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Acceptability of isoniazid preventative therapy for tuberculosis among healthcare workers in Gaborone, Botswana

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Acceptability of Isoniazid Preventative Therapy for Tuberculosis among healthcare workers in Gaborone, Botswana.



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A research report submitted to the Department of Epidemiology and Biostatistics, School of Public Health, Faculty of Health Sciences, University of the Witwatersrand. In partial fulfilment of the requirements for an MSc in Epidemiology (Implementation Science) Degree.

Supervisor:
Professor Jonathan Levin
November 2021

DECLARATION:

I, **Thandi Milton,** declare that this research report is my own unaided work. It is being submitted in partial fulfilment of the requirement for the degree of Master of Science (MSc) in Epidemiology (Field of Implementation Science) at the University of Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at this or any other University.



_____

Signature of Candidate

Date: 11 November 2021

DEDICATION:

In memory of my late father, ***Mr Albert Milton (1962-2019****). I would not be where I am today without you, my biggest cheerleader and motivator. A scholar for life, who taught me the true value of education and the importance of being independent and hardworking.*

Your Legacy lives on.

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I would like to acknowledge God first and foremost, for giving me the strength and focus to complete this assignment. My Husband and family members who supported me while I was away. I acknowledge my late father who pushed me to start this program and although he passed away halfway through, I promised myself I would complete it to honour his memory. I appreciate you all.

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My classmates provided me with a home away from home and I am eternally grateful. Their contribution to my journey is invaluable, from the group discussions, advice and assistance with the course modules. A special mention to Mr Jonathan Majamanda and Dr Roger Ciza, you guys carried me. PhD candidate at Wits School of public health and fellow country man, Miss Melitah Motlhale, has been instrumental in this thesis by proof reading and advising me at every stage. Thank you to all my colleagues and friends, those mentioned here and those I have not.

I am eternally grateful to WHO-TDR for the funding and to the healthcare workers that gave up their time to make my dream come true. I am grateful to all those who believed in me, especially when I doubted myself.

ABSTRACT

Background

Botswana is among the highest TB/HIV burden countries in the world and has been identified by the WHO as a priority country for the global TB/HIV response. Over 50% of TB patients are co-infected with HIV and 40% of AIDS deaths are due to TB. TB Preventative Therapy (TPT) is one of the strategies used to prevent the spread of TB worldwide. Isoniazid Preventive Therapy (IPT) is a form of TPT and several studies have demonstrated its effectiveness, it involves the TB drug Isoniazid (INH) being administered daily for six months to eligible individuals. IPT is currently being rolled out in Botswana, since 2020. As the country implements the strategy, factors that may affect its implementation need to be evaluated. One factor which has not been studied and possibly contributes to poor implementation and use of IPT is its acceptability by health care workers (HCWs). The aim of this study is to assess the acceptability of IPT and the factors influencing its acceptability by HCWs in Gaborone, Botswana. This will be assessed by determining the acceptability of IPT amongst healthcare workers, investigating the factors that influence the acceptability. Finally, the relationship between acceptability and the factors influencing it will be determined.

Methods

This was a cross sectional study, conducted using an explanatory sequential mixed methods design. The study was carried out in 2 phases; an initial quantitative phase, followed by a

qualitative phase. Quantitative data was collected from 97 healthcare workers, in 19 health facilities in Gaborone using self-administered questionnaires, which aimed to determine the level of acceptability of IPT among HCWs and the factors influencing their acceptability. The acceptability implementation measure (AIM) questionnaire has 4 questions which provide a reliable and valid measure of acceptability. The AIM questionnaire was incorporated into the questionnaire in this study and used to measure acceptability of IPT. The theoretical framework of acceptability (TFA) is a multi-construct framework, which can be used to assess acceptability of healthcare interventions from the perspective of both the intervention providers and the recipients. The TFA was used to determine factors influencing acceptability of IPT in this study. Firstly, descriptive analysis of all the data was carried out. Acceptability was then measured using central measures of tendency, mean and standard deviation as well as the median and interquartile range. To compare the acceptability between groups, linear regression models were fitted. The findings were used to inform the qualitative phase of the study which involved in depth interviews with 6 healthcare workers that had a low acceptability score on the questionnaires. Transcription and translation of the interviews was carried out and a coding matrix was developed using the TFA. The interviews were further analysed by doing thematic analysis.

Results

The overall mean acceptability score amongst the 97 healthcare workers who completed the questionnaire was 3.51 and the median acceptability score was 3.5 (IQR: 1.25-5). Factors that showed a statistically significant relationship with acceptability in the quantitative section were

affective attitude and burden. HCWs had a good attitude towards IPT and didn't see it as a burden, which reflected a high acceptability of the intervention. Thematic analysis of in-depth interviews with HCWs with low acceptability scores divided factors affecting acceptability into healthcare worker related factors and intervention related factors. They further highlighted burden and perceived effectiveness of IPT by HCWs as affecting acceptability. Burden emerged as an important factor in determining acceptability in both sections of the study. Nurses accounted for the majority of the study population (91%). Analysis that was carried out to assess for any differences in acceptability by various categories showed a statistically significant difference in acceptability scores between different health facilities and occupations.

Conclusion

Acceptability of IPT amongst healthcare workers in Gaborone is dependent on their affective attitude and whether they consider it a burden. Overall, IPT was an acceptable intervention amongst healthcare workers with a mean acceptability score of 3.51. This score implies that IPT will be implemented well if the factors affecting it are closely addressed. Most of the work related to implementing IPT in this context appears to be done by nurses, therefore interventions and policies would be better targeted towards them. The findings of this study have implications for TB preventative therapy and policy makers in the Botswana ministry of health. The study highlights the importance of considering implementation outcomes such as acceptability, and factors that influence these outcomes, when introducing a new intervention and not just focusing on the logistical and financial aspects.

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LIST OF ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
AIM	Acceptability Implementation Measure
ART	Anti-Retroviral Therapy
ARV	Anti-Retroviral
DHMT	District Health Management Team
HCW	Health Care Worker
HIV	Human Immune Deficiency Syndrome
HREC	Human Research Ethics Council
INH	Isoniazid
IPT	Isoniazid Preventative Therapy
MDR-TB	Multidrug resistant Tuberculosis
PLWHIV	People Living With HIV
SDG	Sustainable Development Goals
TB	Tuberculosis
TFA	Theoretical Framework of Acceptability
TPT	TB Preventative Therapy
TST	Tuberculin Skin Test
WHO	World Health Organization

DEFINITION OF TERMS

Acceptability: The perception amongst healthcare workers or stakeholders that an intervention is agreeable, palatable and satisfactory.

Healthcare Worker: Nurses, medical officers and other staff working in a healthcare setting to carry out Tuberculosis treatment and services.

Isoniazid: A drug used for the prophylaxis and treatment of tuberculosis.

Medical Officer: Name used to describe medical doctors in Botswana.

Prophylaxis: The use of a drug for prevention of a disease or condition before it occurs.

Tuberculosis: A bacterial infection cause by Mycobacterium Tuberculosis.

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CHAPTER 1: INTRODUCTION

1.0. Introduction

This chapter provides a background to the study and gives information on Tuberculosis (TB) and Isoniazid Preventative Therapy (IPT). Preventative therapy for TB is discussed in an international context and with regards to Botswana. The research question as well as the aim and objectives of the study are introduced. This study seeks to assess the acceptability of IPT among health care workers in Gaborone, Botswana. The concept of acceptability is introduced as well as the frameworks used to assess acceptability. Furthermore, a review of literature pertaining to this topic is carried out, which includes measures of acceptability and factors that influence acceptability.

1.1. Background

Tuberculosis (TB) is a major cause of death worldwide, with over 95% of the worldwide mortality from TB occurring in low- and middle-income countries (1). Botswana is among the highest TB/HIV burden countries in the world and has been identified by the WHO as a priority country for the global TB/HIV response (2). The country has a TB notification rate of 280 per 100 000 population and an HIV prevalence of 21.9%, this is the 3rd highest prevalence in the world (3–5). Additionally, over 50% of TB patients are co-infected with HIV and 40% of AIDS deaths are due to TB (6). The capital city, Gaborone, where this study was conducted, has an HIV prevalence of 17.1% and is where 20% of the country's population resides (3). People with HIV are one of the groups considered at high risk of developing TB (7,8). This situation demands

that TB preventative measures be implemented well as prevention of TB will help to reduce the high mortality and morbidity due to TB in Botswana.

In response to the worldwide TB problem, the World Health Organization (WHO) developed the End TB strategy in 2015, which aims to achieve a 90% reduction in deaths from TB and reduce the incidence rate by 80% by the year 2035 (7). The strategy highlights the importance of vaccination and preventative treatment of persons at high risk of TB (9). The End TB strategy is closely aligned with the United Nations Sustainable Development Goals (SDGs) which also aim to eliminate TB by the year 2030 (7,9). Many countries have included these goals within their own internal TB management policies. The Botswana National TB Programme (BNTP), within the Ministry of Health, was established in 1975 with help from the WHO (5,10). The BNTP is fully integrated into the public health system and provides TB services to 24 health districts. The BNTP TB guidelines are based on WHO recommendations and their main aim is elimination of TB in Botswana, in line with the WHO End TB strategy (10). Prevention of TB in vulnerable populations is essential to reducing the worldwide burden of the disease.

TB Preventative Therapy (TPT) is one of the strategies used to prevent the spread of TB worldwide. It involves using anti-TB medications to treat people who are at high risk of developing active TB disease (11). Isoniazid Preventive Therapy (IPT) is a form of TPT and several studies have demonstrated its effectiveness (12–14). IPT involves the TB drug Isoniazid (INH) being administered daily for six months to eligible individuals (15,16). In 2001, Botswana implemented the WHO IPT guidelines, and by 2006, a large number of people living with HIV

(PLWH) in the country were reported to be on IPT (6,17,18). At the time, the BNTP considered all PLWH without clinical evidence of TB disease as eligible for IPT (2,10). However, the continued high prevalence of TB in the country suggested that preventative measures were failing. A review of the Botswana IPT program carried out in 2008, recommended improvement of data management and stronger integration of the program into routine HIV services (2). The 2011 HIV/TB policy guidelines also called for an improvement in IPT implementation and monitoring of the percentage of PLWH started on IPT, but despite these recommendations, the use of IPT in Botswana declined (5). Since 2013, IPT has not been routinely used in health facilities and staff were told to put it on hold with no clear explanation as to why. In 2019 however, the Ministry of Health announced that it was reintroducing TPT, which will include the use of IPT. The intervention was rolled out starting in 2020 (17). As the country is preparing to implement the strategy once again, factors that may affect its implementation need to be evaluated. One factor which has not been studied and possibly contributes to poor implementation and use of IPT is its acceptability by health care workers (HCWs).

1.2. Problem Statement

Uptake of IPT has been poor, particularly in low resource and high risk populations such as Botswana (10,19,20). Botswana has the 3rd highest HIV prevalence in the world which means there's a large population of patients who are at risk of developing active TB in the country and therefore TB prevention should be prioritised (4,6,17). It is important to evaluate factors such as acceptability by HCWs that might be hindering adequate implementation and usage of this intervention (10,21). Currently, there is no existing information on the acceptability of IPT

implementation in Botswana, this study will be key in providing this. There is a knowledge gap and this study will provide valuable insight as the country has recently reintroduced IPT into its TB prevention strategy.

