

A structured questionnaire adopted from MEASURE evaluation was used to ascertain factors associated with quality of data, this was necessary since some variables involved (technical factors, Individual factors and organizational factors) cannot be observed and only can be derived from respondents' views, opinions and feelings. Data quality was ensured through orienting research assistants on the tools, and the tools ware pretested.

### 3.9..2 Document review

Data completion, accuracy and availability were the only proxy attributes that were used for establishing quality of the collected data.

**Accuracy:** The percentage difference in the recounted (i.e. number of cases observed in the TB 03-unit register to the reported (Those reported in the DHIS 2 database) was calculated for each of the visited facility.

**Data completeness:** 5 data elements were selected to check if they were completely filled for each case reported in the past 12 months, these were date of registrations, site of the disease, type of patient, sputum smear microscopy results and date of sputum smear microscopy results.

### 3.10 Validity

To ensure that data collected measured what was intended; pre-testing of the tools was done by the principle investigator to identify any ambiguous questions. Outliers and errors were cross checked to ensure data cleanliness. Supervisor's opinion was put into account in developing tools for data collection to ensure validity.

### 3.11 Reliability

Reliability refers to the consistency of a measure. To achieve reliability test retest was used. One health facility (not included in the sample) was interviewed twice within one week with the same questionnaire. The answers from both questionnaires were compared and calculated using correlation coefficient formula to measure the degree of correlation between the two interviews.

### 3.12 Data analysis

Data collected was then coded and entered into the SPSS, For Objective number one descriptive statistics was employed whereby the quality of recorded TB data was analyzed in forms of percentage frequencies and Results were presented in tables for easy interpretation.

For objectives number two (2) to four (4) the relationship between variables was found though subjecting data from the questionnaires on the Statistical Package for Social Scientists (SPSS v.23) and then cross tabulating the specific organization, behavioral and technical factor with the level of data quality, then the frequency was compared followed by bivariate and multivariate analysis to address the confounders.

### 3.13 Ethical consideration

Ethical approval was thought from the MUHAS-IRB (Institutional Review Board). The written permission to access data and health facilities was sought from the R/CHMT in Lindi municipal**.**

Each selected participant was informed about the purpose of conducting the study and they were made to understand that participation in the study was totally voluntary and they were free to withdraw or refuse to respond to any question in the questionnaire without facing any consequence, those who agreed to participate were provided with the written consent form for them to sign.

Confidentiality was observed whereby the shared information by the respondent was kept private and secured not to be disclosed to the third part, in order to ensure anonymity no name appeared at any place on the questionnaire.

### 3.14 Dissemination of results.

The results of this study will be made available to the participants and the Lindi municipal CHMT; the final report will be submitted to the Muhimbili University of Health and Allied Sciences as part of the fulfillment for the award of the Master of Science in Project Management Monitoring and evaluation in Health.

# CHAPTER FOUR

## 4.0 RESULTS

### 4.1 Socio-demographic characteristics

A total of 11 participants one from each DOT sites in Lindi municipality were interviewed in this study. Among them 6 were females and 5 were males. 6 had the age of less than 30 years while the remaining 5 had the age above 30years. 7 were Nurse Midwives, 2 were clinical officers and the remaining 2 were medical attendants. 7 were educated to attain certificate level while 4 had a diploma and non-had either a degree or higher level of education. 8 have more than 5 years of experience while the remaining three had an experience of less than five years.

