Assessing the acceptability of biometrics in HIV prevention programme by Hillbrow sex workers

Shepherd Nyamhuno
WITS Graduate School of Governance

Thesis presented in partial fulfilment for the degree of Master of Management (in the field of Public Sector Monitoring and Evaluation) to the Faculty of Commerce, Law, and Management, University of the Witwatersrand

March 2019

DECLARATION

I declare that this thesis/dissertation entitled "Assessing the acceptability of acceptability of biometrics in HIV prevention programme by Hillbrow sex workers" is my own, unaided work. I have acknowledged and referenced all the sources that I have used and quoted. I hereby submit it in partial fulfilment of the requirements of the degree of Master of Management (Public sector monitoring and evaluation) in the University of the Witwatersrand, Johannesburg. I have not submitted this report before for any other degree or examination to any other institution.

Shepherd Nyamhuno

Student no. 711699

Johannesburg, March 2019

ABSTRACT

Author: Shepherd Nyamhuno
Thesis title: Assessing the acceptability of biometrics in HIV prevention programme by Hillbrow sex workers

Johannesburg, March 2019

TABLE OF CONTENTS

LIST OF FIGURES

ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
ART	antiretroviral therapy
ARV	antiretroviral
CoJ	City of Johannesburg
DHA	Department of Home Affairs
DoH	Department of Health
DNA	deoxyribonucleic acid
FPIS	fingerprint identification system
HCT	HIV counselling and testing
HIPAA	Health Insurance Portability and Accountability Act
HHP	Hillbrow Health Precinct
HIV	human immunodeficiency virus
HTA	high transmission area
KZN	Kwa-Zulu Natal
MSM	men having sex with men
NGO	non-governmental organisations
RCT	randomised control trials
SASSA	South Africa Social Services Agency
STI	sexually transmitted infections
SWEAT	Sex Workers Education and Advocacy Taskforce
TB	tuberculosis
UAE	United Arab Emirates
USA	United States of America
WRHI	Wits Reproductive Health and HIV Institute

ABSTRACT

Sex workers face several challenges in Hillbrow which include the risks of HIV and STI infection, stigma and discrimination in public health facilities, arrests and exploitation from the police as well as violence from the clients. Sex workers do not always bring their identity documents to the clinic and they are frequently changing their names thereby creating many multiple accounts for an individual. The biometrics have the potential to solve the problems of unique identifiers for Esselen Street Clinic. This study undertook to find out if the biometrics were acceptable to the sex workers. A mixed-methods approach made up of questionnaires, focus group discussions and in-depth interviews for employees was employed. A sample of 120 questionnaires found out that 64.6% accepted the biometrics when used at Esselen Street Clinic. Moreover, 79% had a positive perception of biometrics. The focus group discussion showed that although the sex workers trusted the clinic staff, they had problems with fear of the unknown including someone hacking the system and the data ending up in the hand of future prospective employees. Sex workers also cited that they were using biometrics in other platforms such as the Department of Home Affairs, banks and SASSA. This gave them the confidence to accept them if they were to be placed at the clinic. In order to understand the acceptance of the biometrics by the sex workers, in-depth interviews with employees were carried out. It emerged from the in-depth interviews with the staff members that the clinic had invested much in tailor-made services, which are very convenient for sex workers. Moreover, the continual capacity building in sex worker sensitisation and the quality improvement programme has yielded better outcomes and quality services that are attractive to sex workers. The non-judgemental attitudes of the employees gave the sex workers confidence to accept the biometrics. It was interesting to note that migrant sex workers were more sceptical and fearful of biometrics than local ones due to illegal immigrant status and experience of harassment at the hands of the police. The study concluded that a sex worker-friendly clinic, like Esselen Street Clinic, could perhaps have a better acceptance rate than a public health facility would. With intense lobbying and education, there are higher chances of getting an even higher acceptance rate of the biometrics.

ACKNOWLEDGEMENTS

I would like to thank the following individuals for helping me to finalise my studies;
My supervisor, Professor Murray Cairns for having supported and guided me throughout the studies
My wife, Ashely for having stood by me through the entire duration of my studies
My son, Jordan Jedd for having been the great motivation for pursuing these studies
Last but not least, The Almighty God for having given me life and wisdom to pursue this degree

1 INTRODUCTION TO THE RESEARCH

1.1 Introduction and background

This research seeks to assess the acceptability of biometrics in the human immunodeficiency virus (HIV) prevention programme by Hillbrow sex workers. While this research is going to outline the research problem (Section 1.1.4), purpose statement (Section 1.1.5) and finally the research questions (Section 1.1.6). This section, 1.1 brings in the research context in a broader perceptive. Chapter 2 describes the literature around the sex work in Hillbrow in greater detail, biometric identification technology and the importance of biometrics in programme monitoring and evaluation. The methodology is discussed in Chapter 3 and Chapter 4 presents the research findings. Research results are discussed in Chapter 5, and Chapter 6 concludes the research with a summary of findings and recommendations.

1.1.1 Sex work in Hillbrow

Hillbrow is an overpopulated neighbourhood in the City of Johannesburg (CoJ) (Rees, Delany-Moretlwe, Scorgie, Luchters, & Chersich, 2017a). Social problems in Hillbrow range from unemployment to xenophobia, overpopulation, drug and alcohol abuse and crime (Silverman & Zack, 2007). Several hotels in Hillbrow have been turned into sex establishments due to the deterioration of the area so much that attracting tourism there has become a challenge. Hillbrow is renowned for its shebeens, street-based sex work, as well as muggings (Stadler & Dugmore, 2017).

Sex workers have a very high HIV infection rate because of various factors (Jenny Coetzee, Jewkes, & Gray, 2017). Early sexual debut, inconsistent condom use, age disparity with sexual partners and high prevalence of sexually transmitted infections (STIs) expose the sex workers to a high HIV infection rate. In 2018, the HIV prevalence was as high as 53% and STIs are relatively common amongst this population because of low condom usage rate (Francis et al., 2018). As a result of high STI prevalence in the population, HIV is therefore also a common problem in this part of the city, which resulted in a need for an appropriately configured public health service to address the particular health needs of the sex worker population in Hillbrow. The

Esselen Street Clinic is a targeted sex worker clinic which provides tailor-made sex worker-friendly primary health care services including HIV and STI treatment.

Sex workers are predisposed to HIV because they take on a lot of risks, especially by having unprotected sex with numerous clients (Campeau et al., 2018). While unprotected sex poses some dangers in terms of HIV infection, unwanted pregnancies and STIs, sex workers engage in this activity because they can charge more money to engage in it (Mukumbang, 2017). Therefore, behavioural change amongst sex workers is a fundamental concept that enhances HIV prevention through consistent and correct condom use (Huschke & Coetzee, 2019; Venter et al., 2018).

The conditions under which sex workers operate also expose them to a lot of drug abuse (Jeal et al., 2018; Strathdee et al., 2015). Alcohol, marijuana, mandrax, cocaine, heroin, crack, tobacco, inhalants and injecting drugs are common among sex workers. Sex workers expressed that when intoxicated, they felt more confident to solicit clients. It appears that intoxication assuages sex workers' embarrassment while doing sex work (Wechsberg et al., 2009). These drugs will inevitably make them a target for law enforcement agents' frequent raids.

The living conditions of sex workers often make it difficult for adherence to medical drugs because of mental health problems. Studies done have shown that sex workers often go through depression and post-stress trauma due to stressful and violent working conditions (Krumrei-Mancuso, 2017). Moreover, sex work is fraught with many dangers; harassment by the police, physical abuse by clients who do not want to pay and murder at the hands of clients (Brown, Duby, & Bekker, 2012; Chung, 2015; J Coetzee, Gray, & Jewkes, 2017; Platt et al., 2018). Inevitably, the mental wellbeing of the sex workers becomes challenged by the working conditions.

The vulnerabilities of sex workers are dependent on the places where they operate. Sex workers operate in brothels, streets, along highways, massage parlours and clubs (Brown et al., 2012; Pauw & Brener, 2003; Pisani, 2009). Sex workers that operate in establishments such as massage parlours and brothels where there is a security guard are much safer than those on the streets and highways. Street-based sex workers are often driven to locations far from the city where they are raped, beaten and at times killed

(Gomez et al., 2016). Clients that refuse to pay are often reported to be using violence to get away without paying and some of them rob the sex workers of their belongings, including the day's takings (Semple et al., 2015).

Sex workers face problems when accessing services at public health institutions. Scorgie et al. (2013) hold the view that judgmental attitudes by clinical staff at public health facilities hamper the health seeking behaviour of Hillbrow sex workers. Stigma and discriminatory practices are the reasons why sex workers do not use public health facilities (Brown et al., 2012). Sex workers feel safer to attend the targeted sex worker clinics where the nurses are sensitised to the sex workers' rights (Stadler & Delany, 2006). A targeted sex worker clinic is a sex worker-friendly clinic in which staff members are trained to handle sex workers with dignity and respect (Stadler & Delany, 2013). In South Africa, such facilities are run by non-governmental organisations (NGOs).

Sex work is a crime in South Africa under the Sexual Offences Act 23, of 1997 (Government of South Africa, 1996). Under such a context, sex workers cannot report any crime done to the police because selling sex is a criminal activity under the current South African law (Government of South Africa, 1996). Sex workers operating in establishments such as brothels, shebeens and hotels enjoy more protectionat the hands of establishment owners who employ security guards for that role. On the other hand, the street-based sex workers in Hillbrow seem more prone to a wide range of violence and exploitations at the hands of the police, clients and at times robbers (Rees et al., 2017a). Given the current legislative framework, it is difficult for sex workers to report violence to the police.

1.1.2 HIV prevention programmes

While the sub-Saharan Africa region has the highest burden of HIV infection amongst other regions of the world, South Africa is the hardest hit of all the countries (Pillay-van Wyk et al., 2016). In 2018, South Africa was home to nearly seven million people living with HIV or with the acquired immunodeficiency syndrome (AIDS) (Statistics South Africa, 2018). Sex workers are a key driver of the epidemic because of their risky behaviour (Campeau et al., 2018). The most recent survey shows an HIV prevalence rate of 44% amongst sex workers (Shisana et al., 2014). HIV/AIDS does not have a

cure as yet and as such, it is plausible that the further spread of the disease can be curbed by prevention rather than treatment only (Rotheram-Borus, Swendeman, & Chovnick, 2009).

According to Cowan et al. (2018), HIV prevention is a combination of the biomedical, structural and behavioural interventions. Biomedical interventions entail male circumcision, treatment of STIs, vaccines and antiretroviral treatment (ART). Structural preventions strategies entail addressing economic, social, political and economic matters that cause the spread of the epidemic (Sipe et al., 2017). The behavioural interventions include among other things, addressing practices and behaviours that fuel HIV such as reducing the number of sexual partners, correct and consistent use of condoms and delay of the sexual debut (Coates, Richter, & Caceres, 2008; Follins & Dacus, 2016). It must be highlighted that it is the successful application of all these interventions simultaneously that yields optimal health outcomes.

The Hillbrow Health Precinct (HHP) programme is a CoJ initiative that is aimed at improving the health and environmental state of the Hillbrow community (City of Johannesburg, 2017). The programme focuses on improving the welfare of street children, sex workers, curbing drug abuse, assisting homeless people and addressing sexual and domestic violence. Todes, Harrison and Weakley (2015) clarified that the HHP was a programme run by the partnership of CoJ, Wits Reproductive and HIV Institute (WRHI) and the Gauteng Department of Health. It occupies the land which was previously used by the laboratories and many other public health facilities.

Pioneered in 2004, the HHP covers the areas in Hillbrow Hospital, Esselen Street, Klein Street and Smit Street in Hillbrow. The programme entails upgrading health facilities in Hillbrow into world-class facilities with the latest technology used in health services and the opening of a state-of-the-art health research unit. HHP was formed mainly to deal with development problems of Hillbrow, HIV epidemic and poverty-related health issues. Moreover, the HHP looks at giving access to HIV/AIDS and STI treatment to vulnerable women and children, who include sex workers (Todes et al., 2015).

The HHP offers reproductive health services to marginalised groups such as sex workers and youth (Todes et al., 2015). Other services offered at the clinic include the

diagnosis and treatment of tuberculosis (TB), HIV counselling and testing (HCT) and family planning services. Although the Johannesburg inner city is said to have more than 4 400 sex workers, the HHP has enrolled more than 2 200 in its database who are accessing services at Esselen Street Clinic (Todes et al., 2015).

Todes et al. (2015) confirmed that the programme provides regular screening for STIs and TB and more importantly services for the continual prevention of TB. The Esselen Street Clinic also takes care of the mental health status of the sex workers because of the environment that they work in and of the occupational risks that they face daily. The HHP works through peer educators to recruit more sex workers to come and receive services at the Esselen Street Clinic and addresses some pertinent issues such as abuse and harassment at the hands of the police.

Sex workers do not like to be identified by their real names and as a result, they resort to using aliases, which change from time to time. The challenge with these ever-changing names is that it results in multiple entries of one person in the database, resulting in false ART defaulters and false new sex workers being entered on the database. This results in an inability to uniquely identify sex workers and as a result, the data is inaccurate. The changing sex workers' names pose a challenge to the reliability and integrity of data, and as such, this study is aimed at investigating the possibility of an alternative that might solve the unique identity problems, the biometric technology.

1.1.3 Biometric system

A biometric identification system is a technology that utilises the biological features of a person to identify it uniquely (Schatten, Baca, & Cubrilo, 2009). This means that these features are not found in any other person and cannot be reproduced. Biometric technology has the potential of solving unique identifier problems in monitoring and evaluation because they can identify one person once. Unlike identity cards which can be subject to forgery, biometric systems can identify someone by the features, which can only be found in that one person.

The September 2001 terrorist attacks in the United States of America (USA) have paved a way for increased security at the immigration office using biometric technology (Ratha & Govindaraju, 2008). Additionally, banks have recently intensified their security

through biometric identification to curb increasing fraudulent cases (Venkatraman & Delpachitra, 2008). Zuniga, Win and Susilo (2010) have also shown that biometrics have successfully worked in the medical insurance industry's claims. Biometric technology is becoming a mainstream approach to securely prevent identify fraud in several industries and prevent misidentification.

Whereas literature reviews delineate that fraud, double counting, misidentification of medical patients are rampant, biometric systems have been seen to offer a solution (Jain & Kumar, 2012). Yu, Chen, Chang, Juma and Chang (2005) contend that the strength of biometric system has been that it utilises the feature of a human being that is unique and which cannot be duplicated by any other means. The fingerprints, face, hand geometry, iris, retina, ear, deoxyribonucleic acid (DNA), skin reflection, lip motion, keystroke gait, thermograms, body odour and speaker recognition are the current physical features that uniquely identify a human being. It appears that the credibility of some of these features is still subject to debate and this is discussed in Chapter 2.2.

1.1.4 The problem statement

HHP is an HIV prevention programme that aims at reducing the number of new infections among sex worker in Hillbrow. HIV prevalence is higher amongst sex workers than in the general population due to risky sexual behaviours of the sex workers. Sex workers experience stigma, discrimination and harassment at the hands of the police, clients and the general public. To avert being identified or caught, sex workers use trade names or pseudonyms and avoid revealing their real identity. Previous attempts to ask them to bring identity documents have proved fruitless because some of them are foreigners who do not have identity documents.

The monitoring and evaluation system of the HHP programme experiences a problem with unique identifiers. Sex workers frequently change their names so that no one can track their movements. For the HHP programme, there is a likelihood of counting the same person several times under different names. Previous research has shown that sex workers shun anything that is fingerprint related and this could potentially dissuade them from utilising prevention services. It is unknown how sex workers using the Esselen Street Clinic view the biometric identification system and yet the system can potentially ease the monitoring and evaluation problems of double counting.

Sex workers are generally a highly mobile population that looks at penetrating into new markets and operating in ways that avoid detention and arrest. They operate in taverns, truck stops, shebeens, streets, roadsides, bushes and any places where there are potential clients. The areas that they operate from are called high transmission areas (HTA) because there is a high possibility of HIV transmission in them. With each movement of location, it appears that sex workers change their names and often lie about their ages to be more marketable to customers because the younger they are, the more marketable they become.

This study may inform future policies about confidentiality, rights and fears of sex workers in HIV prevention programmes, in light of the biometric identification system in sex workers. More importantly, it will add value to the monitoring and evaluation field especially for programmes of sex workers in light of unique identifiers. Finally, this study will help many organisations working with sex workers and battling with getting unique identifiers in sex workers.

1.1.5 The research purpose statement

The purpose of this research is to investigate the acceptability of biometrics by sex workers in the HHP programme.

The acceptability of the biometrics refers to the extent to which the sex workers can agree to use this technology when used as an identification tool for the sex workers. There are fears that this technology may be shunned because it is believed to be linked to the police and therefore repulsive to the sex workers. Meanwhile, its ability to uniquely identify an individual brings a lot of benefits to the organisation such as accurate record. As a result, this study undertakes to explore if sex workers will accept the biometrics when placed at Esselen Street Clinic.

1.1.6 The research questions

1. How acceptable is biometric identification to sex workers in the HHP?
    a. What do sex workers think when their fingerprints are put in a computer system?

b. Do sex workers accept biometrics if they are used as a gateway to accessing health services?

1.2 Delimitations of the research

This study is not going to measure the actual usage of the biometric system by sex workers. Instead, the study looks at the perceptions of sex workers towards biometrics and assesses their acceptability. Perceptions and acceptability will be used as proxies for the intentions to use or not to use the biometrics, should they be made available.

1.3 Justification of the research

Unique identifiers in monitoring and evaluation are an important component that ensures reliability and integrity of data. Counting one person once gives credibility to the data to ensure that accurate data is recorded and reported. As highlighted in the problem statement, sex workers change names frequently, thereby convoluting the data with more sex workers than HHP actually has. It has been hard to get sex workers to register at the clinic with their identity documents and to make matters worse, some are foreign nationals who do not have passports.

As it appears, the current HHP data has a particular proportion of sex workers recorded more than once. This study has the potential to solve this problem by assigning one person with one identity which cannot be changed, subjected to misidentification or fraud. Biometrics will ensure that the database has the correct number of individuals and that the loss of clinic and hospital cards do not impede patient identification and the attendant medical services.

In summary, this study is going to focus on the sex workers in Hillbrow that are getting services from Esselen Street Clinic to understand how they will react to biometric installation at the clinic. Furthermore, it will seek to understand if the sex workers will accept it should the clinic make it a gateway into accessing its services. The sex workers are exposed to police harassment and exploitation, robbery, violence, HIV and STIs. The clinic offers health services which could be accurately measured if biometrics were installed. The study has therefore set out to find out the acceptability of such a technology.

2 LITERATURE REVIEW

2.1 Overview of sex work in the world

Sex workers are defined as "female, male and transgender adults and young people who receive money or goods in exchange for sexual services, either regularly or occasionally" (Richter, 2008). Sex work is a common practice in many parts of the world in different ways by both males and females (Pitcher, 2015). In America and Britain, sex work is practised in massage parlours, by escorts and street-based. In Thailand, sex workers operate in the nightclubs where tourists frequent and in the streets at night (Harcourt & Donovan, 2005). In China, where regulations on sex work are tougher, online connections are a mode of operation (Meng, 2013). In South Africa, sex workers operate in roads, shebeens, taverns, hotels, hostels, streets and farms (Brown et al., 2012).

2.2 Sex work in Hillbrow

Hillbrow is a high-density cosmopolitan residential and business area situated in the northeast of the Inner City of Johannesburg, where low middle-income earners reside. It is currently the most populated neighbourhood of South Africa with over 100 000 people dwelling in an area of 1.5 square kilometres. Hillbrow has social problems ranging from drug trafficking, sex work, crime and homelessness. The area is also renowned for its exotic restaurants, shebeens, clubs, hotels, education centres in addition to much informal trade (Johannesburg City, 2011).

Research has shown that Hillbrow is a place of entry into Johannesburg for migrants and a place of refuge for a wide range of marginalised and vulnerable groups (Gossman & Premo, 2012). A survey revealed that 38% of the people residing in Hillbrow were foreign nationals and that 68% had moved into Hillbrow in the past 5 years (Rees, Delany-Moretlwe, Scorgie, Luchters, & Chersich, 2017b). Of the residents of Hillbrow, 37% are unemployed while 30% are self-employed. Crime hot spots frequently change from building to building to avoid detection by the police. This area is also renowned for street children, sex work, drug abuse, xenophobia, muggings and vagrancy (Moyo, Patel, & Ross, 2015; Rees et al., 2017a).

Pauw and Brener (2003) established that sex workers in Hillbrow do not always work in isolation. Sex workers in Hillbrow work in establishments such as taverns, hotels and shebeens where there are custodians of the system. Custodians or gatekeepers are usually pimps, boyfriends, husbands, gangs, taxi drivers, aunties or security guards who look after the sex workers during their work. The gatekeepers or custodians are the individuals who control outsiders access into the services of sex workers. The purpose of the gatekeepers is to ensure the safety and to some extent, the welfare of the sex workers by ensuring that the clients entering these establishments are not armed and that they pay the sex workers for their services. Furthermore, they take the car registrations, keep the sex workers' money, belongings and ensure that the clients pay before leaving the premises of the establishment and that no one steals from sex workers (Pauw & Brener, 2003).