1.3. Justification

The acceptability of an intervention by HCWs can affect whether they use it and how well they administer it (22,23). By determining the acceptability of IPT and factors affecting acceptability, we will be able to guide policy makers to develop policies to improve IPT uptake and usage. The WHO End TB strategy states that priority research gaps in the implementation of latent TB infection management should be identified and addressed, this study will address such gaps (7). Although the study will be set in Gaborone, the findings can be utilized in other parts of the country to improve IPT implementation. The Acceptability Implementation Measure (AIM) questionnaire for acceptability of healthcare interventions, is a reliable and valid measure of acceptability and was used in this study (24). The AIM questionnaire has not been used for IPT or in a setting like Botswana before. Botswana is preparing to bring TB preventative services back and the data generated from this study will be crucial at this early stage of implementation. This study assessed the acceptability of IPT among HCWs in Botswana and the factors that influence this acceptability.

1.4. Research Question

What is the acceptability of Isoniazid Preventative therapy among health care workers in Gaborone, Botswana?

1.5. Aim

To assess the acceptability of IPT and the factors influencing acceptability of IPT among health care workers in Gaborone, Botswana.

1.6. Objectives

i. To determine the acceptability of IPT among HCWs in Gaborone, Botswana.
ii. To investigate factors that influence the acceptability of IPT among HCWs in Gaborone, Botswana.
iii. To assess the relationship between the acceptability of IPT and the factors that influence the acceptability of IPT.

1.7. Literature Review

1.7.1. Burden of TB in Botswana

In 2017, the WHO reported that 1.7 billion people were latently infected by TB worldwide. Of those that had the latent infection, 10 million developed the disease and a further 1.6 million died (1). Sub-Saharan Africa is one of the areas that is hardest hit by this disease, partly due to the high rate of HIV on the continent (1). In 2016, Botswana had a population of 2,230 905 and in the same year, despite this small population, the country was reported to have 8000 new cases of TB with 4800 occurring in HIV positive people (3,10,17). In the same year, 13% of all adult deaths in the country were attributable to this deadly disease (10,17).

International bodies such as the United Nations (UN) and WHO, realise that we cannot eliminate TB unless we prevent it, especially in those with latent disease and at high risk of progressing to active TB disease. Therefore, they have made appeals to countries around the world to adopt IPT and have even proposed shorter regimens. In 2019, the Botswana Ministry of Health announced that they were bringing back IPT. Although newer and shorter IPT regimens exist, the regimen that will be adopted is the conventional IPT regimen of isoniazid once daily for 6 months (17). It is important that as this intervention is being rolled out, aspects that may affect its implementation are investigated.

1.7.2. Challenges and Barriers to Implementation of IPT

There is evidence to suggest that implementation of IPT in many high HIV and TB settings has been slow (15,22,25). One of the reasons cited as leading to slow implementation of IPT is the concern from healthcare providers about resistance to Isoniazid and development of adverse events. These 2 factors were shown to lead to poor implementation of IPT in a Kenyan study and 2 Ethiopian studies (26–28). However, clinical trials in South Africa and Botswana, proved that IPT does not lead to isoniazid resistance in those who receive it and that there are minimal adverse effects from taking the treatment (11,18,29). Numerous other factors have been found to affect the implementation and use of IPT. HCWs in South Africa reported lack of motivation, lack of training and no time to discuss IPT with patients due to heavy patient loads as challenges to them providing this service (29). Researchers also found that for South African HCWs, influence by peers and leaders determines whether they prescribe IPT or not (19). A study which looked at the public health and implementation challenges to providing IPT in Ethiopia

clinics, stated that the main barriers for HCW's were difficulties in ruling out active TB, difficulties identifying latent TB and lack of knowledge about duration of protective efficacy of IPT (30). Other studies have highlighted lack of experience, lack of guidelines and no knowledge on the benefits of IPT by HCWs as important barriers to providing the intervention rather than patient-related factors (20,26,27,31).

In order to assess the success of implementation of interventions, we can look at implementation outcomes (22). Implementation outcomes are the effects of intentional and planned actions to implement new treatments and services. They are also proximal indicators of the implementation processes, intermediate outcomes and indicators of success (22). Acceptability is an implementation outcome. If an intervention has low acceptability, this can affect its implementation fidelity, effectiveness and mode of delivery (32,33).

1.7.3. Acceptability of healthcare Interventions

The concept of treatment acceptability dates back to the 1980s, when Kazdin et al. defined it as whether a treatment is fair, reasonable, appropriate for the problem and whether it meets conventional ideas about what treatment should be (23). Proctor and colleagues later described acceptability as the idea among implementation stakeholders that a service, innovation, treatment or practice is satisfactory, palatable and agreeable (22). Recently, Sekhon et al. defined acceptability as "a multifaceted construct that reflects the extent to which people delivering or receiving a healthcare intervention consider it to be appropriate, based on anticipated or experiential cognitive and emotional responses to the intervention " (33). Witt

and Elliot studied the acceptability of classroom intervention strategies and proposed that acceptability is a critical factor in determining treatment usage and subsequently effectiveness of a treatment (32). Many studies have highlighted the importance of acceptability research in terms of clinicians and HCWs and demonstrate that acceptability should not only be assessed from the patient's perspective, but from the HCW's perspective as they are the ones delivering the intervention, which is the approach this study will take (23,34).

1.7.4. Factors influencing Acceptability

Acceptability studies have been carried out in the healthcare field looking at acceptability of interventions, and although a lot of them are not related to TB, the results are transferable to TB and IPT implementation. Briesch and colleagues, did a study looking at influences on implementation of interventions. They found that participants that had high acceptability scores, were those that saw an intervention as appropriate, and were personally willing to implement it (35). A mixed methods study done in Switzerland, looking at the acceptability of tick control interventions, found that a high perceived efficacy was strongly linked to high acceptability of the intervention (36). In Senegal, the acceptability of malaria prevention interventions by community health workers was assessed by developing a working frame to assess acceptability. Acceptability was defined as a combination of understanding, adequate usage and positive perception. It was then hypothesized that high acceptability would lead to participation in malaria prevention, and this proved to be the case (37). On the other hand, low acceptability has been shown to be associated with interventions found to be inappropriate, which take too long to complete or are perceived as ineffective (38). Acceptability of an

influenza vaccine among HCWs in Canada was evaluated by giving questionnaires to vaccine providers. The findings showed that vaccine providers who considered the vaccine to be ineffective and unsafe, did not support its use. In addition, 36 % of the questionnaire respondents had concerns about vaccine efficacy and were less likely to recommend it to patients (39).

Timing has been found to be an important determinant of acceptability (22,23). Acceptability is also dynamic and varies with experience (22). Measurements of acceptability done pre-implementation produce different results to those done during implementation (22). Some studies have proposed that measurements done after a treatment has begun, yield more accurate results, as the people using the intervention will have more experience (40). Others propose that more experience translates to lower acceptability of an intervention and therefore, it might be better to assess acceptability once implementation of an intervention has started, to get a true picture (32). Our study looked at acceptability of IPT after the intervention had been used but had been discontinued. However, the intervention is about to be rolled out again. The only study that has ever investigated the acceptability of IPT among healthcare workers, is a Kenyan study carried out by Wambiya et al. in 2018. The study found that the main challenge to HCWs implementing IPT in Kenya is inadequate support by policy makers and program managers. They also found that acceptability of IPT was determined by both organizational and structural factors (28).

1.7.5. Measures of Acceptability

Acceptability is best measured at individual provider and/or consumer level as two people can have different views on the same intervention based on their acceptability of it (22). A few measurement tools for acceptability have been developed. These include the Treatment Evaluation Inventory (TEI) and the Intervention Rating Profile-20 (34,41). These tools were invented to assess the extent to which consumers found an intervention to be suitable for the problem. Results showed that treatments thought to be easier to implement, be more effective and have fewer side effects, were more acceptable (23,35,41). The TEI which was initially used to assess deviant child behaviours, is a 15 item Likert style questionnaire which showed that acceptability is related to effectiveness and also found effectiveness to be a major criterion among clinicians (23,41). In response to the paucity of good quality, validated measurement tools for acceptability of healthcare interventions, Weiner et al. developed a new tool, the Acceptability Implementation Measure (AIM). The AIM questionnaire has 4 questions which provide a reliable and valid measure of acceptability (24). The AIM questionnaire will be incorporated into the questionnaire in this study and used to measure acceptability of IPT.

The theoretical framework of acceptability (TFA) is a multi-construct framework, which can be used to assess acceptability of healthcare interventions from the perspective of both the intervention providers and the recipients. It represents acceptability using seven constructs; burden, affective attitude, ethicality, perceived effectiveness, intervention coherence, self-efficacy and opportunity cost (Figure 1.1) (33). The TFA is similar to a model proposed by Reimers et al in 1981, which describes acceptability as being associated with treatment

knowledge, compliance, maintenance, effectiveness and intrusiveness (42). Both models highlight the relationship between treatment knowledge, understanding and effectiveness with acceptability. The TFA will be used to determine factors influencing acceptability of IPT in this study.

Figure 1.1: Theoretical framework of acceptability

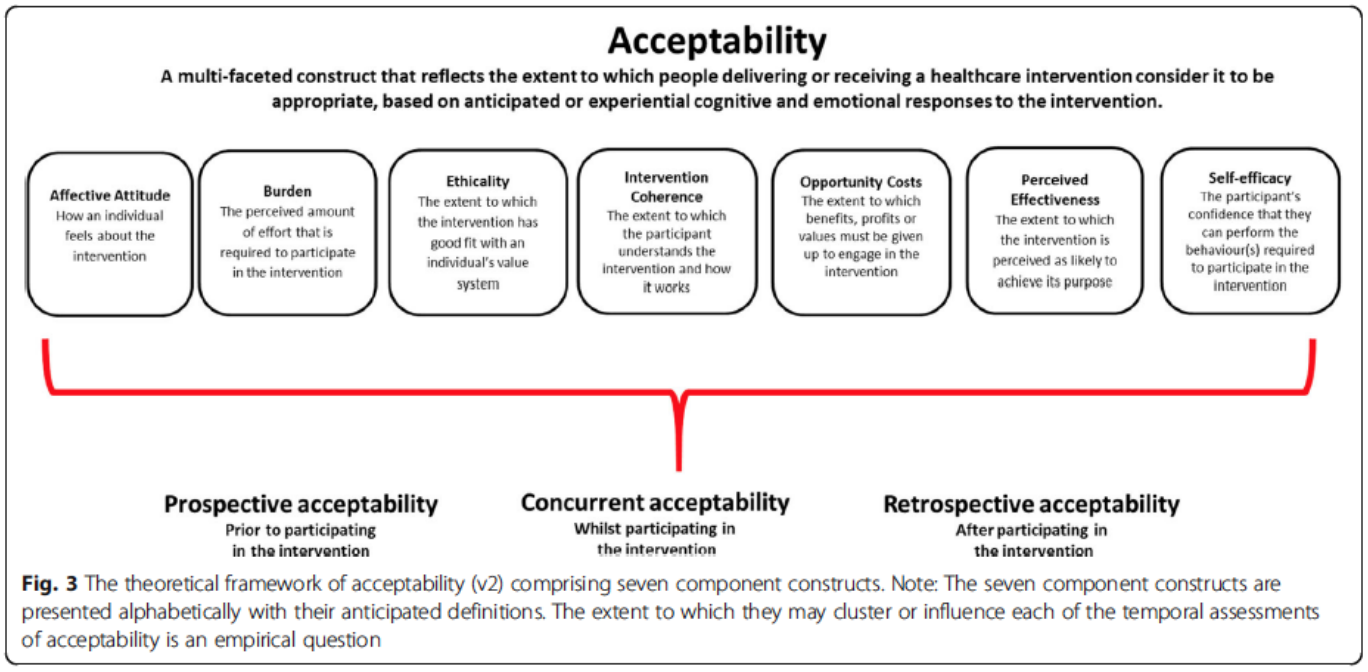


Fig. 3 The theoretical framework of acceptability (v2) comprising seven component constructs. Note: The seven component constructs are presented alphabetically with their anticipated definitions. The extent to which they may cluster or influence each of the temporal assessments of acceptability is an empirical question