**Table 1. Socio-demographic characteristics**

| Socio-demographic characteristics (N=11) | | |
|---|---|---|
| **Variable** | **Categories** | **Frequency** |
| Age | ≤30 | 6 |
| | ≥31 | 5 |
| Sex | Female | 6 |
| | Male | 5 |
| Level of education | Certificate | 7 |
| | Diploma | 4 |
| Field of study | Nurse midwifery | 7 |
| | Clinical officers | 2 |
| | Medical attendant | 2 |
| Years of experience | ≤ 5Years | 3 |
| | >5years | 8 |

**4.2 Level of data quality of a tuberculosis surveillance system for case-based reporting in Lindi municipality.**

In this study data quality have been assessed by using three dimension of data quality, such as **data availability, data accuracy and data completeness.**

Out of 11 health facilities that were assessed, It was found that 9 facilities had all data available, TB Data completeness in health facilities was found to be ranging from 66 % to 99 % with an average of 93%.Data completeness was found to be varying from one facility to another, Over reporting was found in 4 health facilities and under reporting was found in 3 health facilities while one health facility has the accuracy of 100%. For data accuracy comparison was made between data at the facility and those reported in the ETL Database. The average accuracy in this study was found to be 99%. Table 2.1, 2.2 and 2.3

**Table 2.1: Availability of TB data**

| Availability of TB data (N=11) | | |
|---|---|---|
| **Variable** | **Categories** | **Frequency** |
| Availability of registers (TB 03 register, Presumptive TB register and R&R Registers) | Available | 9 |
| | Not available | 2 |
| Total | | 11 |

**Table 2.2 Tb Data Completeness per Facility (N=370)**

| Health facility | Cases complete filled | Total cases in reporting register | Rate of completeness per facility (%) |
|---|---|---|---|
| Brigitta | 41 | 50 | 82 |
| Kitunda | 5 | 8 | 66 |
| Mingoyo | 22 | 24 | 89 |
| Ng`apa | 21 | 24 | 86 |
| Sokoine | 214 | 216 | 99 |
| Town | 34 | 38 | 89 |
| Tulieni | 8 | 10 | 83 |
| Total | 344 | 370 | 93 |

**Table 2.3: Tb Data Accuracy**

| Tb data accuracy per facility(N=370) | | | |
|---|---|---|---|
| **Health facility** | **Recounted number of cases** | **Number of cases reported** | **Accuracy percentage (%)** |
| Brigta | 50 | 77 | 35 |
| Chikonji | 0 | 2 | 100 |
| Kitunda | 8 | 2 | -300 |
| Mingoyo | 24 | 9 | -167 |
| Ng`apa | 24 | 24 | 0 |
| Sokoine | 195 | 187 | -4 |
| Town | 38 | 41 | 7 |
| Tulieni | 10 | 11 | 9 |
| Total | 349 | 353 | 99 |

### 4.3.1 Individual factors affecting tuberculosis data quality.

In this study it was found that participants with age of greater than 30 years had good completeness (i.e.96%) compared to those with 30 years or below who had an overall completeness of 85% however this association was not statistically significant, It was observed that experienced participants (i.e. Those with an experience of more than 5 years had good completeness at 95% compared to 80% for those with less than 5 years' of working experience, this association was statistically significant. Participants with age less than 30 years had good accuracy of 96% compared to 87% for those greater than 30 years old however this association was not statistically significant. The participants educated to certificate level were found to have good completion rate (at 96%) as compared to those educated to diploma level at 83%, this association was found to be statistically significant.

Table 3.1 **Individual factors affecting tuberculosis data completeness**

| | | **Data completeness(N=370)** | | | |
|---|---|---|---|---|---|
| **Variable** | Categories | **Cases complete filled** | **Total cases in register** | **Rate of completeness** | **P-value** |
| Age | ≤30 | 83 | 98 | 85% | **0.4136** |
| | ≥31 | 261 | 272 | 96% | |
| Sex | Female | 303 | 320 | 95 | **0.3285** |
| | Male | 41 | 50 | 82 | |
| Field of study | Nurse midwifery | 264 | 274 | 96 | **0.0053** |
| | Clinical officers | 41 | 50 | 82 | |
| | Medical attendant | 39 | 46 | 85 | |
| Level of education | Certificate | 274 | 286 | 96 | **0.0331** |
| | Diploma | 70 | 84 | 83 | |
| Years of experience | ≤ 5Years | 40 | 50 | 80 | **0.0256** |
| | >5years | 304 | 320 | 95 | |

