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JOHANNESBURG

Faculty of Health Sciences | School of Public Health

**FACTORS INFLUENCING THE COLLECTION OF INFORMATION BY
COMMUNITY HEALTH WORKERS FOR TUBERCULOSIS CONTACT
TRACING IN EKURHULENI, JOHANNESBURG**

A Research Report Presented
by
Mr. Thabang Wellington Maruma

A Research Report submitted to the Faculty of Health Sciences, University of The Witwatersrand, in partial fulfilment of the requirements for the degree of Master of Science Epidemiology in the Field of Implementation Sciences.

May 2018
Johannesburg, South Africa.

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A Research Report Presented
By
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Approved as to style and content by:



Main Supervisor: Dr Salome Charalambous
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DECLARATION

I, **Thabang Wellington Maruma**, declare that the Research Report is my own, unaided work. It is being submitted for the Degree of Master of Science Epidemiology at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at this or any other University. All the quotations have been acknowledged and distinguished (see Appendix I: Student Plagiarism declaration form). This research project also received ethical clearance for protocol number M170244 from the Ethics committee for Research on Human Subjects (Appendix B).



Mr. Thabang Wellington Maruma
07 May 2018

DEDICATION

I dedicate this study to my parents Mr. Griffes Maruma and Mrs. Tina Maruma, to my siblings; Terence and Mahlatse Maruma for their continued support throughout this educational milestone. Their encouragement, love and support has been fundamental to my eagerness to learn. From that first day in our Public Health undergraduates studies; I had no idea we would still be in the same class at Masters level; to Sophia Simbiat Nuhu who has been with me throughout all our tertiary life; I appreciate your friendship.

“Real knowledge is to know the extent of one's ignorance.” Confucius (551-479 BC)

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ABSTRACT
**FACTORS INFLUENCING THE COLLECTION OF INFORMATION BY
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[March, 2018]

Thabang Wellington Maruma

Masters of Science Epidemiology in the Field of Implementation Science

Supervised by: Dr Salome Charalambous & Mr Kavindhran Velen; *The Aurum Institute*

Background: Surveillance structures for tuberculosis (TB) contact tracing are not well integrated into routine national reporting structures. The implementation of reengineering of primary health care through ward based outreach teams (WBOTs) is a step towards equitable primary health care. Data and information collected by WBOTs for household TB contact tracing is an integral part of the implementation model of primary health care reengineering. The quality of patient record documentation becomes even more vital in light of the increased focus on process and outcome measures in health programmes and as a result, careful consideration be given to the WBOT data collection system used by community health workers (CHWs). In order to contribute to efforts of developing an optimised model for household contact tracing, the acceptability of the current paper-based data collection system needs to be assessed in order to develop a comprehensive monitoring & evaluation (M&E) framework for an optimised model for household tuberculosis contact tracing.

Methods: The current cross sectional research project is nested within a project that aims to develop an optimised model for household TB contact tracing. In this nested mixed methods study; the exploratory sequential design was used to explore the facilitators and barriers to completing the current data collection tools used by CHWs. The study had two components, firstly three focus group discussions (FGDs) were conducted in the three Ekurhuleni health sub-districts (Northern, Eastern and Southern) in three purposively selected primary health clinics and secondary data analysis of the main study's FGDs was also conducted. Manual coding and QDA Miner software was used for coding and all qualitative analysis. Emerging themes were identified through inductive thematic analysis using the constant comparison analysis framework. The results informed the quantitative data collection and analysis. Following qualitative analysis; a close ended questionnaire was refined and informed by the results of the qualitative inquiry. CHWs were recruited using targeted sampling techniques from 6 primary health care facilities located in the

different sub-districts in order to administer the questionnaire. The four point Likert Scale questionnaire was developed using theoretical framework for acceptability (TFA) constructs to assess the level of acceptability of the current data collection tools used to document tuberculosis contact tracing activities. Univariate and multivariate linear regression models were fitted to examine significant relationships between the composite acceptability scores and several predictors. All quantitative analysis was performed on STATA version 14 (StataCorp College Station, Texas 77845 USA).

Results: A total of five FGDs were conducted; two that were conducted as part of the main study supplemented the data from the three that were conducted (one in each Ekurhuleni health Sub-district). The total of 54 CHWs participated in all the five FGDs with 89% being female. Average age of all CHWs was 34.41 years [mean (sd): 34.41(8.16)]. Five broad themes emerged including inadequate CHW training, WBOT programme integration with other health and social care service providers, challenges with the WBOT data collection system, community access issues and preference for a digital based data collection system. Data related barriers identified included limitations with the current paper based data collection system such as insufficient competency assessments about the different data collection tools, lack of a specific tool to capture TB contact tracing activities, incomplete referral forms due to clinic staff not completing them, patients providing wrong information, too many papers to complete. Those that were related to the WBOT activities included lack of community acceptance, resource constraints, violent patients and community members, community members that are not welcoming. Facilitators included motivated CHWs. 94 CHWs were enrolled for the quantitative survey with 90 (95.74%) females. From the total, 35% of the CHWs were from the Ekurhuleni health southern sub-district, 34% and 31% were from the eastern and northern sub-districts respectively. The overall median (IQR) composite acceptability scores from all sub-districts was 48 (45 – 51), with the highest scores observed in the Eastern sub-district 49 (45 – 46). In the overall study population, the acceptability of the current WBOT data collection tools was low.

Conclusions: Main findings pertaining to CHW training indicate that the different phases of the Primary Health Care (PHC) reengineering WBOT trainings were inconsistent. There is also a lack of acknowledgement of attendance as CHW expressed their dissatisfaction in not receiving certifications which resulted in low morale for conducting outreach activities. The sub-optimal integration of the WBOT programme into the primary health care system results in a patchy referral system characterised by incomplete back referrals resulted as

referral forms remain incomplete. Communication between the primary health care facility staff and WBOT CHWs needs to be strengthened in order to strengthen the referral linkages with other health and social care service providers. Funding models for WBOT programme need to be reviewed to ensure that resources needed for optimal WBOT functioning are secured. Restricted access to some communities, patients providing wrong addresses, violent and unwelcoming household members and lack of WBOT safety were barriers to accessing TB patients during outreach activities; thus leading to incomplete and inaccurate data. The limitations posed by the current paper-based data collection system have been acknowledged and the CHWs preference for a digital based system highlights the need for the evaluation of the current mobile data collection technologies in other regions in order to inform nationwide scale-up.

Recommendations:

The implementation of the WBOT programme is still in its infancy and in order to improve the data collection processes of the programme, more research on CHW post-training competence is needed to determine the effectiveness of the wide array of training programs. Moreover, the implementation of CHW program should be coordinated among the different training providers including government, civil society organizations and NGOs. To improve the quality of the CHW training delivery and content, CHW feedback should be sought through pre-and post-assessments. There is a need to focus efforts on coordinating and strengthening the different PHC reengineering streams and integrate them into the primary health care system. This will likely strengthen the referral system between the WBOT programme and PHC facilities. The current M&E policy needs to be reviewed and special consideration should be given to TB contact tracing related indicators. This should also be accompanied by an adjustment of the current WBOT data collection tools to better reflect the agreed upon TB contact tracing indicators. The study further recommends further research in the form of economic evaluations to determine the cost effectiveness of scaling up current digital based data collection methods to inform nationwide scale up.

Key words: Ward Based Outreach Teams, data collection system, data collection tools, community health workers, TB contact tracing, Community Based Information System, acceptability, mHealth

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DEFINITIONS OF TERMS

TB Contact tracing	An evidence-based strategy contributing to TB control efforts by detecting undiagnosed TB cases among contacts of identified TB cases, increasing rate of TB case identification and linking TB cases and their close contacts to appropriate care
Data	Unprocessed information, which is made up on a set of qualitative and quantitative values and variables.
Data quality	Refers to data that meets a certain standard were the following data quality constructs are met: Completeness, validity, accuracy, timeliness and consistency.
Public Health Surveillance	A systematic collection, analysis of data to inform the planning, evaluation and implementation of public health practice. It is a continuous process that can assist in the monitoring of epidemiological health outcomes, tracking progress towards goals and allow priority setting to inform strategies and policies.
Acceptability	Acceptability refers to the level of satisfaction derived from what is considered appropriate or socially acceptable. It is influenced by various factors such as individual, organizational and external factors.

LIST OF ABBREVIATIONS

AIDS	: Acquired Immuno-Deficiency Syndrome
BREC	: Biomedical Research Ethics Committee
CBHIS	: Community Based Health Information System
CBO	: Community Based Organization
CHC	: Community Health Centre
CHEWS	: Community health extension workers
CHW	: Community Health Worker
DHIS	: District Health Information System
ETR	: Electronic TB Register
FGD	: Focus Group Discussion
GIS	: Geographic Information System
HBC	: Home Based Care
HIV	: Human Immunodeficiency Virus
HMIS	: Health Management Information System
HREC	: Human Research Ethics Committee
HSRC	: Human Science Research Council
ICT	: Information and Communications Technology
IMCI	: Integrated Management of Childhood Illnesses
IPT	: Isoniazid Preventive Therapy
IPT	: Isoniazid Preventive Therapy
M&E	: Monitoring and Evaluation
MDR-TB	: Multi-Drug Resistant Tuberculosis
NDoH	: National Department of Health
NTP	: National Tuberculosis Programme
PHC	: Primary Health Care
PMTCT	: Prevention of Mother To Child Transmission
SOPs	: Standard Operating Procedures
TB	: Tuberculosis
TIER	: Three Interlinked Electronic Register
WBOT	: Ward Based Outreach Teams
WHO	: World Health Organisation

CHAPTER ONE – INTRODUCTION

1.0 General Introduction

This research report has five chapters. This introductory chapter presents an overview of the rationale, background and justification of the study. This is then followed by the statement of the problem and a complete justification is also discussed in this chapter. Moreover, it provides a detailed review of literature as it relates to the area of study. The terms and concepts used in this study are defined clearly. The chapter also presents the aim and the objectives of the study. Furthermore, it is important to note that the content and context detailed in this research report refer to the state of the situation at the time the research project was conducted.

1.1 Background

Sub-Saharan Africa has been hard hit by TB with South Africa having the highest estimated TB prevalence and incidence and the largest number of Human Immunodeficiency Virus (HIV) associated TB cases. The 2016 World Health Organisation (WHO) global TB report also indicated that in 2015, there were 6.1 million estimated new cases. In 2015, there was a gap of 4.3 million between estimated number of incident cases and notifications of new cases further reflecting the underreported detected cases of TB (1). At a rate of between 737-936 per 100 000 cases, the 2015 South Africa's TB incidence was estimated around 454 000 cases (2). From 2007-2012, the national TB programme data showed a decrease in the number of TB cases. Moreover, multidrug resistant (MDR) TB doubled from 7350 cases in 2007 to 14161 in 2012 and besides the rise in the cases, it is estimated that 50% of the TB cases remain undiagnosed (2)

In South Africa, TB management is fully integrated into the primary health care system. As a strategy that contributes towards TB control efforts, contact tracing for TB is an evidence-based intervention for TB control with demonstrated effectiveness in detecting undiagnosed TB and HIV cases and preventing TB transmission (3–5). A study conducted in North West Province, concluded that targeting households was more efficient than unselected community-based screening as this may lead to interrupting the transmission cycle by diagnosing and treating people; thus mitigating the high mortality and morbidity caused by TB epidemics (6). In the Msinga sub-district of Kwa-Zulu Natal between 2005 - 2010, a community based study also attributed the progressive decrease of drug resistant TB cases to the community based identification and intense follow up of TB patients (7). Although contact tracing is one of the central pillars for TB control, it is time-consuming

and careful consideration needs to be given to the information being collected when implementing this strategy.

The Ward Based Outreach Teams (WBOTs) teams are part of the South African government through its initiative to re-engineer primary health care and they adapted the Brazilian model (8), and created a conducive national policy framework to support this commitment. This primary health care re-engineering policy is an equitable health care delivery system aimed at improving community based primary health care. For many years, community health workers (CHW) have been working in South Africa. However prior to 2011, they were not formally part of the health system (9). In the re-engineering of primary health care, the South African government aims to formalise the role of community health workers in delivering social and health services and incorporate them into the formal health system through WBOTs (10). CHWs in WBOTs are required to complete a 10-day training (Phase 1), followed by a competency assessment and do practicals for 6 months (Phase 2) and do another competency assessment (Phase 3). Phase 1 training introduces the WBOT data collection tools and prepares caregivers to conduct service provision in the WBOT program and perform their job roles as CHWs.

The quality of patient record documentation becomes even more vital in light of the increased focus on process and outcome measures in health programmes. In the Global Plan to Stop TB, one primary objective is to develop integrated patient monitoring systems to generate high quality data (11). Data and information collected by WBOTs for household TB contact tracing is an integral part of the implementation model of primary health care in the community; and while the program is still at an early stage of implementation, not addressing this data element may hinder the effective implementation of WBOTs.

1.2 Problem Statement

It is essential that TB contact tracing conducted by the WBOT teams is well integrated into health facilities data systems to enhance reporting of TB contact tracing -related indicators. The current main method for collection of information within WBOT programme is paper forms and tick-sheets. These papers have several limitations including undercounting, double counting and lack of TB contact tracing related indicators. It also becomes impossible to monitor the patient's movement through the health system if they seek health care in various Primary Health Care (PHC) facilities as the current paper-based system is

not digitized. And a lack of digitized data management suggests that PHC facilities are unable to map the geographic burden of the TB burden in various communities served by WBOTs. A recent WBOT appraisal also identified issues in the WBOT information, data management and M&E highlighting that data collection using the National Department of Health (NDoH) developed WBOT data collection tools such as the household registration forms, child & maternal form, referrals form and other forms was uneven and patchy. The appraisal also found that the form and tick sheets were poorly used by the PHC facility managers and CHWs. The information collected from these data collection tools is infrequently used to change health service delivery according to the needs of the community (12). The WBOT CHWs level of acceptability to using these data collection tools has also not been previously assessed. We will aim to understand the structure of the data collection system and the issues with the data collection tools in order to make recommendations to improve the system to allow for this integration.

1.3 Justification for the study.

The assessment of a WBOT acceptability to the data collection tools is informed by the expressed challenges faced in the information, data management and M&E within the WBOT programme. Moreover, previous evaluations of TB surveillance systems have identified issues such as poor data quality, duplication of data collection and limited use of the data at district, provincial and national level (13,14). Three years into the process of WBOT implementation, a recent appraisal also identified similar challenges in the WBOT data collection system. Acceptability of the data collection tools needs to be strengthened to provide a basis for evaluating progress towards achieving household contact tracing programme targets, supervision of the ward-based PHC outreach teams and for surveillance and monitoring; while enhancing reporting structures that are already integrated into the national reporting system. Improved WBOTs surveillance structures will contribute towards efforts to optimise the efficiency of household contact tracing for TB control in South Africa. The findings of the proposed study will contribute towards strengthening the WBOTs paper-based and electronic data collection system and ultimately inform the WBOT M&E framework while also informing future methods of data collection.

1.4 Literature Review

1.4.1 The tuberculosis surveillance systems in South Africa

South Africa has number of patient centred surveillance systems like the electronic TB register (ETR), drug resistance registers (EDR) and District Health Information System (DHIS); all of which aim to ensure that important gaps between TB diagnosis and treatment are monitored. Currently the National TB Programme (NTP) is implementing the TB surveillance checklist to assess whether different TB surveillance systems are effective in estimating the TB burden. One of the benchmarks in this checklist is that all paper-based systems have to have been received and have data aggregated at the national level (15). It seems with regards to TB contact tracing data collected by WBOTs; this benchmark would be partially met in South Africa as the current surveillance systems doesn't report the TB contact tracing data collected by WBOTs (7). Globally, collective findings from the TB surveillance checklists are that data quality is unknown or suboptimal and that there is a need to conduct data quality audits at the local, district and national level to improve the reliability of data from TB surveillance systems.

The 2012-2016 National Strategic Plan (NSP) progress report for HIV, TB and STIs identified weaknesses in the M&E system regarding core indicators for monitoring progress and the lack of operational reporting system by various reporting partners (16). Other evaluations have also identified issues such as poor data quality, duplication of data collection and limited use of the data at district, provincial and national level (13,14). The effects of poor data quality have been widely documented. For example, inappropriate resource allocation to health, inaccurate performance measurement and public health surveillance failure (17–19). Similarly, an evaluation of the electronic TB register shows a decrease in concordance that is apparent between the ETR.Net and paper-based TB sources further indicating inaccuracies in the data transfer process (20). Numerous challenges with the reporting systems which have also been identified and documented by the NTP; and these include poor quality data entry, high turnover of data capturers and inadequate numbers (19). Kawonga, Blaauw and Fonn also cited factors such as independent reporting and recording systems, lack of integration and separate funding mechanisms as some of the factors that hamper the surveillance for TB-HIV co-infected patients and integrated care (21). It has been suggested that the integration of HIV and TB

care and surveillance systems will enhance precise data collection, eliminate duplication and improve reporting outcomes for HIV-TB co-infection (19).

1.4.2 Community based health information systems

In the global context, community health and social service providers like community health extension workers (CHEWS) and community health workers have met critical service gaps in communities (22,23). In order for the CHWs to do their job, they require information and their team leaders also require it as means of performance monitoring. Likewise, WBOT program donors and governments need this information to monitor program goals and design community health programs. How the information is collected and how it flows is what is known as community-based health information system (CBHIS). CBHIS involve the collection, management and analysis of health and related services provided to communities outside of service providing facilities. Furthermore, they need to enable information sharing between higher-level health facilities and among community based services (24–26). Moreover, the data collected in these systems should feed into national health management information systems like the DHIS. For example in Nigeria, the Nigeria Evidence-based Health System Initiative (NEHSI), automatically synchronizes data with the national HMIS by using CommCare (27) and the Connect project in Tanzania also syncs the community data with the national and district Health Management Information System (HMIS) by aggregating data collected using community registers (26)

Although not much is not known about how they are implemented globally; in developing countries, there has been several reviews that explored the different manifestations and innovations of different CBHIS. Similar to the WBOT data collection system, several CBHIS in the global context have been identified in literature; paying particular focus to how the data is being collected, the tools being used, information flow and access and reporting structures. To inform patient care plans, CBHIS can be used to document the needs of the individuals and track those lost to follow-up whilst also enabling bidirectional referrals and facilitate real-time tracking of clinic referrals. For example, IQReferrals was originally designed for a project in Haiti titled “AIDS Go Away” and it is a portal for community service clinics, supporting satellites and hospitals to capture counter-referral and referral information so that clients are served effectively and efficiently (25,28). IQReferrals is used to track patients referred from various programs; testing, voluntary counselling, tuberculosis and Prevention of Mother To Child Transmission (PMTCT) while

also producing automated reports at central levels, at facilities and across multiple databases, thereby improving feedback and data quality

Challenges with CBHIS have also been noted; these include lack of CHW capacity (24,29). For CHWs involved in data collection in Kenya, the CBHIS highlighted the need for providing intensive training and periodic refresher courses (24) . In the global context, another challenge regarding the CHWs or volunteers is the added workload of data collection and associated activities (30–32). Other challenges include weak data quality (20,25,33–36), lack of resources for data collection in remote areas and data collection tools are sometimes in a language CHWs don't understand (29)

1.4.3 Monitoring Ward Based Outreach Team service provision

The WBOTs offer integrated health care services at the individual, family and community level including treatment defaulter tracing, contact tracing for TB, adherence support, home based care, disease prevention, health promotion, referral to health and social services, pregnancy and post-natal and support groups as well as psychosocial support; all of which are documented in different data sources (37–39). Moreover, some of the TB related services provided by WBOTs at households include TB symptom screening, referral for isoniazid preventive therapy (IPT), home-based HIV testing and sputum collection (12). The WBOTs uses a paper-based system of tick lists and forms which are used in most districts; with only Gauteng (City of Tshwane) and Northern Cape (Britstown) being the exception. The WBOTs data management and flow involves various data sources collected by WBOTs on a daily basis during service provision. Furthermore, the aggregated data is then reported upwards into district level reporting structures, then provincial and eventually reported at national level (38).

According to the DHIS standard operating procedures (SOP) for data management, WBOTs use the WBOT tick register, WBOT sub-total summary form and the team leader uses the WBOT monthly summary form to aggregate all the data the WBOT members collected. These are being used to document every provision of service (38). The DHIS has detailed operating procedures for verification, validation checks and feedback mechanisms to ensure the quality of WBOT collected data. It is the responsibility of the WBOT program manager to conduct weekly spot checks on verifying the data in the forms, tick sheets and summary collation sheets and provide monthly feedback to team leaders about the

accuracy, timeliness and completeness of data (38). These standard operating procedures relating to data quality in medical records should be informed by international benchmarks and standards for data quality, TB mortality data and other HIV/TB surveillance systems (18).

1.4.4 Factors contributing to poor data quality in surveillance systems

Paper-based system: A rapid appraisal of the WBOT implementation (12) done by the University of Pretoria and Fort Hare identified challenges in the WBOTs data management, M&E and information systems. One such challenge identified was the paper-based data collection system which was reported to be time consuming with regards to the data collection, processing of information, verification, gathering, capturing and distribution. It was also reported that the information collected is also prone to loss, delay and errors leading to poor quality data.

Despite the benefits and advantages of electronic registers, the paper-based files and forms remain the basis of the HIV and TB surveillance systems used by WBOTS in the communities and at health facility level (12,38). In China, the use of handheld computers for data collection made the process easier and the staff felt more self-confident and preferred this data collection method over the traditional paper-based methods which affected their acceptability to the method (40). The WBOTs in the City of Tshwane (Gauteng) and Britstown (Northern Cape) use an information and communications technology (ICT) for data collection that enhances the referral system from home to clinics and vice-versa. Although this electronic data system offers an effective enabler to data management collected by WBOTs, network problems are some of the challenges identified. Inaccurate and incomplete data collected by WBOTs will translate into inaccurate and incomplete data captured in DHIS, thus leading to inaccurate outcome assessments of WBOT service provision in the community (19). To address this, program managers need to conduct period audits of patient files and other health information to identify gaps in the reporting and recording in order to reinforce complete and accurate data collection (41).

Type of information collected: The WBOT tick register shows: whether household visits were conducted. the type of household visit (Registration or follow up); and the type of household activity that was done, which include adherence support, pregnancy, postnatal, and home-based care. Since TB contact tracing is part of the services they offer, it is not clear how this information is aggregated in the current DHIS. TB contact tracing is

supposed to be one of the services that WBOTs are providing but this is not explicitly reflected in the data elements that the current DHIS reports on (38).

Data collection processes: Two years after the initial implementation of WBOTs, a status quo report also identified challenges with the data management in the Tshwane District. The report found that the electronic data management and devices used to collect data are not maintained as they lack information about the health status of the health community; further highlighting the inefficiencies in the data collection. Also, storage capacity is a challenge coupled with the fact that there is no filing system further exacerbated these inefficiencies (37).