CHAPTER 2: METHODS

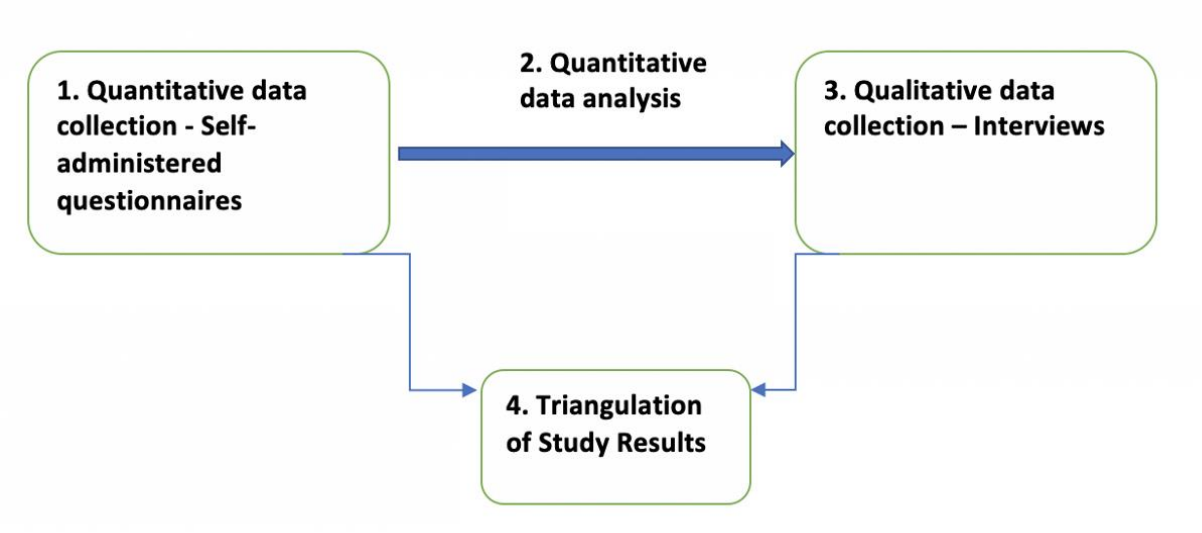
2.0. Introduction

This chapter describes the study design, the study location and the study population. It also presents the data collection tools and gives an outline of the methods used to collect, manage and analyse the data. Other sections include sampling methods used, limitations of the study and ethical considerations.

2.1. Study Design

This was a cross sectional study, conducted using an explanatory sequential mixed methods design (43). The study was carried out in 2 phases; an initial quantitative phase, followed by a qualitative phase. The study was predominantly quantitative and qualitative data was used to support the quantitative findings. Quantitative data was collected using self-administered questionnaires, which aimed to determine the level of acceptability of IPT among HCWs and the factors influencing their acceptability (Appendix 3). The questionnaires were analysed, and the findings were used to inform the qualitative phase of the study. Only healthcare workers with low scores on the questionnaire were selected for interview. The rationale for choosing this study design was that collecting different types of data allows for triangulation and corroboration of ideas. The interviews complemented and expanded on the questionnaire findings.

Figure 2.1: Diagram illustrating the study design



2.2 Study Site

The study was conducted in Gaborone, the capital city of Botswana. Gaborone is the most densely populated city in Botswana, with a population of approximately 471 000 (17). It is the largest urban centre in Botswana and contains nearly 20% of the country's population (3). The city has an HIV prevalence of 17.1%, one of the highest in the country (10). In addition, about 70% of people with TB in Gaborone are also HIV positive, this is compared with an overall country prevalence of 59.2% (10). Nineteen clinics within the Gaborone District Health Management Team (DHMT) were used as study sites. Data was collected from the adult Infectious Disease Care Clinics (IDCC) which specialize in TB and HIV care.

2.3 Study population

The study population comprised of HCWs at the selected clinics who provide TB care and management. All HCWs who consented to participate received the questionnaire and a subset of those that completed the questionnaires were later interviewed. In order to be included in the study, HCWs had to be employed full time at the health facility, had worked in their profession for 6 months or more and be directly involved in TB patient care. Participants included nurse managers, nurses, medical officers, medical specialists and other HCWs involved in TB management. Most of the IDCC clinics in the city are run by nurses, with a visiting doctor coming in for a few days during the week. As a result, the majority of study participants were nurses. Of the 110 participants that were invited to take part in the study, 97 consented, giving a response rate of 88%. The total sample size was 97 HCWs for the self-administered questionnaires, and 6 HCWs for the interview. 11 of the 97 HCWs were eligible for interviews, based on the fact that they had a low acceptability score on the questionnaire (mean score <3), however only 6 of them agreed to be interviewed, while the rest either declined or were unavailable during the interview period.

2.4 Sampling

A purposive sample of nineteen clinics in Gaborone was done for the study sites. The health facilities were selected due to their location in the Gaborone DHMT catchment area and because they provide TB and HIV/AIDs services. The 19 clinics were a sample of the 27 eligible clinics in the city providing TB/HIV services. All nurses and doctors at the 19 clinics who met the

inclusion criteria and were willing to participate in the study, received the questionnaire. HCWs with a low total acceptability score (mean score<3) on the AIM section of the questionnaire were then followed up for interview.

2.5 Data collection

Data was collected between August 2018 and October 2018. Data sources were self-administered questionnaires and semi-structured interviews with key informants.
Both data collection tools (questionnaire and interview guide) were pre-tested in clinics that were not involved in the study before commencing with data collection.

2.5.1. Quantitative data collection

Quantitative data was collected using self-administered questionnaires (appendix E). Questionnaires were completed on paper forms by HCWs. The questionnaire had 3 sections; the first section was basic demographic information, the second part had 7 constructs/domains each consisting of 4 questions each and the third was a validated 4 question measure of acceptability called the Acceptability of Intervention Measure (AIM) (24). All questions were on a 5-point Likert scale and the scoring was as follows, strongly disagree = 1, disagree = 2, neither agree nor disagree = 3, agree = 4, strongly agree = 5. The questionnaire comprised of 41 total questions; 9 demographic questions and 32 Likert items on a 5-point scale. Each participant was assigned a unique study I.D number, which appeared on the questionnaire.

2.5.2. Qualitative data collection

A semi-structured interview guide with open ended, non-directed questions was developed using questionnaire responses and the TFA (appendix B). Interviews were conducted by the researcher in a venue at the clinic, which was convenient for the HCW. The duration of the interviews varied and lasted between 8 and 10 minutes. All interviews were conducted in English and were audio-taped and later transcribed. Interviews were carried out until there was a saturation of ideas.

Table 1.1: Data collection tools by objective

Objective	Data collection tool
1. To determine the acceptability of IPT among HCWs in Gaborone, Botswana.	**PHASE 1 (Quantitative data):**The Acceptability Implementation Measure (AIM) by Weiner was used to determine acceptability of IPT (24). This is a validated measurement tool for acceptability consisting of 4 questions or Likert items on a 5-point scale. Likert item responses range from strongly disagree [1] to strongly agree [5] (appendix E). The AIM was adapted for the study.
2. To investigate the factors that influence the acceptability of IPT among HCW in Gaborone, Botswana	**PHASE 1 (Quantitative data):** Questions were developed using the TFA framework as well as factors affecting acceptability of an intervention as stated in the literature. Constructs from the TFA framework were used as sections of the questionnaire; the seven constructs were burden, affective attitude, ethicality, perceived effectiveness, intervention coherence, self-efficacy and opportunity cost (33). Appropriate questions relating to the heading followed under each section. Every construct had 4 questions or Likert items, each on a 5-point scale, and answers ranged from strongly disagree [1] to strongly agree [5] (appendix E).
2. To investigate the factors that influence the acceptability of IPT among HCW in Gaborone, Botswana	**PHASE 2 (Qualitative data):** The researcher collected data using a semi-structured interview guide (appendix D). The interviews determined the factors associated with acceptability in more detail, and each interview lasted approximately 8 to 10 minutes.

2.6 Data Management

2.6.1. Quantitative data

Quantitative data was collected using paper questionnaires. The researcher and a trained research assistant then entered the into a Research Electronic Data Capture database (REDCap; version 8.6.2, Vanderbilt University) (44). REDCap is an open source software for clinical studies which was used for both questionnaire design and data. The data was exported from REDCap into Microsoft Excel and subsequently uploaded onto STATA Version 15.0 for analysis. Prior to analysis, all the data was checked for any errors, de-identified and any scoring on negatively worded questions was reversed.

2.6.2. Qualitative data

All Interviews were audiotaped and transcribed verbatim. Any responses that were given in Setswana were translated to English before transcription. The researcher and an assistant cross checked for errors and proofread the transcripts.

All the data will be stored for a period of 4 years from the time of collection (2018). Documents containing raw data (transcripts, questionnaires and consent forms) have been kept in a secure, locked cupboard, which only the researcher has access to. All soft copies of the questionnaires are stored safely on REDCap, and all electronic transcripts are in a password protected computer. Audio files are also in a password protected folder on the researcher's computer. For confidentiality, all the data was de-identified before analysis. The results from this study will be disseminated through publications and conference presentations as well as to the ministry of health and all HCWs who took part.

2.7 Variables and Measurements

2.7.1. Outcome Variable

Acceptability of IPT was the outcome variable. Acceptability was measured as a continuous variable and was determined using responses from the AIM section of the questionnaire. Acceptability was calculated using the mean score of the 4 AIM questions. The 4 questions assessed whether IPT is appealing to the respondents, whether it meets their approval, whether they like IPT and welcome it. The AIM questions showed good psychometric properties in trials done by Weiner and colleagues (24). The mean of the AIM questions took values between 1 and 5. Cut off points have not been determined yet in the AIM questionnaire, so for this study, a mean AIM score of less than 3 on the questionnaire was regarded as low acceptability, whereas a high acceptability was a mean score of 3 or more.

2.7.2. Explanatory Variables

Factors affecting acceptability were the dependent variables in this study and were measured as continuous variables. 7 different factors were hypothesized to affect acceptability and were developed using the TFA framework by Sekhon et al (33). Constructs from the TFA framework were used as the different sections of the questionnaire; these were burden, affective attitude, ethicality, perceived effectiveness, intervention coherence, self-efficacy and opportunity cost (33) (appendix B). Appropriate questions relating to the heading followed under each section. Every section had 4 questions or Likert items, each on a 5-point scale, and answers ranged from strongly disagree [1] to strongly agree [5]. Factors were measured as continuous variables,

based on the mean score of the 4 questions within a particular section. Each section had a mean score between 1 and 5 (Low score= <3, High score= 3 or more). Other variables were from the demographic section and included age, sex, occupation and work experience, some of them were categorical and some continuous.