Pauw and Brener (2003) confirmed that when the sex workers fail to pay their rentals to use the facilities of the establishment, the same gatekeepers often use forceful methods to ensure that they get their money. Sex workers are forced out of the establishment and their clothes and other belongings are confiscated to ensure that they pay for their own rentals. Although sex workers in brothels enjoy some form of protection, some brothel owners have also been abusive to sex workers with some threatening to expose the sex workers when they want to quit the industry (Mususumeli, 2016). The gatekeepers are important people in any HIV programme intervention in the sense that they can easily influence the sex workers to participate in HIV prevention activities. It would appear that condoms and other educational materials might safely reach the sex workers if left in the care of gatekeepers.

Sex workers in Hillbrow face occupational risks of HIV infection, STIs, alcohol and drug abuse, stress, rape and physical violence (Fiona Scorgie, Daisy Nakato, Eric Harper, Marlise Richter, Sian Maseko, Prince Nare, 2013). Young women are more prone to HIV infection due to socioeconomic factors as well as gender imbalances (Williams & Gouws, 2001). Sex workers have been identified as a high-risk group in the transmission of HIV and have been named a vector of transmission (Johnson, Dorrington, & Moolla, 2017). The nature of sex work is such that they have unprotected sex with several partners which predisposes them to HIV infection (Francis

et al., 2018). The prevalence of these infections is also evidence that sex workers do not always use condoms with their clients (Varga, 2017).

It is a well-documented finding that sometimes sex workers have unprotected sex because it allegedly carries a higher fee due to the risk of infections and diseases that it carries (Elmes et al., 2014; Mukumbang, 2017). Wojcicki and Malala (2001) reported that a considerable number of clients were paying a quarter of the price when they used condoms. Sex workers sometimes do not use condoms with their regular clients because a relationship of trust built over a lengthy period. However, it emerged that if a new client puts a lot of money for sex without a condom, most of the sex workers agreed that they would accept the offer. It has also been observed that there is a negative correlation between the use of condoms and the number of customers that one gets (Mukumbang, 2017).

Sex workers' clients are resistant to using condoms citing that condoms decrease sensitivity and reduce sexual enjoyment (Campbell, 2000). In a separate research, it was discovered that when sex workers become insistent on condom use, the clients become violent towards the sex worker leaving them to resign to give in to their demands (Marcus, Oellerrmann, & Levin, 1995). Now, this is a clear indication that sex workers are prone to violence at the hands of their own clients who may go against their will. It is apparent that as long as violence against sex workers persists, the prevention of HIV will be impeded.

Clients have also been reported to be in the tendency of robbing and raping sex workers, particularly when they are far from public places (Mgbako, 2013). Under such circumstances, safe sex is relegated and survival takes precedence. Sex workers that operate in establishments such as massage parlours, shebeens and taverns enjoy a form of protection from gatekeepers who have guards stationed at their parlours, shebeens or hotels. However, street-based sex workers do not enjoy such privileges and therefore are more prone to being victims of violence than those working in protected areas (Coetzee et al., 2017). The costs of hiring a sex worker are cheaper in the street than in the establishments because sex workers operating in parlours and shebeens incur operational fees, which include rentals and security services.

According to the Government of South Africa (1997), sex work is a criminal act in South Africa under the Sexual Offences Act 23 of 1997. This Act of the Law has been subject to challenge in light of its implication of hampering HIV prevention efforts. While that may be the case, South Africa has no law that proscribes anyone from offering sex workers medical care (Brown et al., 2012). The police have reportedly confiscated condoms from sex workers as part of the evidence that they are sex workers (Richter, Scorgie, Chersich, & Luchters, 2014). It would appear that for sex workers to circumvent any evidence of sex work, it is prudent for them not to carry condoms with them and this impedes HIV prevention. The experience of sex workers at the hands of the police is particularly important as it may set the basis for the acceptability of biometrics at a health facility.

In South Africa, it has been noted that the police have a tendency of harassing the sex workers and demanding bribes in the form of sex and cash to be freed from arrests (Benoit, Jansson, Smith, & Flagg, 2018a; Tenni, Carpenter, & Thomson, 2015). Wojcicki and Malala (2001) documented the detention in police cells and physical assault of sex workers who could not comply with the personal demands of the police. In one case, a sex worker claimed that she reported a rape perpetrated by the police officer at the local police station and the attending police officer asked her if she had enjoyed the sex (Fick, 2006). Undocumented sex workers face the double ordeal of having committed more than one crime; of being an illegal immigrant and of practising sex work. Of all sex workers' population groups, undocumented migrant sex workers have often been the most harshly dealt with by the police (Walker, Vearey, & Nencel, 2017). There is a probability that sex workers from other countries might view biometrics differently from locals, given this experience of harassment.

Pauw and Brener (2003) confirmed that where sex work is criminalised, street-based sex workers have often felt the full brunt of the law. They work in dark places and sometimes areas where it is easier for rogue clients to rape them, rob them or just refuse to pay. Interviews conducted revealed that some clients would produce a weapon after sex and some would kick the sex workers out of a moving car (Wojcicki & Malala, 2001). Fick (2006) agrees with Benoit et al. (2018a) that for sex workers to report rape was just a waste of time, as the police would ask if it was possible for a sex worker to be raped. Under such laws, clients of sex workers get away easily because a sex worker cannot report the issue to the police because sex work is illegal in the first place. As it

appears, the street-based sex workers in Hillbrow are unprotected against brutality, abuse and rape at the hands of both the police and the clients of the sex workers.

Sex workers face a huge amount of discrimination when accessing health care services. Brown et al. (2012) define stigma as the shame or disgrace that is labelled against individual accruing to their status quo, which in this case is being a sex worker (Fitzgerald-Husek et al., 2017). Discrimination is a tag or an unfair treatment that one receives because of who they are (Fitzgerald-Husek et al., 2017; Mhode & Nyamhanga, 2016). Sex workers are at a bitter end of stigma and discrimination (Benoit et al., 2018a; Fitzgerald-Husek et al., 2017). They are often seen as immoral and deserving to be sick with all sexually transmitted diseases, including AIDS. It has been noted that the twin combination of stigma and discrimination have been responsible for poor uptake of health resources and in particular, HIV prevention programmes (Benoit et al., 2018a).

Scorgie et al. (2013) allude that sometimes nurses withhold treatment from sex workers because they deem them as unworthy of it and label them as deserving to be sick because of their deviant behaviour. Sex workers feel that their privacy is violated when they are probed on what they do for a living and more have indicated that they would rather lie than tell the truth and face harassment. Literature paints a negative picture of the treatment of sex workers in public health facilities. The experiences of sex workers at the hands of care workers will determine how a system such as a biometric is viewed. Now, this becomes tricky in the sense that all ordinary public health institutes do not use biometrics and for that to be placed at a sex worker clinic makes one wonder as to its acceptability.

Chung (2015) stressed that sex workers' access to condoms in public health facilities was a common concern for sex workers. Health care workers were reportedly not keen on providing sex workers with condoms because they feel that they take large quantities thereby depriving other people of a reasonable share. Apart from that, sex workers complain that getting many condoms in the waiting area in sight of everyone makes them feel embarrassed and in their minds, they feel that it immediately makes one know that they are sex workers. It is apparent that the circumstances of sex workers are not conducive for them to access services at the public service since sex workers have a challenge with both health care workers and fellow patients.

STIs are a common ailment amongst the sex workers and as such, treatment-seeking behaviour becomes imperative. Given the nature of their work, sex workers naturally have many sexual partners, and this is further exacerbated by their failure to use condoms all the time and therefore suffer from recurring STIs. As a result, many sex workers reported that they stopped taking their antiretroviral (ARV) drugs and STI treatment because of the attitude of nurses at public facilities (Duby, Nkosi, Scheibe, Brown, & Bekker, 2018). Sex workers are quite sensitive to the treatment they receive from important service points as clinics. Anything that brings great discomfort may result in them shunning services as important as medical treatment. The subject of biometrics poses such a critical make or break scenario which needs careful handling to avoid the abandonment of services at Esselen Street Clinic.

Another deterrent to the uptake of health resources and services in the public health facilities has been the long and winding queues at the public health facilities (Scorgie et al., 2013). Sex workers have busy schedules and appointments with their clients that they do not want to disappoint. High clinic fees and inadequate transport to hospitals have also been cited as reasons for not going to clinics. The current public health service arrangements are a deterrent to sex workers access to health service. If the sex workers are going to access these health care services, tailor-made service for this population will have to be made so that sex workers go where they are comfortable to get services.

Bateman (2013) described Esselen Street Clinic as a sex worker-friendly clinic and was considered a best practice in South Africa that could also be replicated in other places. In addition, sex workers are more comfortable attending a sex worker-friendly clinic such as the Esselen Street Clinic, which is operated by an NGO. While literature seems quite unanimous in agreeing to the challenges that sex workers in light of accessing public health service, it appears that targeted NGO clinics have what it takes to serve a sex work population with health needs. Lazarus et al. (2012) support the view that sex workers do not want to have their identity known. That means when a sex worker attends a clinic, they generally do not want their identity to be known. This phenomenon concurs with the literature in that the stigma around sex work inhibits sex workers from making their identity known lest those close to them know about it.

Aveling, Cornish and Oldmeadow (2013) found that sex workers do not want to bring their identity document for registration into care. They use pseudonyms which change from place to place so that they cannot be followed by anyone or be linked to their identity. Getting cell phone numbers to trace defaulters has often been a difficult exercise with a considerable number of them claiming that they did not have a mobile phone. Even those numbers that are given, are incorrect because outreach workers complain that many of them they do not go through.

To avoid the shame and the unfair treatment that comes with a sex worker's identity, they tend to use pseudonyms or trade names and avoid using their real names (Aggleton, Parker, Attawell, Pulerwitz, & Brown, 2002). Jeffreys (2006, p. 114) confirms that "Street-based sex workers will move and change their practices to avoid the police. Most sex workers will use a pseudonym". It is quite clear that sex workers will not want to be identified by their real names (Ditmore, 2006, p. 434). Such a system is prone to abuse. One person may be having several patient files with different names and get pills under various accounts. For one person to access a service with different names in a short space of time creates problems for the monitoring and evaluation system by creating gibberish data.

2.3 Biometric Identification systems in HIV prevention programmes

A biometric characteristic is a "biological phenomenon's physical or behavioural characteristic that can be used in order to recognize the phenomenon" (Schatten, Baca & Cubrilo, 2009, p. 2). Phadke (2013, p. 1)defines biometric as an "objective measurement of a physical characteristic of an individual which, when captured in a database, can be used to verify the identity or check against other entries in the database". In human terms, biometric identifies a human being through one or more unique features that cannot be duplicated or altered by any other means.

Biometric identification takes different forms and types but the most common and convenient type is the fingerprint (Jain & Kumar, 2010). Woodword (2003) observes that biometrics are categorised into two sections; physical and behavioural. Physical features of the biometric entail, fingerprints, face, hand geometry, iris, retina, ear, DNA, skin reflection, lip motion, keystroke gait, thermograms, body order and speaker

recognition. Some other rare ones include footprint, brainwave pattern, handgrip, fingernail bed, sweat pores and vein patterns. Signature, gait and keystroke are types of behavioural of biometrics. Proponents of biometrics argue that permanence and distinctness are features that render biometrics more credible identification systems (Jain & Kumar, 2010).

Jain and Kumar (2010) argue that physiological characteristics such as fingerprints and retina are scarcely less objectionable than any other human biometric features. However, behavioural biometrics such as signature, gait and keystroke are deemed weak and may easily be subject to fraud. Perhaps most importantly, biometrics are also used for negative identification. This is when the same person is barred from registering in a system twice, which could be key in a monitoring and evaluation system. This is common in claims departments, which reduces fraudulent activities by ensuring that one person does not claim several times (Jain & Kumar, 2010).

Biometrics have increasingly become considered in place of other security features that have seemingly been precarious. One-time pin (OTP), passwords, personal identification number (PIN) may soon become defunct if the biometrics become a ubiquitous security feature (Das & Debbarma, 2011). Biometrics promise to be the solution to identification problems in many spheres. Accessing secured buildings is increasingly facilitated through fingerprint recognition because of its convenience and safety.

Fingerprint recognition is one of the most common types of biometric identification because of its idiosyncrasy and convenience as they occupy 49% of the biometric market (Sarma & Singh, 2010). For that reason, they are considered the longest existent and safest biometric method of identification to date (Jain & Kumar, 2010). Furthermore, fingerprints are made up of several complex ridges called the minutiae. "In addition to minutiae points, there are sweat pores and other details (referred to as extended or level 3 features) which can be acquired in high resolution (1000 ppi) fingerprint images" (Jain & Kumar, 2010, p. 3). In South Africa, many organisations make use of fingerprints and apart from companies, the Department of Home Affairs (DHA) and the South Africa Social Security Agency (SASSA) included (Breckenridge, 2005; Johan Coetzee, 2018; Maime, 2014; Van De Haar, Van Greunen, & Pottas, 2016).

There are several types of other biometric identifications. Facial features such as the nose, the lips and the eyes are used to ensure that one individual does not have multiple passports (Jain & Kumar, 2012). United Arab Emirates (UAE) uses iris as a biometric identification feature (Ratha & Govindaraju, 2008). Other rarely used biometric features are palm prints and the voice and these can be altered by palm injuries and damage of vocal cords (Jain & Kumar, 2012). The DNA is a biological feature that is present in every cell and often used in crime scene investigation and checking if certain people are related. While very effective, DNA is not always used because it is expensive and time-consuming to do the tests.

Jain and Kumar (2010) authenticated that the pattern of hand veins is a unique biometric feature that cannot be altered by surgical processes during certain age groups. These are stable over time and even identical twins cannot have the same vein patterns. While that is quite worth to note, it must be highlighted that vein patterns are only stable between 20 and 50 years and thereafter between to shrink due to old age. In addition to that, there are diseases that may alter the patterns of veins such as the tumours, diabetes and atherosclerosis (Jain & Kumar, 2010).

Jain and Ross (2015) contend that since September the 11th 2001, terrorist attack on the United States of America (USA), the need to rely on names, numbers and demographic information as security features has proved an unsafe security feature. To ensure the integrity of immigrants' identity, the Homeland Security of the USA introduced visa systems with fingerprint identification. Those entering the USA would furthermore have their fingerprints compared with those in the electronic visa to ensure that the same person who applied for the visa is the same one entering the USA.

Venkatraman and Delpachitra (2008) discovered that the banking industry has of late been facing serious challenges of identity theft and the attendant glut of fraudulent activities. It became imperative that stricter and more efficient ways of identifying clients be implemented. Venkatraman and Delpachitra (2008) further alluded that although there were fears of security in the biometrics, the system had thus far been able to deter a lot of possible fraud. Several banks in South Africa have also started using biometric

identification to counter increasing fraud. This development reduces the level of loses that the banks incur through fraudulent claims (Coetzee, 2018).

Biometrics have been used in several health programmes. The Health Insurance Portability and Accountability Act (HIPAA) has mandated in 2014 that all American patient records be biometric to enhance the security of medical records. Zuniga et al. (2010) found out that the system made it easy to see where else the patient has accessed medical services without querying the authenticity of such a transaction. Proponents of using biometrics in health care cite its advantages over paper-based systems as authentic. Inherent in this system, is that that biometric features cannot be shared, stolen or even replicated (Venkatraman & Delpachitra, 2008). Moreover, patient confidentiality breaches and other fraudulent activities will be minimised when a biometric system is employed.

Modern companies have started using biometrics for various advantages that they present. Biometrics are used in validating time and attendance in workplaces (Pedro, Villaroman, Clerigo, Hipos, & Bacani, 2018). This has the advantage of preventing employees from falsifying their attendance at workplaces. Biometrics also reduce the administrative paperwork and minimise employees erroneously completing their timesheet. Biometrics are also used in access control for buildings in both residential and workplace settings across various rooms and buildings (Stefani & Ferrari, 2017). Lately, smartphones have increased the use of biometrics for identification by general users (Mahfouz, Mahmoud, & Eldin, 2017). The recent proliferation of the use of biometrics is likely to add weight to the acceptability of the biometrics. When sex workers use biometrics in so many other places, it makes it easy to accept the biometrics in the clinic.

Serwaa-Bonsu et al. (2010) revealed that the biometric identification system enables a more comprehensive recording and tracking of evaluation data. A study was conducted in India on the use of the biometric system in the sex worker programmes. Paik et al. (2010) showed that the biometric system did not dissuade sex workers from attending their regular medical check-ups when it had replaced the paper-based system. However, in India, sex work is not criminalised, and the levels of stigma and discrimination may not necessarily be equated to South Africa. It is therefore, the sole aim of this study to

assess the acceptability of the biometric identification system within the South African context.

2.4 Methods, data, findings, and conclusions studies and evaluations of corrective policies

Biometric identification is an emerging technology that is increasingly becoming common in financial security, immigration, company security and even health sectors of the economy (Venkatraman & Delpachitra, 2008; Zuniga, Win, & Susilo, 2010). Past and present researches on biometrics, as used in HIV prevention for sex workers in South Africa are limited, therefore this research will look at biometrics within the health care system in general, with the trend certainly changing.

In 2005, Yu, Chen, Chang, Juma and Chang (2005) conducted a study at Mzuzu Central Hospital in Malawi North of Malawi for antiretroviral therapy (ART) patients. The study undertook to see the benefits brought about by replacing the paper-based system with the biometric system. The fingerprint identification was seen as a solution to identification problems, fraud and impostors in a country without a social security number (Yu et al., 2005). Thus, it becomes apparent that biometrics can solve the problem of unique identifiers in social programmes where there are tendencies of individuals to having multiple accounts.

Biometrics are a proven innovative and secure way that is being used in several institutions across the world (Pagnin & Mitrokotsa, 2017). Von Seidlein et al. (2007) demonstrated in their study the efficacy of using biometric technology in a randomised control trials (RCT) in Vietnam. For a study as important as RTC, in which evidence could potentially be used to make a public and health policy change, safety, storage and confidentiality of participants' data need to be guaranteed, biometrics prove vital. Using biometric identification over paper-based identification tools which are subject to loss, wear, tear and damage through use, is beneficial. Biometrics can be even more secure, where cloud-based solutions are applied so that when computers are stolen, there is back up for the identification of client data (Ansar et al., 2018). Given the advantages that the biometrics present, the HHP could securely keep confidential data in an electronic form.

The study illustrated that biometrics were an efficient way to keep the record of a mobile population which was prone to losing documents while in transit (Von Seidlein et al., 2007). Weibel et al. (2008) buttressed the same in their findings in a study of nomadic pastoralists in Chad over a two-year study. Added advantages that were demonstrated were the speed at which one could be identified as the machine only took a minimum of six seconds to pick up the details of the participant in the study. Von Seidlein et al. (2007) aptly validated the fact that biometrics could present several advantages in keeping the records of sex workers programme for HHP.

The nomadic nature of sex workers is demonstrated beyond any doubt by several studies (Grasso et al., 2018; Konstant, Rangasami, Stacey, Stewart, & Nogoduka, 2015; Sinha, 2017). Moreover, the sex workers complain that the public health clinics take much of their time which they could use to make money (Fobosi et al., 2017; Mtetwa, Busza, Chidiya, Mungofa, & Cowan, 2013; Ochako, Okal, Kimetu, Askew, & Temmerman, 2018). Biometrics present advantages to both HHP and the programme beneficiaries who are sex workers. The quicker processing of records works to the advantages of both parties and this might be used as leverage for advocating for this technology. Sex workers will spend less time at the clinic because of a quicker identification system.

Apart from just presenting the advantages of giving unique identifiers, biometrics have additional benefits of saving time and solving the problem that comes with highly mobile populations which include sex workers. Highly mobile populations easily lose their clinic appointment cards which have the patient file number which is used by booking clerks at the clinic. Furthermore, the benefit of identifying an individual with biometrics is that it reduces administrative costs and time spent on identifying some who have lost their records. HHP sex workers are also comprised of foreign nationals who do not have South African identity documents. The biometrics will make it convenient when their passports expire or when sex workers lose their documents. Renewing lost identity documents will not cost any sex worker a missed visit. Therefore, biometrics have the potential to improve HIV treatment outcomes within sex worker programmes.

The findings of Duby et al. (2018) prove that sex workers are concerned about the security of their identity when accessing any social programme services, particularly health. Von Seidlein et al. (2007) illustrated the gains that biometrics can bring to the monitoring and evaluation of HIV prevention programme for sex workers. However, it must be highlighted that the acceptance of such systems by sex workers depends on sex workers' proper understanding of the security of such a system and trusting relations with the institutions involved. Allaying the sex workers' fear of confidentiality breach and instilling confidence in the security of the system is the first step before anyone can embark on bringing such a system to sex workers.

In a study in the USA, the investigators assessed the acceptability of biometrics amongst people seeking HIV and STI related sickness amongst the men having sex with men (MSM) and the transgender population in Los Angeles. This study was aimed at trying to curb the problems of misidentification, double counting and increase the security of the system. Cohen, Flynn, Bolan and Klausner (2012) used a cross-sectional study aimed at getting the insights of the target population. This target population was made up of patients of the Jeffery Goodman Special Care Medical Clinic. The study did a 10 question self-completed survey to a convenience sample. The key question was probing how likely the respondents were to utilise the biometric system using a 5-scale Likert scale. The results were captured on Microsoft Excel and analysed using STATA version 12.