Disengagement between the current DHIS and TB programme: The DHIS has limited provision in the data fields for capturing, analysing and transforming household registration data and other data collected by WBOTs; and the information is not widely used to transform service delivery according to the needs in the community (12). Consequently, health service managers who are expected to report on key TB contact tracing performance indicators and service delivery targets are unable to do that efficiently; further highlighting the implications of this disintegration. Collective findings from several TB surveillance checklists have found that there is unknown or sub-optimal data quality at facility and district level. Also, there is a need to conduct facility level data quality audits to ensure that TB case and contact tracing measurements are accurate; thereby feeding accurate TB contact tracing program outcomes into the national HIV/TB surveillance systems (34).

Individual and team level factors: Lack of training, supervision, resources and sufficient knowledge required to conduct household visits have been reported in the literature which can further exacerbate the challenges in the data collection process (42). There is also a possibility that the health facility does not value the information collected by the WBOT teams. A recent WBOT appraisal also highlighted that some health facility personnel value the information collected by the WBOTs while some regard it as not so useful (12).

Other challenges identified in a recent WBOT rapid appraisal include general shortage of equipment to support WBOT functioning, including access to phones and computers and not having chairs and desks. Where the system is paper-based, lack of lockable filing cabinets and lack of stationery to collect and capture data was also identified as a challenge (12). Other issues that have been identified include: team members have no access to the

electronic data; and they see no benefit to participation in data collection for surveillance as they seldom receive the reports back from higher reporting levels (43,44).

1.4.5 Mobile health for Health Information System Strengthening

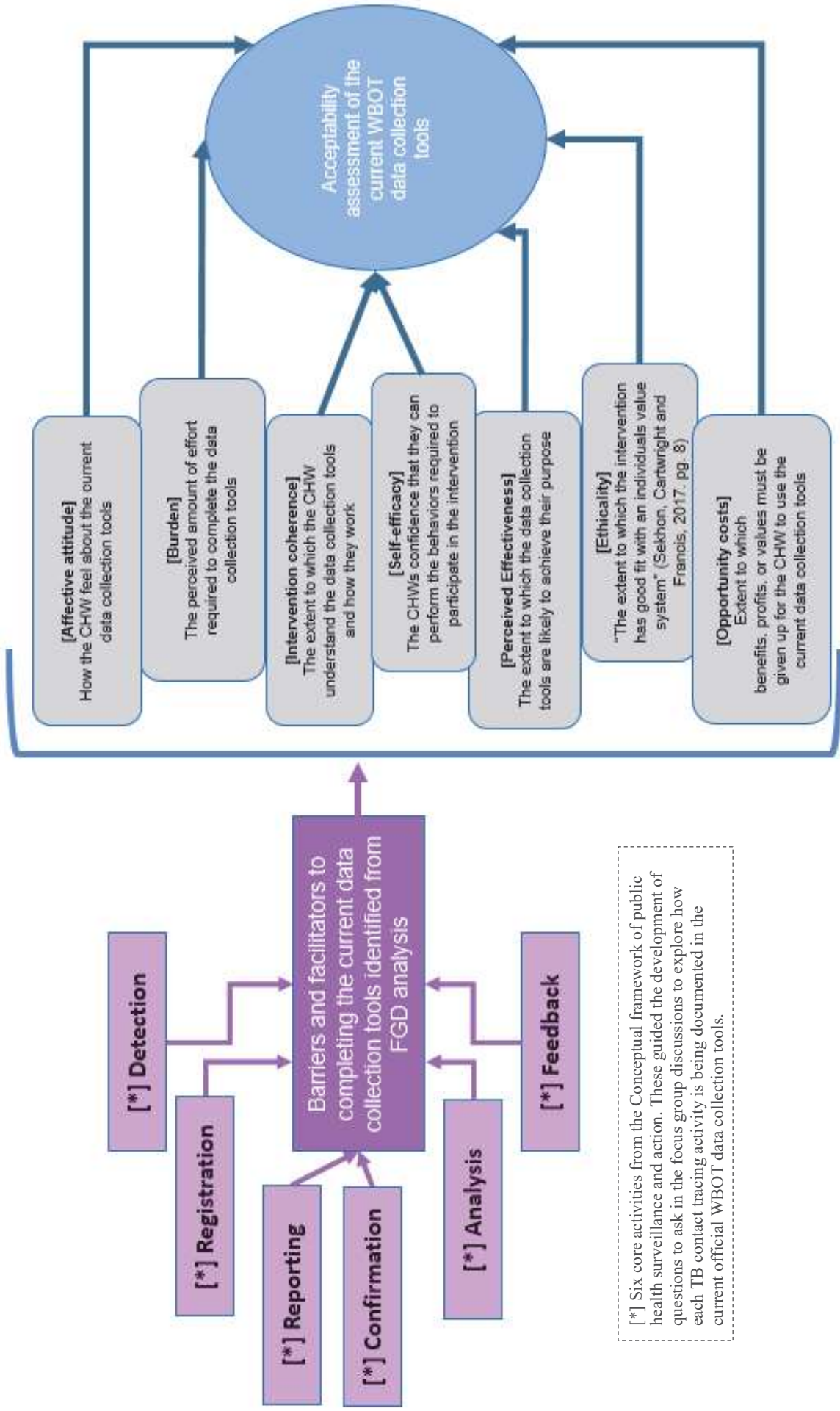
The use of mobile health strategies may provide a promise to improving health care delivery, particularly in the data management for community-based health care services. In low, middle and high-income countries, there has been growing evidence for the acceptability and increased accuracy of health information collected using electronic data collection methods. There is a high satisfaction and acceptance of mobile health interventions by program staff and patients for different program areas and functions in low, medium and high income countries (45–48) and feasibility of mobile health interventions in resource-limited and remote areas has been demonstrated (49–51) with other studies also showing a potential for nationwide scale-up (52,53). This evidence also suggests the effective use and feasibility of mobile health strategies by health workers, particularly in strengthening information systems (50,54–58). Literature suggests that when compared to paper-based data collection systems, mobile data collection improves data completeness, reduces error rates and promptness of data collection (59,60) and also reduce the costs related to data entry, data processing, such as storing and carrying forms and also duplicating paper forms (52,61,62). In the Tshwane District, the CHW are using hand held devices, forms and tick sheets which are supplied by Department of Health (DoH) and they have a general preference for the devices for data collection as it is reliable and fast (12). Consistent with these findings, several studies have also suggested that mobile data collection is an effective way of collecting and reporting community data (63,64) and transferring patient information to a centralised database; thus reducing the need for CHWs to have face to face interaction with the health delivery team (65)

1.4.6 Implementation Outcome measurement and theoretical framework

From the focus group discussions, the main outcome was the description of acceptability of the current WBOT data collection system; the barriers and facilitators to completing the current data collection tools. The six core activities from the conceptual framework of public health surveillance and action guided the development of the focus group guide. This was used to find out how these different activities are currently being documented and reported in the current data collection tools and the challenges and facilitators they experience.

Implementation research focuses on methods to promote the uptake of evidence based practices or research findings into routine practice (66). To understand the implementation process, implementation outcomes quantify the purposive and deliberate actions to implement new services, practices, and treatments (67,68). They are indicators of implementation success and proctor and colleagues highlight different implementation outcomes namely: Acceptability, adoption, appropriateness, fidelity, feasibility, sustainability, penetration and cost (67). For the current study, the main implementation outcome that was measured is concurrent acceptability since there has been some degree of exposure to the data collection tools and they are currently being used (67,69)

Acceptability refers to the level of satisfaction derived from what is considered appropriate or socially acceptable. It is influenced by various factors such as individual, organizational and external factors (67–69). This measured how well the current data collection tools are being received by the community health workers who are collecting data for household TB contact tracing activities. This also assessed whether these data collection tools met their needs for data collection in terms of ease of use, understandability, data management training received, reporting plus other variables identified in the qualitative analysis. To assess the acceptability of the current WBOT data collection tools, the current study employed the theoretical framework for acceptability (TFA). This theoretical framework is the first systematic approach that identifies how acceptability of healthcare interventions are defined, theorized and assessed (69). There are seven component constructs of acceptability that were determined after empirical and theoretical methods were applied to develop this comprehensive framework. These include affective attitude, burden, ethicality, intervention coherence, opportunity costs, perceived effectiveness, and self-efficacy (**Fig 1**)



Adapted from Sekhon, Cartwright and Francis (2017)

Figure 1: Adapted Conceptual Framework using the Theoretical Framework of Acceptability (TFA)

1.5 Research question, aim & objectives

1.5.1 Research Question (s):

Primary research question: What are the facilitators and barriers to the collection of information by WBOTs for household TB contact tracing activities?

Secondary research question: What is the WBOTs level of acceptability in completing the different data collection tools used for household TB contact tracing activities?

1.5.2 Study aim:

Use the theoretical framework for acceptability (TFA) to measure the WBOTs level of acceptability in the various data collection tools and, use the implementation framework of public health surveillance model core activities, to determine how household TB contact tracing activities are being documented in the current paper based WBOT data collection tools.

1.5.3 Primary objectives:

1. To explore facilitators and barriers to completing current WBOT data collections tools in the documentation of TB contact tracing information among WBOT CHWs to inform future methods of data collection in the Ekurhuleni District.
2. To assess the level of acceptability by WBOT CHWs on the official data collection tools used for documenting TB contact tracing outreach activities in the Ekurhuleni District.
3. To examine the relationship between the composite acceptability scores and CHW demographic variables in the Ekurhuleni District.

CHAPTER TWO - METHODS AND MATERIALS

2.0 Introduction

This chapter introduces key concepts that guided the entire research project starting with an overview of the study design described in detail. This is followed by the description of the study sites and the specific PHC clinics that were included in the study. The chapter also outlines the project activities by characterising the different components in terms of study population, participant recruitment and the numbers reached. It also describes the methods that were used to collect, analyse, synthesise and interpret the research data.

2.1 Study design

The current cross-sectional study was nested within a larger qualitative study that aims to optimise the efficiency of implementing household contact tracing for TB control in South Africa. The parent study had two phases. In Phase 1 of the parent study, in-depth interviews with various stakeholders such as DoH stakeholders, facility managers, community health workers, TB index patients and household TB contacts were conducted to explore barriers and moderators in the current system; and they also explored new approaches to delivering an integrated model for TB contact tracing which were piloted and evaluated in Phase 2. As part of Phase 1 of the parent study, two focus group discussions were also conducted with CHWs in Ekurhuleni and Bojanala districts to explore their possible role in delivering contact tracing as an evidence-based intervention. The current research project is an extension of this project.

The current cross-sectional study (MSc project) used a mixed - method approach using the exploratory sequential design. Qualitative data collection (FGDs) and analysis was followed by quantitative data collection and analysis; followed by interpretation of the results. In phase one of the current project, focus groups were also conducted to explore facilitators and barriers to completing existing TB contact tracing data collection tools. The results from that analysis informed the development of a questionnaire that was then used to assess the level of acceptability of the current data collection tools used for TB contact tracing and to also elicit factors that influence the acceptability. This design was chosen in order to get better insight and a multi-level perspective into the documentation and reporting of TB contact tracing information.

2.2 Study site

The public health system in South Africa comprises 52 district municipalities. The research project was conducted in the urban sub-districts of Ekurhuleni in Gauteng province, South Africa. Ekurhuleni metropolitan municipality is the fourth largest municipality in South Africa with an estimated population size of 2 865 611 (DHIS Mid Mid-Year estimates). It is highly urbanised with a growth rate of 2,47% and a population density of 1609 persons/km². With a surface area of 1975km², it has a large population that lives in urban settlements; in informal and residential suburbs accounting for 26% and 6% of Gauteng's and the country's population, respectively. With regards to race, Africans account for the highest percentage (79%) compared to whites (16%), coloureds (3%) and Indians (2%) with 51% of the population being female. The municipality is characterised by key challenges such as migration as seen by the number of informal settlements and as a result, puts pressure on the already constrained health budget. This is further exacerbated by the higher than national unemployment rate of 28.8% (70). The study site was selected because community health care services are being provided by WBOTs and have been rolled out in this area.

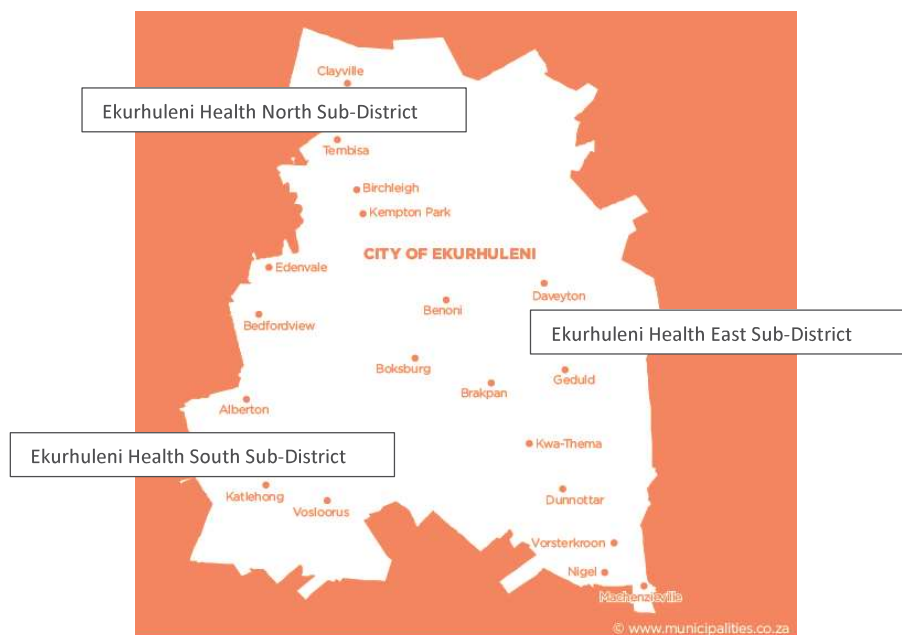


Figure 2: Map showing the study sites within the Ekurhuleni Health District

2.3 Study population

The CHWs who are part of the WBOT program constituted the population for the current study. WBOT CHWs are trained before their deployment and they offer basic essential

social and health care services to the community under their catchment area. Part of the services involve TB contact tracing activities among other health services they provide at individual, household and community level in the Ekurhuleni district. A DHS quarterly performance review indicates that between 2014/2015, there were 42 outreach teams that were established in Ekurhuleni with 30 wards covered with 1 team per a population of 7660 people (71).

2.4 Sampling and recruitment strategy

2.4.1 Phase 1: Focus group discussion recruitment and enrolment

The PHC facilities were identified from a list of all the facilities that were involved in the parent study. One facility from each sub-district (Eastern, Northern and Southern) in the Ekurhuleni district was purposively chosen for the qualitative phase of the current study. Invitations were sent to the selected PHC facilities in the Ekurhuleni Health sub-districts. An initial telephonic interview was set up with the facility managers and WBOT team leaders to introduce the study. This was followed by a site visit where a meeting was held with the facility managers and WBOT team leaders. The aim of the meeting was to introduce the study to the facility managers and the WBOT team leaders so that we can gain access to the CHWs since they report to these higher levels; and also, to set up appointments. Upon receiving approval, the team leaders and CHWs were also contacted to set up appointments for the focus group discussions. WBOT team leaders nominated CHWs who were under their leadership and they were then individually contacted and invited to participate. A purposive sample of CHWs were recruited for the three focus group discussions in each of the three sub-districts districts.

In Phase 1 of the parent study “Optimising the efficiency of TB household contact tracing”, a total of two focus group discussions (FGD) were conducted with CHWs where one FGD took place in the Ekurhuleni district and the other one was in the Bojanala. The purpose of the FGDs were to explore the role of CHWs in delivering TB contact tracing services in the community. Secondary analysis of these FGDs was also performed to search for themes that may be relevant to the objectives of the current study. For the current project, additional CHWs from Ekurhuleni were invited to take part in supplementary FGDs to further explore the acceptability, barriers and facilitators to using existing data collection tools for documenting contact tracing activities.

2.4.2 Phase 2: The acceptability questionnaire.

CHWs in the Ekurhuleni sub-districts are “hidden populations” which refers to a situation where a list of all the community health workers in the district does not exist or is not readily available; resulting in an inadequate sampling frame. For the quantitative phase, we employed targeted sampling techniques where systematic and purposeful methods by which lists of a specific population within the Ekurhuleni geographical sub-districts were developed and detailed plans were designed to recruit adequate numbers of CHWs (72). This sampling method was chosen because an adequate sampling frame of all CHWs in the district was not available; thus, making random sampling to not be feasible.

In the initial mapping phase; we defined the sub-districts where we wanted to conduct the research. We wanted to include CHWs who were currently active in catchment areas within these sub-districts. A District Health System (DHS) quarterly performance review indicates that between 2014/2015, there were 42 outreach teams that were established in Ekurhuleni with 30 wards covered with 1 team per a population of 7660 people (71). It is estimated that there are 2200 community health workers, and we estimate that around 100 team members will be reached. For analysis of factors associated with acceptability, using a difference of two mean scores i.e. 50 and 47 (difference of 3) in a binomial variable (e.g. <35 years and ≥ 35 years), this would require 90 individuals. For this study, 103 CHWs were recruited but only 94 were enrolled upon signing of informed consent forms.

2.4.3 Sample size

For the focus group discussions, a purposive sample of a total of 32 CHWs were recruited and enrolled for the three FGDs. For the acceptability questionnaire, 103 were recruited but only 94 were enrolled in the study upon signing informed consent forms.

2.4.4 Participant inclusion criteria:

Inclusion criteria for participants were age ≥ 18 and they need to have worked as CHWs in the Ekurhuleni catchment area for at least 6 months. CHWs must have provided or currently providing TB contact tracing services to community members.

2.5 Data collection procedures

2.5.1 Qualitative Phase 1: Focus group discussions

In order to collect comprehensive data for this project, two FGDs were conducted in the Ekurhuleni district and Bojanala district to address the parent study objectives. Secondary analysis of this data was performed to look for themes that might be able to answer objectives of the current study. Moreover, for the current project three additional FGDs were conducted with CHWs in each Ekurhuleni region (Northern, Eastern and Southern) of the Ekurhuleni district and they were all conducted over a period of two months. The aim of these FGDs were to understand individual and group level challenges and facilitators experienced when TB contact tracing data is collected, processed and analysed. The six core activities in the conceptual framework of public health surveillance and action (i.e. Detection, Registration, Reporting, Confirmation, Analysis and Feedback) guided the development of the questions to ask in the focus group discussions to explore how each activity is being documented in the current official WBOT data collection tools, specifically for TB contact tracing outreach. The main areas of the ethics approved FGD guide included deductive themes such as perceived usefulness of the tools, ease of use, availability, nature of the data being collected, cost and data security, challenges with the data tools, understanding of the tools (complexity), whether they feel the data collection tools are compatible with the services they provide (compatibility) and whether they prefer the current tools over any other data collection tools. The FGDs were conducted in accordance with ethics approved FGD guide (**See Appendix VII**), *The Aurum Institute*'s parent study SOPs for conducting FDG's, obtaining adult informed consent and audio recording.

In these discussions, the researcher took the role of the moderator and a research assistant from *The Aurum Institute* took the role of the scribe and observer. Any additional key notes from the FGDs were documented by the scribe who was also observing the participant's behaviour during the discussion. The moderator asked engagement and exploration questions relating to the deductive themes and probed the respondents for clarification, explanation and to also engage them. In these discussions, CHWs responded to questions and got into a discussion about particular issues pertaining to the current WBOT data collection system. Participants were not reimbursed for their participation and refreshments were provided during the different FGD sessions

The community health workers were asked what language they would be comfortable in having the discussion in and at Ramokonopi PHC clinic, 70 % (n=7) opted for English, 20 % (n=2) for isiZulu and 10% (n=1) for Northern Sotho; while 90 % (n=90) in Daveyton Main Clinic chose English and 10%(n=1) chose isiZulu. In Winnie Mandela PHC Clinic, 73%%(n=8) opted for English and 27%(n=3) chose Sepedi. Based on these estimates, English was the language used for all the discussion sessions. However, FGD participants were also allowed to express themselves in a different local language should they feel the need to. The whole discussion was recorded using a hand held digital tape recorder.

Prior to commencing with the discussions and obtaining consent for participation, a group informed consent was administered where a trained research assistant from *The Aurum Institute* went through the information sheet to explain the study procedures, benefits, risks, discomforts, and precautions. Prior to them signing the informed consent forms, the researcher did a private one-on-one informed consent session with each participant to go through the study procedures, risks, and benefits to ensure that they were well understood. Any questions and concerns were addressed in this private session; and they were noted. To maintain anonymity of the participants, name tags were given to all participants with unique identifiers and they were instructed to say their allocated numbers should they want to contribute anything to the discussion.

2.5.2 Quantitative Phase 2: Assessment of acceptability of the data collection tools

Following the qualitative analysis; the ethics approved acceptability questionnaire was refined and adjusted to reflect some of the variables observed in the qualitative results. To address objective 2, this close ended questionnaire was administered to the community health workers. The items in the questionnaire were adapted and informed by the qualitative research results from the focus group discussions and by the theoretical framework for acceptability (TFA) constructs. The questionnaire had demographic information of the CHWs and also had questions that assessed their level of acceptability of the current data collection tools using a four-point Likert scale for the responses. The more the scale increased, the more acceptable they found the data collection tools used. The questions that assessed acceptability had underlying themes that aim to measure acceptability of the data collection tools and these included perceived usefulness of the tools, ease of use, availability, nature of the data being collected, cost and data security. The questionnaire also had questions on data support provided by WBOT leaders (**Appendix VII**)

In order to collect and aggregate the quantitative data, Geographic Information System (GIS) cloud was used to capture the data. This is a web-based database that allows for remote mobile data collection using electronic devices like tablets or cell phones. This database was designed with check codes to minimise erroneous data entry and it was also password protected. It was then used to capture the data and this data was then stored on the cloud and only study staff had access to this data. This database was also used to aggregate all the data that was collected from the FGD attendance registers. The captured data were then downloaded in Microsoft Excel format and further exported to STATA V.14 where further data management and analysis was performed. The variables in the GIS cloud database were informed by and were identical to those in the paper-based questionnaire.

2.6 Data management and analysis procedures

The data management process is an integrated system that allows for systematic collection of data, data cleaning, storage, monitoring and reporting of data during the research enquiry process (38). During the data cleaning phase, data quality assurance processes were followed to ensure that the data meets research quality standards. These processes have been detailed below for each different dataset that were used.

