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DISSERTATION

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Table of Contents

CHAPTER 1.

General Introduction

Health is defined as a merit good with positive externalities, and governments have a responsibility to improve health services for their citizenry.[1] In the latter context, one can deduce that health is capital; therefore, governments must prioritize healthcare.[2] With poor health outcomes associated with poor economic conditions and a poor economic environment,[3] equity in health and universal health coverage top the political agendas of low-middle-income countries (LMIC).[4] Evidence in the literature reported high levels of socio-economic inequalities in developing countries, whose health systems are underdeveloped.[5–9] However, in most cases, health inequalities are reported to disproportionately affect people of low socioeconomic status. The healthy and wealthy are more likely to obtain care than the sick and the poor.[10] In the health systems of Sub-Saharan Africa (SSA), health outcomes and access to key health services are distributed unevenly.

The low- and medium-income countries subscribe to the World Health Organisation ideology of being fair and impartial in health care, i.e. there should be equity in offering Universal Health Coverage (UHC).[11] As a member of WHO, South Africa is one of those countries that subscribes to equitable health. The World Health Organisation (WHO) defines equity as "the absence of avoidable or remediable differences among groups of people, whether those groups are defined socially, economically, demographically, or geographically".[12] To address inequity, the South African Government policy is leaning towards universal health coverage. The process began with publishing the Green Paper on the National Health Insurance (NHI) in 2011 for comment, a White Paper in 2017,[12] and the Bill in 2018.[1] However, some concerns have been raised by several private and public organizations, and most of these issues have yet to be fully addressed, specifically the funding structure, and policy and implementation issues.[15,16]

The Western Cape Province is one of the nine provinces in South Africa facing a public health crisis due to the burgeoning quadruple burden of disease. The major causes of morbidity and mortality are (1) communicable diseases, (2) trauma and violence, (3) HIV/AIDS, and (4) injuries.[17] The Health 2030 strategy for the Western Cape Government: Health care focuses on moving from delivery of health service toward a patient-centered approach with the dependent population as the main users of the health system.[17] The dependent population is defined as those relying on the public health system for health care because they are economically disempowered and cannot afford to pay for private health care.

There is a consensus that decisions for the provision of care are being made on behalf of the patient to provide high-quality health care for the patient and ultimately improve their quality of life. In essence, there is no patient input in these decisions.[18–20] As a result, patient satisfaction, continuum of care, treatment adherence, and other factors are negatively affected. This thesis

aims to contribute to determining patients' preferences and willingness to pay with regard to (1) the choice of public health facilities and (2) patients' preferences for HIV testing in South Africa, Western Cape province. This information could help inform operational and policy decisions. In the next parts of this chapter, we intend to provide a detailed background and insights on patients' preferences and methodologies for measuring them.

Health Technology Assessment

The subject of patient preferences is located within the field of Health Technology Assessment. The argument brought forth states that if clinical staff understand the needs of the patients from the client's perspective, treatment options and health outcomes may be more aligned to what the client's expects.[20] This assertion aligns with the ideology of providing person-centered quality care. Unfortunately, predicting an individual's preferences before the actual occurrence of the incident/situation can be difficult. Therefore, to better understand individual preferences, researchers and policymakers have resorted to using hypothetical situations.[21]

The World Health Organization (WHO) described the HTA framework as "the systematic evaluation of health technology properties, effects, and impacts. It is a multidisciplinary process to evaluate the social, economic, organizational, and ethical issues of a health intervention or health technology. The main purpose of conducting an assessment is to inform policy decision-making".[22] In alignment with the WHO definition, the Southern African HTA Society has its own definition of HTA: "a systematic evaluation of the properties and effects of a health technology, addressing the direct and intended effects of this technology, as well as its indirect and unintended consequences, and aimed mainly at informing decision-making regarding health technologies and is conducted by interdisciplinary groups that use explicit analytical frameworks drawing on a variety of methods".[23]

It is evident that patient preference in policymaking is gaining momentum in Health Technology Assessment.[19,24–27] Accordingly, it is essential to include patients who are receivers and users of health technologies in policy and operational assessment. The outcomes of the inclusion are likely to be more positive and beneficial. The Impossibility theorem by Kenneth Arrow notes the daunting task of trying to please everyone and how impossible this is.[22] He noted the difficulty in finding a collective decision-making process where social preferences could be easily ranked. Conflict amongst clinical staff, patients, and family members may result if patient preferences are not considered, resulting in confusion during treatment.[21] In general, there is a need for a middle ground to be established to avoid distrust amongst all parties involved if in general better health outcomes are to be attained.

Patients' preferences

Patient preferences are a product of deliberation about specific elements, such as expected treatments or health outcomes.[28] Preference can be defined as choosing between various possible options.[29,30] Patient preferences refer to the individual's evaluation of the dimensions of health outcomes and may influence healthcare choices. The choice is determined by the limiting factor of disposable income and scarce resources. Without these factors, choices would be nearly non-existent, as all individuals could have their demands fully met; thus, demand equals supply.[31]

The feasibility of using decision analysis to understand better treatment choices that are complicated has been widely demonstrated.[32–34] Neo-classical economic discourse assumes individuals have what they call rational preferences and can assign value to different items. This helps in choosing what maximizes their utility if they are given full information, to have the greatest advantage. However, the theory has been criticized for not accounting for fundamental elements of human behavior, which may result in irrational decision-making. Consumer theory, a part of neo-classical economics, explains preferences and utility in detail.

There are two main methods for eliciting preferences: revealed (RPs) and stated preferences (SPs). The main difference between the two techniques is in how the values are obtained. In the revealed preferences theory, the preference is revealed by the customers' actions in making choices. Stated preference techniques originate from experimental economics and rely heavily upon economic rationality and utility maximization assumptions.[35] It is not always the case that information on market or non-market goods is easily available for observation, as in the circumstances of revealed preferences.[36] To circumvent such impediments, economists have developed a method for using hypothetical situations to elicit customer preferences and measure their value in either a monetary or ratings format.[36] SPs are thus a quantitative methodology used to evaluate relative choices or underlying utility given different attributes.[37–39] In some instances, it is referred to as multi-attribute utility theory.[40] For example, the marginal substitution rate with the price attribute represents the marginal WTP level for a small improvement in the non-price attributes under consideration.[41] When conducting SPs, respondents are required to rank, rate, or choose between different hypothetical product/service scenarios made up of different attribute mixes; hence, the choices made by the respondents can be used to infer how they value different attributes.

The two most applied SPs techniques are the contingent valuation technique/willingness to pay (CV/WTP) and discrete choice experiments (DCE).[42] The main difference between the two techniques is how the values are obtained. In CV/WTP, willingness to pay is assessed in the

form of yes-no or double-bound question (s) or a bidding game.[41] The obtained values are integral (sometimes referred to as discrete); i.e., they represent a mean value for a unit of the benefit.[43] DCE, also called conjoint analysis or choice experiment, is used mostly to assess preferences when a question may not be answered due to the complicated nature of having multiple attributes with multiple levels.[44] In DCE, interestingly, the worth of the advantage is portrayed through its qualities (attributes of a profile), and their effect is assessed mutually.[38,45–47] It is referred to as multi-attribute utility theory in some instances.[37]

Willingness to Pay

Willingness to Pay (WTP) is also referred to as the contingency valuation method. The willingness to pay method has been widely used in different disciplines. For example, economists, psychologists, and marketing researchers rely on measures of consumers' willingness to pay (WTP) in estimating demand for private and public goods and designing optimal price schedules.[39] WTP is defined as the maximum amount of income an individual is willing to give up, assuming that a proposed service or good is available.[40] Most studies have revealed parameters that usually affect WTP, including age, socio-economic status (SES), dependency, household size, quality of service, geography, and perception.[48] However, some have found that prices don't influence the WTP to pay for health services.[49] In addition, the amount of satisfaction one gets from the care, i.e. the utility derived, also has a huge impact on WTP, and so do any incremental costs.[48]

Discrete Choice Experiments (DCE)

DCE is a proponent of Daniel McFadden's work on choice theory. The DCE is rooted in transport research but has become popular in health economics, human resource management, and environmental management.[37,50–52] DCEs are embedded in consumer and experimental design theory.[37,51] Thus, DCEs are particularly useful when complex interventions target specific user groups. They are a survey-based approach and allow for the estimation of user values in the absence of observable markets, where services are provided for free or have not yet been introduced.[53] Discrete Choice experiments (DCEs) are based on the utility of goods or services determined by different characteristics, called attributes, that characterize the good or service.[54] Each attribute has different specifications, such as attribute levels. The researcher is responsible for constructing choice sets through an experimental design, allowing for statistical assessment of each attribute's effect.[55] Once a research question has been identified, the next step is to identify the attributes and sample size.

One can use literature reviews, focus group discussions or interviews to develop a list of candidate attributes and their sublevels for the DCE. The researcher takes the responsibility to construct attributes and their sub-levels. It is important to have well-designed attributes

and levels to estimate the model efficiently, underlining the importance of diligent qualitative approaches to be implemented in selecting attributes. After the decision has been finalized on candidate attributes, wording, and levels, the Bayesian D-efficient statistical design (Ngene software) will reduce the number of choice sets. For example, assessing a migraine pain attribute must include the severity of the pain according to described levels.[55] The sub-levels of the attributes are systematically varied for each respondent. The design aims to maximize the precision of estimated parameters for a given number of choice questions by including prior information about the sign and value of parameters. A systematic review showed that an average of 4-6 attributes and 9-6 choice sets were used in DCE studies.[56] The choice sets were developed and formed different groups of questionnaires. These gave visual representations (translated into selected languages). In the case of eight groups of questionnaires, only one was handed out to the client randomly to ensure efficiency. It is important to conduct a pilot of the initial questionnaires to check for validity, reliability, and efficiency. Subsequently the questionnaire can be adjusted for final data collection.

Sample sizing in DCEs has proven not to be uniform. Our sampling has proven the need for calculating sample sizes for DCEs. As performed, our sampling did not achieve the minimum required to fulfill terms of the statistical power of hypothesis tests on the estimated coefficients.[56] We then recommended increasing sample sizes and the number of hypothetical scenarios in a study to strengthen the internal validity of results.[56,57]A systematic review showed that most of the sample sizes did not clearly report the method of calculation (49 studies), nine studies had used a rule of thumb, eight referred to other studies, three reviewed studies, three used Lancsar and Louver's method, and four use the parametric approach.[57] The study sample suggested by Lancsar and Louver (2008) requires at least 20 to 30 respondents/observations per choice set, and this has been judged to be adequate to provide precise parameter estimates.[57]

One can measure the preferences between service attributes, for example, by using DCEs to value waiting times, prices, and patient gender. Econometric models are used to predict the choices of individuals given hypothetical alternatives. The hypothetical alternatives are what set the methodology aside from revealed preferences.

Rationale of this thesis

This thesis aims to assess patients' preferences for public health services (i.e., primary health care and HIV testing) in the Western Cape province, South Africa, using focus groups, discrete choice experiments and willingness to pay sub-studies. This aim is well aligned with the Western Cape Government: Health vision of access to person-centered quality care.[17] Patient preferences must be assessed and used in policymaking and operational decisions. Therefore, it is important

to add to the body of knowledge by conducting research using the clientele that uses the public health facilities and services offered in-house or as part of the outreach. Most South Africans access health services through government-run public clinics and hospitals. As South Africa moves to adopt National Health Insurance (NHI), the success of this process hinges on public healthcare reforms, which are critical to the delivery of high-quality, accessible, public-sector health services for universal coverage in the health system.

Evidence in the literature suggested that patients' and households' preferences have been side-lined when researching access to health services.[57] The National Department of Health has, through its Health Establishment Service Delivery Improvement Plan, established a way to measure patient satisfaction with an emphasis on access to services, availability and use of medicines ,patient safety, cleanliness and infection control, staff values and attitudes, and waiting time.[59] However, more needs to be done to understand preferences at facility level for different contexts within the South African health system. There is a consensus that the quality of care in all forms needs improvement if NHI is to succeed.[13]

Even though there is a large body of work on stated preferences, only a few studies have been conducted regarding patients' choice of facility, specifically within public health care. There has generally been an increase in DCEs in low- and middle-income countries,[57] but only a few studies have been conducted in Africa. A systematic review of patients' preferences for primary health care (PHC)[52] recorded an average of 3 DCEs per year in healthcare during 1990-2000, 14 per year from 2001-2008, and 45 per annum in the period 2009-2012. The countries with the most DCE reviews were the United Kingdom, followed by Australia, the United States of America, Canada, Denmark, the Netherlands, and Germany.[52] These were mostly focused on General Practitioner (GP) consultations,[54] whilst Chinese studies appeared to focus primarily on the public health preferences of rural populations.[60–64] Only one South African DCE of public health facility preferences was identified[26], by Honda et al (2015); this study suggests that treatment by doctors versus nurses, availability of medication, staff attitudes, waiting times, transport costs, expert advice, and examination are important factors influencing the choice of public health facilities. The Honda et al (2015) study focused on a community-based cohort, not specifically on patients attending the facilities. This prompted the need to understand the preferences from the perspective of patients in the facilities at the point of data collection.

Patients are assumed to be willing to pay for access to what they perceive as quality health care. The South African Government (SAG) has noted that the only way to achieve universal health coverage in the face of 29% unemployment rates,[67] and 84% uninsured citizens,[69] is to offer no-fees at point of service for all levels through an NHI.[13] Solutions brought forward

include a mandatory NHI, which would see every person accessing adequate health care when needed without worrying about user fees or out-of-pocket payments.[13] Clients can understand the value of healthcare services more when a monetary figure is applied. The public sector's primary health care (PHC) is based on a no-fee for service platform whilst government funds subsidize the secondary and tertiary services. A survey by African Barometer found that 41% of South Africans are willing to pay user fees or higher taxes for health spending as a way to increase spending on public health care.[66] It is therefore important to ascertain the willingness to pay towards PHC visits in South Africa's public sector despite there currently being no payable user fees.

Due to the importance of HIV as an epidemic that has devasted economies and populations, it is also important to understand access to HIV and primary care services and to understand preferences. To our knowledge, limited literature exists on patients' preferences relative to HIV, especially in Africa. A systematic review of DCEs in HIV revealed 14 studies conducted in 10 countries, eight from sub-Saharan countries,[68] suggesting that people with HIV have preferences for HIV testing and are willing to accept trade-offs between attributes. To our knowledge, no DCE studies have been conducted in South Africa specifically on HIV testing preferences. However, two other DCEs have looked at critical attributes and attribute levels on oral pre-exposure prophylaxis against HIV (PrEP) delivery among young people in Cape Town and Johannesburg.[65] It would be interesting to use a DCE to further elicit clients' preferences amongst those presenting for HIV testing in South Africa; this would provide local evidence for policy and operational decisions.

Objectives

To address the main aim of this thesis, the following four objectives are defined:

1. To gain insight into attributes affecting the choice of public health facility (at the primary care level) and help inform operational and policy decisions in the provision of health services
2. To ascertain factors affecting the public health facility preferences of patients at Bothasig and Goodwood CDC, by means of a DCE
3. To ascertain the willingness to pay (WTP) to access health services of patients presenting at Bothasig and Goodwood CDC
4. To gain insight into public HIV testing preferences, in order to inform programmatic decisions surrounding HIV counseling and testing (HCT), by means of a DCE

Thesis outline

This thesis comprises of six chapters. The studies presented in Chapter 2 to Chapter 5 were conducted among persons presenting at two public health primary care facilities in Cape Town, South Africa, in 2018, namely Goodwood and Bothasig Community Day Centers.

Chapter 2 describes the identification and prioritization of attributes for the DCE, using the nominal group technique relative to patients' choice of public health facilities in Cape Town, South Africa.

Chapter 3 focuses on enhancing public participation in public health offerings by investigating patient preferences for facilities in the Western Cape Province, by means of a DCE.

Chapter 4 assesses willingness to pay for primary health care at public health facilities in the Western Cape, South Africa. This survey used the contingent valuation range methodology in eliciting the amounts participants would be willing to pay for health care.

Chapter 5 focuses on investigating HIV testing preferences in South Africa, using a DCE.

Finally, **Chapter 6** provides a discussion of the main findings in this thesis, as well as a discussion of the main methodological considerations of the thesis and implications for further research.

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CHAPTER 2.

Identification and prioritization of attributes for a discrete choice experiment using nominal group technique: Patients' choice of public health facilities in Cape Town, South Africa

Chapter 2 draws upon:

Chiwire, P., Evers, S.M., Mahomed, H.; Hiligsmann, M., 2021. Identification and prioritization of important characteristics in the choice of public health facilities in Cape Town, South Africa: Value in Health Regional Issues, 2021, 27:90-98, DOI: 10.1016/j.vhri.2021.06.005

Abstract

Introduction: To date there has been scant research on patient input regarding the desirable characteristics of healthcare facilities. This study uses the nominal group technique (NGT) to develop a discrete-choice experiment aimed at identifying and prioritizing, from the patient's perspective, essential characteristics for choosing public health facilities in Cape Town, South Africa.

Methods: Four focus-group discussions were conducted, including a total of 21 patients or their parents/companion at Bothasig and Goodwood community day centers (CDCs offer primary care within substructure), in Cape Town. The group discussions followed the steps of NGT guidelines. At each facility, the frequency of an attribute being within the top five was determined, a weighted ranking was calibrated, and a subgroup analysis was performed.

Results: The six most important attributes in choosing a facility were 'treatment by a doctor/ (family physician) (%66.7), 'distance to the community day center (%61.7), 'availability of medication' (%61.7), 'confidentiality during treatment' (%57.7), and 'waiting time' and 'treatment by a nurse'. The weighted results showed that distance was most important, followed by treatment by the doctors, treatment confidentiality, availability of medication, and waiting time and treatment by a nurse.

Conclusion: This study confirms the feasibility and value of the NGT in identifying and prioritizing the attributes for a DCE. The NGT can be used to elicit patient preferences, and when employed together with a DCE, can enhance information quality and quantity for decision making in tandem with patient satisfaction and experiences.

Introduction

The South African Government's National Development Plan [1] commits to offering a long and healthy life for all South Africans, an outcome that entails achieving universal health coverage and satisfying section 27 of the constitution, which establishes every citizen's right to health care. The National Health Insurance (NHI) White Paper [2] was released in 2017, followed by the Bill [3] in 2018, proposing NHI.

In the Western Cape province of South Africa, the government (WCG: Health) has designed the Health 2030 strategy focusing on a patient-centered approach to improving the current model for delivering health services [4]. The dependent population who are the primary users of WCG: Health services is defined as those relying on the public health system for health care because they are economically disempowered and cannot afford to pay for private health care. The approach to health management being implemented by WCG: Health is "Access to person-centered, quality care" [4]. Given the nature of health provision and available health system structures, health providers make decisions on behalf of patients following protocols and policies. These decisions, although fully intended to provide quality health care and ultimately improve the patient's quality of life, may not necessarily lead to the desired outcome.

Consequently, with the NHI policy in South Africa taking traction, it is important to understand patient preferences, and to use them in preparing for implementation. Patient preferences are increasingly important in designing intervention programs that fit with individual patient needs. In Europe and the United States [5], the use of preference research has drastically increased in regulatory and reimbursement decisions, and this could also be important in South Africa. In this study, we focused on the prioritization of attributes for a discrete choice experiment (DCE) related to patient preferences in a facility providing health services.

Current mechanisms such as Ideal clinic, a government program is meant to improve and correct "deficiencies in public sector Primary Health Care (PHC) clinics require the Patients' Rights Charter to be displayed in all waiting areas in at least two local languages" [6]. The mechanism is a way to educate and inform the patients of their right to be heard. However, this method does not necessarily ensure that patients will notice or use the information provided. In addition to the current mechanisms for registering patient complaint and comments, client satisfaction surveys, and the institution of health committees there should be structured ways of determining patient preferences concerning the characteristics of their public health facilities. The complaint and comments system are bound to be utilized by the most opinionated. Accordingly, decisions from this technique may end up benefiting that group as opposed to the

less articulate and opinionated [7]. However, patient and person-reported experiences (PRE) and satisfaction (PRS) [8], may be undesirable due to inadequate patient input. As a result, patient satisfaction, the continuum of care and adherence to treatment, amongst other factors, could be negatively affected.

To date, few studies have assessed patients' preferences for choosing public health facilities, including only one study in South Africa [9], with the rest of the literature concentrating on preferences of the health workforce, clinical intervention, sexually transmitted disease testing preferences amongst others. This study aimed to identify attributes for a DCE with regards to the choice of public health facilities using the Nominal Group Technique (NGT). FDA guidance recommends focus group discussions (FGDs) with ranking exercises to elicit preferences; accordingly, we used the NGT [10]. Use of the NGT has taken traction in identifying the attributes which should be used in DCEs. The NGT offers both quantitative and qualitative techniques in eliciting public preferences for health care, a strength, as the this offers contextual information and supports in prioritization of attributes [11]. The attributes are centerd around enhancing mechanisms used to include the patient's voice when decisions are made for providing their health care.

Methodology

This study is part of a larger project formed to elicit preferences among certain characteristics of public health facilities, including a future DCE, which will provide decision-makers with quantitative measures of the relative importance of various characteristics in policy-related questions [12–14]. As the first step of a DCE, it is essential to identify and prioritize attributes for inclusion. This study also aimed to add to the literature on the identification of attributes for DCE. Group discussions using the NGT were conducted to elicit preferences on facility choice from patients at selected facilities.

Population and sampling/participant selection

The WCG: Health has six districts, which comprise one metropolitan (urban) and five rural. The metropolitan has four sub-structures, each sub-divided into two sub-districts. For our study, we selected the Northern Tygerberg sub-structure, which is comprised of the Northern and Tygerberg sub-districts to conduct FGDs. The target population was clientele attending Community Day Centers (CDCs), which offer primary health care in the sub-structure. Our study population and health facilities were identified through consultation with the Northern Tygerberg substructure team, comprised of the Sub-structure director and Primary Health Care managers.

Goodwood CDC and Bothasig CDC were selected as our study sites. Participants represented the local population demographics and were patients at the facilities.
Four FGDs were conducted at the two selected facilities with two client groups at each facility, using convenience sampling. At Bothasig CDC, participants were approached in the pharmacy waiting area and the reception asking them to participate. This method was the most feasible way to get participants because of the CDC layout and operations. At the Goodwood CDC, we selected the last seven patients waiting to see the nurse for an initial assessment. Once we identified the patients, we enrolled them in the group discussions if they consented. Once patients were settled, the project was explained to them. The patients needed to be 18 years old to be eligible for participation.

Selection of Attributes list for group discussions

A literature review was initially conducted to identify potential important characteristics related to primary healthcare facility preference; this review excluded hospital-associated attributes. The study focused on primary care only and the attributes selected were appropriate for that level of care. These identified characteristics were used to inform group discussions. The databases used included African Online Journal, the Wiley online, Science Direct Elsevier, and BMJ. These databases carry a vast number of articles from worldwide journals. We started the search with the Africa Online Journal database, which includes articles from countries whose context is like South Africa's. The database carries over 350 African journals and is a repository of African scholarly research. The factors considered for the planned national health insurance (NHI) process in South Africa were considered for the list [15].

These factors were also found in studies that reviewed the access, availability, and affordability of health care in South Africa [15–19], and in other countries including Albania, China, Iran, Jordan, Nigeria, Pakistan, Spain, Tanzania, and Uganda [20–32]. A list of possible attributes to be presented to the participants was compiled, with the concurrence of the Northern Tygerberg sub-structure team, resulting in the finalization of the pre-group discussion list. Table 1 summarizes articles from which the attributes were retrieved, mainly from South African-related articles, thus providing a glimpse into patient preferences in the country of study. The attributes of "treatment by the doctor" and "treatment by a nurse" followed the context of patient flow within the CDCs. From reception, the patient sees a professional nurse and clinical nurses who conduct the basic test and decide if it's necessary to see a doctor. Therefore, the provision of care by the nurse or doctor can become contentious.