2.8 Data Analysis

2.8.1. Quantitative data

All quantitative data was exported to and analyzed using STATA version 15.0 (Stata statistical software, Stata Corporation, College station, Texas, USA). Before analysis, reverse scoring of negatively phrased questions and recoding was done so that all questions were in the same direction. Each section of the questionnaire was analysed differently. For this analysis, each section represented a Likert scale and each question within a construct represented a Likert item.

Firstly, descriptive analysis of all the data was carried out. For the demographic section, this was the predominant analysis. The second part of the questionnaire had not been validated, therefore this had to be done for each of the seven sections. In order to determine the scale quality and internal reliability of the questions, Cronbach's alpha for each construct was calculated using the questions in each section. Although the AIM questionnaire was validated, it had never been used to measure IPT acceptability, so the same analysis was carried out. A reliability coefficient of 0.65 or more was deemed significant.

To determine the main outcome variable, acceptability, HCW responses on the AIM questionnaire were used (appendix E). Acceptability was measured using central measures of tendency, mean and standard deviation as well as the median and interquartile range. Each of the 4 AIM questions were given a score from 1 to 5 on a Likert scale and the mean of the 4 scores was the acceptability score (maximum score is 5, minimum score 1). Low acceptability was an average score of less than 3, High acceptability was a score of 3 or more. Individual questions were also analysed using descriptive statistics. Frequencies of responses were reported, and graphs were used where appropriate to demonstrate responses. The acceptability among HCWs was also reported using proportions and percentages. The factors influencing acceptability were also measured as continuous variables, based on the mean score of the set of questions within a particular section and the same cut offs applied.

To compare the acceptability between groups, univariable linear regression models were fitted. Simple linear regression models were also used to examine the relationship between the acceptability score and other scales (Table 3.5). Statistical significance was assessed using two-tailed testing at the 5% significance level. Since the acceptability score did not have an underlying normal distribution, robust estimation of standard errors was used to correct the standard errors and allow for more conservative inference. Additionally, graphical representation was done using 2-way scatter plots and a correlation coefficient was computed and used to evaluate the strength of the relationship (appendix B).

Once relationships were determined, a multiple regression model was fitted and adjusted for potential confounders such as occupation, potential confounders were determined prior. Factors influencing acceptability were used as the covariates, and were regressed against the outcome, acceptability. Fitting a model allowed us to identify covariates that best predict acceptability. Socio-demographics variables such as age and sex that were potential confounders were also included in the model (Table 3.6).

2.8.2. Qualitative data

The interviews were transcribed verbatim by the researcher. After transcription and translation, a coding matrix was developed, using the theoretical framework of acceptability by Sekhon et. al (33). After the main codes were developed, more specific codes for the transcripts were developed; this was done manually, where the researcher and an assistant engaged in line by line analysis of the transcripts using the coding matrix. Thematic analysis of the transcripts was done after they were coded, and themes and categories which addressed the research question and objectives were analysed in greater depth. Quotes representing each theme, and which supported the overall objectives of the study were derived from the text.

To triangulate data from the questionnaires and interviews, factors that emerged from the quantitative section as being important in determining acceptability of IPT, were compared to themes which emerged from the qualitative inquiry; any similarities in findings were noted.

2.9. Ethical Considerations

This study was approved by the Human Research and Ethics Committee (Medical), at the University of the Witwatersrand (reference number M180140) as well as the Botswana Ministry of Health ethics committee (reference number ST347-18), (appendix F). Permission to enter the clinics was also obtained from hospital superintendents and chief medical officers at the health facilities. All participants received an information sheet before participating in the study. For the quantitative phase of the study, completing the self-administered questionnaire was automatically taken as consent. However, for the interviews, participants had to sign an informed consent form to allow audio recording (appendix C). Each participant was interviewed one on one to ensure privacy and no names or identifiers were used during data analysis.

CHAPTER 3: RESULTS

3.0. Introduction

The findings from both the quantitative and qualitative data analysis are presented in this chapter. Tables, charts and graphs are used to illustrate the quantitative findings, whereas quotations are used to present themes that emerged from the qualitative enquiry.

3.1. Demographic characteristics of study population

The total number of HCWs that completed the questionnaire was 97, of which 33 (34%) were male and 64 (66%) were female. Nurses accounted for the majority of the study population (91%). Just over half of the HCWs were over the age of 35 (52.6%) and 75% had over 5 years of work experience. Selected demographic characteristics of the HCWs are presented in Table 3.1.

Table 3. 1 Socio-demographic characteristics of healthcare workers.

Socio-Demographic Variables	Number (percentage %)
Male	33(34)
Female	64(66)
Age category:	
18-24 years old	3(3.1)
25-35 years old	43(44.3)
>35 years old	51(52.6)
Occupation:	
Medical Specialist	1(1.0)
Medical Officer	4(4.1)
Registered Nurse	89(91.8)
TB coordinator	3(3.1)
Time in Profession	
< 6 months	1(1.0)
6-12 months	3(3.1)
12-24 months	5(5.2)
2-5 years	13(13.4)
>5 years	75(77.3)
Education	
Diploma	66(68.0)
Degree	25(25.8)
Masters	6(6.2)

3.2. Internal reliability of questionnaire items

Questionnaire internal reliability and consistency was measured using Cronbach alpha (Table 3.2). An alpha score of 0.65 or more was deemed significant. All the constructs scored > 0.65 on the Cronbach alpha test using the 4 questions under the respective construct, so the questions had high internal reliability. The AIM questionnaire, which is already validated by Weiner et al (24), had a high Cronbach alpha score of 0.9502.

Table 3. 2: Cronbach alpha scores for questionnaire items

Construct	Cronbach alpha
Intervention coherence	0.92
Perceived effectiveness	0.95
Affective attitude	0.65
Self-efficacy	0.70
Burden	0.83
Opportunity cost	0.73
Ethicality	0.73
Acceptability Intervention Measure (AIM)	0.95

3.3. Acceptability of IPT among HCW

Acceptability of IPT was measured using the AIM questionnaire (24). The mean score on the questionnaire was taken as the acceptability score of the HCWs. The mean acceptability score was 3.51 and the median acceptability score was 3.5 (IQR: 1.25-5). The range of scores was from 1 to 5. The Shapiro Wilks test established that acceptability was not normally distributed, and a histogram and a box plot of acceptability scores confirmed the same (Figure 3.1 and Figure 3.2).

Figure 3.1: Histogram of acceptability of IPT amongst healthcare workers

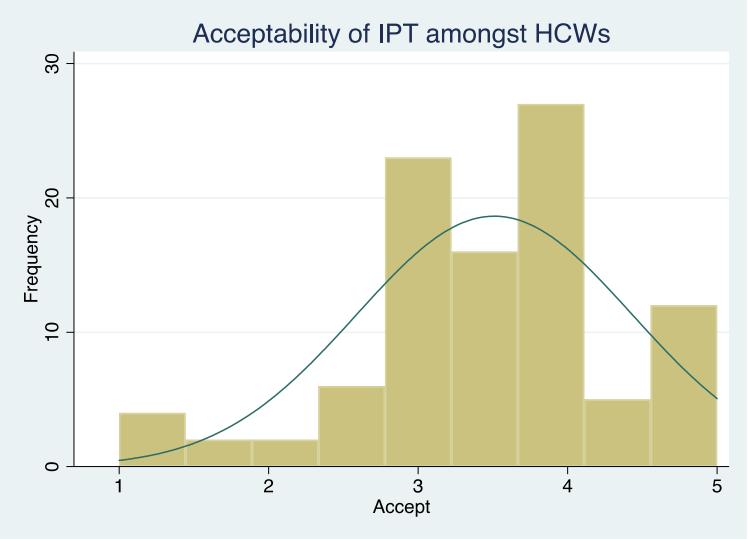
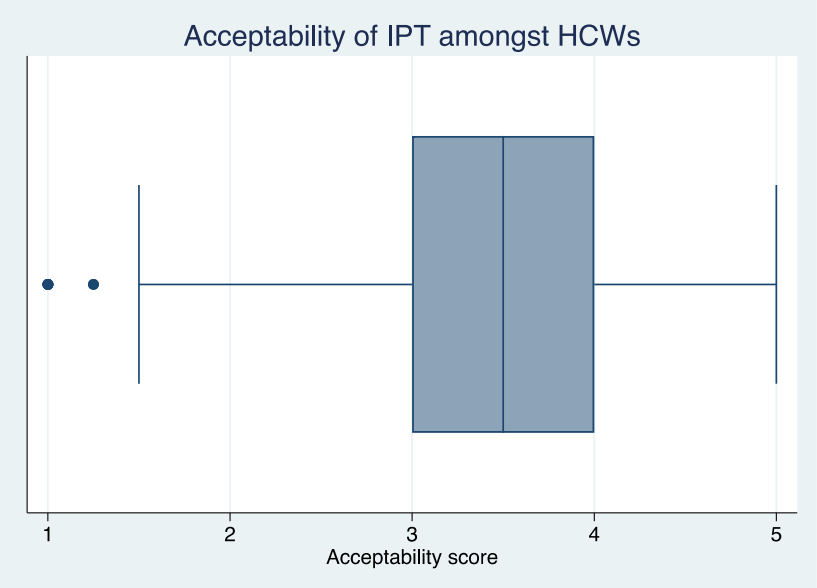


Figure 3. 1: Box and whisker plot of acceptability of IPT amongst healthcare workers



Males had a higher mean score than females; 3.58 compared to 3.48. With regards to age categories, the highest acceptability was noted in the 18-24 year olds (mean = 3.83), with the lowest being in the 25-35 year olds (3.44). Medical officers had the highest acceptability scores amongst the occupations (4.56), and nurses had the lowest scores (3.45). When looking at qualifications, the lowest mean acceptability scores were seen in those with a diploma (3.38) and the highest scores in those with Masters degrees (3.92). In terms of clinics, the highest mean acceptability score was recorded at Broadhurst 3 clinic (3.89) and the lowest score was from Broadhurst Traditional clinic (2.6).

Inferential statistics were used to evaluate whether the differences between categories were statistically significant. A Wilcoxon rank sum test revealed no significant difference in acceptability between males and females. Kruskal Wallis testing was carried out to assess for any significant differences in acceptability by various categories and showed that acceptability scores were not significantly different between age groups, education levels nor length of time in a profession or facility. However, a statistically significant difference in acceptability scores was found between different health facilities and between occupations. In addition, univariable linear regression models were also fitted to see whether the mean acceptability score differed between categories. These models did not find significant differences between males and females. However, statistically significant differences in acceptability scores were found between different age groups, occupations and depending on time spent in a profession or facility. The results are summarized in Table 3.5.

Table 3. 3: Mean acceptability scores by socio-demographic variables

Socio- Demographic Variables	Mean acceptability (SD)
Male	3.58(0.83)
Female	3.48(0.97)
Age category:	
18-24 years old	3.83(0.29)
25-35 years old	3.44(0.77)
>35 years old	3.54(1.06)
Occupation:	
Medical Specialist	4.00(0)
Medical Officer	4.56(0.52)
Registered Nurse	3.45(0.92)
TB coordinator	3.83(0.52)
Time in Profession	
< 6 months	3.25(0)
6-12 months	3.66(0.58)
12-24 months	3.55(1.00)
2-5 years	3.58(0.76)
>5 years	3.49(0.97)
Education	
Diploma	3.38(0.95)
Degree	3.75(0.84)
Masters	3.92(0.75)

3.4. Factors affecting acceptability and relationship with acceptability

Simple linear regression was carried out to determine associations between factors and acceptability and all of them were statistically significant as independent predictors of acceptability ($p<0.05$). This analysis was used to observe the independent relationship between each variable and acceptability. All the factors had a positive linear relationship with acceptability, except burden and opportunity cost which both had negative linear relationships.