2.6.1 Inductive thematic analysis

The recordings from the focus group discussions were transcribed verbatim and this rich-text based data was entered into QDA Miner software where inductive thematic analysis using the constant comparison analysis framework was carried out. The constant analysis framework was used because there were multiple FGDs in the same study and we wanted to assess if emerging themes from one sub-district were also noted in other sub-district (73). The various steps taken when analysing this qualitative data was documented in detail in an Excel based log book format titled “Diary of steps”. This diary of steps and **fig 2** summarises various steps taken in the analysis of this data. This analysis technique was used to pinpoint, examine and record patterns in the datasets in order to gain an understanding of the team member’s perceptions concerning the different themes that were discussed (74–76). The researcher familiarised themselves with the data and generated initial codes and documented them in a Microsoft Excel based codebook. Steps to develop the codebook included word frequency tabulation, text searches, highlighting statements that entail the frequently occurring words, linking statements to the deductive themes, further inductive review of the text, associating sub-themes to main themes and coding to index the transcript. The codes and the relevant statements were entered onto an excel

spreadsheet (77,78). The codebook was used to help try and link the statements they say to the themes and the codes were grouped into concepts used to come up with a theory. This grounded theory approach helped us in making sense of the codes. The main themes were given names and defined. The main outcome of the qualitative analysis was the description of the acceptability, preferences for data collection tools, challenges and facilitators in completing the various data collection tools for household contact tracing activities.

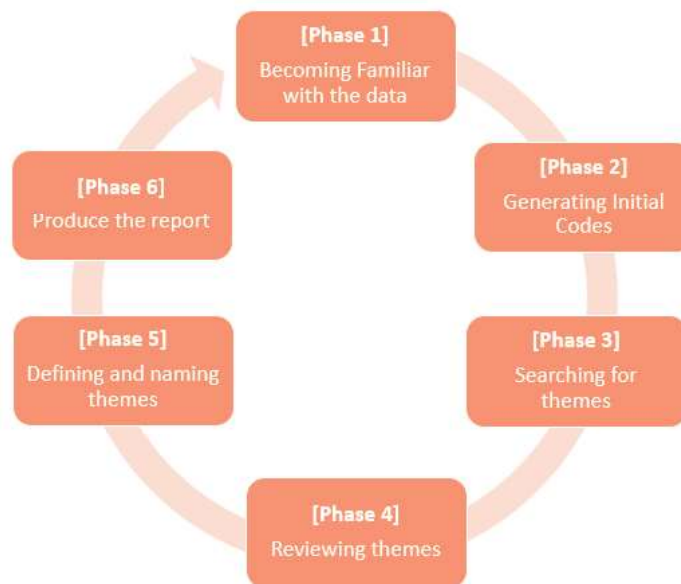


Figure 3: Summary of the inductive thematic analysis processes undertaken

Phase 1: Familiarizing ourselves with the data.

Before the transcription phase was initiated, a criterion for transcribing was established. This ensured that there were no inconsistencies in the transcription as these may introduce biases in the data analysis(74,79,80). There was an SOP for transcription that was used when transcribing all the audio tapes. To draw on the verbal discussions and non-verbal utterances, this SOP described how non-verbal utterances would be transcribed. For example, parenthesis was used to indicate short pauses between statements. This also lead to a richer and comprehensive understanding of the meaning of the statements in the dialogue. All transcripts were quality controlled and this process involved the verification of statements on the transcripts with the audio to check for any inconsistencies, missing or inaccurate data. In order to develop potential codes, the importance of note taking is emphasised and is highlighted as a crucial part of this phase (74,79,81). All notes and analysis procedures were documented in detail in a Microsoft Excel based “Diary of steps” template and reviewed throughout the analysis process. The audio tapes were copied from the digital audio recorder and saved under relevant folders. The recordings from the focus

group discussions were transcribed verbatim into written form onto a Microsoft word document; and this rich-text based data was entered into QDA Miner software where manual coding and thematic analysis was carried out.

Phase 2: Generating initial codes.

Transcripts from the different research sites were included for analysis and stored as text files in QDA miner; a computerized qualitative analysis software. In qualitative research, coding is a systematic way of trying to organize the data in such a way that we gain a deeper meaning of the data. The coding process through an inductive approach involves generating of codes that accurately depict the data set as they emerge when reading the dialogues. It was a cyclical process where we repeatedly carried out the different thematic analysis phases until we were satisfied with the final themes that emerged (80). We generated initial codes and refined them each time by removing, adding, splitting, or combining potential codes. This was done using two processes. Firstly, this was done through condensing the transcripts into smaller units and this is known as data reduction. Three ways to facilitate the data reduction process are suggested and these were (a) noticing a relevant phenomenon in the data, (b) collect examples about the identified phenomena and (c) analyzing it to find overlying structures, patterns, differences, similarities (74). Secondly, the coding process was done through data complication where we tried to provide new contexts about the way the data can be analyzed and viewed. This meant that we were able to go beyond the data and ask questions in order to generate theories and frameworks that fit the data (74,79,80,82). Steps to develop this codebook included word frequency tabulation, text searches, highlighting statements that entail the frequently occurring words, linking statements to the deductive themes, further inductive review of the text, associating sub-themes to main themes and coding to index the transcript (77,78). The codes and the relevant statements were entered onto an excel spreadsheet. The codebook was used to help try and link the statements they say to the themes and the codes were grouped into concepts used to come up with a theory. This grounded theory approach helped us in making sense of the codes.

Phase 3: Searching for themes.

When searching for themes; we examined how the different codes were combined to create sub-themes. This was done by examining the broader patterns in the data to identify how the combined codes fit in with the list of proposed themes. These themes were then used

to describe an outcome of the coding. These potential themes were then narrowed down to derive an overarching theme (74,82). Furthermore, if there was a shift in the topic, or use of analogies and metaphors or indigenous terms; these were also noted to better understand the context of the statements. Analysis of the differences and similarities in the participant's linguistic expression during the discussions also allowed for the themes and categories to emerge from the data. At the end of this phase, there were many candidate themes that were described throughout the analysis process. While some of the themes were insignificant, they were not discarded as they may be used later in the analysis process (80).

Phase 4: Reviewing themes

At this phase; we refined and reviewed our themes. We went back to the data and searched it again to check if the proposed themes were supported or refuted by the data. At this analysis stage, we had a set of potential themes and by assessing whether the data fit with the proposed themes; it allowed for revision and further expansion of the themes as they developed (79–81). During this stage, we found that some of the themes needed to be condensed while others collapsed into each other. Also, we went back to read and re-read to confirm if the identified themes related back to the data. The researcher ensured that there was no mismatch between the analytic claims and data as these reduce the support that the data can provide (79). This was done by repeating this process until the researcher was satisfied with the thematic map. At the end, we had an idea of what the themes were and were also able to describe how they fit together to tell a story about the data set.

Phase 5: Defining and naming themes.

In order to determine interrater reliability, the researcher and the supervisors reviewed the Excel codebook and transcripts independently in order to identify themes. Any differences were resolved by reviewing the codebook and agreed on the which coding method to use. At this stage; some codes were suggested and some were dropped. The researcher and the supervisors suggested new codes as needed and helped categorize the transcripts according to the codebook. If both supervisors agreed on a code, then the consistency of the codes was good and if there was any disagreement; the codes were dropped (74,75,80). At this stage of the analysis, the existing themes that are? presented were refined and defined in order to discover further depth of the themes and alert us to any new potential sub-themes (74,76,80). The description of these themes entailed describing how and why the identified themes are interesting and to also identify the significance of each theme. In order to

identify the story of each themes, we then wrote a detailed analysis of the theme. At the end of this stage, we defined what each theme consisted of and explained it. We highlighted the importance and sense of the final themes by beginning to think of the names for the themes.

Phase 6: Producing the report

When writing the final report, we decided on the themes that make meaningful contributions to answering the research question. We ensured that the report contained sufficient evidence that the described themes in the data are relevant to the data. To increase dependability, dialogue that relates to all chosen themes was presented (76,80). This was done by including extracts in the narrative so that the full meaning of arguments and statements in the analysis are captured. Furthermore, to establish credibility, member checking was conducted whereby we took the final themes and supporting statements from the dialogues to provoke a response (75,76,80). The main outcome of the qualitative analysis was the description of the acceptability, preferences for data collection tools, challenges, and facilitators in completing the various data collection tools for household contact tracing activities.

Results were summarized in a table showing the distribution of responses across the themes and direct quotations were used. This table describes the different related concepts within the themes and sub-themes (See **Table 2**). Also, a summary of the barriers and facilitators to completing the data collection tools is also shown (See **Table 3**). Any possible relationships between or among the themes was presented diagrammatically using a concept map (See **Figure 4**).

2.6.2 Quantitative data analysis

STATA version 14 (StataCorp, College Station, Texas 77845 USA) was used to perform all quantitative data management activities (verification, data cleaning and analysis). Participant characteristics and other socio-demographic variables collected were summarized and presented as frequencies with corresponding proportion (%) as a percentage of column total. The questionnaire used a four-point Likert scale for questions that assessed acceptability: (1) Strongly disagree, (2) Disagree, (3) Agree and (4) Strongly agree. The more the scale increases, the more acceptable they found the current data

collection tools. The responses for each Likert item was also summarised as frequencies and proportions as a percentage of the total number of respondents for each item. The responses were also reported as a modal value to show the most frequent responses per question and expressed as frequencies and proportions. To measure the reliability of the scale, the Cronbach alpha was computed to measure how closely related the set of items are as a group (83).

A composite acceptability score was computed for each observation in the dataset using 20 Likert items. These items aimed to assess acceptability using the constructs in the theoretical framework for acceptability (TFA). Visually, a box plot was drawn to show the distribution of the composite acceptability scores by various categories of the acceptability level and the different Ekurhuleni sub-districts. Moreover, there were various tests that were conducted to test whether various assumptions held and this guided the choice of statistical tests used herein. As determined by the skewness ($P > 0.05$) and the Shapiro-Wilk normality test ($P < 0.05$), the acceptability composite scores for CHWs were not normally distributed; but followed a negatively skewed distribution. The normality probability plot also showed that the scores did not follow a normal distribution. As determined by the homogeneity of variance test, the variation in the acceptability composite scores between male and female CHWs was also not equal. Therefore, based on this determination; non-parametric statistical procedures were used. Mann-Whitney U test was used to check whether the median acceptability scores differed significantly between two groups while the Kruskal-Wallis equality-of-populations rank test was used to check for significant differences of median acceptability composite scores between three or more categories or groups.

As there is no literature in the field indicating cut off values for classifying acceptability level under different categories (low, moderate and high); tertile were used to classify the composite acceptability scores. Tables were used to report the distribution of the acceptability levels by different CHW demographics. The three categories of acceptability level were cross tabulated with various categorical CHW demographic characteristics and a chi-square test or a Fischer's Exact test was used to test for any association. The choice to either report chi-square or Fischer's Exact was guided by various assumptions regarding the statistical tests. **Table 6** summarizes the distribution of the acceptability scores and acceptability levels by selected CHW characteristics.

To find the relationship between the acceptability scores and the different explanatory variables; a linear regression model was estimated. The F test of overall significance was computed for the estimated model to check whether the overall model was significant ($P > F$). This was also followed by reporting the coefficient of determination (r^2) to assess how much variability in the composite acceptability scores is being explained by the different predicting factors (84). The unadjusted and adjusted coefficients were reported along with their corresponding significance level.

4. Ethical considerations

Ethical issues were considered initially and during the research project timeline. The proposed research project was conducted in a manner was appropriate to promoting good public health practice by building support for research, respecting human values and protecting the University's reputation and that of *The Aurum Institute*.

The current nested research MSc project received ethical clearance from Human Research Ethics Committee (HREC) at the University of the Witwatersrand, Johannesburg under clearance certificate number **M170244** (Refer to Appendix II). As the current MSc project was an extension of parent study titled "*Optimizing the efficiency of household contact tracing for TB control in South Africa*"; ethics approval for the main study was also granted by HREC at the University of Witwatersrand under clearance certificate **160305** (Refer to **Appendix III**) and the London School of Hygiene and Tropical Medicine ethics committee under clearance certificate **11020-1** (Refer to **Appendix IV**),

The research dealt with human subjects and if there was a possibility of risk for them during the research inquiry, they were well informed of everything regarding the research procedures, risks and benefits. Informed voluntary consent (IVC) was sought from all the WBOT CHWs using ethics approved IVC forms before their participation in the research project was confirmed. Also, since the responses by the WBOT members may include sensitive information; confidentiality of participants was respected by using participant unique identifiers instead of their names.

CHAPTER THREE - RESULTS

3.0 Introduction

This chapter outlines the main results of the research as per the study objectives. As this is an extension of the overall project, some of the themes identified from the qualitative component of the parent study may also be described if they are relevant to the objectives of the current study. The results section is divided into two main categories; the results from the focus group discussions followed by those from the acceptability questionnaire. This first section commences with a detailed description of the CHWs characteristics from the focus group discussion sessions; specifically describing their behaviour and how it relates to their responses. For the qualitative inquiry, a table showing the distribution of responses for each emerging theme is shown (refer to Table 2). A concept map showing how the emerging themes are linked and interrelated is also be presented (refer to **Fig 4**). A table summarising the barriers and facilitators at different levels is also be shown (**see Table 3**)

This section of the results is then followed by the quantitative results of the assessment of the acceptability of the current data collection tools. In this section, a table descriptively summarising the participant's demographics is presented. A detailed description of the different levels of acceptability will be shown, followed by the assessment of factors influencing the composite acceptability scores.

3.1 Focus group discussions

3.1.1 Focus group participant enrolment

In the parent study, the aim of the focus group discussions were to explore the possible role of CHW in delivering an integrated household model for TB contact tracing. Two focus group discussions were conducted in Ekurhuleni and Bojanala to address this. For the current study (MSc Project); three more focus groups were conducted in each sub-district of Ekurhuleni. The distribution of CHWs by region is shown in Table 1.

Table 1: Demographic characteristics of community health workers who participated in the Focus Group Discussions.

	Asibambisane; OHTC (Parent Study)		MSc Epidemiology Research Project (Ekurhuleni Region)			Total [N=54]
	Ekurhuleni health Southern Sub-district; Villa Heida Hall [N=10]	Bojanala; Mabieskraal Health Centre Boardroom [N=12]	Southern Sub- district; Ramokonopi CHC [N=10]	Northern Sub-district; Winnie Mandela PHC Clinic [N=12]	Eastern Sub- district; Daveyton Main PHC Clinic [N=10]	
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Sex						
Female	9(90)	12(100)	9(90)	11(91.67)	7(70)	48(89)
Male	1(10)	0(0)	1(10)	1(8.33)	3(30)	6(11)
Age category						
24-30	2(20)	2(16.67)	6(60)	5(41.7)	7(70)	22(40.74)
31-35	2(20)	3(25.0)	1(10)	2(16)	2(20)	10(18.52)
36-40	2(20)	3(25.0)	3(30)	4(33.3)	0(0)	12(22.22)
41>	4(40)	4(33.3)	0(0)	1(8.3)	1(10)	10(18.52)

3.1.2 Characteristics and behaviour description of the community health workers in the focus group discussions.

The seating plans for all the discussion sessions can be seen in **Fig 7 – 11** under Appendix V. On average, these discussions lasted for not more than 2 hours, with the longest one lasting approximately 1 hour, 57 minutes.

3.1.2.1 Villa Heidi Hall/boardroom in Ekurhuleni

For the parent study, the first focus group discussion was conducted at Villa Heidi Hall/boardroom in Ekurhuleni (refer to **Fig 7** under Appendix V for seating plan). All the participants came from the different primary health care clinics in the Ekurhuleni South district. Participants had unique identifiers ranging from 10-19 and majority of them had more than five years working experience as community health care workers. WBOT CHW training came up during this session with CHWs talking about the different WBOT related trainings and other trainings they attended. Although WBOT PHC Phase 1 training introduced them to the data collection procedures; no one mentioned attending training that focused on data collection tools. Community access issues such as unwelcoming community members were also raised as barriers to conducting community outreach services.

There was variation in the behaviour of the FGD participants. Some of the participants were very engaging and active during the discussion while others such as participant 13 were very reserved and quiet. Participant 11 participated a lot in the discussions. She was very vocal and clear in her opinions. Both participant 12 and 14 were very arrogant in the way they expressed themselves in the discussion. During the discussion, participant 16 looked distracted and also kept fiddling with her pen. Participant 19 was very detailed in her responses about what was happening during household contact tracing activities and she was very passionate about her work. This session was conducted in English

3.1.2.2 Mabieskraal Health Centre Boardroom

The second focus group discussion was held in the Bojanala at Mabieskraal Health Centre boardroom. The participant unique identifiers for this group ranged from 12-23 (Refer to **Fig 8** under Appendix V). All the participants came from the different primary health care facilities located in the Moses Kotane West district. During the discussion, the participants respected each other's views and if there were any differences in opinions, they were addressed in a respectful manner. The language used for the discussion was in both English and Setswana. The discussion started off in English but some participants felt more comfortable expressing themselves in Setswana.

Compared to other sub-districts; there were more CHWs requesting further training and also the group that spoke most about the other types of trainings they had received. Although most attended Phase 1 training; there was no mention of CHWs receiving training related to the data collection tools. Most of the concepts that came up in this session were related to the barriers and facilitators to the implementation of TB contact tracing in the communities and less about the data collection tools. The safety of WBOTs while conducting community based outreach services was a general issue related to community access that came up in the session. When she talked about the patients she meets on a daily basis, participant 13 often showed her emotions. Both her and participant 16 were actively involved in the discussion were very vocal in expressing their opinions. Participant 16 liked using her hands and body language to illustrate a point. Of all the participants, participant 23 was the most vocal and she seemed very passionate about her work and was very knowledgeable about the PHC reengineering strategy and their role in delivering community outreach services. She was also able to describe in detail the difference between how things were before and after the PHC reengineering was introduced. She was very detailed in her responses and very actively engaged in the discussion.

3.1.2.3 Ramokonopi Primary health care clinic (Southern Sub-District)

In the FGD at Ramokonopi Primary health care clinic, the participant unique identifiers for this FGD ranged from 1-10 (Refer to **Fig 9** under Appendix V). The group was highly interactive and very vocal about the challenges relating to the WBOT program, specifically the inadequate training and not receiving certificates upon completing the trainings. Incomplete referral forms was also a general concept that came up a lot in this session. Moreover, most CHWs also raised the issue of not having a specific tool for documenting TB contact tracing activities. CHWs in this session also raised concerns about the patchy referral system where clinic sisters refuse to complete the referral forms. At one point, they got into a debate about how they believe certain forms were supposed to be filled in and moderator had to calm them down. Participant 10 and 2 were very well spoken and were the most interactive in the discussion. Participant number 10 dominated the discussion and was always the first person to respond to any question the moderator posed to the group. Her responses were quite elaborate and was the most vocal in the group. Participant number 6 had the loudest tone of voice and wanted to be heard every time she made a contribution to the discussion. Participant number 5 was the only male in the group and although he looked like someone who was stuck in his thoughts and was very quiet; he was very vocal. Both him and participant number 4 liked to use their hands to express themselves and were actively involved in the discussion. This session was conducted in English but participants were allowed to express themselves in a local language.

3.1.2.4 Daveyton Main Primary Health Care Clinic – Eastern Sub-District

In the FGD at Daveyton Main Clinic, there were 10 participants with participant unique identifiers for this group ranging from 11-20 (refer to **Fig 10** under Appendix V). In this session, CHWs dwelled a lot on the fact that they lacked essential resources needed for the effective functioning of the WBOT programme. These resources included a WBOT designated office, stationery and lack of filing cabinets. There was also a general consensus among this group that there was a need to implement a digital system to deal with the limitations posed by the current paper based system. Participant 14 dominated the discussion and was the most vocal participants. He talked a lot and expressed his ideas very well. He also liked to use her hands to make a point. He seemed to enjoy what was talked about in the conversation and would always engage himself. . Participant 13 folded her arms most of the time and would use her hands a lot when she wanted to get a point across. Participant number 20 was also very quiet at the beginning of the session and only started

contributing later to the discussion. He seemed preoccupied as he was stretching his hands and playing with a chair. The session was conducted in English.

3.1.2.5 Winnie Mandela Primary Health Care Clinic – Northern Sub-District

In the FGD at Winnie Mandela PHC Clinic, the participant unique identifiers for this group ranged from 21-31 (Refer to **Fig 11** under Appendix V). At the beginning of the session, they all seemed confused until the moderator elaborated further about the study after which they eased into the discussion. This was the least interactive group amongst all the FGD sessions. As the discussion commenced; there were a lot of negatives mentioned about the current WBOT data collection system such as lost papers, lack of stationery to complete the forms, patients providing wrong information. Most CHWs here also mentioned receiving training that was related to TB symptoms and treatment but not specifically TB contact tracing. Participant number 23 was very vocal and was very interactive in the discussion. Participant 21's head was facing down most of the time as though she was deep in thoughts and did not engage much in the discussion. Participant 24 seemed distracted and played with a pen during the session and would look preoccupied until the moderator prompted her to respond. Participant 29 also hardly spoke and would always smile or laugh when the other participants were giving their viewpoints. Participant 30 was not very vocal. When she did speak, she focused a lot on the challenges they are facing during contact tracing activities. This session was conducted in English.

3.1.3 Emerging themes from the FGD analysis

In coming up with the themes, the number of CHWs speaking of or mentioning a certain issue was looked at in conjunction with the number of times the different codes were coming up. Those that were greater than 5 were looked at separately and grouped into categories and then into themes. Independent reviewers (Supervisors) reviewed the codebook and independently came up with themes. We originally identified six emerging themes, however after this review process, only five broad themes were finalized. The emerging themes were: [1] Inadequate WBOT CHW training, [2] WBOT programme integration with other health and social service providers, [3] challenges with the current WBOT data collection system, [4] community access issues and [5] Preferences for a digital based data collection system. **Table 2** shows the summary of the emerging themes, sub-themes and related concepts and the distribution of responses by location.