**Table 3.2 T**

**He association between production of data of good quality and ability to carry out data quality assessment and knowledge on data quality.**

| | | Data completeness | | | |
|---|---|---|---|---|---|
| **Variable** | **Categories** | **Cases complete filled** | **Total cases in register** | **Rate of completeness** | **P-value** |
| Ability to carry out data quality assessment | Low | 62 | 74 | 84% | **0.0346** |
| | High | 282 | 296 | 95% | |
| Knowledge on data quality issues | Low | 62 | 74 | 84% | **0.0021** |
| | High | 282 | 296 | 95% | |

Having ability of data quality assessment and knowledge on data quality issues was found to influence production of data of good quality, and this association was found to be statistically significant.

**Table 3.3 The association between sociodemographic characteristics and production of data of good accuracy.**

| | | Data accuracy | | | |
|---|---|---|---|---|---|
| **Variable** | **Categories** | **Cases complete filled** | **Total cases in register** | **Rate of accuracy** | **P-Value** |
| Age | ≤30 | 251 | 241 | 4 | **0.4762** |
| | ≥31 | 98 | 112 | -13 | |
| Sex | Female | 299 | 274 | 9% | **0.1532** |
| | Male | 50 | 79 | -37% | |
| Field of study | Nurse midwifery | 253 | 233 | 9 | **0.2167** |
| | Clinical officers | 50 | 77 | -35 | |
| | Medical attendant | 46 | 43 | 7 | |
| Level of education | Certificate | 265 | 256 | 4 | **0.0471** |
| | Diploma | 84 | 97 | -13 | |
| Years of experience | ≤ 5Years | 50 | 79 | -37 | **0.0317** |
| | >5years | 299 | 274 | 9 | |

From this study it was revealed that both level of education and years of experience were found to influence the accuracy of the thereof produced data, whereby those educated to certificate level were found to produce accurate data as compared to those educated to diploma level, those with working experience of more than five years of working experience were found to produce data of good quality as compared to those with working experience of less than five years, and this association was found to be significant statistically.

**Table 3.4 Individual factors affecting tuberculosis data accuracy.**

| | | Data accuracy | | | |
|---|---|---|---|---|---|
| **Variable** | **Categories** | **Recounted number of cases** | **Number of cases reported in register** | **Accuracy** | **P-Value** |
| Ability to carry out data quality assessment | Low | 74 | 86 | -14% | **0.513** |
| | High | 275 | 267 | 3% | **0.781** |
| Knowledge on data quality issues | Low | 74 | 86 | -14% | |
| | High | 275 | 267 | 3% | |

This study revealed no statistically significant association between production of data with good accuracy and both abilities to carry out data quality assessment and knowledge on data quality issues.

### 4.3.2 Technical factors that affect tuberculosis data quality for case-based reporting in Lindi municipality.

Participants who had received a training regarding TB HMIS health care provider were found to have good data completeness of 97% compared to 84% completeness among those who didn't receive training on TB HMIS, this association was found to be significant statistically. Those who perceived the process of TB notification being easy had good completeness of 93% , compared to 80% for those who perceived the process TB cases notifications complex however this association was found not to be significant statistically . While Perception on register that are used in TB case notification to be user friendly were found to have a completeness higher at 93% compare to those who perceived them to be complex this association was found not to be significant statically. (Table 3.4).

**Table 4.1: Technical factors that affect tuberculosis data completeness in Lindi**

| | | Data completeness | | | |
|---|---|---|---|---|---|
| **Variable** | **Categories** | **Cases complete filled** | **Total cases in register** | **Rate of completeness** | **P-Value** |
| Received a training on basic computer skills | Yes | 243 | 250 | 96% | **0.0339** |
| | No | 101 | 120 | 86% | |
| Received training regarding TB HMIS | Yes | 253 | 262 | 97% | **0.0327** |
| | No | 91 | 108 | 84% | |
| Perception on register that are used in TB case notification | User friendly | 323 | 346 | 93% | **0.7102** |
| | Complex | 21 | 24 | 88% | |
| Perception on process of TB notification. | Easy | 336 | 360 | 93% | **0.323** |
| | Complex | 8 | 10 | 80% | |