In the univariable linear regression, 4 of the demographic characteristics (age 25-35, being a medical officer or nurse, and spending 12-24 months both in a facility and in one's profession) were significantly positively associated with acceptability. Whereas all of the factors emerged as significant independent predictors of acceptability in the univariable linear regression. Results are summarized in Table 3.5. The mean scores for all the factors affecting acceptability shown in Table 3.4 were higher than 3, except for the 2 that were negatively associated with acceptability (burden and opportunity cost). These low scores for the 2 factors also imply high acceptability as HCWs don't see IPT as a burden or as having a large opportunity cost.

Table 3. 4: Mean and median scores of factors affecting acceptability

Construct	**Mean (SD)** **Median (IQR)**
Intervention coherence	3.92 (0.91) 4 (3.5-4.5)
Perceived effectiveness	3.71 (0.98) 3.75 (3.0-4.25)
Affective attitude	3.70 (0.77) 3.50 (3.0-4.25)
Self-efficacy	3.12(0.81) 3 (2.5-3.5)
Burden	2.66 (0.78) 2.75 (2.0-3.0)
Opportunity cost	2.29 (0.76) 2.25 (2.0-2.75)
Ethicality	3.46 (0.67) 3.5 (3.0-3.75)

Table 3. 5: Univariable linear regression

Variable	Coefficient (95% CI)	p-value
Socio-demographic characteristics		
Sex		
Male (ref)	-	-
Female	-0.099 (-0.474 – 0.28)	0.60
Age		
21-24 (ref)	-	-
25-35	-0.39 (-.75 - -0.32) *	0.033
>35	-0.69 (-0.28- 0.12)	0.166
Occupation		
Medical Specialist (ref)	-	-
Medical Officer	0.56 (0.09-0.11) *	0.015
Nurse	-0.56(-0.75 - -0.36) *	<0.001
TB coordinator	-0.17(-0.66- 0.33)	0.508
Education Level		
Diploma (ref)	-	-
Degree	0.40(-0.01-0.80)	0.056
Masters	0.54(-0.07 – 1.15)	0.082
Time in facility		
<6 months (ref)	-	-
6-12 months	0.079(-0.54-0.69)	0.80
12-24months	0.51(0.34-0.99) *	0.04
2-5 years	0.10(-0.45-0.65)	0.73
>5 years	0.26(-0.28 – 0.80)	0.35
Time in profession		
<6 months (ref)	-	-
6-12 months	0.429(-0.14-0.97)	0.14
12-24months	0.75(0.748-0.750) *	<0.001
2-5 years	0.33(-0.09-0.74)	0.119
>5 years	0.24(0.016-0.47)	0.636
Factors affecting acceptability		
Intervention Coherence	0.25 (0.052-0.45) *	0.028
Perceived Effectiveness	0.55 (0.39-0.70) *	<0.001
Affective Attitude	0.82 (0.64-1.00) *	<0.001
Self-Efficacy	0.30 (0.07-0.52) *	0.036
Burden	-0.79 (-0.97- -0.61) *	<0.001
Opportunity Cost	-0.69 (-0.89- -0.48) *	<0.001
Ethicality	0.80 (0.56-1.03) *	0.001

CI = 95% confidence interval; * = Significant at p-value < 0.05, ref= reference category.

Finally, a multivariable linear regression analysis was carried out, including selected socio-demographic factors. Age, sex and occupation were included in the multivariable linear regression model, as these are potentially important confounders. This selection was made a priori based on the literature. In this model, four socio-demographic variables were significantly associated with acceptability namely age 25-35 years (coefficient: -0.468, 95% CI: -0.72- -0.22), age >35 years (coefficient: -0.492, 95% CI: -0.71- -0.22), being a medical officer (coefficient: -0.462 (95% CI -0.91 - - 0.018) and being a nurse (coefficient: -0.647, 95% CI: -0.96- - 0.34). The multivariable linear regression also revealed affective attitude and burden as significant predictors of IPT acceptability). A unit increase in affective attitude results in a 0.43 (95% CI 0.17-0.68, P=0.001) increase in acceptability. Increasing burden by a unit caused a fall in acceptability of 0.37 (95% CI 0.63 - 0.12). The results are presented in Table 3.6.

Table 3. 6: Multivariable linear regression

Variable	Coefficient (95% CI)	p-value
Socio-demographic characteristics		
Sex		
Male (ref)	-	-
Female	0.61 (-0.21-0.33)	0.655
Age		
21-24 (ref)	-	-
25-35	-047(-0.72- -0.22) *	<0.001
>35	-0.49(-0.71- -0.28) *	<0.001
Occupation		
Medical Specialist (ref)	-	-
Medical Officer	0.46(-0.91- -0.018) *	0.042
Nurse	0.65(-0.96- - 0.34) *	<0.001
TB coordinator	0.51(-1.93-0.92)	0.481
Factors affecting acceptability		
Intervention Coherence	-0.16 (-0.35-0.023)	0.161
Perceived Effectiveness	0.20 (-0.14-0.41)	0.067
Affective Attitude	0.43 (0.17-0.68) *	0.001
Self-Efficacy	-0.06 (-0.26-0.15)	0.567
Burden	-0.37 (-0.60- -0.14) *	0.006
Opportunity Cost	-0.17 (-0.38- -0.05)	0.256
Ethicality	0.97 (-0.35- 0.54)	0.666

R-Squared = 65.8%; CI = 95% confidence interval; * = Significant at p-value < 0.05, ref= reference category.

3.5. Qualitative Results

All participants with mean acceptability scores < 3 were eligible for interview and 11 of the 97 participants were eligible. Of the 11 with a low mean acceptability score, 6 of them consented to interview and of the 6 interviewed, only one was male. All of the participants that had low acceptability scores (<3) were nurses. Themes that emerged from their interviews are highlighted below.

3.5.1 Intervention/IPT related factors

These are factors which affected acceptability that were related to the intervention itself. These were potential development of drug resistance, burden of IPT on workload in the clinic as well as how effective interviewees thought IPT was.

Development of drug resistant TB

Participants were concerned about the development of drug resistant TB. The majority of the interviewees believed that using IPT predisposed patients to resistance to TB medications should they need them later on and preferred that only those who develop active TB should be treated.

"Myself I can say it is not appropriate because if I'm given that treatment and I'm not sick, I'm not going to comply. Consequently, I will develop resistance when I'm supposed to begin that same treatment when sick, since I have been exposed to that medication before." (Nurse, clinic 1)

"I feel that if someone gets TB, let's treat them. Prophylaxis generally is a good thing to prevent something…What I mean is, prevention is better than cure definitely. But then, this IPT one I'm not so sure about. Like what about resistance? What are we going to do after that?" (Nurse, clinic 2)

"Since it was one of the drugs that was used to treat TB, I heard claims that it was predisposing patients to drug resistant TB. So, me I don't think it is a useful intervention, no I don't." (Nurse 2, clinic 1)

"According to me, I don't rate IPT. It's better to wait for the client to develop TB, then treat. Because, the patient can end up developing resistance due to this IPT drug by the time they have to take treatment, just because he or she had previously taken the 6 months course." (Nurse, clinic 3)

"Since it is taken for 6 months. I see it as a waste of drugs, it should be stopped, rather wait to use it when a patient has contracted mycobacterium." (Nurse, clinic 4)

"I feel it can result in someone developing resistance to Isoniazid and end up having drug resistance. I don't support it because we have MDR or Multi Drug Resistant TB now, but before IPT there was no MDR. Now most of the patients with MDR, they started with IPT. Isn't it when we talk of drug resistance, we are talking about resistance to these two main pills Rifampicin and Isoniazid? So, I think by the time one really needs it, it won't work. I think if someone doesn't have TB, let's leave them, when they get infected with TB, we will treat TB as TB. That's what I think… (laughs)" (Nurse, clinic 5)

Perceived effectiveness:

Most of the participants that were interviewed did not think that IPT was effective and thought that it would not achieve its intended purpose. They highlighted the fact that it is not useful and patients who take IPT end up getting TB anyway.

"Ah, myself I don't recommend IPT. I don't see any benefits. Because patients who were on IPT, they ended up having TB." (Nurse, clinic 4).

All I see is that I actually do not believe in IPT in the first place. In fact, there's a 50/50 chance of getting TB. When you have low immunity then you will get TB sometimes, right? So, if we assume half of everyone with HIV will get TB then there's no point, I think. "(Nurse 2, clinic 1)

"Giving that IPT to an HIV patient who doesn't have TB, well I see it as exposing a patient to a drug that might not work the next time the patient is actually sick. Adding more drugs may result in liver toxicity too, like for patients already on HAART. These are one of the things that we should avoid and prescribe fewer drugs as much as possible. This thing is not useful" (Nurse, clinic 2).

3.5.2. Provider/ HCW related Factors

Burden of IPT and effect on workload:

Most HCWs felt that IPT was not a burden and would not have much effect on their workload. They felt that they would adapt easily to it and find ways to integrate it into the work they are already doing.

"It is nothing hectic or anything, it's a matter of giving a patient the medication and availing the drug, that's it. Nothing much because I always give medications and it's a medication just like any other, so I don't think it's a problem or extra work." (Nurse, clinic 4)

"Well, I don't think there are any effects on my duties because then we'll have to have a nurse who will be allocated for IPT just like we will do with other duties." (Nurse, clinic 3)

"We won't give up much per se, but myself I can say I will be comfortable but problem is that it is going to increase the waiting period for patients because you have to give all the services at the same time for a certain client so you will have to take more time." (Nurse 1, clinic 1)

"We won't have to give up other duties to give IPT or not really because that is a drug like any other drug so it's just okay. You just add it when dispensing" (Nurse 2, clinic 1)

"There is no how you can neglect other duties for it, there is no how. You just have to somehow squeeze it in your schedule. Maybe to make it easier, we can have bookings like we do at sexual and reproductive health clinic. Although we may have to reduce our booking numbers for other services in order to cater for IPT patients." (Nurse, clinic 5)

"Eish, I think there is a lot we are doing currently, it will increase the workload." (Nurse, clinic 2)

Self-Efficacy and the need for training:

HCWs were confident administering and prescribing IPT. They were comfortable with the task although most did not know the exact doses of the drug used. They however felt that they could easily learn what they did not know and proceed with the task if needed. Most HCWs expressed the need for more training on the use of IPT. The intervention has not been routinely used in the Botswana health system for a few years and most of the HCWs would appreciate more training on it, especially the ones with less work experience.

"Yes, I am confident diagnosing and or ruling out active TB & prescribing IPT." (Nurse 1, clinic 1)

"Yes, most definitely. I wouldn't mind being trained if it's being reintroduced. I don't know much about IPT. I'd appreciate it if we could get some training on it." (Nurse, clinic 3)

"I'm confident ruling out and diagnosing TB and seeing who needs IPT. I trained in 2008, so if there are any new implementations in the training or something has changed, I don't have any problem learning." (Nurse 2, clinic 1)

"I'd be confident. Yes, if there are no changes. Because since we used to give it years ago, I know it. I would definitely appreciate refresher training though." (Nurse, clinic 4)

"I would appreciate some training in the use of IPT as I have not used it before except in children being administered with it in the clinic." (Nurse, clinic 5)

Intervention Coherence:

All of the participants that were interviewed knew what IPT was and had some basic understanding of how it works. They were all aware that it is used for prevention of TB in vulnerable populations, including in HIV positive individuals. Some of them had previous experience administering IPT and therefore had more knowledge on the topic than others.