Table 2: Summary of participant responses from the focus group discussions

Theme		Sub themes/Concepts		Participant responses (Number of participants that raised or spoke of the issue)								
				Parent Study ("Asibambisane")		Master of Science Research Project		Total				
		Bojanala [N=12]	Ekurhuleni [N=10]	Ramokhopi [N=10]	W. Mandela [N=11]	Daveyton [N=10]						
Inadequate community health worker training	CHWs have received some sort of training	8	67%	3	30%	4	40%	3	27%	4	40%	22
	CHW have received TB-related training	4	33%	2	20%	2	20%	4	36%	0	0%	12
	CHW did not receive any kind of training	2	17%	2	20%	2	20%	2	18%	0	0%	8
	Received other forms of trainings [Computer, auxiliary nursing, HIV AIDS, life skills training, counselling, HBC, Project Management)	9	75%	3	30%	3	30%	0	0%	3	30%	18
	Community health workers request further training	5	42%	0	0%	2	20%	3	27%	0	0%	10
	In service training	1	8%	1	10%	1	10%	0	0%	1	10%	4
	PHC re-engineering training	4	33%	3	30%	5	50%	3	27%	1	10%	16
WBOT programme integration with other health and social service providers	Received data collection tools training	0	0%	0	0%	2	20%	1	9%	1	10%	4
	Referral networks are established (Any mention of referral to any other service provider)	4	33%	1	10%	4	40%	3	27%	1	10%	13
	Incomplete referral forms (Sisters at PHC clinic do not fill in the referral forms)	2	17%	1	10%	4	40%	3	27%	2	20%	12
	Sisters at PHC clinic do not take community health workers seriously.	1	8%	0	0%	2	20%		0%	1	10%	4

Table 2: Summary of participant responses from the focus group discussions (*Continued*)

Theme	Participant responses (Number of participants that raised or spoke of the issue)											
	Parent Study ("Asibambisane")						Master of Science Research Project					
	Bojanala [N=12]		Ekurhuleni [N=10]		Ramokoponi [N=10]		W. Mandela [N=11]		Daveyton [N=10]		Total	
Sub themes/Concepts	1	8%	0	0%	3	30%	3	27%	1	10%	8	
Use official forms and tick sheets for documentation	0	0%	0	0%	4	40%	0	0%	0	0%	4	
Use of non-official tools for documentation [Notebooks and personal diaries]	0	0%	1	10%	7	70%	3	27%	0	0%	11	
No specific tool for TB contact tracing activities	2	17%	2	20%	1	10%	4	36%	0	0%	9	
Patients providing wrong information (Wrong addresses, cellphones etc.)	0	0%	1	10%	2	20%	0	0%	2	20%	5	
Data collection tools are too many to complete or too long.	0	0%	0	0%	1	10%	1	9%	3	30%	5	
Filing system does not meet the needs of the data and the CHW (Lost paper)	1	8%	0	0%	2	20%	3	27%	5	50%	11	
Resource constraints (Lack of stationary, forms and tick sheets etc)		0%		0%		0%		0%		0%	0	
Community members lack of trust in community health workers	2	17%	2	20%	0	0%	1	9%	0	0%	5	
Community members are not welcoming CHW in their homes	4	33%	1	10%	2	20%		0%		0%	7	
WBOT safety (CHW are raped, Drunk and violent patient, risk of acquiring infection, fear walking alone, No Regular TB screenings for CHWs)	0	0%	1	10%	2	20%	0	0%	2	20%	5	
Weaknesses in the paper based data collection system (Too many papers, papers too long etc.)	0	0%	1	10%	3	30%	5	45%	3	30%	12	
Digital based data collection system (Ease of use, facilitate reporting												

3.1.3.1 Inadequate WBOT community health worker training

As part of the WBOT programme model, there are certain trainings that the CHWs receive so that they can provide the community outreach health and social care services efficiently and effectively. These trainings are provided by (FPD) (PHC re-engineering WBOT training Phase 1 & Phase 2) and CHWs expressed that these trainings made conducting their duties easier.

“Since well we went for PHC training, I think it became a little bit not stressful...”
(FGD Participant 14; Male 35 years; Daveyton Main PHC Clinic)

“... we did a WBOTS course when we still at NGOs. When we were done they took all of us and moved us to clinics. NGOs are still there and they exist but they are developing others who are coming behind us (meaning in terms of training) I think when we move step further or when they taking us from where we are or next level also they will take them from NGO and move them to the level we are at currently and then develop others. (FGD Participant 10; Ekurhuleni [Asibambisane OHCT])

“I did re-engineering training and TB training. Then I took myself for auxiliary and computer training. (FGD Participant 12; Bojanala [Parent Study])

“... we went to the training last year around February and they were teaching us about TB. All in all they were teaching us what is TB, What are the ways to prevent it. How to take a treatment and adhering to it” (FGD Participant 13, Ekurhuleni; [Parent Study])

In addition to the WBOT related trainings; CHWs across all sub-districts also mentioned that they attend in-service trainings every Friday.

“... The only training that we doing here is when we doing it among ourselves. Every Friday we don't go outside. We...we help each other we are debate how these things work. Yes I do this, “No you are wrong. You [are] supposed to do this way” you see we...we show each other, we teach each other how to do it. (FGD Participant 10; Female 27 years; Ramokonopi CHC, Katlehong)

“... the only thing that we have is on Fridays; we have in-service trainings for the team, only for the team. That's the only thing we have....” (FGD Participant 14; Male 35 years Daveyton Main PHC clinic)

CHWs in all the sub-districts had received other forms of trainings which are both formal and informal. These trainings included disease specific training like TB and/or HIV/AIDS. Other types of trainings received included computer training, auxiliary nursing, counselling, home based care, project management, life skills to name just a few. The CHWs expressed that they received a lot of trainings of which some were not accredited and they did not get certificates upon completion. For most of the WBOT related trainings;

CHWs expressed their disappointments as they have not received certifications or any acknowledgement of attendance. This was mostly expressed in

“... I received basic TB training and it was [just for] attendance. I received basic home base care training and it was [just for] attendance. I received mhm what do they call it? At the train- I have the one that we did in the train. I received pillow pepper training and it was [just for] attendance. It was not [ac]credited. I only have 1 training that is accredited which is the one that I took myself to school for. Its...its auxiliary nursing. It is the only one [that is] accredited while the others are [just] for attendance. They [the trainings] are 12 (attendance) and that one (pillow pepper training) [which] is for 1 day...for five...five days. I have received a 59 days training without getting a certificate; I received it (the training). I attended it with that lady wearing a pink shirt and we didn't get certificates. I did what...what management. I also did it but the person who was conducting the training disappeared during the training. We didn't finish the training and we didn't get certificate[s].” (FGD Participant 23; Bojanala [Parent Study])

“I also received a lot of training without certificate[s]. I did auxiliary nursing training and I got a certificate. I did computer training and I got a certificate. The others are...I did disaster management training, life skills training, HIV and AIDS training and ehh project management. They are a lot... (FGD Participant 16; Bojanala [Parent Study])

There were inconsistencies in responses as some CHWs mentioned that they had not received any TB contact tracing related training while some said they had received it. It is not clear whether WBOT information and data management competency assessments were integrated in these trainings; although some mentioned that they had specifically received training on how to use some of the WBOT forms and tick sheets (Phase 1). While some had received TB contact tracing related training; some did not remember attending any TB related training.

“According to me I don't remember attending TB contact tracing training. The training I last attended was TB in general. They were teaching us about TB and it was not last year. Long time ago. I don't even remember when was it?”(FGD Participant 11; Ekurhuleni [Parent Study])

CHWs have received training on the various forms and tick sheets used for the documentation of outreach activities. These forms and tick sheet was part of the Phase 1 PHC re-engineering training that most CHWs had received. CHWs were confident in the use of the forms and tick sheets after the trainings.

“Yes, we have gone [for training]. We went for a course for how many days? 5, 10 days for PHC training [and] for all of this paperwork. We already know it from

the back of our heads” (FGD Participant 14; Male 35 Years; Daveyton Main PHC Clinic)

“... we did the training on WBOT and all forms were there, they train us how to fill [in] these forms” (FGD Participant 1; Female 40 Years; Ramokonopi CHC, Katilehong)

In light of the infrequent and inconsistent WBOT related trainings; CHWs have acknowledged the skills gap in their community outreach duties during service provision. Most CHWs in Bojanala and Ramokonopi have requested further training that specifically focuses on the WBOT data collection tools, procedure for how to handle dead patients, the different regimens of TB treatments. They feel that this would help them to be more effective in carrying out their duties. They felt that information gained from these trainings would help them have confidence when educating their patients.

“... I don't understand some of the forms I was talking about these forms that my colleagues said they are the last ones. The consent forms screening; I don't understand it clearly. That's why I'm saying eh, it's not a perfect training”. (FGD Participant 2; Female 38 Years; Ramokonopi CHC, Katilehong)

“... we need more ehh workshops. If we can get more information, we would be able to do a better job...I think that if we continue getting more trainings like workshops or things like that, we are going to be able to improve the services that we offer” (FGD Participant 12; Bojanala [Parent Study])

“...I am pleading that if there are going to be trainings available; could we also be trained too. It is just a plea. Could we be trained on dying patients because our schedule says when you find someone dead, you are not supposed to touch them. You are totally not supposed to touch them. Instead you are supposed to call [a] people from next door or call an ambulance even [if] you [don't] know that the person [has] died or not. So I suggest that we must be trained for certain things” (FGD Participant 23; Bojanala [Parent Study])

3.1.3.2 WBOT programme integration with other health and social service providers

In the Eastern Sub-district; there was a general sense that there was no team work between the different service providers and the WBOT CHWs which may contribute to the lack of WBOT integration into health facilities. In all the sub-districts, the CHWs felt that there was a division between them and the PHC clinic staff. This is characterised by poor communications between these cadres regarding their different roles and aligning the PHC objectives with that of the WBOT programme. There was a perception that the clinic staff are not oriented to their roles as WBOT CHWs and that the PHC clinic staff feel superior

to WBOT CHWs. The CHWs feel like their efforts are constantly being undermined by the clinic staff. They felt that they were being used and not been taken seriously by the PHC clinic staff which resulted in PHC clinic staff not seeing any value in completing the referral forms that CHWs issue.

“....The only problem is that we don't have team work in this clinic. WBOTs one side, sisters one side, doctors one side so there is no team work... The only thing I have noticed is that sisters or doctors; they don't understand the meaning of WBOT. I think it was going to be better if they take them for training so they can understand the meaning of WBOT [and understand] what does WBOT do for the community. So that If you refer a patient to them; they must take us seriously and respond to our referral forms “(FGD Participant 15; Female 25 years; Daveyton Main PHC)

“... they (sisters at the PHC facilities) must recognize [that] us we are existing. We are WBOTS. We do what they want us to do for them. It's like now they are using us. When they get what they want from us, they don't care how do we feel”. (FGD Participant 10; Ekurhuleni [Parent Study]

“.... maybe if they (Sisters at the PHC facilities) can take our job serious. For me myself; they don't take it serious[ly]. So if they [do] take it seriously; they will do something cause we are doing a lot of work. We are identifying children, we are identifying pregnant women, we [are] identifying...you know. So they don't take this seriously” (FGD Participant 10; Female 27 years; Ramokonopi PHC; Katlehong)

The referral networks established by the WBOT programme to other health and social care service providers is patchy as a result of poor communication between the WBOT CHWs and these service providers resulting in referral forms to not be completed. In all sub-districts, there was a general consensus that the clinic staff also do not fill in the back-referral forms when CHWs refer community members to the PHC facilities. This results in an underestimated number of reported patients referred for TB testing or other conditions as incomplete referrals are not counted in the monthly referrals as per the WBOT program design.

“The only challenge that I'm facing with this [referral] form is that I do work every day but I don't get the form back to me. Cause I have to have that information says the sister wrote back in the paper” (FGD Participant 10; Female 27 years; Ramokonopi PHC clinic; Katlehong)

“We usually use the referral form for any chronic disease. We usually use the referral form for any chronic disease even the social devel- the social department we do referrals. But our main challenge is that when we write down the referral form, our doctors and nurses in the local clinics; they don't write the back referral “(FGD Participant 16; Female 27 years; Daveyton Main PHC clinic)

“But we do have a challenge with the sisters not filling in the referral letters to show that we have transferred the patient here at the clinic.... But we do have a challenge with the sisters not filling in the referral letters to show that we have transferred the patient here at the clinic... it seems like we are not referring any patients because they (the sisters) don't fill up this thing; the back of the referral form” (FGD Participant 13; Daveyton Main PHC)

It was highlighted in all sub-districts that patients or community members referred to the PHC clinic do not return the referral forms to the CHWs. Some of the information on form is needed to develop individual patient care plans on the individual form (adult patient care plan) and child and maternal form (pregnant women and children under five years old care plan) for follow up patient monitoring. With these incomplete back referrals from the PHC facilities; CHWs are unable to fill in these forms as well. The number of patients referred for TB screening or other conditions is underestimated as back referrals are not completed; thereby making compiling of monthly statistics difficult.

“... it is difficult for us when we go to the clinics to report the feedback cause the sisters does not give us the feedback whether the people we have traced have come back... have come to the clinic or not; we don't get the feedback.... The record of referrals it's a challenge to me cause if I have to refer someone to the clinic, we don't get the outcome of the referrals so it's hard to report on this individual form” (FGD Participant 9; Female 27 years; Ramokonopi PHC; Katlehong)

“... they don't write the back referral. So that's our main challenge cause we don't get the full information what happened to the patient when referred to the clinic. This referral is very important because we need the back referral so that we can write it down here in the individual form. There is a need of a record, yah. because here they will want the outcome (Points on the adult individual health form), the feedback that you get from the clinic so that you can write it down and say that this patient has started treatment or not.” (FGD Participant 16; Female 27 years; Daveyton Main PHC clinic)

Moreover, the CHWs from all sub-districts felt that the clinic staff does not seem to understand the importance of completing the back-referral form or the implications for patient care and therefore do not bother completing the back referrals. This is what some participants had to say regarding that:

“... I think they don't recognize the form or they are ignorant because sometimes the sisters; they just read this referral form and they don't want to fill it in. They just leave it blank. That's the challenge. (FGD Participant 18; Female 30 years; Daveyton Main PHC clinic)

“The only response we get from the sisters is that they don't understand our English; that its very poor so they won't fill in the referral forms. (FGD Participant 15; Female 25 years Daveyton Main PHC clinic)

Because of challenges with the referral form; CHWs in the Eastern and Southern sub-district expressed that they don't see the value the referral form adds. This is because the health and social care service providers also do not regard it as important. This is what some of the participants had to say about this:

“ ... We have a very serious challenge about that because sisters; she has ...the doctors and the sisters don't fill up the referral form even when you write to the social development; they don't recognize the form. You write to the whatsoever institution that is there; they don't respond to the - which means the referral form is not working... ”. (FGD Participant 14; Male 35 Years; Daveyton Main PHC)

3.1.3.3 Challenges with WBOT data collection system

NDoH developed official forms and tick sheets to document outreach activities and support the WBOT data management. These include Household registration form, maternal and child health form, daily tick-sheet and referral form. These data collection tools are used to document a range of services and as a result, many disease related indicators are extrapolated from these different forms and tick sheets to report in the monthly form.

“We use the forms. Yes, we have the registration form, individual forms where we record our visits” (FGD Participant 18; Female 30 Years; Daveyton Main PHC)

“... When we are doing the household registration form, we are assessing on whether that house has a TB patient or HIV or stuff. If we have on that household we have a patient that is maybe on TB treatment or HIV or stuff; so that is whereby we fill [in] the individual form so that we can have the record. So, we write the referral form whereby there is a defaulter patient on that household who needs to go for re-treatment”. (FGD Participant 14; Male 35 Years; Daveyton Main PHC)

It seems that the official forms and tick sheets do not have all the fields the CHWs require to document every service provision as documentation of outreach activities and work planning is also done on non-official data collection tools like personal diaries, notebooks and other papers. This was mentioned by CHWs in all sub-districts but was more pronounced in the Southern sub-district. There is no clear, structured way of how the information in these diaries eventually gets reported. These informal tools are also used for planning their day and managing their workload with no indication of how the information in these tools is transferred onto official forms and tick sheets and how this data gets

reported into routine reporting structures. This means that any useful information recorded in these diaries and notebooks are not reported at all.

“...when you are a community health care worker, you must have your notebook. This book it's where you write your notes. You are able to divide your things TB, HIV Pap smear and other stuff. You separate them in the book. You know that when you wrote ART where you should go in your book. Pap smear you know you know where to go” (FGD Participant 10; Ekurhuleni [Parent Study]

“As a community health care worker, you have to have a book that you write that you go to the place. You are the one who knows your schedule and how you arrange your things” (FGD Participant 10; Ramokonopi PHC Clinic, Katlehong)

“You have your own diary that's where you write either tracing for TB or for HIV. But then at the month end, you specify on your monthly report (Meaning you specify what tracing activities were conducted). There is a space...there is a space for i-TB (TB) tracing” (FGD Participant 2; Female 38 Years; Ramokonopi PHC Clinic, Katlehong)

In the Southern & Northern sub-districts, most CHWs expressed that a lack of a specific form to document TB contact tracing outreach activities was a problem as they are unable to give a specific report about all TB contact tracing activities since all the diseases are all on the same forms. The only way to tell what disease the person is being referred for is to check the individual form which can also be used for other diseases. This form does not specify whether the person being traced is a TB contact or not, or whether they are being traced as a TB treatment or ART defaulter as all treatment defaulters are recorded as the same. As a range of services are documented on the same forms; service provision for different diseases are documented in the same tools which means it's difficult to report specific TB contact tracing related indicators.

“I think everything is done correctly but the problem is the form [that] we use, because there is no specific form for TB when we are doing tracing. We just write in our books, we come back we register in communication book, but there is no form which I can exactly say on this day I was at this house and we find this and this..... After I registered the person in my individual form there is no specific one for a TB person. I just know me on my individual, I will write TB and then on our daily tick sheet is just said adherence, [and] you just tick to adherence. Adherence it's TB, it's for HIV, it's for high blood pressure, it's for anyone who is on treatment. There is no forms specifically for TB patients.” (FGD Participant 1; Female 40 Years; Ramokonopi PHC clinic)

“... we don't see the benefits for us to do the trace because we don't record ,we don't have the space where we say we did it (traced TB contacts) ,so is a challenge

to us ,we do trace but we don't have the space where we write **(FGD Participant 23; Female 26 Years; Winnie Mandela PHC clinic Thembisa).**

“...but for TB suspect, we don't have any form. We don't have [the form], we just refer that person after we suspect that he may or she may get TB. ... We don't have any form for [documenting] suspects... TB suspects” **(FGD Participant 10; Female 27 Years; Ramokonopi PHC clinic)**

At the time of the FGDs, none of the FGD participants had gone for the PHC WBOT phase 2 competency assessment training. In Phase 1, the data collection tools were introduced and they were given training on how to use them to document service provision. However, there were still CHWs that expressed that they still did not understand how they should be filled in and as a result; they were being filled in differently by different CHWs. This was more pronounced in the Southern sub-district. Because of not understanding the forms; some choose to not fill them in. The CHWs think that some of the data collection tools are difficult to understand and that they find them to be very complicated.

“...it take time for us to understand [how the data collection tools are used] as you have just saw; we do as a debate thing , where there is no debate thing (Means they are debating amongst themselves when they shouldn't be debating about how the tools are to be used) , cause we don't understand if someone write this way and I do this way, and he do this way...” **(FGD Participant 10; Ramokonopi PHC clinic, Katlehong)**

“... even our team leaders don't understand some of these papers as I said there's that registration, consent form... I asked them what I must write here. I asked one of the team leaders and then she said I don't understand this paper. Then she just said you must ask the team leader that gave that paper ...”. **(FGD Participant 2; Female 38 Years; Ramokonopi PHC clinic, Katlehong)**

In all the sub-districts, there was a mention of community members providing CHWs with wrong information in the form of wrong addresses and cellphone numbers. When patients provide wrong addresses, CHWs are unable to locate patients for follow up care, or to trace TB contacts. They are also unable to monitor whether patients are taking treatment or not; which is likely to result in an increase in treatment defaulters. As a result of this; the data collected in the WBOT data forms has a degree of inaccuracy and its accuracy cannot be verified if the patients cannot be located.

“... we go and trace those people, sometimes the address are wrong, the address most of the time the address are wrong we go and trace those people, yes. **(FGD Participant 4; Female 29 Years; Ramokonopi PHC Clinic, Katlehong)**

“... I think when the clinic can tell the patients or maybe to make them free about their house numbers or the addresses because some others they just give us wrong addresses...” (FGD Participant 23; Female 26 Years; Winnie Mandela PHC Clinic, Thembisa)

“Others give out wrong address[es]. If a person who stays in Tlhakong goes to Tweelagte clinic and they have relatives there, they would say they stay in Tweelagte only to find out that they stay in Tlhakong...” (FGD Participant 17; Bojanala [Parent Study])

“The other thing that is challenging us as community health care workers is that they are giving us wrong addresses. And you want to assist the person who has MDR and they say he`s not available or not staying there. You ask yourself when they say he is not staying there since he gave us wrong address, I wonder how many people has he infected with TB where he is staying?... (FGD Participant 13, Ekurhuleni [Parent Study])

While some are providing wrong addresses; some of the patients that are seeking care are highly mobile and do not stay in the same place for long periods of time. This also means that access to them is limited as they can't be located for follow up visits. Loss to follow up may likely be linked to the increasing rate of treatment defaulters in the communities. It was mentioned that some seek care in other PHC clinics from which they started their treatment at out of fear of being recognized by their neighbours at the PHC clinic.

“The problem here we...we do our work here, Umm we do tracing a lot [but] the problem is [that] the patient; they move [and] they change places . This is the challenge. As I'm working at Musi section; lots of my patients are moving [and] I can't find [them]” (FGD Participant 6; Female 29 Years; Ramokonopi PHC clinic, Katlehong)

“...most of the patients are afraid of going to Mabieskraal health centre because maybe they know the care giver and nurses from there (Mabieskraal clinic) and they (care givers and nurses) also know them. So they would rather go to Tweelagte Clinic because at Tweelagte clinic there is nobody who Who...who knows them. The person stays in Tlhakong but they go to Tweelagte clinic. That is what they usually do. Actually, that's what patients do and even when you trace them you cannot find them because they say they live in Tweelagte but when you arrive there, you are looking for a ghost.” (FGD Participant 17, Bojanala [Parent Study])

CHWs fill in incorrect information. Some lack vital documentation like birth certificates which makes it hard for the CHW to fill in the correct information such as date of birth and the community members feel that the CHW are taking no effort to ensure that community members obtain these important documents even though its not part of their job description.

“...I'm getting a problem with community on ward 59, most of them they don't have ID's, they don't have certificate for kids...” (FGD Participant 10; Female 27 Years; Ramokonopi CHC, Katlehong)

Let's say the family maybe in the family they are 8 you end up forgetting the date of birth maybe of the child. But it's his child it's her child, they will tell I just forget the date so it becomes a problem (FGD Participant 3; Female 39 Years; Ramokonopi PHC clinic, Katlehong)

The lack of integrity and honesty by some CHWs in filling in the forms and tick sheets also leads to the collection of inaccurate information as some CHWs in the Eastern Sub-district mentioned that they forge some of the information in the forms in order to meet their performance targets.

“This form (Household Registration Form) is very easy to be forged... (FGD Participant 14; Male 35 Years; Daveyton Main PHC)

“Sometimes I feel like our team leader does not understand our work because I can forge this paper and bring [it] back to him. (FGD Participant 11; Female 30 Years; Daveyton Main PHC)

“... The other challenge with this household registration form is that you can write wrong information about the patient for example, “I'm number 14 [and my] date of birth [is] 1992” [and you write] “deceased”. And it happens that number 14 come back to the clinic; they [would] go back and check [and say] “Number 14, you are deceased”. It's just a big challenge sometimes. (FGD Participant 15; Female 25 Years; Daveyton Main PHC Clinic)

The filing systems in the various PHC clinics do not meet the data needs for efficient data storage which results in incomplete record keeping and data that cannot be accessed when needed. An effective data collection system requires sufficient resources such as stationery and lockable cabinets needed for efficient data collection, storage and processing. CHWs highlighted that the lack of WBOT dedicated offices with enough filing storage for the forms and tick-sheets was a problem. They expressed that this jeopardized the patient confidentiality as there are no lockable cabinets as anyone can have access to the files.