Cohen et al. (2012) used 192 respondents and 41 of them responded that they were indifferent to the biometric and four were incomplete. The overall acceptability of the fingerprints was 72% (95% CI 63-80). In addition to that, the study did not observe any differences in the racial and ethnic subgroups that participated in the study. The study did not measure the actual use of the biometric but assessed the acceptability. Despite these findings, it could easily be argued that intention to use is not a predictor of actual usage.

Acceptability and feasibility of biometrics in sex workers HIV prevention programme in a limited resource setting have also been a question in Zambia (Wall et al., 2015). In limited-resource settings, the unique identification of sex workers is often impeded by; lack of national identification system given that some sex workers are foreign nationals,

inconsistent spelling names, uncertain date of birth, ever-changing cell phone numbers, missing street addresses and intentional avoidance of any identification procedures because of the stigma around sex work and HIV/AIDS.

The study combined mixed methods of focus group discussion and questionnaire to gather the data around the acceptability of biometrics (Wall et al., 2015). The study observed a 98% acceptance rate of biometric technology. Additionally, the qualitative methodology provided insight into some of the fears of sex workers. Lack of privacy and confidentiality issues were cited because the fingerprint readers would be brought into public places such as taverns, bars and shebeens and would be administered in the presence of the public which would make the public inquisitive as to what was going on. Likewise, the study noted that there was a false fingerprinting reading error would be curbed by reading two fingerprints from both hands.

It is evident from the study by Wall et al. (2015) that biometrics are acceptable if confidentiality concerns of sex workers are addressed. Concerns with one being unnecessarily exposed as a sex worker discourage the use of biometric in certain settings. This study critically highlights that the implementation of such systems ought to be underpinned by being responsive to the concerns of the sex workers first before they can be implemented. Biometrics have smaller probabilities of misidentification which can be solved by using more than a single finger.

White et al. (2018) did an assessment of the feasibility and acceptability of fingerprint in TB contacts in Kampala, Uganda. The study used digital fingerprinting of index patients and contacts to allow for follow up visits. Secondly, community health care workers collected qualitative data from the interviews. The study found that while biometrics was a novel idea that could potentially solve the identification challenges in Africa, there were problems fraught with implementing such systems. The biometrics system had a 74.2% success fingerprint scan during all the household visit (White et al., 2018). Of the unsuccessful scans, 60.3% were due to software problems, while 36.3% were hardware problems and 3.3% remained unclassified. It is clear that biometrics have the potential to solve identification challenges, but they are as good as they are programmed. Noting the successes of the biometrics in other programmes (Serwaa-Bonsu et al., 2010; Von

Seidlein et al., 2007; Wall et al., 2015; Weibel et al., 2008), one needs to be thorough in testing systems before impending lest they frustrate the users.

2.5 Identifying and discussing the academic field of study encompassing the research

This study falls in the monitoring and evaluation broader field. While monitoring refers to a constant assessment of what will be happening in a programme, evaluation refers to a periodic assessment of the overall programme attainments and a review to verify if the intended objectives have been achieved (Kusek & Rist, 2004). Data is an integral component of monitoring and evaluation because it is the instrument that informs whether an objective has been achieved, as it measures the performance (Holland & Ruedin, 2012). This study is looking at ways in which data quality can be enhanced by reducing duplicates within a system thereby improving data integrity.

In HIV prevention programmes, biometrics are an efficient way of maintaining an accurate patient database (Paik et al., 2010; Yu et al., 2005). Although other benefits such as minimising fraud and reducing patient misidentification are realised, accurate data remains a major attainment in the monitoring and evaluation system. While noting that Serwaa-Bonsu et al. (2010) highlighted that South Africa had a high acceptance rate of the biometric in the general population because SASSA and DHA use them; some NGOs have already been using them to link services between different service points.

Inpatient care, it is important to uniquely identify a patient so that there is no mix up of records. Over and above that, unique identifiers ensure a continuum of care and prevent treatment errors such as administering the wrong drugs to a patient (White et al., 2018). (Beck et al., 2018) underlined that unique identifiers help in linking the patient to various services and make disaggregation and data analysis easy for monitoring and evaluation. In clinical trials and other researches, biometrics preserve strict data integrity and prevent misclassification of data.

In limited resource settings, highly mobile communities and those with poor literacy rates have several barriers to unique identifiers by having inconsistent names, changing physical address, incorrect cell phone and telephone numbers (White et al., 2018). This problem is worse in populations that have a stigma attached to them because

programme beneficiaries have problems in identifying themselves because of fear of being known. This ties in with the fact that sex workers are subjected to a lot of stigma and discrimination and therefore may not want to be identified. However, the benefits of biometrics when accepted are likely to improve the monitoring and evaluation systems by giving accurate data.

Monitoring and evaluation refers to the routine collection of data in order to ensure that the programme is on track to meet its set out objectives (Rossi, Freeman, & Lipsey, 1999). Part of reporting includes frequent reporting so that the data is used to align the operations to the targets and programme direction (Karani, 2014). Curry (2018) defines evaluation as an assessment of the programme at a certain phase: implementation, midway or completion to see if it has achieved its intended objective.

Data integrity is a key tenant that underpins the monitoring and evaluation and evaluation system. It refers to the extent to which the data is true (Levin, 2017). Unique identities play a pivotal role in data integrity of data in various systems, including monitoring and evaluation (Madsen, Madsen, & Gauffriau, 2016). Unique identification of patients helps identify an individual once and contributes to the accuracy of reporting (Watson-Grant, Xiong, & Thomas, 2017). HHP's monitoring and evaluation system has been challenged by double counting of sex workers names thereby compromising data integrity. This study promises to contribute to the improvement of HHP's data quality.

Sex workers are prone to drug abuse because of the conditions under which they work (Jeal et al., 2018; Strathdee et al., 2015) and literature also shows that they use drugs in order to work without feeling ashamed (Wechsberg et al., 2009). In South Africa, there is a concoction of ARVs and marijuana that makes a strong substance called *whoonga* or *nyaope* (Grelotti et al., 2014; Rough et al., 2014; Thomas & Velaphi, 2014). Having that background, there is room to suggest the possibility of sex workers using ART for mind-altering substances, other than for the purpose for which it is intended. There is a motivation for sex workers to have many accounts with an HIV clinic to get as many dosages of ARVs as possible to obtain these drugs, thereby giving monitoring and evaluation false numbers. This risk makes a strong argument that for the purposes of monitoring and evaluation, biometrics be installed. A study by Yu et al. (2005) in Malawi

showed that using biometrics reduced double counting as patients were having more than one account for ARVs.

Biometrics are now a common technology in several parts of the world. Financial institutions, health institutions, government institutions, mobile devices, building access control are some recent users of this technology. Despite its advantages, the sex workers in Hillbrow have experienced previous harassment at the hands of public health officials as well as the police who take fingerprints of suspects for prosecution. It remains to be seen at this point if the sex workers will accept the biometrics.

3 RESEARCH METHODOLOGY

3.1 Research strategy

A research strategy is a plan of action and a general orientation for a research study (Bairagi & Munot, 2019). Through it, one is able to know how to proceed with data collection and choose data collection methods to adapt to have a credible research report. A research strategy is a road map that outlines the direction of the research for planning purposes and resource mobilisation towards the completion of the research.

Mixed methods combine both quantitative and qualitative methods in a single study (Creswell, 2014). Additionally, data is collected concurrently and sequentially so as to get the data for the same time for both methods for comparison purposes. Mixed methods also refer to the use of different methods which could typically be both quantitative or qualitative such as interviews and observations (Williamson, 2018). The benefits of mixed methods are that there is a triangulation of data and validity of the results that come through the use of different methods (Wagner, Kawulich, & Garner, 2012). Biases and risks that come with using one method are mitigated through the use of more than one methodology. When two divergent methods confirm the same thing, it makes the findings more robust and credible, thereby buttressing the reliability of the results.

This study made use of a mixed-method research design to find out the acceptability of biometrics by the sex workers. A combination of qualitative and quantitative methodology was used to answer the research questions of the study. The data collection methods consisted of a questionnaire that was given to 120 sex workers, a focus group discussion and in-depth interviews done with three Esselen staff members.

3.2 Applied research design

Research design refers to the plan of action, which the study must follow (Wagner et al., 2012). Babbie (2015) seems more explicit as he refers to a research design as the outline of all the steps that are involved in the research from the moment one generates an idea up until results are reported. However, Bryman (2012) views a research design as a framework for generating scientific evidence. In short, a research design refers to a number of templates that one can utilise in research. This study made use of a case

study while gathering data at a particular time-frame in terms of a population of sex workers in the HHP.

Babbie (2012) defines a case study as an "in-depth examination of a single instance of some social phenomenon". Bryman (2012) concluded that a case study refers to an intensive analysis of a single case. Zooming in on a single case allows for intensity, depth, thorough rigor, which enables a robust understanding of the causal relationships in the phenomenon observed. This study focused on the Hillbrow sex workers attending the Esselen Street Clinic in order to find out how they felt if biometrics were introduced at the Esselen Street Clinic. The study explored the acceptability of biometrics amongst sex workers considering the context of stigma, prejudice, fears, HIV prevalence, criminalisation of sex work, migrant sex workers, at a targeted sex workers' clinic.

3.3 Research procedure and methods

3.3.1 Research data collection instrument

Primary research data come from two sources; target population or the researcher observes the target population (Dawson, 2014). An interview refers to the interaction between a researcher and a participant, in which the latter responds to the former (Wagner & Kawulich, 2012). In this study, the researcher collected data using a questionnaire and a focus group discussion with the sex workers as well as interviews with staff members.

In their study on the acceptability of biometrics in the people living with HIV/AIDS, Cohen et al. (2012) made use of the questionnaire. In Thailand, a survey was done on the sexual reproductive health of sex workers and the data collection instrument used was a questionnaire (Guest, Prohmmo, Bryant, Janyam, & Phuengsamran, 2007). Lastly, the sex workers' experience of violence at the hands of their clients was investigated while using questionnaires in different British cities (Church, Henderson, Barnard, & Hart, 2001).

Falling under the ambits of qualitative methodology, focus groups discussions refer to a group of people between five and twelve discussing a particular matter (Wagner &

Kawulich, 2012). This research used a focus group comprising of six members to ensure that the few that attended contributed to the depth of the discussion. The group discussion is led by a facilitator and is aimed at investigating emerging themes and concepts (Rossi et al., 1999). In the case of this research, the researcher moderated the focus group session, based on the analysis of the quantitative data. The sample was drawn from people that had been interviewed to complete the quantitative survey instrument.

There are times when the focus groups have been used to complement the findings of the questionnaire (Bairagi & Munot, 2019). A focus group discussion can illuminate a quantitative method by exploring further, what the numbers have shown (Archibald, Radil, Zhang, & Hanson, 2015). There are also benefits of triangulation accrued to using divergent traditional schools of quantitative and qualitative methodology such as validation of the reliability of the results. The addition of a focus group to a quantitative study adds consolidation to the findings and supplements the results (Chor et al., 2009). The researcher was the moderator for the focus group, which consisted of six sex workers.

In a study on teenagers in Zimbabwe, the study used a questionnaire and buttressed its findings with a focus group to consolidate its findings (Gregson et al., 2002). Bentley et al. (2004) used a quantitative methodology in assessing the acceptability of micro-biocides in Malawi, Zimbabwe, Thailand and India and yet supported the findings with the focus group. Lastly, in assessing the sexual behaviour of lesbians and bisexual women in England, quantitative methods were employed and supported by a focus group discussion (Bailey, Farquhar, Owen, & Whittaker, 2003).

The researcher administered 120 questionnaires through the HHP peer educators to save time and facilitate easier administration of the paperwork. The involvement of peer educators enhanced levels of participation because the sex workers were already familiar with the peer educators and were a gateway into accessing the sex worker community. The researcher had to train the peer educators on how to give out the questionnaires. The training covered broadly what the questionnaire was about, who the principal investigator was and which institute the researcher was from. The peer educators were also trained on ensuring completeness of the questionnaires. Lastly, they were trained on how to negotiate with sex workers to participate in the questionnaires without any

compensation. However, in the focus group discussions, the researcher moderated it himself and then transcribed it immediately after the discussions.

3.3.2 Research target population and sampling respondents

Empirical evidence shows that convenience sampling has been used in other studies involving sex workers. In China, convenience sampling was used in determining the prevalence of sexually transmitted infections amongst sex workers (Chen et al., 2005). In Senegal, the prevalence of HIV amongst sex workers was also investigated by way of convenience sampling of sex workers (Wang et al., 2007). Lastly, in another study, the prevalence of condom usage was investigated and the participants in the research were chosen by convenience sampling method (Lau et al., 2007). As a result, convenience samples are an appropriate sampling method for sex workers in the HHP.

Social programmes have certain individuals or communities that are beneficiaries in certain interventions. In every social programme, there are intended recipients and beneficiaries that are called a target population. A target population refers to a unit or community at which an intervention is implemented (Bell, Bryman & Harley, 2018). Wagner et al. (2012) highlighted that a target population has a list of all subjects of the research. In this research, the target population is made up of the sex workers operating in Hillbrow and attending the HHP.

A sample is a subset of the entire population that acts as respondents (Bell, Bryman & Harley, 2018). A target population is usually too large to consider for data collection and so a representative proportion or a sample is often considered (Wagner et al., 2012).

Sampling is a selection of respondents from the target population that will be considered as a source of information (Neuman, 2014). Better still, a sample is a part of the population that will be considered for research (Bryman, 2012). In quantitative methodology, there are five sampling methods, which are simple random sampling, systematic sampling, stratified sampling, cluster sampling and multistage sampling (Rao, 2017). This study did not commit to the list above but used a convenience random sampling method. The sex worker community is one that is hard to penetrate because the population is a hidden one due to socio contextual issues such as stigma,

discrimination and criminalisation of sex work (Magnani, Sabin, Saidel, & Heckathorn, 2005; Weitzer, 2018).. In such cases, convenience sampling is often used.

In Pascom, Szwarcwald and Barbosa Júnior (2010) convenience sampling is used in a quantitative research methodology to estimate the prevalence of STI and HIV in the sex workers in Brazil. A research was done in China amongst sex workers to investigate the condom usage and convenience sampling was employed (Chen et al., 2014). Michael (2009) conducted an investigation delving into the variations on HIV prevalence by industry. He too used a convenience sample for a quantitative methodology. This research applied convenience sampling by administering the questionnaires to whoever was available and willing to participate at that time.

The researcher administered 120 questionnaires and the focus group discussion to the Hillbrow sex workers that were receiving clinical services at the Esselen Street Clinic. A sample of 120 questionnaires was based on the available peer educators as well what could reasonably be achieved in the timeline. These sex workers operate in hotels, brothels, shebeens and the streets (Stadler & Dugmore, 2017). These sex workers originate from different provinces of South Africa as well as from neighbouring countries (Nyangairi, 2010).

The peer educators are dispatched on a daily basis to the HTAs where sex workers operate to educate sex workers about Esselen Streer Clinic services as well as distribute the HIV prevention commodities. The peer educators then invited sex workers to participate in the questionnaires during their visits to the brothels, shebeens and streets. The peer educators did a group explanation to those who had expressed willingness to participate in the questionnaire. The peer educators also helped individuals who experienced problems in completing the questionnaire. A peer educator team leader collected all questionnaires from all peer educators and handed over the questionnaires to the researcher.

The focus group discussion was held at the Ambassador Hotel in Hillbrow, which is a sex worker establishment. The researcher visited the hotel in the company of the peer educator and first met with the security who was known to the peer educator. The security referred both the researcher and peer educator to the aunt who managed the

establishment. The aunt and the peer educator when through the rooms and managed to get six sex workers for the focus group discussion. The aunt opened the bar space since it was in the morning and the bar was still closed at the time.

The researcher introduced himself to the sex workers and discussed the purpose of the focus group discussion. The researcher informed the discussants about consenting and their rights to withdraw from the discussions. After consenting to the discussion the researcher started the discussion and it was recorded on a recorder. The researcher would ask a question and allow the sex workers to discuss it sufficiently as to enable to answer the research question. Where necessary, the researcher would probe for more in order to get to the depth of the matters rising as they would give weight to research. The discussion was then wrapped up and the concluded.

3.3.3 Research ethical considerations used

It is important that any study conducted adheres to ethical standards. Ethical research ensures that the welfare, dignity and safety of the participants are preserved during and after the study (Walliman, 2019). Researchers ought to comply with legal and ethical considerations lest the researcher faces a raft of litigations in the aftermath of the research (Neuman, 2014). A fundamental ethical maxim in research is to do well and not to cause any harm to any of the research participants (Green & Thorogood, 2018). Bryman (2012) summarises good ethics as harmless moral principles which have informed consent, which have no invasion of privacy and have no thread of deception at all.

The researcher gave all participants the questionnaire and focus group discussion participant letters and information sheets which had the university contacts and contacts for counselling organisation should one need it. On top of that, the researcher ensured that the data collection methods employed did not emotional harm any participant during and after the data collection process. To do this, the researcher had to forewarn the participants before the discussion that issues of experiences police and Esslen Street Clinic services would be discussed and that if anyone had a traumatic experience that they did not want to relive were free to live and no one left. The researcher also monitored body movements while discussions were going on going on to identify any potential discomfort. Lastly, the respondents signed an informed consent form and the

researcher ensured that the identity of the respondents was protected during the collection and even after this research, the report has been finalised. All personally identifiable information was removed from the data questionnaires and all transcribed materials to protect the identity of the research participants.

This study focussed on a vulnerable population that engages in a criminalised practice and the researcher was aware of the possibilities of having underage sex workers in the prospective target population. The researcher ensured that the recipients in the data collection were above the age of 18, which is the legal age of consent in current South African law (Government of South Africa, 1996). To guard against infringing ethical standards, the researcher included a prerequisite to the questionnaire as participants older than or 18 years. This study was duly cleared by the WITS Ethics Committee on 17 February 2017 and the clearance letter is attached in Appendix 13.

3.3.4 Research data collection and storage

The data collected from the questionnaires was scanned to ensure the dual storage of the data in the hard drive and in Dropbox. The researcher also ensured that no names, addresses or correspondence where stored to safeguard the confidentiality of the participants. The researcher could not guarantee anonymity because he met the sex workers in person and could only guarantee to keep the confidentiality of the data collected. The researcher was aware of the nature of the research that it could evoke some previous traumatic experiences and a referral was made to for counselling by Sex Workers Education and Advocacy Taskforce (SWEAT) after each interview. The referral form and information sheet are annexed under Appendix 10 and Appendix 11 respectively. For the focus group discussions, the researcher stored the voice recorder in a locker to prevent loss through theft. Soon after the focus group discussion, the researcher transcribed the focus group discussion to minimise data loss due to loss of the gadget and even forgetfulness.

3.3.5 How research data was processed and analysed

The research data was captured from the questionnaires onto an excel spreadsheet. The excel spreadsheet was exported into Statistical Package for the Social Science (SPSS) for analysis. The researcher bolstered the findings of the questionnaires with a focus group discussion. The discussion was recorded with an audio recorder, immediately

transcribed and coded soon after. The researcher identified the emerging themes that pointed to the perceptions of the sex workers towards biometrics. The themes expressed in terms of fears, confidence, faith expressed in word during the focus group were put together to find the general feeling of sex workers to biometrics and then used to give the power of quantitative methodology.

Interestingly, the results yielded something that was unexpected. More than half of the sex workers that participated in the questionnaire accepted the biometrics, particularly at Esselen Street Clinic. This prompted the researcher to dig deeper into such an observation and for this to happen, further interviews with three staff members had to be done. In the one on one interviews, the researcher interviewed the staff members who were key in interacting with the sex workers. The interviews were also recorded in the same way as the focus group discussion and then transcribed and coded.

3.4 Research reliability and validity measures applied

Reliability refers to the extent to which results are free from error and yield consistent results even if repeated by different researchers or if different methods are used (Williamson, 2018). Williamson (2018) maintains that for results to be deemed reliable, they must remain consistent even after repetitions. This research has a mixture of both quantitative and qualitative methods, which minimises the risks of the bias of a single method. Moreover, the interviews of the Esselen Street Clinic employees would further reinforce the validity and the reliability of the results of the study.

While this study falls under the quantitative research methodology, the research confirmed the findings of the questionnaires with focus group discussion. This was to get in writing, the expressed feelings of the sex workers in their own words as well as the view of the employees at Esselen Street Clinic. The thoughts, the fears and the anxiety of the sex workers when expressed in discussion reveal the validity of the findings of the questionnaires. Data triangulation informed the researcher of the extent to which the data was reliable.

Validity refers to the degree to which a research measures that which it was intended to measure (Bell, Bryman & Harley, 2018). This study will ensure that the questions, the themes and the notions that run through this study from research objectives to the data

collection tools to ensure validity. Alignment of the research purpose, questions, literature review to the data collection tools ensures that the research is measuring what it must measure.

3.5 Research limitations identified

3.5.1 Technical limitations

This research measured the perceptions to ascertain the acceptability. However, it must be highlighted that perceptions themselves are not measures of the intentions (Cohen et al., 2012). It is possible that those perceptions towards the biometric system and the actual usage of the system when it has been implemented are very different things. This research is limited in its scope due to its failure to address actual use.