"I know that it was a program that was started by the government for HIV positive patients who were screened for TB, if they were known not to have TB then they were started on IPT for 6 months". (Nurse, clinic 4)

"Ok Isoniazid Preventative Therapy hmm…From what I read and from what I've heard it's a prophylaxis given to HIV positive people to prevent active TB infection. It came before I started work, so I don't know if I'm right or not. "(Nurse, clinic 5).

"Umm IPT, my little knowledge that I have, I only know that a TB drug was used previously. Even today it's still being used. The Isoniazid tablet is used to prevent TB in HIV positive clients. I know that it was used before, around 2010, back then. "(Nurse, clinic 3)

CHAPTER 4: DISCUSSION, CONCLUSION AND RECOMMENDATIONS

No previous study has assessed acceptability of IPT amongst HCW's in Gaborone, Botswana before. This study is also the first to look at the factors affecting acceptability in this context. The study assessed whether seven different factors affected acceptability, these were burden, affective attitude, self-efficacy, perceived effectiveness, intervention coherence, ethicality and opportunity cost. Nurses accounted for the majority of the study population (91%) and the mean acceptability score amongst the HCW, which was determined using a 5-point Likert scale was found to be 3.51. Statistically significant differences in acceptability scores were found between professions and health facilities. Both sections of the study identified burden as a significant determinant of acceptability of IPT. The factors that were significantly associated with acceptability in the quantitative section were affective attitude and burden. The qualitative enquiry highlighted burden and perceived effectiveness as important when assessing IPT acceptability. This chapter discusses the findings from the results section in detail, as well as provides conclusions and recommendations based on these findings.

4.1 Acceptability of IPT

The mean acceptability score in this study was found to be 3.51. The lowest possible mean score was 1, the highest was 5 and anything below 3 was considered low, so the score of 3.51 was moderate. There was a scarcity of studies on IPT implementation in Botswana or how acceptability affects it. Only one other study looked at acceptability of IPT in the Kenyan context and also found acceptability of IPT amongst HCWs in Nairobi to be moderate (28).

Differences in mean acceptability scores were evaluated between health facilities and by occupation, age, sex, health facility, time in facility and time in profession. Statistically significant differences in mean acceptability were noted between occupations and health facilities. Doctors had the highest scores and nurses had the lowest. This might be explained by the fact that when it comes to IPT administration, nurses tend to do the bulk of the work and therefore are more aware of the challenges and difficulties of IPT administration. The fact that health facilities showed significant differences possibly just reflects that some are better resourced than others, with things such as medicines, access to trainings and human resources.

4.2 Factors affecting acceptability of IPT

This study revealed factors affecting acceptability that were similar to those found in the literature. Several factors were looked at and evaluated to see whether they affect acceptability. These were demographic characteristics, and the seven factors based on the study by Sekhon et al (30). Both sections of the study revealed that burden was a significant determinant of acceptability of IPT. Of the seven factors that were evaluated, affective attitude and burden were shown to be significantly associated with acceptability in the quantitative part, whereas the qualitative part revealed that acceptability of IPT can be influenced by intervention related factors or health-worker related ones. Comparably, the Kenyan study by Wambiya and colleagues, found patient and intervention related factors to be the most significant predictors of IPT acceptability (28).

Scatter plots were used to determine the direction and strength of the relationship between acceptability and the factors thought to affect acceptability (appendix B). All the factors had a positive linear relationship with acceptability, except burden and opportunity cost which both had negative relationships. These two factors both reflect negative views about acceptability and the fact that they have a negative relationship is a positive finding which suggests that HCWs didn't perceive IPT as burdensome or having a large opportunity cost. In the multivariable model, unit increases in the variables that were significantly associated with acceptability, lead to somewhat large changes in acceptability; on a scale of 1-5, a mean change of 0.43 as with affective attitude is a notable one. Adjusted R-squared for the adjusted model was 0.658, indicating that 65.8 % of the variation in acceptability is due to the model.

Burden emerged in both sections of the study. In the quantitative section which included 97 healthcare workers, the low mean burden score (2. 66, SD=0.78) reflected that HCWs don't find IPT to be a burden. This was supported by the interviews, where most HCWs did not see IPT as a burden or increasing their workload. HCWs that were interviewed were only those with a low overall acceptability score, so their findings are not representative of all healthcare workers.

In addition, following interviews conducted with healthcare workers, factors affecting the acceptability of IPT were categorized into 2; intervention related factors and provider related factors. Development of drug resistant TB was a concern that came up with several HCWs and this affected whether they were willing to give IPT to patients. Interviews further revealed that although most HCWs knew what IPT was, they were not completely confident administering it

and needed further training. Similar to the quantitative findings, HCWs did not think of IPT administration as a possible burden or adding to their workload. Some of the qualitative findings were consistent with other studies assessing IPT implementation in the literature.

4.3 Strengths and Limitations of the study

4.3.1 Limitations

The sample size used in this study was small and this might affect validity and reliability of results, however a larger study was not feasible given the time and resources available. Robust estimation of the variance was used to adjust the standard errors for non-normality of the acceptability score, therefore it was not possible to simultaneously adjust for the clustering of respondents within clinics, so it is possible that the standard errors given in the linear regression are too small.

HCWs in public health facilities are often overworked and have very limited time, therefore asking them to fill out a questionnaire was met with resistance from some and even those who obliged sometimes rushed through the responses. Another possible limitation to this study was non-response bias as some participants did not respond to the questionnaire, only 88% responded. In addition, leaving a box in health facilities as a way to avoid disrupting HCWs duties and giving them time to complete questionnaires proved futile and contributed to HCWs not submitting questionnaires. To counteract these issues, the researcher had to visit the sites beforehand establish a rapport with clinical staff and ensure that they understood the

importance of the study. She also waited for those who had collected forms to complete them to avoid a low response rate.

Only 6 of the 11 eligible HCWs were interviewed as the others either did not consent or were unavailable at the time. Although it appeared that a saturation of ideas was reached within these 6 interviews, the study could have benefited from a wide range of interviews from different centers. Social desirability bias may have been an issue with some of the interviews, as interviewees may have crafted their responses to appear knowledgeable and in agreement with the use of IPT. Data from the interviews was also not as robust as the quantitative data as it cannot be tested for statistical significance allowing us to draw conclusions.

The study was conducted in the capital city, Gaborone, so the results may not be representative of the rest of the population. Gaborone health facilities tend to have more resources and staff than most facilities around the country. In addition, the small sample size in this study means that some of the findings were not generalizable to the general population.

The fact that only those with a low acceptability score were interviewed means that the qualitative findings were not really reflective of the whole study population or even the general HCW population. Only interviewing those with a low acceptability score, also meant that it was difficult to truly link the qualitative and quantitative findings. Some interviews conducted in Setswana information might have been lost when translating and transcribing them to English.

4.3.2 Strengths

This was the first study of this kind, evaluating the acceptability of IPT amongst healthcare workers in Botswana. Mixed methods were a strong choice of study design, that allowed for triangulation of ideas and full understanding of the issue. This study design allowed us to get a deeper understanding of the research question and answer the objectives better than we could have done with quantitative or qualitative methods alone. Furthermore, acceptability was measured using a validated tool, which makes our results more reliable.

4.4 Conclusion

Acceptability of an intervention can impact its overall effectiveness and affect how it is delivered; therefore, these findings warrant further investigation as they may impact IPT rollout in the country (22, 30). Factors that emerged as important during this investigation, such as affective attitude and burden as well as those that were highlighted by the in-depth interviews, give policy makers and implementors an idea of areas to focus on during the roll out of IPT. Acceptability of IPT amongst healthcare workers in Gaborone is dependent on their affective attitude and whether they consider it a burden. Overall, IPT was an acceptable intervention amongst healthcare workers with a mean acceptability score of 3.51. This score implies that IPT will be implemented well if the factors affecting it are closely addressed. Most of the work related to implementing IPT in this context appears to be done by nurses, therefore interventions and policies would be better targeted towards them. IPT is currently being rolled out, so it is important that it is implemented correctly and that healthcare workers find it

acceptable. Identifying gaps in IPT implementation will allow policy makers to be able to develop appropriate policies to address them and therefore improve uptake and usage. The findings of this study could have implications for TB preventative therapy and policy makers in the Botswana ministry of health. The study demonstrates the importance of considering implementation outcomes when introducing a new intervention and not just focusing on the logistical and financial aspects. This study can help policy makers know where to focus their efforts and resources.

4.5 Recommendations

In this context, affective attitude of healthcare workers and whether they see IPT as a burden needs to be a major focus during implementation and rollout as these 2 factors were significantly related to acceptability. So, ensuring that the effort required to deliver this intervention isn't overwhelming for HCWs is key; having enough trained staff with adequate resources will be useful. Also constantly evaluating their ideas, feelings and challenges about IPT rollout will be crucial to ensuring HCWs are motivated to give IPT and their affective attitude remains high.

It is clear that nurses do the bulk of the work when it comes to this service, so perhaps efforts to improve its implementation would be better targeted at them. Trainings and teaching healthcare workers about IPT would also be an important aspect of its implementation. HCWs cannot simply be expected to deliver a service that they do not fully comprehend. Also, this study revealed perceived effectiveness and affective attitude as being significant, so teaching

HCWs about the effectiveness of this intervention is key. Dispelling myths and beliefs that healthcare workers have about IPT will allow them to have better acceptance of the intervention. The fact that it was just stopped abruptly without explanation or reason, leaves a lot of room for interpretation or ideas. Most HCWs then believed that there was something wrong with it, hence its discontinuation.

Finally, data driven decision making is a key part of the implementation process in public health, this study recommends that key stakeholders, implementing partners and policy makers make sure to involve healthcare workers who deliver the intervention when making decisions and planning. More research and data collection should be done at the facility level to assist in these decision-making processes and policy formulation. Further studies are needed to guide the implementation and scale up of IPT, in Botswana. In addition, other implementation outcomes will need to be evaluated to ensure optimum roll out.

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APPENDICES

Appendix A: Plagiarism Declaration



PLAGIARISM DECLARATION TO BE SIGNED BY ALL HIGHER DEGREE STUDENTS

SENATE PLAGIARISM POLICY: APPENDIX ONE

I Thandi Milton (Student number: 0714477x) am a student registered for the degree of MSc Epidemiology (Implementation science) in the academic year 2021.

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.
- I have included as an appendix a report from "Turnitin" (or other approved plagiarism detection) software indicating the level of plagiarism in my research document.