With regards to the inefficient filing systems for CHWs in the PHC facilities; this is what some had to say:

“... we don't have space where we can put even our forms, is a challenge sometimes our forms are getting lost because we don't have the space where we can put them”

(FGD Participant 23; Female 26 Years; Winnie Mandela PHC Clinic, Thembisa).

“We also don't have a smart cupboard. Our files are untidy, our cupboards are so small. When we file our files; it's not nice, it's too untidy.... At that side; there's a youth centre and patients; they get in and we have a cupboard like this and it is not locked and we know that file is confidential. So it is easy for the patient while sitting to go and open and read the data and papers there” (FGD Participant 16; Female 27 Years; Daveyton Main Clinic)

“... firstly, our work has not been storage [being stored]; our work has been placed all over... we... if our work was being storage (stored); we will not [be] having this problem” (FGD Participant 10; Ramokonopi PHC clinic, Katlehong)

There are WBOT related resource constraints characterised by the lack of WBOT designated offices in the PHC facilities. These concerns of lack of WBOT offices were raised in all the sub-districts. These limited WBOT resources means CHWs have to share office spaces and other resources with the PHC facilities as there are shortage of paper and essential stationery and equipment needed for data processing. The unavailability of copy machines means that number of forms needed may not be enough for a specific day.

“We don't have the files, they didn't provide the files. We did buy the files, we buy files and then again we don't have enough space in the yard where we work so we don't have much space where we can put our files ,we don't have everything is a big challenge to us (FGD Participant 23; Female 26 Years; Winnie Mandela PHC Clinic, Thembisa).

“... we would like to see our own offices cause that we make to do our job more easily, because there will be somewhere where I will capture my job....We are maybe 28 or 27 and the rooms are smaller. We have to go and squeeze ourselves there and sometimes is hot...” (FGD Participant 10; Ramokonopi PHC clinic, Katlehong)

“...if we can have especially our place WBOTS in the clinics we are working at. When you arrive in the clinic really, we don't have a place to sit. We always arrive in the boardroom to sign register and then we go to the field. But if we can have our place they will know that when they need us, [they know] where to get us...” (FGD Participant 11, Ekurhuleni; [Parent Study])

There is also a general lack of other resources needed for data processing. These were raised in all sub-districts but were more pronounced in the Eastern sub-district.

“... As [of] now, we have a challenge of [making] copies; where [will] the government take that money? Right now, we have a challenge of [making] copies;

there is no ink for [the] stamp, there is no paper at the clinic... (FGD Participant 20; Male 27 Years; Daveyton Main PHC Clinic Daveyton)

“Our challenge is that we don't have equipment like we use these papers; we don't have machines to make copies. And then we also use our money to buy pens, pencils to write on the patients; so that's a challenge” (FGD Participant 16; Female 27 Years; Daveyton Main PHC Clinic Daveyton)

“And sometimes, we don't get ball pens to write and we are buying our own pens...” (FGD Participant 13; Female 34 Years; Daveyton Main PHC Clinic Daveyton)

CHWs are expected to fill in a number of forms and tick-sheets and they expressed their discomfort in the structure of some of the data collection tools like the household registration form saying that it is too long and that the number of forms to complete in a single visit is too much. This was expressed in all the sub-districts.

“...we work with a lot of papers and the papers get lost” (FGD Participant 12; Female 50 Years; Daveyton Main PHC)

“The paper (household registration form) is too long especially when find if you find a person and you ask all the questions some of the people they give us the wrong information because the things that you are asking....” (FGD Participant 3; Female 39 Years Ramokonopi PHC clinic, Katlehong)

“... even the house registration form is too long. I will take a lot of time, registering asking a lot of questions. So for me to come back and do a lot of question and questioning, people they say “Me, I'm busy. I'm going somewhere. So the paper is very...very long. Yona yodwa (that one only) it take 30 to 35 minutes [to complete]. Yona yodwa and kusase (That one only and there are)... and there are other forms, individual that I need to fill it. I also need to tick on the daily tick sheet so there...it's too long.” (FGD Participant 5; Male 32 Years; Ramokonopi PHC clinic, Katlehong)

The number of forms to complete sometimes results in community members getting annoyed when CHW request for information to complete the forms. They also felt that the time used to complete the forms in a single household could have been used to render outreach services to more households. This means that some of the data collection tools are left not filled in; resulting in incomplete information. This issue was more pronounced in the Southern sub-district.

“.... they get irritated they think you are wasting their time .. their time because your papers are not prepared. But sometimes they are prepared but there are lot

of papers that I have to take out” (FGD Participant 10; Female 27 Years; Ramokonopi PHC clinic, Katlehong)

“... its better if they minimize the papers, the information is important but to minimize the information into one thing. (Coughing) so that we can work fast, even in the household so that people cannot get irritated as they do.....the [household registration] form is too long...(FGD Participant 4; Female 29 Years; Ramokonopi PHC clinic, Katlehong)

3.1.3.4 Community access issues

CHWs need access to the communities in order to reach community members to collect data but they are sometimes met with resistance from the community members. This means CHW annual household registration and follow up targets are less likely to be reached if they are unable to gain access into the households. If CHWs cannot access these households, it is also less likely that documentation for household registration and follow up care is done.

“....we were introduced to the community but still they are not okay even then. We were introduced with our team leaders in their community meeting but still they don't want [us]...” (FGD Participant 14, Ekurhuleni; [Parent Study])

“We end up receiving such harsh words [from the community members] but we go give sister that report. We end up receiving harsh words even though we are trying to help people in the community” (FGD Participant 14, Bojanala [Parent Study])

Even patients are hiding themselves that they are sick and by the way, they don't really like us. Most of them they are not welcoming us well or [not] welcoming us in a good way, but in all that we do our job.”. (FGD Participant 11, Ekurhuleni; [Parent Study])

Part of the reason community members are resistant to CHWs is that TB and HIV/AIDS are diseases that still highly stigmatized in some communities and CHWs mentioned that as a result; they are being chased away because some community members believe that the CHWs will disclose their disease statuses to other people.

“... We once went to this shack [and] we find another patient and he said “It's better when you come to me, don't wear your uniform. Because the neighbors can see that I'm sick.... (Participant 15, Ekurhuleni [Parent Study])

“...they [the patients] get angry when we arrive at...at their houses and they would chase us away. Shout at us and tell us to get out of their yards because they came to the clinic yesterday, that's all that you know, shining with our sicknesses” (FGD Participant 18, Bojanala; [Parent Study])

Some of the inaccurate information provided by the patients is as a result of patients being dishonest lying about their disease status out of fear of being judged by the CHWs. This disease related stigma in the communities means that CHWs are likely to get inaccurate information from community members out of fear.

“... even when we ask the status they don't...they don't... say the truth usually. When we say you have tested for HIV, they won't give correct status they will say I am negative. And then when you go to the clinic and you get what the tracing is the person you know and is that person who said he is negative”. (FGD Participant 4; Female 29 Years; Ramokonopi CHC, Katlehong)

Some CHWs suggested continuous community campaigns and support groups to sensitise the community to the WBOT programme to facilitate CHW acceptance and reduce disease related stigma.

“I think what can be done in communities is if we can have continuous campaigns where we can educate them at; not just having one campaign the whole year. However, it must be something that happens now and then cause that that...Cause people; they still have that thing of stigma. Like when they see us coming wearing our uniform a person will ask “Did my neighbor saw [see] you?” (FGD Participant 12, Ekurhuleni [Parent Study])

“... we will also be recognized by the community if we are doing a social group also” (FGD Participant 13, Female 34 Years; Daveyton Main PHC)

“... It is going to be very helpful for us to conduct the support groups because as the community – also them; they are living in the stigma of maybe “I have TB and I am alone” you understand? How can I say it... goenyenyefatsa (To look down on yourself). It is going to help a lot of patients to know themselves and to live within the society normally” (FGD Participant 14, Daveyton Main PHC clinic)

Community members sometimes undermine the CHWs and there seems to be a general lack of trust in their competency to providing outreach services. They are sometimes receptive when CHWs are accompanied by team leaders or someone with a more professional status like a nurse. At times; CHWs have to forge the information in the forms when the community members refuse to sign.

“I can arrive today going alone and when I arrive, [I will] talk to the person. Let's say maybe I already know that the person is on treatment. The person... you [can] see that he doesn't like when I come there. I will go for the 1st time and when I see that this person doesn't like when I keep on coming, then I will go [for the] 2nd time [and] then for the 3rd [time], I won't go alone. I will go with my team leader [and ask her] that “Please

accompany [me] to such a patient or in that house". I personally don't know how people take or treat us. When you go with a professional, they accept you" (FGD Participant 18, Ekurhuleni District; [Parent Study])

"...cause sometimes they (the community members) don't approve us when we are going alone they are approve us when we go with the sister with epaulets." (FGD Participant 10, Female 27 Years; Ramokonopi PHC clinic, Katlehong)

Despite the resistance from the communities and the challenges they are facing; CHWs are still motivated to provide outreach services to the communities. They are aware of the impact they have in the communities they serve.

"All I can just say [is that] we are community care workers as we are. The... our main purpose is to help the community especially the health system; that's all we are doing. And it's not easy at all. We are facing so many challenges. That's all I can say right now (Clearing throat)" (FGD Participant 11, Ekurhuleni District; [Parent Study])

"And if they say [that] they refuse; when they get sick or somebody needs help, they do come here personally [and] go to our team leader and they need our help even if they did refuse us." (FGD Participant 13, Female 34 Years; Daveyton Main PHC clinic)

"...however what impresses me with community health care workers [is that] we don't give up, we don't lose hope [and] even though you feel like you want to give up, you just continue doing your work..." (FGD Participant 10, Ekurhuleni District; [Parent Study])

There is also a general threat to the safety of the WBOT CHW in the community which may limit their access to the communities to go and collect outreach data. Due to lack of transportation; CHWs walk long distances to the different households. They expressed that since most of them are females; they fear walking long distances alone as they may be raped or violated by community members who do not understand their work. This came up in Bojanala and Southern sub-district.

"The activity that I do not like to do is to visit man who stay [alone] because you will never know what harm they will do to you; whether they will rape you or what because we walk alone, we are not walking in groups. Firstly, you will be expected to go [and] register a household that you have never went to before. It is not my patient, I am not used to them and I do not know how they are. Maybe when I enter the house, they would lock the door and not let me out, what am I going to do?" (FGD Participant 15, Bojanala; [Parent Study])

"I am allocated ward 23 Mabieskraal and I do not know where it ends. So I and a re-engineering CHW [and] have to walk in [the] bush from Seolong

to Mabieskraal. You see, sometimes they would say I must go trace someone in ward 23 Mabieskraal and I don't go there because I am afraid of walking in the bush and I do not have transport to go there ((noise in the background)) cause there is only bus that goes there and if it passes it will never come back". (FGD Participant 21, Bojanala; [Parent Study])

Some of the patients do not present themselves to the health facilities for screening and treatment and some contacts also refuse to be screened. This leads to incomplete information as the referral loop will not be completed. Some of the cited reasons patients do not present to the clinics for follow up care include: highly mobile patients attending a different clinic from which they were referred, long queues at the clinics and rude clinic staff.

"...we had that paper (referring to the daily tick sheet) and the problem is, we go and trace the patients. Other patients they don't come to the clinic, so there is a space where we have to write how many patients have come, the outcome, others they don't come but we do trace them. (FGD Participant 6; Female 29 Years; Ramokonopi PHC clinic, Katlehong)

"....will find the person we are looking for. We will ask "Why don't come to the clinic because they want you". The person will tell [you] that "I will no longer go to your clinic because the sisters are shouting at us, they talk many things. I have even changed a clinic I'm attending at Zonke as we are Magagula"...". (FGD Participant 17; Ekurhuleni [Parent Study])

3.1.3.5 Preference for a digital based data collection system

CHWs have acknowledged the limitations posed by the current WBOT paper based data collection system in collecting TB contact tracing data; and have expressed their interest in the implementation of a digital based data collection system. There is a general perception among CHWs that this system would facilitate the development of a more consistent reporting structure, help with lost papers, help with supervision, reduce workload and even improve the quality of their data.

"... it will be easy for us to transfer the information to the tablet" (FGD Participant 7; Female 29 Years; Ramokonopi PHC, Katlehong)

"I think tablet can solve our problem because if you get in to the household and get a problem, you deliver directly to the department I think it can be safe" (FGD Participant 28, Female 31 Years; Winnie Mandela PHC Clinic, Thembisa)

“...I am still pressing [for] the digital system to be implemented so that our workload should be decreased and even there in our clinics [so that] we don't have a lot of papers hanging around and i-data angeke ilahleke easy (the data will not get lost easy).” (FGD Participant 14, Daveyton Main PHC)

Table 3: Summary of barriers and facilitators to completing data collection tools by different levels

	Barriers	Facilitators
Patient level	<ol style="list-style-type: none"> 1) Difficult to trace patients seeking care at different clinics because wrong information is provided by patients making it difficult to locate patient for follow up care (Wrong addresses and cell phone numbers) 2) Incomplete referrals (Contacts not reporting to clinic for TB testing or for medications) 3) Patients do not present to clinics after being referred 4) Patients are sometimes rude to CHW. 	<ol style="list-style-type: none"> 1) Although it may sometimes be inaccurate, patients are willing to give information to fill in the data collection tools.
CHW level	<ol style="list-style-type: none"> 5) High workload (Too many papers to complete, forms too long) 6) Low understandability of some data collection tools 7) CHWs do not prefer current paper-based system. 	<ol style="list-style-type: none"> 2) Motivation for data use and CHWs understand importance of data 3) Despite the resistance from the communities; they are still motivated to work in these communities.
Community level	<ol style="list-style-type: none"> 8) Restricted community access (Patients are not welcoming CHWs in their homes) 9) WBOT Safety (Violent patients and community members) 10) Long distances to walk to locate patients (No transport for CHW) 	

Table 3 (Continued): Summary of barriers and facilitators to completing data collection tools by different levels

	Barriers	Facilitators
PHC Clinic level	<p>11) Lack of WBOT integration in facilities (Referrals not completed by clinic staff)</p> <p>12) Relationship between CHW and clinic staff (Lack of Communication)</p> <p>13) Poor supervision by team leaders (Leads to forging of information)</p> <p>14) Inefficient filing system at the PHC facilities to accommodate CHW data needs</p> <p>15) Resource constraints (Papers, stationery, transport etc.)</p>	
WBOT Program level	<p>16) WBOT Training focusing on data management is insufficient, inconsistent, there's lack of refresher courses. Not many CHWs had gone for the Phase 2 competency assessment training; therefore, their competency to use the forms and tick sheets has not been assessed.</p> <p>17) NGOs in the area conducting contact tracing activities leading to duplication of activities and duplicative reporting.</p> <p>18) Lack of specific tool for documenting TB contact tracing information. For example, "Defaulter tracing" on some forms is not specific to what disease they are tracing for.</p>	<p>4) Various trainings are provided for CHWs in different sub-districts.</p>

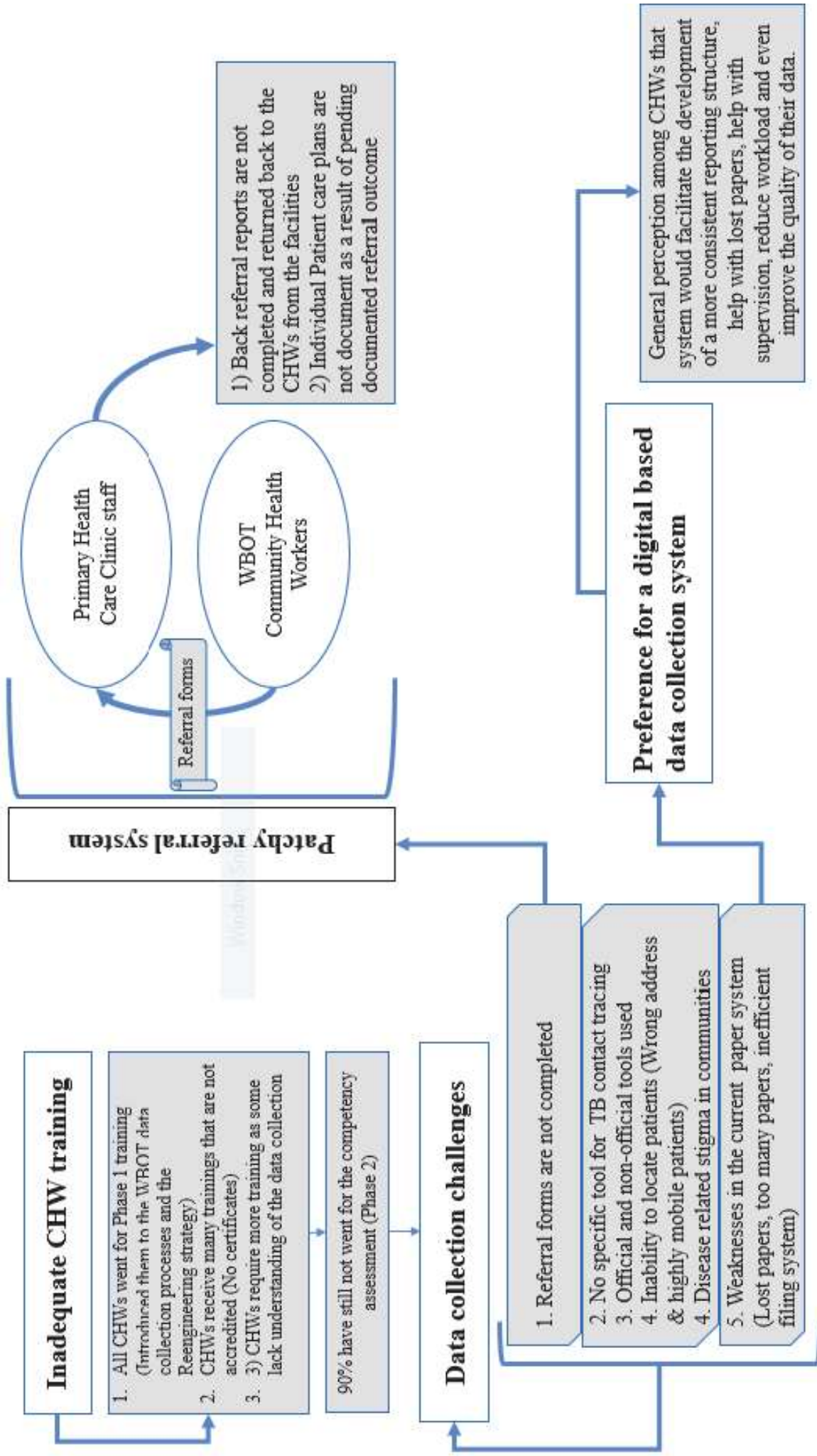


Figure 4: A conceptual framework showing possible relationships between emerging themes and how they may be linked and interrelated

3.2 Assessment of acceptability of the current data collection tools

3.2.1 Characteristics of community health workers in the acceptability assessment

Table 4 describes the demographic characteristics of the study sample. A total of 103 CHWs were recruited and screened but only 94 were enrolled in the study after signing informed consent forms. Reasons for refusing participation were not collected but impression was that there was concerns about confidentiality and the lack of monetary compensation for participation. The age of the overall study sample ranged from 24 – 57 years with an average age of 37.2 years. Of the total enrolled CHWs, majority (96%) were females. The study sample constituted of CHWs who had worked as caregivers prior to being absorbed into the WBOT programme and those that started being CHWs in the WBOT programme. Majority of the CHWs (90.43%) had worked as home-based care-givers. The number of years worked as caregiver/CHW ranged from 2-16 years with a median (IQR) number of years of 5(7 – 9). Across all sub-districts, all CHWs had gone for the 10-day phase 1 training that introduced them to the PHC re-engineering model and the WBOT data collection system. Of those, only 10% had gone for both Phase 1 and the competency assessment (Phase 2). CHWs received number of WBOT and non-WBOT related trainings provided by different institutions including community-based organizations (CBOs), nongovernmental organizations and local and national governments. These trainings include HIV/AIDS & TB related trainings, ancillary nursing, Integrated management of childhood illnesses (IMCI), 69 days training program (Home-Based Care), PMTCT among others. Most (43.01%) of the CHWs received 4-6 different types of trainings, 29.03% received between 1-3 trainings and only 27.96% received 7 or more trainings

Table 4: Demographic characteristics of community health workers who participated in the acceptability assessment of the current WBOT data collection tools.

	Ekurhuleni health Southern Sub-district N=33, n(%)	Ekurhuleni health Northern Sub-district N=29, n(%)	Ekurhuleni health Eastern Sub-district N=32, n(%)	Ekurhuleni Region N=94, n(%)
Sex, n(%)				
Female	32(97)	29(100)	29(91)	90(96)
Male	1(3)	0(0)	3(9)	4(4)
Age category, n(%)				
24-34	18(55)	12(41)	11(34)	41(44)
35-44	13(39)	15(52)	8(25)	36(38)
45-54	2(6)	2(7)	9(28)	13(14)
55>	0(0)	0(0)	4(13)	4(4)
Highest Education Level				
Secondary Education (Gr 8-11)	16(48)	11(38)	16(50)	43(46)
Matric (Grade 12)	16(48)	11(38)	13(41)	40(43)
Higher Certificate	1(3)	5(17)	2(6)	8(9)
Diploma	0(0)	2(7)	1(3)	3(3)
Worked as caregiver/CHW prior WBOT				
Yes	33(100)	22(76)	30(94)	85(90)
No	0(0)	7(21)	2(6)	9(10)

Table 4 (Continued): Demographic characteristics of community health workers who participated in the acceptability assessment of the current WBOT data collection tools.

	Ekurhuleni health Southern Sub-district N=33, n(%)	Ekurhuleni health Northern Sub-district N=29, n(%)	Ekurhuleni health Eastern Sub-district N=32, n(%)	Ekurhuleni Region N=94, n(%)
Caregiver/CHW experience (Years)				
0-5 Years	9(27)	13(45)	9(28)	31(33)
6-8 Years	16(49)	10(34)	13(41)	39(41)
9-12 Years	4(12)	6(21)	4(13)	14(15)
13-15 Years	3(9)	0(0)	1(3)	4(4)
16 Years or more	1(3)	0(0)	5(16)	6(6)
WBOT PHC Re-engineering Trainings received				
Phase 1 only	33(100)	29(100)	32(100)	94(100)
Phase 1 & 2	7(21)	2(7)	0(0)	9(10)
Number of trainings received (WBOT & non WBOT related)				
Received 1-3 Trainings	7(21)	15(52)	5(16)	27(29)
Received 4-6 Trainings	11(33)	14(48)	15(48)	40(43)
Received 7 or more trainings	15(46)	0(0)	11(36)	26(28)

3.2.2 Summary of Likert item responses and description of internal consistency of questionnaire

A total of 20 Likert items were used to assess the level of acceptability. These items were developed using the TFA constructs (**Fig 1**). According to literature, a Cronbach alpha of ≥ 0.7 indicates a good internal consistency. The internal consistency of the items was ($\alpha = 0.6190 \approx 0.62$). Table 5 summarises the responses from the Likert Items.