In this study technical factors such as health care providers Perception on complexity of the process of TB cases notification and data collection tools were found to have an influence on accuracy of the data collected whereby those who perceived the process being easy had an accuracy as good as 100%,compared to those had a perception that the process was complex who had an underreporting of 23%(hence less accuracy) however this association was found not to be statistically significant. Also, this study further revealed that receiving trainings regarding both computer skills and TB HMIS was influencing positively production of data with good completeness, this association was found to be statistically significant.

### 4.3.3 Organisational factors that affect tuberculosis data quality for case-based reporting in Lindi municipality.

**Table: 5.1 Organizational factors that affect tuberculosis data completeness**

| | | Data completeness | | | |
|---|---|---|---|---|---|
| **Variable** | **Categories** | **Cases complete filled** | **Total cases in reporting register** | **Rate of completeness** | **p-Value** |
| Availability of guideline regarding data Quality | Yes | 318 | 338 | 94% | **0.0325** |
| | No | 26 | 32 | 81% | |
| Received training regarding TB HMIS | Yes | 253 | 262 | 97% | **0.0339** |
| | No | 91 | 108 | 84% | |
| Received supervision in the past six months. | Yes | 248 | 258 | 96% | **0.0458** |
| | No | 96 | 112 | 86% | |
| Ever been queried by the district staff for delay in sending reports | Yes | 13 | 18 | 72% | **0.0877** |
| | No | 331 | 352 | 94% | |
| Ever been queried by the district staff for inaccuracies found in reports sent to the district. | Yes | 248 | 258 | 96% | **0.0217** |
| | No | 96 | 112 | 86% | |
| Availability of specific budget for | Yes | 96 | 116 | 83% | **0.2649** |

| | | | | |
|---|---|---|---|---|
| data/ information management issues | No | 248 | 254 | 98% |

Among the organisation factors assessed, such as availability of guideline regarding data quality, training/on job training regarding TB HMIS, Presence of supervisions in the past six months and queries/feedback by the district teams(CHMT) for inaccuracies found in reports sent to the district level, All were found to influence data quality across all the three dimensions and the association was found not to be statistically significant.

This study revealed that, on the presence of all of the above, completeness was observed to be 94 % when the guidelines were present, 97% among providers who received training and 96% to the facilities that had supervisions conducted for the past six months.

However, on presence of queries/feedback, it was found that completeness was observed to be 72% while completeness of 85% was observed in the absence of the above factors, however availability of budget was found to have no influence on good data completeness however this association was found not to be statistically significant.

**Table 5.2: Organisational factors that affect tuberculosis data accuracy**.

| | | Data accuracy | | | |
|---|---|---|---|---|---|
| **Variable** | **Categories** | **Recounted number of cases** | **Number of cases reported register** | **Accuracy** | **P-Value** |
| Availability of guideline regarding data Quality | Yes | 317 | 327 | -3% | **0.0182** |
| | No | 32 | 26 | 23% | |
| Ever been queried by the district staff for delay in sending reports | Yes | 18 | 13 | 38% | **0.4798** |
| | No | 331 | 340 | -3% | |
| Ever been queried by the district staff for inaccuracies found in reports sent to the district. | Yes | 237 | 226 | 5% | **0.0261** |
| | No | 112 | 127 | -12% | |
| Received supervision in the past six months. | Yes | 237 | 224 | 6% | **0.0317** |
| | No | 112 | 129 | -13% | |

| | | | | | |
|---|---|---|---|---|---|
| Availability of specific budget for data/ information management issues | Yes | 116 | 125 | -7% | **0.7812** |
| | No | 233 | 228 | 2% | |

Also in this study, the presence of guidelines and SOPs regarding data quality,provision of queries by the district teams(CHMT) for inaccuracies found in reports sent to the district level and presence of supervisions to these facilities for the past six months was found to be associated with TB data quality in terms of accuracy, whereby underreporting of 3% was observed on the presence training/On Job training(97% accurate), an over reporting of 5% (95% accurate) when all the guidelines and SOPs were present at the particular facility, and an accuracy of 94% (6% over reporting) when data were queried/feedback given from higher levels and this association was found to statistically significant.