Table 1: List of attributes from the literature review and detailed explanation (pre-group discussion list)

Atrributes from literature	Explanation of Attributes	Ideal Cinic Manual (2018) and the NHI white paper (2017)	Honda et al. (2015)	Nunu et al. (2017)	Scheffler et al. (2015)	Plaks et al. (2012)	Phaswana-Mafuya et al. (2011)	Goldstein et al. (1995)
Staff gender	If the staff is a man or woman	Expert opinion for the study context						
Distance to Community Day Centre (CDC)	How long it takes you to travel to the CDC	√			√		√	√
Records Confidentiality	No-one can open your records to reveal your illness except for the doctor and nurse who are expected not to reveal to anyone by law	√	√	√	√		√	
Confidentiality during treatment	Examination done being closed doors without other patients hearing what is happening	√	√	√	√			
Treatment offered by a Doctor	Treatment is administered by a doctor		√	√				
Treatment offered by a Nurse	Treatment is administered by a nurse		√	√				
Hygiene at the Community Day Centre	The CDC is clean and the nurses conduct their work in clean premises and throw the used swabs, cotton etc. away properly	√				√	√	
Waiting Time	How much time it takes to wait till you see the doctor or nurse who will give diagnosis	√	√	√	√	√	√	√
Staff attitude	Are the people working in the CDC nice to you or rude	√	√	√	√	√	√	√

Table 1:(continued)

Atrributes from literature	**Explanation of Attributes**	Ideal Cinic Manual (2018) and the NHI white paper (2017)	Honda et al. (2015)	Nunu et al. (2017)	Scheffler et al. (2015)	Plaks et al. (2012)	Phaswana-Mafuya et al. (2011)	Goldstein et al. (1995)
Availability of required medication	Do you get the medication prescribed at the CDC or have to get a prescription to buy at a private pharmacy	√	√			√		√
Opening Hours	What time the CDC opens and closes. How does this fit in your schedule	√					√	

NB: √ means it was included in the article

The Nominal Group Technique process

The NGT is a process used in eliciting information using small groups of persons. The NGT has previously been used to elicit key attributes from participants depending on the content and availability of information [33]. NGT is noted to supersede group-based brainstorming because it allows individuals to freely express their thoughts through anonymous voting/ranking and individual brainstorming without being embarrassed about to offering their opinions or censoring themselves [34–37]. In this study, a long list of potential characteristics was identified in the literature review, and as inclusion in a further DCE was limited to four to seven attributes, the NGT was chosen to prioritize characteristics and narrow down the number of attributes, as well as to identify attributes that could have been missed in the literature.

The process was divided into five steps. The first step entailed providing a brief description of the project to the patients and obtaining their consent to participate. Those willing to participate signed the consent form and proceeded to complete the identification form which included their name, date of birth, gender, the preferred way of contact, level of education, and health status. The data were captured using a unique numerical number given to each questionnaire. The spreadsheet and questionnaire were available to those involved in the research. The second part included introducing the study objective and a brief description of the individual attributes from the literature. Once all ten attributes from the literature review were discussed, in the third part of the discussion offered the opportunity for participants to add extra attributes of importance that affected their choice of facility. They were required to write those on a separate sheet without consulting other group members. In part four, the new attributes were discussed extensively and included in a form that also listed the first ten attributes. Each group could thus have a variable number of additional attributes. Last, participants were asked individually on paper to choose the top five attributes they deemed valuable out of all the listed attributes and to rank the chosen five from least important (1) to most important (5).

For the reliability of the group discussions, questions were repeated consistently. We moderated the group discussions to control the flow of the discussion to ensure that it was keeping in line with the framework of the research. Each participant was given an equitable opportunity and time to contribute. When a participant appeared to be reserved and without the confidence to share, the researcher encouraged them and gave them time to speak.

When all four group discussions were completed, the data was compiled, and two methods were used to analyze data, namely (i) to assess the frequency of each characteristic that was ranked in the top five and (ii) to calibrate a weighted system for the characteristics, with 5 points

for the most important down to 1 for the least important (and 0 if not in top 5). A subgroup analysis was conducted for each facility.

Ethics approval and consent

Ethics approval was given by the Health Research Ethics Committee of Stellenbosch University. After approval by the university, approval was sought from the WCG Provincial Health Research Committee to allow access to the facilities, and this was granted. The study adheres to the Declaration of Helsinki principles. All the selected participants were required to sign consent forms before proceeding with the group discussions.

Results

Participants Characteristics

There were 21 participants from both CDCs, of whom the majority were female (61.9%). Table 2 depicts the characteristics of the persons involved in the group discussions. Of the total participants, 6 were guardians or accompanied their family members to the facility and were not seeking treatment for themselves. These included mothers of sick children and companions of older people. The age ranged from 18 to 85 years. At least 52% of the group had a National Qualification Framework (NQF, Certificate or Diploma) and bachelor's degree or equivalent, which is contrary to the notion that public health care used by the poor has a negative correlation to education and socio-economic status. The remaining members who fell into the level of schooling below Grade 12 were mostly older patients, for whom an NQF was not a prerequisite for obtaining employment when they were young. From observed the discussions, it became clear that the sample understood the topic to such an extent that the level of education did not impede the valuable contribution of participants.

Overall and group attributes ranking

The first method assessed the frequency for each characteristic that was ranked in the top 5. Out of the total 21 participants, treatment by the doctor (family physicians) was chosen the most by the participants or 14 (66.7%) individuals. It was followed by distance to the community day center (61.7%) and availability of medication (61.7%), confidentiality during treatment (57.7%), treatment by a nurse, and waiting time (33.3% respectively,) (Table 3).

Table 2: The Participants' Characteristics

Descriptive Statistics	Bothasig		Goodwood		Total
	Group 1	Group 2	Group 3	Group 4	N (%)
Gender					
Total	7	4	6	4	21 (100%)
Female	4	2	6	1	13 (62%)
Male	3	2	0	3	8 (38%)
Age in years					
Range	31 - 85	26 - 73	18 - 68	33 - 56	18 - 85
Level of education					
Grade 0-7	3	1	1	0	5 (24%)
Grade 8-12	2	0	1	2	5 (24%)
NQF	1	3	2	2	8 (38%)
Bachelors or equivalent	1	0	2	0	3 (14%)
Health problems					
No	2	2	1	1	6 (29%)
Yes	5	2	5	3	15 (71%)

Table 3: Nominal representation of attribute choices

Number of participants who chose the attribute	Bothasig (Group 1 and Group 2)	Goodwood (Group 3 and Group 4)	Total, N=21
Treatment by a Doctor	7	7	14 (66.7%)
Distance to Community Day Center	5	8	13 (61.9%)
Availability of medication	8	5	13 (61.9%)
Confidentiality during treatment	6	6	12 (57.1%)
Treatment by a Nurse	3	4	7 (33.3%)
Waiting Time	5	2	8 (33.3%)
Hygiene at Community Day Center	2	4	6 (28.6%)
Safety	2	4	6 (28.6%)
Cost of visit	1	5	6 (28.6%)
Staff attitude	3	2	5 (23.8%)
Records Confidentiality	4	0	4 (19.0%)
Automation of Appointments	1	2	3 (14.3%)
Opening Hours	2	0	2 (9.5%)
Space extension	1	0	1 (4.8%)
Food for chronics /kiosk	0	1	1 (4.8%)

Figure 1 shows the overall weighted preferences of the participants of both CDCs.

Table 4 presents the weighted results by group. The results were closely related to the collated individual choices. Group 1, unlike other groups, did not consider distance to be a significant factor but considered records confidentially to be an essential factor. Group 2 placed more weight on hygiene at the facility than did the other groups, which showed less than 4% weight on this factor. Group 3, based at Goodwood, considered safety as the third most important factor, along with the availability of medication; these two characteristics were considered equally important by Group 3. Safety scored less than 4% in other groups. Group 4 considered automation of appointments and the admission process to be the second most important factor at the same level with treatment by a nurse, yet other groups considered it to be the least important at less than 4 % weight.

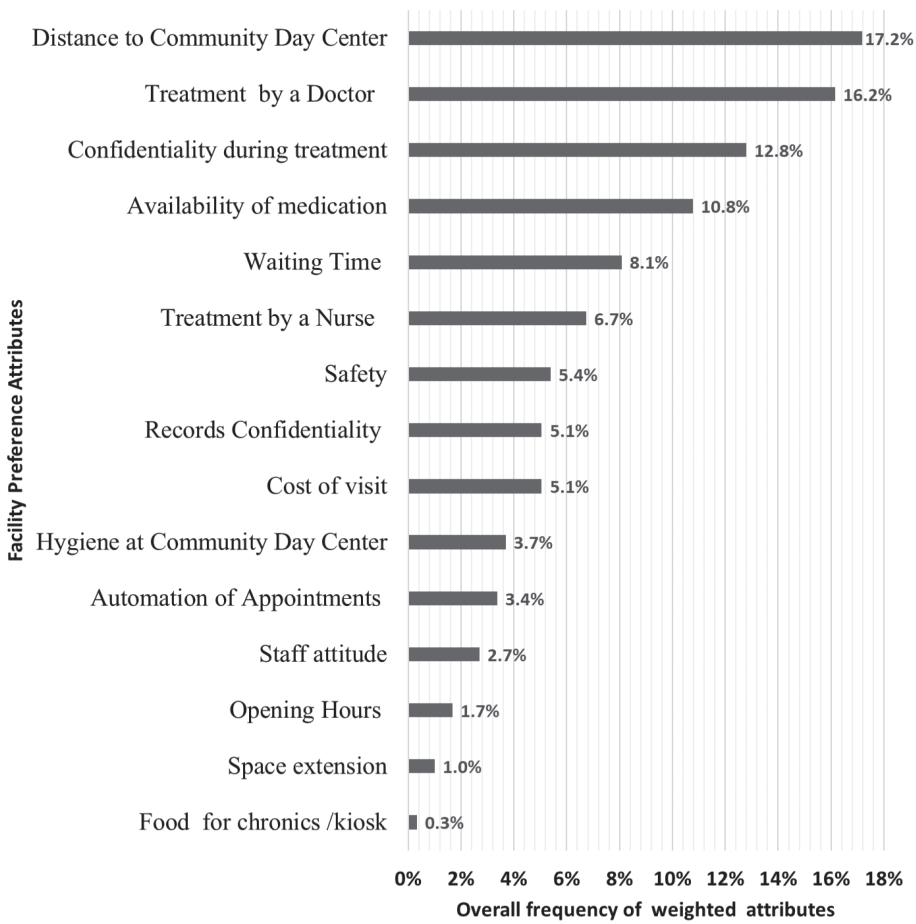

Figure 1: Overall weighted preferences for Goodwood and Bothasig

Table 4: Weighted preferences by group

Attributes Choices by Groups	Group 1 %	Group 2 %	Group 3 %	Group 4 %	Overall %
Distance to Community Day Center	7,8%	21,7%	21,3%	25,0%	17,9%
Records Confidentiality	12,2%	6,7%	0,0%	0,0%	5,3%
Confidentiality during treatment	23,3%	3,3%	10,7%	11,7%	13,3%
Treatment by a Doctor	10,0%	20,0%	24,0%	11,7%	16,1%
Treatment by a Nurse	5,6%	3,3%	6,7%	13,3%	7,0%
Hygiene at Community Day Center	0,0%	11,7%	1,3%	3,3%	3,5%
Waiting Time	13,3%	8,3%	4,0%	6,7%	8,4%
Staff attitude	3,3%	3,3%	4,0%	0,0%	2,8%
Availability of medication	12,2%	13,3%	12,0%	3,3%	10,5%
Opening Hours	5,6%	0,0%	0,0%	0,0%	1,8%
Cost of visit	3,3%	0,0%	4,0%	10,0%	4,2%
Automation of Appointments	0,0%	3,3%	0,0%	13,3%	3,5%
Safety	3,3%	0,0%	12,0%	0,0%	4,2%
Space extension	0,0%	5,0%	0,0%	0,0%	1,1%
Food for chronics /kiosk	0,0%	0,0%	0,0%	1,7%	0,4%
Total	100%	100%	100%	100%	100%

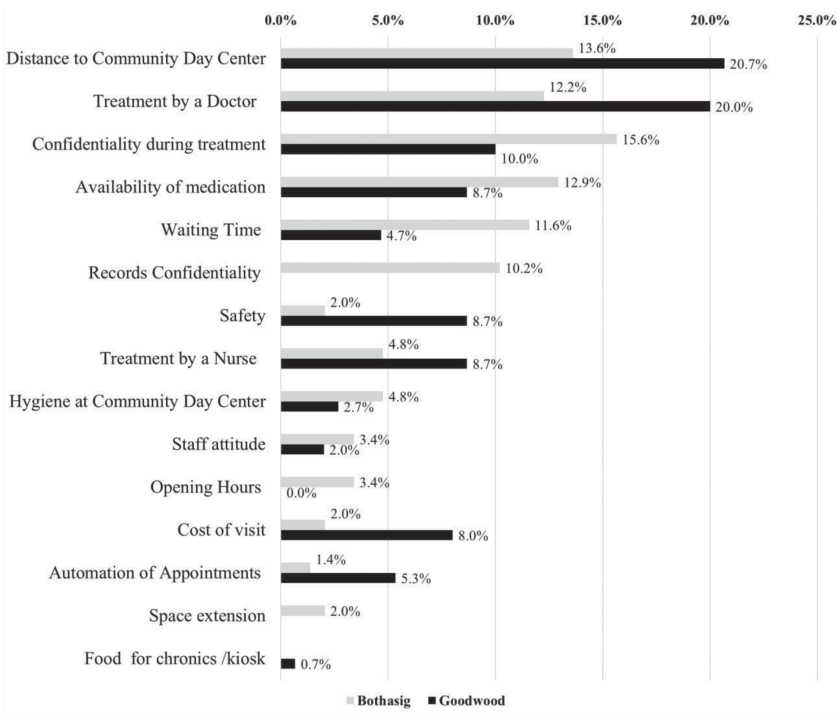

Figure 2: Overall weighted attribute choices by the facility

The second weighted analysis method showed that distance was considered most important, followed by treatment by the doctors, confidentiality during treatment, availability of medication, waiting time, and treatment by nurses, respectively. The weighted results were like those shown in the methodology, which assessed the percentage that each characteristic ranked in the top 5 (Figure 2). Despite the low scoring for concern for safety, staff attitude, cost of the visit, hygiene at the CDC, opening hours, and space extension, these attributes also proved to be crucial to the participants during the discussions.

Attributes choices per facility

Four of the top 5 attributes per facility were similar. The top 5 weighted attributes at Bothasig CDC were confidentiality during treatment (15.6%), distance (13.6%), availability of required medication (12.9%), treatment by the doctor (12.2%), and waiting time (11.6%). The top 5 attributes at Goodwood CDC were distance (20.7%), treatment by the doctor (20%), confidentiality during treatment (10%), and availability of required medication, safety, treatment by a nurse (all at 8.7%).

Though records confidentiality during treatment rated ten at Goodwood, the group discussion was centered around its importance at that facility. There was less discussion about confidentiality at Bothasig, but it scored higher as a concern there than it did at Goodwood. The attributes of opening hours, hygiene at the center, and staff attitude dominated the discussions but ranked lower at both facilities.

Discussion

This study revealed the most important characteristics impacting the choice of facilities in the Northern Tygerberg area of South Africa's Western Cape. The top six characteristics were distance to facility, treatment by doctors (family physicians), confidentiality during treatment, availability of required medication, waiting time and treatment by a nurse. The within-group analysis showed that the groups differed slightly in their top five choices, with some including safety, automation, and records confidentiality within the top five critical factors. Distance to facilities is well documented as one of the crucial factors in patients accessing health care [38–42]. In South Africa, policy decisions have been centered around having a primary health care facility within a 5 km radius of its population [16], to allow easy access for the financially limited and vulnerable populations. Despite the availability of a facility within the patient's vicinity being a vital policy mandate, this does not amount to improved service or needs met [41]. Having a facility in proximity to the population, which nevertheless fails to offer the expected service, can result in low satisfaction levels and reduced trust in the health system.

In a previous study, (Honda et al., 2015),conducted a DCE to elicit preferences for public health services in relatively poor socio-economic areas of the Western Cape and Eastern Cape provinces. Unlike our study, which gathered data at two CDCs, one located in a relatively low-medium income area and the other in a middle-income area, (Honda et al., 2015) used participants from the surrounding community. The attributes which were similar in our group discussions and in those elicited by (Honda et al., 2015) include treatment by nurses or doctors (which was dealt with separately in our group discussions), availability of medication, staff attitudes, and waiting time. Distance was noted as a factor in studies set in China, [23] Albania, [43] and Spain [25]. Several Chinese [21–23] studies found the staff or workforce providing the service to be a factor associated with choice of PHC facility. South African studies by [44] and [41] lists confidentiality during treatment, waiting time and staff attitudes among factors affecting patient satisfaction. Three more South African studies namely [15], [19] and [45] add distance, hygiene of the facility, and availability of medication to the attributes. The similarities thus show alignment between our study and other studies. Some studies did not quite mirror the attributes extracted from our group discussions, possibly due to different objectives and study methodologies. Studies in South Africa, [9] China, [21–23,26,27] India, [20] Iran, [24] Jordan, [46], Spain [25] and Albania [43] included age, education, employment, travel time, transport costs, chronic illness, medication availability, illness gravity, accessibility, type of service provided, previous experience, care providers and facilities infrastructure.

The government abolition of fees at public sector primary health care facilities was meant to increase access to low-income quantiles of society [18,47] and is the basis of NHI [48]. This attribute was not included in the list for literature reviewed; however, it was mentioned in the group discussions as vital. Nevertheless, in the ranking, the attribute did not garner more weight than the stated attributes. Research has shown that affordability does not ensure improved service, which in turn affects the choice of the facility by the patients [9,49,50]. Participants who previously attended Goodwood CDC preferred the Bothasig CDC for safety reasons. Thus, safety during travel and at the facility was an important attribute. However, safety has been identified as a component NHI, which indicates its importance in the South African healthcare system [51].

There are some other limitations to the study. In choosing the participants, the face-to-face approach to patients, who, in some cases, were afraid to lose their spot in a lengthy queue, could have resulted in losing valuable information on personal preferences. Group discussions have been proven to have sample bias in terms of the opinions of a few individuals and are not necessarily generalizable for an entire population [52]. The slight dominance of females to males in the sample strengthened the generalizability of our study. There were more females in the neighbourhoods surrounding the facilities. Bothasig had 52%, and Goodwood had 51%

females, according to Statistics South Africa's 2011 Census, which may have changed to date. Another reason for more females could be health-seeking behaviour, which has skewed more towards females than males [40]. The sample size could be limited but is in line with previous similar studies. We followed recommendations from the literature [53–56] which recommend 5 to 8 participants in a non-commercial FGDs and recommend against using more than 10 participants per group as a larger group may be difficult to control. Accordingly, we conducted group discussions up to data saturation, with no new information being attained by the fourth focus group. The sample size is within the same magnitude as other NGT studies such as [57] (n=14), [58] (n=14), (Hifinger et al., 2017) (n=14), [60] (n=24), [61] (n=27), and [62] (n=26). These studies have shown NGT with relatively small sample groups to be a successful methodology in eliciting preferences.

There was no monetary incentive for participants to reduce bias within the study. Payment is often seen as diminishing the integrity of the study [63]. No payment of participants also showed that conducting group discussions for selecting attributes for a DCE can be less costly in low-income settings.

The attribute list was compiled such that it was reflective of the local context. The study sample was situated in the facilities as opposed to including community members who were not seeking treatment. The attributes were chosen through a literature review, consultation with the Northern-Tygerberg sub-structure management team responsible for the area, and group discussions to ensure validity in our study. There was consensus that the pre-group discussions list reflected the local context and would most likely form a general list any participant would generate. It was a fair reflection of the patient satisfaction information gathered from people who visit public health facilities [41,44,64]. However, including the management team in attribute selection may seem contradictory to the aim of giving patients a voice. It can be argued that both provider and patient input provide buy-in from both parties. NGT is meant to provide a platform for comparing priorities between different groups such as health consumers and providers, leading to a consensus and convergence of provider and patient views [65]. Furthermore, including of the facilities' management provides a platform for the study results to be considered in decision-making processes.

Unlike some other NGT processes [36,37,66], where the participants generate their list of attributes before the discussion and rank them afterward, attributes were compiled from a literature review by the researcher and presented randomly to ignite the discussion. This is in-line with the guidelines and other research on choosing attributes for DCEs [14,67]. Although participants were not allowed to brainstorm before the discussion due to time constraints, they were granted

the opportunity to add more attributes as deemed necessary by everyone. The study aimed to prioritize attributes from a long list and meant to restrict the participants' choice to keep the final list of attributes meaningful. Allowing the participants to add attributes at a later stage revealed the value of NGT in bringing to light attributes that may have been omitted if only a literature review were used in the selection of DCE attributes. There is a possibility of researcher bias being introduced in this case resulting in participants prioritizing the list provided by the researcher. The impact may have been evidenced by the participants' additional attributes not faring very well in the weighted rankings.

In line with other studies, our study confirms that the use of NGTs is feasible and valuable for selecting attribute for DCEs. Having conducted the four group discussions in the two facilities, we are confident this is further proof of the feasibility of using NGTs in choosing attributes for DCEs. Though the attributes chosen by the participants were like those derived in the initial literature review, the techniques helped in prioritization for a DCE. More so, by conducting at least two group discussions at each facility, the method sought to assess the dataset. The overall responses from the 4 groups were similar except for a few outliers, proving the reliability of the methodology.

The study contributes to the literature on how to identify and prioritize attributes for DCEs in a healthcare setting within a developing country noted by Mangham et al. to be more popular outside of the African healthcare sector [68]. Our study could be important in designing future research concerning patient preferences for public facilities. A follow-up study using a DCE is planned to study the trade-offs patients make between the essential attributes.

Conclusion

In conclusion, though the prioritized attributes are like the literature review, NGT achieved its intended purpose of giving the participants a chance to add their voice, identifying and prioritizing the attributes for a DCE. Using NGT to elicit public preferences together with the DCE is an example of a possible technique that can be employed to enhance the collection of information from the patients; employing the methodologies in tandem can utilize patients' reported experiences to improve the delivery of effective health care and patient satisfaction.

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CHAPTER 3.

Enhancing public participation in public health offerings: patient preferences for facilities in the Western Cape Province using a Discrete Choice Experiment

Chapter 3 draws upon:

Chiwire, P., Beaudart, C; Evers, S.M., Mahomed, H.; Hiligsmann, M., 2021. Enhancing public participation in public health offerings: patient preferences for facilities in the Western Cape Province using a Discrete Choice Experiment: Int. J. Environ. Res. Public Health 2022, 19(1), 590, https://doi.org/10.3390/ijerph19010590

Abstract

Background: Understanding patients' preferences for health facilities could help decision-makers in designing patient-centered services. Therefore, this study aims to understand how patients' willingness to trade for certain attributes affects the choice of public health facilities in the Western Cape province of Cape Town, South Africa.

Methods: A discrete choice experiment was conducted in two community day centers (CDCs). Patients repetitively chose between two hypothetical health facilities that differed in six attributes: distance to facility, treatment by doctors vs. nurses, confidentiality during treatment, availability of medication, first visit (drop-in) waiting times, and appointment waiting times. The sample consisted of 463 participants.

Results: The findings showed that availability of medication (%50.5), appointment waiting times (%19.5), and first visit waiting times (%10.2) were the most important factors for patients when choosing a health facility. In addition, respondents preferred shorter appointment and first visit waiting times (<2 h).

Conclusion: These results identified important characteristics in choosing public health facilities in Cape Town. These public health facilities could be improved by including patient voices to inform operational and policy decisions in a low-income setting.

Introduction

When people are unwell, the choice of where to seek medical care is influenced mainly by personal preferences, illness severity, and economic capacity [1,2]. The provision of quality health services is largely dependent on the sufficiency of the health workforce (in terms of numbers, the quality of skills they possess, how and where they are deployed, and how they are managed) [3]. The World Health Organization (WHO) argues that health systems are made of different components (organizations, institutions, and resources) that devote themselves to producing actions whose primary purpose is to improve health [4]. Most of the South African population access health services through government-run public clinics and hospitals. As South Africa moves to adopt National Health Insurance (NHI), the success of this process hinges on public healthcare reforms, which are critical to the delivery of high-quality, accessible, public-sector health services for universal coverage in the health system. Regardless of whether healthcare services become more affordable and available, people will not use them if the quality of these services is unacceptable [5]. Citizenry criticism of public healthcare is widely documented. As a result, several initiatives such as NHI Public Hearings have been carried out to capture concerns and try to improve the services offered by the government [6,7].

Public participation is widely regarded as the backbone of democracy in South Africa [8]. Several studies in the literature [3,8–11] have cited public participation as an instrument for establishing democracy and promoting unity between the government and the people. The aim of shifting decision making to a local level is to give citizens and their local representatives more power in public decision making. Thus, there is more participation in smaller geographic areas where mutual knowledge is greater, distances are shorter, and scales are smaller [11]. This could grant citizens greater influence on the formulation and implementation of health policies in the context of the national policy and healthcare framework, and the health system.

Community participation has widely been argued to be an important factor in improving health outcomes and the performance of health systems [10]. A relational skillset of intangible software, such as values, power, and communication, has been deemed crucial in fostering better community participation in health systems [11]. The inclusion of patient voices in policymaking is also increasingly gaining momentum in health technology assessments (HTA) [12–17]. Some studies note a lack of patient input in operations (day-to-day management) and treatment decisions, with healthcare providers continuing to make decisions for the provision of care on behalf of the patient. It is essential to include patients, who are the users of health technology, in policymaking and day-to-day operational assessments. The outcomes following patient voice inclusion are likely to be more positive and beneficial for citizens. It is therefore important to elicit

the preferences of patients using public health facilities. Several studies in the literature [3,5,8,10,18–24] argued for the need for more research to be carried out to integrate community perspectives into the available evidence-based health systems.