Table 5: Summary of Likert item responses

TFA Construct	Questionnaire Items	n	Strongly Disagree (1)	Disagree (2)	Agree (3)	Strongly Agree (4)	Total
affective attitude	Documentation of TB contact tracing activities is important.	94	1%	4%	52%	43%	100%
	It is worth my time to ensure that contact tracing activities are documented	94	6%	10%	55%	29%	100%
Self- efficacy	In general, I am able to use the current WBOT data collection tools to capture TB contact tracing activities	93	3%	30%	55%	12%	100%
Burden	There are too many WBOT data collection tools to fill in	92	7%	12%	39%	42%	100%
	The data collection tools can be completed within the time that I am in the household	94	34%	33%	20%	13%	100%

Perceived effectiveness	The current data collection tools are useful in collecting information for TB contact tracing outreach activities	93	15%	37%	43%	5%	100%
	The forms have the fields required to capture all the TB contact tracing activities	94	17%	47%	28%	9%	100%
	The WBOT data collection tools are generally available when I need them	94	24%	53%	19%	3%	100%
	I have the necessary resources to support my data collection needs (e.g. Stationery, books etc.)	94	43%	38%	16%	3%	100%
Ethicality	It is easy to forge the information in the data collection tools	93	18%	30%	27%	25%	100%
Intervention coherence	I find the current WBOT data collection tools easy to understand	94	3%	17%	56%	23%	100%
	I find the data collection tools easy to fill in and complete	94	5%	12%	60%	23%	100%
	A digital platform would be better to document contact tracing activities	94	2%	13%	37%	48%	100%
	The WBOT data collection tools are generally available when I need them	94	24%	53%	19%	3%	100%
	I have the necessary resources to support my data collection needs (e.g. Stationery, books etc.)	94	43%	38%	16%	3%	100%
	In general, I am satisfied with the training provided on the different WBOT data collection tools	94	36%	40%	16%	7%	100%
	My data collection activities are supervised by our team leader	93	6%	16%	47%	30%	100%
	Any issues with the data collection tools can be discussed with the WBOT leader	93	13%	12%	34%	41%	100%
	The data collection tools make it possible for me to check for any errors with the data	92	8%	36%	47%	10%	100%
	I can tell where the data in the data comes from by looking at the data captured	91	11%	31%	44%	14%	100%

3.2.3 Level of acceptability by different community health worker characteristics

As seen in **Fig 5**, majority (41.49%; n= 39) of the CHWs were in the low acceptability category, followed by 29.79% (n=28) in the moderate acceptability category while only 28,72%(n=27) of the CHWs found the WBOT data collection tools to be highly acceptable. The acceptability levels of the WBOT data collection tools differed significantly among the different categories of acceptability levels ($P<0.01$). As seen in **Fig 6**; the distribution of the overall composite scores did not differ significantly among the different Sub-districts ($P>0.05$)

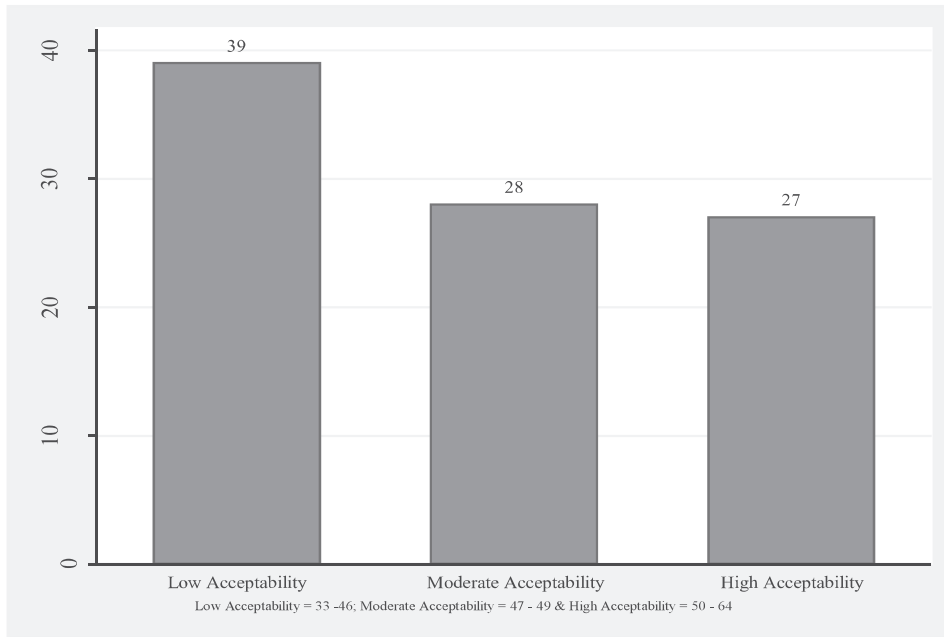


Figure 5: The distribution of the number of CHWs across the different acceptability levels

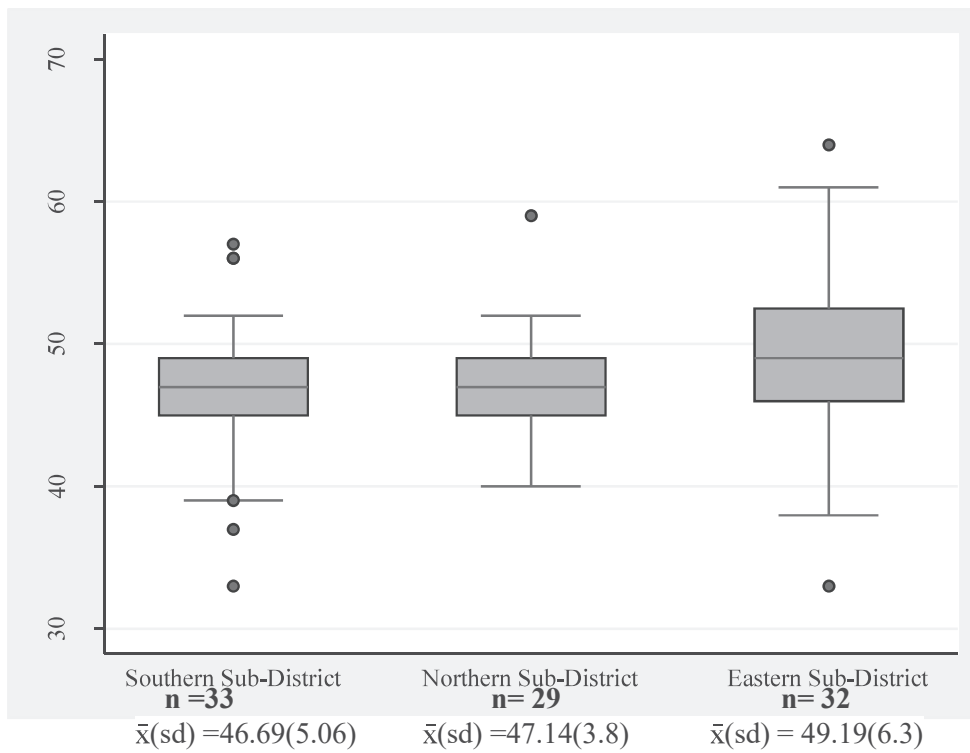


Figure 6: Box plot showing the distribution of the composite acceptability scores by the different Ekurhuleni sub-district

Table 6 summarises the composite acceptability scores and the level of acceptability by selected CHW demographics. The CHWs in the Eastern Sub-districts had acceptability scores that were higher [Median(IQR): 49(46-52.5)] compared to those in the Southern [Median(IQR): 47(45-49)] and Northern [Median(IQR): 47(45-49)] sub-district respectively. The differences in the median scores across the sub-districts were similar ($P=0.069$). This was further confirmed by comparing the number of CHWs in each acceptability level category by the different sub-districts and found no significant differences in the acceptability score [$\chi^2(4)= 7.9320$; $P>0.05$]. Although the study sample constituted mostly of female CHWs; their median scores also did not differ significantly from the male CHWs median scores ($P>0.05$). Even when comparing the different genders by the different categories of acceptability levels; the same effect was observed (Fischer's Exact $P>0.05$)

There was no relationship between the different categories of acceptability levels and the age categories (Fischer's Exact $P>0.05$). Although those aged above 45 had higher acceptability scores; the median scores across each age category did not significantly differ across each category of age ($P>0.05$). Even amongst the different highest education categories of the CHWs; their median acceptability composite scores did not significantly differ between the educational levels ($P>0.05$).

Those who also worked as caregivers prior to joining the WBOT program had higher acceptability scores compared to those who only worked as WBOT CHWs; however, this observed difference in median scores was not statistically significant ($P>0.05$). CHWs with 16 years and more years' experience in providing community outreach services had the highest median acceptability scores [median(IQR): 49.5 (49 - 55)], followed by those with 0-5 years' experience [median(IQR): 49(46 -51)], 6-8 years' experience [median(IQR): 47(46-51)]

Table 6: The level of acceptability of WBOT data collection tools by participant demographics

		Acceptability level			P-value	Acceptability scores	
		Low acceptability; n(%) N= 39	Moderate Acceptability; n(%) N=28	High Acceptability; n(%) N=27		Median(IQR) N=94	P-value
Ekurhuleni District							
Southern Sub-district		15(38.46)	11(39.29)	7(25.93)	0.094 ^a	47(45 - 49)	
Northern Sub-district		14(35.90)	10(35.71)	5(18.52)		47(45 - 49)	
Eastern Sub-district		10(25.64)	7(25.00)	15(55.56)		49(46 - 52.5) 0.0691 ^c	
Sex							
Female		39(100)	26(92.86)	25(92.59)	0.218 ^b	48(45 - 50)	
Male		0(0.00)	2(7.14)	2(7.14)		49.5(47.5 - 51.5) 0.2967 ^d	
Age category							
18-24		1(2.56)	0(0.00)	0(0.00)	0.428 ^b	46(46 - 46)	
25-34		13(33.33)	14(50.00)	13(48.15)		48(45.5 - 51)	
35-44		19(48.72)	11(39.29)	7(25.93)		46(44 - 49)	
45-54		5(12.82)	3(10.71)	5(18.52)		49(46-51)	
55>		1(2.56)	0(0.00)	2(7.41)		52(41 - 55) 0.362 ^c	
Highest Education Level							
Secondary Education (Gr 8-11)		17(43.59)	13(46.43)	13(48.15)	0.49 ^b	48(46 - 51)	
Matric (Grade 12)		15(38.46)	12(42.86)	13(48.15)		48(44-51)	
Higher Certificate		6(15.38)	2(7.14)	0(0)		45.5(41.5 - 47)	
Diploma		1(2.56)	1(3.57)	1(3.70)		48(40 - 52) 0.1979 ^c	
Worked as caregiver/CHW prior joining WBOT							
Yes		34(87.18)	27(96.43)	24(88.89)	0.505 ^b	48(45 - 50)	
No		5(12.82)	1(3.57)	3(11.11)		46(43 - 52) 0.8315 ^d	
Caregiver/CHW experience (Years)							
0-5 Years		9(23.08)	12(42.86)	10(37.04)	0.455 ^b	49(46 - 51)	
6-8 Years		18(46.15)	10(35.71)	11(40.74)		47(46-51)	
9-12 Years		8(20.51)	3(10.71)	3(11.11)		46(44 - 49)	
13-15 Years		3(7.69)	1(3.57)	0(0.00)		43 (41.5 - 46)	
16 Years or more		1(2.56)	2(7.14)	3(11.11)		49.5 (49 - 55) 0.1656 ^c	
WBOT Trainings received							
PHC Re-engineering Phase 1 only		34(87.18)	26(92.86)	25(92.59)	0.743 ^b	48(45 - 51)	
PHC Re-engineering Phase 1 & Phase 2		5(12.82)	2(7.14)	2(7.4)		46(45 - 49) 0.5835 ^d	
Number of trainings received (WBOT & non WBOT related)							
Received 0-3 Trainings		11(28.21)	10(35.71)	6(23.08)	0.652 ^a	48(45 - 49)	
Received 4-6 Trainings		15(38.46)	11(39.29)	14(53.85)		48.5 (45.5 - 51)	
Received 7 or more trainings		13(33.33)	7(25.00)	6(23.08)		46.5(45 - 49) 0.5265 ^c	

Pearson Chi-Square^a ;Fishers Exact^b ; Kruskal-Wallis equality-of-populations rank test^c ; Wilcoxon rank-sum (Mann-Whitney)^d

3.2.4 Factors influencing the acceptability of the WBOT data collection tools.

A linear regression model was estimated to investigate the relationship between the acceptability scores and the different predicting factors (refer to Table 7). As determined by the F-test of overall significance, the overall model was better than the intercept only model ($P < 0.001$). The results of the regression model are to be interpreted with caution owing to the small sample size ($n=94$); thus, making it less likely to detect an existing effect. The adjusted model explained 75% of the variation in the composite acceptability scores as shown by the coefficient of multiple determination (r^2).

In the unadjusted model, CHW highest educational level was significantly associated with the acceptability scores. Those with a higher certificate had a 5 unit decrease in acceptability scores compared to those with only secondary education (coeff: -4.72; 95%CI: -8.66 – 0.77; $P < 0.05$). Those who were not satisfied with the trainings they received had a 3 unit decrease in acceptability scores compared to those who were satisfied who were satisfied (coeff: -2.81; 95%CI: -4.96 - -0.67; $P < 0.05$). When adjusting for sex, age, region, CHW work experience in years, working as CHW prior WBOT, type of PHC reengineering trainings received, number of trainings received and whether they were satisfied with all the trainings they received, only educational level and acceptability level was significantly associated with the acceptability scores. Those with matric as their highest educational level were associated with 1.5 decrease in composite acceptability scores compared to those with only secondary education (coeff: -1.55; 95%CI: -2.90 - -0.20). Those in the moderate acceptability category had their acceptability scores increase by 5 units compared to those in the low acceptability category (coeff: 5.37; 95%CI: 3.87– 6.88; $P < 0.001$) while those in the high acceptability category had a 10-unit increase in acceptability scores when compared to those in the low acceptability category (coeff: 10.11; 95%CI: 8.42–11.80; $P < 0.001$). There were no predictors that were significantly associated with acceptability scores.

Table 7: Factors influencing the composite acceptability scores by different demographic characteristics

	n (%)	Unadjusted Coefficients		P-value	Adjusted Coefficients		P-value	
		Coef	(95%CI)		Coef	95%CI		
Sex								
Female	90(95.74)	1.00						
Male	4(4.26)	1.90	(-3.43 - 7.2)	0.481	-0.62	(-3.89 2.65)	0.707	
Age Category								
24-34	41(43.62)	1.00						
35-44	37(39.36)	-2.14	(4.48 -0.19)	0.072	-0.69	(-2.02 0.64)	0.305	
45-54	13(13.83)	0.59	(-2.7 -3.8)	0.724	-0.26	(-2.42 1.90)	0.810	
55>	3(3.19)	0.92	(-5.25 7.09)	0.768	1.53	(-2.71 5.77)	0.474	
Highest Educational level								
Secondary Education (Gr 8-11)	43(45.74)	1.00						
Matric (Grade 12)	40(42.55)	-0.77	(-3.02 1.49)	0.502	-1.55	(-2.90 - -0.20)	0.025*	
Higher Certificate	8(8.51)	-4.72	(-8.66 -0.77)	0.020*	-1.87	(-4.19 0.45)	0.112	
Diploma	3(3.19)	-1.80	(-7.92 4.33)	0.561	-3.25	(-7.24 0.74)	0.108	
Ekurhuleni District Region								
Eastern Sub-District	33(35.11)	1.00						
Southern Sub-District	29(30.85)	-2.49	(-5.04 -0.06)	0.056	-0.37	(-2.02 -1.27)	0.653	
Northern Sub-District	32(34.04)	-2.05	(-4.69 0.587)	0.126	0.41	(-1.43 -2.24)	0.658	
Providing outreach community health services prior WBOT								
No (I started with WBOT)	9(9.57)	1						
Yes (Was part of the HBC programme before WBOT)	85(90.43)	-1.21	(-2.45 -4.871)	0.512	-1.42	(-3.64)	0.808	
Caregiver/CHW work experience (Years)								
0-5 Years	31(32.98)	1.00						
6-8 Years	39(41.49)	-1.01	(-3.53 -1.5)	0.424	-0.21	(-1.75 -1.32)	0.782	
9-12 Years	14(14.89)	-0.54	(-3.9 -2.83)	0.752	0.86	(-1.12 -2.84)	0.391	
13-15 Years	4(4.26)	-4.57	(-10.1 -0.98)	0.105	-0.57	(-3.93 -2.80)	0.738	
16 Years or more	6(6.38)	0.84	(-3.81 -5.50)	0.720	-1.54	(-4.52 -1.44)	0.306	
PHC Re-engineering WBOT trainings								
Received only Phase 1	85(90.43)	1.00						
Phase 1 & Phase 2	9(9.57)	-0.51	(-4.17 -3.16)	0.784	0.77	(-1.47 -3.01)	0.498	
Number of trainings received (Inclusive of non WBOT related)								
Received 0-3 Trainings	27(29.03)	1.00						
Received 4-6 Trainings	40(43.01)	0.29	(-2.19 - 2.78)	0.814	-0.48	(-1.98 -1.02)	0.525	
7 and more trainings	26(27.96)	-0.63	(-3.37 -2.11)	0.648	-0.08	(-1.99 -1.82)	0.93	
Satisfied with all trainings received								
Yes	58(61.7)	1.00						
No	36(38.3)	-2.81	(-4.96 - -0.67)	0.011*	-0.09	(-1.49 -1.32)	0.903	
Acceptability level								
Low Acceptability	40(42.11)	1.00						
Moderate Acceptability	28(29.47)	5.13	(3.67 -6.59)	<0.001	5.37	(3.87 -6.88)	<0.001	
High Acceptability	27(28.42)	10.44	(8.97 -11.91)	<0.001	10.11	(8.42 -11.80)	<0.001	

Prob>F: P<0.001; r2(Adjusted Model): 0.7527; Level of significance *P<0.05, **P<0.01 ***P<0.001

3.3 Main findings

3.3.1 Barriers and facilitators from the qualitative inquiry

CHWs received a range of WBOT related trainings (Phase 1 & Phase 2) and other trainings to prepare them to deliver quality outreach services. Phase 1 training introduced the CHWs to the various forms and tick sheets and trained them on how to document their outreach activities for various disease outcome. Phase 2 is a competency assessment training and only a few had received this training at the time of the study. CHWs doubted whether the trainings received were accredited as they did not receive any certificates or acknowledgement of attendance. Educational level was associated with the composite acceptability scores. CHWs also expressed their interest in receiving more training to fill their skills gap.

The partial integration of the WBOT programme into the formal primary health care system results in a patchy referral system between the WBOT programme and the PHC facilities. Back referrals are not completed as PHC staff see no value in filling them in. This means the documentation of individual patient care plans cannot be developed and documented on other forms such as the individual, child and maternal forms.

There are challenges with the current data collection system which are characterised by a lack of a specific data collection tool for TB contact tracing, documentation in official and non-official data collection tools. Documentation of outreach activities is also done on notebooks and personal diaries in addition to the official forms prescribed by the NDoH. Not much is known about how the data in the personal diaries gets reported in routine reporting structures. There are limitations with the current paper-based system which mainly rise from resource constraints. The PHC facilities lack cupboards, stationery which are needed for an efficient filing system and for effective data processing. The lack of a TB contact tracing specific tool was also mentioned as a challenge. CHWs also expressed that they do not understand how some of the forms and tick sheets and this could be related to the majority of CHWs who have not gone for the Phase competency assessment. There is a lack of verification systems as community members are providing CHWs with wrong addresses making it hard to locate them for tracing of contacts. Some of the information in the data collection tools is forged when patients do not understand how to fill it in resulting in inaccurate information. CHWs expressed their discomfort in the structure of some of the data collection tools like the household registration form saying that it is too long and that the number of forms to complete in a single visit were too much. Even though there is variation in the acceptability scores by different CHW demographics, there is generally low acceptability of the current data collection tools as seen by the majority of CHWs in the low acceptability category. Due to the limitations of the paper-based data collection system; CHWs have expressed their preference for the implementation of a data collection system.

CHWs are motivated to provide service to the communities they serve but are sometimes met with resistance when conducting their outreach duties. This is related to the HIV/AIDS and TB related stigma in the communities. Community members fear that their disease status will become community knowledge since most CHWs work in the same communities they stay in. They undermine CHWs and are more receptive when accompanied by a professional. They further suggested that continuous community campaigns and support groups should be conducted to sensitize the communities to the WBOT programme.

WBOT provide a range of service from different disease areas and they expressed that the workload was too high and were unable to cope. They did not understand why they had to register same households in the programme in different years and mentioned that as a result of this; some community members were now reluctant to give out the same information to the CHWs leading to incomplete data collection tools. There was a mention of how their duties are prioritized through a week plan. The competency of the team leaders is questionable as there was varying levels of supervision. Some CHWs expressed that their team leader did not verify their paperwork's after they get back from the field; further contributing to the reduced data quality owing to lack of effective data verification systems.

3.3.2 Assessment of acceptability of the data collection tools

The majority of the CHWs were in the low acceptability category. Although the composite scores did not differ significantly across the sub-districts; the median score for the CHWs in the Eastern Sub-district was higher than the other sub-districts. Acceptability scores were similar across various CHW demographics such as age, highest educational level, categories of number of years of experience as CHWs, number of trainings received and between those that worked as caregivers before joining WBOT programme and those that started during the WBOT programme. Highest educational level of CHWs was significantly associated with the composite acceptability scores.

CHAPTER FOUR – DISCUSSION

4.0 Introduction

The current study explored the barriers and facilitators to the completion of the WBOT data collection tools to document TB contact tracing activities. It was among the first to use the Theoretical Framework for Acceptability to assess the level of acceptability for the current paper-based data collection tools. This chapter discusses the main findings by comparing and contrasting them to other literature in the field to confirm or refute the findings as they relate to the current study's objectives.

4.1 Discussion

4.1.1 Community Health Worker Training

In the context of global health programs, mounting evidence indicates that utilizing trained CHWs in community-based health programs is effective as it contributes towards the development and maintenance of CHW competencies and deliver of quality community outreach services (85–87). In Sub-Saharan Africa, research shows that CHWs are not effectively trained, retained or remunerated despite the heavy reliance on them (12,88–90). Despite an existing formal scope of work outlined for CHW's, their expected activities remain unclear (91). The literature identifies a number of gaps in CHW training across different countries including those from Sub-Saharan Africa and the most common being 1)CHW role definition, 2) use of training materials, and 3) inconsistencies in the different types of CHW trainings (90).