Again, Availability of specific budget for data/ information management issues and ever been queried by the district teams (CHMT) for delay in sending reports/accuracy of data was found not to influence Tb data accuracy compared to those facilities which didn't receive the later.

# CHAPTER FIVE

## 5.0 DISCUSSION

### 5.1 The level of data Quality of the Tuberculosis Routine Health Information System

In this study availability of data, completeness, and accuracy and timelines were the only attributes used for measuring data quality.

Majority of health facilities offering DOT services in Lindi MC have data available with an exception of two facilities which had no TB reporting and recording tools, the facilities with missing TB reporting and recording tools are the same facilities that had no supportive supervisions conducted to them. Small facilities (Dispensaries) were found to have TB data of poor quality as compared to higher level facilities, on overall TB data completeness was good, and it was found to be higher compared to that of revealed by the study done in Dar es salaam by Simba and Mwangu (2006) on assessment of factors influencing HMIS in Tanzania which found that the average data completeness was 64.2%, completeness being higher in government facilities compared to privately owned health facilities. Only one facility was found to have data that had a durable accuracy with the rest either under or over reporting. Sharma et al., (2015) conducted a study across four provinces of Kenya which had some findings similar to the one of this study, their study showed that both completeness and availability were affected with some data elements remaining spared for completeness, but the HIV test dates and treatment regimen were severely reported to be affected in more than a half of all of the reported cases. Another study conducted in Eden District, Western Cape South Africa in 2015, revealed that, data completeness was low, ranging between 66% and 100%, these findings are similar to the findings of our study which also showed production of TB data that was incompletely filled (Mlotshwa et al.,2015)

Also, this study have findings similar to another study conducted in South Africa in which weakness in both consistency and completeness of TB data recording and reporting was observed, this weakness was more pronounced at higher burden facilities and it was attributed to a number of factors, the major ones being lacking unique patients identifiers, and fewer supportive supervision on TB data and training on TB HMIS(Van der Heijden et al,.2019).

## 5.2 The Behavioral/Individual factors affecting Tuberculosis data quality for case-based reporting in Lindi municipality.

This study has shown that nurse midwives and medical attendants as well as those trained to attain the certificate level are more likely to produce data of good quality as compared to clinical officers or those trained to attain diploma level respectively in terms of both completeness and accuracy, this difference can be attributed to a number of factors and one among them being, those who have higher training are more likely to be overwhelmed by the large number of patients as compared to the least trained staff hence the quality of data produced by them, gets jeopardized in that sense. Also, this study further revealed that having ability to conduct data quality assessment and having knowledge on data quality issues was linked to production of data of good quality across all three studied attributes of data quality. These findings were similar to findings from another study done in Uasian Gishu County in Kenya that reported a relationship between an increase in age of participant on the quality of data. In the same study it was found that, experience (In terms of number of years of service) of a particular health care worker on various discipline does not translate the improved quality of data which is contrary to the findings from this study. (Cheburet et al,.2016).

Having a Direct Observed Therapy (DOT) provider at TB unit who perceived themselves having intermediate ability to carry out data quality assessment and intermediate knowledge on data quality issues have shown to be associated with data of good quality in terms of both completeness and accuracy, compared to those who perceived themselves having low ability and knowledge. These findings are similar to the findings in the study conducted in South Africa which found that ability to interpret is coupled with confidence in performing HIS tasks and subsequently lead to production of data of good quality (Nicol, Bradshaw, Phillips, Dudley, 2013). The same findings were reported in the study that was done in Dar es Salaam by Simba and Mwangu (2006) which found that knowledge on HMIS basic concepts results to improvement in quality of data produced.