Secondly being a case study makes it difficult to generalise the results of this study to the entire sex worker population. This study looks at the sex workers in Hillbrow's Esselen Street Clinic at a particular point in time. This means that the results of this study cannot in any way be generalised to sex workers in other parts of the world. The study is also utilising a convenience sampling method and therefore the results cannot be generalised to the entire sex worker population. On top of that, the convenience sample was not representative because of the nature of the target population.

Lastly, another limitation of this study is that it focuses on the acceptability of biometrics in a clinic that is designed to provide targeted services to sex workers. This clinic is run by an NGO, which has a different mode of operation from the public clinics. The extraordinary efforts and steps made by the clinic to ensure that sex workers fully embrace the HIV prevention packages are not offered in public health institutions. Therefore, the sex workers interviewed in this study only looked at the biometrics from the Esselen Street Clinic's perspective only. This means that the results of this study cannot be generalised to the entire sex worker population, particularly those attending public clinics.

3.5.2 Administrative limitations

The sex worker population is a hard community to penetrate because of the perceptions and the general environment that surrounds it. Continual harassment at the hands of the

police, clients and the public has created a mistrust of sex workers to anyone who approaches them. The sex worker community is a hidden population with times of working and sleeping that are outside the researcher's normal working hours. The researcher had to work with the gatekeepers to find convenient times for collecting the data. Lastly, sex workers are always on the look for clients and finding time for completing the questionnaires was a challenge. Collecting data took a bit longer than expected due to the factors mentioned above.

This study used a mixed-method approach to combine the power of both words and numbers. Furthermore, triangulation of the two divergent quantitative and qualitative methods ensured the validity and reliability of the results. The researcher obtained an ethical clearance to ensure the safety of the respondents. Lastly, a focus group of six sex workers and 120 questionnaires were administered in this study and the results are presented in the next chapter.

4 PRESENTATION OF FINDINGS

4.1 Demographic profile

4.1.1 Race profile

The data from the questionnaires was collected from 120 sex workers who had been attending the Esselen Street Clinic for more than two weeks. Although it is reported that there are some male sex workers attending at Esselen Street Clinic, the 120 participants were all females. Two of the respondents were coloureds and the rest (118) were blacks.

4.1.2 Country of origin

Figure 1 below shows that 60% of the participants were South Africans while 35% were not from South Africa. 5% of the respondents chose not to disclose their origins. The significant number of foreigners in this study poses an important question as to whether they respond differently from South African ones.

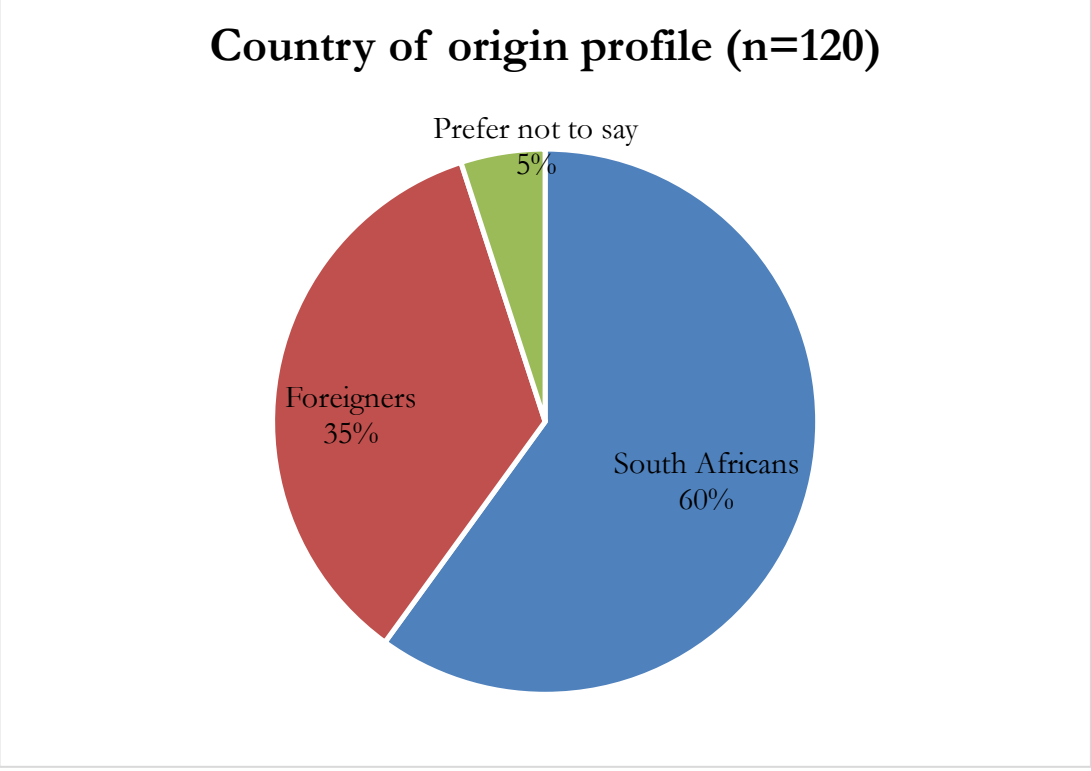

Figure 1 Country of Origin

4.1.3 Age categories

The average age of the respondents was 32. The oldest respondent was aged 53 and the youngest was 18 years old. Meanwhile, 30% of the respondents were between the ages of 25 and 30, which was the most represented age category, followed by those between the ages of 31 and 35 which had 27%.

4.2 General questions

In terms of trusting the clinical staff, 82% of the sex workers showed that they had faith in their caregivers at Esselen Street Clinic. This translates to the understanding that sex workers might take the caregivers at their word. Interestingly, 52% of the sex workers had given identity documents to the clinic while 55% had used real names. This response shows that slightly less than half of the sex workers are not keen to be known who they are at the clinic.

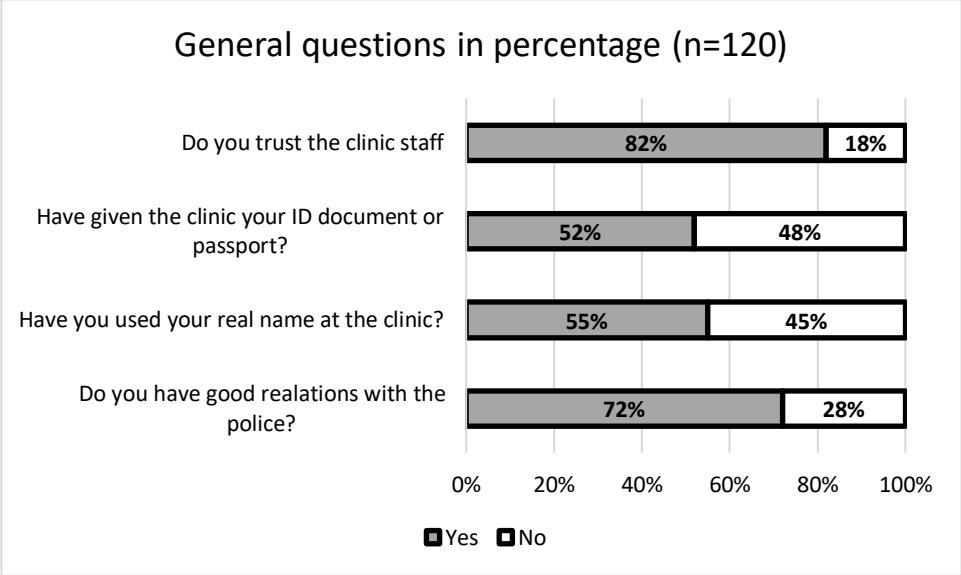

Figure 2 Response to the general questions

4.3 Research question 1

4.3.1 What do sex workers think when their fingerprints are put in a computer system?

Based on the focus group discussion, it came out that the change to bring about the biometrics was initially received with suspicion and many questions where posed which showed that the sex workers would want to know upfront the reason for such a development.

> Why do you want our fingerprints now when we have been working well with them? Why now? I want to know why the change is coming now when we were taking our medications there all along (Respondent 4 August 2017)

At the foremost, one would think that an explanation is needed to properly detail the rationale of biometrics in terms of the benefits that they bring et cetera. It is clear that their fears are attached to some risks that are posed by biometric technology.

> What if I decide to leave this work that I am doing now (sex work) and I want a real job? (Respondent 2 August 2017)

There are fears that biometrics may be detrimental to sex workers' future job prospects. There is something about the biometrics and prospective employment companies that is in the mind of the sex workers, which in their mind, may prevent them from being employed. From the responses of the sex workers, it is implicit that some sex workers are not going to be practising sex work for their entire lives and that that they fear that the biometrics could close their exit doors from sex work. The sex workers thought that biometric registration at Esselen Street Clinic would result in future prospective employers retrieving the data from somewhere that they were once sex workers and refusing them employment on the grounds of having practised sex work.

> What if they use my ID and link to those fingerprints to check information on me and they see I was a sex worker? I think they are going to refuse to give me the job if they know that I was once a sex worker (Respondent 3 August 2017)

> Some companies may check in their computers about you and may find out that you were at Esselen Street Clinic as a sex worker and you will remain a sex worker forever. Me, I want to quit this work, so I don't think I can give them my fingerprints (Respondent 4 August 2017)

> Yooooooo. No one will hire a sex worker (Respondent 5 August 2017)

There is a feeling that using biometrics will expose them that they once practised sex work during an employee background check. Sex workers feel that prospective employees will refuse to employ them because they once practised sex work. The above expression from Respondent 5, reflects that stigma is also internalised in some sex workers simply because it shows that they themselves feel that sex workers should be treated differently. There is also the thinking that everyone knows about Esselen Street Clinic being a sex worker clinic. Moreover, some workers think computers are linked together somewhere and therefore there is a possibility of one searching on the computer and finding clinical records of someone attending a sex worker clinic.

The researcher asked the sex worker who had a biometric at Esselen Street Clinic what it felt like and this was her response;

> I felt that it was strange, like why did they need my fingerprints, I was already in a long queue and they were already registering me so I couldn't refuse. I had given them my ID and so they asked me of my fingerprints. I couldn't refuse that (Respondent 1 August 2017)

It must be acknowledged that the idea of biometrics in public health settings itself is uncommon and therefore in a population like sex workers who hide their identity it comes as no surprise that they perceive it as strange. Generally, people are used to the idea of paperwork that requires identity document at the hospital and as such, biometrics are seen as a strange development and one that is received with suspicion.

> Why would they want my fingerprints? Like we already have files and they give us cards (appointment cards) that we bring to the clinic and they call our names every time, why fingerprints now? (Respondent 6 August 2017)

There are questions about why a clinic would need fingerprints. This reveals a knowledge gap within sex workers about why a company needs fingerprints. The advantages presented by the fingerprints are wholly unknown to sex workers. In sex workers' view, biometrics are not necessary and therefore, a proper explanation will help in allaying these fears. The benefits of biometrics must be explained in detail to get a positive response.

On the other hand, some of the sex workers expressed that they enjoyed a good relationship with the clinic and if they trusted them to treat them, they could not fear biometrics.

> I think we are just afraid as ladies because fingerprints make you known. I see no reason why we can't give them. They give us medicine that we drink and to me, it does not make sense that we don't trust them with our fingerprints. I would give them because they are responsible for my life (Respondent 4 August 2017)

Some of the fears are just for the unknown. Some sex workers would perhaps want to tread cautiously because they simply do not know the risk that comes with registering their fingerprints. Nevertheless, some expressed the idea that their fears are unjustified and overrated.

> I just want to be safe. I don't like giving my fingerprints, you may never know how these things end up (Respondent 2 August 2017)

> Who really cares about sex workers? I don't think there is anyone who wants sex workers' information I don't think so (Respondent 6 August 2017).

When the sex workers were asked if the clinic can ever give away the fingerprints, the responses below came out;

> I think they can only look for it if you are missing (Respondent 1 August 2017)

> I think if they want to arrest us they can come here (Ambassador Hotel) and to us all into the van. If I was a police officer, I wouldn't waste time going to the clinic and get fingerprints. I would come here (Ambassador Hotel) and go Summit Hotel, Diplomat (another hotel) Market Street and just arrest all ladies there (Respondent 3 August 2017)

From the analysis of the responses above, it comes out that the sex workers thought that police had many effective ways of rounding up the sex workers for arrest if they needed to, rather than use the long and difficult route of using biometric technology at the clinic. Clearly, while others fear arrests through the biometrics, some feel that there was no point in putting the biometric in order to arrest the sex workers when there were easier ways to do so.

Meanwhile, the questionnaires yielded the answers below on how they perceived the biometrics.

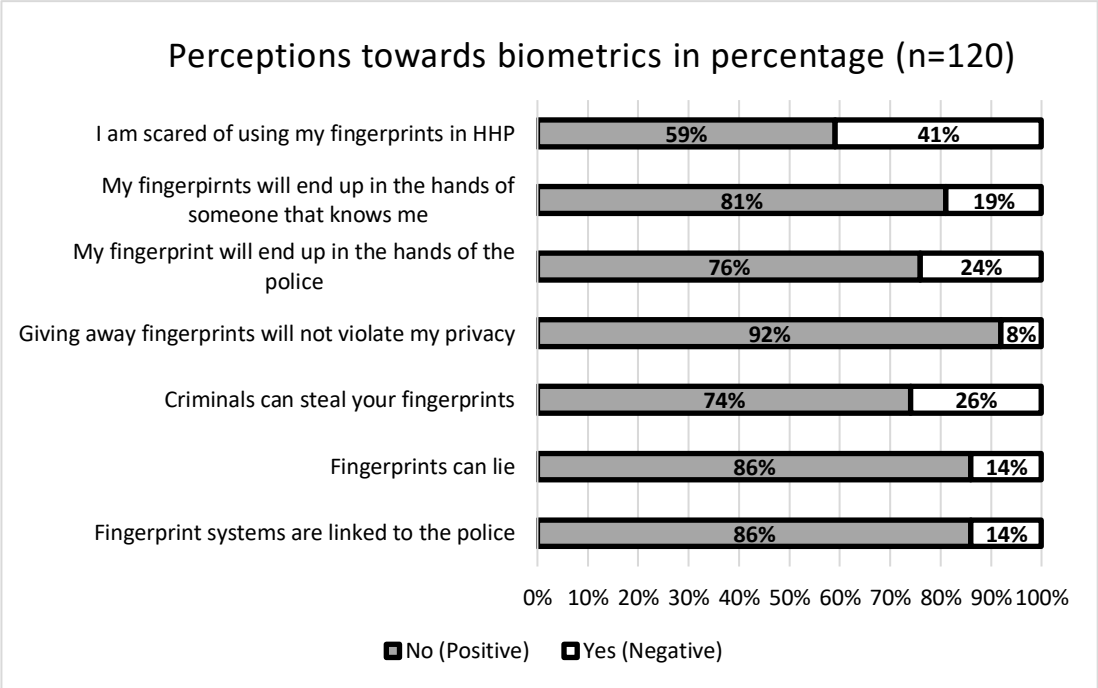

Figure 3 Perceptions towards biometrics

The study found that only 14% believed that the biometrics were linked to the police and the rest thought they were not. Besides that, 86% felt that fingerprints were not capable of lying. Also, 74% thought that criminals were unable to steal the fingerprints. 92% felt that should Esselen Street Clinic give anyone their fingerprints that would be a breach of privacy. 76% did not believe that the fingerprints would end up in the hands of the police while 81% felt that there was no way their fingerprint would end up in the hands of someone who knew them. Interestingly, 59% reported that they feared using fingerprint system at the clinic.

In summary, an average of 79% of the sex workers expressed positive perceptions towards the biometrics. It was apparent that there was nothing sinister about installing the biometrics at the Esselen Street Clinic where they had been accessing services. The discussion showed that although there was a generalised fear of the unknown, sex workers concurred that the biometrics were not linked to the police. They also agreed that Esselen Street Clinic would not volunteer the information to anyone who would want to harm or use the information to discredit the sex workers. 81% expressed that there was no chance that the biometrics would end up in the hands of someone who knew them.

4.4 Research question 2

4.4.1 Do sex workers accept biometrics if they are used as a gateway to accessing health services?

The research uncovered the fact that the relationship with the clinic is such that they cannot see the staff at Esselen Street Clinic turning the sex workers to the police. In their minds, Esselen Street Clinic is fighting the spread of the disease and they had no time to have the sex workers arrested. To do so was to defeat all the health talks and reverse all the gains they had achieved in the sex worker community.

> I really think that after talking to us about HIV and giving us condoms, they can't call the police to arrest us. Why? Plus, those police officers are also our customers (chuckles). They (Esselen Street Clinic Staff) can't talk of our good lives and have us arrested because they sometimes tell us about what to do when arrested and they sometimes come and talk to the police to let us out (Respondent 5 August 2017)

The relationship that the sex workers have built over the past years with Esselen Street Clinic makes the sex workers feel that there cannot be anything suspicious with the clinic installing the biometrics. Moreover, issues about sex worker's rights and confidentiality emerged as matters that give sex workers a level of confidence in using biometrics. Sex workers expressed for Essenel Street Clinic as a facility to give their details to the sex workers would be an uthunkable act they did not expect.

> I also don't think they will give anyone those fingerprints. Isn't it when we test (for HIV) they say its secret, so why give to someone when we did not agree. It's betraying us. We can also have them arrested (Respondent 1 August 2017)

As Bateman (2013) highlighted, sex workers get better treatment at health facilities that are run by NGOs as compared to public health ones. Targeted sex worker clinics offer the sex workers a better package of care which enhances their relationship. The level of commitment that the Esselen Street Clinic has put into this programme, precedes them. It is so much so, that even sex workers feel that the employees go above and beyond the call of duty. Therefore, it is unthinkable to the minds of sex workers how such gains can be reversed by breaching this level of trust.

> I have been there for the past 5 years and sex workers came and go and I have been there. I don't think they will do anything with those fingerprints. They want us, prostitutes, not to give other people diseases, so I think they will not betray us, plus imagine how they help us. They are with us at

midnight and sometimes you call them at night or on weekends and they come. I don't think they will do such a thing as giving someone our fingerprints (Respondent 1 August 2017)

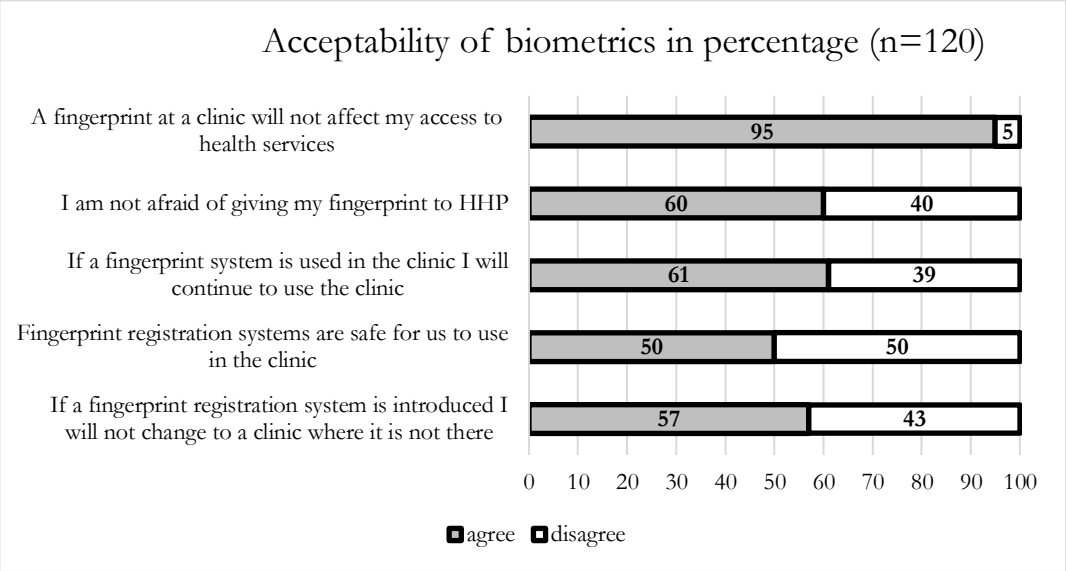

Figure 4 Acceptability of biometrics

4.4.1.1 If a fingerprint registration system is introduced I will not change to a clinic where it is not there

As Figure 4 shows, 57% of the sex workers responded that they would not change the clinics to where it is not. The problem has been shown in the focus group discussion that the public health facilities have judgemental health care workers. Although the fingerprints are not preferable, the sex workers would rather have biometrics at a facility where they feel respected than using paperwork where they are subjected to judgement and shame. The fears of stigma and discrimination at the public health facilities outweigh the uncertainty and confidentiality concerns of biometrics.

4.4.1.2 Fingerprint registration systems are safe for us to use in the clinic

50% of the sex workers felt that biometrics were safe for them to use at the clinic and while another 50% felt that it was not safe. It is apparent from the focus group discussion that sex workers have concerns as to why the fingerprints are needed at the clinic. At the same time, some felt that the dedication of Esselen Street Clinic to the welfare of the sex workers was evidence that they would not give the biometrics to other entities.