The National Core Standards for health establishments in South Africa specifies six priority areas for improvement: staff values and attitudes, waiting times, cleanliness, patient safety, security, infection prevention, control, and availability of medicines and supplies [25]. Information on how patients value these priority areas and other factors are often not presented in a format that shows their conditional relative importance when weighed against each other. For this reason, there is limited knowledge of South African patients' preference weighting about choosing public health facilities. This is an important issue that influences decision making by management. The current paper, therefore, uses a discrete choice experiment to understand the conditional relative importance of various healthcare factors.

Discrete choice experiments (DCEs) are a stated preference method that has gained popularity when eliciting preferences for healthcare interventions and services. Even though there is a large body of work on stated preferences, only a few studies have been conducted regarding patients' choice of facility, specifically within public health care. A systematic review of DCEs used to elicit patient preferences for primary healthcare showed that most studies were American or European, and focused on general practitioner (GP) consultations, [26] whilst Chinese studies appeared to focus primarily on the public health preferences of rural populations [27–31]. Only one South African DCE of public health facility preferences was identified [5]. This study suggested that treatment by doctors versus nurses, availability of medication, staff attitudes, waiting times, transport costs, expert advice, and examination are important factors influencing the choice of public health facilities. To the best of our knowledge, our study is the second DCE carried out in South Africa, focusing on patients attending public health facilities, contrary to Honda et al. (2015), who interviewed people outside the facility [5].

The present study aims to incorporate patient voices to identify areas in which the experience of care at public health facilities can be improved. The purpose is to facilitate demand for services and to increase patient satisfaction. The study uses a DCE to address patient preferences in the light of the proposed implementation of National Health Insurance in South Africa [32].

Methods

Discrete Choice Experiments

Research regarding patients' preferences of the attributes mentioned above has been limited to quantitative and qualitative studies that look at the patients' opinions of each attribute separately. Therefore, a DCE study was undertaken with the aim of better understanding patients' willingness to trade off some of these attributes, which may affect their choice and attendance at public health facilities.

Study Design and Sampling

Selection of Attributes and Attribute Levels

The study followed the International Society for Pharmacoeconomics and Outcomes Research (ISPOR) conjoint analysis guidelines [33]. The guidelines provide researchers with the necessary steps for conducting a conjoint analysis. A stepwise approach [34] was followed when selecting attributes and attribute levels. This multi-step approach included a literature review, stakeholder consultations, and focus group discussions (FGDs) using the nominal group technique (NGT). The identification and prioritization of attributes related to choosing healthcare facilities are reported in Chiwire et al. (2021) [35]. The same identification and prioritization protocols were used for this DCE. Five candidate attributes were chosen as top priorities following the participants' responses to the ranking and weighting process: distance ranked top of the list, followed by treatment by doctors, confidentiality during treatment, availability of medication, waiting times, and treatment by nurses, respectively. The attributes were divided into structural dimensions (distance to facility, waiting times, availability of drugs) and process dimensions (confidentiality during treatment and treatment by nurses or doctors) as per Donabedian's healthcare quality model [26]. The list of attributes and attribute levels was finalized through consultation with the research team and facilities management team. For example, the teams agreed to split waiting times into two attributes due to the nature of the services offered at the Community Day Centers (CDCs)—due to high demand, patients can be instructed to return on a different day so that more urgent cases can be prioritized. Additionally, chronically ill patients presenting for their bi-annual check-up were most likely to have an appointment. Table 1 details the final list of attributes and levels.

Table 1: Attributes, definition, and attribute levels describing facility choice preferences in the DCE

Attributes	**Definition of Attributes**	**Attribute**
Distance to CDC	How far for patients to travel to the community day center (CDC) in kilometers from their home.	Less than 3 km Between 3–5 km Between 5–10 km More than 10 km
Confidentiality during treatment	Consultation is carried out behind closed doors, without other patients and staff hearing.	Other patients and staff cannot hear the consultation Other patients and staff can hear the consultation
Waiting time for the first visit to the facility (without an appointment)	How long does it take to consult with the doctor or nurse after entering the CDC. If the first visit is for a particular ailment, they will give a diagnosis.	2 h 4 h 6 h Different day than the appointment
Waiting time with an appointment	How long does it take to see the doctor or nurse after entering the CDC with a pre-booked appointment?	2 h 4 h 6 h 8 h
Treatment offered by	Which staff member provides a diagnosis.	Doctor Nurse
Availability of required medication	The patient receives the medication prescribed at the CDC.	All ofAll the required medication is available Most of the required medication is available Some of the required medication is available

Questionnaire Design and Sample Size

As it is not very efficient to provide all possible combinations of these patient attributes, a Bayesian D-efficient statistical design (Ngene software) was used to reduce the number of choice sets. In addition, the design aimed to maximize the precision of the estimated parameters for a given number of choice questions by including a priori information about the sign and value of the parameters. In total, 24 binary choice sets were developed and divided into two versions, namely, questionnaire 1 with 12 choice sets and questionnaire 2 with the remaining 12. Participants were required to choose the alternative they preferred: facility A or facility B. Thus, each patient received 12 choice sets. Visual representations were used to facilitate patient understanding. The questionnaire was initially developed in English and then translated into Afrikaans and Xhosa. Figure 1 shows an example of a choice set.

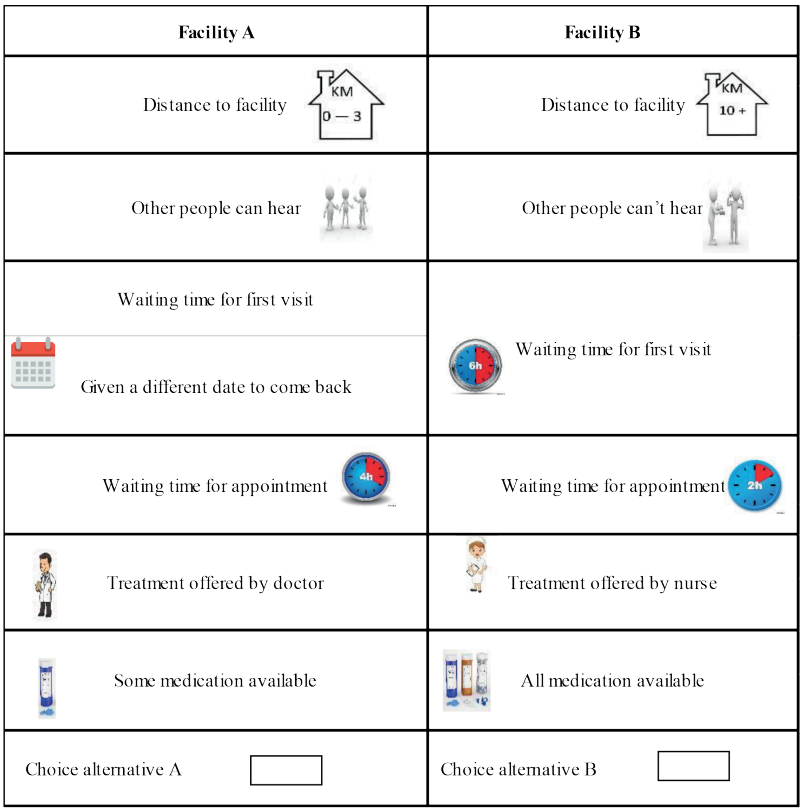

Figure 1: Example of a choice set in the DCE questionnaires

The final questionnaire included the DCE, a willingness-to-pay section following another paper [36], and sociodemographic information. The DCE section started with a description of the task, a list of all attributes and levels, and an example of a choice task. A pilot study was conducted for face validity with 7 participants at Bothasig CDC to determine the feasibility of using the questionnaires in their original form, and to estimate the ease at which the participants could answer the questions. Only a few minor changes were made. The questionnaires were handed out to the clients. Regarding sample size, the requirements of DCEs are not uniformly determined. The Lancsar and Louver method[37], advises at least 20–30 respondents/observations per choice set to provide precise parameter estimates. To strengthen the internal validity of the results, the literature recommends increasing sample size as well as the number of hypothetical scenarios [38–40]. Thus, guided by other studies, and to reduce sampling error, 200–250 respondents were decided to be sufficient for this study. Hence, a sample of 500 was recruited, with 250 participants at each facility.

Setting and Participants

The DCE was conducted in the South African city of Cape Town. The target population was clientele of primary health facilities at community day centers (CDCs) in the Northern and Tygerberg sub-structures (a part of the city containing 2 out of 8 subdistricts). The studied population and health facilities were identified through consultation with the Northern–Tygerberg substructure team, comprised of the sub-structure director and 3 primary health care managers. Following this, Goodwood CDC and Bothasig CDC were selected as study sites. Bothasig is in a more affluent area compared with Goodwood. The sites were also chosen due to similarities in their offered care package, reducing selection bias in facility choice. Community day centers (CDCs) in South Africa offer a comprehensive primary health care package (antenatal care, termination of pregnancy, reproductive health, chronic diseases and care, TB care, People with HIV/AIDS, mental health, oral health, rehabilitation and disability services, environmental health, occupational health, casualty, and maternity).

The participants were adult males and females aged 18 or above. All were patients accessing the Bothasig or Goodwood CDC public health facilities for any of the services which are in the primary health comprehensive package. The participants were approached as they waited for consultation in the reception, pharmacy, or doctors' waiting rooms. Some patients declined participation due to fear of missing their consultation; these participants were replaced. The sample is thus a convenience sample in response to the health services' specific target. The findings would provide more broadly applicable information suited for decision-making. It could also guide the selection of a more considerable, more representative study within the Western Cape.

Analysis

Analysis of the DCE was carried out using Nlogit software, version 5.0 (Econometric Software, Inc, NY, USA). First, a random parameter logit model or a latent class model were chosen for analyzing the choice observations. A random parameter logit model assumes that parameters are randomly distributed in the population and captures heterogeneity by estimating the standard deviation of the parameters' distribution [12,41–43]. All attributes were categorical. The constant was included in the model to test for a systematic preference for either facility. Second, all parameters were specified as random (i.e., normal distributions) to account for heterogeneity, and 2 000 Halton draws were conducted. Effect coding was used to describe all categorical attributes. The reference/omitted levels were distance over 10 km; people can hear the conversation with nurses; given a date for appointment; waiting time with an appointment—8 h; treatment by a nurse; and some of the required medication is available. These were calculated as a negative sum of the attribute levels' non-omitted coefficients and normalized to zero. The

preference weights are relative to the mean effect of the different attribute levels and coefficients signs; the attribute preferences are either positive or negative compared with the mean. The conditional relative importance of each attribute was estimated using the beta-coefficients range for each attribute. Thereafter, interaction model analyses were conducted for sub-groups related to sociodemographic variables (age, gender, and facility).

Ethical Considerations

The Health Research Ethics Committee of Stellenbosch University approved the study. In line with the Western Cape Government's research guidelines, approval for facilities access was granted by the Western Cape Government Provincial Health Research Committee. The study adhered to the Declaration of Helsinki principles. All participants were required to sign consent forms before completing the questionnaires.

Results

A total of 500 participants completed the DCE questions. Questionnaires that were incomplete, or filled out by participants who were under 18, were not included. This resulted in a final sample of 463 (232 at Bothasig and 231 at Goodwood). Unfortunately, no information about the response rate was recorded. Overall, the respondents' demographic characteristics showed that most of the participants were female (61%), 35 years or above (59%), educated to grade 8–12 (high school) (64%), and unemployed (44%). Please refer to Table 2 for more information.

Participant characteristics were similar at both facilities. In both cases, more females than males answered the questionnaire. Most of the participants were married or in a partnership (46% at both facilities), and the proportion of singles was similar (35% and 36%, respectively). Students accounted for 7% at both facilities. Most participants traveled for 15–30 min to reach their local facility. However, several characteristics also differed between facilities: fifty percent of participants at Goodwood were 18–34 years old, whilst at Bothasig the majority was 35 or above. Half of the participants at Goodwood were unemployed, whilst at Bothasig, 64% were either formally employed or self-employed. Most participants at Bothasig were seeking care for a one-off condition, whilst at Goodwood, there were similar proportions of one-off patients and chronically ill patients. The visiting frequency was most commonly 1–12 months at Bothasig and >2 years at Goodwood. The mode of transport was most commonly walking for Goodwood participants, and private car for Bothasig participants. Please refer to Appendices A and B for more information.

Table 2: Respondents' demographic characteristics

			Facility		
Type of Factors	**Variables**	**All (n=466)**	*Bothasig CDC (n=230)*	*Goodwood CDC (n=236)*	*p-value*
Socio-Demographic Factors	**Sex (%)**				
	Male	179 (38.4)	81 (35.2)	98 (41.5)	0.024
	Female	282 (60.5)	149 (64.8)	133 (56.4)	
	Age Group (%)				
	18-34	192 (41.2)	114 (49.6)	78 (33.1)	<0.001
	35 +	274 (58.8)	116 (50.4)	158 (66.9)	
	Marital Status (%)				
	Single	164 (35.2)	82 (35.7)	82 (34.7)	0.931
	Married or Partnership	214 (45.9)	106 (46.1)	108 (45.8)	
	Widowed	28 (6.0)	13 (5.7)	15 (6.4)	
	Divorced	46 (9.9)	22 (9.6)	24 (10.2)	
	Separated	6 (1.3)	4 (1.7)	2 (0.8)	
	Education (%)				
	Grade 0-7	32 (6.9)	12 (5.2)	20 (8.5)	0.022
	Grade 8-12	296 (63.5)	137 (59.6)	159 (67.4)	
	National Qualifications Framework (NQF, Diploma or Certificate)	80 (17.2)	52 (22.6)	28 (11.9)	
	Bachelor's Degree	43 (9.2)	24 (10.4)	19 (8.1)	
	Master's Degree	8 (1.7)	3 (1.3)	5 (2.1)	
	Employment (%)				
	Student	34 (7.3)	17 (7.4)	17 (7.2)	0.034
	Unemployed	205 (44.0)	86 (37.4)	119 (50.4)	
	Self-Employed	53 (11.4)	31 (13.5)	22 (9.3)	
	Employed	165 (35.4)	93 (40.4)	72 (30.5)	
Access-Related Factors	**Facility Visit**				
	First time	54 (11.6)	37 (16.1)	17 (7.2)	<0.001
	Between 1-12 months	120 (25.8)	77 (33.5)	43 (18.2)	
	Between 1-2 years	74 (15.9)	48 (20.9)	26 (11.0)	
	2 years or more	208 (44.6)	65 (28.3)	143 (60.6)	
	Chronic				
	Chronic	203 (43.6)	89 (38.7)	114 (48.3)	0.097
	One-Off	236 (50.6)	127 (55.2)	109 (46.2)	
	Both	10 (2.1)	4 (1.7)	6 (2.5)	
	Transport				
	Walking	186 (39.9)	58 (25.2)	128 (54.2)	<0.001
	Public Taxi	72 (15.5)	31 (13.5)	41 (17.4)	
	Private Taxi	12 (2.6)	7 (3.0)	5 (2.1)	
	Bus	16 (3.4)	12 (5.2)	4 (1.7)	
	Private Car	170 (36.5)	119 (51.7)	51 (21.6)	
	Ambulance	1 (0.2)	1 (0.4)	0 (0.00)	
	Travel Time				
	0-15 Minutes	246 (52.8)	128 (55.7)	118 (50.0)	0.208
	15-30 Minutes	140 (30.0)	66 (28.7)	74 (31.4)	
	30 Minutes to 1 Hour	51 (10.9)	19 (8.3)	32 (13.6)	
	More than 1 Hour	11 (2.4)	7 (3.0)	4 (1.7)	

*p-values obtained with Chi² test

5 missing data for gender, 8 missing data for marital status, 7 missing data for education, 9 missing data for employment.
10 missing data for facility visit, 16 missing data for chronic, 9 missing data for transport, 17 missing data for travel time (+1 data entry error/coded as 5),

Patient Preferences

The main results of the patients' preferences, obtained using a random parameters logit model, are presented in Table 3 and Figure 2. At least one level of each attribute was significant at $p < 0.05$. An assessment of the attributes according to conditional relative importance shows that the availability of medication (50.5%) was the most important attribute for patients when selecting a facility, followed by appointment waiting times (19.5%), and first visit waiting times (10.4%). Conversely, going by relative importance, the least important attributes when selecting a facility were treatment by doctors vs. nurses (8.2%), distance to the health facility (6.7%), and confidentiality (4.6%).

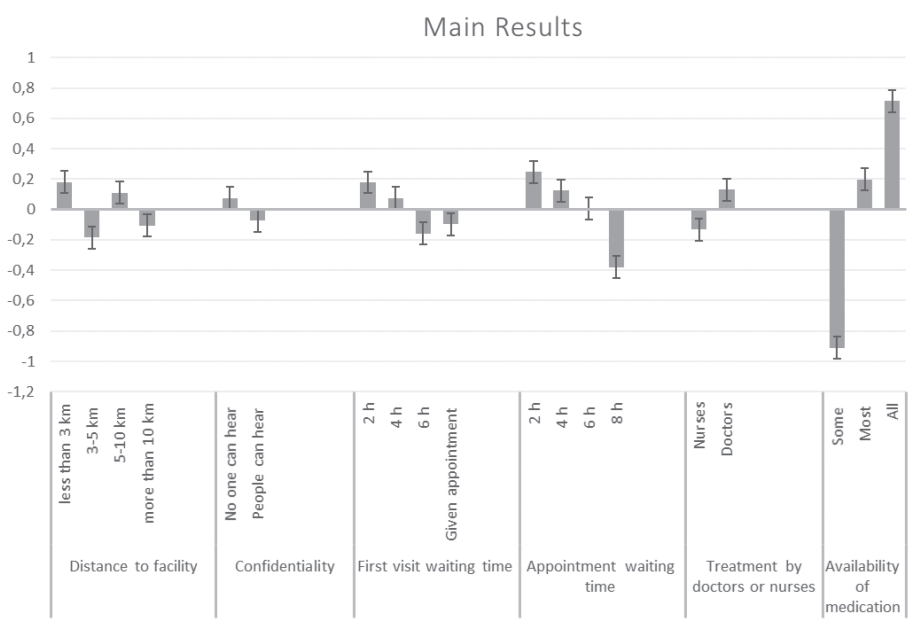

Figure 2: Main results random parameters logit model with a standard deviation

Table 3: Main results random parameters logit model

Overall results

Attribute/Level	Coefficient	Estimated Standard Deviation	Relative Importance
Constant (non-random parameter)	0.07** (0.01 to 0.14)		
Distance			
Distance to facility is less than 3km	0.18*** (0.67 to 0.29)	0.23***	
Distance to facility is 3-5km away from home	-0.18*** (-0.27 to -0.10)	0.36***	
Distance to facility is 5-10km away from home	0.11*** (0.03 to 0.18)	0.19**	
Distance to facility is more than 10km	-0.11** (-0.21 to -0.01)		6.7%

Table 3: (continued)

Overall results

Attribute/Level	Coefficient	Estimated Standard Deviation	Relative Importance
Confidentiality			
No one can hear your conversation with the nurses	0.07*** (0.02 to 0.13)	0.22***	
People can hear conversation with nurses	-0.07 (-0.13 to -0.02)		4.6%
First visit waiting time			
First Visit waiting time 2 hours	0.12*** (0.08 to 0.27)	0.20**	
First Visit waiting time 4 hours	0.08* (-0.00 to 0.16)	0.30***	
First Visit waiting time 6 hours	-0.16 (-0.23 to -0.08)	0,1	
Given different date appointment	-0.10 (-0.22 to 0.02)		10.4%
Appointment Waiting time			
Appointment waiting time 2 hours	0.25*** (0.14 to 0.35)	0.23***	
Appointment waiting time 4 hours	0.13*** (0.05 to 0.20)	0.19**	
Appointment waiting time 6 hours	0.01 (-0.07 to 0.09)	0,01	
Appointment waiting time 8 hours	-0.38*** (-0.49 to -0.27)		19.5%
Treatment by doctors or nurses			
Treatment offered by nurses	-0.13 (-0.23 to -0.04)		
Treatment offered by doctor	0.13*** (0.04 to 0.23)	0.1	8.2%
Availability of medication			
Some of the medication required is available	-0.91*** (-1.10 to -0.72)		
Most of the required medication is available	0.20 (0.14 to 0.26)		
All medication required is available	0.71*** (0.55 to 0.88)	0.97***	50.5%
Replications for simulated probs. =1000	Log likelihood function -3618.69568	McFadden Pseudo R-squared .0528530	
RPL model with panel has 466 groups	Restricted log likelihood -3820.62726	Estimation based on N = 5512, K = 27	
Fixed number of observations. /group= 12	Chi squared [27] (P= .000) 403.86315	Inf.Cr.AIC = 7291.4 AIC/N = 1.323	
Number of observations.= 5592, skipped 80 observations	Significance level .00000		

***** Significant at 0.01; ** Significant at 0.05; * Significant at 0.1**

Respondents preferred facilities where all required medication was available to facilities where only some medication was available. Respondents also preferred short appointment waiting times (2 h), with preference reducing as the waiting time increased. Similar findings were also observed for first visits, where short waiting times (2 h) were preferred to longer ones. In addition, respondents preferred to be treated by doctors rather than nurses. They also preferred absolute confidentiality—no one else being able to hear their consultation—compared with no

confidentiality. Finally, the positive coefficient when the attribute of distance to the health facility was less than 3 km shows that respondents preferred traveling shorter distances, rather than longer distances. Standard deviations were, however, significant for all attributes except for treatment by doctors vs. nurses, showing that there was significant variation/heterogeneity within each attribute/level across respondents.

Sub-Group Analysis

Sub-group analysis was conducted on age, gender, and facilities. Significant differences were observed for the gender and facilities classes but not for the age groups.

Males vs. Females

The health facility preferences by males and females are presented in Table 4 and Appendix C. The interaction model revealed significant differences in waiting times and confidentiality. Females had slightly more preference for first visits and appointment shorter waiting times (2 h) than men. In addition, females reported a higher preference for confidentiality compared with men.

Facilities: Goodwood vs. Bothasig

Table 5 and Appendix D show the results for the facilities sub-group analysis. Goodwood participants had a much higher relative importance for medication availability (62%) than Bothasig (19%). Other attributes' relative importance was internally evenly spread for Bothasig except for confidentiality. The interaction model revealed significant differences in the availability of medication. Goodwood had a significantly stronger preference for all the medication being available ($p = 0.00$) compared with Bothasig. Similarly, most of the medication is available ($p = 0.03$). Bothasig had a significantly higher preference for treatment to be offered by a doctor ($p = 0.02$) than Goodwood. The distance between 3–5 km was significantly less preferred at Goodwood compared with Bothasig. Respondents at Goodwood showed a significantly stronger preference for confidentiality than at Bothasig. Both facilities preferred short first visit waiting times (2 h), with Bothasig having slightly more preference. As the times increased to 6 h, both facilities reduced preference, with a stronger negative preference at Goodwood than Bothasig.