Also, it was found that having a female Direct Observed Therapy provider and being educated to certificate level was found to be associated with production of good Tb data in terms of completeness and accuracy compared to those who are male and those with

diplomas or above. On field of study, facilities with Nurse Midwifery DOT provider has good data completeness, followed by medical attendant then clinical officers. While accuracy was good to medical attendant followed by nurse midwifery then clinical officers.

### 5.3 Technical factors affecting tuberculosis data Quality for case-based reporting in Lindi municipality.

In this study it was found that health facilities with DOT providers who received training on basic computer skills and those who received training regarding TB health management information system have good TB data completeness and accuracy compared to those who didn't receive training on basic computer and TB HMIS. This finding was similar to another study conducted in Ethiopia, in which it was observed that departments with skilled human resources and staff trained on proper use of HIS has an increased likelihood of producing data of good quality (Teklegiorgis, Tedesseke and Tereffe,2016). Also, another study done in Benin Benin by Gle`le` Ahnhanzo et al 2014 had similar finding to this of mine and it reported that RHIS training in the past 12 months have influence in improving data quality. On the other hand, the findings of this study are found to be contrary to the study that was done in Dar es Salaam by Simba and Mwangu (2006) which revealed that there was no relationship between training in HMIS and Improved quality of data.

Also, facilities with DOT providers who perceived TB registers used for recording cases and making follow up for cases to be user friendly were found to have data of good quality in terms of completeness and accuracy compared to those who reported it to be complex. Also, those who perceived the process of TB notifications to be user friendly were found to have data of good quality in terms of completeness and accuracy than those who reported the process to be complex. These findings were similar to that of another study done by Gle`le` Ahnhanzo et al, (2014) which reported that perceiving the system to be complex is associated with production of data of good quality.

### 5.4 The Organizational Factors affecting Tuberculosis data quality for case-based reporting in Lindi municipality.

The findings of this study showed that presence of guidelines and SOPs at the facility, presence of supervisions conducted in the past six months at the visited facilities is

associated with production of data of good quality in terms of completeness and accuracy compared to those with no guideline and those who didn't receive supportive supervision in the past six month. Findings of this study are similar to those of a study conducted in Kenya which found that there was a relationship between supportive supervision and frequencies of supportive supervision on the quality of data produced (Chebuert, Odhiambo,2016).

This study also revealed that sending queries back to the facilities that produced these data was associated with production of data of good quality in terms of completeness and accuracy compared to those who never received queries from district teams(CHMT) for inaccuracies found in report. But facilities that reported to ever receive a query from district team(CHMT) for either delay in sending report or inaccuracy to the district level was found have data of low quality in terms of completeness and accuracy, These findings are similar to another study done by Simba and Mwangu which showed that those queried for inaccuracies had higher completion rate (74.8%) than those not queried (61.9%) and there was no difference in completion between health facilities queried for delay (59.3) compared with those that were not queried for delay(65.7%).

Facility having specific budget for data or information management was found to have poor data quality of data both completeness and accuracy compared to those with no budget. This is contrary with the study done in Kenya which reported that having budget for health information system influence quality of Data ((Chebuert, Odhiambo,2016).

# CHAPTER SIX

# CONCLUSION AND RECOMMENDATIONS

## 6.1 Conclusion

### 6.1.1 Level of Data Quality of Tuberculosis Surveillance System.

In Lindi municipality the data produced are not of good quality having a reference of all the studied attributes of data quality and majority of the DOT nurses are lacking either training or supportive supervisions on carrying out TB data quality issues.

### 6.1.2 Individual Factors affecting TB Data quality for case-based reporting in Lindi municipality.

Providers who were midwives and educated to certificate level were responsible for production of data of good quality in terms of completeness, however those aged less than 30 years, females, medical attendant and those with five or more years of working experience were found to be producing more accurate data compared to their counterparts.