FGDs conducted within a sub-district of the Eastern Cape reported that CHWs perceived weaknesses in the implementation of WBOT outreach teams (91). In addition, it was noted that WBOT CHWs desired more supervision in the community and field based practical training. This is consistent with our findings as CHWs in the Ekurhuleni district requested additional operational and technical trainings. Moreover; the CBHIS in Kenya also highlighted that there was a need to provide intensive training and refresher courses for the CHWs involved in data collection (24). Our study also found that only a few CHWs had gone for the WBOT PHC phase 2 competency training where they would have tested their competency regarding the different WBOT data collection tools and their outreach duties in a practical setting. Perhaps the WBOT Phase 2 competency test training provides an opportunity to teach CHWs how the current data collection tools are aligned with the overall M&E for the TB contact tracing.

Although globally there are many different trainings implemented for CHW's, there is inconsistent evidence to assess their effectiveness as these trainings rarely assess CHW competency to measure training efficacy (90). Whilst no distinct associations have been reported between type of CHW training service provider and program duration, evidence suggests that longer trainings were perceived better as they tended to cover a broader range of health interventions, skills and were thus more comprehensive (85,90). Although several programs perform pre-and post-training tests; literature reflects much debate about the

effectiveness of CHW training programs as little evidence exists and Funes and colleagues (92) attribute the scarcity of information to the absence of M&E frameworks in CHW training programs.

To strengthen national, regional and global CHW in-service training, a framework has been suggested by PEPFAR and USAID. It provides guidance to regulatory bodies, professional associations and training service providers on practices to improve the efficiency, effectiveness, and sustainability of CHW competencies (93). This framework can be used so that WBOT CHWs have a full complement of attitude, knowledge, and skills to enable them to fulfil their responsibilities as defined in the WBOT program. Moreover, research has highlighted that in order to harvest the full value of effective CHW trainings, government along with other training and research institutions, must invest in providing managerial support (88,89,94). Recommendations based on best practices for CHW training suggest that in order to address CHW training gaps, there should be 1) continuous update and review of training content, 2) adaption of health interventions and training materials into local languages, 3) consideration of CHW educational and socioeconomic backgrounds, and 4) offer refresher courses (87,95). However, it also needs to be acknowledged that for the quality of CHW training to be maintained, training service providers need to be accredited by an independent body or by government.

4.1.2 WBOT Program and Primary Health Care clinic integration

Evidence from national community based Health Worker (CBHW) Programmes has shown that referral systems are relatively easy in terms of design, but implementing them is extremely difficult (96,97). For the referral networks between the WBOT programme and other social and health care providers to be effective; the integration of the WBOT programme into the formal health system is crucial. Our study reported significant disintegration of the WBOT programme with the formal health system, resulting in an ineffective referral system largely due to a reluctance of clinic staff to complete referral forms.

The literature has highlighted considerable difficulties faced by CBHWs programmes while integrating into formal national systems (96,97). Globally, factors that inhibit the integration include parallel and hierarchical structures which risk weak referral systems, inadequate supplies and infrastructure. Other factors included ineffective incentive structures, policy maker buy-in to support system components and support and supervision by facility-based staff. Factors that facilitated the integration process included participation of community members and politicians in programme processes, perceived relative advantage of community-based programmes and the counties availability of human resource (98). Austin-Evelyin *et al* (91) explored the WBOT CHW program spread and scale-up and described the program integration within the broader health system and noted that CHWs perceived themselves as agents of change. Evidence has shown that the integration of some national community based health programs into

formal health systems has not been optimal (99,100). This is consistent with results from our study which found that the WBOT programmes integration into the formal primary health care system is sub-optimal. For WBOTs to be better integrated into the health system; consideration must be given to improving communication channels between the CHWs and the PHC staff by orienting every member of the health care system to the functions of the WBOT program. The PHC facility staff need an orientation to the WBOT programme so they can effectively apply their skills in the management and implementation of the WBOT programme.

4.1.3 Acceptability of WBOT`s paper-based data collection system

To generate programmatically useful information that enables missing TB cases to be identified within the community and informs the disease epidemiology, the WBOT program needs to balance effective integrated community case management and record keeping. Our study found that the CHWs were aware of the limitations of the current paper-based system as it requires time to process the information that includes gathering, verifying, capturing and distributing the data. They also expressed that it was prone to loss and error; this is consistent with a recent WBOT appraisal (12).

Our study found that the majority of CHWs were in the low acceptability category with no significant differences in composite acceptability scores across sub-district and by other CHW demographics. Literature suggests a variation in the acceptability scores of paper-based systems when compared to other methods of data collection. An observational study in Pakistan aimed to investigate the utility of paper-based data collection methods versus smartphone devices in a low middle income country and found that digital based data collection methods required fewer resources, was time efficient even though accuracy of data collected in the smartphone was lower than the paper-based method (101). When compared to paper-based data collection systems, mobile data collection improves data completeness, reduces error rates and promptness of data collection (59,60) and also reduce the costs related to data entry, data processing, such as storing and carrying forms and also duplicating paper forms (52,61,62). Paper based systems were also found to be less acceptable compared to technology-based data collection methods.

4.1.4 Community access for Community health workers.

There is growing evidence that community participation is crucial for the sustainability of CBHWs Programmes. Critical reviews of community based health Programmes show that focused, casual and deliberately structured discussions at various level of community are necessary in order to sensitize the communities to the aims and objectives of the programme; this in turn facilitates the CHW acceptance into the community (28,98). One such example from the Eastern Cape, which through the PHC Re-engineering engagement process, fostered links with chiefs, traditional leaders in order to sensitize the

community members to the WBOT program, and this facilitated the acceptance of WBOTs by community members (91).

Tuberculosis-related stigma has also been cited as one of the factors leading to incomplete contact investigation, a finding noted in other health Programmes (102,103). An informed and involved community can promote TB screening and diagnosis by helping reduce disease-related stigma, thereby allowing more participation and greater adoption of contact tracing initiatives and encouraging early TB case detection, contact tracing and treatment adherence within the community. A study conducted in the Eastern Cape described the attitude towards the WBOT CHWs as negative despite feeling appreciated and accepted by the community and also having a productive rapport between outreach teams and the community. In their FGDs, they reported that CHWs felt that their engagement and fit with the communities was a significant enabling factor for them to conduct outreach services (91). Similarly, we found that despite their willingness to work in these communities, CHWs were met with resistance from the communities in which they work in.

4.1.5 Preference for a digital based data collection system.

In Kwa-Zulu Natal, the HSRC used the Technology Acceptance Model (TAM) to assess acceptability, accuracy, feasibility and use of mobile data collection methods among PHC facility staff members and found that using phones to collect data was highly acceptable during pre-training, post training and even six months in the field; and it was perceived to be easy to use and more useful (50)The general preference of a digital based data collection system noted in our study is in line with health programs that are moving towards electronic data capturing systems. In addition to the WBOT paper based system, there are currently mobile capturing system being piloted in the Tshwane District and Northern Cape (12).

Several studies have proven the efficacy of mobile data collection for different disease areas (50,59,104), particularly for tuberculosis contact tracing in resource limited settings (55). When compared to paper based data collection systems, digital based systems were feasible (35,50,105) highly acceptable (46,50,57,58) easy to use (50,106) cost-efficient (101), adaptable (107) and effective at increasing adherence to data collection protocols (107,108). Moreover, it has the potential to provide programs with real-time data which can be used for prompt response (108).

In literature, there are varying reported levels of accuracy of data collected using different methods. A prospective study in a low middle income country indicated that the accuracy of data collected with paper was found to be higher [median(IQR): 93.9%(6.1)] than when using smartphones [median(IQR): 90.9%(1.6)] even when paper based methods were less time-efficient [median(IQR): 451 (54.5) seconds] than smartphones ([median(IQR): 297(31.0) seconds]) (101)

There are several studies that have explored the application of standard low cost basic mobile phones for data collection and for data management and surveillance of various diseases in community settings (35,109–113); two studies used smart phones (113,114), while only one study used tablets for tuberculosis contact tracing in a resource-limited setting (55). At the community level, there is a general acceptance of using mobile phones for collecting data although most studies did not evaluate acceptance among the consumers (112), while other studies have evaluated user satisfaction among the data collectors (55). A Zanzibar study assessed the burden of community-acquired bloodstream infections and compared paper and digital based data collection systems with outcomes: acceptability, knowledge transfer, data entry time, training, data turnaround time in days, accuracy, and cost in US dollar. The study found that compared to paper-based data collection, using personal digital assistants (PDAs) was 25% cheaper and faster and rates of omissions in paper-based system in 32 variables differed significantly in paper based (6%; 95%CI: 5.4 – 6.6) compared to 0% in data collection using PDA's ($P < 0.05$). There was also less erroneous data collected (1% versus 7%). Moreover, late error detections and delayed turnaround times for data in paper-based systems were also avoided. The study also found that since paper-based data collection was a known method for most staff, there was a high acceptability and implementation was easier and that there was a higher acceptability for digital based system after initial usage and training. Initial implementation of PDAs required supervision (58).

In line with Jinnabahi and colleague's recommendation for the implementation of a fully integrated ICT system to support WBOT data management; Mobenzi technologies collaborated with the University of Western Cape, Health Systems Trust, provincial DoH in Limpopo and Northwest, Anova Health Institute and Medical Research Council to develop a mobile health application to support WBOT data management. It is an integrated system that is used for data collection, reporting, point of care decision support, messaging, completing case management, workflow automation to enable referrals while also building mobile capacity for the WBOTs. In the Tshwane district, the Aita Health has been used to deliver preventative care services to communities on a home-based level. It is a smartphone-based application that supports clinical and administrative decision making in real time. It uses less paperwork, guides the CHWs through the data collection tools which further ensures data quality by eliminating mistakes, further ensuring database and record integrity. Between September 2014 – June 2015, approximately 40000 households have been registered by 1250 CHWs in Tshwane, using AitaHealth. With these mHealth solutions, reporting of WBOT contact tracing client level data and aggregated stats are readily available. There are mobile devices that are installed at local PHC clinics ensuring that referrals are transmitted electronically and outcomes of the referrals are communicated back to CHWs for follow up visits (108)

Several research findings have also noted challenges with mobile health systems such as challenges in training community health workers in implementing mobile health interventions (56,115,116), health

systems' poor capacity to integrate patient records into the already existing electronic health records and poor network receptions (54,115,117). Moreover, technical challenges associated with the mobile health systems reduced data transfer and quality (62,118,119)

4.1.6 Study strengths and limitations

The use of mixed methods techniques gave this study a multi-level perspective to understanding the possible barriers and facilitators in documenting outreach activities, specifically TB contact tracing. This helped with the identification of bottlenecks in the WBOT paper-based data collection system. The use of theoretically and practically tested frameworks to guide the qualitative inquiry and the development of Likert scales to measure acceptability was a strength as it provided an objective way of measuring this implementation outcome. The generalizability of these findings however might require several considerations. Firstly, owing to the lack of a standardised tool to measure acceptability, our questionnaire internal consistency was low. The development of a psychometrically tested tool to measure acceptability would contribute towards efforts to advance implementation research. We acknowledge the need to develop such tool in order to advance implementation research by finding objective ways of measuring implementation outcomes like acceptability. Secondly, the study was conducted only amongst CHWs, and thus did not involve the opinions and perceptions of clinic staff, team leaders, district managers and other relevant stakeholders in TB management. Therefore, the challenges, barriers and facilitators outlined here may not be comprehensive. We acknowledge the potential contribution these stakeholders would have added to the findings of this research. Lastly, the study was largely exploratory and the sample size for the quantitative survey was small.

CHAPTER FIVE –RECOMMENDATIONS & CONCLUSION

5.1 Recommendations

More research on CHW post-training competence is needed to determine the effectiveness of the wide array of training programs. Moreover, the implementation of CHW program should be coordinated among the different training providers including government, civil society organizations and NGOs. To improve the quality of the CHW training delivery and content, CHW feedback should be sought through pre-and post-assessments. There is a need to focus efforts on coordinating and strengthening the different PHC Reengineering streams and integrate them into the primary health care system; this will strengthen the referral system between the WBOT programme and PHC facilities. The WBOT programme needs to be fully integrated into the existing primary health care system to improve communication barriers between the WBOT CHWs and PHC facility staff which will improve and strengthen the referral linkages with other health and social care service providers. This integration will also see that the referral forms are completed. Community members need to be sensitized to the WBOT program to improve their acceptance so that CHWs can have access to the communities in order to collect contact tracing outreach data. The current M&E policy needs to be reviewed and special consideration should be given to TB contact tracing related indicators. This should also be accompanied by an adjustment of the current WBOT data collection tools to better reflect the agreed upon TB contact tracing indicators. The study further recommends research in the form of economic evaluations to determine the cost effectiveness of scaling up current digital based data collection methods to inform nationwide implementation.

5.2 Dissemination and future research plans.

The study findings will further be written up in a policy brief to highlight the findings to the NDOH as well as the National TB control and WBOT programmes. The findings will also be presented at skills building workshop at the 5th South African TB conference in Durban. Moreover, more research products like abstracts and research articles will also come out of this project. The Aurum Institute is currently We will also be looking at the implementation of the mobile health tool, in response to the findings of this research project the primary study, paying particular attention to the accuracy of this new system.

5.2 Conclusion

In resource constrained health systems; the importance of CHWs has been highlighted in various CBHPs. Evidence on the effectiveness of CHW training programs is limited but where available, has shown that CHW training emphasizes the development of specific skills and competencies that are required for high quality performance. More research on CHW post-training competence is needed to determine the effectiveness of the wide array of CHW training programs. The limitations posed by the current paper-based data collection system have been acknowledged and the CHWs preference for a digital based system highlights the need for the evaluation of the current mobile data collection technologies in other regions in order to inform nationwide scale-up.

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APPENDICES

Appendix I: Student Plagiarism Declaration Form




PLAGIARISM DECLARATION TO BE SIGNED BY ALL HIGHER DEGREE STUDENTS

SENATE PLAGIARISM POLICY: APPENDIX ONE

I Thabang Wellington Maruma (Student number: 1429994) am a student registered for the degree of MSc Epidemiology (Implementation Science) in the academic year 2017.

I hereby declare the following:

- ❖ I am aware that plagiarism (the use of someone else's work without their permission and/or without acknowledging the original source) is wrong.
- ❖ I confirm that the work submitted for assessment for the above degree is my own unaided work except where I have explicitly indicated otherwise.
- ❖ I have followed the required conventions in referencing the thoughts and ideas of others.
- ❖ I understand that the University of the Witwatersrand may take disciplinary action against me if there is a belief that this is not my own unaided work or that I have failed to acknowledge the source of the ideas or words in my writing.

Signature:  Date: 07 May 2018



R14/49 Mr Thabang Wellington Maruma

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

CLEARANCE CERTIFICATE NO. M170244

NAME: Mr Thabang Wellington Maruma
(Principal Investigator)
DEPARTMENT: School of Public Health
Epidemiology and Biostatistics
Ekurhuleni, Gauteng

PROJECT TITLE: Factors Influencing the Collection of Information by
Community Health Workers for Tuberculosis
Contact Tracing in Ekurhuleni, Johannesburg

DATE CONSIDERED: 24/02/2017

DECISION: Approved unconditionally

CONDITIONS:

SUPERVISOR: Dr S. Charalambous, Dr V. Chihota and Mr K. Velen

APPROVED BY: 
Professor P Cleaton-Jones, Chairperson, HREC (Medical)

DATE OF APPROVAL: 07/05/2017

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office Secretary in Room 301, Third Floor, Faculty of Health Sciences, Philip Tobias Building, 29 Princess of Wales Terrace, Parktown, 2193, University of the Witwatersrand. I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated, from the research protocol as approved; I/we undertake to resubmit the application to the Committee. **I agree to submit a yearly progress report.** The date for annual re-certification will be one year after the date of convened meeting where the study was initially reviewed. In this case, the study was initially reviewed in February and will therefore be due in the month of February each year. Unreported changes to the application may invalidate the clearance given by the HREC (Medical).

Principal Investigator Signature _____

Date _____

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

Appendix III: Wits Research Clearance (Parent Study)
(Attached as an appendix at the end of this document)

Appendix IV: Clearance Certificate LSHTM (Parent Study)
(Attached as an appendix at the end of this document)

Appendix V: Seating plans for the different focus group discussions.

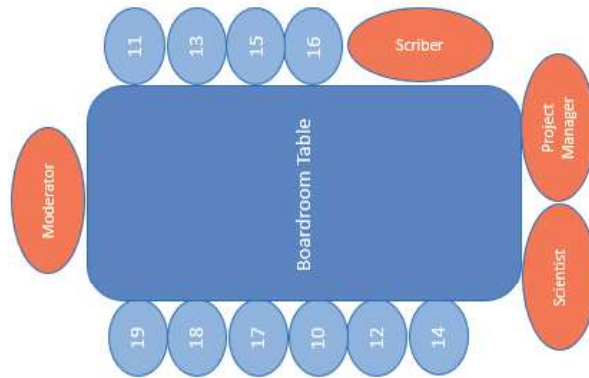


Figure 7: Seating Plan for focus group discussion; Villa Heidi Hall/boardroom (Ekurhuleni).

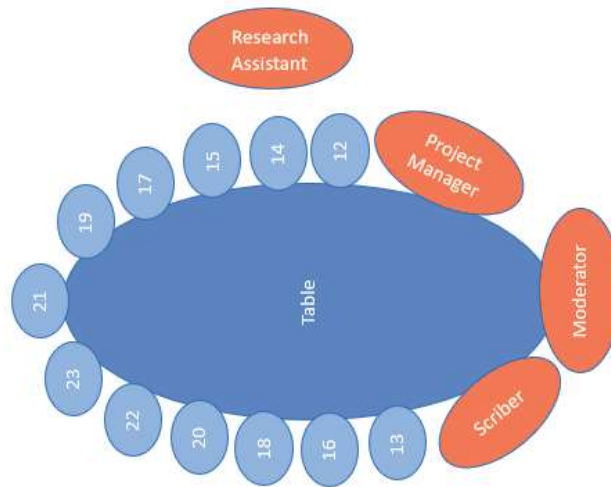


Figure 8: Seating Plan for focus group discussion; Mabieskraal Health Centre boardroom

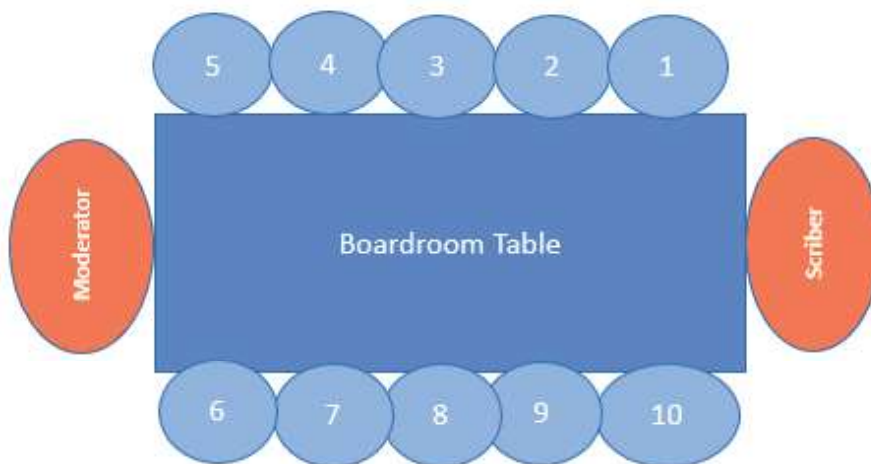


Figure 9: Seating Plan for the focus group discussion; Ramokonopi PHC clinic, Katlehong (Southern Sub-district).

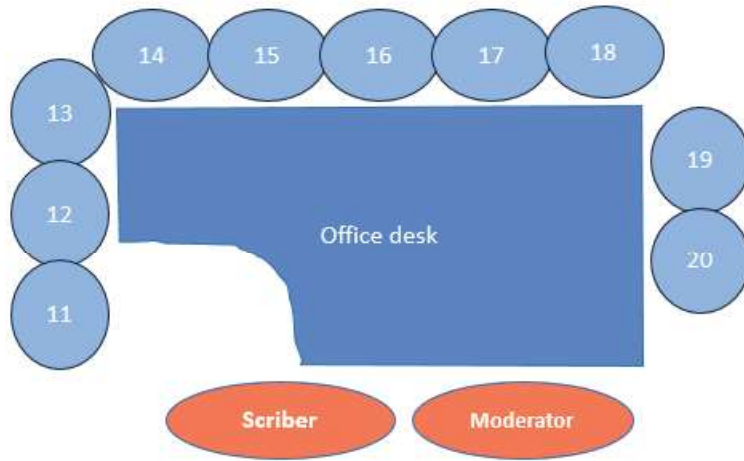


Figure 10: Seating Plan for the focus discussion; Daveyton Main PHC clinic (Eastern Sub-district).

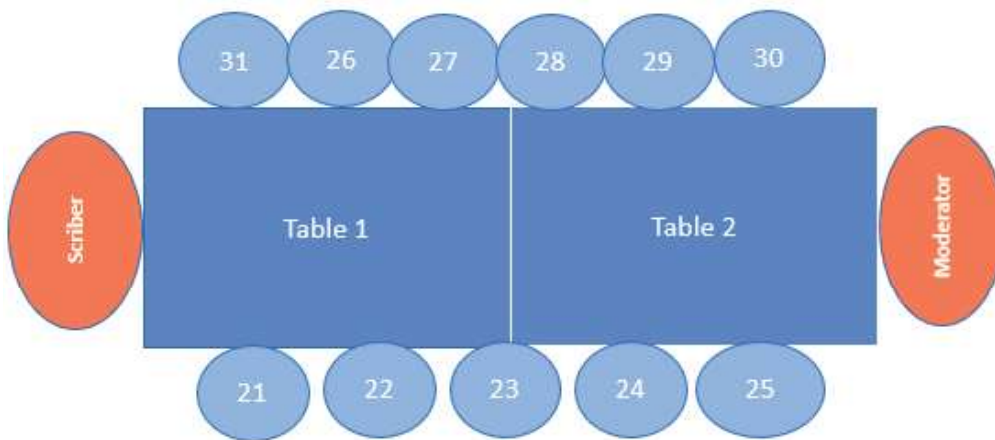


Figure 11: Seating Plan for the focus discussion; Winnie Mandela PHC clinic, Thembisa (Northern Sub-district).