4.4.1.3 If a fingerprint system is used in the clinic I will continue to use the clinic

61% of the sex workers responded that they would continue to use the clinic even though a biometrics system was introduced. 35% responded that they would not use the clinic while 4 % were uncertain. Although 50% had said the biometrics were unsafe, if Esselen Street Clinic implemented these systems, those who had fears might end up taking up registering their fingerprints to get services.

4.4.1.4 I am not afraid of giving my fingerprint to HHP

60% of the sex worker expressed that they were not afraid of giving their fingerprints to the clinic. This ties in with the interviews of the employees which reinforces the reason why most of the sex workers have faith in the Esselen Street Clinic.

4.4.1.5 A fingerprint at a clinic will not affect my access to health services

95% of the workers responded that if biometrics were installed at the clinic, it would not affect their access to the health facilities.

The increased use of biometrics in the border control, access into buildings and smartphones could be in some way have helped shape the response of the sex workers. In the past, biometrics were usually associated with the police. But recent technological advancements have seen a growing use of biometrics in different spheres of industries including smartphones (Mahfouz et al., 2017). Without a doubt, a daily use of the smartphones' biometric (most commonly fingerprints) reading features gets the sex workers accustomed to fingerprint readers as a security feature than as a police-related aspect of technology.

4.5 Focus group discussion

The focus group discussion found that many sex workers had enjoyed the freedom of doing their work without much harassment except for one who had reported an incident of having been arrested by the police. All the sex workers that attended the focus group discussion were attending Esselen Street Clinic where they get the services

such as TB treatment, ART, contraceptives and any other ailments. The focus group was made up of both South African nationals as well as foreign nationals.

It came up during the interviews that at the clinic there had been presumed changes in the requirements of registering the sex workers in the clinic records. It also emerged that the administrators at the clinic asked for whatever document one has and if one declares to be undocumented they would take the word of mouth and register the sex workers based on what they say. It surfaced that sex workers were generally comfortable in giving their correct names to the administrators while some gave them false names.

One key issue that came up several times this focus group discussion was the trustful attitude of the sex workers towards Esselen Street Clinic. The sex workers trust the clinic staff and have high regard for the care that they get from the clinic. It came up several times that sex workers prefer attending Esselen Street Clinic simply because the nurses are not judgemental towards them as in other general clinics.

> I like attending Esselen because I am free to take as many condoms as I want. There, we are alone (as sex workers) at the clinic and no one looks at you with a talking eye (judgmental looks). If you go where there are many people (public clinic), you can't take many condoms (Respondent 5 August 2017).
>
> If I am busy that I can't attend the clinic I can Whatsapp Phindi (peer educator) to bring me condoms and lubs (lubricants) or to arrange the car (mobile clinic) to bring my pills at the night. For me, Esselen is the best (Respondent 3 August 2017)

The focus group discussion gleaned the fact that the sex workers were not keen to attend any other clinic except Esselen Street Clinic because of the quality of care. It emerged during the discussions that sex workers had a good relationship with Esselen Street Clinic staff members. It appears that even though the sex workers expressed fears over the risks that come with biometrics, they will accept the biometrics because of their long-standing history of good relations with the clinic.

Some sex workers also expressed that they had used the biometrics in other places other than just the Department of Home Affairs and SASSA.

> I have also used it at FNB (First National Bank) and every time I get inside the bank I put on my fingerprints inside the machine (sound of music at the

> background). I don't think the purpose of the fingerprints is to have anyone arrested (Respondent 1 August 2017)
>
> Me too (coughs). I have done that at the bank and also on my cell phone I use my fingerprints to open my cell phone. It's now fingerprints everywhere (Respondent 2 August 2017)

The responses above reveal that sex workers acknowledge that fingerprints are now a commonly used security feature in banks and on cell phones. This gives leverage to support the idea that biometrics are an acceptable form of identification.

The core issue of the biometrics was initially received with a lot of scepticism in the focus group discussion. It appears that sex workers have been exposed to paper-based systems all long. A change like that leads to questions on why a clinic would want to get fingerprints of sex workers. The findings of the focus group discussions confirmed what the numbers showed. The discussions showed that sex workers generally did not see the biometrics as threatening to their peace and safety when administrated by Esselen Street Clinic. This was explained by their level of confidence in the employees at Esselen Street Clinic. Moreover, the employees also explained the reasons for the sex workers' trust as being a tailored package of care for sex workers. The questionnaire showed that 79% of the sex workers had positive perceptions towards while 64.6% revealed that they accepted biometrics as a gateway to accepting services at Esselen Street Clinic.
The quantitative data revealed that a greater proportion of the sex workers accept the biometrics (64.6%) while the focus group showed the reason for that level of acceptance. In their responses, the sex workers said that they would use the biometrics simply because they trusted the staff at Esselen Street Clinic. Sex workers discussed that it would be improbable that there were hidden motives behind the biometrics installation at the clinic. In terms of their perceptions, most sex workers expressed a positive attitude towards biometrics (79%) although some had some fears. The results from the questionnaires and from the focus group discussion are correlated in showing that the greater proportion of the sex workers accepted the biometrics.

4.6 Staff member interviews

The staff interviews gave a better explanation of the findings of the results. The researcher asked the staff members about the kinds of services, behaviours and attitudes that have made sex workers trust in the Esselen Street Clinic staff members. The

interviews revealed that from the way the services are packaged, it would seem as if the staff members have given the sex workers convenient services.

> Good question there. We don't just offer a service; we offer a comprehensive tailor-made package. That means we look at the needs of sex workers and you find out that they don't like spending the whole day at the clinic, they are pressed for time so we have a day clinic and a night clinic so that those who work during the day can come clinic at night and those who work at night can come during the day (Employee Respondent 2 August 2017)

Offering convenient services for sex workers comes at a cost for the employees of the Esselen Street Clinic who must brave the dangers of the night that includes the risk of being assaulted, robbed or mugged in order to serve the sex workers. This level of sacrifice and commitment is translated by sex workers as a genuine commitment to the welfare of the sex workers. It has resulted in them trusting the employees of Esselen Street as having the sex workers at heart as an organisation.

Some sex workers had given their correct identification information and seemed readily willing to take on biometrics because their information including South African identity documents had been given to the clinic. The sex workers expressed confidence that their personal details were safe and secured in the hands Esseelen Street Clinic. One sex worker expressed that they had been a trial on the use of fingerprints in which she had registered using fingerprints and had agreed.

> I think I can leave my fingerprints at Esselen because I can also take my file with me if I want to leave the clinic. If we give them IDs, it's the same as giving them our fingerprints because they can know us. I don't think I will be doing this (sex work) forever. I think the day I leave the clinic I will fetch my file and it won't matter that my fingerprints were left there. (Respondent 5 August 2017)
>
> I think they keep confidentiality (Respondent 2 August 2017)
>
> I don't think they can tell anyone (Respondent 6 August 2017)
>
> I think they keep it there. But eish it's tricky but who do they give the information to. I don't think they can give anyone (Respondent 3 August 2017)

Although the sex workers had misgivings about biometrics and unsure about whether to use them or not, it appears that if there was no other option to use the clinic except through the biometrics, sex workers concluded that they would use the biometrics. Sex

workers were unanimous that if urged to use them, they would accept the biometric identification.

> If you really need a service, you will go to them and do the fingerprints. I think I will give them my fingerprints so that I get treated when I fall sick (Respondent 4 August 2017)
>
> I will give a fingerprint because I need to get treated (Respondent 6 August 2017)
>
> I would do the same (Respondent 3 August 2017)
>
> I will give them (Respondent 1 August 2017)
>
> I already gave them, so I can't answer that (laughing) (Respondent 5 August 2017)

Sex workers agreed that there was no connection between their clinic and the police, home affairs or any other business entity and their responses showed that there was none in their views. They referred to the fact that there had never neem prior arrests at the Esselen Street Clinic accrued to the fact they had clinical records of many sex workers. They further expressed huge doubts about the prospects of such a thing happening in the future.

> No. I don't think so, if there was a connection there would always be arrests at the clinic and we would all be arrested by now (Respondent 2 August 2017)
>
> No (Respondent 1 August 2017)
>
> There is no link with anyone. That's what I think (Respondent 3 August 2017)

The sex workers revealed that if biometrics were to be installed they would have nowhere to go but would take the risk of attending at the clinic because anywhere else (public health clinics) they will be judged and treated badly. The sex workers highlighted in their responses that there is no other clinic in their reach which is as good as the Esselen Street Clinic in terms of fair treatment. If anything, the sex workers have run away from the judgemental attitude of the clinicians at public health facilities.

> The nurse and the doctors (at public health facilities) will judge me and I can't say I am a sex worker and at the end of the day and I can't receive the medications that I want (Respondent 4 August 2017)

The staff interviews gave a different explanation to the findings of the results. The researcher asked the staff members about the kinds of services, behaviours and attitudes that have made sex workers trust in the Esselen Street Clinic staff members. As it emerged, the way the services are packaged, it would seem as if the staff members have given the sex workers a very comprehensive package of holistic services.

> We don't just offer a service; we offer a comprehensive tailor-made package. That means we look at the needs of sex workers and you find that they don't like spending the day at the clinic. They are pressed for time, so we have a day clinic and a night clinic so that those who work during the day can come to the clinic at night and those who work at night can come during the day (Employee Respondent 2 August 2017)

The Esselen Street Clinic has also gone just beyond mere clinical care to go as far as ensuring personal safety by involving the police to ensure that harassments and detentions cease because they interfere with HIV prevention. It leads to sex workers defaulting ART, thereby defeating the objective of the programme. Given their history with Esselen Street Clinic, it is beyond the comprehension of sex workers that after such a good effort in ensuring welfare of the sex workers that they can suddenly turn them over to the police to be arrested.The sex workers have no doubt whatsoever to the genuineness of the Esselen Street Clinic employees to meet their needs of safety and wellness.

> I really think that after talking to us about HIV and giving us condoms, they can't call the police to arrest us. Why? Plus, those police officers are also our customers (chuckles). They (Esselen Street Clinic Staff) can't talk of our good lives and have us arrested because they sometimes tell us about what to do when arrested and they sometimes come and talk to the police to let us out (Respondent 5 August 2017)

> We have established a relationship with the police and SWEAT who are playing the role of advocacy to have the ill-treatment and harassment of sex workers stopped. We used to visit the police cells and talk to the station commander after arrests and the dividends have now paid off. The last 3 years have seen the declining of arrests and complaints from sex workers. Our ladies can now work freely. It's only when they commit a crime or are found to be dealing with drugs that the police come in full force to look for the sex worker involved (Employee Respondent 3 August 2017)

Sex workers also get tailor-made services which help prevent HIV from their context and get commodities that they cannot get from the government health clinics. Most sex workers indicate that when they attend Esselen Street Clinic, they have public health facility at the back of their minds which do no meet their requirements. At Esselen

Street Clinic they get what they cannot get at any public health facility which makes it, a facility of their choice.

> Yes, they do get specialised service in the sense that in government all are equal, so they don't offer certain things like lubricants which prevent abrasions during sex (Employee Respondent 1 August 2017)
>
> They (public health facilities) limit the number of condoms that one gets, and they don't get "special treatment" which we give them (Employee Respondent 3 August 2017)

The clinic went out of their way, even to the extent of hiring a security guard to protect both the health care workers and the sex workers while the clinical services were being provided in Hillbrow.

> I think that we generally go out of our way so much. For example, if they get arrested at night I would go and talk to the police and involve organisations like SWEAT and Sonke Gender Justice to ensure that they get released. We even go to lengths of doing talks to them about self-defence and how to be safe, which they cannot get any else. At our mobile clinics at night, we try to ensure the safety of both our staff and sex workers by having a guard and I think that on its own is a statement that shows that we have good and quality services (Employee Respondent 2 August 2017)
>
> .

The clinic itself offers very time-sensitive services with an inbuilt mechanism designed to reduce the waiting time. Sex workers have been reportedly dissuaded from accessing the services at public services by long queues. The sex workers indicated that spending an hour at the clinic was something that viewed as an advantage of Esselen Street Clinic which encouraged health-seeking behaviour by sex workers.

> The Clinic is very fast (quick). If I go at 8, usually at 10 I am back. They are very quick unlike at Hellen Joseph (public health facility) where we spend the whole day and not make money. It's better if I go to the mobile clinic, if I queue at 6 (pm) I am usually done at 7 pm.

However, the clinic seems to have offered the sex workers that which they cannot get anywhere else. Such services have made a difference in the perceptions of sex workers towards biometrics at this particular clinic. The fact that sex workers do not have to queue for services is a key factor in this study to understand why biometrics were acceptable by sex workers.

> We give them services at their doorstep, some sex workers can't come to the clinic during the day because their manager wants them to come to work and so coming to their shebeen will make them easily access the services. Also, we try to make sure that we don't leave without giving

> services to all who are in need of it. At our mobile clinic, they don't have to queue. They could be working and coming whenever they don't have a client (Employee Respondent 3 August 2017)
>
> .

The continuous quality improvement programmes that look at improving sex worker programmes on a continual basis, as well as the in-house trainings, entrench the value of non-judgemental healthcare which the sex workers value.

> We generally do a lot of quality improvement programmes with organisations like SA Partners and they score us. There are a lot of on-going in-house trainings and there are suggestion boxes for comments and compliments and the organisation also takes these seriously and addresses them with relevant people. We take quality seriously in this work or else we lose out (Employee Respondent 1 August 2017)
>
> Those people (sex workers) can read if you have an attitude or not. You have to love them. We are always having workshops and trainings about how to work with sex workers (Employee Respondent 1 August 2017)

The staff members have been willing to forgo personal comfort and attend to sex workers in ways such as attending to sex workers outside working hours.

> We give services that no one else gives. Like I have already said, we do so much that the DoH doesn't do any of the things that we do. One more thing, sometimes the sex workers go away to Lesotho or KZN (KwaZulu Natal) and come back weekend and they say I don't have tablets, I go out and give her. Do you expect that person do mistrust me? I don't think so (Employee Respondent 3 August 2017)
>
> They sometimes call us right in midnight and they cry and although my manager says I shouldn't do it, I listen and try to talk to them while they narrate to me their problem's. Sometimes their child has no one to care of him or her and they are worried because their mother is saying come back home and they have been doing this without their parent's knowledge, you must listen to this and counsel them (Employee Respondent 2 August 2017)

Lastly, the staff members seem very accommodative to the sex workers' behaviour itself and will put personal frustrations aside and render services which could have been denied.

> It takes your heart; you need to be passionate about them because if you don't do so, you won't manage to work with them. Let me tell you this. If I make an appointment with you (researcher) I expect to see you at the agreed time, and if you can't, I expect to get a call from you to say I can't come or make it. But sex workers, you tell them I am coming to your room to get your blood at 10 am, you go there you find she is not there or she has gone to town or she is drunk or she says I am tired I got a client with money last night and he took me the whole night so I am tired and I can't see you now come a little later in the evening. We have to put up with all

> that and sometimes especially when its mid-month, they are so moody that they can tell you that today we don't want to see you guys. But because we know them we always come back and they sometimes act like nothing has happened. If you start taking them to task and say why did you not come, then you create hostility (Employee Respondent 1 August 2017)

The interviews done on staff members uncovered that the clinic trains its staff on stigma and discrimination as a way to do away with the tendencies of the public sector. As it appears, there were continual in-house trainings for staff members on working with sex workers and how to retain them in care. The services of the clinic are further enhanced by working with other partner organisations that do quality improvements, making their services better than before.

> We sort of babysit them. We spoil them by bringing the clinic right to their doorstep. They have two options basically. They can come to the fixed clinic which opens 8 to 4 pm or the mobile clinic that travels at night. It goes to their shebeens with all their files and carries all common ailment drugs like STIs, ARVs, etc. They will never get that anywhere else except from us (Employee Respondent 1 August 2017)

The staff members confirmed that investing in trusting relationships has been the very core business in working with sex workers. The employee interviews substantiated that the quality of services have been amongst a host of factors that have made the sex workers trust in the staff. The staff members often go out of their way to help the sex workers, even at personal cost to their free time, such as after work. Staff members share their cell numbers with sex workers so much so that they even call them at night and weekends should they get arrested or run out of medication, a phenomenon that is unseen at public clinics.

> I must say, it takes your heart, you need to passionate about them…because if you don't you won't manage…let me tell you this…if I make an appointment with sex you, I expect to see you and if you can't I expect to get a call from you to say I can't come or make it….but sex workers you tell them I am coming to your room to get your blood at 10 am, you go there you find she is not there or she has gone to town or she is drunk or she says I am tired I got a client with money last night and he took me the whole night so I am tired and I can't see now come a little later in the evening….we have to put up with all that….sometimes especially when its mid-month , they are so moody that they can tell you that today we don't want to see you guys….but because we know them we always come back and they sometimes at like nothing happened….but if start taking them to task and say why did you refuse the service every day, you lose the plot (Employee Respondent 2 August 2017)

Peer educators play a very pivotal role in HIV prevention. The fact that the sex workers see their peers working for the Esselen Street Clinic and encouraging them to partake in the services is also the reason why the sex workers trust in the services of Esselen Street Clinic. The lack of trust in health care workers is often curbed by the peer educators' work, which represents the clinic to the sex workers. Peer educators could play a role in convincing sex workers to use biometrics, should the clinic decide to go that route.

> They were very sceptical from the onset until a little later. I had to visit the sex workers and get to mingle with them, we employed some of them as peer educators, trained them on how to give services to their fellows. We also planned that the peer educators were the first recipients of our services so as to encourage their fellows to come (Employee Respondent 3 August 2017)

> Well, we involved peer educators and when that happened the sex workers started coming here and until now, we have a lot of new members coming through being referred with their friends here (Employee Respondent 2 August 2017)

The staff interview also supported the idea that convenient services were part of the reason why sex workers preferred Esselen Street Clinic over other non-targeted sex worker clinics. They brought services to their doorsteps, by bringing condoms, during the day and availing the clinic at night to sex workers even while they are operating. Sex workers are very time conscious and as the study showed, sex workers' failure to access the health services was attributed to long queues, which often require the sex workers to be at the clinic the whole day.

> The Clinic is very fast (quick). If I go at 8, usually at 10 I am back. They are very quick unlike at Hellen Joseph where spend we the whole day and not make money. It's better if you go to mobile if I queue at 6 (pm) I am usually done at 7 pm.

The one-stop shop service where a sex worker meets one nurse and gets all at once has often seen the sex workers coming to the clinic.

> We avoid having too many stations. Sex workers are busy and don't want to spend a lot of time at the clinic so we ensure that they get everything from one person, from the tablets, condoms and any treatment, it comes from the one nurse. No pharmacy queueing yeah that's what we do so that we ensure that quick quick they are off to business. Some will be waiting in the streets for clients and when it becomes free (mobile clinic) they come and in 15 to 20 minutes they are back to work.

In summary, the focus group discussion painted a picture of sex workers who have misgivings about what the biometrics can bring. On the other hand, when they look at

Esselen Street Clinic, it is unthinkable for them to suggest that the staff members may take that information and give to individuals and entities that will misuse the data. At the same time, there are fears that someone may find his or her way into the fingerprint system and jeopardise their welfare. 64.6% responded that they would accept the biometrics while 79% expressed that they perceived the biometrics positively.

5 DISCUSSION OF RESULTS

5.1 Research question 1

5.1.1 What do sex workers think when their fingerprints are put in a computer system?

Naturally, sex workers do not like biometrics because according to them, they could end up in the hands of an entity or a being which could compromise their privacy. Sex workers were not quick to accept the use of biometrics because there were some questions about the safety of using the biometrics. The first impressions that came up during the focus group discussion were that sex workers are averse to giving their biometrics. There are fears that prospective employees might pick up in their computers that one was once a sex worker and not employ them. There were also fears by some sex workers that the police could potentially raid the database and arrest all sex workers.

Ditmore (2006) and Jeffreys (2006) unanimously agreed on sex workers' reluctance to reveal their real identity to anyone. This was so because of the stigma and discrimination that were associated with sex work (Fitzgerald-Husek et al., 2017). In responding to the questionnaire, 59% of the respondents said that they had used their actual names at registration. Notably, 52% of the respondents said that they enjoyed good relations with the police. Benoit, Jansson, Smith and Flagg (2018b) narrated the ordeal of the sex workers at the hands of the police which included harassments, bribery, rape and torture. The sex worker-police relationships could have been the result of the partnership with between HHP, the police and SWEAT as explained by the employee.

> We have established a relationship with the police and SWEAT who are playing a lot of advocacy to have the ill-treatment and harassment of sex workers stopped. We used to visit the police cells and talk to the station commander after arrests and the dividends have now paid off. The last 3 years have seen the declining of arrests and complaints from sex workers. Our ladies can now work freely. It's only when they commit a crime or are found to be dealing with drugs that the police come in full force to look for the sex worker involved (Employee Respondent 3 August 2017)

If biometrics were to be accepted, steps have to be taken to ensure that their fears have been dispelled and that the sex workers have a clear understanding of what the biometrics mean and who else can access them. Moreover, the rights-based approach and assurance of the fact that the system is not linked to the police or any group of companies is needed if such a technology is to be accepted. A clear explanation of security systems of the biometrics will perhaps do better to allay the fears of the sex workers and assist in making an informed decision. When the biometrics were implemented in India, it was discovered that a hub where there was assistance and explanation had a higher acceptance and usage rate as opposed to where it was not (Paik et al., 2010). Without a doubt, a lot of support needs to accompany the installation of such an infrastructure.

At the end of the discussion with sex workers, they agreed that Esselen Street Clinic had very caring employees and that it would not be in them to betray them into the hands of the police or whoever wanted their information. They also seemed to articulate that there were smaller chances that there would be someone interested in getting their fingerprints because they were so insignificant to society. They also agreed that it had not happened that anyone had failed to get a job because of their history of being a sex worker, as far as they knew. As indicated earlier, Bateman (2013) found Esselen Street Clinic to be a best practice with great quality of care that meets the requirements of serving a sex worker program. This changes the perspectives of biometrics at Esselen Street Clinic altogether.

While there are fears espoused by some sex workers that fingerprints might end up in the wrong hands, others felt that only someone with a motive to look for the information would make attempts to do so. Even then, the security features of the biometrics will be called into question as to how an outsider can easily intrude. Duby et al. (2018) acknowledge that sex workers are concerned about the confidentiality of their personally identifiable information. This explains why there is a general reluctance by the sex workers to disclose their identity (Jeffreys, 2006). Fear of their identity as sex workers ending up in up in wrong hands is clearly expressed in the focus group discussion and literature.

An interesting phenomenon was picked up in the discussion with the sex workers. The untrustworthiness of the Esselen Street Clinic staff members was never raised. If anything, they expressed that they are generally treated very differently compared to the way they had been treated in public clinics. The fears of the sex workers did not point to the staff members at the clinic deliberately handing over information to some entities. They feared that, by chance, their data would end up in the hands of someone known to them through an involuntary linkage between computer systems. Their perception of the staff members' ability to keep confidentiality was very high.

The questionnaires revealed that many sex workers did not believe that the fingerprints would end up in the hands of the police. An average of about 20% believed that it would end up in the hands of the police. This data reflects on their perceptions about the clinic staff members' ability to keep confidentiality as well as their knowledge of the biometrics. Of great importance, an average of 79% of the responses revealed that despite fears that sex workers might have, they still have a positive perception of biometrics in the hands of Esselen Street Clinic.

5.2 Research question 2

5.2.1 Do sex workers accept biometrics if they are used as a gateway to accessing health services?

It turned out that in the worst-case scenario, sex workers would accept the biometrics based on their good working relations with the Esselen Street Clinic staff. With education and explanation, some fears which are a result of lack of knowledge, the biometrics could be accepted with some levels of comfort. Although the result shows that 64.6% accepted the results, the rest remained sceptical on accepting the biometrics. Given the lack of information and understanding of biometrics, education about this technology might result in greater acceptance of the system.

Remarkably, it appeared that when asked if sex workers were given to choose between Esselen Street Clinic with biometrics and a public health facility without the biometric identification, the sex workers expressed that they would lay down their fears and use Esselen Street Clinic. 62% of the sex workers said that would be willing to brace for the biometric technology and use Esselen Street Clinic. 14% revealed were unsure if they

would leave Esselen Street Clinic to avoid using the biometrics. The in-depth interviews showed that the tailor-made services meant a lot to the sex workers and as such, they could not trade them off for anything. While sex workers have considerable fears about biometrics, the reality is that leaving Esselen Street Clinic will be hard for most of them.

The sex workers trust their clinicians and caregivers which makes the biometrics fairly acceptable. There seems to be a trend in sex workers accepting the biometrics in a public health setting. Paik et al. (2010) and Wall et al. (2015) demonstrated in India and in Zambia respectively that biometrics were acceptable in sex workers in accessing health services. Although the sex workers in Zambia had a 98% acceptability rate of biometrics, they also expressed concerns about privacy and confidentiality when using fingerprint readers in public places. Cohen et al. (2012) found that MSM accepted biometrics within a health setting in the USA. When health care workers treat the sex workers well, it builds a basis of trust such that biometrics can be easily trusted.

The explanation for this unusual finding is that the health care workers at the Esselen Street Clinic are sensitised on how to work with sex workers. The efforts that have been put forward in the programme in ensuring that all employees working with sex workers are fair and non-judgemental has helped shape the way healthcare workers view sex workers which translate into how they treat sex workers. Sex workers are generally happy with the treatment that they get at Esselen Street Clinic and more often than not, they reflect based on their previous experience at the hand of DoH.

It also came up during the discussions with the healthcare workers that they go to all ends to service the sex workers, even outside the normal working hours' parameters. Although the sex workers are averse to the fingerprints, they have no mistrust with the clinic staff, clearly showing a good relationship with the clinic. This is shown by the way the sex workers responded to the questionnaire on biometrics. Although the sex workers showed initial misgivings about biometrics, they showed that given the relationship they have with the clinic, they could accept the biometrics.

Moreover, the use of peer educator was highlighted in the in-depth interviews with the workers at Esselen Street Clinic as being one of the reasons why the sex workers trust the Esselen Street Clinic and subsequently, the high acceptance of biometrics. The role

of peer educators as key players between the clinic and the sex workers appears quite crucial. Although the level of influence is greatly unknown, such a move can make a difference if properly administered in lobbying for the implementation of such a technology.

Although this study showed that biometrics are acceptable, it is important to note that this is a sex worker-friendly clinic, where the relationship with sex workers is built on trust. Should one decide to embark on this, stakeholder engagement must be done, sex workers must be consulted and if that is done, more sex workers are likely to use the biometrics. Peer educators could also play a very pivotal role in lobbying and persuading their peers to make use of the biometrics.

Sex workers who are South African nationals have probably used the biometrics in more places than their foreign colleagues. As literature survey has shown, DHA, banks and SASSA are public institutions that have started using biometrics and the sex workers have probably never asked the question why those institutions need fingerprints (Breckenridge, 2005; Johan Coetzee, 2018; Maime, 2014; Van De Haar et al., 2016). As a matter of fact, if biometrics are being used in several institutions there is a lesser chance of them being rejected because they have become a common form of identity. The questionnaires show that South African sex workers were less scared of biometrics that their foreign counterparts.

The respondents who were South African nationals were able to open bank accounts because they had South African national identity documents in which they could use their fingerprints. This explains why South African nationals were less afraid of biometrics than foreign nationals because they had more opportunities for using the biometrics than their foreign counterparts and therefore less afraid. Additionally, the SASSA grant is only given to South African nationals and Home Affairs service are for locals as well foreigners who want to regularise their stay in South Africa. Most of the migrant sex workers in South Africa are undocumented meaning that they did not apply for work permits at Home Affairs (Walker, Vearey, & Nencel, 2018). Therefore, South African sex workers have more opportunities to use biometrics than their foreign colleagues.

This section concludes by observing that sex workers will accept the biometrics at Esselen Street Clinic because the clinic offers a targeted package of services that are attractive to sex workers. Although the literature has also shown that biometrics are acceptable to the sex worker population, this study went further to find the reasons why in Hillbrow sex workers would accept the biometrics. Esselen Street Clinic has settled the important questions about trust and that has contributed widely to the acceptance of the biometrics. Lastly, there has been a general increase in the use of biometrics which makes them acceptable when placed at a clinic.

6 CONCLUSIONS AND RECOMMENDATIONS

The research shows that sex workers can accept biometrics, if and only if, they can be assured that the health care providers have their best interest at heart. The experiences at the hands of the health care workers determine their perceptions on the health care workers. The slightest inclination to be understood as harsh, severe, exacting and judgemental often brings negative reactions from the sex workers, which brings distrust. The findings of this study observed that the perceptions of sex workers are shaped by their experiences with health care workers and that acceptability is based on trust.

The sex workers generally do not understand what biometrics entail and what exactly they are used for. During the focus group discussion, this study discovered general ignorance, which showed the reason why there was a generally sceptical understanding of what biometrics can do. Fears of having their personal identification information in the clinical database being hacked, law enforcement officers and prospective employment organisation accessing the clinic information were some of the fears that the sex workers revealed. It was interesting that the sex workers did not raise the fears about the untrustworthiness of the healthcare workers.

Sex workers can accept biometrics if an organisation builds good and trusting relations. Relations of trust take some time and painstaking effort to establish and require a lot of training to the employees of the organisation. Faith in healthcare providers is important in introducing such technology to sex workers. Training the health care providers on how to treat sex workers with care and avoid anything that can be interpreted to be judgemental by sex workers is important.

The nature of the clinic programmes and services are such that the sex workers generally trust the staff members at Esselen Street Clinic. The convenient nature of the programmes and the extra efforts that the clinic offers have resulted in many sex workers clearly agreeing that their healthcare workers are less judgemental than those at public facilities. The clinic staff members themselves have attested that they sometimes go way out of their line of duty to help the sex workers in the time of need. Sex workers prefer Esselen Street Clinic because it saves them from queuing for long and it delivers the medical services right at their doorstep where they work. Given these factors, sex

workers would be reluctant to forfeit such a convenient service and endure the harsh treatment at the hands of public health care workers to evade the biometric system.

Although the Esselen Street Clinic is trying to win the confidence of the sex workers, it came out in the focus group discussion that some of the sex workers had not given their true identity to the clinic, particularly on their first day of registration. There is a possibility that newcomers who are not as confident as old sex workers may resist giving their fingerprint and not ever access the services again. Due regard is needed in registering new sex workers in this system, perhaps a thorough use of peer educators in introducing new sex workers to the clinic will reduce the possible resistance to this technology.

This research set out to find the acceptability of the biometrics by the sex workers attending Esselen Street Clinic. It asked the following questions;

1. How acceptable is biometric identification to sex workers in the HHP?
    a. What do sex workers think when their fingerprints are put in a computer system?
    b. Do sex workers accept biometrics if they are used as a gateway to accessing health services?

This study found out that a majority of sex workers did not see anything amiss with this development although a handful expressed fears that someone may get the data that they were once sex workers and then this knowledge will prevent them from getting future employment opportunities. It came out that Esselen street Clinic employees were not capable of such a thing but rather an outsider who could work his or her way into the system. 64.6% of the sex workers expressed that they would accept the biometrics if they were used as a gateway into accessing the health services. The interviews that were done on the employees revealed that the quality of care which the sex workers received explained the high acceptance rate of the biometrics.

Lastly, there is a need to educate the sex workers on what biometrics are and the extent to which they are secure. Some fears in sex workers that result in negative perceptions, about what they could be exposed to can be allayed easily with better information. Should an organisation wish to embark on installing this technology, time should be

invested in educating the sex workers on the security measures that protect the identity of the sex workers upon registering for biometrics.

In general, most of the sex workers accept biometrics. However, if the factors identified are addressed, there should be a higher number of sex workers accepting the biometrics. As alluded before, biometrics are a commonly used technology in South Africa and debunking the mysteries surrounding the dangers, both real and perceived, will be key to solving matters around the acceptability of biometrics. Although the sex workers generally do not like the biometrics, it appears that more would use them should it become mandatory owing to the relationship of trust that has been built over the years.

6.1 Recommendations

The results of this study cannot be generalised to any other setting save the sex workers attending sex worker-friendly-clinics. Further studies are needed to find out how sex workers in settings where they attend public clinic feel about biometrics. The results of this study are affected by the uniqueness of the circumstances of the population under study. The sex workers in Hillbrow attend a sex worker clinic where the staff members are sensitised about working with sex workers. It merged in this study that sex workers fear attending public clinics run by the government because they are ill-treated and judged as deserving all kinds of sicknesses because of their lifestyle. Further studies are needed to investigate if biometrics are still going to be acceptable under such settings.

Furthermore, future studies need to investigate the effect of technology on new sex workers who might not have had a history with the clinic. Trust is built over time, and it is possible that newcomers who might have experienced harassment at the hands of other public facilities might resist this due to their own past experiences. Most of the sex workers that attend Esselen Street Clinic alluded that they did not start sex work in Hillbrow and as a result they had gone to some clinics elsewhere where they were harassed and illtreated by the nurses.

Male sex workers are not a very common feature in South African literature. The respondents to this stuy were mainly females. Sex workers have traditionally known as females who by the look of things are prone to gender-based violence and police harassment. It would be interesting someday to do the same study yo male sex workers

and analyse if they perceive biometrics the same their female counterparts do.The extent to which the male sex workers are harassed by the police remains unknown at this jutnure and so are their experiences at the hands of public health facilities.

Lastly, there is a possibility that police are was known by sex workers as very abusive and harassing sex workers. There is a chance that there are other places where the relations between sex workers and the police are not as bad as in Hillbrow. There is a view that sex workers few in Hillbrow feared that biometrics were linked to the police all because of the history of arrests and harassments. It would be interesting to observe the perceptions of the sex workers towards biometrics in such a setting.

REFERENCES

Aggleton, P., Parker, R., Attawell, K., Pulerwitz, J., & Brown, L. (2002). HIV / AIDS-related Stigma and Discrimination: A Conceptual Framework and an Agenda for Action. *Social Science & Medicine*, *57*, 1–28.

Ansar, M., Sheraz, M., Malik, A., Fatima, M., Aslam, S., Rasheed, A., & Nazir, I. (2018). Biometric Encryption in Cloud Computing: A Systematic Review. In *IJCSNS International Journal of Computer Science and Network Security* (Vol. 18).

Aveling, E.-L., Cornish, F., & Oldmeadow, J. (2013). *Emma-Louise Aveling, Flora Cornish and Julian Oldmeadow Diversity in sex workers' strategies for the protection of social identity: content, context and contradiction Book section Diversity in sex workers' strategies for the protection of social identity:*

Babbie, E. (2012). *The Practice of Social Research* (p. 583). p. 583. New York: Cengage Learning.

Babbie, E. (2015). *The practice of Social research* (14th ed.). Boston: Cengage Learning.

Bailey, K. D. (1982). *Methods of social research*.

Bailey, J. V, Farquhar, C., Owen, C., & Whittaker, D. (2003). Sexual behaviour of lesbians and bisexual women. *Sexually Transmitted Infections*, *79*(2), 147–150. https://doi.org/10.1136/sti.79.2.147

Bairagi, V., & Munot, V. M. (2019). Research Methodology: A Practical and Scientific Approach - Google Books (!st). New York: Taylor and Francis Group. Retrieved from https://books.google.co.za/books?id=5tKFDwAAQBAJ&printsec=frontcover&dq=research+methodology&hl=en&sa=X&ved=0ahUKEwi64NzmgfbkAhVStXEKHaCND2QQ6AEIUjAG#v=onepage&q=research methodology&f=false

Bateman, C. (2013, July 4). Neglected high-risk groups a top priority in AIDS prevention/treatment. *South African Medical Journal*, Vol. 103, pp. 503–505. https://doi.org/10.7196/SAMJ.720

Beck, E. J., Shields, J. M., Tanna, G., Henning, G., de Vega, I., Andrews, G., … Low-Beer, D. (2018). Developing and implementing national health identifiers in resource limited countries: why, what, who, when and how? *Global Health Action*, *11*(1), 1440782. https://doi.org/10.1080/16549716.2018.1440782

Bell, E., Bryman, A., Harley, B. (2018). Business Research Methods - Emma Bell, Alan Bryman, Bill Harley - Google Books. Oxford: Oxford University Press. Retrieved from https://books.google.co.za/books?hl=en&lr=&id=J9J2DwAAQBAJ&oi=fnd&pg=PP1&dq=validity+in+research+2018&ots=GLfDkddPCN&sig=1FnFN8FLIt_IBG_xlVVk-40ICrc&redir_esc=y#v=onepage&q=validity in research 2018&f=false

Benoit, C., Jansson, S. M., Smith, M., & Flagg, J. (2018a). Prostitution Stigma and Its Effect on the Working Conditions, Personal Lives, and Health of Sex Workers. *The Journal of Sex Research*, *55*(4–5), 457–471. https://doi.org/10.1080/00224499.2017.1393652

Benoit, C., Jansson, S. M., Smith, M., & Flagg, J. (2018b). Prostitution Stigma and Its Effect on the Working Conditions, Personal Lives, and Health of Sex Workers. *The Journal of Sex Research*, *55*(4–5), 457–471. https://doi.org/10.1080/00224499.2017.1393652

Bentley, M. E., Fullem, A. M., Tolley, E. E., Kelly, C. W., Jogelkar, N., Srirak, N., … Celentano, D. D. (2004). Acceptability of a microbicide among women and their

partners in a 4-country phase I trial. *American Journal of Public Health*, *94*(7), 1159–1164. https://doi.org/10.2105/AJPH.94.7.1159

Breckenridge, K. (2005). The biometric state: The promise and peril of digital government in the New South Africa. *Journal of Southern African Studies*, *31*(2), 267–282. https://doi.org/10.1080/03057070500109458

Brown, B., Duby, Z., & Bekker, L. (2012). *Sex Workers: An introductory Manual for Health Care Workers in South Africa* (1st ed.). Cape Town: Compress.

Bryman, A. (2012). *Social research methods*. Oxford: Oxford University.

Campbell, C. (2000). Selling sex in the time of AIDS: the psychosocial context of condom use by sex workers on a Southern African mine. *Social Science and Medicine*, *50*(2), 479–494.

Campeau, L., Blouin, K., Leclerc, P., Alary, M., Morissette, C., Blanchette, C., … SurvUDI Working Group. (2018). Impact of sex work on risk behaviours and their association with HIV positivity among people who inject drugs in Eastern Central Canada: cross-sectional results from an open cohort study. *BMJ Open*, *8*(1), e019388. https://doi.org/10.1136/bmjopen-2017-019388

Chen, R., Tao, F., Ma, Y., Zhong, L., Qin, X., & Hu, Z. (2014). Associations between Social Support and Condom Use among Commercial Sex Workers in China: A Cross-Sectional Study. *PLoS ONE*, *9*(12), e113794. https://doi.org/10.1371/journal.pone.0113794

Chen, X., Yin, Y., Liang, G., Gong, X., Li, H., Poumerol, G., … Yu, Y. (2005). Sexually transmitted infections among female sex workers in Yunnan, China. *AIDS Patient Care & STDs*, *19*(12), 853–860. https://doi.org/10.1089/apc.2005.19.853

Chor, J. S. Y., Ngai, K. L. K., Goggins, W. B., Wong, M. C. S., Wong, S. Y. S., Lee, N., … Chan, P. K. S. (2009). Willingness of Hong Kong healthcare workers to accept pre-pandemic influenza vaccination at different WHO alert levels: two

questionnaire surveys. *BMJ (Clinical Research Ed.)*, *339*, b3391. https://doi.org/10.1136/bmj.b3391

Chung, H. (2015). Sex Work and the Law in South Africa, Sweden and New Zealand: an evidence based argument for decriminalization. *The Journal of Global Health*.

Church, S., Henderson, M., Barnard, M., & Hart, G. (2001). Violence by clients towards female prostitutes in different work settings: questionnaire survey. *BMJ (Clinical Research Ed.)*, *322*(7285), 524–525. https://doi.org/10.1136/bmj.322.7285.524

City of Johannesburg. (2017). Hillbrow Health Precinct | Johannesburg Development Agency. Retrieved December 30, 2018, from Hillbrow Health Precinct website: http://www.jda.org.za/hillbrow-health-precinct/

Coates, T. J., Richter, L., & Caceres, C. (2008). Behavioural strategies to reduce HIV transmission: how to make them work better. *The Lancet*, *372*(9639), 669–684. https://doi.org/10.1016/S0140-6736(08)60886-7

Coetzee, J, Gray, G. E., & Jewkes, R. (2017). Prevalence and patterns of victimization and polyvictimization among female sex workers in Soweto, a South African township: a cross-sectional, respondent-driven sampling study. *Global Health Action*, *10*(1), 1403815. https://doi.org/10.1080/16549716.2017.1403815

Coetzee, Jenny, Jewkes, R., & Gray, G. E. (2017). *Cross-sectional study of female sex workers in Soweto, South Africa: Factors associated with HIV infection*. https://doi.org/10.1371/journal.pone.0184775

Coetzee, Johan. (2018). Strategic implications of Fintech on South African retail banks. *South African Journal of Economic and Management Sciences*, *21*(1), 2455. https://doi.org/10.4102/sajems.v21i1.2455

Cohen, J. K., Flynn, R., Bolan, R., & Klausner, J. (2012). *Acceptability of Fingerprint Scanning for Personal Identification Among Patients Seeking HIV / STI-Related Services,*

Los Angeles, 2011 Drug-Resistant Virus Has Reduced Ability to Induce Immune Activation. *61*(4), 59–60.

Cowan, F. M., Davey, C., Fearon, E., Mushati, P., Dirawo, J., Chabata, S., … Hargreaves, J. R. (2018). Targeted combination prevention to support female sex workers in Zimbabwe accessing and adhering to antiretrovirals for treatment and prevention of HIV (SAPPH-IRe): a cluster-randomised trial. *The Lancet. HIV*, *5*(8), e417–e426. https://doi.org/10.1016/S2352-3018(18)30111-5

Curry, D. W. (2018). Perspectives on Monitoring and Evaluation. ChaploweScott G.CousinsJ. Bradley. (2016). Monitoring and Evaluation Training: A Systematic Approach. Thousand Oaks, CA: Sage. 464 pp. $69 (paperback), ISBN 9781452288918. https://us.sagepub.com/en-us/nam/monitorin. *American Journal of Evaluation*, (October), 109821401877584. https://doi.org/10.1177/1098214018775845

Dawson, J. F. (2019). Moderation in Management Research: What, Why, When, and How. Journal of Business and Psychology, 29(1), 1–19. https://doi.org/10.1007/s10869-013-9308-7

Ditmore, M. H. (2006). *Encyclopedia of Prostitution and Sex Work*. In *Encyclopedia of Prostitution and Sex Work*. Greenwood Press.