Signature: _____ Date: 20/05/2021

Appendix B: Additional tables and figures

Table B 1: Theoretical framework of acceptability

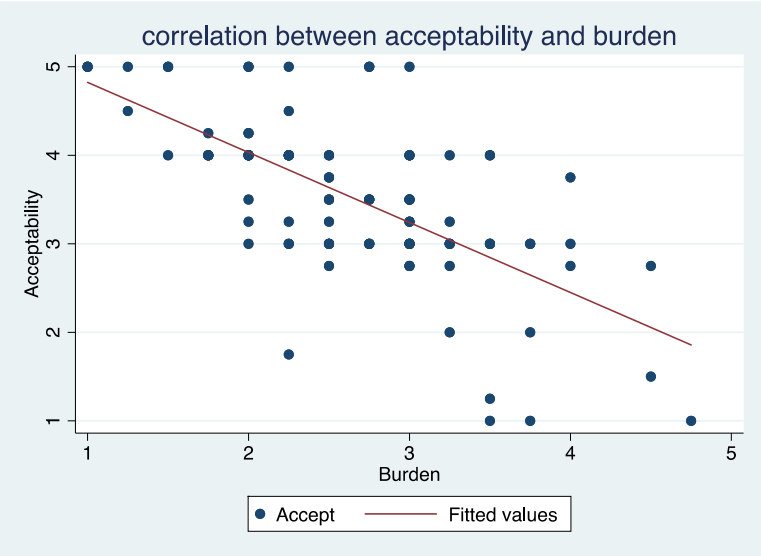
Source of table: Sekhon et. Al, 2017 (33)

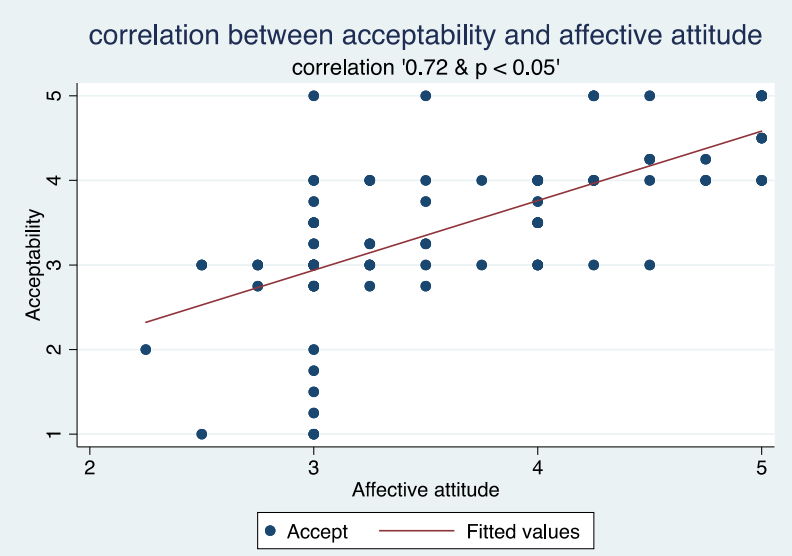
Ethicality	The extent to which the intervention has good fit with an individual's value system
Affective Attitude	Anticipated Affective Attitude: How an individual feels about the intervention, prior to taking part Experienced Affective Attitude: How an individual feels about the intervention, after taking part
Burden	Anticipated burden: The perceived amount of effort that is required to participate in the intervention Experienced burden: the amount of effort that was required to participate in the intervention
Perceived effectiveness	Anticipated effectiveness: the extent to which the intervention is perceived to be likely to achieve its purpose Experienced effectiveness: the extent to which the intervention is perceived to have achieved its intended purpose
Self-efficacy	The participant's confidence that they can perform the behaviour(s) required to participate in the intervention
Intervention Coherence	The extent to which the participant understands the intervention and how it works
Opportunity costs	The extent to which benefits, profits, or values must be given up to engage in an intervention

Table B 2: Spearman correlation scores.

Variable/Construct	Spearman correlation (Rho)
Intervention coherence	0.38
Perceived effectiveness	0.67
Affective attitude	0.72
Self-efficacy	0.32
Burden	-0.67
Opportunity cost	-0.60
Ethicality	0.63

Figure B 1: Scatter Plots of statistically significant factors





Appendix C: Informed consent forms and information sheets

INFORMATION FORM: SELF ADMINISTERED QUESTIONNAIRE

Study title: Acceptability of Isoniazid Preventative Therapy for tuberculosis, among healthcare workers in Gaborone, Botswana.

Introduction: Hello, my name is Thandi Milton. I am a student at the University of Witwatersrand in Johannesburg, South Africa where I am studying for an MSc in Epidemiology and implementation science. I am doing a study for my Masters project about Isoniazid Preventative Therapy (IPT) for Tuberculosis. I want to find out the acceptability of IPT by Healthcare workers (HCWs) in Gaborone. The purpose of this questionnaire is to help me answer the question below.

Research Question: *What is the level of acceptability of Isoniazid Preventative therapy (IPT) among health care workers (HCWs) in Gaborone, Botswana?*

Why are we doing this? Botswana has one of the highest HIV prevalence rates worldwide and a very high TB/HIV coinfection rate. Studies have shown that Isoniazid is an effective Preventative therapy for TB, especially amongst HIV positive people. The Botswana National TB Program (BNTP) adopted the use of Isoniazid for TB prevention in 2001, however implementation and use of IPT has been very slow. **Currently, IPT is not being used in health facilities in Gaborone.** Acceptability of an intervention by healthcare workers can affect its implementation and use. The aim of this study is to determine the acceptability of IPT among HCWs in Gaborone. We want to identify the factors that influence this acceptability and find out how these factors are associated with acceptability of IPT by HCWs. **The acceptability of IPT among HCWs in Botswana has not been established**. By establishing this, government might be able to identify ways to improve IPT implementation and use; this will ultimately impact TB prevalence rates in the country.

Invitation to participate: As a health care worker in a clinic in the greater Gaborone area, we are inviting you to participate in this research study.

What is involved in the study:

If you agree to take part in this study, you will be taking a questionnaire. The questionnaire is self-administered, and consent is implied by filling in the questionnaire. The questionnaire

will take a maximum of 15 minutes to complete. This is a mixed methods study and data will be collected using both questionnaires and interviews. It will take place in Gaborone, over the next 2-3 months. If you agree to take part in the study, you will answer a questionnaire. The questionnaire consists of 42 questions which are related to the research question above. Approximately 80 other healthcare workers at different health facilities in Gaborone will also take this questionnaire. From those 80 healthcare workers, some will be sampled for interview later, so there is a possibility that you will be interviewed as well.
You will be given pertinent information on the study while involved in the project and after the results are available.

Risks: There are no risks involved in being a part of this study. Your identity will be protected and the information you provide will be treated with the utmost confidentiality. Only the study team will have access to the information, and documents will be stored securely for up to 2 years.

Benefits: There is no assurance that you will benefit directly from the study. However, by participating, you will be able to contribute to this body of knowledge, and help in answering this important public health question which might ultimately improve TB patient care in Botswana in the long term.

Participant Rights: Your participation in this study is voluntary. You may withdraw from the study and discontinue participation at any time, without penalty, loss of benefits to which you are otherwise entitled. If you choose to withdraw, please inform the researcher. You have the right to refuse to participate in this study, refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled.

Reimbursements: None. No anticipated additional costs to study participants.

Confidentiality: Efforts will be made to keep personal information confidential.
For data analysis, you will be given a unique participant identification number, and no personal information will be used.
Personal information may be disclosed if required by law, therefore absolute confidentiality cannot be guaranteed.
The data will be stored in a secure location, where only the research team will have access to it for up to 2 years.
Organizations that may inspect and/or copy your research records for quality assurance and data analysis include the Research Ethics Committees of the University of Witwatersrand and the Botswana Ministry of Health.

If results are published, this may only lead to clinic or health facility identification.

Thank you for taking the time to read this.

For further information or questions related to the study please contact me, Thandi Milton on +267 74207717 or 0714477x@students.wits.ac.za .

If you have any concerns or complaints about the study, you can report these to the Wits Human Research Ethics Committee (HREC) on the details below:
Chair: Professor Peter Cleaton-Jones at cleaton-jones1@wits.ac.za or 011 717 2301.
Research Administrators: Mr Rhulani Mkansi at Rhulani.Mkansi@wits.ac.za and Ms Zanele Ndlovu at zanele.ndlovu@wits.ac.za . Or call 011 717 1252/2700/1234/2656

INFORMATION FORM: INTERVIEW

Study title: Acceptability of Isoniazid Preventative Therapy for tuberculosis, among healthcare workers in Gaborone, Botswana.

Introduction: Hello, my name is Thandi Milton. I am a student at the University of Witwatersrand (Wits) in Johannesburg, South Africa where I am studying for an MSc in Epidemiology and implementation science. I am doing a study for my Masters project about Isoniazid Preventative Therapy (IPT) for Tuberculosis. I want to find out the acceptability of IPT by Healthcare workers (HCWs) in Gaborone. The purpose of this interview is to help me answer the question below.

Research Question: *What is the level of acceptability of Isoniazid Preventative therapy (IPT) among health care workers (HCWs) in Gaborone, Botswana?*

Why are we doing this? Botswana has one of the highest HIV prevalence rates worldwide and a very high TB/HIV coinfection rate. Studies have shown that Isoniazid is an effective Preventative therapy for TB, especially amongst HIV positive people. The Botswana National TB Program (BNTP) adopted the use of Isoniazid for TB prevention in 2001, however implementation and use of IPT has been very slow. **Currently, IPT is not being used in health facilities in Gaborone.** Acceptability of an intervention by healthcare workers can affect its implementation and use. The aim of this study is to determine the acceptability of IPT among HCWs in Gaborone. We

want to identify the factors that influence this acceptability and find out how these factors are associated with acceptability of IPT by HCWs. **The acceptability of IPT among HCWs in Botswana has not been established**. By establishing this, government might be able to identify ways to improve IPT implementation and use; this will ultimately impact TB prevalence rates in the country.

Invitation to participate: As a health care worker in a clinic in the greater Gaborone area, we are inviting you to participate in this research study.

What is involved in the study:

If you agree to take part in this study, you will have already taken a questionnaire and will now participate in an interview. This is a mixed methods study and data is collected using both questionnaires and interviews. If you agreed to take part in the study, you have already answered the questionnaire. About 80 other healthcare workers at different health facilities in Gaborone have also taken this questionnaire. From those 80 healthcare workers, some have been sampled for interview.
The interview is a face-to-face interview with the main researcher and will last approximately 20 minutes. It will be scheduled at a date, time and venue convenient to you. The interviews will also be recorded using an audio tape recorder. The reason for this, is so that the information can be transcribed later and used for data analysis. No personal information will be included in the recordings.
As a participant, you will be given pertinent information on the study while involved in the project and after the results are available.

Risks: There are no risks involved in being a part of this study. Your identity will be protected and the information you provide will be treated with the utmost confidentiality. Only the study team will have access to the information, and documents will be stored securely for up to 2 years.

Benefits: There is no assurance that you will benefit directly from the study. However, by participating, you will be able to contribute to this body of knowledge, and help in answering this important public health question which might ultimately improve TB patient care in Botswana in the long term.

Participant Rights: Your participation in this study is voluntary. You may withdraw from the study and discontinue participation at any time, without penalty, loss of benefits to which you are otherwise entitled. If you choose to withdraw, please inform the researcher. You have the

right to refuse to participate in this study, refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled.

Reimbursements: None. No anticipated additional costs to study participants.

Confidentiality: Efforts will be made to keep personal information confidential.
For data analysis, you will be given a unique participant identification number, and no personal information will be used.
Personal information may be disclosed if required by law, therefore absolute confidentiality cannot be guaranteed.
The data will be stored in a secure location, where only the research team will have access to it for up to 2 years.
Organizations that may inspect and/or copy your research records for quality assurance and data analysis include the Research Ethics Committees of the University of Witwatersrand and the Botswana Ministry of Health.
If results are published, this may only lead to clinic or health facility identification.

Thank you for taking the time to read this.