INFORMATION SHEET

A QUALITATIVE APPROACH TO UNDERSTANDING FACTORS INFLUENCING THE COLLECTION OF INFORMATION BY COMMUNITY HEALTH WORKERS FOR TUBERCULOSIS CONTACT TRACING IN EKURHULENI, JOHANNESBURG

Good day, my name is _____. I am speaking to you on behalf of our research team. We are doing a research to assess the level of acceptability of the data collection tools used to collect information for tuberculosis contact tracing. The primary investigator for this study is Mr. Wellington Maruma, a student enrolled in Masters of Science (MSc) Epidemiology programme at the University of the Witwatersrand, Johannesburg. The research is being supervised by Dr. Salome Charalambous, Senior director for research science at *The Aurum Institut, Dr Violet Chihota* and co-supervised by Mr. Kavindhran Velen, Senior research manager at *The Aurum Institute*. I would like to invite you to consider participating in a project entitled “*Factors influencing the collection of information by community health workers for tuberculosis contact tracing in Ekurhuleni, Johannesburg*”

1. Before agreeing to participate, it is important that you read and understand the following explanation of the project procedures, benefits, risks, discomforts and precautions, as well as your right to withdraw from the study at any time. You need to understand what is involved before you agree to take part in the study.
2. If you have any questions do not hesitate to ask me.
3. You should not agree to take part unless you are satisfied with all the procedures involved.
4. If you decide to take part in this study, you will be asked to sign/thumbprint this document to confirm that you understand the study. You will be given a copy to keep.

Why are we doing this study?

- Research is a way to learn the answer to a question and use the answers to improve health care services.
- The assessment of the acceptability of the data collection tools used for Tuberculosis (TB) contact tracing is informed by the expressed challenges faced in the information, data management and M&E identified in TB surveillance systems.
- There is also duplication of data collected by community health workers and limited use of this data at the district, provincial and national level
- The purpose of this study is to measure the community health workers level of acceptability in completing the various data collection tools and understand how household TB contact tracing activities are being documented by exploring the barriers and facilitators to the collection and documentation of this data.

How long do you have to be part of the study?

- The total length of this study is approximately 5 months.

What will happen if you take part in this study?

- If you agree to take part in this study, you will be part of focus group discussion with other community health workers. In this focus group discussion, we will ask you some questions about your understanding and the ease of use of the data collection tools being used to document TB contact tracing activities. We will also ask you how you feel about the methods used to collect the data and the challenges and benefits of those. We will also ask about the type of data being collected as part of TB contact tracing and how this data is being fed into various information systems. This discussion may last about 30-60 minutes.

- If today is not a good day for us to talk with you, we will arrange for a date that you are free to talk to us.
- We will not be providing you with any medications.
- There is no cost to you for participating in the study.
- You will **NOT** be paid to participate in this study.

What are the benefits of being in the study?

- By participating, you will be helping us to strengthen the strengthening the WBOTs paper-based and electronic data collection system and ultimately inform the WBOT M&E framework while also informing future methods of data collection for WBOTs.
- You will also be helping in finding efficient ways to document TB cases and contacts and help manage TB and prevent it from spreading in your communities. This may go a long way in improving the disease surveillance systems in South Africa.

What are the risks and discomforts of being in this study?

- The study involves asking questions regarding your life and experiences. Talking about these things can be disturbing or emotional. You may feel uncomfortable answering a question. If you do not feel comfortable then you can refuse to answer the question. Please also note that confidentiality cannot be guaranteed in the focus group discussion since there will be other people there. Psychological /mental and emotional support will be provided to you by study staff if you feel you need it.

What happens if you do not agree to take part in this study?

- Your participation in this study is voluntary. You may withdraw (stop taking part) from the study at any time. If you withdraw from the study, we will not collect any further information from you for research purposes. We will use only the information we collected up to the point that you withdrew for research purposes, if you agree to this.
- If you refuse to participate, you will not be stopped from receiving any future health services from any clinic that you may attend.

How is the information collected during this study going to be kept confidential?

- All information collected during the course of this study will be kept secure and confidential/kept secret: Mr Wellington Maruma and Dr Salome Charalambous is responsible for this. All personal information is only available to study staff and kept in a locked and secured cabinet. All datasets will be password protected so that only authorised personnel in the research team will have access to the data
- Your name will not be recorded in this focus group discussion. Actual responses to questions will only be identified using a personal unique identifier that only the study staff can trace back to you. Reports about the study may be made, but you will not be personally identified in any report about this study.
- Please also note that confidentiality cannot be guaranteed in a focus group as the responses will be in a group setting.
- Participants will also complete a separate consent form to give permission for the investigators to audiotape interviews and focus group discussions. Part of this consent will also include allowing their discussions to be quoted or not.

What if you have more questions you wish to ask about this study?

If you have any questions about this study, please ask us now. If you have any questions later, you may also telephone *Dr Salome Charalambous on 010-5901300* during office hours or *Mr Wellington Maruma on +27764259971*. The committee giving ethical approval for this study are the Human

Research Ethics Committees for the University of the Witwatersrand. If you have any questions or concerns about your rights as a person taking part in a research study you may contact the chair of the ethics committee, Professor Cleaton-Jones (011 717 2301) at the University of the Witwatersrand, or via the administrator Mrs Anisa Keshav at:

- Telephone +27 (0) 11- 717- 1234
- Fax: +27 (0) 11-717-1265
- Email: anisa.keshav@wits.ac.za
- Address: Wits Research Office, 10th Floor Senate House, East Campus

INFORMED CONSENT FORM (PHASE 1)
**A QUALITATIVE APPROACH TO UNDERSTANDING FACTORS INFLUENCING THE
COLLECTION OF INFORMATION BY COMMUNITY HEALTH WORKERS FOR
TUBERCULOSIS CONTACT TRACING IN EKURHULENI, JOHANNESBURG**

University of the Witwatersrand
The Aurum Institute

: Mr. Wellington Maruma
: Dr Salome Charalambous & Mr Kavindhran Velen

- ❖ I have read the information sheet or had it fully explained to me (or the information sheet about this study has been read to me) and I understand what will be required of me and what will happen to me/required of me if I take part in the study.
- ❖ My questions concerning this study have been answered by

(Name of study staff member)

(Signature of study staff)

(Date)

- I understand that I may withdraw from this study at any time without giving a reason and without being penalised or losing any benefits to which I am normally entitled.
- I agree to take part in the study:

(Participant's name/initials)

(Signature or thumbprint)

(Date)

(Witness name/initials)

(Witness signature or thumbprint)

(Date)

(Translator's name/initials)

(Translator's signature or thumbprint)

(Date)

INFORMED CONSENT FOR AUDIO-TAPING OF FOCUS GROUP (STAFF AND COMMUNITY HEALTH WORKER)

I hereby confirm that I have been informed by the researcher, _____ about the nature, conduct, benefits and risks of this study: “A qualitative approach to explore facilitators and barriers to completing existing TB contact tracing data collection tools”

- ❖ I have also received, read or had read to me, and understood the above written information (Participant Information Sheet and Informed Consent) regarding this study.
- ❖ By signing this consent form I agree for the interview to be audio-taped.
- ❖ I may, at any stage, and with no prejudice, withdraw my consent to audio-taping the interview.
- ❖ I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to be audio-taped.
- ❖ I agree for any parts of the discussion to be quoted: **YES / NO** (answer to be circled)

PARTICIPANT:

Printed Name Signature / Mark or Thumbprint Date and Time

I, _____ (*name of researcher*), hereby confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

RESEARCHER:

Printed Name Signature Date and Time

If the information sheet and consent form were translated or explained to the participant, please enter the name of the translator or person explaining the informed consent form here together with their signature:

TRANSLATOR / OTHER PERSON EXPLAINING INFORMED CONSENT (DESIGNATION):

Printed Name Signature Date and Time

If the participant gave verbal consent, please enter the name of the person who witnessed the consent here and their signature:

WITNESS (If applicable):

Printed Name Signature Date and Time



UNIVERSITY OF THE
WITWATERSRAND,
JOHANNESBURG

Health Sciences Faculty | School of Public health
WBOT community health worker focus group discussion guide

Focus groups with community health care workers will be conducted to explore facilitators and barriers to completing existing contact tracing data collection tools among WBOTs. This will be used for the research titled “*Factors influencing the collection of information by community health workers for Tuberculosis contact tracing in Ekurhuleni, Johannesburg*”

Date of focus group discussion (dd/mm/yyyy)			
Number of community health workers present			
Total number of CHWs that signed Informed Consent Forms			

Welcome note:

Thanks for taking the time to join us to talk about the data collection tools used for household TB contact tracing by WBOTs. My name is Wellington Maruma and I will be your moderator for this discussion. Our topic for today is about the WBOT data collection system; the data collection tools, the facilitators and challenges you face in completing them. You were selected to participate in this discussion because you are a member of the ward based outreach team (WBOT) and you use the data collection tools for contact tracing activities.

Please note that there are no right or wrong answers but rather differing points of views. Keep in mind that we're just as interested in negative comments as positive comments, and at times the negative comments are the most helpful. The discussion will be tape recorded so there should be one person speaking at a time. We are on a first name basis so feel comfortable to call everyone by his or her names and we will not be using any names in our reports. You are assured of complete confidentiality.

Well, let us begin. We have placed name cards on the table in front of you to help us remember each other's names. Let us find out some more about each other by going around the table. Tell us your name and where you live.

Exploration Questions

- 1 How have you been involved in household contact tracing?

Probing questions

 - Do you think the collection of data is important – why/why not?
 - What do you think of the methods you use to collect data? – Paper based/electronic, which would be better and why? – What benefits would the paper based/electronic provide?
 - What kind of data is being collected for household activities and where are they documented?
 - How does data flow from the moment you collect it to the point it reaches the health facilities?

- 2 Think back over the past year of the things that (name of organization) did. What went particularly well? 4. What needs improvement?

Probing questions

 - Was the data collection easier or harder? – What has changed? – Why do you think this affects the way you collect data for these activities?

- 3 Suppose that you were in charge and could make one change that would make the program better. What would you do? What can each one of us do to make the data collection better?

Engagement questions:

- 4 What is your favorite/worst data collection tool that you use to document contact tracing activities?

Probing questions

- Do you like the data collection tools used? – Why/Why not?
- Should it be adjusted? –
- What should be adjusted? (Remove/Add variables? format?)
- Do you understand the data collection tools used? – What is it about them that make it easy to understand/not understand?

5 The national implementation toolkit for WBOTs describes four main categories of activities to be done by the community health workers at household level. I would like to know more about these activities and how they are documented.

Category 1: Screening, assessment and, referral.

Is the team doing screening, assessment and referral for TB contact tracing? Please describe how these are documented and the different data collection tools used to document.

Category 2: Information and support.

Is the team providing information and support for TB contact tracing? Please describe how these are documented and the different data collection tools used to document this service.

Category 3: Psychosocial support

Is the team providing information and support for TB contact tracing? Please describe how these are documented and the different data collection tools used to document.

Category 4: Referral linkages with the health facility that supports WBOT

Is the team providing for referral linkages with the health facility services for TB contact tracing? Please describe how these are documented and the different data collection tools used to document.

Probing questions for each category of service

- What are the challenges in the documentation of these services? What do you think causes these challenges?
- Do the data collection tools allow you to document all categories of the services you provide?

6 What do you think about the different tools? (Go through the tools one by one)

Probing questions

- Why do you think its important to use this (identified) tool?
- What about the number of fields in the (identified) tool?
- Is it easy to fill it in? – Why/why not?
- Do you understand how to fill in this (identified) tool? – why/why not?
- How can you improve this (identified) tool? – how do you think this improvement will change the way you collect data using this (identified) tool?
- What would make this tool better? – Change format? include/delete variables?

7 Do you get data from the WBOT leader regarding the data collection?

- Does this make the data collection and use of the different data collection tools easier/more difficult?
- How do you think the support from leaders can help you in the data collection process?

Exit questions

8 Of all the things we've talked about, what is most important to you?

9 Is there anything else you would like to say about why you use/not use, like/not like the data collection tools?

Any changes

The End

Thank you for participating in the focus group discussion. I appreciate the time you have taken to answer the questions.



UNIVERSITY OF THE
WITWATERSRAND,
JOHANNESBURG

Health Sciences faculty | School of Public health
INFORMATION SHEET

**A QUANTITATIVE APPROACH TO ASSESS THE LEVEL OF ACCEPTABILITY BY
WBOTS OF THE CURRENT DATA COLLECTION TOOLS FOR TB CONTACT TRACING
OUTREACH ACTIVITIES IN EKURHULENI, JOHANNESBURG**

Good day, my name is _____. I am speaking to you on behalf of our research team. We are doing a research to assess the level of acceptability of the data collection tools used to collect information for tuberculosis contact tracing. The primary investigator for this study is Mr Wellington Maruma, a student enrolled in Masters of Science Epidemiology programme at the University of the Witwatersrand. The research is being supervised by Dr. Salome Charalambous, Senior director for research science at *The Aurum Institute*. I would like to invite you to consider participating in a project entitled “*Factors influencing the collection of information by community health workers for tuberculosis contact tracing in Ekurhuleni, Johannesburg*”

5. Before agreeing to participate, it is important that you read and understand the following explanation of the project procedures, benefits, risks, discomforts, and precautions, as well as your right to withdraw from the study at any time. You need to understand what is involved before you agree to take part in the study.
6. If you have any questions do not hesitate to ask me.
7. You should not agree to take part unless you are satisfied with all the procedures involved.
8. If you decide to take part in this study, you will be asked to sign/thumbprint this document to confirm that you understand the study. You will be given a copy to keep.

Why are we doing this study?

- Research is a way to learn the answer to a question and use the answers to improve health care services.
- The assessment of the acceptability of the data collection tools used for Tuberculosis (TB) contact tracing is informed by the expressed challenges faced in the information, data management and M&E identified in TB surveillance systems.
- There is also duplication of data collected by community health workers and limited use of this data at the district, provincial and national level
- The purpose of this study is to measure the community health workers level of acceptability in completing the various data collection tools and understand how household TB contact tracing activities are being documented by exploring the barriers and facilitators to the collection and documentation of this data.

How long do you have to be part of the study?

- The total length of this study is 5 months.

What will happen if you take part in this study?

- If you agree to take part in this study, you will be asked to fill in a questionnaire that will have questions relating to the perceived usefulness of the data collection tools, ease of use, availability, nature of the data being collected, cost and data security. This questionnaire will assess the level of acceptability using a four point Likert scale for the responses.
- The questionnaire will take approximately 20 minutes to complete.
- There is no cost to you for participating in the study.
- You will **NOT** be paid to participate in this study.

What are the benefits of being in the study?

- By participating, you will be helping us to strengthen the strengthening the WBOTs paper-based and electronic data collection system and ultimately inform the WBOT M&E framework while also informing future methods of data collection for WBOTs.
- You will also be helping in finding efficient ways to document TB cases and contacts and help manage TB and prevent it from spreading in your communities. This may go a long way in improving the disease surveillance systems in South Africa.

What are the risks and discomforts of being in this study?

- The study involves asking questions regarding your life and experiences. Talking about these things can be disturbing or emotional. You may feel uncomfortable answering a question. If you do not feel comfortable then you can refuse to answer the question.

What happens if you do not agree to take part in this study?

- Your participation in this study is voluntary. You may withdraw (stop taking part) from the study at any time. If you withdraw from the study, we will not collect any further information from you for research purposes. We will use only the information we collected up to the point that you withdrew for research purposes, if you agree to this.
- If you refuse to participate, you will not be stopped from receiving any future health services from any clinic that you may attend.

How is the information collected during this study going to be kept confidential?

- All information collected during the course of this study will be kept secure and confidential/kept secret: Mr Wellington Maruma and Dr Salome Charalambous is responsible for this. All personal information is only available to study staff and kept in a locked and secured cabinet. All datasets will be password protected so that only authorised personnel in the research team will have access to the data
- Your name will not be recorded in the questionnaire. Actual responses to questions will only be identified using a personal unique identifier that only the study staff can trace back to you. Reports about the study may be made, but you will not be personally identified in any report about this study.

What if you have more questions you wish to ask about this study?

If you have any questions about this study, please ask us now. If you have any questions later, you may also telephone *Dr Salome Charalambous* on 010-5901300 during office hours or *Mr Wellington Maruma* on +27764259971. The committee giving ethical approval for this study are the Human Research Ethics Committees for the University of the Witwatersrand. If you have any questions or concerns about your

rights as a person taking part in a research study you may contact the chair of the ethics committee, Professor Cleaton-Jones (011 717 2301) at the University of the Witwatersrand, or via the administrator Mrs Anisa Keshav at:

- Telephone +27 (0) 11- 717- 1234
- Fax: +27 (0) 11-717-1265
- Email: anisa.keshav@wits.ac.za
- Address: Wits Research Office, 10th Floor Senate House, East Campus

INFORMED CONSENT FORM (PHASE 2)

A QUANTITATIVE APPROACH TO ASSESS THE LEVEL OF ACCEPTABILITY BY WBOTS OF THE CURRENT DATA COLLECTION TOOLS FOR TB CONTACT TRACING OUTREACH ACTIVITIES IN EKURHULENI, JOHANNESBURG

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The Aurum Institute

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- ❖ I have read the information sheet or had it fully explained to me (or the information sheet about this study has been read to me) and I understand what will be required of me and what will happen to me/required of me if I take part in the study.
- ❖ My questions concerning this study have been answered by

(Name of study staff member)

(Signature of study staff)

(Date)

- I understand that I may withdraw from this study at any time without giving a reason and without being penalised or losing any benefits to which I am normally entitled.

• I agree to take part in the study:

(Participant's name/initials)

(Signature or thumbprint)

(Date)

(Witness name/initials)

(Witness signature or thumbprint)

(Date)

(Translator's name/initials)

(Translator's signature or thumbprint)

(Date)

Appendix VII: Acceptability Questionnaire (Phase 2)



UNIVERSITY OF THE
WITWATERSRAND,
JOHANNESBURG

Health Sciences faculty | School of Public health

NB: A mobile data collection application (GIS Cloud) was used to collect questionnaire data. The following are the questionnaire fields that were developed in the mobile application.

1	Participant Unique Identifier	[enter PIN here]			
2	Name of Primary health care clinic & Sub-District	[enter name of clinic here]			
3	Age	[enter age here]			
4	Gender	<input type="radio"/> Male <input type="radio"/> Female			
5	Highest Education Level	Secondary Education (Gr 8-11) Matric (Grade 12) Higher Certificate Diploma Degree Honours			
6	Have you worked as a community health worker before WBOT?	<input type="radio"/> Yes <input type="radio"/> No			
7	Number of years working as caregiver/Community health worker	[enter number of years here]			
8	WBOT related trainings (Tick the ones you have received)	<input type="radio"/> PHC Reengineering Phase 1 <input type="radio"/> PHC Reengineering Phase 2			
9	Number of trainings received (WBOT & non WBOT related)	[Enter number of trainings received here]			
10	Documentation of TB contact tracing activities is important.	<input type="radio"/> Strongly disagree (1)	<input type="radio"/> Disagree (2)	<input type="radio"/> Agree (3)	<input type="radio"/> Strongly agree (4)
11	It is worth my time to ensure that contact tracing activities are documented	<input type="radio"/> Strongly disagree (1)	<input type="radio"/> Disagree (2)	<input type="radio"/> Agree (3)	<input type="radio"/> Strongly agree (4)
12	In general, I am able to use the current WBOT data collection tools to capture TB contact tracing activities	<input type="radio"/> Strongly disagree(1)	<input type="radio"/> Disagree (2)	<input type="radio"/> Agree (3)	<input type="radio"/> Strongly agree (4)
13	There are too many WBOT data collection tools to fill in	<input type="radio"/> Strongly disagree(1)	<input type="radio"/> Disagree (2)	<input type="radio"/> Agree (3)	<input type="radio"/> Strongly agree (4)
14	The data collection tools can be completed within the time that I am in the household	<input type="radio"/> Strongly disagree(1)	<input type="radio"/> Disagree (2)	<input type="radio"/> Agree (3)	<input type="radio"/> Strongly agree (4)
15	The current data collection tools are useful in collecting information for TB contact tracing outreach activities	<input type="radio"/> Strongly disagree(1)	<input type="radio"/> Disagree (2)	<input type="radio"/> Agree (3)	<input type="radio"/> Strongly agree (4)
16	The forms have the fields required to capture all the TB contact tracing activities	<input type="radio"/> Strongly disagree(1)	<input type="radio"/> Disagree (2)	<input type="radio"/> Agree (3)	<input type="radio"/> Strongly agree (4)
17	The WBOT data collection tools are generally available when I need them	<input type="radio"/> Strongly disagree(1)	<input type="radio"/> Disagree (2)	<input type="radio"/> Agree (3)	<input type="radio"/> Strongly agree (4)

18	I have the necessary resources to support my data collection needs (e.g. Stationery, books etc.)	<input type="radio"/> Strongly disagree(1)	<input type="radio"/> Disagree (2)	<input type="radio"/> Agree (3)	<input type="radio"/> Strongly agree (4)
19	It is easy to forge the information in the data collection tools	<input type="radio"/> Strongly disagree(1)	<input type="radio"/> Disagree (2)	<input type="radio"/> Agree (3)	<input type="radio"/> Strongly agree (4)
20	I find the current WBOT data collection tools easy to understand	<input type="radio"/> Strongly disagree(1)	<input type="radio"/> Disagree (2)	<input type="radio"/> Agree (3)	<input type="radio"/> Strongly agree (4)
21	I find the data collection tools easy to fill in and complete	<input type="radio"/> Strongly disagree(1)	<input type="radio"/> Disagree (2)	<input type="radio"/> Agree (3)	<input type="radio"/> Strongly agree (4)
22	A digital platform would be better to document contact tracing activities	<input type="radio"/> Strongly disagree(1)	<input type="radio"/> Disagree (2)	<input type="radio"/> Agree (3)	<input type="radio"/> Strongly agree (4)
23	The WBOT data collection tools are generally available when I need them	<input type="radio"/> Strongly disagree(1)	<input type="radio"/> Disagree (2)	<input type="radio"/> Agree (3)	<input type="radio"/> Strongly agree (4)
24	I have the necessary resources to support my data collection needs (e.g. Stationery, books etc.)	<input type="radio"/> Strongly disagree(1)	<input type="radio"/> Disagree (2)	<input type="radio"/> Agree (3)	<input type="radio"/> Strongly agree (4)
25	In general, I am satisfied with the training provided on the different WBOT data collection tools	<input type="radio"/> Strongly disagree(1)	<input type="radio"/> Disagree (2)	<input type="radio"/> Agree (3)	<input type="radio"/> Strongly agree (4)
26	My data collection activities are supervised by our team leader	<input type="radio"/> Strongly disagree(1)	<input type="radio"/> Disagree (2)	<input type="radio"/> Agree (3)	<input type="radio"/> Strongly agree (4)
27	Any issues with the data collection tools can be discussed with the WBOT leader	<input type="radio"/> Strongly disagree(1)	<input type="radio"/> Disagree (2)	<input type="radio"/> Agree (3)	<input type="radio"/> Strongly agree (4)
28	The data collection tools make it possible for me to check for any errors with the data	<input type="radio"/> Strongly disagree(1)	<input type="radio"/> Disagree (2)	<input type="radio"/> Agree (3)	<input type="radio"/> Strongly agree (4)
29	I can tell where the data in the data comes from by looking at the data captured	<input type="radio"/> Strongly disagree(1)	<input type="radio"/> Disagree (2)	<input type="radio"/> Agree (3)	<input type="radio"/> Strongly agree (4)