Duby, Z., Nkosi, B., Scheibe, A., Brown, B., & Bekker, L.-G. (2018). 'Scared of going to the clinic': Contextualising healthcare access for men who have sex with men, female sex workers and people who use drugs in two South African cities. *Southern African Journal of HIV Medicine*, *19*(1), 1–8. https://doi.org/10.4102/sajhivmed.v19i1.701

Elmes, J., Nhongo, K., Ward, H., Hallett, T., Nyamukapa, C., White, P. J., & Gregson, S. (2014). The Price of Sex: Condom Use and the Determinants of the Price of

Sex Among Female Sex Workers in Eastern Zimbabwe. *Journal of Infectious Diseases*, *210*(suppl 2), S569–S578. https://doi.org/10.1093/infdis/jiu493

Fick, N. (2006). Enforcing Fear: Police abuse of sex workers when making arrests. *SA Crime Quarterly*, (16), 27–33.

Fiona Scorgie, Daisy Nakato, Eric Harper, Marlise Richter, Sian Maseko, Prince Nare, J. S. and M. C. (2013). "We are despised in the hospitals": sex workers' experiences of accessing health care in four African countries. *Culture Health & Sexuality.*, *15*(4), 450–465. https://doi.org/10.1080/13691058.2012.763187

Fitzgerald-Husek, A., Van Wert, M. J., Ewing, W. F., Grosso, A. L., Holland, C. E., Katterl, R., … Baral, S. D. (2017). Measuring stigma affecting sex workers (SW) and men who have sex with men (MSM): A systematic review. *PLOS ONE*, *12*(11), e0188393. https://doi.org/10.1371/journal.pone.0188393

Fobosi, S. C., Lalla-Edward, S. T., Ncube, S., Buthelezi, F., Matthew, P., Kadyakapita, A., … Gomez, G. B. (2017). Access to and utilisation of healthcare services by sex workers at truck-stop clinics in South Africa: A case study. *South African Medical Journal*, *107*(11), 994. https://doi.org/10.7196/SAMJ.2017.v107i11.12379

Follins, L. D., & Dacus, J. (2016). Conceptualizing and developing behavioral HIV prevention interventions for black gay men. *Journal of HIV/AIDS & Social Services*, 1–14. https://doi.org/10.1080/15381501.2015.1116036

Francis, S. C., Mthiyane, T. N., Baisley, K., Mchunu, S. L., Ferguson, J. B., Smit, T., … Shahmanesh, M. (2018). Prevalence of sexually transmitted infections among young people in South Africa: A nested survey in a health and demographic surveillance site. *PLOS Medicine*, *15*(2), e1002512. https://doi.org/10.1371/journal.pmed.1002512

Golafshani, N. (2003). Understanding reliability and validity in qualitative research. *Test*, *8*(4), 597–606.

Gomez, G. B., Eakle, R., Mbogua, J., Akpomiemie, G., Venter, W. D. F., & Rees, H. (2016). Treatment and Prevention for female Sex workers in South Africa: protocol for the TAPS Demonstration Project. *BMJ Open*, *6*(9), e011595. https://doi.org/10.1136/bmjopen-2016-011595

Gossman, C., & Premo, A. (2012). *Urban Resilience in Situations of Chronic Violence Case Study of Medellín, Colombia*. (May), 1–34.

Government of South Africa. The Constitution of the Republic of South Africa. , 38 Government Gazette § (1996).

Grasso, M. A., Manyuchi, A. E., Sibanyoni, M., Marr, A., Osmand, T., Isdahl, Z., … Lane, T. (2018). Estimating the Population Size of Female Sex Workers in Three South African Cities: Results and Recommendations From the 2013-2014 South Africa Health Monitoring Survey and Stakeholder Consensus. *JMIR Public Health and Surveillance*, *4*(3), e10188. https://doi.org/10.2196/10188

Green, J., & Thorogood, N. (2018). Qualitative Methods for Health Research - Judith Green, Nicki Thorogood - Google Books. In SAGE. Retrieved from https://books.google.co.za/books?hl=en&lr=&id=HUhLDwAAQBAJ&oi=fnd&pg=PP1&dq=validity+in+research+2018&ots=quHb-KPcUM&sig=lwnHQIHuKWkIjog8AyhPClW85x8&redir_esc=y#v=onepage&q=validity in research 2018&f=false

Gregson, S., Nyamukapa, C. A., Garnett, G. P., Mason, P. R., Zhuwau, T., Caraël, M., … Anderson, R. M. (2002). Sexual mixing patterns and sex-differentials in teenage exposure to HIV infection in rural Zimbabwe. *Lancet*, *359*(9321), 1896–1903. https://doi.org/10.1016/S0140-6736(02)08780-9

Grelotti, D. J., Closson, E. F., Smit, J. A., Mabude, Z., Matthews, L. T., Safren, S. A., … Mimiaga, M. J. (2014). Whoonga: potential recreational use of HIV antiretroviral medication in South Africa. *AIDS and Behavior*, *18*(3), 511–518. https://doi.org/10.1007/s10461-013-0575-0

Guest, P., Prohmmo, A., Bryant, J., Janyam, S., & Phuengsamran, D. (2007). *2007 survey of sexual and reproductive health of sex workers in Thailand*.

Harcourt, C., & Donovan, B. (2005). The many faces of sex work. *Sexually Transmitted Infections*, *81*(3), 201–206. https://doi.org/10.1136/sti.2004.012468

Huschke, S., & Coetzee, J. (2019). Sex work and condom use in Soweto, South Africa: a call for community-based interventions with clients. *Culture, Health & Sexuality*, 1–15. https://doi.org/10.1080/13691058.2019.1568575

Jain, A. K., & Kumar, A. (2012). Biometric Recognition: An Overview. *Second Generation Biometrics: The Ethical, Legal and Social Context*, 49–79. https://doi.org/10.1007/978-94-007-3892-8_3

Jain, A. K., & Ross, A. (2015). Bridging the gap: From biometrics to forensics. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *370*(1674). https://doi.org/10.1098/rstb.2014.0254

Jeal, N., Patel, R., Redmond, N. M., Kesten, J. M., Ramsden, S., Macleod, J., … Horwood, J. (2018). Drug use in street sex workers (DUSSK) study protocol: a feasibility and acceptability study of a complex intervention to reduce illicit drug use in drug-dependent female street sex workers. *BMJ Open*, *8*(11), e022728. https://doi.org/10.1136/BMJOPEN-2018-022728

Jeffreys, E. (2006). Contemporary sex worker cultural practice in Australia: Sex workers' use of sex industry skills in public protest and performance. *Journal of Australian Studies*, *30*(89), 113–124. https://doi.org/10.1080/14443050609388097

Jenkins, M. (1998). The focus group, a qualitative research method Reviewing The theory, and Providing Guidelines to Its Planning. *Focus*, (010298), 1–22.

John W. Creswell. (2014). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (4th ed.). Los ANgels: SAGE Publications.

Johnson, L. F., Dorrington, R. E., & Moolla, H. (2017). HIV epidemic drivers in South Africa: A model-based evaluation of factors accounting for inter-provincial differences in HIV prevalence and incidence trends. *Southern African Journal of HIV Medicine*, *18*(1), 695. https://doi.org/10.4102/sajhivmed.v18i1.695

Konstant, T. L., Rangasami, J., Stacey, M. J., Stewart, M. L., & Nogoduka, C. (2015). Estimating the Number of Sex Workers in South Africa: Rapid Population Size Estimation. *AIDS and Behavior*, *19*(S1), 3–15. https://doi.org/10.1007/s10461-014-0981-y

Krumrei-Mancuso, E. J. (2017). Sex Work and Mental Health: A Study of Women in the Netherlands. *Archives of Sexual Behavior*, *46*(6), 1843–1856. https://doi.org/10.1007/s10508-016-0785-4

Lau, J. T. F., Zhang, J., Zhang, L., Wang, N., Cheng, F., Zhang, Y., … Lan, Y. (2007). Comparing prevalence of condom use among 15,379 female sex workers injecting or not injecting drugs in China. *Sexually Transmitted Diseases*, *34*(11), 908–916. https://doi.org/10.1097/OLQ.0b013e3180e904b4

Lazarus, L., Deering, K. N., Nabess, R., Gibson, K., Tyndall, M. W., & Shannon, K. (2012). NIH Public Access. *Culture, Health & Sexuality*, *29*(6), 997–1003. https://doi.org/10.1016/j.biotechadv.2011.08.021.Secreted

Madsen, H. H., Madsen, D., & Gauffriau, M. (2016). Evaluation of unique identifiers used as keys to match identical publications in Pure and SciVal – a case study from health science. *F1000Research*, *5*, 1539. https://doi.org/10.12688/f1000research.8913.2

Magnani, R., Sabin, K., Saidel, T., & Heckathorn, D. (2005). Review of sampling hard-to-reach and hidden populations for HIV surveillance. *AIDS (London, England)*, *19 Suppl 2*, S67–S72. https://doi.org/10.1097/01.aids.0000172879.20628.e1

Mahfouz, A., Mahmoud, T. M., & Eldin, A. S. (2017). A survey on behavioral biometric authentication on smartphones. *Journal of Information Security and Applications*, *37*, 28–37. https://doi.org/10.1016/j.jisa.2017.10.002

Maime, R. B. (2014). *Challenges and opportunities of adopting management information systems (MIS) for passport processing: comparative study between Lesotho and South Africa*. Central University of Technology.

Marcus, T., Oellerrmann, K., & Levin, N. (1995). AIDS and the Highways: Sex Workers and Truck Drivers in KZN. *Indicator South Africa*, *13*, 80–84.

Meng, J. (2013). *On the Decriminalization of Sex Work in China* (1st ed.). North York: Palgrave Macmillan.

Mgbako, C. (2013). Fordham Law School FLASH: The Fordham Law Archive of Scholarship and History the Case for Decriminalization of Sex Work in South Africa Recommended Citation. In *J. Int'l L.*

Mhode, M., & Nyamhanga, T. (2016). Experiences and Impact of Stigma and Discrimination among People on Antiretroviral Therapy in Dar es Salaam: A Qualitative Perspective. *AIDS Research and Treatment*, *2016*, 7925052. https://doi.org/10.1155/2016/7925052

Michael, P. (2009). *QUT Digital Repository: Title*. *6*, 45–50.

Moyo, U., Patel, L., & Ross, E. (2015). Homelessness and mental illness in Hillbrow, South Africa: a situation analysis. *Social Work/Maatskaplike Werk*, *51*(1), 1–21. https://doi.org/10.15270/51-1-425

Mtetwa, S., Busza, J., Chidiya, S., Mungofa, S., & Cowan, F. (2013). "You are wasting our drugs": health service barriers to HIV treatment for sex workers in Zimbabwe. *BMC Public Health*, *13*(1), 698. https://doi.org/10.1186/1471-2458-13-698

Mukumbang, F. C. (2017). Actions of female sex workers who experience male condom failure during penetrative sexual encounters with clients in Cape Town: Implications for HIV prevention strategies. *Southern African Journal of HIV Medicine*, *18*(1), 9. https://doi.org/10.4102/sajhivmed.v18i1.698

Mususumeli, R. (2016). *Life Histories of Women who engaged in Sex Work*.

Neuman, W. L. (2014). *Social Research Methods: Qualitative and Quantitative approaches*.

Nyaga Karani, F. (2014). Effective Use of Monitoring and Evaluation Systems in Managing HIV/AIDS Related Projects: A Case Study of Local NGOS in Kenya. *Science Journal of Business and Management*, *2*(2), 67. https://doi.org/10.11648/j.sjbm.20140202.13

Nyangairi, B. (2010). *Migrant women in sex work: Trajectories and perceptions of Zimbabwean sex workers in Hillbrow, South Africa*.

Ochako, R., Okal, J., Kimetu, S., Askew, I., & Temmerman, M. (2018). Female sex workers experiences of using contraceptive methods: a qualitative study in Kenya. *BMC Women's Health*, *18*(1), 105. https://doi.org/10.1186/s12905-018-0601-5

Pagnin, E., & Mitrokotsa, A. (2017). Privacy-Preserving Biometric Authentication: Challenges and Directions. *Security and Communication Networks*, Vol. 2017, pp. 1–11. https://doi.org/10.1155/2017/7129505

Paik, M., Samdaria, N., Gupta, A., Weber, J., Bhatnagar, N., Batra, S., … Thies, W. (2010). A biometric attendance terminal and its application to health programs

in India. *Proceedings of the 4th ACM Workshop on Networked Systems for Developing Regions - NSDR '10*, 1–6. https://doi.org/10.1145/1836001.1836005

Pascom, A. R. P., Szwarcwald, C. L., & Barbosa Júnior, A. (2010). Sampling studies to estimate the HIV prevalence rate in female commercial sex workers. *The Brazilian Journal of Infectious Diseases: An Official Publication of the Brazilian Society of Infectious Diseases*, *14*(4), 385–397. https://doi.org/10.1016/S1413-8670(10)70081-7

Pauw, I., & Brener, L. (2003). 'You are just whores—you can't be raped': barriers to safer sex practices among women street sex workers in Cape Town. *Culture, Health & Sexuality*, *5*(6), 465–481. https://doi.org/10.1080/136910501185198

Pedro, A. B. S., Villaroman, G. A. C., Clerigo, E. R., Hipos, A. T., & Bacani, K. M. (2018). The Use of Biometric Attendance Recording System (BARS) and Its Impact on the Work Performance of Cabanatuan City Government Employees. *OALib*, *05*(01), 1–10. https://doi.org/10.4236/oalib.1104273

Phadke, S. (2015). *The Importance of a Biometric Authentication System*. (July).

Pillay-van Wyk, V., Msemburi, W., Laubscher, R., Dorrington, R. E., Groenewald, P., Glass, T., … Bradshaw, D. (2016). Mortality trends and differentials in South Africa from 1997 to 2012: second National Burden of Disease Study. *The Lancet Global Health*, *4*(9), e642–e653. https://doi.org/10.1016/S2214-109X(16)30113-9

Pisani, E. (2009). *The Wisdom of Whores: Bureaucrats, Brothels, and the Business of AIDS*. W. W. Norton.

Pitcher, J. (2015). Sex work and modes of self-employment in the informal economy: diverse business practices and constraints to effective working. *Social Policy and Society: A Journal of the Social Policy Association*, *14*(1), 113–123. https://doi.org/10.1017/S1474746414000426

Platt, L., Grenfell, P., Meiksin, R., Elmes, J., Sherman, S. G., Sanders, T., … Crago, A.-L. (2018). Associations between sex work laws and sex workers' health: A systematic review and meta-analysis of quantitative and qualitative studies. *PLOS Medicine*, *15*(12), e1002680. https://doi.org/10.1371/journal.pmed.1002680

Rao, P. S. R. S., & CRC Press LLC. (2017). Sampling Methodologies with Applications. Chapman & Hall/CRC [Imprint]. Retrieved from https://books.google.co.za/books?id=Rd-NswEACAAJ&dq=sampling+methods&hl=en&sa=X&ved=0ahUKEwi2jPeBkvbkAhUBqXEKHYulCoU4HhDoAQg2MAI

Ratha, N. K., & Govindaraju, V. (2008). *Advances in Biometrics: Sensors, Algorithms and Systems*. Springer.

Reason, P., & Bradbury, H. (2011). *Action Research: Participative inquiry and practice*.

Rees, H., Delany-Moretlwe, S., Scorgie, F., Luchters, S., & Chersich, M. F. (2017a). At the Heart of the Problem: Health in Johannesburg's Inner-City. *BMC Public Health*, *17*(S3), 554. https://doi.org/10.1186/s12889-017-4344-2

Rees, H., Delany-Moretlwe, S., Scorgie, F., Luchters, S., & Chersich, M. F. (2017b). At the Heart of the Problem: Health in Johannesburg's Inner-City. *BMC Public Health*, *17*(S3), 554. https://doi.org/10.1186/s12889-017-4344-2

Richard Levin. (2017). Professionalising monitoring and evaluation for improved performance and integrity: opportunities and unintended consequences. In *Journal of Public Administration* (Vol. 52). South African Institute for Public Administration.

Richter, M. (2008). Sex work, reform initiatives and HIV/AIDS in inner-city Johannesburg. *African Journal of AIDS Research*, *7*(3), 323–333. https://doi.org/10.2989/ajar.2008.7.3.9.656

Richter, M. L., Scorgie, F., Chersich, M. F., & Luchters, S. (2014). "There are a lot of new people in town: but they are here for soccer, not for business" a qualitative inquiry into the impact of the 2010 soccer world cup on sex work in South Africa. *Globalization and Health*, *10*, 45. https://doi.org/10.1186/1744-8603-10-45

Rossi, P. H., Freeman, H. E., & Lipsey, M. W. (1999). *Evaluation a systematic approach*.

Rotheram-Borus, M. J., Swendeman, D., & Chovnick, G. (2009). The past, present, and future of HIV prevention: integrating behavioral, biomedical, and structural intervention strategies for the next generation of HIV prevention. *Annual Review of Clinical Psychology*, *5*, 143–167. https://doi.org/10.1146/annurev.clinpsy.032408.153530

Rough, K., Dietrich, J., Essien, T., Grelotti, D. J., Bansberg, D. R., Gray, G., & Katz, I. T. (2014). Whoonga and the abuse and diversion of antiretrovirals in Soweto, South Africa. *AIDS and Behavior*, *18*(7), 1378–1380. https://doi.org/10.1007/s10461-013-0683-x

Sarma, G., & Singh, P. K. (2010). Internet Banking: Risk Analysis and Applicability of Biometric Technology for Authentication. *International Journal of Pure and Applied Sciences and Technology*, *1*(2), 67–78.

Schatten, M., Baca, M., & Cubrilo, M. (2009). *Towards a General Definition of Biometric Systems. 2*.

Semple, S. J., Stockman, J. K., Pitpitan, E. V, Strathdee, S. A., Chavarin, C. V, Mendoza, D. V, … Patterson, T. L. (2015). Prevalence and Correlates of Client-Perpetrated Violence against Female Sex Workers in 13 Mexican Cities. *PloS One*, *10*(11), e0143317. https://doi.org/10.1371/journal.pone.0143317

Serwaa-Bonsu, A., Herbst, A. J., Reniers, G., Ijaa, W., Clark, B., Kabudula, C., & Sankoh, O. (2010). First experiences in the implementation of biometric

technology to link data from Health and Demographic Surveillance Systems with health facility data. *Global Health Action*, *3*. https://doi.org/10.3402/gha.v3i0.2120

Shisana, O., Rehle, T., Simbayi, L. C., Zuma, K., Jooste, S., Zungu, N., … Onoya, D. (2014). *South African national HIV prevalence, incidence and behaviour survey, 2012*.

Silverman, M., & Zack, T. (2007). *Land Use Management and Democratic Governance in the City of Johannesburg, Case Study: Hillbrow*. Johannesburg.

Sinha, S. (2017). *Sex Workers and HIV/AIDS in India* (Vol. 1). https://doi.org/10.1093/acrefore/9780199975839.013.1189

Sipe, T. A., Barham, T. L., Johnson, W. D., Joseph, H. A., Tungol-Ashmon, M. L., & O'Leary, A. (2017, December). Structural Interventions in HIV Prevention: A Taxonomy and Descriptive Systematic Review. *AIDS and Behavior*, Vol. 21, pp. 3366–3430. https://doi.org/10.1007/s10461-017-1965-5

Stadler, J., & Delany, S. (2013). The "healthy brothel": the context of clinical services for sex workers in Hillbrow, South Africa. *Culture, Health & Sexuality*, *8*(5), 451–464. https://doi.org/10.1080/13691050600872107

Stadler, J., & Dugmore, C. (2017). "Honey, Milk and Bile": a social history of Hillbrow, 1894–2016. *BMC Public Health*, *17*(S3), 444. https://doi.org/10.1186/s12889-017-4345-1

Statistics South Africa. (2018). *Mid-year population estimates-2017*. https://doi.org/Statistical release P0302

Stefani, E., & Ferrari, C. (2017). Design and implementation of a multi-modal biometric system for company access control. *Algorithms*, *10*(2), 61. https://doi.org/10.3390/a10020061

Strathdee, S. A., West, B. S., Reed, E., Moazan, B., Azim, T., & Dolan, K. (2015). Substance use and HIV among female sex workers and female prisoners: Risk

environments and implications for prevention, treatment, and policies. *Journal of Acquired Immune Deficiency Syndromes*, *69*(0 1), S110–S117. https://doi.org/10.1097/QAI.0000000000000624

Tenni, B., Carpenter, J., & Thomson, N. (2015). Arresting HIV: Fostering Partnerships between Sex Workers and Police to Reduce HIV Risk and Promote Professionalization within Policing Institutions: A Realist Review. *PLOS ONE*, *10*(10), e0134900. https://doi.org/10.1371/journal.pone.0134900

Thanasegaran, G. (2003). Reliability and Validity Issues in Research. *Integration & Dissemination*, 35–40.