Table 4: Differences between male and female respondents in preferences for facilities in the Western Cape province

Sub-group Gender	Male			Female			Interaction Gender
Attribute/Level	Coefficient	Estimated Standard Deviation	Relative Importance	Coefficient	Estimated Standard Deviation	Relative Importance	Significance P-value
Constant (non-random parameter)	0.07 (-0.03 to 0.18)			0.07* (-0.01 to 0.16)			0.15
Distance							
Distance to facility is less than 3km	0.09 (-0.10 to 0.28)	0.41***		0.24*** (0.10 to 0.39)	0.15		0.18
Distance to facility is 3-5km away from home	-0.16** (-0.29 to -0.02)	0.35***		-0.20*** (-0.30 to -0.9)	0.36***		0.67
Distance to facility is 5-10km away from home	0.13** (0.00 to 0.25)	0.17		0.09 (-0.00 to 0.19)	0.22**		0.65
Distance to facility is more than 10km	-0.06 (-0.22 to 0.10)		11.4%	-0.13** (-0.25 to -0.01)		8%	
Confidentiality							
No one can hear your conversation with the nurses	0.01 (-0.07 to 0.09)	0.18***		0.12*** (0.05 to 0.19)	0.26***		0.06*
People can hear conversation with nurses	-0.01 (-0.09 to 0.07)		0.8%	-0.12 (-0.19 to -0.05)		6%	
First visit waiting time							
First Visit waiting time 2 hours	0.05(-0.10 to 0.21)	0.24**		0.27*** (0.14 to 0.39)	0.20*		0.03**
First Visit waiting time 4 hours	0.17** (0.03 to 0.30)	0.34***		0.04 (-0.06 to 0.14)	0.25***		0.15
First Visit waiting time 6 hours	0.10 (-0.22 to 0.02)	0.11		0.19*** (-0.09 to 0.11)	0.11		0.23
Given different date appointment	-0.32** (-0.53 to -0.11)		14.6%	-0.12 (-0.28 to 0.04)		12%	
Appointment Waiting time							
Appointment waiting time 2 hours	0.10 (-0.63 to 0.27)	0,21		0.34*** (0.20 to 0.47)	0.21		0.04**
Appointment waiting time 4 hours	0.14** (0.02 to 0.27)	0.34***		0.12** (0.02 to 0.22)	0.19		0.78
Appointment waiting time 6 hours	-0.01 (0.14 to 0.12)	0.13		0.01 (-0.09 to 0.11)	0.00		0.88
Appointment waiting time 8 hours	-0.23** (-0.41 to -0.05)		14.6%	-0.47*** (-0.61 to -0.33)		21%	

Table 4: (continued)

Sub-group Gender	Male			Female			Interaction Gender
Attribute/Level	**Coefficient**	**Estimated Standard Deviation**	**Relative Importance**	**Coefficient**	**Estimated Standard Deviation**	**Relative Importance**	**Significance P-value**
Treatment by doctors or nurses							
Treatment offered by nurses	-0.07 (-0.23 to 0.08)			-0.17 (-0.30 to -0.05)			
Treatment offered by doctor	0.07 (-0.08 to 0.23)	0.13	5.5%	0.17*** (0.05 to 0.30)	0.12	9%	0.34
Availability of medication							
Some of the medication required is available	-0.77 (0.47 to 1.07)			-0.87 (0.62 to 1.12)			
Most of the required medication is available	0.19*** (0.10 to 0.29)	0.23***		0.10*** (0.12 to 0.28)	0.29***		0.97
All medication required is available	0.58*** (0.32 to 0.84)	0.98***	53.1%	0.77*** (0.12 to 0.28)	1.00***	43%	0.28

*** Significant at 0.01; ** Significant at 0.05; and * Significant at 0.1.

Table 5: Differences between Goodwood and Bothasig respondents in preferences for facilities in the Western Cape Province

Sub-group Facilities	Goodwood			Bothasig			Interaction Facility
Attribute/Level	**Coefficient**	**Estimated Standard Deviation**	**Relative Importance**	**Coefficient**	**Estimated Standard Deviation**	**Relative Importance**	**Significance P-value**
Constant (non-random parameter)	0.10* (-0.00 to 0.19)			0.06 (-0.03 to 0.15)			0.17
Distance							
Distance to facility is less than 3km	0.25*** (0.82 to 0.42)	0,17		0.09 (-0.07 to 0.25)	0.32***		0.18
Distance to facility is 3-5km away from home	-0.29*** (-0.43 to -0.53)	0.63***		-0.07 (-0.18 to 0.04)	0.01		0.01***
Distance to facility is 5-10km away from home	0.12** (0.01 to 0.23)	0.22**		0.11** (0.00 to 0.22)	0.21**		0.98
Distance to facility is more than 10km	-0.08 (-0.23 to 0.07)		11.3%	-0.13* (-0.27 to 0.01)		10%	

Table 5: (continued)

Sub-group Facilities	Goodwood			Bothasig			Interaction Facility
Attribute/Level	Coefficient	Estimated Standard Deviation	Relative Importance	Coefficient	Estimated Standard Deviation	Relative Importance	Significance P-value
Confidentiality							
No one can hear your conversation with the nurses	0.16*** (0.09 to 0.24)	0.08		0.00 (-0.08 to 0.08)	0.29***		0.02**
People can hear conversation with nurses	-0.16 (-0.24 to -0.09)		6.7%	0.00 (-0.08 to 0.08)		-	
First visit waiting time							
First Visit waiting time 2 hours	0.07 (-0.06 to 0.21)	0.05		0.29*** (0.15 to 0.44)	0.35***		0.02**
First Visit waiting time 4 hours	0.11* (-0.01 to 0.22)	0.17		0.03 (-0.09 to 0.15)	0.35***		0.21
First Visit waiting time 6 hours	-0.26*** (-0.37 to -0.14)	0.04		-0.08 (-0.18 to 0.02)	0.14		0.03**
Given different date appointment	0.08 (-0.10 to 0.26)		7.8%	-0.24** (-0.42 to -0.06)		22%	
Appointment Waiting time							
Appointment waiting time 2 hours	0.20*** (0.05 to 0.36)	0.33***	11.8%	0.28*** (0.14 to 0.43)	0,19		0.30
Appointment waiting time 4 hours	0.21*** (0.09 to 0.33)	0.35***		0.08 (-0.03 to 0.19)	0.05		0.34
Appointment waiting time 6 hours	-0.05 (-0.16 to 0.07)	0.02		0.07 (-0.04 to 0.18)	0.01		0.25
Appointment waiting time 8 hours	-0.36*** (-0.53 to -0.19)			-0.43*** (-0.58 to -0.28)		29%	
Treatment by doctors or nurses							
Treatment offered by nurses	-0.01 (-0.16 to 0.13)			-0.24 (-0.38 to -0.10)			
Treatment offered by doctor	0.01 (-0.13 to 0.16)	0.00	0,4%	0.24*** (0.10 to 0.38)	0.25***	20%	0.02**
Availability of medication							
Some of the medication required is available	-1.62 (1.31 to 1.93)			-0.29** (0.06 to 0.52)			
Most of the required medication is available	0.29*** (0.20 to 0.39)	0.34***		0.13*** (0.04 to 0.21)	0.23***		0.03**
All medication required is available	1.33*** (1.06 to 1.61)	1.14***	62.0%	0.16 (-0.04 to 0.36)	0.65***	19%	0.00***

*** Significant at 0.01; ** Significant at 0.05; * Significant at 0.1

Discussion

The present study aimed to incorporate patient voices to identify areas in which the experience of care at public health facilities can be improved. The purpose is to facilitate demand for services, and to increase patient satisfaction. The study uses a DCE to address patient preferences in the light of the proposed implementation of National Health Insurance in South Africa [32]. We managed to identify the most preferred attributes in choosing a facility, bridging the gap in the stated preferences on the topic studied in South Africa. Ours is the second DCE study investigating understanding public facility choice in the Western Cape and South Africa. In addition, there was strength in including a sample of patients at the facilities as participants who captured preferences of individuals experiencing and were able to attest to the service provided at the facility, unlike the Honda et al. [5] study that facilitated a DCE with the community setting. The availability of medication was the most important relative attribute when selecting a health facility. The findings were consistent with Honda et al. [5], of which drug availability was identified as the most important issue. The literature demonstrates treatment measures to be the most important factors that affect healthcare seeking [44]. This study reveals that patients have preferences for certain characteristics of health facilities: near (short distances to health facility), with absolute confidentiality during visits, with short first visit waiting and appointment waiting time, where treatment is offered by doctors, and where all required medication is available.

Distance to health facilities has been argued to influence major health outcomes [45–49]. Universal access to health care requires service availability and accessibility. Therefore, distance to health facilities is a critical component of accessibility. Our study findings showed that patients generally prefer health facilities near households across facilities and demographic characteristics. However, studies in literature [45,47–49] showed that the relationship between distance and facility selection in urban settings could be less clear as women were cited as having more health service options within reasonable travel distance compared with men. The latter can explain higher preferences for facilities that are close by. Our study findings also revealed that participants preferred to be treated by a doctor than a nurse; similar results were also recorded in a DCE by Caldow et al. [50], who reported that it is most important for respondents to see a general practitioner (GP) rather than a practice nurse. In our study, women reported appointment waiting time as the most important attribute when selecting a health facility. A previous DCE supported this, with a cohort of women that noted appraisals of the quality of care depended vigorously on the care process and nature of the services received rather than infrastructure [51].

Pedersen et al. [52], in their DCE, identified that patients preferred short waiting times if one had an appointment. This was also true in our study for both first visit waiting time and appointment waiting time. In addition, this attribute was cited as more important than "distance to the practice" in a patient preference study [52]. This was also true in our study as both first visit waiting time and appointment waiting time had higher relative importance proportions than the distance to health facility attribute. In terms of waiting time, all other things being equal, patients are generally less likely to choose healthcare services with long waiting times. The finding that women more than men prefer shorter waiting times appears to be unique to our study. Literature search on similarly findings showed gender gap on waiting times is mostly concentrated on surgical waiting times. We therefore did not have any comparable study. However, we can assume this may be linked to the amount of responsibilities carried by women in households. The structural outcomes at Goodwood were of greater concern compared with the Bothasig. Goodwood seemed to lack resources (based on observation or the participants' responses), affecting their structural outcomes. The interaction model for facilities revealed significant differences between Goodwood and Bothasig participants. More specifically, Goodwood participants gave more importance to the availability of medication, confidentiality, shorter distances, and first visit waiting times. Medication availability could suggest concern over stock-outs that require attention, re-assessing drug supply chain, and home delivery systems. There have been reported stock-outs in South Africa, mainly for HIV and TB drugs, associated with the scale-up of treatments [53]. As noted in Chiwire et al. [35], the focus group discussions process for selecting attributes for this study revealed an overcrowded Goodwood facility with less confidentiality during nurses' first point of patient screening. It is not surprising that the same issues were considered most important at Goodwood. Bothasig facility was less crowded and appeared to provide more confidentiality during screening. It is recommended that infrastructure and patient flow at Goodwood be re-assessed. Alternative methods to reduce overcrowding and long waiting times apart from the current deferral appointment system should also be considered. Despite the national policy on managing patient waiting time in outpatient departments [54], improvements in waiting times for first and appointment visits appear to be slow. They need to be continuously monitored and strengthened. More participants at Bothasig were educated at the diploma level and above (34.3%) compared with 16.9% at Goodwood. There is a possibility of a correlation between education and the higher preference for treatment by a doctor at Bothasig.

This study has several limitations. The differences in facility layout and patient flow may have increased bias towards preferences from participants. Goodwood facility layout does not allow for confidentiality, especially at the first point of contact between health professionals and patients. The space is not big enough to have the first point-contact consultations to be

conducted separately, hence nurses doing temperature screening and those doing medical probing will be in the same room. As a result, there were high patient volumes at Bothasig compared with Goodwood because of these structural differences. Secondly, external validity ensures comparability of hypothetical and actual choices [55]. As respondents are not obliged to make the choices, they indicate in a DCE, hypothetical bias may reduce the usefulness of DCE results [56]. However, the results in our study are not far removed from other findings and policy-targeted priority areas. Lastly, facets of participants who refused to participate were not systematically collected and we were not able to do a contrast with those who participated.

The study brings in a wealth of knowledge, especially in the Southern African context and specifically South Africa. To date, very few well-founded scientific studies have been conducted in South Africa and we are aware of only one study in the South African context that looked at patients' preferences, especially from a trade-off point of view in the public health facility, and it concentrated on a community sample. Therefore, this study provides relevant scientific valuable information to policymakers as South Africa, like any other low-middle income country, is characterized by a limited health budget. Our study is further innovation in the sense that we reveal that patients are willing to accept trade-offs between the included attributes and most were thus important. Considering alternative data sources available to decision-makers is important, more so for them to understand how useful DCEs are in predicting behavior. The quantification of how well DCEs predict behavior could explicitly account for uncertainty in DCE predictions [56]. DCEs can provide a relatively accurate and cost-effective option to predict individual choices [56]. The data from DCEs can then be used to quantify the relative importance of aspects of health care [51]. Therefore, this study avails information to policymakers on patients' preferences in the Western Cape, which is relatively accurate. Thus, accounting for the variation in DCE prediction accuracy in this manner would make for more robust uptake and impact models.

Conclusions

The study findings show overall availability of medication is the most important factor in choosing a facility for service provision. Shorter waiting times were preferred either on appointment or first visit. Being treated by doctors was significantly preferred to be treated by nurses, whilst the shorter distance to facility and confidentiality were highly preferred. Decision-makers must include these patient voices in improving healthcare provision and increasing patient satisfaction.

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Appendix A

Table A1: Demographics by sub-groups

		Facility			Gender			Age		
Variables	**All (n = 466)**	**Bothasig CDC (n = 230)**	**Goodwood CDC (n = 236)**	**p-Value**	**Women (n = 282)**	**Men (n = 179)**	**p-Value**	**18–34 (n = 192)**	**35+ (n = 274)**	**P-Value**
Sex (%)					/	/	/			
Male	179 (38.4)	81 (35.2)	98 (41.5)	0.024	/	/		62 (32.3)	117 (42.7)	0.003
Female	282 (60.5)	149 (64.8)	133 (56.4)					125 (65.1)	157 (57.3)	
Age group (%)										
18–34	192 (41.2)	114 (49.6)	78 (33.1)	<0.001	125 (44.3)	62 (34.6)	0.003	/	/	/
35+	274 (58.8)	116 (50.4)	158 (66.9)		157 (55.7)	117 (65.4)		/	/	
Marital status (%)										
Single	164 (35.2)	82 (35.7)	82 (34.7)	0.931	99 (35.1)	65 (36.3)	<0.001	111 (57.8)	53 (19.3)	<0.001
Married or partnership	214 (45.9)	106 (46.1)	108 (45.8)		123 (43.6)	91 (50.8)		64 (33.3)	150 (54.7)	
Widowed	28 (6.0)	13 (5.7)	15 (6.4)		24 (8.5)	4 (2.2)		2 (1.0)	26 (9.5)	
Divorced	46 (9.9)	22 (9.6)	24 (10.2)		32 (11.3)	14 (7.8)		5 (2.6)	41 (15.0)	
Separated	6 (1.3)	4 (1.7)	2 (0.8)		3 (1.1)	3 (1.7)		3 (1.6)	3 (1.1)	
Education (%)										
Grade 0–7	32 (6.9)	12 (5.2)	20 (8.5)	0.022	21 (7.4)	11 (6.1)	<0.001	3 (1.6)	29 (10.6)	<0.001
Grade 8–12	296 (63.5)	137 (59.6)	159 (67.4)		191 (67.7)	105 (58.7)		120 (62.5)	176 (64.2)	
National Qualifications Framework (NQF, diploma or certificate)	80 (17.2)	52 (22.6)	28 (11.9)		39 (13.8)	41 (22.9)		40 (20.8)	40 (14.6)	
Bachelor's degree	43 (9.2)	24 (10.4)	19 (8.1)		26 (9.2)	17 (9.5)		20 (10.4)	23 (8.4)	
Master's Degree	8 (1.7)	3 (1.3)	5 (2.1)		3 (1.1)	5 (2.8)		3 (1.6)	5 (1.8)	

Table A1: (continued)

Variables	All (n = 466)	Facility			Gender			Age		
		Bothasig CDC (n = 230)	Goodwood CDC (n = 236)	p-Value	Women (n = 282)	Men (n = 179)	p-Value	18–34 (n = 192)	35+ (n = 274)	P-Value
Employment (%)										
Student	34 (7.3)	17 (7.4)	17 (7.2)	0.034	24 (8.5)	10 (5.6)	<0.001	33 (17.2)	1 (0.4)	<0.001
Unemployed	205 (44.0)	86 (37.4)	119 (50.4)		136 (48.2)	69 (38.5)		52 (27.1)	153 (55.8)	
Self-employed	53 (11.4)	31 (13.5)	22 (9.3)		21 (7.4)	32 (17.9)		16 (8.3)	37 (13.5)	
Employed	165 (35.4)	93 (40.4)	72 (30.5)		98 (34.8)	67 (37.4)		85 (44.3)	80 (29.2)	

* *p*-values obtained with Chi² test; 5 missing data for gender; 8 missing data for marital status; 7 missing data for education; and 9 missing data for employment.

Appendix B

Table A2: Access-related variables by facility, gender, and age

	Access-Related Variables									
		Facility			Gender			Age		
Variables	All (n = 466)	Bothasig CDC (n = 230)	Goodwood CDC (n = 236)	p-Value	Women (n = 282)	Men (n = 179)	p-Value	18–34 (n = 192)	35+ (n = 274)	p-Value
Facility visit										
First time	54 (11.6)	37 (16.1)	17 (7.2)	<0.001	26 (9.2)	28 (15.6)	0.161	31 (16.1)	23 (8.4)	<0.001
Between 1–12 months	120 (25.8)	77 (33.5)	43 (18.2)		75 (26.6)	45 (25.1)		68 (35.4)	52 (19.0)	
Between 1–2 years	74 (15.9)	48 (20.9)	26 (11.0)		43 (15.2)	31 (17.3)		29 (15.1)	45 (16.4)	
2 years and above	208 (44.6)	65 (28.3)	143 (60.6)		134 (47.5)	74 (41.3)		58 (30.2)	150 (54.7)	

Table A2: (continued)

		Access-Related Variables								
		Facility			Gender			Age		
Variables	All (n = 466)	Bothasig CDC (n = 230)	Goodwood CDC (n = 236)	p-Value	Women (n = 282)	Men (n = 179)	p-Value	18–34 (n = 192)	35+ (n = 274)	p-Value
Chronic										
Chronic	203 (43.6)	89 (38.7)	114 (48.3)	0.097	120 (42.6)	83 (46.4)	0.073	44 (22.9)	159 (58.0)	<0.001
One-off	236 (50.6)	127 (55.2)	109 (46.2)		151 (53.5)	85 (47.5)		135 (70.3)	101 (36.9)	
Both	10 (2.1)	4 (1.7)	6 (2.5)		3 (1.1)	7 (3.9)		1 (0.5)	9 (3.3)	
Transport										
Walking	186 (39.9)	58 (25.2)	128 (54.2)	<0.001	105 (37.2)	81 (45.3)	0.283	74 (38.5)	112 (40.9)	0.249
Public taxi	72 (15.5)	31 (13.5)	41 (17.4)		52 (18.4)	20 (11.2)		37 (19.3)	35 (12.8)	
Private taxi	12 (2.6)	7 (3.0)	5 (2.1)		8 (2.8)	4 (2.2)		5 (2.6)	7 (2.6)	
Bus	16 (3.4)	12 (5.2)	4 (1.7)		10 (3.5)	6 (3.4)		7 (3.6)	9 (3.3)	
Private car	170 (36.5)	119 (51.7)	51 (21.6)		104 (36.9)	66 (36.9)		61 (31.8)	109 (39.7)	
Ambulance	1 (0.2)	1 (0.4)	0 (0.00)		1 (0.4)	0 (0.00)		1 (0.5)	0 (0.00)	
Travel time										
0–15 min	246 (52.8)	128 (55.7)	118 (50.0)	0.208	154 (54.6)	92 (51.4)	0.645	101 (52.6)	145 (52.9)	0.905
15–30 min	140 (30.0)	66 (28.7)	74 (31.4)		85 (30.1)	55 (30.7)		55 (28.6)	85 (31.0)	
30 min to 1 h	51 (10.9)	19 (8.3)	32 (13.6)		30 (10.6)	21 (11.7)		19 (9.9)	32 (11.7)	
More than 1 h	11 (2.4)	7 (3.0)	4 (1.7)		8 (2.8)	3 (1.7)		4 (2.1)	7 (2.6)	

* *p*-values obtained with Chi² test; 10 missing data for facility visit; 16 missing data for chronic; 9 missing data for transport; 17 missing data for travel time (+1 wrong data entered/coded as 5); and 8 missing data for home residence.

Appendix C

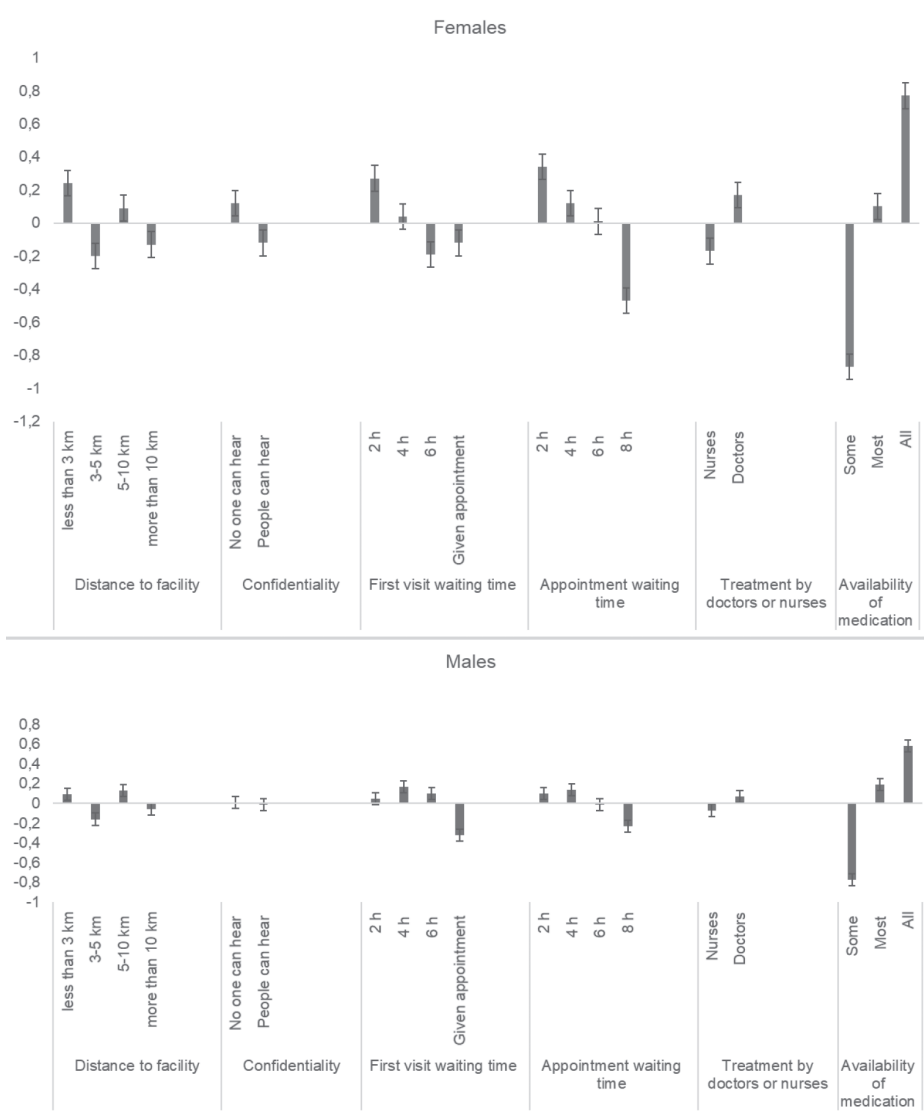
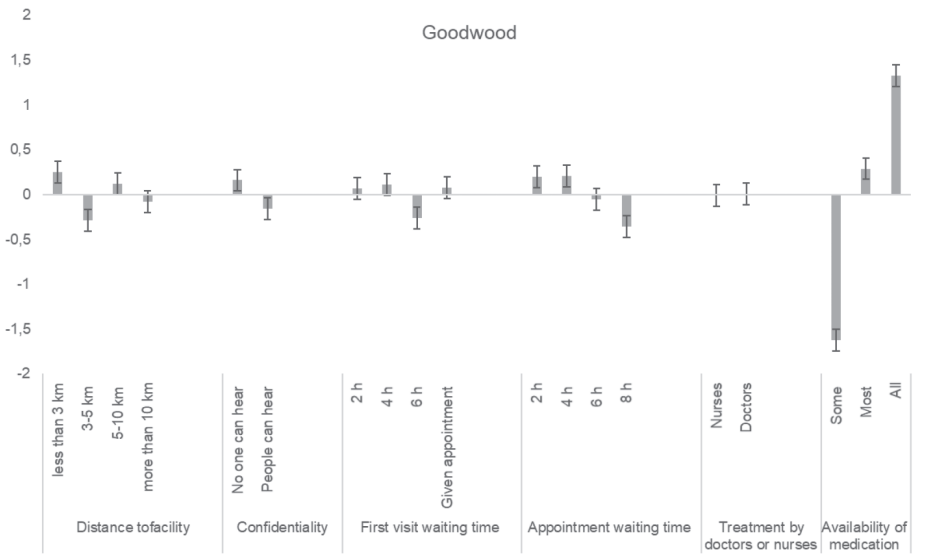


Figure A1: Sub-group analysis males vs. females

Appendix D



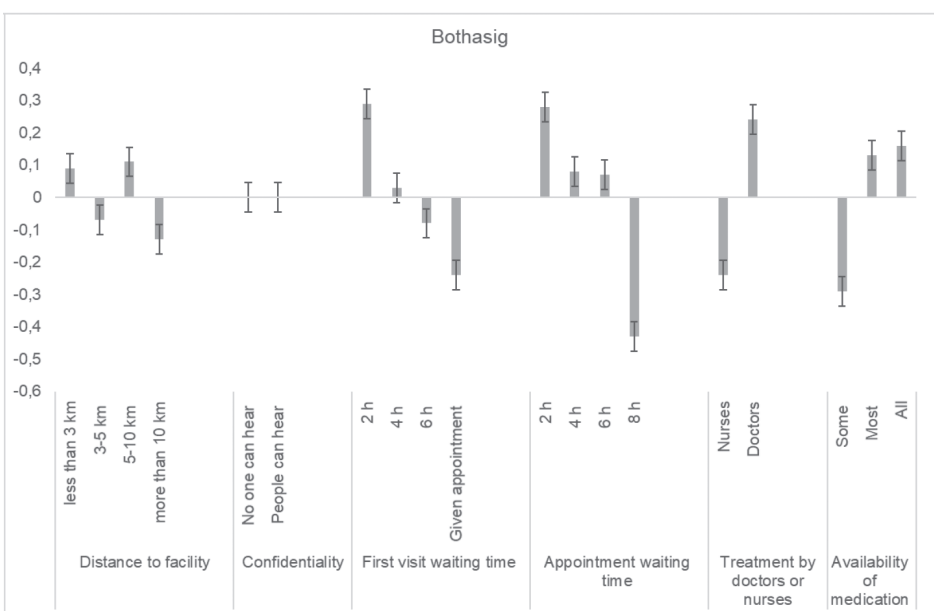


Figure A2: Sub-group analysis facilities

CHAPTER 4.

Willingness to Pay for Primary Health Care at Public Facilities in the Western Cape Province, South Africa

Chapter 4 draws upon:

Chiwire, P., Evers, S.M., Mahomed, H.; Hiligsmann, M., 2021. Willingness to pay for primary health care public facilities in the Western Cape Province, Cape Town, South Africa, Journal of Medical Economics, 24:1, 162-172, DOI: 10.1080/13696998.2021.1877147

Abstract

Background and Objectives: As facilities are being prepared for the implementation of National Health Insurance (NHI) in South Africa, there is a pressing need to understand how the public equates the provision of health services at Primary Health Care (PHC) centers with monetary value. Accordingly, this exploratory study was designed to ascertain the willingness to pay (WTP) for public primary healthcare services in South Africa and to identify factors that influence the WTP.

Methods: The study was conducted in Cape Town, South Africa, among 453 persons presenting at two public primary health care centers, namely Bothasig Community Day Center (CDC) and Goodwood CDC. The study used the contingent valuation range methodology. Descriptive statistics, multiple logistic and Tobit regression analyses were conducted to assess demographics, socio-economic, and health access factors that influence WTP.

Results: Overall, 60% of participants were willing to pay for services offered at the PHC facilities. The average willingness to pay for all participants was 49.44 ZAR, with a median of 25 ZAR. The multiple logistic regression for grouped facilities showed unemployment, public transport, and the facility attended to be significant whilst public transport, facility visits, and facility attended were the only significant variables in the Tobit model. There was less willingness to pay for those unemployed in comparison with students, those using public transport rather than walking, those frequenting the facilities more than first-time visitors and those attending Goodwood facility in comparison with Bothasig.

Conclusion: This study revealed factors related to the participants' WTP and to their willingness to contribute towards the health service, though at very low amounts. Understanding the economic value placed upon a service provided in a facility is essential in decision-making for quality care improvements, especially as the South African health system is making the facilities ready for NHI.

Introduction

South Africa's health sector is a two-tier system with a public and private sector. Payment structures separate the two systems. The public sector's primary health care (PHC) is based on a no-fee for service platform whilst government funds subsidize the secondary and tertiary services. However, private providers of health care are for-profit at all levels of care and require payment for services. These are mostly reimbursements in the form of pooled funds from medical insurance and a voluntary prepayment system for those who can afford it. The public health system caters for an estimated 84% of the population who do not have medical insurance [1]. As a result, public health facilities are under pressure to service most of the population with limited resources.

When it comes to health care systems in South Africa, willingness to pay (WTP) has often been discussed in the realm of private health care and only rarely in public health care due to the nature of the public health system that allows no fee at the point of service. The perceived disparities in the provision of care between public and private providers in terms of patient experience such as quality of care, waiting times, staff attitudes, and environmental comforts, have resulted in those who can afford it opt to invest in private health care through medical health insurance [2–4].

The South African Government (SAG) has noted that the only way to achieve universal health coverage in the face of 29% unemployment rates[5] and 84% uninsured citizens [6], is to offer no-fees at point of service for all levels through a National Health Insurance (NHI) [7]. Solutions brought forward includes a mandatory NHI, which will see every person accessing adequate health care when needed without worrying about user-fees or out-of-pocket payments [7]. The Competition Commission's inquiry into the private healthcare sector identified the lack of a national system to monitor the quality of health care being offered to the public and the high costs of private health care [8], another motivator for the government's proposed NHI. On the opposite side is a group advocating for their right to private healthcare for fear of what is seen as a failed public health system [8].

These clients are willing to pay for access to what they perceive as quality health care. The National Department of Health has, through its Health Establishment Service Delivery Improvement Plan, established a way to measure patient satisfaction with an emphasis on access to services; availability and use of medicines; patient safety; cleanliness and infection control; staff values and attitudes and waiting time [9]. The factors noted in measuring patient satisfaction are likely to affect their willingness to pay for services. There is a consensus that

the quality of care in all forms needs improving if NHI is to succeed [7]. The value of health care services can be more fully understood by clients when a monetary figure is applied. A survey by African Barometer found 41% of South Africans willing to pay user fees or higher taxes for health spending to increase spending on public health care [10].

Evidence suggests that common factors associated with WTP for health care services include age, gender, marital status, education, household size, health status, treatment preferences, hospital visit or stay, satisfaction with the quality of care, perceptions of health care financing, distance from the facility, travel time, urban/ rural setting amongst others [11–14]. Examples include WTP in Malaysia [12] and Nigerian [15] which noted that households with more educated heads or persons who had higher education were found to be more WTP.

In Nigeria, [15] reported less WTP amongst those with post-secondary education for social health insurance. The effect of health status, specifically chronic illness, was explored in studies by [14],[13] and [16] however, they reported contradictory results. The objective of this study was to ascertain the willingness to pay towards PHC visits services in South Africa's public sector. Furthermore, we aimed to identify factors associated with WTP.

Methods

Design

The study used the contingent valuation (CV) range methodology in eliciting the amounts participants would be willing to pay for health care. The contingent valuation method is well-grounded in economic theory and using it for assessing health services makes it possible to review monetary value placed upon products/goods, services, and the trade-offs individuals or groups are willing to make, especially where no market exists [17]. It allows the valuation of products/goods or services that may not previously exist by creating hypothetical markets and clarifying price estimates when there is uncertainty [17]. The researcher provides the participants with hypothetical questions and uses the responses to conclude their choices. Valuation is based on survey techniques such as bidding games, open-ended questions, and dichotomous choices [18]. We followed the range method used by [19] which allowed for the participant to choose within a range rather than a point estimate. Their results showed participants to be more favourable to the range methodology; this was assumed to reduce hypothetical bias [20]. The ex–post perspective was adopted as most participants were assumed to have experienced the service under review.

The researcher provided background information on the study, which included choosing the WTP amount per visit, assuming service improvements to the status quo in areas such as waiting time, confidentiality during treatment, staff attitude, availability of medication, and whatever they perceived needed improvement. The participants were then asked the following question, 'How much are you definitely and definitely not willing to pay for the services in the facility which you require?' The range method gives the participant a range of values to choose from for bounded ranges in pricing instead of open-ended questions and the dichotomous method. Two focus group discussions, one with 6 and the other with 4 participants were conducted for compiling a range of monetary values, including the highest and lowest number of which participants were willing to pay. The range of zero to 300 ZAR was ascertained and used in the questionnaire with 25 ZAR intervals. The SAG minimum wage for employees for the year 2020 was noted to be 20.76 ZAR per hour, which amounts to 3 566 ZAR per month[21]. During the period of data collection, which was the most convenient time for the facilities (September 2018), the exchange rate for 1 USD was 13.73 ZAR. The exchange with the 1 Euro was 16.54 ZAR.

The threshold of 300 ZAR was 21.85 USD and 18.14 Euro. A pilot study was conducted to ascertain the reliability of the questionnaire before it was implemented in the full study. The participants were asked to rank the questionnaire from 1 (extremely easy) to 7 (extremely difficult), and 5 participants ranked it 4. Minor changes were made to allow for an easy understanding of some questions, and it was reiterated that the data collector should explain the task clearly. The main study was implemented thereafter. During the survey, patients were first asked to indicate how much they would pay, starting with the lowest amount and stopping at the highest (Table 1). The next stage was to select from listed amounts those they were not willing to pay. Additional characteristics of the participants were included in the questionnaire; these were demographic (gender, age, marital status), socio-economic factors (education and employment), health-related (facility visit, the reason for visit), and access factors (transport used, travel time, and residence).

Table 1: Monetary range for participants to ascertain WTP ZAR (R, currency)

Payment per Visit	A: I would **definitely pay** the amount **(please tick V)**	B: I would definitely **NOT** pay the amount **(please tick X)**
R 0		
R 25		
R 50		
R 75		
R 100		
R 125		
R 150		
R 175		
R 200		
R 225		
R 250		
R 275		
R 300		

Study population and data sampling

The study was conducted among persons presenting at two public health primary care facilities in Cape Town, South Africa, in 2018. The target population was clientele attending primary health facilities in the Community Day Centers (CDCs). A CDC is a primary health care center providing a range of ambulatory services including care for acute and chronic illnesses, preventive care such as immunizations, screening such as pap smears and tuberculosis symptom screening, and reproductive care such as family planning. The facilities have a Family Medicine doctor, but the system works in a way that one may only experience a nurse driven service (be treated by a clinical nurse) or be seen by a doctor. If medication is prescribed, the patient will see a pharmacist (but not for a consultation). As noted by Honda et al.,[22] the South African PHC is mostly nurse-driven, although most patients would prefer to be treated by a doctor.

The WCG: Health service has 6 districts, of which one is metro (urban) and five rural. The metro has 4 sub-structures, each sub-divided into 2 sub-districts. For this study, the Northern-Tygerberg sub-structure was selected, comprised of the Northern and Tygerberg sub-districts, for conducting the focus group discussions. The study population and health facilities were identified through consultation with the Northern-Tygerberg sub-structure team, which was comprised of the sub-structure Director and Primary Health Care managers. The sample included participants who came from within an 8.2 km radius from Bothasig Community Day Center (CDC) and of Goodwood CDC. Facilities were recruited through convenience sampling

as recommended by local management to represent two facilities with different communities, to cover better generalizability of the study.

The facilities are meant to offer services to clients from the Bothasig and Goodwood area. According to Statistics South Africa, the total population of the two communities was approximately 62,075 in 2011, with 51% females and 49% males [23]. The number will have changed by now, and the next full census may reflect a new population. The figures discussed in the profile are all from the 2011 census from Statistics S.A. Bothasig residence has a 60.8% employment rate whilst Goodwood has 63.1% employed. Most of the total population is English speaking (53%), followed by Afrikaans speakers (32%), and the remaining are Xhosa speakers and other languages. In terms of racial composition, Bothasig has 77% whites, 14% Colored (mixed race), 6% Blacks, and 3% other. Goodwood is comprised of 38% Colored, 38% Whites, 18% Blacks, and 6% other.

Convenience sampling was used to select participants who were aged 18 years and above. Trained university students were tasked with interviewing the participants. They students requested participation from to those waiting in the queue at for facility reception, or for consultation with either the nurse, doctor, or pharmacist. The study purpose and objectives were communicated, and consent was requested for participation; and only those who consented were enrolled. The participants were made aware of the option to stop participation at any time during the interview/study.

Ethical Considerations

Ethics approval was given by the Health Research Ethics Committee of Stellenbosch University, Reference number S17/10/208. Approval was then sought from the Western Cape Government: Health's Provincial Health Research Committee for facility access. The study adheres to the principles set out in the Declaration of Helsinki. The participants were not offered any financial incentives, and consent was sought before participation.

Data Analysis

Data cleaning and analysis was done using Microsoft Excel and Stata. Participants below the age of 18 years and those who did not complete the WTP section were excluded. First, patient characteristics were analyzed using frequencies and chi2 analysis. The mean and median of WTP was then calculated and included the frequencies for the WTP and not WTP within the identified demographic and socio-economic factors. A range analysis was performed to evaluate the range of differences in WTP by the participants. This was followed by a bivariate

analysis/cross tabular analysis with chi2 of possible factors associated with willingness to pay for service.

Furthermore, multiple regression models were conducted to assess the association between demographic, socio-economic, health-related, and access factors with WTP. First, univariable logistic regression analysis was applied using the dichotomous variable (WTP = 0 or WTP >0) as outcome to check for possible predictors for the WTP model. Significant variables obtained in this first step were then included in a multiple logistic regression analysis. The effects were expressed in terms of odds ratios with corresponding 95% confidence intervals (CI). Additionally, linear regression analysis was performed to assess the association of the variables with WTP measured on a numerical scale. As a sensitivity analysis, a Tobit regression was conducted using the numerical WTP variable as a dependent variable, assuming it is censored at a lower limit of 0, and the same independent variables. Tobit regression was used to replace linear regression analysis (marginal effects model), due to the large number of zero WTP responses. The Tobit regression model is used when many dependent variables are true zeros chosen by the participants (not missing values), which would result in using OLS [24]. Using Tobit regression allows for censoring of the true zero values. The corrected effect (estimated regression coefficient) is reported together with the 95% CI.

Results

Participants Characteristics

The demographics showed a total of 462 participants included in the study. However, 13 of these were excluded from the study for incomplete questionnaires. Of the excluded participants, 9 (69%) were female, and 4 (31%) were male. In total, 449 participant responses were analyzed, of whom 60% were female, a breakdown like the excluded participants. The catchment area or geographic area of service showed the total population to be comprised of 51% females and 49% males, slightly different from the sample of 60% female and 40% male. Participants were predominantly in the youth category (as per the Statistics South African category), i.e., 18-34 years old. The smallest cohort was that of senior citizens (65 and above). A more significant number were married or in a partnership, followed by those who were single. Only 48% of the sample were employed. Most of the respondents in the sample studied up to Grade 12, the highest grade before starting university. Table 2 includes all participants' characteristics. The health-related characteristics showed a slight majority for facility visits that were one-off, and most participants were frequent clients. In terms of access variables, 86% of the participants declared a 0-30 minutes' travel time, suggesting that the facilities are serving participants within their geographic catchment areas.

Table 2: Characteristics of Respondents

Variables		n (%)
Total participants		449 (100%)
Facility	Bothasig	232 (52%)
	Goodwood	217 (48%)
Demographics		
Gender	Male	178 (40%)
	Female	271 (60%)
Age groups	18-34	183 (41%)
	35-49	124 (28%)
	50-64	92 (21%)
	65 and above	47 (11%)
Marital status	Single	159 (36%)
	Married/Partnership	211 (47%)
	Widowed/Divorced/Separated	76 (17%)
Socio-economic factors		
Education	Grade 0-7	31 (7%)
	Grade 8-12	287 (64%)
	Higher education	128 (29%)
Employment	Students	34 (8%)
	Unemployed	196 (44%)
	Employed	214 (48%)
Health-related factors		
Facility visit	First time	52 (12%)
	0 to12 months	117 (26%)
	More than 12 months	274 (62%)
Reason for visit	Chronic	205 (47%)
	Once-off	232 (53%)
Access factors		
Transport	Walking	182 (41%)
	Public transport	87 (20%)
	Private transport	175 (39%)
Travel time	0-15 minutes	242 (55%)
	16-30 minutes	134 (31%)
	More than 30 minutes	60 (14%)
Sub-district / Residence	Northern	155 (35%)
	Tygerberg	207 (46%)
	Western	79 (18%)
	Eastern/Khayelitsha/ Klipfontein	8 (2%)

Willingness to Pay

Of the overall participants, 60% were willing to pay for healthcare services. The mean (S.D.) that participants were willing to pay and not to pay was 49.44 ZAR (63.38) with a median of 25 ZAR. When considering only the willingness to pay participants, the mean WTP was 81.92 ZAR (63.21) and the median 50 ZAR. The highest amount for WTP was 300 ZAR and selected by 5 participants, which were the last listed amount on the 0-300 ZAR range of choices given to participants (refer to Figure 1). The nominal figures for the facilities showed that 74% of participants from Bothasig were willing to pay, whilst only 46% at Goodwood were willing to pay.

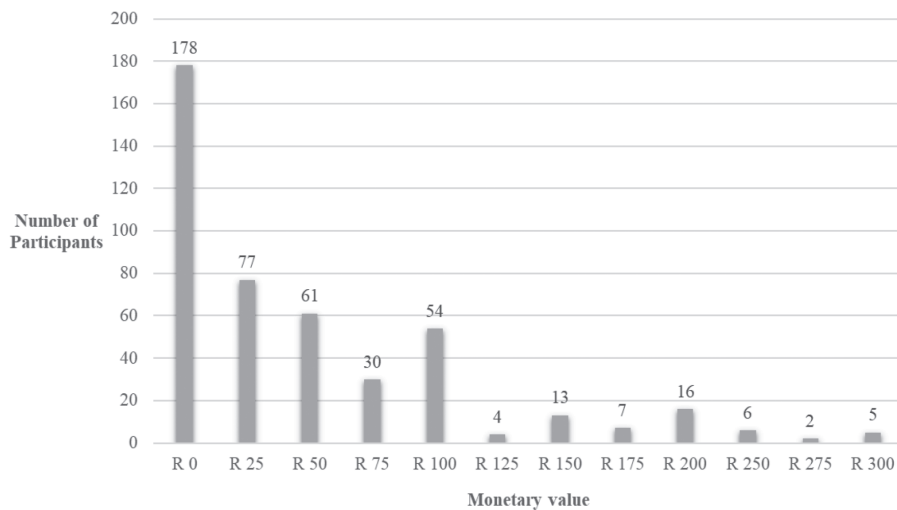


Figure 1: Willingness to pay for access to primary health care, ZAR (R, currency)

The range observed was mostly a 25 ZAR difference (equivalent to the minimum difference between two levels) between amount people were WTP and the amount they were NWTP. For more details, refer to Appendix 2. Unaffordability was the major reason for not being willing to pay, followed by the sentiment that providing health care was the government's responsibility and poor service provision hindered the WTP. Some respondents decided not to provide the reason (12%), and some felt it was the government's responsibility (19%) to provide the service. Table 3 shows a bivariate analysis of WTP against demographics, socio-economic, health-related, and access factors.

Table 3: A Bivariate analysis of possible factors associated with willingness to pay for services

	Variables	**Number of participants** n (%)		
	n 449	271 (60%)	**Willing to Pay**	p-value
Gender	Male	178	109 (63%)	0,431
	Female	271	162 (59%)	
Age groups	18-34	183	126 (69%)	0,001
	35-49	124	82 (66%)	
	50-64	92	42 (46%)	
	65 and above	47	19 (40%)	
Marital status	Single	159	108 (68%)	0,023
	Married/Partnership	211	123 (58%)	
	Widowed/Divorced/Separated	76	38 (50%)	
Education	Grade 0-7	31	15 (48%)	0,131
	Grade 8-12	287	169 (58%)	
	Higher education	128	85 (66%)	
Employment	Students	34	24 (70%)	0,001
	Unemployed	196	80 (40%)	
	Employed	214	165 (77%)	
Facility visit	First time	52	38 (73%)	0,026
	0 to 12 months	117	77 (66%)	
	More than 12 months	274	153 (56%)	
Reason for Visit	Chronic	205	110 (54%)	0,007
	Once-off	232	154 (66%)	
Transport	Walking	182	104 (57%)	0,021
	Public transport	87	45 (52%)	
	Private transport	175	119 (68%)	
Travel time	0-15 minutes	242	153 (63%)	0,384
	16-30 minutes	134	76 (57%)	
	More than 30 minutes	60	34 (57%)	
Facility	Bothasig	232	171 (74%)	0,001
	Goodwood	217	100 (47%)	

Note: For 5 participants, NWTP cannot be calculated as their WTP is 300 the max.

Multiple Logistic and Tobit regression

Univariable logistic regression analyses revealed age, marital status employment, education, facility visit history, the reason for visit, transport, and the facility to be significantly associated with WTP. These significant variables were included in a multiple logistic regression model, which showed a good fit based on the Hosmer–Lemeshow goodness-of-fit test (p=0.204).

The multiple logistic regression for each facility separately showed that only unemployment was significant at Goodwood CDC and public transport was the only significant variable at Bothasig CDC. For the Goodwood model, the unemployed were less likely to be willing to pay in comparison to students (OR 0.20, 95% CI 0.05 to 0.77). Bothasig CDC model showed that those using public transport were less likely to be willing to pay in comparison to those who walked to the facility (OR 0.35, 95% CI 0.13 to 0.97).

The analysis for grouped facilities using, the multiple logistic regression showed unemployment, public transport and the facility attended to be significant (refer to Table 3). The unemployed were less likely to be willing to pay in comparison to students (OR 0.36, 95% CI 0.13 to 0.94). Those using public transport to reach the facility were less likely to be willing to pay compared to those walking (OR 0.47, 95% CI 0.25 to 0.86). Lastly, those attending Goodwood were less likely to be willing to pay compared to Bothasig attendees (OR 0.32, 95% CI 0.20 to 0.52).

Table 3: Multiple logistic regression modelling for willingness to pay (grouped facilities)

Multiple logistic regression with significant univariables			
Variables		**Odds ratio**	**95% Confidence Interval**
Age			
18-34	Reference		
35-49		1,27	0.67-2.35
50-64		0,82	0.39-1.77
65 and above		0,74	0.29-1.89
Marital status			
Single	Reference		
Married/Partnership		0,65	0.38-1.14
Widowed/Divorced/Separated		0,59	0.28-1.24
Education			
Grade 0-7	Reference		
Grade 8-12		0,84	0.34-2.05
Higher education		0,67	0.24-1.81
Employment			
Students	Reference		
Unemployed		0.36 *	0.13-0.94
Employed		1,63	0.64-4.17
Facility visit			
First time	Reference		
0 to 12 months		0,72	0.31-1.67
More than 12 months		0,82	0.37-1.82

Table 3:(continued)

Multiple logistic regression with significant univariables			
Variables		**Odds ratio**	**95% Confidence Interval**
Reason for visit			
Chronic	Reference		
Once-off		1.15	0.70-1.89
Transport			
Walking	Reference		
Public transport		0.47*	0.25-0.86
Private transport		1,23	0.71-2.12
Facility			
Bothasig	Reference		
Goodwood		0.32***	0.20-0.52
Constant		7.51**	1.63-34.63

* p < 0.05; ** p < 0.01; *** p < 0.001
Pearson or Hosmer–Lemeshow goodness-of-fit test
Prob > chi2 = 0.2036

Table shows the Tobit regression model results. Public transport, facility visits, and facility attended were the only significant variables in the Tobit and linear regression models. Employment which was significant in the multiple logistic regression analysis took the same direction of a negative relationship for the unemployed and a positive relationship for the employed in comparison to students in the Tobit regression analysis.

Table 4: Tobit regression modelling for willingness to pay (grouped facilities)

		Tobit regression model (censored)		
Explanatory variables		**β**	**95% Confidence Interval**	
Age groups				
18-34	Reference			
35-49		-3,87	-26.45	18,72
50-64		-23,27	-52.68	6,13
65 and above		-26,31	-64.04	11,40
Marital status				
Single	Reference			
Married/Partnership		-13,1	-33.58	7,38
Widowed/Divorced/Separated		-22,37	-50.66	5,91
Education				
Grade 0-7	Reference			
Grade 8-12		-19,29	-55.05	16,46
Higher education		-10,1	-49.03	28,83

Table 4:(continued)

		Tobit regression model (censored)		
Explanatory variables		**β**	**95% Confidence Interval**	
Employment				
Students	Reference			
Unemployed		-28,85	-65.14	7,42
Employed		27,58	-6.37	61,55
Facility visit				
First time	Reference			
0 to 12 months		-24.67****	-53.69	4,35
More than 12 months		-23.51****	-50.85	3,83
Reason for visit				
Chronic	Reference			
Once-off		-10,15	-29.24	8,93
Transport				
Walking	Reference			
Public transport		-29.32*	-53.48	-5.15
Private transport		16,56	-3,85	36,97
Facility				
Bothasig	Reference			
Goodwood		-31.4***	-50.32	-12.48
Constant		95.52***	39,840	151,20

*** p < 0.05; ** p < 0.01; *** p < 0.001**

******p < 0.1**

Number of observations = 430

Uncensored = 259 LR chi2(15) = 100.22

Limits: lower = 0 Left-censored = 171 Prob > chi2 = 0.0000

The WTP was - 29.32 ZAR (C.I 95%: -53.48 to -5.15) lower in those using of public transport than for those walking to the facility. The WTP was -24.67 ZAR (C.I 95%: -53.69 to 4.35) lower in those whose facility history ranged between 0-12 months and ZAR -23.51 (C.I 95%: -50.85 to 3.83) lower for more frequent users (more than 12 months) in comparison with the first-time visitors. Goodwood attendees WTP was lower by -31.40 ZAR (C.I 95%: -50.32 to -12.48) compared to those attending Bothasig.

Discussion

Decision-makers need to understand the value placed upon the services offered as this can also reflect patient satisfaction and users' preferences [25]. There are critical gaps in South Africa and Sub-Saharan Africa studies focusing on in WTP for public health facility visits, which could provide a greater understanding of patients' perceived economic value on services. Stated preferences WTP studies for public health services are mostly on national and social health insurance [11–14]. This study explores the gap as it focusses on the WTP in public health facilities, which have no-fee at point of service policy, without pointing towards national health insurance. The study asked for WTP for a visit in general. WTP could potentially differ according to the type of services (preventive care or acute illness).

There is a potential to do research work on individual services offered in the PHC environment. The status of the health facilities and the health care system affects the individual WTP. Several studies have included factors like those this study in analyzing WTP, namely, socio-economic status and the existing health service [26]. There was an expectation that most of the participants may not be WTP considering they were already seeking care at non-paying facilities as opposed to visiting private general practitioners. However, our results demonstrated that 60% of the participants were willing to pay for visits to a public health institution, assuming improvement in services offered at the facilities. This is an indication of how persons attach economic value to the service that has no charge now of use. The findings are contrary to a larger population sample of 2400 surveyed by African Barometer, in which 41% of South Africans were willing to pay user fees or higher taxes for health spending to increase spending on public health care [27]. The latter alluded to mostly correlation between public perception, care experiences, and confidence in the government running the system.

A DCE by Honda et al. in the Eastern and Western Cape provinces of South Africa, concluded that WTP increased with improvements in overall services.[22] Studies on WTP for health services, mostly centered around national or social health insurances found more than half of the participants were willing to pay under different circumstances [12,14,15,28]. The mean (49.44 ZAR) and median (25 ZAR) were low in comparison to the 300 ZAR private general practitioners' fees being charged in the same communities during the data collection period. It becomes an issue of affordability or refusal to pay for unsatisfactory service in the facility provided services.

Considering that 52% of the participants were students and unemployed, it is reasonable that the mean and median WTP is very low. The population of 2011 showed an employment rate of approximately 60% employment rate in the community under assessment. It is plausible that the

students and unemployed were overrepresented due to the no-fee service offered at PHCs by the government. Some of the participants, who were not WTP (18.5%), stated that government responsibility was the reason. There is a possibility this sentiment may be gaining traction [29] since the beginning of NHI policy discussion, taking into consideration the Governments' commitment to providing health for a long and healthy life for all South African in the National Development Plan (2030) [30].

Our study explored the use of multiple logistic (MLRM) and Tobit regression modelling (TRM). The results from both models were similar, with only a few differences giving us confidence in both methodologies. The MLRM found unemployment to be significant contrary to the TRM. However, they were both similar in direction, a negative sign. Being unemployed resulted in a lower willingness to pay in comparison with students and employed counterparts. This result aligns with economic theory and evidence, which notes that lack of income results in diminished ability to pay and the possibility of lower WTP. A study in Nigeria found employed women more willing to pay than the unemployed when seeking maternal health care [31]. Using employment as a proxy for income, the findings were contrary to a study in South Sudan by [32], where income was not significant [14]. A study in Nigeria found income and WTP for social health insurance to be positively associated [15].

The mode of transport used by participants correlates with WTP in both models, with those using public transport having a lower WTP than did other transport types. Transport type and distance travelled is a key component to accessing health care and has been used to determine the location of healthcare facilities in South Africa. This influences the National Department of Health's norm of having a facility with a maximum of 5 km radius or at most 2-5 km walking distance of the community [3]. The World Health Organisation rightfully notes that a fully capacitated health facility should be supported by access in its catchment area and consider logistical constraints [33]. Most of the reviewed studies on WTP did not include this variable except in Sudan, [14] which used a similar variable of distance to the facility.

Most participants walked, suggesting their proximity to the facilities, as noted in their sub-district. The catchment areas for the facilities include Northern and Tygerberg sub-districts as per the structuring of the district health service in the Western Cape Province. According to the findings, most of the participants (82%) resided in the sub-districts mentioned above. However, 18% of the participants resided in the Western sub-district, not considered a catchment area for the CDCs. Therefore, we can assume their willingness to travel and pay for transport to access health services at the CDCs under study.

Furthermore, there was a negative relationship between WTP, and the facility attended in the MLRM and TRM. Those attending Goodwood were less likely to be willing to pay in comparison with the Bothasig CDC attendees. This is despite Goodwood having a higher employment rate than Bothasig suburbs [23]. A perusal of the facilities showed that Bothasig has better infrastructure given the recent upgrades, lower waiting times due to fewer clients, and is situated in a more affluent area compared to Goodwood. The population in Bothasig was 11,790 compared to Goodwood's 50,285, according to the 2011 census [23].

The TRM findings also showed the number of facilities visits to be a significant factor of in WTP. Those who visited the facility frequently were less willing to pay in comparison to the first-time visitor. The same finding is seen in Nigerian studies, which concentrated on national health insurances [13,16]. It is plausible that experience at the facility affected the perceptions of frequenters.

Age, gender, marital status, education, health status (chronic/once-off visit), facility visits, and travel time were found to be insignificant in this study. The finding on education contradicted Malaysian [12], and Nigerian [15] studies. The effect of health status, specifically, chronic illness, was found to be insignificant by [14] and [16] whereas [13] found it to affect WTP. The same applied to age with the studies noted. A study in Hong Kong and Spain revealed that older people were less WTP [25,34]. This is most likely due to most people becoming less active economically the older they become. Findings in a study in Bangladesh [35], demonstrated that the more educated one becomes, the more likely one is willing to pay to ensure good health, contrast to Nigeria, where [15] reported that those with post-secondary education are less WTP for social health insurance. The results from other studies also appear to be context-driven and do not necessarily follow the same direction.

The use of the range method in evaluating WTP raises questions about, 'the measurement and management of WTP ranges and the relevant theoretical foundations' [36]. This study used the range methodology to limit the possible, realistic amounts and avoid having too many outliers. The amounts used as the upper range were the going fees for a consultation with a general practitioner in the respective communities at the time of the study. WTP studies are affected by problems which include compliance bias related to participants wanting to please the interviewers by choosing low or high WTP values, [26,28] outliers, and too many zero responses, even, when they are provided with a starting and ending bid. Other possible problems include strategic bias where there is a misrepresentation to influence the result, [37] and hypothetical bias where there is uncertainty in the value of the goods, resulting in over-valuation of the goods [38].

The range method was, however, not very successful in this study, as most participants selected the next amount for non-willing to pay. The study showed that 60% of the participants chose above zero, and a few chose the ending bid, which gives us the confidence less or no compliance bias. Thus, the use of TRM for left-censoring the zero responses allowed for better estimation. There seems to be no standard way of analysing and reporting results in WTP, as some studies use one or more models to find the best model estimation.

It would be worthwhilst to expand the research with a bigger sample to evaluate the WTP as a proxy for contributing towards the NHI. The medical scheme membership increased by 2% annually from 2006 to 2014 [39]. The increase has been ascribed to the growth in the Government Employees Medical Scheme (GEMS). It is also an indication of increased WTP for health services though at a lower per capita rate. During the years 2015 to and 2019, there was negative economic growth and an increase in unemployment (24.5% in 2015 to 29.1% in 2019) [40].

Moreover, inflation in medical insurance contributions has continuously surpassed the consumer price index, which was 4.9 % and 1.5 % above the consumer price index (CPI) in 2017 and 2018, respectively. It can only be assumed that the medical insurance dropouts end up in the public health system. There has been an increasing emergence of South Africans using the private sector for PHC and gravitating towards public health service provision for specialized services, [22] which are heavily subsidized by the government. A study in South Africa revealed that some participants without medical insurance saw the benefits of the NHI [29] and similarly felt it would reduce poverty within their households. The private sector is perceived to offer quality health care [41] because users pay and are under the impression, they get value for money. It begs the question, would public PHCs be perceived to operate in a satisfactory manner if one was to make a monetary contribution towards NHI service, and would clients feel they are treated any better than the current status quo. Not with-standing that the public health system would raise much-needed revenue at point-of-service.

A study in Vietnam on WTP for health insurance recommended using public sensitization, following their discovery that lack of information correlates to negative attitudes towards possible monetary contributions [26]. The lack of public knowledge of the possible benefits of contributions may influence the attitude towards any form of contribution, be it a fee per visit or a tax deduction for national health insurance. In a South African study, most participants did not fully understand NHI and the standard payment mechanisms for health care received [42]. The reasons expressed by public servants in Juba City, South Sudan, revealed their WTP for health insurance resulted from understanding the benefits like ‘cost-sharing, development of healthcare infrastructure, risk protection, and reduction of poverty’ [14].

There are potential limitations to this study. First, the study did not explore the association between WTP and the improvement of services. This aspect was in the Discrete Choice Experiment (DCE) part of the study, which will be analyzed separately. Second, using employment as a proxy for affordability may have restricted us from being able to have meaningful comparisons with other studies that elicited actual amounts of income from participants. The questionnaire did not include income in the socio-economic questions. The decision not to include income came from the expectation that most of the participants may not be employed and we wanted to avoid causing discomfort amongst participants. Self-reported income is likely to be inaccurate, flawed, and plagued with non-response resulting in errors in measurement [43–45].

The study concentrated on understanding willingness to pay rather than the ability to pay. The lack of similar studies using the revealed preference methodology in private and public health care limited the ability to compare the stated preference WTP monetary values provided by participants within South Africa. Thirdly, the study was conducted in the same sub-district and is context-specific to participants in that geographical area, which limits the generalizability unless replicated across other similar population/economic groups. Furthermore, that characteristics of participants who declined were not systematically collected and we were not able to do a comparison with those who participated. It would be valuable to replicate the study in other provinces within the country to fully understand the magnitude of the population's willingness to pay. However, some other countries with similar patients and healthcare system characteristics could have similar findings.

Conclusion

In summary, the study reflects that about 60% of the participants are willing to pay an average of ZAR 49.44 amongst primary care attendees show the economic value placed upon the public health facilities. However, the average amount is very low. Factors influencing the willingness to pay included employment, the facility providing care, the mode of transport, and the frequency of facility visits. Understanding the value placed upon a service provided in a facility is essential in decision-making for improving the quality of care, especially now when the South African health system is making the facilities ready for NHI.

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Appendices

Appendix 1 The range between definitely willing to pay and definitely not willing to pay

Definitely WTP (ZAR)	Definitely NWTP (ZAR)	Range (ZAR)	Number of participants
0	300	300	178
25	50	25	73
25	300	275	4
50	75	25	52
50	100	50	5
50	125	75	1
50	300	250	3
75	100	25	30
100	125	25	47
100	150	50	3
100	200	100	1
100	300	200	2
125	150	25	3
125	300	175	1
150	175	25	12
150	300	150	1
175	200	25	6
175	300	125	1
200	225	25	14
200	300	100	2
250	275	25	3
275	300	25	2
300	.		5
			449

Appendix 2: Questionnaire for Willingness to pay

Questionnaire: Part 2 related to WTP questions

Part 2: Are questions relating to your willingness to pay on given alternative

You shall be given option to choose the WTP amount per visit, assuming improvements to the status quo in areas such as waiting time, confidentiality during treatment, staff attitude, availability of medication, and whatever you perceive needs improvement.

Part 2: Willingness to Pay

1) Please indicate how much you would definitely pay and how much you would definitely not pay for services in the facility

Instructions

You should start with column A and R0. If you are definitely willing to pay R0, then tick a V. Then go to R25, R50 until you are not willing to pay. Put an V at every amount that you are willing to pay.

Then, move to column B and start with the last row (R300). If you are definitely not willing to pay 300 then cross X; then move to 275. Put an X at every amount that you are not willing to pay. Remember to start from the last row (R300).

NB: Make sure you either have a V only or X in one row. You cannot have both X and V next to the same amount

Payment per visit	A: I would definetly pay the amount (please tick V)	B: I would definitely NOT pay (please cross X)
R 0		
R 25		
R 50		
R 75		
R 100		
R 125		
R 150		
R 175		
R 200		
R 225		
R 250		
R 275		
R 300		

2) NB: Only if you do not tick in column A or you ticked only R0, give a reason why you are not willing to pay

.....

.....

NB: It was orally explained to the participants that the WTP should be decided with the assumption of improvements to the status quo i.e., how much one is willing to pay if the service is improved.

CHAPTER 5.

A discrete choice experiment investigating HIV testing preferences in South Africa

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Abstract

Background: South Africa (SA) has the world's highest burden of HIV infection, with an estimated 13.7% of the population living with HIV (PLWH/Persons Living With HIV). The early identification of PLWH and rapid engagement of them in HIV treatment are indispensable tools in the fight against HIV transmission. Understanding client preferences for HIV testing may help improve uptake. This study aimed to elicit client preferences for key characteristics of HIV testing options.

Methods: A discrete-choice experiment (DCE) was conducted among individuals presenting for HIV testing at two public primary healthcare facilities in Cape Town, South Africa. Participants were asked to make nine choices between two unlabeled alternatives that differed in five attributes, in line with previous DCEs conducted in Tanzania and Colombia: testing availability, distance from the testing center, method for obtaining the sample, medication availability at testing centers, and confidentiality. Data were analyzed using a random parameter logit model.

Results: A total of 206 participants agreed to participate in the study, of whom 199 fully completed the choice tasks. The mean age of the participants was 33.6 years, and most participants were female (83%). Confidentiality was the most important attribute, followed by distance from the testing center and the method of obtaining a sample. Patients preferred finger prick to venipuncture as a method for obtaining the sample. Medication availability at the testing site was also preferred over a referral to an HIV treatment center for a positive HIV test. There were significant variations in preferences among respondents.

Conclusion: In addition to accentuating the importance of confidentiality, the method for obtaining the sample and the location of sites for collection of medication should be considered in the testing strategy. The variations in preferences within target populations should be considered in identifying optimal testing strategies.

Introduction

Human Immunodeficiency Virus (HIV/AIDS) is one of the pandemics the world currently facing with approximately 37.7 million people living with HIV/AIDS[1]. UNAIDS reported great progress in the fight against HIV/AIDS worldwide, although the infection rates are not reducing fast enough to eradicate the pandemic. As of 2020, there were 1.5 million new HIV infections prompting a need for transformative measures to tackle the pandemic[2]. The response has resulted in 28.8 million accessing HIV treatment as of June 2021[2]. HIV/AIDS is a major public health problem in South Africa (SA), with an estimated 8.2 million positive cases (13.7% of the population) as of July 2021[3]. For the population between 15-49, 19.5% are HIV positive[4]. Therefore, the South African government has acted and committed to achieving the United Nations Programme on HIV/AIDS (UNAIDS)' targets[5,6]. Strides in achieving the targets and high coverage rely on people-centered delivery strategies and relevant societal enablers[5].

HIV testing is the gateway to improving the prevention and treatment of HIV[7]. The HIV testing service (HTS, formally known as HIV counseling and testing) strategy employs different approaches to ensure the success of the HIV programme. These strategies include providing HTS in health facilities, community settings, self-testing, and clinical trial or research settings[8]. Given the diversity of potential approaches to the implementation of HIV testing, it is critical to understand client preferences. Various forms of testing exist, including provider-initiated counseling and testing (PICT) and client-initiated counseling and testing (CICT). CICT encompasses home or self-testing, community-based testing, and voluntary counseling and testing (VCT), whilst PICT is offered in clinical settings to promote access to prevention and treatment services[8]. In PICT provision, protocols such as getting consent and offering pre- and post-testing counseling are observed [8,9].

South Africa adopted a test and treat approach to boost the uptake of treatment after testing positive[10]. A South African study showed that the availability of medicine at facilities and prevention programs provides incentives for HIV testing and succeeded in increasing the number of tests administered[11]. In contrast, failure to provide medication at the testing point can deter testing and cause delays in initiating treatment. Hwang et al. (2019) reported that stock-outs are prevalent in South Africa, resulting in patients leaving the facilities without their medications[12]. The Covid-19 pandemic appears to have increased uncertainty over shortages of HIV medications in South Africa, including deferment of collecting medication by patients fearing Covid-19 infection during clinic visits[12].

Eliciting client preferences, using discrete-choice experiments (DCE), is increasingly important as support for making healthcare policy decisions[13] and could help improve our understanding and uptake of HIV testing. A discrete choice experiment (DCE) is a survey where participants choose between hypothetical alternatives, each representing a specific product or service that is described by several more and less desirable attributes. Recently, a systematic review of DCEs involving HIV revealed 14 studies conducted in 10 countries, 8 of them being from sub-Saharan countries[7]. Among those, Ostermann et al.[14] noted the benefits of tailoring interventions in conjunction with evidence-based preferences, using the example of a DCE in Tanzania. More recently, using a similar DCE design, another study was conducted in Colombia[15], revealing the importance of distance to the HIV testing center, testing days (weekdays vs. weekends), confidentiality, a method for obtaining the sample, and services in HIV testing as was observed in Tanzania[14].

To our knowledge, no discrete choice experiment (DCE) studies have been done in South Africa specifically on HIV testing preferences. However, two studies have looked at critical attributes and attribute levels on the delivery of oral pre-exposure prophylaxis (PrEP) among young people in Cape Town and Johannesburg[16], and the uptake and effectiveness of HIV prevention products may also rely on pregnancy and STI protection[17]. This study aimed to elicit clients' preferences amongst those presenting for HIV testing in South Africa, using a DCE to provide local evidence for policy and operational decisions.

Methods

A DCE was used to elicit the participants' preferences for HIV testing. The DCE is a stated preference method that allows participants to choose between hypothetical scenarios of a given service that vary according to a list of predefined attributes and attribute levels. For this study, we adopted similar attributes, levels, and choice sets as those developed for a study in Tanzania by Ostermann et al. (2014)[14] and further used by Wijnen et al. in Colombia (2019)[15], due to the adaptability of the levels and attributes to the South African HIV context. The attributes were further validated through literature relative to HIV testing in South Africa[11,18–24].

Attributes and levels

The DCE included five attributes presented in Table 1[14] testing days, distance to testing, availability of HIV medications at the testing site, confidentiality, and the method for obtaining the sample. The testing days included two levels, namely testing during the week or weekends. In South Africa, one can test at public health facilities, at a general practitioner's (GP's) office, at private clinics and pharmacies, at NGO's mobile outreach facilities, and at facilities for public

clinic outreach. Some public facilities are closed during the weekend, and most of the testing is conducted by the private sector. The distance to testing was split into four levels, ranging from testing at home to 20 kilometers (km) away from home. As per South African policy, most public health facilities are within a 5 km radius of the population to ensure access to healthcare in urban areas[25]. There are three methods for obtaining the sample: venipuncture on the arm, an oral swab in the mouth, and a finger prick.

All methods are used in South Africa, with oral swabbing used mainly in-home testing and available for purchase over the counter (OTC) as approved by the South African Pharmacy Council in 2017[26]. The availability of HIV medications at the testing site was split into two levels: collecting at the testing point or referral to an HIV treatment center. Antiretroviral drugs are collected at clinics, or, through a GP, one can be referred to collect government-issued medication at designated pharmacies dispensing units and at automated machine (ATM) pharmacies available in some provinces. Finally, confidentiality had three levels: no one would be aware, the partner would be made aware, and many people would know one had been tested. In South Africa, it is recommended that all sexual partners of an HIV positive be notified, with the consent of the infected, and without breaking confidentiality as per WHO guidelines[27,28]. The HTS, the main policy document on HIV testing, stresses the importance of these factors in its quest to increase testing and treatment numbers[8].

Indication of Tables

Table 1: Attributes and attribute levels for the HIV test DCE14

Attributes	Attribute Levels
Testing days	1. Testing is available on weekdays.
	2. Testing is available on weekends.
Distance	1. You will test at your home.
	2. You will test 1 km from your home.
	3. You will test 5 km from your home.
	4. You will test 20 km from your home.
Method for obtaining the sample	1. The sample is taken from the arm.
	2. The sample is taken from the mouth.
	3. The sample is taken from the finger.
Services if HIV positive	1. If you have HIV, you will receive medications at the testing site.
	2. If you have HIV, you will receive a referral to a treatment center for medications.
Confidentiality	1. Without telling; no one will know that you tested
	2. Your partner will know that you tested.
	3. Without telling; many people who know you will know that you tested

Experimental design and questionnaire

NGene software was used to identify a D-efficient statistical design of 72 choice tasks, allocated as eight blocks/questionnaires with nine choice sets[14,29]. Each choice set was made up of two alternatives, alternative A and B. An example of a choice set is shown in Figure 1. Pictures were used to help respondents in understanding the alternatives.

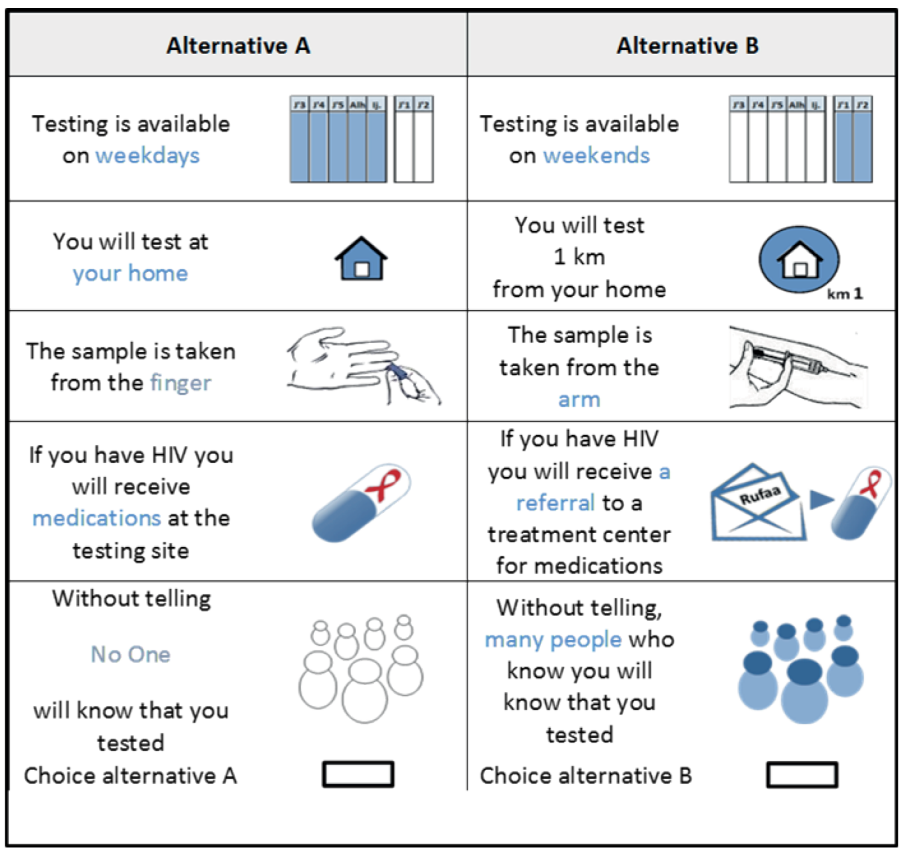

Figure 1: Example of a choice set[14]

The questionnaire was comprised of three sections. Part one of the questionnaire contained an explanation of the study, attributes, and levels. Part two was the DCE section, including nine choice sets. The final part included socio-demographic and HIV-related questions. The questionnaire is available from the first author. The English paper-based questionnaires were randomly distributed to clients by a trained university student among those waiting to be tested for HIV at two community health centers. Participants were asked to provide written informed consent. A pilot was conducted with seven respondents for quality assurance, face validity, and to identify any difficulties engaging with the questions. As a result, minor wording changes

were made to the questionnaires. In the event of a participant being confused with the task, the interviewer assisted in understanding. Ethics approval was given by the Health Research Ethics Committee of Stellenbosch University (reference number S17/10/208), and the Provincial Health Research Committee of Western Cape Government: Health.

Study population

The study was conducted among persons presenting for HIV testing at the two main public health primary care facilities in Bothasig and Goodwood, Cape Town, South Africa. The facilities provide comprehensive primary health care to approximately 12,000 and 50,000 people, respectively, in their catchment areas. Clients presenting for testing were targeted for the study. The overall impact of the lockdown due to the COVID-19 pandemic tended to be less marked in the rural clinics in South Africa[30]. These findings suggest that HIV services were generally maintained for people already receiving ART. However, engaging new people into care (through HIV testing and subsequent treatment initiation) was impeded by the lockdown, particularly in urban clinics[30]. We consecutively approached all individuals ages 18 and older who were waiting to be tested for HIV. For those who provided informed consent, we proceeded to field the paper-based questionnaires.

Statistical Analysis

The descriptive statistics for socio-demographic and HIV-related questions were analyzed using Stata 15 software. The DCE choice data were analyzed using Nlogit version 6 Software[31]. All parameters were categorical and dummy coded, facilitating the interpretation of model estimates[32]. A panel random parameter logit model (RPLM) was used to account for the data's panel nature, with 1,000 Halton draws and normally distributed random parameters. The random parameter model allowed for the standard deviation of parameter distribution estimates, which captured the heterogeneity in preferences[32]. Although the conditional logit model is suitable for many applications, it also has limitations including the fact that it does not account for unobserved systematic differences in preferences across respondents (preference heterogeneity)[32] . Due to the latter, the study used the random parameter logit model that allow parameter values to vary across respondents [33].

This variation is achieved by specifying a random parameter that has a distribution and estimating the mean (β) and standard deviation of the error term (η) to capture the parameter's distribution. If the standard deviation is significantly different from zero, this is interpreted as evidence of significant preference variation for the attribute in the sample Significance was measured at $p<0.05$. Using dummy coding, we estimated coefficients that represented a preference for each attribute level relative to the omitted level. For the coefficient sign, a negative

coefficient implied that an attribute level is less preferred, whilst a positive sign indicated a positive preference relative to the reference level. The relative importance of attributes was calculated using the range method (calculating the level range for each attribute and dividing each range by the sum of all level ranges). A sub-group analysis was conducted to determine differences between age groups (18-34 years vs. 35 years or older). A joint model was estimated using interaction terms to assess the significance of the differences between both age groups. A normally distributed random component was added for the dummy variable describing the age group.

Results

Participants' Characteristics

A total of 206 participants agreed to participate in the study, of whom 199 fully completed the questionnaire. The mean age of the participants was 33.6 years (Table 2). Most participants (83%) were female. Sixty-one percent (122) fell in the 18-34 age group, representing youth by South African definition, and the rest were 35 and above. Most of the participants had secondary or higher education and were employed. Approximately half of the participants were single or married and in partnership, with a few widowed, divorced, and separated. The HIV status of 6% (12) of the participants was positive, i.e. ten women and two men. These clients were coming in for repeat tests and were included, given that they too may have opinions on the testing processes. The majority reported to have had two or more partners in their lifetime, and only 4 (2%) had had sex for money. Only eight had other sexually transmitted diseases. More than half had tested five or more times in their lifetimes, whilst 67% had their last test within the same year. Appendices 1 and 2 provide more details on socio-demographics.

Random parameter logit model

Table 3 shows the overall DCE results. Significant differences between levels were observed for three attributes: a method for obtaining the sample, distance, and confidentiality. No significant differences were observed for the distance to the HIV center and time of the week. The relative importance analysis reveals that confidentiality (65%) was the most important attribute, followed by a method for obtaining the sample (15%), distance (10%), collection of medication (6%), and time of testing (4%). Significant variation between respondents (reflected by significant standard deviations) was observed for most attributes, especially for confidentiality and distance.

Table 2: Socio-Demographic and HIV characteristics of participants

Socio-Demographics	n (%)	HIV-Related Questions	n (%)
Total participants	199 (100%)	**HIV Status**	
Age		Self-reported negative	187 (94%)
18-34	122 (61%)	Self-reported positive	12 (6%)
35 and above	77 (39%)	**Sexual partners in a lifetime**	
Gender		None	3 (2%)
Male	33 (17%)	One	72 (36%)
Female	166 (83%)	More than one	122 (61%)
Marital Status		Missing	2 (1%)
Single	86 (43%)	**Sex for money**	
Married or Partnership	94 (47%)	No	195 (98%)
Widowed/ Divorced/Separated	19 (10%)	Yes	4 (2%)
Education		**Other Sexually Transmitted Disease**	
Elementary	44 (22%)	No	191 (96%)
Secondary (Matric)	102 (51%)	Yes	8 (4%)
Higher education (Diploma and above)	53 (27%)	**Number of times tested**	
Employment		1-2 times	39 (20%)
Student	19 (10%)	More than 2 times	
Unemployed	55 (18%)	5 or more times	156 (78%)
Employed/self-employed	125 (63%)	Missing	4 (2%)
Alcohol consumption		**Last HIV test**	
No	86 (43%)	Less than 1 year	134 (67%)
Yes	113 (57%)	1 year and above	63 (32%)
		Missing	2 (1%)
		Travelled/slept away from home	
		No	120 (60%)
		Yes	79 (40%)

Overall, patients preferred a finger prick compared to venipuncture on the arm. For participants who tested positive, collection of medication at an HIV treatment center was less preferred than collecting at the testing site. In terms of confidentiality, there was a significant preference to informing the partner relative to no one knowing, with a high preference heterogeneity (significant estimated standard deviation of 1.40). However, there was an aversion to many people knowing, with the most important significant preference heterogeneity (estimated standard deviation of 1.99).

Table 3: Random parameter logit model results

Attribute/Level	Coefficient	Estimated Standard Deviation	Relative Importance
Constant (non-random parameter)	0.06 (-0.09 to 0.20)		
Time of the week			
Weekends	-0.11(-0.29 to 0.07)	0.60***	4%
Weekdays	Reference		
Distance			
Home	-0.03 (-0.29 to 0.22)	0.72***	10%
1 km	Reference level		
5 km	-0.17 (-0.49 to 0.15)	0.01	
20 km	-0.29 (-0.73 to 0.15)	0.74**	
Sample collection			
Arm	Reference level		
Finger	0.45*** (0.22 to 0.68)	0.55***	15%
Mouth	0.18 (-0.05 to 0.40)	0.57***	
Collection of medication			
Testing site	Reference level		
HIV treatment center	-0.18** (-0.33 to -0.02)	0..25	6%
Confidentiality			
No-one	Reference level		
Partner	1.19*** (0.86 to1.51)	1.40***	65%
Many people	-0.70*** (-1.08 to -0.33)	1.99***	

***** Significant at 0.01; ** Significant at 0.05; * Significant at 0.1**
Log-likelihood = -1235.88
Pseudo R-Squared= 0.17
Replications for simulated probs. =1000 Halton draws
Random parameters assumed to be normally distributed
Fixed number of groups = 9
Number of observations = 1791, skipped eight observations

Sub-Group analysis

Table 4 presents the sub-group analysis according to age. The joined model revealed that three parameters were significantly different between groups. The coefficient 5 km (p=0.01) and 20 km (p=0.07) were more important for younger participants, with a negative preference for longer distances away from home, whilst the older group was indifferent. There were further significant differences between the younger and older groups regarding confidentiality, with the younger group disliking more the premise of many people knowing compared to the older group, and a slight preference for the level “only partner knows” in the younger group.

Table 4: Age sub-group analysis

Attribute/Level	18-34 years old			34 years old and above			Significance difference between both groups
	Coefficient	Estimated Standard Deviation	Relative Importance	Coefficient	Estimated Standard Deviation	Relative Importance	P-Value
Constant	0.04 (-0.16 to 0.25)			0.04 (-0.16 to 0.25)			
Time of the week							
Weekends	Reference level			Reference level			
Weekdays	0.12 (-0.15 to 0.38)	0.84***	3%	0.12 (-0.96 to 0.35)	0.26	6%	0.98
Distance							
1 km	Reference level			Reference level			
Home	-0.06 (-0.41 to 0.29)	0.71**	18%	-0.09 (-0.43 to 0.26)	0.61**	17%	0.39
5 km	-0.59** (-1.05 to -0.12)	0.05		0.26 (-0.11 to 0.62)	0.06		0.01***
20 km	-0.78** (-1.414 to -0.12)	1.01**		0.12 (-0.34 to 0.58)	0.08		0.07*
Sample collection							
Arm	Reference level			Reference level			
Finger	0.57***(0.22 to 0.92)	0.71***	13%	0.38**(0.07 to 0.69)	0.29	19%	1.00
Mouth	0.33**(0.00 to 0.65)	0.78***		0.01 (-0.29 to 0.32)	0.33		0.55
Collection of medication							
Testing site	Reference level			Reference level			
HIV treatment center	0.13 (-0.35 to 0.09)	0.25	3%	-0.20* (-0.41 to 0.02)	0.18	10%	0.47
Confidentiality							
No-one	Reference level			Reference level			
Partner	1.48*** (0.96- to 1.99)	1.55***	62%	0.82*** (0.42 to 1.22)	1.12***	48%	0.05**
Many people	-1.15*** (-1.67 to -0.62)	2.08***		-0.16 (-0.65 to 0.32)	1,69***		0.00***

***** Significant at 0.01; ** Significant at 0.05; * Significant at 0.1**

Pseudo R-Squared= 0.17

Log-likelihood = -1235.88 Fixed number of groups = 9 Number of observations = 1791, skipped 8 observations

Replications for simulated probs. =1000 Halton draws Random parameters assumed to be normally distributed

Confidentiality, distance, and method for obtaining the sample were significant for the youth group (18-34 years old) with a stronger relative importance for confidentiality (62%), followed by distance (18%) and method for obtaining the sample (13%). In the older group (35 years and above), confidentiality, the method for obtaining the sample, and the collection of medication were significant. This group valued confidentiality the most (48%), followed by the method for obtaining the sample (19%), distance (17%) and collection of medication (10%). There was a positive preference to the partners knowing relative to no one knowing that one had been tested in both groups. However, there was a more significant preference by the youth in comparison with the older group. There was a negative preference to many people knowing of the test for both groups, though considerably less preferred by the youth than the older group. The older group suggested that obtaining the sample is more important than the comparator, with both groups preferring finger prick to venipuncture in the arm or taking an oral sample.

Discussion

The objective of the study was to elicit preferences among clients presenting for HIV testing in South Africa using a Discrete Choice Experiment. Overall, our study results suggested that preferences regarding confidentiality, the method for obtaining the sample, and the collection of medication were significant and thus relevant for HIV testing decisions. Confidentiality was the most important attribute in our study, and it is also one of the key components of the South African National HTS, namely the 5Cs during testing: confidentiality, counseling, consent, correct results, and connection[8]. The National HTS Policy provides for the use of community-based HTS, which includes testing conducted in mobile outreach facilities, at events, workplaces, places of worship, and in home-based and educational settings as means to mitigate the missed opportunities for testing.

Whilst in our study 83% of the participants were females, this was higher compared to what was observed by Sharma et al. [7], who reported over 60% of their study participants were females. In South Africa, more women than men are HIV positive, with HIV prevalence among young women four times higher than their male counterparts[34]. Testing appears to be higher for women across all age groups (54%) than for men[35]. Even though HIV in South Africa being at heightened risk, adolescent girls, and young women (ages 15-24) are reported as often reluctant to get tested in health facilities for various reasons, including the fear of encountering judgmental attitudes[36]. As of 2021, Avert[37] reported that South African men were less likely than women to get tested, arguing that the latter might be partly because women are routinely offered HIV testing through antenatal care and family planning services.

Our study used the same design as the DCE done in Tanzania by Ostermann et al.[14], which was also adopted by Wijnen et al.[15] in Colombia and further validated through the literature on HIV testing in South Africa[11,18–24]. We adopted the same methodology to allow for comparability with other international settings. Ostermann et al.[14], used a random community sample whilst Wijnen et al.[15] utilized a sample from two separate clinics where participants were approached in the waiting room. Important differences in attribute preferences are however worth noting.

Ostermann et al. (2014)[14] found all five attributes significant and distance to be the strongest driver of preference in Tanzania. Our study observed similar findings as what was reported in Columbia [15], where confidentiality was the most important attribute. Confidentiality was significant in all three settings, thus implying the importance placed on anonymity when testing. Confidentiality was identified as a key aspect of preference in the literature[38]. However, even though test centers still prioritize confidentiality, many patients are still afraid of confidentiality violations when visiting the test centers. Our study showed a negative preference for many people knowing one has been tested and a stronger preference for informing a partner. The subgroup analysis showed that younger people were even more concerned that many people could be aware of HIV testing than the older group. This concurs with the findings we observed as maturity was an important determinant for HIV education on the acceptance and disclosure of partner testing. Therefore, HIV education among older people could increase HIV testing and treatment uptake.

Disclosing HIV test results is of enormous concern, reflecting the importance of confidentiality as a barrier to testing. The South African National HTS policy highlights the importance of bringing in a partner for testing and disclosure to partners as part of the couple's HIV counseling and testing (CHCT). However, partner testing may occur with or without disclosure[8]. Therefore, the underlying principle is allowing confidentiality, respecting one's human rights. Though not tested in this study, fear of discordance has resulted in some individuals opting out of testing as it may be seen as a sign of infidelity[20,39–41]. Stigma from family and friends has made HIV counseling and testing (CHCT) more challenging for couples, with some partners choosing to keep their status to themselves[20]. Ryan et al.[24] found those perceiving the test as confidential three times more likely to go for the HIV test than those who had doubts[24].

The method of sample collection showed a high preference for finger pricking as being significantly more desirable than venipuncture in the arm. Several factors have been reported in the literature to influence the choice of the method for obtaining the sample; levels of pain from venipuncture and finger pricking [14,42] and accuracy of test results[7,43]. In Tanzania, Ostermann et al.[14] reported that participants preferred finger pricking or venipuncture to oral testing in the

general population, and porters preferred venipuncture over finger pricking or oral testing[34]. Strauss et al.[44] found the difference between collecting an oral sample and by finger pricking insignificant in Kenya, with first-time testers preferring oral testing. In Nigeria, most participants preferred finger pricking compared to venipuncture[45]. In the USA[46] men-having-sex-with men among youths, as in our study, preferred finger pricking to oral home testing/self-testing (HIVST). Thus, South Africa still has a long way to go, especially in educating its citizens on the differences and cost-effectiveness of testing methodologies.

Our study findings revealed a higher preference for collecting medication at testing sites than at the HIV treatment center. South Africa has been known to struggle with stock-outs of ARVs, which have since been exacerbated with the disruptions of the Covid-19 pandemic[12,47]. Sibanda et al.[48] argued that the availability of ARVs could reduce loss to follow-up by 24%. Sub-group analysis showed older groups having a significant negative preference towards collection at treatment centers, whilst the youth were indifferent. Though we did not check for the link between the testing site and distance, the latter attribute may be linked. As the results showed, collecting treatment where one is tested, which should not be too far away from home, maybe easier.

The distance was not relevant to testing overall but was a significant factor amongst the youth. Like studies in Kenya, Colombia, and Tanzania[14,15,29,44], more distance between home and place of testing resulted in a negative preference. Reasons given by some participants in a testing survey included lack of ability to pay for transportation and not wanting to go to a clinic[22]. The stigma surrounding HIV/AIDs has driven some individuals to resort to testing at home, where one performs the test and interprets results without a trained healthcare worker. HIVST has been hailed for bringing convenience and acceptability as an alternative to facility-based testing[27]. Studies have shown an increase in self-testing kits and the preference for HIVST, at lower cost in most cases[19,21,22,49,50]. However, HIVST has also been criticized as it misses the pre-and post-testing opportunity to offer emotional support and information on the importance of treatment adherence[22]. At the same time, pre-and post- counseling, which is normally characterized by power imbalances between clients and providers, can be a deterrent to testing in clinical or outreach settings[23]. Nevertheless, with HIVST at home being insignificant in our study, we can infer preference towards provider-facilitated testing. There is room for further studies on the magnitude of HIVST since its introduction in South Africa, coupled with research on the most appropriate method of sample collection (oral or finger prick) for home testing.

Several factors can be alluded to the dislike of HIV testing, such as long waiting hours, especially at a public health facility, or the availability of testing centers during weekdays versus weekends

(working hours vs. non-working hours)[27,38,42,51,52]. Convenience is a key factor for individuals in deciding where to test for HIV[52]. Our study found testing days to be insignificant overall, and in the sub-group analysis. These findings contrast with some studies that revealed that weekend testing could be essential for increasing HIV testing[53–58]. Weekend testing is noted as a pull factor for those working during the week[41]. Concerning the testing day, in Zimbabwe, the AIDS Healthcare Foundation (AFH) noted an increased amount of testing during the weekend, instead of during regular working hours[59]. Our findings assume success in South Africa bridging the gap between weekdays and weekends by providing enough resources to reach the communities. Testing days could also play a role in the decision to test or not, despite not being confirmed by our study.

The major strength of our study is that the clinical setting aided in understanding the HIV testing preferences given that our participants were present to have a test conducted and had put thought into getting a test. However, this may have introduced bias in that the participants had already chosen their testing site. We, therefore, did not capture the preferences of those who had not presented themselves for testing, which would equally be important in designing testing service. It would thus be interesting in future to conduct further preference research comprising of testing clientele from the general public (including people who are no testing) as opposed to the cohort from the facility, a way to understand the preferences of those who have not made up their minds to test. There are several limitations to the study. First, the study applied the same methodologies and experimental design by Ostermann et al.[14] in Tanzania and later adopted by Wijnen et al.[15] in Bogota, Colombia.

This may be construed as a limitation, as this did not allow us to collect attribute information specifically for our study setting. However, the attributes were validated by literature on South Africa's testing platform[11,19–24,40] and the HTS[8]. Several, with the goal of providing local evidence for policy and operational decisions. Barriers have been reported to be associated with lack of testing and can be divided into the personal, health system, economic and socio-demographic. Amongst these are stigma, fear of discordance, inconvenient testing hours, location of the testing center, confidentiality, and not trusting testing methods[41]. Second, convenience sampling may have introduced biases that limit the generalizability of the results. Finally, similarly to the study of Ostermann et al. in Tanzania, we cannot make inferences regarding uptake of testing options as we did not include a "no test" option[14]. With the advent of Covid-19, it is important to explore measures associated with increasing testing at non-clinical and non-crowded settings. It would be interesting to conduct further preference research comprising of testing clientele from the public as opposed to the cohort from the facility, a way to understand the preferences of those who have not made up their minds to test. Further exploration on the attributes,

specifically the most preferred, would be beneficial in policy and operational recommendations tailormade to improve testing at within the health system. Attributes not explored in this study such as preferred testing provider, availability of social and emotional support offered by testing and possible mental health effects of testing are possible areas to explore. Further, investigating preferences and satisfaction with HIV treatment could also complement our research and provide further insights to optimize screening and treatment of HIV patients."

Conclusion

Confidentiality remains the most important attribute in HIV testing. Thus, it should remain a key component of the South African National HIV Testing Strategy, with a possibility of accentuating its importance. In addition, the method for obtaining the sample and collection of medication at testing sites should be considered in the HTS strategy as part of the modalities for reaching different populations and linking care for positive persons. Finally, the variations in preferences for testing options should be considered in deciding optimal testing strategies.

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Appendices

Appendix 1: Socio-Demographics by age groups

	Age groups		
Socio-Demographics	**18-34**	**35 and above**	**Total**
Age	**122 (61%)**	**77 (39%)**	**199 (100%)**
Gender			
Male	18 (15%)	15 (19%)	33 (17%)
Female	104 (85%)	19 (80%)	166 (83%)
Marital Status			
Single	75 (61%)	11 (14%)	86 (43%)
Married or Partnership	44 (36%)	50 (65%)	94 (47%)
Widowed	1 (1%)	8 (10%)	9 (5%)
Divorced	2 (2%)	6 (8%)	8 (4%)
Separated	0	2 (3%)	2 (1%)
Education			
Elementary	23 (19%)	21 (27%)	44 (22%)
Secondary (Matric)	16 (56%)	34 (44%)	102 (51%)
Higher education (Diploma and above)	31 (25%)	22 (28%)	53 (27%)
Employment			
Student	16 (13%)	3 (4%)	19 (10%)
Unemployed	19 (16%)	11 (14%)	30(15%)
Self-employed	16 (13%)	8 (10%)	24 (12%)
Employed	55 (45%)	46 (60%)	101 (51%)
Housewife/Houseman	16 (13%)	9 (12%)	25 (13%)
Alcohol consumption			
Never	35 (29%)	78 (47%)	86 (43%)
Few times per year	43 (35%)	14 (18%)	57 (29%)
Few times per month	38 (31%)	9 (12%)	47 (24%)
Few times a week/daily	6 (5%)	3 (4%)	9 (5%)

Appendix 2: HIV related questions

	Age groups		
HIV Related Questions	**18-34**	**35 and above**	**Total**
HIV Status			
No	115 (94%)	72 (94%)	187 (94%)
Yes	7 (6%)	5 (6%)	12 (6%)
Sexual partners in lifetime			
None	3 (2%)	0	3 (2%)
One	40 (33%)	32 (42%)	72 (37%)
Two to five	65 (54%)	36 (47%)	101 (51%)
six or more	13 (11%)	8 (11%)	21 (11%)
Sex for money			
No	118 (97%)	77 (100%)	195 (98%)
Yes	4 (3%)	0	4 (2%)
Other Sexually Transmitted Disease			
No	116 (95%)	75 (97%)	191 (96%)
Yes	6 (5%)	2 (3%)	8 (4%)
Number of times tested			
1-2 times	17 (14%)	22 (29%)	39 (20%)
3-4 times	31 (26%)	16 (21%)	47 (24%)
5 or more times	71 (60%)	38 (50%)	109 (56%)
Last HIV test			
Less than 1 year	90 (74%)	44 (59%)	134 (68%)
1-2 Years	29 (24%)	21 (28%)	50 (25%)
More than 2 years	3 (2%)	10 (13%)	13 (7%)
Travelled/slept away from home			
No	67 (55%)	53 (68%)	120 (60%)
Yes	55 (45%)	24 (31%)	79 (40%)

CHAPTER 6.

General Discussion

The subject of patient preferences is located within the parameters of Health Technology Assessment. Patient preferences refer to the individual's evaluation of various dimensions of health outcomes/interventions that may influence healthcare choices. Therefore, the thoughtfulness regarding patient preferences as an input into healthcare decision-making is rooted in the application of decision theory to the comprehension of individual decisions. The main aim of this thesis was to assess public participation in public health offerings: patient preferences for facilities in the Western Cape, South Africa, using a Discrete Choice Experiment.

The Western Cape, one of the nine provinces in South Africa, has, similar to other provinces, faced a public health crisis due to the burgeoning quadruple burden of diseases. The major causes of morbidity and mortality are non-communicable diseases, injuries, maternal and child health conditions, and HIV/AIDS. [1] This has resulted in the formulation of the Health 2030 strategy, which mandates moving health delivery services towards a patient-centered approach, focusing on the dependent population as the main users of the health system. [1] The dependent population is defined as those relying on the public health system for health care because they are economically disempowered and cannot afford to pay for private health care.

The Western Cape Department of Health has resorted to implementing a population-based health management approach. The vision is: "Access to person-centered, quality care" [1] . It can be deduced that the emphasis is on the patient being the ultimate focus. The "Voice of the Patient" is a pillar of the strategy. [1] At the same time, the organization takes an active role in delivering health care by providing quality care and ensuring a smooth transition through wellness promotion, preventive care, and treatment. In line with this person-centered vision of care, this dissertation was formulated to investigate patient preferences, as they are the main component in resolving the crisis with the Western Cape health system. The entire health system needs to move away from preaching person-centeredness to enacting it for this to happen. The enacting can be done by determining patient preferences and using other forms of patient involvement, such as using health committees, reviewing patient complaints, and conducting client satisfaction surveys.

The first part of this dissertation focused on the elicitation of patient preferences from primary health care clients who, it is argued, are largely or fully dependent on the public health sector. The many issues that characterize public health systems have been cited as requiring patient input in public health decision-making. Currently, however, there is however no or limited patient input in these decisions.[2–4] As a result, patient satisfaction, continuum of care, treatment adherence, and other factors are negatively affected.

In addition, a complementary study was done to single out and elicit testing preferences among HIV testing clientele. Human Immunodeficiency Virus (HIV/AIDS) is one of the pandemics the world is currently facing, with approximately 37.7 million people living with HIV/AIDS.[5] UNAIDS has reported great progress in the fight against HIV/AIDS worldwide, although the infection rates are not decreasing fast enough to eradicate the pandemic. As of 2020, there were 1.5 million new HIV infections, prompting a need for transformative measures to tackle the pandemic.[6] HIV/AIDS is a major public health problem in South Africa (SA), with an estimated 8.2 million positive cases (13.7% of the population) as of July 2021.[7] For the sexually active population between 15-49, about 20% are HIV positive.[8] Therefore, the South African government has acted and committed to achieving the United Nations Programme on HIV/AIDS (UNAIDS)' targets.[9,10] Strides in achieving the targets and high coverage rely on people-centered delivery strategies and relevant societal enablers.[9]

The aim of this thesis is two-fold. **Part I** (Core study) describes the studies conducted to elicit the willingness to pay for health services, and patient preferences regarding facilities in the Western Cape province in South Africa. **Part II** assesses HIV client testing preferences. More specifically, Chapter **2** describes the identification and prioritization of attributes for a discrete choice experiment using a nominal group technique relative to patients' choice of public health facilities in Cape Town, South Africa. **Chapter 3** shows how public participation could be enhanced in public health service offerings by using a Discrete Choice Experiment concerning patient preferences in the Western Cape. This chapter adds to the limited research on identifying what communities regard as the greatest problems with the health services whilst providing decision makers with a different method for eliciting preferences - the option of the revealed preference. **Chapter 4** reported on the willingness to pay for Primary Health Care (PHC) at Public Facilities in the province of the Western Cape, South Africa. In **Part II** (Chapter 5), patients' preferences were elicited with regard to HIV testing in South Africa using a Discrete Choice Experiment.

Main findings

Nominal Group Technique

Chapter 2 presents findings drawn from four focus group discussions that were conducted to identify and prioritize, from the patient's perspective, essential characteristics for choosing public health facilities in Cape Town, South Africa. The focus groups included 21 persons in total from Bothasig and Goodwood community day centers (CDCs which offer primary healthcare services) in Cape Town. The group discussions followed the Nominal Group Technique (NGT) guidelines. At each facility, the frequency of an attribute within the top five was determined

using a weighted ranking technique which was then calibrated, and a subgroup analysis was performed. The six most important attributes in choosing a facility were revealed, including treatment by a doctor/ (family physician) (66.7%), distance to the community day center (61.7%), availability of medication (61.7%), confidentiality during treatment (57.7%), waiting time (33.3%), and treatment by a nurse (33.3%).

Discrete Choice Experiment: Patient preferences for public primary healthcare facilities

Chapter 3 presents findings of a discrete choice experiment among a sample that consisted of 463 participants (232 from Bothasig and 231from Goodwood) in community day centers (CDCs) in Cape Town. First, candidate attributes were decided upon from focus group discussions at the two facilities, as described in **Chapter 2**. The main results on patients' preferences reported that respondents preferred shorter traveling distances to health facilities to longer distances. Respondents also preferred absolute confidentiality scenarios where no one can hear conversations with nurses, shorter waiting time for the first visit, to be treated by doctors rather than nurses, and facilities which could offer all required medication.

Willingness to pay

Chapter 4 was written based on the same participants from the survey as the DCE in Chapter 3. It was done among 453 persons who presented at two public primary health care centers, namely Bothasig Community Day Center (CDC) and Goodwood CDC. The study used the contingent valuation range methodology. This chapter revealed that 60% of participants were willing to pay for services offered at the PHC facilities (currently, no fees are payable). The average willingness to pay for all participants was 49.44 ZAR, with a median of 25 ZAR. The multiple logistic regression for grouped facilities showed factors influencing willingness to pay, namely unemployment, public transport, and the facility attended, to be significant, whilst public transport, number of facility visits, and facility attended were the only significant variables in the Tobit model. There was less willingness to pay for those unemployed than for students, those using public transport rather than walking, those frequenting the facilities more than first-time visitors, and those attending the Goodwood facility compared to Bothasig.

Discrete Choice Experiment: HIV testing preferences

Chapter 5 drew its findings based on a discrete-choice experiment conducted among individuals who presented for HIV testing at two public primary health care facilities in Cape Town, South Africa, in 2018. Participants were asked to make nine choices between two unlabelled alternatives that differed in five attributes, in line with previous DCEs conducted in Tanzania and Colombia: testing availability, distance from the testing center, method for obtaining the sample,

medication availability at testing centers, and confidentiality. A total of 206 participants agreed to participate in the study, of whom 199 fully completed the choice tasks. The mean age of the participants was 33.6 years, and most participants were female (83%). The results deduced from the analysis showed that confidentiality stood out as the most important attribute, followed by distance from the testing center. In terms of the method of obtaining a sample, patients preferred a finger prick to venepuncture. Finally, availability of medication at the testing site was also preferred over a referral to an HIV treatment center when the HIV test was positive.

Methodological considerations

It is well documented in the literature that models of preferences in health services research (HSR) and Health Economics are often defined by readily available information, such as that captured in claims data and electronic health records.[11–20] However, many important questions about patient choices cannot be studied easily due to a lack of critical elements of data. Therefore, various methods were used to answer the question of patient preferences in facility choice, willingness to pay, and HIV testing. A nominal group technique (Chapter 2), DCE (Chapters 3 and 5), and willingness to pay (Chapter 4) were used to fulfill the research objectives.

Nominal Group Technique

The nominal group technique (NGT) is highlighted in the literature as a means for attribute identification due to its structured approach and ranking methodology within a face-to-face focus group setting.[21] Depending on the content and availability of , the NGT has previously been used to elicit key attributes using small groups of persons.[22] The NGT is noted to supersede group-based brainstorming because it allows individuals to freely express their thoughts through anonymous voting/ranking and individual brainstorming, without being embarrassed about offering their opinions or censoring themselves.[23–26] In addition, the NGT technique captured participant responses and got them to prioritize their thoughts and perspectives.[27,28] The key benefit of NGT is that it requires participants to prioritize attributes into a manageable list, thus addressing concerns of cognitively burdensome DCEs. Furthermore, the methodology has a distinct advantage over other qualitative consensus methods such as the "Delphi methodology." It quickly ensures that groups reach a consensus through face-to-face discussions and has a higher response rate.[29]

Following the results in Chapter 2 we can conclude that, although the prioritized attributes concur with what has been observed in the literature relative to patient's preferences, in this instance NGT achieved its intended purpose, which was to give the participants a chance to add their voice, identifying and prioritizing the attributes for a DCE. Using NGT to elicit public preferences together with the DCE is an example of a possible technique that can be used to enhance the collection and prioritization of information from patients.

Discrete Choice Experiments

The use of discrete choice experiments enables the integration of patients' values on all aspects of care in one measure. For example, this thesis showed how patients trade different health outcomes and process attributes alongside each other. Given the challenges to the latter, discrete choice experiments provide the opportunity to estimate pair-wise choices and analyze marginal values or the total value of a health service or good.[30]

Both of the DCEs presented in this dissertation provided important insights and highlighted that patients have preferences and are willing to trade off between attributes. First, Chapter 3 identified important characteristics of public health facilities in Cape Town, South Africa. The chapter also revealed patients' trade-offs among important characteristics of HIV testing services. In both studies, significant variations in preferences between respondents were observed, suggesting that variations in preferences within target populations should be considered in identifying optimal testing strategies and that adequate tools are needed to elicit heterogeneity in preferences.

Willingness to Pay

Chapter 4 revealed significant drivers or determinants related to the participants' WTP and willingness to contribute to the health service. This study used the range methodology to limit the possible, realistic amounts and avoid having too many outliers. The amounts used in the upper range were the going fees for a consultation with a general practitioner in the respective communities at the time of the study. However, the range method was not very successful in this study, as a substantial proportion of participants selected the next amount for not willing to pay. The study showed that 60% of the participants chose above zero, and a few chose the ending bid, which gave us the confidence of little or no compliance bias. However, the willingness to contribute was for very low amounts. Finally, factors influencing the willingness to pay included employment, the facility providing care, the mode of transport, and the frequency of facility visits; these were not far removed from other study findings.

Generalisability and transferability

Our studies were conducted in two facilities (Goodwood CDC and Bothasig CDC), which may not be representative of the broader population of Cape Town or beyond. The generalisability of the data collected in a DCE study is often difficult as DCEs rely heavily on context-specific scenarios.[14] However, it has become an accepted practice in health economics that, where a focus on 'health' is seen as sufficient and appropriate, a generic health status measurement tool (such as the EQ-5D) can be used, allowing off-the-shelf preference data to be applied to

the health states of interest.[31] In contrast, the preference elicitation exercise must be repeated for each clinical setting or technology when the DCE technique is used.

Transferability refers to the extent to which the study's results could be applied in other contexts than the specific context of the study at hand. The number of discrete choices presented to respondents in DCE surveys is often very small with regard to the number of scenarios generated.[14] Due to the latter, it is often difficult to transfer DCE outputs, thus challenging transferability. This has also been reported in the literature. From a DCE perspective, a key difficulty is that attributes and levels may not match well between different contexts.[32] For example, a study showed that DCE models that consider both scale and preference heterogeneity were better able to predict choices mimicking real-world decisions and performed best when three alternatives were presented to respondents.[19] Reflecting a more detailed argument, Ostermann et al. (2014)[33] found all five attributes considered in our study to be significant, with distance being the strongest driver of preference in Tanzania. However, in our study distance was not the strongest driver of preference, confidentiality was. In the literature, confidentiality was identified as a key aspect of preference.[35]

Implications and recommendations for clinical practice, policy, and further research

Overall, our research substantiated the importance of listening to the patient's voice. This ties in with the vision of providing "access to patient-centeredness and quality care" for Western Cape Government: Health. The involvement studies included the patients, allowing for future use in organizing services within the public health facilities. Understanding the economic value placed upon the provision of clinical services also gives insight into what patients deem more valuable. The voice of the patients adds to the literature on the key role of the patient in determining aspects of the service provided, particularly in government spaces, where decisions are usually made using a provider-based top to bottom operational decision-making system approach. Despite patient surveys being implemented, in most cases, from simple qualitative methods or revealed preferences, DCEs are a serious contender in determining which factors carry more weight in preferences and in the willingness to trade-off attributes in question. Good health can only be realized by facilitating patient, provider, and community participation in attaining and maintaining health.[34] Tailoring service to patient needs would go a long way toward retaining clients and in adherence to treatment.

Although one would never think to consider it at a no fee for services primary healthcare facility, it was revealed that most patients were hypothetically willing to pay. It is interesting to note that

some tertiary facilities have Hospital Trusts where donations are welcome and used to improve the facilities. A similar method may be investigated when it comes to PHC facilities. No amount is too little, particularly considering that there are 14 million visits per annum to PHC facilities.

Overall, thesis findings show that the availability of medication is the most important factor in choosing a facility for receiving services. Therefore, it is of utmost importance that health facilities are well stocked. Also, shorter waiting times were preferred for both the first visit and subsequent appointments. This highlights the importance of effective and efficient clientele service at health facilities. Treatment by doctors was significantly preferred to treatment by nurses, whilst the shorter distance to the facility and confidentiality were highly preferred. There is a need to investigate why patients prefer being assisted by a doctor rather than a nurse; as they are all health professionals, the quality of care being rendered should be equally acceptable. Conclusively, decision makers must include patient voices to improve the provision of health care and to increase patient satisfaction. It is important to note that despite increased attention toward patient preferences (PP), the use of PP in making decisions about medical service and products remains limited and unstructured.[35] With regard to the strategy for HIV testing, the method for obtaining the sample and the location of sites for collecting medication should be considered, in addition to the importance of confidentiality. The variations in preferences within target populations should also be considered in identifying optimal testing strategies. This DCE observed that participants preferred being assisted by a doctor rather than a nurse, which is a cause of concern. However, there should be no variance in the care quality between the two cadres, as primary health facilities specialist services are offered at primary health care facilities. It would be worthwhile to expand the research with a bigger sample to evaluate the WTP as a proxy for contributing toward the NHI. Further, investigating preferences and satisfaction with HIV treatment could complement our research and provide further insights toward optimizing the screening and treatment of HIV patients. This can be extended to patient preferences in the treatment of tuberculosis, chronic diseases, and child and maternal health, amongst other areas.

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APPENDIX

Summary

Impact

Curriculum Vitae

Dissemination Activities

Summary

The thesis aimed to assess patients' preferences for public health services (i.e., primary health care and HIV testing) in the Western Cape province, South Africa, using focus groups, discrete choice experiments and willingness to pay studies. Patient preferences must be assessed and used in policymaking and operational decisions. Therefore, it is important to add to the body of knowledge by conducting research using the clientele that uses the public health facilities and services offered, both in-house and as part of the outreach. Most South African people access health services through government-run public clinics and hospitals. As South Africa moves to adopt National Health Insurance (NHI), the success of this process hinges on public healthcare reforms which are critical to the delivery of high-quality, accessible, public-sector health services for universal coverage in the health system.

The thesis is two-fold. **Part I** (Core study) describes the studies conducted to systematically understand the willingness to pay for health services and patient preferences in the Western Cape in South Africa. P**art II** looks at HIV client testing preferences. More specifically, **Chapter 2** describes the identification and prioritization of attributes for a discrete choice experiment using a nominal group technique relative to patients' choice of public health facilities in Cape Town, South Africa. **Chapter 3** describes the enhancement of public participation in public health offerings in relation to patient preferences in the Western Cape using a Discrete Choice Experiment **Chapter 4** describes willingness to pay for Primary Health Care (PHC) at Public Facilities in the Western Cape, South Africa. . Patient preferences in **Part II** were elicited regarding HIV testing in South Africa using a Discrete Choice Experiment in **Chapter 5** which builds on the formative work done in chapters 2-4 and is based on five attributes: availability of testing on weekends or weekdays, distance from the testing centers, collection method, availability of medication at testing centers, and confidentiality of tests and levels. **Chapter 6** discusses the main findings in this thesis and discusses its main methodological considerations and implications for further research.

In **Chapter 2,** the nominal group technique (NGT) was used to select attributes linked to the choice of public primary healthcare facilities; these attributes are then used in a discrete-choice experiment (next chapter) aiming to identify and prioritize, from the patient's perspective, essential characteristics for choosing public health facilities in Cape Town, South Africa. In this chapter, results showed that the six most important attributes in choosing a facility were 'treatment by a doctor/ (family physician) (66.7%), 'distance to the community day center (61.7%), 'availability of medication' (61.7%), 'confidentiality during treatment' (57.7%), and 'waiting time' and 'treatment by a nurse.' This study was used as a basis for the next DCE on WTP, to further

confirm the feasibility and value of the NGT in identifying and prioritizing the attributes for a discrete choice experiment (DCE). The NGT, therefore, can be used to elicit patient preferences and, when employed together with a DCE, can enhance the quality and quantity of information for decision making, in tandem with patient satisfaction and experiences.

To get further insights on patients' preferences for health facilities and how they are making trade-offs between important attributes, **Chapter 3** uses a DCE where patients repetitively choose between two hypothetical health facilities which differ in six attributes: distance to facility, treatment by doctors vs. nurses, confidentiality during treatment, availability of medication, first visit (drop-in) waiting times, and appointment waiting times. The aim of **Chapter 3** is to understand how the patients' willingness to trade for certain attributes affects their choice of public health facilities. Findings in **Chapter 3** show that availability of medication (50.5%), appointment waiting times (19.5%), and first visit waiting times (10.2%) were the most important factors for patients when choosing a health facility, with respondents preferring shorter waiting times for both first visit and subsequent appointments (<2 h). Therefore, it can be deduced that the aforementioned results identified important characteristics in choosing public health facilities in Cape Town; these important attributes can be considered in other countries with similar settings.

As South Africa is currently preparing to implement National Health Insurance (NHI), there is a pressing need to understand how the public equates the provision of health services at Primary Health Care (PHC) centers with monetary value. **Chapter 4** explores the willingness to pay (WTP) for public primary healthcare services in South Africa, using an exploratory study to identify factors that influence WTP. About 60% of the study population was willing to pay for services offered at the PHC facilities. The average willingness to pay for all participants was 49.44 ZAR. The multiple logistic regression for grouped facilities showed unemployment, public transport, and the facility attended to be significant, whilst public transport, facility visits, and facility attended were the only significant variables in the Tobit model. With final regression, results show that the following were less willing to pay: the unemployed in comparison with students, those who used public transport rather than walking, those frequenting the facilities more than first-time visitors, and those attending Goodwood facility in comparison with Bothasig. **Chapter 4**, therefore, highlighted the factors related to the participants' WTP and their willingness to contribute to the health service, although at very low amounts. In the existing health economic research informed by the findings of **Chapter 4**, it would be safe to say that understanding the economic value placed upon a service provided in a facility is essential in decision-making for improving the quality of care, particularly as the South African health system is making the facilities ready for NHI.

Considering that South Africa (SA) has the world's highest burden of HIV infection, with an estimated 13.7% of the population living with HIV (PLWH/Persons Living With HIV), understanding client preferences for HIV testing may be a significant driver in improving the uptake of HIV treatment. Therefore, in **Chapter 5** client preferences for key characteristics of HIV testing options are elicited using a discrete-choice experiment (DCE). Study findings in **Chapter 5** report confidentiality as the most important attribute, followed by distance from the testing center and the method of obtaining a sample. Patients prefer a finger prick to venepuncture as the method for obtaining the sample. Further, the availability of medication at the testing site was preferred over a referral to an HIV treatment center following a positive HIV test. There were significant variations in preferences among respondents. In addition to accentuating the importance of confidentiality, the method for obtaining the sample and the location of sites for the collection of medication should be considered in the testing strategy. The variations in preferences within target populations should be considered in identifying optimal testing strategies. Generally, including patient voices to inform operational and policy decisions would increase the utilization of public health facilities in a low-income setting.

In conclusion, we assessed patients' preferences for public health services, ***i.e.*** primary health care and HIV testing in the Western Cape, South Africa using focus groups and discrete choice experiments. It was evident in the literature reviewed that understanding patients' preferences is crucial in effective policymaking and operational decisions. Therefore, the findings observed in this thesis, which describes research conducted using the clientele that uses the public health facilities and services offered in-house or as part of the outreach, are important additions to the body of knowledge. Furthermore, this thesis also provides evidence on using health economics methodological techniques. For instance, one of the published papers confirmed the feasibility and value of the NGT in identifying and prioritizing the attributes of a DCE, this providing supporting evidence that the NGT can be used to elicit patient preferences and, when employed together with a DCE, can enhance the quality and quantity of information for decision-making in tandem with patient satisfaction and experiences.

The thesis findings provide information on which public health facilities could be improved - and how - by including patient voices to inform operational and policy decisions in low-income settings. In addition, the thesis reveals factors related to the participants' WTP and willingness to contribute to the health service, though at very low amounts. Understanding the economic value placed upon a service provided in a facility is essential in making decisions for improving the quality of care, in particular as the South African health system is making the facilities ready for NHI. Last, understanding client preferences for HIV testing is crucial to improving uptake. The dissertation elicited client preferences for key characteristics of HIV testing options.

Observed findings revealed that in addition to the importance of confidentiality, the method for obtaining the sample and the location of sites for collecting medication should be considered in the HIV testing strategy. The variations in preferences within target populations should also be considered in identifying optimal testing strategies.

Impact

It has been argued in the reviewed literature that patient preferences can provide direction for selecting treatment options and tailoring interventions.[1] The literature has documented that when people are unwell, the choice of where to seek medical care is influenced mainly by personal preferences, severity of illness, and economic capacity.[2,3] Therefore, the provision of quality health services is largely dependent on the sufficiency of the health workforce (in terms of numbers, the quality of skills they possess, how and where they are deployed, and how they are managed).[4] Patient preferences are crucial in informing choices in clinical decisions where science has yet to provide dominant solutions to healthcare problems, and discrete choice experiments are essential to decision theory and health informatics as they offer promising strategies to help meet challenges associated with understanding patient preferences.

Scientific Impact

Chapter 2 identifies attributes for a Discrete Choice Experiment (DCE) concerning the choice of public health facilities using the Nominal Group Technique (NGT). The use of the NGT has been reported to have made traction in identifying the attributes which should be used in DCEs.[5–16] The NGT technique offers both quantitative and qualitative techniques in eliciting public preferences for health care, a strength as this offers contextual information and supports the prioritization of attributes.[17] As the NGT technique focuses on both quantitative and qualitative aspects, **Chapter 2** enhances mechanisms for including the patient's voice when decisions are being made for the provision of their health care. **Chapter 2** contributes to the literature on identifying and prioritizing attributes for DCEs in a healthcare setting within a developing country, noted by Mangham et al. to be more popular outside the African healthcare sector.[18] **Chapter 2** could be an important guide in designing future research concerning patient preferences for public facilities. **Chapter 2** has shown that using NGT to elicit patient preferences, together with the DCE, is an example of a technique that could be employed to enhance the collection of information from patients; employing the methodologies in tandem can utilize patients' reported experiences to improve the delivery of effective health care and better patient satisfaction.

Chapter 3 of this thesis brings in a wealth of knowledge, particularly in sub-Saharan Africa and specifically South Africa. The thesis findings showed that to date very few well-founded scientific studies had been conducted in South Africa on patient preferences. The literature reviewed showed that only one study in South Africa looked at patients' preferences, from the point of view of trade-offs, and concentrating on a community sample in a public health facility. Accordingly, **Chapter 3** provides relevant and valuable scientific information to policymakers in South Africa and in other African countries with similar health systems. Like any other low-

middle-income country, South Africa has a limited budget for health care. **Chapter 3** contributes a further innovation as it reveals that patients are willing to accept trade-offs between the included attributes, helping to define and rank them. Considering alternative data sources available to decision makers is important for understanding how useful DCEs are in predicting behavior. The quantification of how well DCEs predict behavior could explicitly account for uncertainty in DCE predictions.[19] Therefore, DCEs could provide a relatively accurate and cost-effective option for predicting individual choices.[19] The data from DCEs can then quantify the relative importance of aspects of health care[20]. Therefore, **Chapter 3** provides information to policymakers on patients' preferences in the Western Cape. Taking the variation in DCE prediction into account would make for more robust uptake of HIV treatment and impact models.

When it comes to healthcare systems in South Africa, willingness to pay (WTP) has usually been discussed in the realm of private health care and only rarely in public health care, due to the nature of the public health system, where no fee is charged at the point of service. The perceived disparities in the provision of care between public and private providers in terms of patient experiences, such as quality of care, waiting times, staff attitudes, and environmental comforts, have resulted in those who can afford it opting to invest in private health care through medical health insurance.[21–23] **Chapter 4** ascertained the willingness to pay for primary health care (PHC) services in South Africa's public sector and identified factors associated with willingness to pay (WTP). First, **Chapter 4** showed, amongst primary care attendees at public health facilities, how much patients were willing to pay, showing economic value for care at these facilities. The latter methodology could be used as a benchmark for other countries with similar health systems as South Africa in doing WTP studies. Second, **Chapter 4** showed the factors influencing the willingness to pay, including employment, the facility providing care, the mode of transport to reach the facility, and the frequency of facility visits. Finally **Chapter 4,** the thesis shows the importance of understanding that the value placed upon a service provided in a facility is essential in making decisions intended to improve the quality of care, particularly now, when the South African health system is making the facilities ready for NHI.

HIV testing is the gateway to improving the prevention and treatment of HIV.[24] The HIV testing service (HTS, formally known as HIV counseling and testing) strategy employs different approaches to ensure the success of the HIV programme. The literature reviewed showed no specific discrete choice experiment (DCE) studies on HIV testing preferences in South Africa. However, two studies looked at critical attributes and attribute levels on the delivery of oral pre-exposure prophylaxis (PrEP). The uptake and effectiveness of HIV prevention products may also rely on pregnancy and STI protection[25] among young people in Cape Town and Johannesburg.[26]

Chapter 5 describes the DCE that was used to elicit preferences from clients presenting for HIV testing in South Africa, providing local evidence for policy and operational decisions. **Chapter 5** reports that confidentiality is the most important attribute of HIV testing. This additional evidence that confidentiality with regard to HIV testing should remain a key component of the South African National HIV Testing Strategy accentuates its importance. In addition, the method for obtaining the sample and the availability of medication at testing sites should be considered in the HTS strategy as parts of the modalities for reaching different populations and linking care for positive persons. Finally, the variations in preferences for testing options should be considered in deciding on optimal testing strategies.

Social impact

This thesis also provides important insights into patient preferences in South Africa that can be of interest to policymakers, particularly those in the health sector. By highlighting the cross-sectoral impact of patients' preferences on health services access, this thesis is aligned with broader approaches to policymaking and systems of thought that stress the importance of collaboration across societal sectors to improve access to health care.

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Curriculum Vitae

Plaxcedes Chiwire was born on the 7 January 1982 in Zimbabwe. She holds a BSc (Hons) in Economics from the University of Zimbabwe, an MSc in Development and Environmental Economics from the University of Oslo, Norway, and a Master's in public health, majoring in Health Economics, from the University of Cape Town.

Plaxcedes has worked in the field of Health Economics for the past twelve years. She has been active in the Non-Governmental Organisations (NGOs) and International NGOs (UNAIDS, the Clinton Foundation, The Global Fund, Bill & Melinda Gates Foundation) as a consultant supporting African countries in strengthening health financing systems. This includes budgeting, tracking expenditures, and creating investment cases for HIV/AIDS. She has also had the opportunity to lecture on Finance and Health Economics at the Graduate School of Business and the Child and Health Faculties of the University of Cape Town. She is the current Deputy Director of the Health Intelligence Unit (Health Economics) at the Western Cape Government: Health and Wellness (WCGHW). Her current position at the WCGHW has been to assist all departments in strategic planning, focusing on cost-effective resource allocation, equity budgeting, infrastructure planning, monitoring, and evaluation. Her position in and out of government has enabled her to understand how the intertwined health system functions. The PhD process has added to her knowledge base, as she interacted with patients and developed her understanding of how decisions made from above may not in the best interest of the user.

Dissemination Activities

The various chapters of this thesis have been published in peer-reviewed journals. These articles have also been forwarded to the Western Cape Government: Health and Wellness management team responsible for strategic planning and for the facilities which were part of the research. They have expressed their gratitude by stating the following in one of the articles, "Thanks for this interesting article, which enhances our understanding of how patients make rational choices. It does give us a clear idea of what we need to do to improve the client experience".

The researcher also intends to attend some international research conferences targeting a broader multi-disciplinary audience, including the policymakers representing patient organizations, industry, regulatory bodies, and academics. Below is the list of publications.

Scientific articles in peer-reviewed journals

- **Chiwire P**, Evers SM, Mahomed H, Hiligsmann M. Identification and Prioritization of Attributes for a Discrete Choice Experiment Using the Nominal Group Technique: Patients' Choice of Public Health Facilities in Cape Town, South Africa. Value in Health Regional Issues. 2022 Jan 1;27:90-8.

- **Chiwire P**, Evers SM, Mahomed H, Hiligsmann M. Willingness to pay for primary health care at public facilities in the Western Cape Province, Cape Town, South Africa. Journal of Medical Economics. 2021 Jan 1;24(1):162-72.

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