### 6.1.3 Technical factors affecting TB data quality for case-based reporting in Lindi municipality.

Those who received training in both basic computer skills and TB HMIS, and those who perceived both reporting tools and the processes of finding TB cases to be user friendly, were found to be producing data of good quality in terms of completeness and accuracy.

### 6.1.4 Organizational factors affecting TB data quality for case-based reporting in Lindi municipality.

It was found that facilities that had received a supportive supervision in the past six months and had a guideline/SOP, those which have queried by the district team(CHMT) for data inaccuracy were found to have data of good quality in terms of completeness and accuracy, while having a budget for conducting TB data activity was found to have no association with the quality of data produced.

### 6.2 Recommendations

In order to ensure the availability of quality TB data I recommend the following to be done

**On level of Data Quality:** Data quality check and triangulation should be done by technical advisor and regional HMIS focal person who will be visiting health facilities and reviewing the registers, instead of checking only reported data in the system and this process should be done at least once every quarter (three months) to address low completeness rate and halt inaccuracies in production of these data.

**To address technical factors** hindering/contributing to production of data of good quality Health care provider, providing TB services at health facilities should be trained on Computer skills and TB HMIS for them to be able to use computer in entering data, this will help them to review data on monthly basis to compare with what they have, this can be made possible through efforts of both Implementing partners(through provision) of financial support and the council health management team through organizing on job trainings and mentorships on the same..

**To address organizational factors** hindering/contributing to production of data of good quality, supportive supervision by members of CHMT and technical advisors from the implementing partners, should be done frequently focused on TB health services and data, this will help the DOT providers to get knowledge and skills on data quality check and it will help to identify if there is any problem early and fix. This will help to avoid missing of TB registers at health facilities.

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## APPENDIX III: RUHUSA YA KUFANYA UTAFITI

**JAMHURI YA MUUNGANO WA TANZANIA**
**Ofisi ya Rais**
**Tawala za Mikoa na Serikali za Mitaa**
**Halmashauri ya Manispaa ya Lindi**

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*Mkurugenzi wa Manispaa*
*S.L.P 1070*
**Lindi**

*08/05/2020*

Kumb. Na. LMC/R.60/1/50

Ndg. Mayega Samson,
Chuo Kikuu cha Afya na Sayansi,
Shirikishi Muhimbili,
S.L.P 65001,
**DAR ES SALAAM.**

**YAH: RUHUSA YA KUFANYA UTAFITI.**

Husika na somo tajwa hapo juu.

*Rejea barua yako isiyokuwa na* Kumb. Namba ya tarehe 26/03/2020 kuhusiana *na maombi ya ruhusa ya kufanya utafiti.*

*Kwa barua hii, napenda kukujulisha kuwa ombi lako la kuomba kufanya utafiti kuhusu* ***''Assessment of factors affecting tuberculosisi data quality for case – based reporting in Lindi Municipality''*** kwenye vituo vya afya vilivyomo ndani ya *Manispaa ya Lindi limekubaliwa.*

*Nakutakia mafanikio mema.*

Adam, S.A
Kny: Mkurugenzi wa Manispaa
**LINDI.**

**APPENDIX IV: INTRODUCTION LETTER**

**MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES**
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Ref. No. HD/MUH/T. 629/2017

18th September, 2019

District Medical Officer
Lindi Municipal
P.O. Box 753
**LINDI.**

**Re: INTRODUCTION LETTER**

The bearer of this letter Mr. Samson Mayega is a student at Muhimbili University of Health and Allied Sciences (MUHAS) pursuing MSc. Project Management Monitoring and Evaluation in Health.

As part of his studies he intends to do a study titled: "***Factors affecting Tuberculosis data quality for case based in Lindi Municipality***".

The research has been approved by the Chairman of University Senate.

Kindly provide him the necessary assistance to facilitate the conduct of his research.

We thank you for your cooperation.

Ms. Sharifa Kamby
**for: DIRECTOR, POSTGRADUATE STUDIES**

Dean, School of Public Health and Social Sciences