Thomas, R., & Velaphi, S. (2014). Abuse of antiretroviral drugs, combined with addictive drugs by pregnant women is associated with adverse effects in infants and risk of resistance. *South African Journal of Child Health*, *8*(2), 78. https://doi.org/10.7196/sajch.734

Todes, A., Harrison, P., & Weakley, D. (2015). *Resilient Densification Four Studies from Johannesburg*.

Van De Haar, H., Van Greunen, D., & Pottas, D. (2016). Biometrics in social grants: Separating myth from reality. *International Symposium on Technology and Society, Proceedings*, *2016-March*, 1–8. https://doi.org/10.1109/ISTAS.2015.7439438

Varga, C. A. (2017). The Condom Conundrum: Barriers to Condom Use Among Commercial Sex Workers in Durban, South Africa. *African Journal of Reproductive Health*, *1*(1).

Venkatraman, S., & Delpachitra, I. (2008). Biometrics in banking security: a case study. *Information Management & Computer Security*, *16*(4), 415–430.

Venter, W. D. F., Hankins, C. A., Ncube, S., Slabbert, M., Matthew, P., Kadyakapita, A., … Buthelezi, F. (2018). Access to and utilisation of healthcare services by sex

workers at truck-stop clinics in South Africa: A case study. *South African Medical Journal*, *107*(11), 994. https://doi.org/10.7196/samj.2017.v107i11.12379

Von Seidlein, L., Vu, D. T., Dang, D. A., Do, G. C., Puri, M., Gupta, V., … Clemens, J. (2007). Using a fingerprint recognition system in a vaccine trial to avoid misclassification. *Bulletin of the World Health Organization*, *85*(1), 64–67. https://doi.org/10.2471/BLT.06.031070

Wagner, C., & Kawulich, B. (2012). *Doing Social Research: A Global Context* (C. Wagner, B. Kawulich, & M. Garner, Eds.). London: McGraw-Hill Education.

Wagner, C., Kawulich, B., & Garner, M. (2012). *Doing Social Research: A Global Context*. McGraw-Hill Higher Education.

Walker, R., Vearey, J., & Nencel, L. (2017). Negotiating the city: Exploring the intersecting vulnerabilities of non-national migrant mothers who sell sex in Johannesburg, South Africa. *Agenda*, *31*(1), 91–103. https://doi.org/10.1080/10130950.2017.1338858

Wall, K. M., Kilembe, W., Inambao, M., Chen, Y. N., Mchoongo, M., Kimaru, L., … Allen, S. A. (2015). Implementation of an electronic fingerprint-linked data collection system: A feasibility and acceptability study among Zambian female sex workers. *Globalization and Health*, *11*(1). https://doi.org/10.1186/s12992-015-0114-z

Walliman, N. (2019). Research Methods: The Basics. Research Methods: The Basics (2nd ed.). New York: Routledge. https://doi.org/10.4324/9780203836071

Wang, C., Hawes, S. E., Gaye, A., Sow, P. S., Ndoye, I., Manhart, L. E., … Kiviat, N. B. (2007). HIV prevalence, previous HIV testing, and condom use with clients and regular partners among Senegalese commercial sex workers. *Sexually Transmitted Infections*, *83*(7), 534–540. https://doi.org/10.1136/sti.2007.027151

Watson-Grant, S., Xiong, K., & Thomas, J. C. (2017). Achieving sustainability in health information systems: a field tested measure of country ownership. *Globalization and Health*, *13*(1), 36. https://doi.org/10.1186/s12992-017-0258-0

Wechsberg, W. M., Wu, L.-T., Zule, W. A., Parry, C. D., Browne, F. A., Luseno, W. K., … Gentry, A. (2009). Substance abuse, treatment needs and access among female sex workers and non-sex workers in Pretoria, South Africa. *Substance Abuse Treatment, Prevention, and Policy*, *4*, 11. https://doi.org/10.1186/1747-597X-4-11

Weibel, D., Schelling, E., Bonfoh, B., Utzinger, J., Hattendorf, J., Abdoulaye, M., … Zinsstag, J. (2008). Demographic and health surveillance of mobile pastoralists in Chad: Integration of biometric fingerprint identification into a geographical information system. *Geospatial Health*, *3*(1), 113–124. https://doi.org/Public Health and Epidemiology, Human and Animal Health

Weitzer, R. (2018). Resistance to sex work stigma. Sexualities, 21(5–6), 717–729. https://doi.org/10.1177/1363460716684509

White, E. B., Meyer, A. J., Ggita, J. M., Babirye, D., Mark, D., Ayakaka, I., … Davis, J. L. (2018). Feasibility, Acceptability, and Adoption of Digital Fingerprinting During Contact Investigation for Tuberculosis in Kampala, Uganda: A Parallel-Convergent Mixed-Methods Analysis. *Journal of Medical Internet Research*, *20*(11), e11541. https://doi.org/10.2196/11541

Williams, B. G., & Gouws, E. (2001). The epidemiology of human immunodeficiency virus in South Africa. *Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences*, *356*(1411), 1077–1086. https://doi.org/10.1098/rstb.2001.0896

Williamson, K. (2018). Research concepts. In Research Methods (pp. 3–25). Elsevier. https://doi.org/10.1016/B978-0-08-102220-7.00001-7

Wojcicki, J. M., & Malala, J. (2001). Condom use, power and HIV/AIDS risk: Sex-workers bargain for survival in Hillbrow/Joubert Park/Berea, Johannesburg. *Social Science & Medicine*, *53*(1), 99–121.

Wolff, B., Knodel, J., & Sittitrai, W. (1993). Focus Groups and Surveys as Complementary Research Methods: A Case Example. *Successful Focus Groups: Advancing the State of the Art*, pp. 118–136. http://dx.doi.org/10.4135/9781483349008

Woodword, J. (2003). *Biometrics: The Ultimate Reference*. Dreamtech Press.

Wysocki, D. K. (2008). *Readings in Social Research Methods*. Boston: Cengage Learning.

Yu, K.-L., Chen, C.-C., Chang, W.-S., Juma, H., & Chang, C. S. (2005). Fingerprint identification of AIDS patients on ART. *Lancet*, *365*(9469), 1466. https://doi.org/10.1016/S0140-6736(05)66415-X

Zuniga, A. E. F., Win, K. T., & Susilo, W. (2010). Biometrics for electronic health records. *Journal Of Medical Systems*, *34*(5), 975–983.

Appendix 1: Participant letter: questionnaire

Title: Assessing the acceptability of biometrics (fingerprint system) in HIV prevention programme by Hillbrow sex workers

Dear Prospective Respondent,

You are hereby invited to participate in a focus group discussion. This questionnaire is administered by Shepherd Nyamhuno a student from the Masters of Management Part-Time programme. The purpose of the questionnaire is to collect data with regards to the acceptability of biometrics in the HIV prevention programme.

This survey is entirely voluntary and the data collected is kept confidentially. As a participant, you will not be required to write your name or any information that reveals your identity so that your identity remains unknown. You may at any point opt out of this research process and the information that you submitted will not be used. There will no penalties for opting out. There are no rewards for participating in the interview as well.

Thank you very much,

Shepherd Nyamhuno
Student No. 711699
Email: snyamhuno@gmail.com
Cell: 078 422 9666

Appendix 2: Participant letter: focus group discussion

Title: Assessing the acceptability of biometrics (fingerprint system) in HIV prevention programme by Hillbrow sex workers

Dear Prospective Respondent,

You are hereby invited to participate in a focus group discussion. This discussion is chaired by Shepherd Nyamhuno, a student from the Masters of Management Part-Time programme. The purpose of the discussion to collect data with regards to the acceptability of biometrics in the HIV prevention programme.

This discussion is entirely voluntary and the data collected is kept confidentially. As a participant, you will not be required to say out your name or any information that reveals your identity so that your identity remains unknown. You may at any point opt out of this research process. There are no penalties for quitting the discussion. There are also no rewards for taking part in the interview.

Thank you very much,

Shepherd Nyamhuno
Student No. 711699
Email: snyamhuno@gmail.com
Cell: 078 422 9666

Appendix 3: Participant letter: employee interviews

Title: Assessing the acceptability of biometrics (fingerprint system) in HIV prevention programme by Hillbrow sex workers

Dear Prospective Respondent,

You are hereby invited to participate in an in-depth interview about the sex workers the work that you are doing with the sex workers. This interview is conducted by Shepherd Nyamhuno, a student from the Masters of Management Part-Time programme. The purpose of the interview is to find out how you relate to the sex workers who come to Esselen Street Clinic.

This interview is entirely voluntary and the data collected is kept confidentially. As a participant, you will not be required to say out your name or any information that reveals your identity so that your identity remains unknown. You may at any point opt out of this research process. There are no penalties for quitting the discussion. There are also no rewards for taking part in the interview.

Thank you very much,

Shepherd Nyamhuno
Student No. 711699
Email: snyamhuno@gmail.com
Cell: 078 422 9666

Appendix 4: Consent Form for questionnaire

Consent Form

Title of Project: **Assessing the acceptability of biometrics in HIV prevention programme by Hillbrow sex workers**

Purpose: To find out how sex workers feel about biometric being used at a clinic

Name of Researcher: **Shepherd Nyamhuno**

I confirm that (please tick box as appropriate):

1.	I have been informed about the research and its purpose	☐
2.	I am above the age of 18	☐
3.	I am a sex worker	☐
4.	I have been given the opportunity by the researcher to ask some questions that I had about his research	☐
5.	I voluntarily agree to participate in this research as a respondent	☐
6.	I fully understand that I have the right to withdraw from this interview	☐
7.	I have been informed about the confidential nature of this interview	☐
8.	I agree to take part in the questionnaire	☐
9.	I have been assured that this data will not be used for any purpose other than this research	☐
10.	I do not wish for my name to be used in the write-up to this research	☐

Appendix 5: Consent Form for focus group discussion

Consent Form

Title of Project: **Assessing the acceptability of biometrics in HIV prevention programme by Hillbrow sex workers**

Purpose: To find out how sex workers feel about biometric being used at a clinic

Name of Researcher: **Shepherd Nyamhuno**

I confirm that (please tick box as appropriate):

1.	I have been informed about the research and its purpose	☐
2.	I am above the age of 18	☐
3.	I am a sex worker	☐
4.	I have been given the opportunity by the researcher to ask some questions that I had about his research	☐
5.	I voluntarily agree to participate in this research as a respondent	☐
6.	I fully understand that I have the right to withdraw from the discussion	☐
7.	I have been informed about the confidential nature of this discussion	☐
8.	I agree to take part in the questionnaire	☐
9.	I agree for the focus group discussion to be audiotaped	☐
10.	I have been assured that this data will not be used for any purpose other than this research	☐
11.	I do not wish for my name to be used in the write-up to this research	☐

Appendix 6: Consent Form for employee interviews

Consent Form

Title of Project: **Assessing the acceptability of biometrics in HIV prevention programme by Hillbrow sex workers**

Purpose: To find out how Esselen Street Clinic relates to the sex workers

Name of Researcher: **Shepherd Nyamhuno**

I confirm that (please tick box as appropriate):

1.	I have been informed about the research and its purpose	☐
2.	I am an employee of Esselen Street Clinic	☐
3.	I interact with sex workers	☐
4.	I have been given the opportunity by the researcher to ask some questions that I had about his research	☐
5.	I voluntarily agree to participate in this research as a respondent	☐
6.	I fully understand that I have the right to withdraw from the discussion	☐
7.	I have been informed about the confidential nature of this discussion	☐
8.	I agree to take part in the interview	☐
9.	I agree for the interview to be audiotaped	☐
10.	I have been assured that this data will not be used for any purpose other than this research	☐
11.	I do not wish for my name to be used in the write-up to this research	☐

Appendix 7: Questionnaire

A. Demographic information

1. Sex: Male ☐ Female ☐ Transgender ☐ Prefer not to say ☐
2. Race: Black ☐White ☐ Colored ☐ Asian ☐ Other/Unspecified ☐
3. Are you a South African national? Yes☐ No ☐ Prefer not to say ☐
4. Age_____ Prefer not to say ☐

	A. General Questionnaires	Yes	No
1	Do you trust the clinical staff?	☐	☐
2	Have you given clinic your identity document or passport?	☐	☐
3	Have you used the correct name at the clinic?	☐	☐
4	Do you have good relations with the police?	☐	☐

B. PERCEPTIONS	strongly agree	agree	uncertain/ not applicable	disagree	strongly disagree
1. Fingerprint systems are linked to the police	☐	☐	☐	☐	☐
2. Fingerprints cannot lie	☐	☐	☐	☐	☐
3. Criminals can steal your fingerprints	☐	☐	☐	☐	☐
4. Giving away my fingerprints will violate my privacy	☐	☐	☐	☐	☐
5. My fingerprint will end up in the hands of the police	☐	☐	☐	☐	☐
6. My fingerprints will end up in the hands of someone that knows me	☐	☐	☐	☐	☐
7. I am scared of using fingerprints in HHP	☐	☐	☐	☐	☐
8. I think someone at the clinic will give away my fingerprint to someone else.	☐	☐	☐	☐	☐

C. ACCEPTABILITY	strongly agree	agree	uncertain / not applicable	disagree	strongly disagree
1. Fingerprint registration systems are safe for us to use in the clinic	☐	☐	☐	☐	☐
2. If a fingerprint system is used in the clinic I will continue to use the clinic	☐	☐	☐	☐	☐
3. If a fingerprint registration system is introduced I will change to a clinic where it is not there	☐	☐	☐	☐	☐
4. I am afraid of giving my fingerprint to HHP	☐	☐	☐	☐	☐
5. A fingerprint at a clinic will not affect my access to health services	☐	☐	☐	☐	☐

Appendix 8: Focus group discussion questions

Duration: 1 hour

1. Which clinic do we go to when we fall sick?
2. What is the general attitude of staff towards us?
3. What documents do you use to register in the records of the clinic?
4. Do you use your real name at the clinic?
5. Describe the kind of treatment that you receive at the clinic?
6. Does the clinic staff treat you with the dignity that you deserve?
7. Do you give correct personal identification at the clinic?
8. What has your experience been at the hands of the police?
9. What do you think you will do if the Esselen Street Clinic will require you to access the service by identifying yourself with a fingerprint?
10. Do you think registering at Esselen Street Clinic using fingerprints will get you arrested?
11. Do you think someone else someone else with bad intentions will get the fingerprint data put you in danger?

Appendix 9: Employee interview questions

Duration: 1 hour

1. How long have you worked at Esselen Street Clinic?
2. What type of services do you offer to sex workers?
3. What difference do you think you are making in the sex workers' lives?
4. What challenges do you face in working with sex workers?
5. What makes Esselen Street Clinic stand out to be the best sex worker clinic?
6. How do you ensure that you retain the sex workers in your care?
7. In your own view what makes Esselen Street Clinic so attractive to sex workers?

Appendix 10: Participants Information Sheet: Focus Group

Good day,

My name is Shepherd Nyamhuno and I am a Wits University Students doing a post grad in M&E. I am hereby conducting a group discussion for my research on sex workers. May I kindly invite you to participate in the focus group discussion which will take approximately 1 hour of your time.

Purpose of the study:

The purpose of this study is to find out how sex workers feel when they use a fingerprint recognition system in accessing health services at Esselen Street Clinic in Hillbrow. This study investigates various experiences that sex workers have had while attending at Esselen Street Clinic. It looks at their perceptions of the attitudes of the staff members and looks at finding out the extent to which sex workers trust the staff at the clinic. More importantly, do their past experiences at the clinic determine their acceptance of fingerprint reading machine if it is made a requirement to access medical services?
The focus group discussion will thrust finding more of what is said in a questionnaire. In the discussion on the focus group, the researcher will be asking for the participants to elaborate more on issues that will be coming up.

Finally, the researcher would like to know what sex workers think about fingerprint readers. The researchers would like to explore how sex workers think about a fingerprint when it is used a way to identify them. In short, the research wants to know if a fingerprint reading machine will affect the way sex workers access health services. The researcher would wish to inform you that the discussion is a closed space and therefore he asks you to respect it, if you go on to participate in it. That means to say what is discussed there will be left there and not discussed outside the discussion meeting.

The researcher wishes to inform you that you have the right to withdraw from the focus group discussion at any point should you wish to do so. During the discussion, you don't always have to answer every question that is paused. There are no rewards for

taking part in this group discussion and there are also no penalties for not taking part in it.

If you require counselling after this discussion, please contact

1.SWEAT on 0800 60 60 60 and talk to friendly counsellors. You can also visit

S**WEAT** Johannesburg Offices on

9th Floor OPH House

112 Main Street

Johannesburg

2. **Thuthuzela Care centre**

011 909 1002

3. Sophiatown Community Psychological Services
011 482 8530

All the services above are offered for free

Here are the other contacts;

For more information about this research please contact

Academic Supervisor

Name: Murray Cairns

Phone: 27 11 717 3689.

Email : Murray.Cairns@wits.ac.za

Researcher

Name: Shepherd Nyamhuno

Student #: 611799

Cell phone is 068 422 9666

Email: snyamhuno@gmail.com

Thank you,

Regards,

Shepherd Nyamhuno

Appendix 11: Participants Information Sheet: Questionnaire

Good day,

My name is Shepherd Nyamhuno and I am a Wits University Students doing a post-grad in M&E. I am hereby conducting interviews for my research on sex workers. May I kindly ask you to take part in the questionnaire which may take approximately 15 minutes to complete.

Purpose of the study:

The purpose of this study is to find out how sex workers feel when they use a fingerprint recognition system in accessing health services at Esselen Street Clinic in Hillbrow. This study investigates various experiences that sex workers have had while attending at Esselen Street Clinic. It looks at their perceptions of the attitudes of the staff members and looks at finding out the extent to which sex workers trust the staff at the clinic. More importantly, do their past experiences at the clinic determine their acceptance of fingerprint reading machine if it is made a requirement to access medical services?

The questionnaire asks of the experiences of the sex workers at the hands of the police while working in Hillbrow. It asks for the experience of sex workers while attending the clinic at Esselen Street clinic.

Finally, the researcher would like to know what sex workers think about fingerprint readers. The researchers would like to explore how sex workers think about a fingerprint when it is used as a way to identify them. In short, the research wants to know if a fingerprint reading machine will affect the way sex workers access health services.

The researcher wishes to inform you that you have the right to withdraw from the focus group interview at any point should you wish to do so. While completing the questionnaire, you don't always have to answer for every question that is paused. There are no rewards for taking part in this interview and there are also no penalties for not taking part in the interview.

If you require counselling after this interview, please contact

1.SWEAT on 0800 60 60 60 and talk to friendly counsellors. You can also visit

S**WEAT** Johannesburg Offices on

9th Floor OPH House

112 Main Street

Johannesburg

2. **Thuthuzela Care centre**

011 909 1002

3. Sophiatown Community Psychological Services
011 482 8530

All the services above are offered for free

Here are the other contacts;

For more information about this research please contact

Academic Supervisor

Name: Murray Cairns

Phone: 27 11 717 3689.

Email : Murray.Cairns@wits.ac.za

Researcher

Name: Shepherd Nyamhuno

Student #: 611799

Cell phone is 068 422 9666

Email: snyamhuno@gmail.com

Thank you,

Regards,

Shepherd Nyamhuno

Appendix 12: Participants Information Sheet: Employee interviews

Good day,

My name is Shepherd Nyamhuno and I am a Wits University Students doing a post-grad in M&E. I am hereby conducting interviews for my research on sex workers. May I kindly ask you to take part in an interview which takes approximately 1 hour.

Purpose of the study:

This interview is a follow up on the data collected from sex workers about the acceptability of the biometrics at Esselen Street Clinic by the sex workers. The researcher seeks to investigate how you relate to sex workers as an organisation. It seeks to understand the reasons behind some of the findings the focus group and questionnaires by further investing the type of services that you give to the services and how you treat them.

For more information about this research please contact;

Academic Supervisor
Name: Murray Cairns
Phone: 27 11 717 3689.
Email: Murray.Cairns@wits.ac.za

Researcher
Name: Shepherd Nyamhuno
Student #: 611799
Cell phone is 068 422 9666
Email: snyamhuno@gmail.com

Thank you,
Regards,
Shepherd Nyamhuno

Appendix 13: Ethics clearance certificate

Research Office

HUMAN RESEARCH ETHICS COMMITTEE (NON-MEDICAL)
R14/49 Shepherd

CLEARANCE CERTIFICATE	**PROTOCOL NUMBER: H17/02/26**
PROJECT TITLE	Assessing the acceptability of biometrics in a HIV prevention program by Hillbrow sex workers
INVESTIGATOR(S)	Mr N Shepherd
SCHOOL/DEPARTMENT	Wits School of Governance/
DATE CONSIDERED	17 February 2017
DECISION OF THE COMMITTEE	Approved
EXPIRY DATE	28 March 2020

DATE 29 March 2017 **CHAIRPERSON** J. Knight
(Professor J Knight)

cc: Supervisor : Professor M Cairns

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10004, 10th Floor, Senate House, University. Unreported changes to the application may invalidate the clearance given by the HREC (Non-Medical)

I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. **I agree to completion of a yearly progress report.**

Signature

30 / 03 / 2017
Date

PLEASE QUOTE THE PROTOCOL NUMBER ON ALL ENQUIRIES