For further information or questions related to the study please contact me, Thandi Milton on +267 74207717, or email 0714477x@students.wits.ac.za

If you have any concerns or complaints about the study, you can report these to the Wits Human Research Ethics Committee on the details below:
Chair: Professor Peter Cleaton-Jones at cleaton-jones1@wits.ac.za or 011 717 2301.
Research Administrators: Mr Rhulani Mkansi at Rhulani.Mkansi@wits.ac.za and Ms Zanele Ndlovu at zanele.ndlovu@wits.ac.za . Or call 011 717 1252/2700/1234/2656

INFORMED CONSENT FORM: Interview

I hereby confirm that I have been informed by the study team about the content of the study, the benefits and the risks of this study assessing the acceptability of IPT for TB among healthcare workers in Gaborone, Botswana. I confirm that:

- I am aware that I may choose whether to participate or not to participate in the interview
- I am aware that I may stop the interview at any point.
- I have received, read and understood the information sheet.
- I am aware that the results of the study, including my personal details will be processed anonymously and confidentially.
- I agree that that the data collected during this study can be processed by the researchers or on their behalf.
- I have been given the opportunity to ask questions and freely declare myself (of my own free will) prepared to participate in the study.

I agree to participate in the Study assessing the acceptability of IPT among healthcare workers in Gaborone, Botswana as outlined in the information sheet above and to be interviewed for this purpose.

☐ **Yes (consent given)**
☐ **No (consent not given)**

Name:_____ **(Interviewee)**
Signature:_____
Date:_____/_____/_____

I,_____**(Interviewer)** herewith confirm that the above participant has been fully informed about the conduct and risks of the above study.

Signature:_____
Date:_____/_____/_____

CONSENT FORM- AUDIO RECORDING

By signing the audio consent form below, I acknowledge that I have been informed about this study assessing the acceptability of IPT for TB among healthcare workers in Gaborone, Botswana. I have also been given a chance to ask questions. I voluntarily consent to be a participant in this study and understand that I have the right to withdraw from the research at any time.

- The reason for audio-recording the interview has been explained to me.
- I am aware that I may choose whether my interview should be recorded or not.
- I am aware that the results of the study, including my personal details will be processed anonymously and confidentially.
- The understand that the recording is kept confidential and safe.
- I have been given the opportunity to ask questions and freely declare myself (of my own free will) prepared to participate in the study.

I agree to participate in the Study and I consent to having the interview audio recorded.

☐ **Yes (consent given)**
☐ **No (consent not given)**

Interviewee:
Name:
Signature:_____
Date: __/__/__

Interviewer:
Name:
Signature:_____
Date: __/__/__

Appendix D: Interview guide

INTERVIEW GUIDE

Introduction: *Hello, my name is Thandi Milton. I am an MSc student in Epidemiology and implementation science at the University of Witwatersrand in Johannesburg, South Africa. I am doing a study for my Masters project, about IPT for TB and its acceptability by Healthcare workers in Gaborone. The purpose of this interview is to help me answer the question below.*

Research Question: What is the level of acceptability of Isoniazid Preventative therapy (IPT) among health care workers (HCWs) in Gaborone, Botswana?

Demographic Information	
Participant ID (same as questionnaire)	
Gender	Male ☐ Female ☐
Age	
Occupation	Medical Specialist ☐ Resident ☐ Medical Officer ☐ Medical Intern ☐ TB-coordinator ☐ Registered Nurse ☐ Other, specify: _____
Highest Education Level	Diploma ☐ Degree ☐ Masters ☐ PhD ☐
Health Facility	
Duration of time in Health Facility?	0- 6 months ☐ 6 – 12 months ☐ 12–24 months ☐ 24 months - 5 years ☐
Duration of time in Profession?	0- 6 months ☐ 6 – 12 months ☐ 12–24 months ☐ 24 months - 5 years ☐

Acceptability Interview Questions:

Construct/Topic	Potential Questions
Intervention coherence	Please tell me what you know about IPT. • Do you know why we prescribe IPT to our patients? • Are you confident identifying patients who are eligible for?
Perceived Effectiveness	What are the benefits associated with using IPT? • What is your view on the necessity of IPT in your setting? • What do you think are the benefits of IPT as an intervention?
Affective Attitude	How do you feel about giving IPT to your patients? • How would you manage your patients who were at risk of TB? • What do you think should be done for HIV patients at risk for TB? • What kind of patients would you give IPT to? •
Self-Efficacy	Are you confident diagnosing and ruling out Active TB? • Have you ever received training on the use of IPT? • Would you be confident using IPT for your patients? • Would you appreciate further training on IPT?
Burden	What effect do you think prescribing IPT would have on your normal duties? • How much effort do you think it takes to prescribe IPT to a patient? • How much time do you think it takes to prescribe IPT?
Opportunity Cost	What activities do HCWs give up, if any, by participating in IPT? • What do you think HCWs give up in order to participate in IPT services?
Ethicality	Do you think it is ethical to use IPT? • What risks do you think are associated with IPT? • What effect do you think IPT could potentially have on the rates of drug resistant TB?
Additional Questions	Studies have found these to be the factors affecting IPT use (list factors), what is your opinion on this? Studies have shown that a weekly IPT regimen for 3 months is just as effective as daily IPT for 6 months, how do you feel about this?
Additional probing questions	**Please tell me more about that.** **What did you mean by that.** **Please elaborate on that statement.**

Closing Statement: Is there anything else you would like to add? Do you have any questions for me? Thank You.

Appendix E: Questionnaire

QUESTIONNAIRE

Research Question: What is the level of acceptability of Isoniazid Preventative therapy (IPT) among health care workers in Gaborone, Botswana?

SECTION A- DEMOGRAPHIC INFORMATION

Please answer the Questions below by ticking the appropriate box. √

Demographic Information	
Participant ID	
Name	
Gender	Male ☐ Female ☐
Age **<21** **21-25** **25-35** **>35**	
Occupation	Medical Specialist ☐ Resident ☐ Medical Officer ☐ Registered Nurse ☐ Other, specify: _____
Highest Education Level	Diploma ☐ Degree ☐ Masters ☐ PhD ☐
Health Facility	
How long have you worked in this Health Facility?	0- 6 months ☐ 6 – 12 months ☐ 12–24 months ☐ 24 months - 5 years ☐ more than 5 years ☐

Duration of time in your Profession?	0- 6 months	□
	6 – 12 months	□
	12–24 months	□
	24 months - 5 years	□
	more than 5 years	□

SECTION B – FACTORS INFLUENCING ACCEPTABILITY OF IPT

Please answer the Questions below by ticking the appropriate box. √

1. Intervention coherence

	Completely disagree	Disagree	Neither agree nor disagree	Agree	Completely agree
1. I understand the purpose of IPT	①	②	③	④	⑤
2. I understand how IPT works	①	②	③	④	⑤
3. I know which patients should be given IPT	①	②	③	④	⑤
4. I know how IPT should be prescribed.	①	②	③	④	⑤

2. Perceived Effectiveness

	Completely disagree	Disagree	Neither agree nor disagree	Agree	Completely agree
5. IPT is an effective intervention	①	②	③	④	⑤
6. IPT reduces the risk of TB	①	②	③	④	⑤
7. IPT is necessary in our setting	①	②	③	④	⑤
8. Patients benefit from being given IPT	①	②	③	④	⑤

3. Affective Attitude

	Completely disagree	Disagree	Neither agree nor disagree	Agree	Completely agree
9. I approve of giving IPT	①	②	③	④	⑤
10. I would prescribe IPT to ALL eligible patients (adults and children)	①	②	③	④	⑤
11. I would prescribe IPT to only adults	①	②	③	④	⑤
12. I support the use of IPT	①	②	③	④	⑤

4. Self-Efficacy

	Completely disagree	Disagree	Neither agree nor disagree	Agree	Completely agree
13. I feel confident prescribing IPT	①	②	③	④	⑤
14. I have enough knowledge about IPT	①	②	③	④	⑤
15. I can identify patients who need IPT	①	②	③	④	⑤
16. I need further training on IPT use	①	②	③	④	⑤

5. Burden

	Completely disagree	Disagree	Neither agree nor disagree	Agree	Completely agree
17. It is too much work to give IPT	①	②	③	④	⑤
18. We have enough staff to give IPT	①	②	③	④	⑤
19. IPT is good use of resources	①	②	③	④	⑤
20. Giving IPT takes up too much time	①	②	③	④	⑤

6. Opportunity Cost

	Completely disagree	Disagree	Neither agree nor disagree	Agree	Completely agree
21. I give up other activities to give IPT	①	②	③	④	⑤
22. Time used for IPT is taken from my core duties	①	②	③	④	⑤
23.When I give IPT I can't do other jobs	①	②	③	④	⑤
24. I spend more time with IPT patients	①	②	③	④	⑤

7. Ethicality

	Completely disagree	Disagree	Neither agree nor disagree	Agree	Completely agree
25. IPT increases Isoniazid resistance rates	①	②	③	④	⑤
26. The duration of IPT is suitable	①	②	③	④	⑤
27. It is ethical to give drugs to patients that are not yet sick	①	②	③	④	⑤
28. A 3 month, weekly IPT regimen would be better for the patients	①	②	③	④	⑤

SECTION C- ACCEPTABILITY OF IPT

Acceptability of Intervention Measure (AIM)

	Completely disagree	Disagree	Neither agree nor disagree	Agree	Completely agree
1. IPT meets my approval.	①	②	③	④	⑤
2. IPT is appealing to me.	①	②	③	④	⑤
3. I like IPT.	①	②	③	④	⑤
4. I welcome IPT.	①	②	③	④	⑤

Appendix F: Ethics Forms

TELEPHONE: 3904451

FAX : 3188012

REPUBLIC OF BOTSWANA

Greater Gaborone District
Health Management
PRIVATE BAG RW 004
GABORONE
BOTSWANA

23rd February, 2018.

Ref:GDHMT4/2/36/1/13

The Chairperson
Research ethics committee
Ministry of health & Wellness
Private Bag 0038
Gaborone

Dear Sirs,

RE: SUPPORT LETTER FOR DATA COLLECTION BY DR. THANDI MILTON AT GABORONE DHMT CLINICS.

This letter serves to support Dr. Thandi Milton's application for permission to conduct data collection her Masters Research project at Gaborone DHMT clinics. Dr. Milton's Masters Research project is titled Acceptability of Isoniazid Preventative Therapy amongst healthcare workers in Gaborone, Botswana. Dr. Milton intends to collect data from nurses and doctors at who provide TB services, using questionnaires and interviews over a period of 3 months.

I fully support her project and grant her permission to collect data from healthcare workers at Gaborone DHMT clinics.

Please contact me if you require any additional information.

Yours sincerely,

Dr. G. Simoonga
Head Gaborone DHMT
simoonga@yahoo.com / gsimoonga@gov.bw

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

R14/49 Dr Thandi Milton

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

CLEARANCE CERTIFICATE NO. M180140

NAME: (Principal Investigator)	Dr Thandi Milton
DEPARTMENT:	Epidemiology and Biostatistics Gaborone District Health Management Team (DHMT) Clinics
PROJECT TITLE:	Acceptability of Isoniazid Preventative Therapy for Tuberculosis among Healthcare Workers in Gaborone, Botswana
DATE CONSIDERED:	26/01/2018
DECISION:	Approved unconditionally
CONDITIONS:	
SUPERVISOR:	Jabulani Ncayiyana and Joseph Jarvis
APPROVED BY:	Professor CB Penny, Chairperson, HREC (Medical)
DATE OF APPROVAL:	25/06/2018

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 on the Third Floor, Faculty of Health Sciences, Phillip 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 **January** and will therefore be due in the month of **January** each year. Unreported changes to the application may invalidate the clearance given by the HREC (Medical).

Principal Investigator Signature

Date 03/07/2018

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES