

https://dspace.org/

Influence of migrant status on HIV sexual risk behaviours in Chókwè district, Mozambique

Pereira, Emanuel

2021
https://hdl.handle.net/10539/33452

Downloaded from a DSpace repository. https://dspace.org/

University of the Witwatersrand

Faculty of Health Sciences

School of Public Health

Research Report

Influence of migrant status on HIV sexual risk behaviours in Chókwè district, Mozambique

Student Name:
Emanuel Pereira

Student Number:
1925417

Student´s Supervisor:
Nicola Christofides, MPH, PhD

A research report submitted to the School of Public Health of the University of Witwatersrand in partial fulfilment of the requirements for the degree of Master of Public Health.

September 2021

Declaration

I, Emanuel Novais Pereira, declare that this dissertation is my original work. It is submitted in partial fulfilment of the requirements for the degree of Master of Public Health, in the field of Social and Behaviour Change Communication, at the Faculty of Health Sciences of the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination to this or any other university.

Emanuel Novais Pereira

14/09/2021

Abstract

Introduction: Migration has been identified as a factor that contributes to the spread of HIV, including in Eastern and Southern Africa. With an adult HIV prevalence of 13%, Mozambique has a generalized epidemic unequally distributed across its 11 provinces, with those located in the southern part of the country bearing the highest rates of infection. Gaza province has the highest adult HIV prevalence (24.4%) and has historically been marked by high trends of out-migration. Regional studies focused on migrant miners have demonstrated possible associations with the epidemic, but little is known in terms of the broader relationship between migrancy and HIV sexual risk behaviours and status beyond the mining sector. Using data from a health demographic surveillance system installed in Gaza´s district of Chókwè, this study investigated the possible influence that migration had on sexual risk behaviours and HIV status among men and women who migrated to other regions within Mozambique or to South Africa in the year that preceded data collection.

Methods: A secondary analysis was conducted using data gathered in four rounds of HIV surveillance in the Chókwè Health and Demographic Surveillance System, between 2014 and 2017. Descriptive statistics were used to describe the sociodemographic characteristics of migrant and non-migrant populations aged ≥15 years and sexually initiated living in Chókwè district at the time of data collection. Univariate and multivariable analyses were conducted to investigate possible associations between migration experience and sexual risk behaviours and HIV status while controlling for potential confounders such as age and relationship status.

Results: A total of 12,581 participants were included in the data analysis, of which 9,031 were women (71.78%) and 3,550 were men (28.22%). About 961 people reported to have lived for more than one month outside of Chókwè district in the 12 months that preceded data collection. Of these participants classified as migrants, 463 (men:210; women:253) were internal migrants and 449 (men:139; women: 310) had migrated to South Africa. Internal migration and migration to South Africa were found to be statistically associated with increased reporting of multiple sexual partnerships among men and women in both the bivariate and logistic regression analysis. Consistent condom use was low among all participants, but it was associated in the bivariate analysis with both internal migrant men and women ($p \leq 0.002$). The multivariate logistic regression, however, showed that consistent condom use was only statistically significant among internal migrant men (aOR=1.52, 95% CI 1.07 – 2.14, P=0.017). The analysis of symptoms suggestive of a sexually transmitted infection showed mixed results with the multivariate logistic regression demonstrating an association between reporting of abnormal discharge from genitals with internal migrant women (aOR=1.51, 95% CI 1.12 – 2.20, P=0.009) and genital sores with men who had migrated to South Africa (aOR=1.71, 95% CI 1.06 – 2.75, P=0.025). As for HIV status, a prevalence of 26.73% was estimated among the study's participants, with a higher rate among

women (29.64%) in comparison with men (19.10). At the exception of women who had migrated to South Africa (36.70%), the HIV prevalence was in generally lower among migrant participants, but the logistic regression model showed that the odds of being infected was identical for both migrant and non-migrant participants.

Conclusions: Overall, this study has demonstrated that out-migrant populations of Chókwè district have increased sexual risk behaviours that are known to lead to HIV acquisition. It also showed that the odds of being HIV-positive was identical among migrant and non-migrant populations, which should be interpreted considering the epidemiological profile of the Chókwè district marked by a high HIV prevalence and a well-established and matured epidemic. Results point to the need of further investing in health programs that adequately address migrant population sexual and reproductive health needs, and particularly beyond the mining sector and those specific to migrant women.

Acknowledgements

The development of a research report such as the one presented here is in essence a solitary experience that allows us to explore our individual strengths, capacities, and limitations. This individual journey is, nonetheless, greatly influenced by the personal, academic and professional contacts that we maintain throughout the research process, and its success is partly a result of all the contributions one receives. In this sense, I hope with the following words to thank all the people and entities that supported me in completing my research project:

To my partner, Marta Botelho, and my daughter, Camila Botelho Pereira, I dedicate this work as it is ultimately the result of your permanent and unlimited encouragement, support, and patience.

To Dr. Nicolas Christofides, I want to offer my sincere gratitude for all the support and technical guidance that made it possible to define and accomplish the research project. Your willingness to share knowledge, and your friendliness, openness, and humility, were determining motivational factors that kept me on track to accomplish the objectives of the research project.

To all the colleagues to whom I have turned to for clarifying occasional doubts about research methodologies, a big thank you for putting your time and knowledge at my disposal.

To the *Centro de Investigação e Treino em Saúde do Chókwè* and the U.S. Centers for Disease Control and Prevention, thank you for believing in the value of my research proposal and for allowing me to conduct a secondary analysis of the Chókwè's Health Demographic and Surveillance System data.

To all the participants of the Chókwè's Health Demographic and Surveillance System, thank you for your enormous contribution to improving public health in Mozambique.

To all my family and friends, thank you so much for your continued support and the interest that you have demonstrated on my research work.

Table of Contents

Declaration ii
Abstract iii
Acknowledgements v
List of Tables viii
Acronyms ix
1. Introduction 1
1.1. Literature Review 2
1.1.1 Mozambique's HIV epidemiological profile 2
1.1.2 Association between migration and HIV 4
1.1.3 Migration and HIV in Mozambique and Gaza province 5
1.1.4 HIV and sexual risky behaviours 7
1.2 Problem statement 9
1.5 Study aim 10
1.6 Study objectives 10
2. Methodology 11
2.1 Study design 11
2.2 Study site 11
2.3 Study population 12
2.4 Study sample 12
2.5 Data collection 13
2.6 Measurement of variables 13
2.7 Data Management 15
2.8 Data Analysis Plan 15
2.9 Ethical considerations 16
3. Results 17
3.1 Sociodemographic characteristics and migrant status information of study's participants 17
3.2. Sociodemographic characteristics of study´s participants by migrant status 19
3.2.1 Sociodemographic characteristics of all migrant participants 19
3.2.2 Migration duration 20
3.2.3 Sociodemographic characteristics of internal migrant participants 21
3.2.4 Sociodemographic characteristic of participants who migrated to South Africa 22
3.3. Study's participants HIV status and sexual risk behaviours 23
3.4. Study participants' HIV status by sociodemographic characteristics 26
3.5 HIV status by study participants' migrant status 27

3.6 Study participants' HIV sexual risk behaviours by sociodemographic characteristics 28
3.6.1 Multiple sexual partnerships 28
3.6.2 Consistent condom use 30
3.6.3 Symptoms of sexually transmitted infections 31
3.7 HIV sexual risk behaviours by migrant status 34
3.7.1 Multiple sexual partnerships 34
3.7.2 Consistent Condom Use 36
3.7.3 Symptoms of sexually transmitted infections 37
3.8 Multivariate Logistic Regression: Associations between migration and HIV risk behaviours and HIV status 39
3.8.1 All forms of migration 40
3.8.2 Internal Migration 41
3.8.3 Migration to South Africa 43
4. Discussion 46
4.1 Study participants' sociodemographic characteristics 46
4.2 Study participants' HIV sexual risk behaviours 48
4.2.1 Multiple Sexual Partnerships 48
4.2.2 Consistent Condom Use 50
4.2.3 Sexually Transmitted Infections 51
4.2.4 Study participants' HIV status 53
4.3 Limitations 55
5. Conclusions and recommendations 55
5.1 Conclusion 55
5.2 Recommendations 56
6. References 58
7. Appendices 65
Appendix 1 – Primary Study Questionnaire (extractions of the relevant sections to the secondary data analysis) 65
Appendix 2 – Ethics Approval HREC (Medical) Clearance Certificate N. 191105 78
Appendix 3 – Signed Plagiarism Form 79

List of Tables

Table 1: Participation HTS 12
Table 2: Variables of the secondary data analysis 13
Table 3: Data analysis plan 16
Table 4: Sociodemographic characteristics of study participants 18
Table 5: Migrant status of study´s participants 19
Table 6: Sociodemographic characteristics of all migrant participants 20
Table 7: Sociodemographic characteristics of participants by duration of migration 21
Table 8: Sociodemographic characteristics of internal migrants 22
Table 9: Sociodemographic characteristics of participants who migrated to South Africa 23
Table 10: Study's participants HIV status and sexual risk behaviours 25
Table 11: Study's participants HIV status by sociodemographic characteristics 27
Table 12: Study's participants HIV status by migrant status 28
Table 13: Multiple sexual partnerships by sociodemographic characteristics of study´s participants 30
Table 14: Consistent condom use by sociodemographic characteristics of study´s participants 31
Table 15: Abnormal discharge from genitals by sociodemographic characteristics of study´s participants 33
Table 16: Genital sores by sociodemographic characteristics of study´s participants 34
Table 17: Study´s participants sexual partnerships by migrant status 36
Table 18: Consistent condom use by study´s participants migrant status 37
Table 19: Abnormal discharge from genitals by study´s participants migrant status 38
Table 20: Sores in genital area by study´s participants migrant status 39
Table 21: Summary Results of Logistic Regression Models for the association between all forms of migration and HIV risk behaviours, symptoms of STIs, and HIV status, adjusting for age and marital status 41
Table 22: Summary Results of Logistic Regression Models for the association between internal migration and HIV risk behaviours, symptoms of STIs, and HIV status, adjusting for age and marital status 43
Table 23: Summary Results of Logistic Regression Models for the association between migration to South Africa and HIV risk behaviours, symptoms of STIs, and HIV status, adjusting for age and marital status 45

Acronyms

AIDS	Acquired immunodeficiency syndrome
AOR	Adjusted odds ratio
CDC	U.S. Centers for Disease Control and Prevention
CI	Confidential Interval
CITSC	Centro de Investigação e Treino em Saúde do Chókwè
HDSS	Health and Demographic Surveillance System
HIV	Human immunodeficiency virus
HPS	HIV Prevention Survey
HTS	HIV testing and counselling
IBBS	Integrated biological and behavioural survey
IMASIDA	Inquérito de Indicadores de Imunização, Malária e HIV/SIDA em Moçambique
INS	Mozambican National Institute of Health
PLHIV	People Living with HIV
UNAIDS	Joint United Nations Programme on HIV/AIDS
WHO	World Health Organization

1. Introduction

Over the past decade, the global response to the HIV pandemic has resulted in significant reductions in new annual infections and AIDS-related deaths(1). Progress in expanding prevention and treatment programs has dramatically increased the number of people living with HIV (PLHIV) receiving life-saving antiretroviral therapy (ART). The Joint United Nations Programme on HIV/AIDS (UNAIDS) estimates indicate that 26 million out of 38 million PLHIV were enrolled in an HIV treatment program as of June 2020(2). Still, the global response is not advancing at the same pace across regions and countries, with significant variations that result in HIV remaining a major public health threat(2, 3). These discrepancies pose a serious risk to the world's ability to meet the HIV/AIDS pandemic control targets set by UNAIDS for 2030(4).

The Eastern and Southern Africa region is disproportionately affected by the HIV epidemic and is home to 54.4% (20.7 million) of all PLHIV in the world(2). It is also the region in which more new annual HIV infections occur worldwide, despite a reduction of 38% in new cases since 2010(2, 3). In 2019 alone, 51% (870,000) of the estimated 1.7 million new global infections occurred in this region(2). As in other neighbouring countries, Mozambique has a generalized HIV epidemic that affects 13% of its population over 15 years old(5). Approximately 150,000 new HIV infections occur each year in the country, making it the second largest contributor (17.2%) after South Africa (29.8%) to all new cases registered annually in the Eastern and Southern Africa region(2).

The epidemic in Mozambique is unequally distributed across its 11 provinces, with Gaza bearing the highest adult HIV prevalence at 24.4%(5). Located in the country's southern region, Gaza´s socioeconomic profile is marked by high poverty rates in which family farming represents the primary form of income and labour migration offers families an alternative to escape economic deprivation(6-9). Historically, Gaza has been marked by high trends of out-migration both to urban areas within the Southern region of Mozambique and to neighbouring South Africa(8-10). The HIV prevalence in Gaza's district of Chókwè is known to be of the highest in the country and in 2017 was estimated to be of 25.6% among the adult population between the ages of 15-59 years old(11). As in other southern regions of Mozambique, the high HIV prevalence in Chókwè district has been associated with population mobility, and particularly male labour migration(12-18). The relationship between migration and HIV has been studied in Mozambique with a particular focus on migrant miners working in South Africa, including in Chókwè district, demonstrating that this population is at high risk of HIV acquisition due to prevalent high sexual risk behaviours(10, 13-15, 17-21). Other studies have also highlighted the influence that male migration to the mining sector has on the increased vulnerability of their female partners to HIV infection(15, 16, 19, 20, 22). These findings are aligned with various studies around HIV and migrant miners conducted in South Africa and its neighbouring countries that have traditionally been a source of human resources to the South African mining industry(23-25).

There is a broad scientific consensus on the influence that population mobility has had in the global spread of HIV until the virus gained the status of a pandemic(26-31). Population mobility is a critical factor in explaining how HIV reached a global scale(29-31). This scientific recognition has motivated a vast number of research that sought to determine how migration influences the ability of the epidemic to spread(32-37). It has also demonstrated that HIV control health policies must not only seek to mitigate the risks of infection among migrant populations, but also respond to the root causes that motivated migration in the first place, including those related with economic and political instability(36, 38). The risk of contracting HIV does not depend solely on the act of migrating, but rather on the vulnerability of migrant populations during their migratory journeys, and on the sociocultural context of the communities in which they settle at the migration destination, which ultimately may influence their sexual behaviour(38, 39).

Considering the prevailing hypotheses that migration is a determinant of the unequal spread of the HIV epidemic in Mozambique, this study uses data from a health demographic surveillance system installed in the Chókwè district to investigate the possible influence that migration has on sexual risk behaviours and HIV prevalence among out-migrant populations of this region. In a community greatly exposed to migration and with a high HIV prevalence, understanding the possible influence that mobility has at a population level on sexual risk behaviours and HIV prevalence, and in particular beyond men and the mining sector, will assist the development of public health policies that can respond more effectively to the epidemic.

1.1. Literature Review

1.1.1 Mozambique's HIV epidemiological profile

Mozambique is an African country located in the southeast region of the continent with an estimated population of about 30.8 million people, of which 45.4% are under the age of 15 years old(40). Close to two-thirds of Mozambique's population lives in rural areas, and the predominant economic activity is associated with family farming and artisanal fishing and is, therefore, highly dependent on natural resources(41, 42). Poverty affects a significant portion of the population, with about 46.1% of the nation's inhabitants living below the poverty line, accordingly to the United Nations(42). Approximately 40% of the country's adult population cannot read and write and the literacy rate is higher among men (72.5%) than among women (50.2%)(43).

Most of the Mozambican population accesses health care through the National Health Service, which was established in the country after it gained independence from the Portuguese colonial regime in 1975(44). The country's public health system was severely affected by a civil war that followed the independence and lasted until 1992, and its impact is still pointed out today as one of the reasons why Mozambique´s health indicators lag behind those of other countries in the region(45, 46). Currently,

Mozambique has a network of 1674 health centres, 14 provincial-level hospitals, and 51 district-level hospitals, most of which offer primary health care services(47). The shortage of skilled health human resources is one of the main barriers to quality health care delivery. According to the World Health Organization (WHO), in 2018, the ratio of medical doctors per 100,000 people was 8.4, while that of nurses was 29.1(48). In this same year, the average life expectancy was around 62 years for women and 55 years for men(43). Malaria, HIV/AIDS, Tuberculosis and neonatal disorders are the leading causes of death in the country, whose health sector funding is deficient and represents about $34 per inhabitant(49). The shortfall in government funding for health is further aggravated by a heavy dependence on external resources, which are mostly directed towards supporting HIV/AIDS, Tuberculosis, and Malaria health programs(50).

Thirty-five years after the first case of AIDS was diagnosed in Mozambique, the country is home to approximately 2.2 million people living with HIV, of which 150,000 are under the age of 15 years(2). In relation to the UNAIDS 90-90-90 objectives cascade, in 2020, 77% of all people living with HIV in the country were aware of their HIV positive status, of which 77% were receiving antiretroviral treatment, and of which 75% had a suppressed HIV viral load result(2). The epidemic in the country is mostly driven by heterosexual infections and is more prevalent among women (15.1% in comparison with 10.2% among men)(5). In addition to biological-related attributes that facilitate the virus acquisition, various cultural, social, and political factors contribute to the greater vulnerability of women to HIV infection in Mozambique(51). Aspects such as poverty, lower level of education and access to employment opportunities, intergenerational and transactional sex, and gender-based violence are determinants that have been identified as facilitators of HIV infection among Mozambican women(52-55). Additionally, and although with regional level variations, social norms that normalize multiple and concurrent sexual partnerships also contribute to risky sexual behaviours that lead to HIV transmission(56-58). Combined with low comprehensive HIV knowledge (only 31% of adult men and 30% of women) and a low prevalence of condom use (even among people who report multiple sexual partnerships, condom use is reported among less than 30% of men and women), HIV transmission remains at an alarming level of over 400 new daily infections(2, 5). Furthermore, large gender disparities remain in access to HIV care and treatment services with 66% of men (versus 86% of women) living with HIV being aware of their HIV status, and, of these, only 70% taking antiretroviral treatment (in contrast with 79% among women)(2). Viral suppression among people on antiretroviral treatment is also lower among men (75%) than among women (78%), further increasing men´s risk of HIV transmission. Underpinned by masculinity norms that encourage risky sexual behaviour and limit access to health services, the lack of awareness of their HIV-positive status in combination with low retention rates on antiretroviral treatment and viral suppression among those who are aware, place

men, and in particular young and asymptomatic men, as a critical source of new HIV infections in the country, and especially among adolescent girls and young women aged 15-24 years old(57, 59).

1.1.2 Association between migration and HIV

Population mobility and migration are correlated with health at the individual and population level, and particularly in today's globalized societies(60). This dynamic results in public health threats reaching a global prevalence in a short period of time and requires international and national policies that allow for a coordinated and rapid response by different countries and international-level health bodies(60). Population mobility and migration interrelate with people's health through determinants that encompass biological and genetic, social, political and economic, and behavioural factors(60). Hence, its impact varies greatly between individuals and populations, posing a sizable challenge to the success of health policies and interventions in this context.

The study of the determinants of HIV/AIDS has placed emphasis on population mobility and migration, and there is broad consensus of an association that favours the virus' ability to spread from one geographic space or population group to another(32, 33, 35, 36). This assumption is reflected and evidenced in a vast literature that seeks to ensure a thorough understanding of the origins of HIV, its path up to gaining a pandemic status, and the influence that mobility has exerted on different regional and national epidemics to the present day(26-31). Similarly, it influences international and national HIV/AIDS response policies, and warrants attention from bodies such as UNAIDS, which describes population mobility as having the potential to increase individuals' vulnerability to HIV infection(38). This vulnerability is greater among undocumented migrants but is also exacerbated by issues such as barriers to accessing health services, and especially HIV prevention and treatment services, livelihood conditions, language barriers, poor social support, and human rights violations(38).

Additionally to research findings that establish the sub-Saharan African region as the starting point of the HIV pandemic, the study of the spread of the virus in the region has shown a relationship to corridors of population movement that are driven by the search for better living conditions, growth of urban areas, and political instability and natural-related events that can lead to the displacement of populations from their residential areas of origin (33, 61-63). Effectively, population mobility is also considered to help explain why the epidemiological context of HIV varies considerably between countries and internal regions(25). From this perspective, the spread of the epidemic is contextualized in two moments, the first of which runs until the year 2000, and is marked by the regional expansion of the virus, and the second, which extends to the present day, and which is characterized by the epidemic settlement and maturation in the different countries(25, 64). Concurrently, the relationship between HIV and mobility is also widely studied from the perspective of population groups who are at particularly high risk of exposure to the virus because of the living conditions they encounter at the

destination of migration. Such an approach has been particularly targeted at migrant populations working in the mining industry in South Africa, resulting in a vast number of publications that evidence the disproportionate risk to HIV infection to which these workers are exposed(18, 23, 24, 65).

The inferences drawn from these studies have limited the full understanding of the effect that migration has on the HIV epidemic, including in the sub-Saharan African context. In addition to issues related to the study designs, some authors argue that these research methodologies lack approaches that address the conceptualization of population mobility, including a specific focus on the migrants' sociodemographic characteristics, the factors that motivate migration, the social context of migrants' regions of destination and origin, as well as other determinants that influence the risk of HIV infection, including those of a behavioural nature(32, 64). Concurrently, recommendations are also made for future investigations to account for aspects related to the heterogeneity of migrant populations, the various forms of mobility, and the epidemiological stage of HIV in the regions where the studies occur(64).

1.1.3 Migration and HIV in Mozambique and Gaza province

Internal mobility in Mozambique has followed the globally observed pattern of population movement from rural to urban areas, with an average annual urbanization rate of about 3.3%, according to estimates from the United Nations Human Settlements Programme(66). Internal migration in the country is framed in two distinct phases in the period that followed independence in the mid-1970s(67). As a result of the civil war (1976-1992), the population movement from rural to urban areas was primarily motivated by fleeing the conflict and seeking safety in the cities, which were protected by government military forces(7, 67). After the peace agreements between the two belligerent factions and the introduction of a democratic political system, since 1994, migration was been mostly spurred by economic reasons, and relied on family networks already established in the migration destinations, which facilitates the integration of newcomers(67). Given the difficulties of the governmental authorities to manage the two migratory waves and to create adequate housing conditions for the new urban residents, the cities' expansion occurred with significant deficiencies, favouring social asymmetries and the emergence of public health threats, and in particular those related to the lack of public sanitation(67). Cholera outbreaks that occur regularly in the country, for example, are partially a consequence of the rapid growth of Mozambican cities without the necessary sanitation infrastructure network(68-70).

While Mozambique has diverse experiences of international migration, studies have focused on migration to South Africa, not only due to the geographical proximity between the two countries, but also because it represents the main destination for Mozambican migrants(9, 71-73). Estimates from the International Organization for Migration (IOM) indicate that, in 2017, 653,251 Mozambicans (2.16% of

the population) lived in another country, of which 381,386 in South Africa(74). This figure differs greatly from estimates by South African authorities, whose 2016 population census data indicate that a total of 283,405 Mozambican migrants reside in the country, the second largest migrant community (20.6%) after Zimbabwe (547,047 migrants)(75). The migratory movement of Mozambican citizens to South Africa has its roots in agreements made in the early 20th century by the Portuguese colonial government and the South African apartheid regime, which were focused on the supply of labour for the country's mining industry(9). At present, the Mozambican government maintains a collaborative labour agreement with South Africa through the Employment Bureau of Africa (TEBA) which establishes conditions for some 35,000 Mozambican miners to be legally employed in South African mines(21). Moreover, since the end of the apartheid regime in 1994, undocumented migration to South Africa has grown considerably, including into the mining sector, which is said to be illegally employing a number of migrants close to that reported by TEBA(9, 21). Undocumented migration is driven by the demand for cheap, unskilled labour, and generates jobs in agriculture, construction, informal trade, and domestic work. It also appears to have a predominantly male dimension, although research in migrant communities living in South Africa has shown that the presence of Mozambican women is noticeable(9).

As in other regional countries, the expansion of the HIV epidemic in Mozambique has been studied from the perspective of the influence of migration and population mobility. In particular, considering the variability of the HIV prevalence across the country's different provinces, which is highest in the southern region comprising the provinces of Maputo City, Maputo Province, and Gaza, some authors have argued that migration may have contributed "to marked regional differences" of the epidemic(12). Standing out with the highest adult HIV prevalence rate in the country (24.4%), Gaza is also the province in which migration exerts the greatest weight on demographic indicators(5, 41). Data from the 2017 census indicates that cumulative migration in Gaza translated into a negative population balance of 77% compared to the previous survey round, considering that 283,907 people left the province, but only 54,957 people migrated into the region(41). The impact of this population movement is visible in the province's sex distribution indicators, in which the population of 1,545,879 inhabitants is made up of about 55% women and 45% men, in contrast to 52% and 48% of the national average, respectively(41). Still, such observation must be interpreted carefully so that migration is not classified as male driven only, given that the 2017 census data shows that 139,586 women left the province in comparison to 99,321 men. Additionally, through this data, it is also possible to observe that the main migratory destination of the province's citizens is Maputo City, whose largest migrant community (36%) originates from Gaza(41). Given the absence of disaggregated data showing the province of origin of Mozambican migrants living abroad, including in South Africa, it is not possible to determine the weight

that international migration has in the combined migration data of Gaza province. Still, some studies, including qualitative, suggest that it is significant(8, 9, 13, 15, 76).

Apart from research studies that sought to explain the influence of migration and population mobility in the early phase of the spread of the epidemic in Mozambique, little is known about the possible relationship between HIV and internal migration in the country(12, 77). With the exception of an integrated biological and behavioural survey (IBBS) conducted with long distance truck drivers, which showed an HIV prevalence of 15.4% among the participants and signalized this population as highly exposed to risky sexual behaviours, most studies have focused on communities impacted by international migration, and specifically male migration to the South African mining sector(10, 13-15, 17, 18, 20, 78). For example, findings from a IBBS targeting Mozambican migrant miners pointed to a high HIV prevalence (22.3%) among the participants, which reported high risky sexual behaviours, including concurrent sexual partnerships and transactional sex(14). Another study conducted in Chókwè district with male miners working in South Africa found a high prevalence of risky sexual behaviours, but a low HIV risk perception(13). A research targeting two communities with families of migrant miners in Gaza province estimated an HIV prevalence of 24.2%, observed that less than 20% of the participants reported condom use at the last sexual intercourse, and verified that about one third had had a sexual transmitted infection at some point in their lifetime(15). Additionally, other research studies have been directed towards female partners of migrant miners seeking to understand the behavioural and cultural nuances that exacerbate their risk of HIV infection, as well as their acceptance of prevention methods such as pre-exposure HIV prophylaxis(10). Finally, representing an exception in terms of population focus, evidence from a study looking at the sexual and reproductive health of women working in informal cross-border trade in the Southern province of Maputo indicated that they are exposed to extortion, transactional sex and physical violence, which can potentially increase their risk for the acquisition of sexual transmitted infections, including HIV(79).

1.1.4 HIV and sexual risk behaviours

The risk of HIV infection is greatly influenced by the form of exposure (i.e. sharing needles vs coitus vs anal sex) and behaviour (i.e. sexual intercourse without using condoms vs sexual intercourse under the influence of drugs or alcohol)(80). Different types of exposure and behaviours tend to characterize the dynamics of an HIV epidemic in a certain region or country(81-83). In Eastern and (84)Southern Africa, HIV transmission is mostly associated with heterosexual sex, to which contributes a combination of risk factors that include multiple and concurrent sexual partnerships, transactional sex, condomless sex, alcohol and drug use before and during sexual intercourse, among others.(83) The risk of infection can also be exponentially increased depending on certain biological factors such as the presence of an untreated sexually transmitted infection in one of the sexual partners, or the HIV viral

load level of the individual that is at risk of transmitting HIV(85). Other attributes of HIV risk may include the stage of the epidemic in a geographic area, and various health determinants associated with economic, social, cultural and political aspects that can increase an individual's vulnerability to HIV acquisition(86). For example, intergenerational sex in the context of the Sub-Saharan Africa is often associated with poverty and the necessity of young women to find economic resources to survive through the financial support of an older men (53, 87, 88). Sexual risk behaviours explored in this study are analysed in the sections below in the context of literature relevant to the subject of the research.

1.1.4.1 Multiple Sexual Partnerships

Multiple sexual partnerships is a high-risk sexual behaviour classified as one person having more than one sexual partner in a 12 months period(89). This is a HIV risk indicator used by UNAIDS to ascertain "progress in reducing the percentage of people who have higher-risk sex", which takes into consideration the rationale that "individuals who have multiple partners have a higher risk of HIV transmission" than those who do not(89). The measurement is frequently collected in HIV behavioural studies, reporting a cumulative number of sexual partners over the period of a year, which an individual may have had in sequence or at the same time (concurrent partnerships), which would potentially further aggravate the risk of HIV transmission(5, 56, 89).

Social and cultural norms are known to influence the prevalence of multiple sexual partnerships in the Southern Africa region, and particularly among men, who more predominantly tend to report more often this behaviour(56). Yet, a study reviewing data from 15 regional nations on multiple sexual partnerships reported by men found great variation across countries, ranging from 1% in Ethiopia to 28% in Cameroon(56). By comparison, in Mozambique, the prevalence of multiple sexual partnerships is estimated to be of 20.4% among men and 2.6% among over the age of 15 years old.(5)

1.1.4.2 Condom use

When used consistently, condoms can have a protective effect of up to 95% against HIV acquisition, which means that "condom users are 10 to 20 times less likely to become infected when exposed to the virus than are inconsistent or non-users"(90). Giving the critical importance that condoms play in the HIV/AIDS response, their use is often measured in HIV studies as a risky sexual behaviour indicator(91). Often, two measurements of condom use are considered in research environments: condom use at last sexual intercourse and consistent condom use during past 12 months(91-93).

In Southern Africa, condom use has a low prevalence among both men and women, although men tend to report a higher use. Multiple factors contribute to low acceptability and use of condoms in the region, including social and cultural aspects that shape gender roles in societies(92, 93).

Concurrently, masculinity norms that promote gender inequality have been found to limit women's ability to negotiate the usage of condoms with their male partners(93-95). Additionally, aspects such as age, education, income, and area of residence (urban vs rural) have also been found to influence condom use(91, 93). In general, younger people, and tend to report more often condom use, and so do people with higher levels of education and income(93). Access to condoms and education on their use are also important aspects that influence this behaviour and tend to be higher in urban areas in comparison with rural settings(93).

1.1.4.3 Sexually transmitted infections

Sexually transmitted infections are known to be a biological risk factor for sexual transmission of HIV. Individuals that have an untreated sexually transmitted infection are more at risk to transmit or acquire HIV(85). For example, the odds of an HIV-negative man getting infected with HIV during sexual intercourse with an HIV-positive woman more than doubles if he has an active sexually transmitted infection(85). Diseases classified as sexually transmitted infections include, but are not limited to, bacterial vaginosis, chlamydia, genital herpes, gonorrhoea, and trichomonas(96).

Because these diseases are normally transmitted through unprotected sexual contact and their risk of acquisition is higher in individuals who engage in risky sexual behaviours, their study is often used as a proxy to ascertain the sexual risk behaviour of an individual(97). In this type of research, the prevalence of sexually transmitted infection may be investigated through the collection and laboratorial analysis of biological samples or through questionnaires and the self-reporting of symptoms suggestive of an infection(5, 98).

In Sub-Saharan Africa, the high incidence and prevalence of sexually transmitted infections has been considered a public health crisis(99). In this region, a systematic review of studies with pregnant women estimated that a high prevalence of syphilis (4.5%), gonorrhoea (3.7%), chlamydia trachomatis (6.9%), and bacterial vaginosis (50.8%)(100). In Mozambique, through the measurement of symptoms suggestive of a sexually transmitted infection in a national HIV seroprevalence study, it was found that 4.5% of women and 4.7% of men reported to have had an abnormal discharge from genitals in the previous year(5). In the same study, 2.1% and 3.2% of women reported to have had genital sores in the 12 months preceding data collection(5).

1.2 Problem statement

The Mozambican province of Gaza has the highest HIV prevalence in Mozambique and is marked by a socio-economic profile based on labour-migrancy both within Mozambique (internal migration) and to South Africa (external migration). Regional studies focused on migrant miners have demonstrated possible associations with the epidemic: increased prevalence of risky sexual behaviours

and high HIV prevalence rates. However, little is known in terms of the broader relationship between migrancy and HIV sexual risk behaviours beyond the mining sector, and particularly among migrant women.

1.3 Study justification

Chókwè presents a socioeconomic and HIV epidemiological situation similar to that of the Gaza province, and has a Health and Demographic Surveillance System under which comprehensive HIV surveillance has been conducted. Using sociodemographic and behavioural-related data, our research will investigate the relationship between risky sexual behaviours and migration in Chókwè district. By extending the migration analysis beyond a specific labour area (mining sector), while simultaneously including both internal and external migrants, this study intended to identify new evidence for supporting the design of targeted interventions aimed at reducing the risk of HIV acquisition within these subgroups of the population.

1.4 Research question

To what extent does migrancy status influences HIV sexual risk behaviours and status in Chókwè district, Mozambique?

1.5 Study aim

To investigate the extent to which migrant status influences HIV sexual risk behaviours and status among migrant populations living in Chókwè district.

1.6 Study objectives

Objective 1: To describe the sociodemographic characteristics of the migrant and non-migrant men and women living in Chókwè district, from 2014-2017.

Objective 2: To compare the HIV sexual risky behaviour and status among migrant and non-migrant men and women of the Chókwè district, from 2014-2017, while controlling for possible confounders, including other risk factors and sociodemographic characteristics of participants.

Objective 3: Determine influence that migrant status has on HIV sexual risky sexual behaviours among migrant and non-migrant men and women of the Chókwè district, from 2014-2017.

2. Methodology

2.1 Study design

The HIV Surveillance in the Chókwè Health and Demographic Surveillance System is a cross-sectional study with annual data round collections conducted from 2014-2017 under the Health and Demographic Surveillance System (HDSS) of the Chókwè district(101). The HDSS is led by the *Centro de Investigação e Treino em Saúde do Chókwè* (CITSC), an institution affiliated with the Mozambican National Institute of Health (INS, in its Portuguese acronym) and has been conducting home-based census since 2010. With the aim of assessing the "effects of combination HIV prevention interventions on HIV incidence in Mozambique", the study was integrated into the HDSS "to track coverage of HIV interventions, community viral load, and the prevalence and incidence of HIV"(101). The study design consists of three main components, namely:

i. Conducting a short interview survey and HIV testing and counselling (HTS) to all consenting eligible HDSS participants.
ii. Administering a longer HIV Prevention Survey (HPS) to a representative sample of consenting HDSS residents and conducting CD4 and viral load tests for participants who tested HIV-positive.
iii. Clinical surveillance for estimating ART clinical retention-related outcomes for HIV-positive patients

In order to investigate associations between migrant status and sexual risk behaviours among residents in the Chókwè district, this secondary analysis used data from the annual cross-sectional HPS conducted between 2014 and 2017.

2.2 Study site

The study was conducted in the Chókwè district of Gaza province, which is located in the Southern region of Mozambique, and had an estimated population of 182,977 inhabitants at the time of data collection(101). The district is formed by 15 administrative neighbourhoods, of which eight are designated as urban areas (municipal), and seven as rural areas (administrative posts)(101). The HDSS covers approximately half of the administrative neighbourhoods, including the city of Chókwè and seven rural villages(101). Home to the largest irrigation system in Mozambique, Chókwè´s economy is mainly driven by agriculture-related activities. Due to the lack of economic opportunities, the district is marked by high trends of out-migration, particularly to neighbouring South Africa.

2.3 Study population

The study population were men and women aged ≥15 years old living in the Mozambican district of Chókwè between 2014 and 2017.

2.4 Study sample

The HDSS covers approximately half of the Chókwè district population – about 100,000 inhabitants and 22,000 households(101). For the purpose of the HIV surveillance study, the participants selection criteria for the Component I (estimate annual HIV prevalence and incidence in geographic area covered by the study) included being ≥15 years old, registered in the Chókwè HDSS, and able to provide written informed consent(101).

The Chókwè HDSS conducts bi-annual census and the HIV surveillance study activities were integrated into one of the two data collection rounds(101). After the first round of HTC, participants who had previously tested HIV-positive through the HDSS were encouraged not to test again, and residents who self-reported a prior HIV diagnosis (not HDSS-related) were given opportunity to re-test(101). Overall, 90,879 participants were surveyed as part of the four rounds of the HDSS data collection (R1: 24,946; R2: 24,440; R3: 24,125; R4: 17,368).

For Component II (HPS), a stratified, simple random sample of the HDSS participants was selected for each census round in which HTC was conducted. Eligibility followed the same criteria applied in Component 1. Stratification was done by geographic location – urban and rural – and looking to recruit an equal number of women and men (totalizing 4,760 people), which ended up not being possible, as seen in the table below:

Table 1: All participants surveyed per round of the HTS Component

Round	Participants	Women N (%)	Men N (%)
R1	2,896	1,817 (62.7)	1,079 (37.3)
R2	3,100	2,220 (71.6)	880 (28.4)
R3	4,994	3,633 (72.7)	1,361 (27.3)
R4	4,181	2,932 (70.1)	1,249 (29.9)
Total	**15,171**	**10,602 (69.9)**	**4,569 (30.1)**

For the secondary data analysis, additional eligibility criteria were considered for the selection of the study sample. As the focus of the analysis was related with risky sexual behaviours, participants who responded that they had not initiated sexual intercourse were excluded from the data analysis. Concurrently, participants who responded “don’t know” to one of the variables of interest selected for the study were also excluded. In order to ensure sufficient power in the analysis of migrant status in relation to the study outcomes, we analysed the sum of the four data collection rounds. Data from

participants who had participated in more than one round were only considered at the first round of participation.

2.5 Data collection

Data from the HPS was collected using a standardised questionnaire with close-ended items which took approximately 30 minutes to administer. The questionnaire, which was administered by trained interviewers using a paper-based format, had 19 sections capturing information on "sociodemographic, psychological and behavioural characteristics, and exposure to interventions and health systems services that are either known or hypothesized to be associated with the uptake of evidence-based interventions and HIV infection"(101). For the secondary analysis, the study considered data related with participants' sociodemographic and HIV sexual risk behaviours.

2.6 Measurement of variables

The HPS variables of interest used in the secondary data analysis are described in Table 2. An explanation is provided on how variables were used.

Table 2: Variables used in the secondary data analysis

Variable	Definition	Measurement	Coding	Use
Gender	Independent, dichotomous nominal	Binary	1. Male 2. Female	Used to disaggregate analysis for all descriptive univariate, and multivariable analyses
Age	Independent, categorical	Interval-level	1. 15-19 2. 20-24 3. 25-29 4. 30-34 5. 35-39 6. 40-44 7. 45-49 8. ≥50	Used in descriptive, univariate, and multivariable analyses
Marital status	Independent, categorical	Categorical	1. Single 2. Married or living in marital union 3.Divorced, Separated or Widowed	Used in descriptive, univariate, and multivariable analyses
Employment status	Independent, categorical	Categorical	1. Employed 2. Self-employed	Used in descriptive, univariate (excluding logistical regression analyses)

Variable	Definition	Measurement	Coding	Use
			3.Not employed/Stays at home 4. Student	
Migrant status (internal)	Focal independent, nominal	Binary	1. Yes 2. No	Used in descriptive, univariate, and multivariable analyses
Migrant status (International/South Africa)	Focal independent, nominal	Binary	1. Yes 2. No	Used in descriptive, univariate, and multivariable analysis **Note:** considering data entry errors and that most of the international migrants reported to had migrated to South Africa, this study only considered international migrants the participants who migrated to this country.
Occupation	Independent, categorical variable	Categorical	1. Mining 2. Truck driving 3. Agriculture 4. Vendor 5. Construction 6. Fishing 7. Police/Military 8. Other	Used in descriptive analysis
Number of sexual partners past 12 months	Dependent, categorical variable	Interval-level	1. None 2. One 3. Two 4. Three or more	Used in descriptive, univariate, and multivariable analyses
Number of sexual partners past 12 months	Dependent, categorical variable	Binary	1. None or one 2. More than one	Used in logistical regression model
Characterisation of last sexual partner	Independent categorical variable	Categorical	1. Spouse 2. Casual partner 3. Exchange partner	Used in descriptive analysis
Condom use with last sexual partner	Dependent/outcome categorical variable	Categorical	1. Yes 2. No	Used in descriptive analysis
Consistent Condom use (last 12 months)	Dependent, categorical variable	Binary	1. Consistent 2. Inconsistent use	Used in descriptive, univariate, and multivariable analysis
Alcohol or drug use during last	Dependent, categorical variable	Binary	1. Yes 2. No	Used in descriptive analysis

Variable	Definition	Measurement	Coding	Use
sexual intercourse				
Transactional sex with last sexual partner	Dependent, categorical variable	Binary	1. Yes 2. No	Used in descriptive analysis
Violence perpetrated by last sexual partner	Dependent, categorical variable	Binary	1. Yes 2. No	Used in descriptive analysis
Sexual transmitted infection – Abnormal discharge genitals past 12 months	Dependent, categorical variable	Binary	1. Yes 2. No	Used in descriptive, univariate, and multivariable analysis
Sexual transmitted infection – Genital sores past 12 months	Dependent, categorical variable	Binary	1. Yes 2. No	Used in descriptive, univariate, and multivariable analysis
HIV status	Dependent, categorical variable	Binary	1. Positive 2. Negative	Used in descriptive, univariate, and multivariable analyses

2.7 Data Management

Electronic data was extracted from the HTS component of the HIV Surveillance in the Chókwè HDSS study, which is owned by the Ministry of Health of Mozambique and managed by the CITSC in collaboration with the U.S. Centers for Disease Control and Prevention (CDC). In the primary study, SAS and SAS-callable SUDAAN analytic programs were used for data analysis. For the secondary analysis, STATA version 13 (Stata Corp, College Station, Texas, USA) was used for the statistical analysis. Prior to the beginning of the analysis, the data set was assessed to detect possible errors or missing values. Some of the variables of interest were re-coded as indicated in Table 2.

2.8 Data Analysis Plan

Analysis of the data used descriptive statistics to present the prevalence of the outcomes (e.g. HIV status, risk behaviours) and exposure variables (e.g. migration and sociodemographic characteristics), and inferential statistics to measure associations between the key exposure (migrant status) and outcomes of interest (HIV sexual risk behaviour and status), while also controlling for potential confounders such as age and marital status. Sexual risk behaviours were mostly binary variables (e.g. HIV positive/negative), and participants' sexual behaviour was typified as risky if they

had engaged in one or more risky sexual behaviours. Table 3 outlines the data analysis plan that was followed.

Table 3: Data analysis plan

Objectives	Variables	Analysis
To describe the sociodemographic characteristics of the migrant and non-migrant populations living in Chókwè district, from 2014-2017.	All variables	**Descriptive Statistics:** simple proportions by migrant status and sociodemographic variables. Mean used to describe continuous variables with standard deviations. Frequencies and proportions used to describe categorical variables.
To compare the HIV sexual risk behaviours and status among migrant and non-migrants' residents of the Chókwè district, from 2014-2017, while controlling for sociodemographic characteristics of participants.	**Sociodemographic:** Gender, Age, Marital Status, Employment status Migrant status (internal, South Africa). **Sexual risk behaviours:** Number of sexual partners past 12 months; condom use frequency last 12 months; Sexually transmited infections (self-reporting of abnormal discharge from genitals past 12 months and self-reporting of sores in genitals past 12 months).	**Univariate analysis** using chi-square test. The analysis considered migrant status as predictors and HIV sexual risk behaviours and status as outcomes. **Logistic regression analysis** with HIV sexual risk behaviours as the outcomes and migrant status as the predictor, while controlling for sociodemographic factors (age, sex, marital status) as potential confounders. Notes: I. Analysis was stratified by gender. II. Inference based on 95% confidence intervals for Odds ratio. P-values were calculated to test for significance.

2.9 Ethical considerations

The primary study received ethical clearance from the Mozambican Human Research Ethics committee and the CDC's Office of the Associate Director of Science. All study participants were given full information about the objectives of the study and provided informed consent before data was collected. The project team received initial and annual refresher trainings in research ethics involving human subjects. Access to the database was restricted to authorized staff. The secondary data analysis received approval from the ethical review board led by the CITSC in coordination with the CDC. Ethics clearance was granted by the University of Witwatersrand's Faculty of Health Sciences Human Research Ethics Committee (M191105).

3. Results

3.1 Sociodemographic characteristics and migrant status information of study's participants

After data cleaning, a total of 12,581 participants were included in the data analysis, of which 9,031 were females (71.78%) and 3,550 were males (28.22%) (Table 4). Among women, the smallest number of respondents were in the 45-49 age group (7.58%; n=685) while the largest was in the age group of 50 and above (14.43%; n=1,303). In men, the variation between age groups was more pronounced, starting at 5.07% in the 45-49 age group (n=180) to 27.58% in the 15-19 age group (n=979). Most participants reported that they were Mozambican nationals (99.32%) with only 85 individuals reporting another nationality (0.68%). Foreign migrants included citizens from South Africa, Zimbabwe, and Malawi, Tanzania, Nigeria and India.

For marital status, more than half of men reported to be either married or living in a non-marital partnership (50.27%), followed by 44.54% who reported to be single, and 5.18% that were either widowed, divorced or separated. In contrast, more women reported to be married or living in a non-marital relationship (62.89%) and to be widowed, divorced or separated (15.60%), and less to be single (21.50%).

Close to a third of men reported that they were self-employed (31.39%) and 20.07% to be formally employed, while 25.21% indicated they were either unemployed or staying at home with no formal source of income. In comparison, a greater proportion of women (63.69%) reported to be unemployed or staying at home, and only about a fourth reported to be self-employed (22,55%) or to be formally working (4,83%). Women were also less likely to be studying (8,93%) in comparison with men (23.33%).

Agriculture was the main form of occupation within both genders, although it was significantly higher among women (61.73%) than in men (22.80%). Construction (17.97%), commerce (9.95%), truck driving (6.76%) and law enforcement or military were the other main forms of employment among men. About 38% of the male respondents reported to have other occupations, which included various professions such electrician, guard, fireman, mechanic, nurse, baker and others. Interestingly, only 0.39% reported to work in the mining industry, which likely results from the fact that data was collected in periods of the year when local miners are traditionally migrated in South Africa. As for women, trading was the second occupation most reported (21.20%), and other forms of employment (15.50%) included activities such as nurse, hairdresser, dressmaker, charcoal seller, and others.

Table 4: Sociodemographic characteristics of study participants

	All		Male		Female	
	(N)	(%)	(N)	(%)	(N)	(%)
Gender	12,581	100.00	3,550	28.22	9,031	71.78
Age (N=12,581)						
15-19	2,144	17.04	979	27.58	1,165	12.90
20-24	2,038	16.20	587	16.54	1,451	16.07
25-29	1,530	12.16	360	10.14	1,170	12.96
30-34	1,587	12.61	373	10.51	1,214	13.44
35-39	1,483	11.79	340	9.58	1,143	12.66
40-44	1,175	9.34	275	7.75	900	9.97
45-49	865	6.99	180	5.07	685	7.58
≥50	1,759	13.98	456	12.85	1,303	14.43
Median (IQR)	*31 (20)*		*27 (21)*		*33 (20)*	
Nationality (N=12,573)						
Mozambican	12,488	0.68	3,518	99.18	8,970	0.62
Non-Mozambican	85	99.32	29	0.82	56	99.38
Marital Status (N=12,573)						
Single	3,521	28.00	1,580	44.54	1,941	21.50
Married/Non-marital partnership	7,460	59.33	1,783	50.27	5,677	62.89
Divorced/Separated/Widowed	1,592	12.66	184	5.18	1,408	15.60
Employment Status (N=7,713)						
Employed	681	8.83	406	20.07	275	4.83
Self-employed	1,918	24.87	635	31.39	1,283	22.55
Not employed/Stays at home	4,139	53.60	510	25.21	3,624	63.69
Student	980	12.71	472	23.33	508	8.93
Occupation (N=2,603)						
Mining	7	0.27	4	0.39	3	0.19
Truck driving	77	2.96	70	6.76	7	0.45
Agriculture	1,204	46.25	236	22.80	968	61.73
Vendor	437	16.79	103	9.95	334	21.30
Construction	188	7.22	186	17.97	2	0.13
Fishing	14	0.54	12	1.16	2	0.13
Police/Military	41	1.58	32	3.09	9	0.57
Other	635	24.39	392	37.87	243	15.50

Table 5 reports on the study´s participants' migrant status. Among all the respondents, 961 (7.65%) reported to had been away for at least one month from Chókwè district in the 12 months that preceded data collection. Migrants represented 10.36% of the male participants (367) and 6.59% of the female participants (594). Looking at the length of the migration period, most men (82.66%) and women (87.07%) indicated that they had been away from home for less than six months.

As for the destination of migration, 463 participants said they migrated to another region of Mozambique, with these internal migrants accounting for 5.92% of the men's group (210) and 2.80% of the women´s group (253). A total of 491 respondents said they had migrated to another country, with South Africa being the main country of destination (449 participants). Other reported countries of destination included Eswatini, Zimbabwe, Malawi, Tanzania and others not specified. Of the cross-border migrants who said they had been to South Africa, 139 were men (4.80% of male participants) and 310 were women (4.26% of female participants). In terms of the reason that motivated the

migration to South Africa, 83.94% of men (115) said it was related to work and 16.06% with family (22). Conversely, among migrant women, 87.06% said it was related with family and 12.94% with work.

Table 5: Migrant status of study´s participants

	All		Male		Female	
	(N)	(%)	(N)	(%)	(N)	(%)
Away from home more than one month last 12 months (N=12,555)						
Yes	961	7.65	367	10.36	594	6.59
No	11,594	92.35	3,174	89.64	8,420	93.41
Time away from home (N=957)						
1 - 6 months	817	85.37	305	82.66	512	87.07
6 - 12 months	140	14.63	64	17.34	76	12.93
Last 12 months, lived outside of Chockwe district but within Mozambique for at least one month (N=12,581)						
Yes	463	3.68	210	5.92	253	2.80
No	12,118	96.32	3,340	94.08	8,778	97.20
Last 12 months, lived for at least one month in South Africa (N=10,174)						
Yes	449	4.41	139	4.80	310	4.26
No	9,725	95.59	2,758	95.20	6,967	95.74

3.2. Sociodemographic characteristics of study´s participants by migrant status

This section presents the sociodemographic characteristics of the study´s participants by their migrant status

3.2.1 Sociodemographic characteristics of all migrant participants

Table 6 presents the study's participants migrant status by sociodemographic characteristics. For both men and women, age was significantly associated with all forms of migration in the 12 months that preceded data collection (p=0.000). In all age groups, the proportion of migrants was higher in men than in women. Additionally, among men, the migration peak occurred in the age band of 20-24 years old (16.38%) while in women it was in 25-29 (8.36%), decreasing consistently in both groups as the age increased.

Men's marital status did not show an association with migration (p=0.769). Approximate values were found in the proportion of male migrants that were single (10.15%), married or living in non-marital partnership (10.69%), and divorced, separated or widowed (9.24%). The opposite occurred with women (p=0.000) who had more pronounced differences in the proportion of migrants across the different marital status that were reported: single - 8.98%; married or living in non-marital partnership - 6.33%; and, divorced, separated or widowed - 4.38%.

Employment status was associated with migration among men (p=0.000), which had distinct weights in the four categories that were measured: employed (10.10%), self-employed (7.72%); not employed or stays at home (4.31%), and studies (3.82%). No statistically significant differences was found for women (p=0.752), whose migratory weights in the different employment status were more approximate, varying between 3-5%.

Table 6: Sociodemographic characteristics of all migrant participants

	Away from home more than one month last 12 months								
	Men					Women			
	Yes		No		P	Yes		No		P
	F	%	F	%		F	%	F	%	
Age	**N=367**		**N=3,174**		**0.000**	**N=594**		**N=8,420**		**0.000**
15-19	73	7.47	904	92.53		82	7.05	1081	92.95	
20-24	96	16.38	490	83.62		121	8.36	1327	91.64	
25-29	56	15.60	303	84.40		98	8.40	1069	91.60	
30-34	50	13.44	322	86.56		88	7.25	1125	92.75	
35-39	35	10.39	302	89.61		78	6.84	1063	93.16	
40-44	22	8.00	253	92.00		55	6.13	842	93.87	
45-49	17	9.44	163	90.56		25	3.65	659	96.35	
≥50	18	3.96	437	96.04		47	3.61	1254	96.39	
Marital Status	**N=367**		**N=3,171**		**0.769**	**N=594**		**N=8,417**		**0.000**
Single	160	10.15	1,416	89.85		172	8.89	1762	91.11	
Married/Non-marital partnership	190	10.69	1,588	89.31		359	6.33	5312	93.67	
Divorced/Separated/Widowed	17	9.24	167	90.76		63	4.48	1343	95.52	
Employment Status	**N=130**		**N=1,892**		**0.000**	**N=250**		**N=5,435**		**0.752**
Employed	41	10.10	365	89.90		15	5.47	259	94.53	
Self-employed	49	7.72	586	92.28		59	4.60	1,224	95.40	
Not employed/Stays at home	22	4.31	488	95.69		156	4.31	3,464	95.69	
Student	18	3.82	453	96.18		20	3.94	488	96.06	

3.2.2 Migration duration

As reported in Table 7, for both men and women, no statistical significance was found for the duration of period of migration and the sociodemographic variables that were considered in the data analysis (p value varied from 0.059 and 0.858).

Table 7: Sociodemographic characteristics of participants by duration of migration

	Time away from home								
	Men					Women			
	1-6 months		7-12 months		P	1-6 months		7-12 months		P
	F	%	F	%		F	%	F	%	
Age	**N= 305**		**N= 64**		**0.144**	**N= 512**		**N= 76**		**0.858**
15-19	63	87.50	9	12.50		68	83.95	13	16.05	
20-24	71	73.20	26	26.80		102	85.71	17	14.29	
25-29	49	89.09	6	10.91		83	84.69	15	15.31	
30-34	43	84.31	8	15.69		78	88.64	10	11.36	
35-39	29	80.56	7	19.44		67	89.33	8	10.67	
40-44	20	86.96	3	13.04		48	87.27	7	12.73	
45-49	15	93.75	1	6.25		23	92.00	2	8.00	
≥50	15	78.95	4	21.05		43	91.49	4	8.51	
Marital Status	**N=305**		**N= 64**		**0.059**	**N=511**		**N=76**		**0.072**
Single	131	82.39	28	17.61		140	84.85	25	15.15	
Married/Non-marital partnership	162	84.82	29	15.18		319	89.36	38	10.64	
Divorced/Separated/Widowed	12	63.16	7	36.84		52	80.00	13	20.00	
Employment Status	**N=103**		**N=29**		**0.804**	**N=207**		**N=39**		**0.272**
Employed	30	73.17	11	26.83		10	66.67	5	33.33	
Self-employed	40	81.63	9	18.37		50	83.33	10	16.67	
Not employed/Stays at home	17	77.27	5	22.73		130	86.09	21	13.91	
Student	16	80.00	4	20.00		17	85.00	3	15.00	

3.2.3 Sociodemographic characteristics of internal migrant participants

The sociodemographic characteristics of the internal migrants are described in table 8. For participants who had lived in another region of Mozambique for at least one month in the year that preceded data collection, age was associated with migration for both men (p=0.002) and women (p=0.000). In men, migration was proportionally higher in the 30-34 age group (8.58%) and in the 20-24 age group (8.18%). For women, this occurred among young participants aged 15-19 (5.24%) years old, followed by a progressive reduction in the proportion of the migrant population as the age increased.

For men, marital and employment status was not associated with migration (p=0.105 and p=0.275, respectively). The opposite occurred with women (p=0.000) with the proportion of migrants being greater among female participants who reported to be single (5.82%) and being a student (3.35%).

Table 8: Sociodemographic characteristics of internal migrants

	Last 12 months, lived outside of Chockwe district but within Mozambique for at least one month								
	Men					Women			
	Yes		No		P	Yes		No		P
	F	%	F	%		F	%	F	%	
Age	**N=210**		**N=3,340**		**0.002**	**N=253**		**N=8,778**		**0.000**
15-19	53	5.41	926	94.59		61	5.24	1,104	94.76	
20-24	48	8.18	539	91.82		60	4.14	1,391	95.86	
25-29	25	6.94	335	93.06		36	3.08	1,134	96.92	
30-34	32	8.58	341	91.42		28	2.31	1,186	97.69	
35-39	18	5.29	322	94.71		16	1.40	1,127	98.60	
40-44	14	5.09	261	94.91		20	2.22	880	97.78	
45-49	10	5.56	170	94.44		9	1.31	676	98.69	
≥50	10	2.19	446	97.81		23	1.77	1,280	98.23	
Marital Status	**N=210**		**N=3,337**		**0.105**	**N=253**		**N=8,773**		**0.000**
Single	108	6.84	1,472	93.16		113	5.82	1,828	94.18	
Married/Non-marital partnership	91	5.10	1,692	94.90		114	2.01	5,563	97.99	
Divorced/Separated/Widowed	11	5.98	173	94.02		26	1.85	1,382	98.15	
Employment Status	**N=68**		**N=1,955**		**0.275**	**N=85**		**N=5,605**		**0.000**
Employed	19	4.68	387	95.32		8	2.91	267	97.09	
Self-employed	23	3.62	612	96.38		14	1.09	1,269	98.91	
Not employed/Stays at home	13	2.55	497	97.45		46	1.27	3,578	98.73	
Student	13	2.75	459	97.25		17	3.35	491	96.65	

3.2.4 Sociodemographic characteristic of participants who migrated to South Africa

All socio-demographic variables included in the analysis were significantly associated with migration in participants who reported to have lived in South Africa for at least one month in the year prior to data collection ($p<0.05$), as described in table 9. In general, considering the different age groups, it was possible to verify that the proportion of migrants tended to be higher among men (the only exception was among participants aged 30-35). Still, for both men and women, the age group with the highest proportion of migrants was the 25-29 age band (8.90% and 6%, respectively).

Reporting of marital status indicated that migration was higher among men (6.44%) and women (5.04%) married or living in a non-marital partnership. More marked differences were found among divorcees, separated or widowed, with men (4.23%) being more likely to migrate than women (2.79%).

The proportion of migrants was also higher among employed men (4.19%) and self-employed women (3.13%). However, it is important to note that the number of migrant women who reported not having a job or staying at home (99) was substantially higher than those who reported having their own employment (40). This difference was not found among men, whose number of migrants was relatively close among the various employment categories. Participants who reported being students had the lowest proportion of migrants (0.64% for men and 0.40% for women), a clear contrast to what was

observed among internal migrants, suggesting that education has less weight in the motivations that drive Chókwè's residents to migrate to South Africa.

Table 9: Sociodemographic characteristics of participants who migrated to South Africa

	Last 12 months, lived for at least one month in South Africa								
	Men					Women			
	Yes		No		P	Yes		No		P
	F	%	F	%		F	%	F	%	
Age	**N= 139**		**N=2,758**		**0.000**	**N= 310**		**N=6,967**		**0.000**
15-19	18	2.22	793	97.78		18	1.98	889	98.02	
20-24	42	8.64	444	91.36		55	4.84	1,081	95.16	
25-29	26	8.90	266	91.10		57	6.00	893	94.00	
30-34	15	5.17	275	94.83		53	5.44	921	94.56	
35-39	17	6.12	261	93.88		57	5.96	900	94.04	
40-44	9	3.98	217	96.02		32	4.27	717	95.73	
45-49	4	2.60	150	97.40		16	2.95	527	97.05	
≥50	8	2.22	352	97.78		22	2.07	1,039	97.93	
Marital Status	**N=139**		**N=2,755**		**0.000**	**N= 310**		**N=6,962**		**0.000**
Single	40	3.06	1,267	96.94		49	3.10	1,533	96.90	
Married/Non-marital partnership	93	6.44	1,352	93.56		229	5.04	4,315	94.96	
Divorced/Separated/Widowed	6	4.23	136	95.77		32	2.79	1,114	97.21	
Employment Status	**N= 51**		**N=1,961**		**0.002**	**N=148**		**N=5,506**		**0.010**
Employed	17	4.19	389	95.81		7	2.57	265	97.43	
Self-employed	22	3.50	607	96.50		40	3.13	1,237	96.87	
Not employed/Stays at home	9	1.78	497	98.22		99	2.75	3,501	97.25	
Student	3	0.64	468	99.36		2	0.40	503	99.60	

3.3. Study's participants HIV status and sexual risk behaviours

Table 10 shows the prevalence of HIV and sexual risk behaviours among the study's participants. The HIV status measurement in 10,744 participants showed a seroprevalence of 26.73%, which was higher in women (29.64%) than in men (19.10%).

Reporting on the number of sexual partners in the past 12 months indicated that more than half of men (53.97%) and over three-quarters of women (81.04%) had only one sexual partner. Men reported having more sexual partners than women - 16.45% said they had two partners and 27.02% said they had three or more - a significant contrast to women: 4.23% and 3.82%, respectively. Conversely, more women (10.91%) than men (2.57%) said they did not have any sexual partners.

The consistent use of condoms in the 12 months prior to the study was low for both sexes but reported by twice as many men (16.83%) compared to women (7.21%). As for the reporting of condom

use at last sexual intercourse, the proportion was also higher among men (37.06%) than women (23.06%).

Sharp differences in behavioural patterns of both genders were also observed in the question about the last sexual partner. The proportion of men (59.85%) who reported having sex with a steady partner was lower than among women (80.35%). Additionally, more men than women reported having had a casual partner (37.07% vs. 18.61%) and an exchange partner (3.08% vs. 1.05%).

Interestingly, only women reported having had sex in exchange for food, shelter, transportation, money or drugs in the last 12 months prior to the study, at a proportion of 1.96%. Additionally, only women reported physical violence perpetrated by their sexual partners (2.32%).

Another possible risk factor analysed was the consumption of alcohol or drugs before or during the last sexual intercourse, with this behaviour being reported more often by men (6.42%) than by women (0.81%).

As for the reporting of symptoms that were suggestive of a possible sexually transmitted infection in the 12 months prior to data collection, a higher proportion of women (13.29%) reported having had abnormal/unusual discharge from their genitals compared to men (5.06%). Additionally, an almost identical proportion of men and women (3.45% vs. 3.84%) reported having had genital sores.

Table 10: Study's participants HIV status and sexual risk behaviours

	All		Men		Women	
	(N)	(%)	(N)	(%)	(N)	(%)
HIV Status (N=10,744)						
Negative	7,872	73.27	2,937	80.90	5,475	70.36
Positive	2,872	26.73	566	19.10	2,306	29.64
Number of sexual partners during past 12 months (N=12,021)						
0	1,029	8.56	87	2.57	942	10.91
1	8,825	73.41	1828	53.97	6,997	81.04
2	922	7.67	557	16.45	365	4.23
≥3	1,245	10.36	915	27.02	330	3.82
Used condoms consistently during past 12 months (N=12,466)						
No	11,227	90.06	2,940	83.17	8,287	92.79
Yes	1,239	9.94	595	16.83	644	7.21
Last person that had sex was (N=11,469)						
Spouse (married or living with as if married)	8,509	74.19	2,062	59.85	6,447	80.35
Casual (someone whom had sex only once, a few times, or occasionally)	2,770	24.15	1,277	37.07	1,493	18.61
Exchange partner (partner who is not a steady or casual partner who was paid or who paid respondent to have sex)	190	1.66	106	3.08	84	1.05
Used condom with last sexual partner (N=11,302)						
No	8216	72.69	2,159	62.94	6,057	76.94
Yes	3086	27.30	1,271	37.06	1,815	23.06
During past 12 months, had sex with last partner in exchange for things like food, shelter, transportation, money or drugs (N=4,942)						
No	4,845	98.04			4,845	98.04
Yes	97	1.96			97	1.96
During past 12 months, was hit, slapped, kicked or suffered other form of physical violence by last sex partner (N=4,952)						
No	4837	97.68			4,837	97.68
Yes	115	2.32			115	2.32
Last time had sex, used alcohol or drugs before or during sex (N=7,589)						
No	7415	97.71	1,880	93.58	5,535	99.19
Yes	174	2.29	129	6.42	45	0.81
Past 12 months, had abnormal/unusual discharge from the vagina/penis (N=12,520)						
No	9,989	89.03	3,357	94.94	7,790	86.71
Yes	1,390	10.97	179	5.06	1,194	13.29
Past 12 months, had sores in genital area (N=12,576)						
No	12,059	96.27	3,413	96.55	8,646	96.16
Yes	467	3.73	122	3.45	345	3.84

3.4. Study participants' HIV status by sociodemographic characteristics

Among the study participants, HIV status was associated with age for both men and women, as shown in table 11. In men there was a statistically significant difference in HIV status by age groups (p=0.000). The rate of HIV positive men increased abruptly in the transition between the ages of 20-24 (2.39%) to 25-29 years old (22.92%), with a growing trend until 35-39 years of age (36.96%), from which it began to decrease consistently. In women, there was also a statistically significant association between HIV status and age group (p=0.000). The peak of HIV positive status occurred earlier, between 15-19 (6.11%) and 20-24 years of age (19.98%), with a subsequent trend similar to that of men in the increase of prevalence until 35-39 years of age (43.97%) and a gradual reduction after that age.

Marital status was also associated with HIV status in men (p=0,000) and women (p=0,000). In both groups, the prevalence was higher among men (38.9%) and women (49.25%) who reported being divorced, separated or widowed, and lower among those who reported being single (4.56% vs. 22.48%), although with a notable difference in the proportion for men and women. Additionally, HIV prevalence was higher among men who reported to be married or living in a non-marital partnership (30.70%) compared to women with the same marital status (27.20%).

HIV status was associated with the employment situation of male (p=0.000) and female participants (p=0.000). HIV positivity was lower among students, although with a considerable difference between men (0.48%) and women (6.18%). In the other employment categories, HIV prevalence was higher among men (26.01%) and women (36.79%) who reported to work for a third party.

Table 11: Study's participants HIV status by sociodemographic characteristics

	HIV status of study's participants									
	Men					Women				
	Positive		Negative		p	Positive		Negative		p
	F	%	F	%		F	%	F	%	
Age	**N=566**		**N=2,397**		**0.000**	**N=2,306**		**N=5,475**		**0.000**
15-19	11	1.26	863	98.74		65	6.11	999	93.89	
20-24	12	2.39	490	97.61		258	19.98	1,033	80.02	
25-29	66	22.92	222	77.08		294	30.85	659	69.15	
30-34	93	33.82	182	66.18		416	40.08	622	59.92	
35-39	102	36.96	174	63.04		430	43.97	548	56.03	
40-44	103	47.25	115	52.75		290	38.82	457	61.18	
45-49	68	45.95	80	54.05		208	36.05	369	63.95	
≥50	111	29.06	271	70.94		345	30.45	788	69.55	
Marital Status	**N=566**		**N=2,395**		**0.000**	**N=2,303**		**N=5,473**		**0.000**
Single	62	4.56	1,297	95.44		373	22.48	1,286	77.52	
Married/Non-marital partnership	446	30.70	1,007	69.30		1,336	27.20	3,575	72.80	
Divorced/Separated/Widowed	58	38.93	91	61.07		594	49.25	612	50.75	
Employment Status	**N=300**		**N=1,375**		**0.000**	**N=1,436**		**N=3,431**		**0.000**
Employed	84	26.01	239	73.99		78	36.79	134	63.21	
Self-employed	110	21.28	407	78.72		372	34.32	712	65.68	
Not employed/Stays at home	104	24.94	313	75.06		958	30.72	2,160	69.28	
Student	2	0.48	416	99.52		28	6.18	425	93.82	

3.5 HIV status by study participants' migrant status

As reported in table 12, the data analysis for male and female participants did not show an association between HIV status and migrant status. The only exception occurred with female migrants who reported living in South Africa for at least one month in the year preceding data collection (p=0.013). This group of women had an HIV prevalence of 36.70% compared to the rate found among the other participants (29.62%).

Table 12: Study's participants HIV status by migrant status

	HIV status of study's participants								
	Men					Women			
	Positive		Negative		P	Positive		Negative		P
	F	%	F	%		F	%	F	%	
Migrant status										
Away from home more than one month last 12 months	**N=565**		**N=2,392**		**0.607**	**N=2,296**		**N=5,472**		**0.201**
Yes	54	18.00	246	82.00		165	32.04	350	67.96	
No	511	19.23	2,146	80.77		2,131	29.38	5,122	70.62	
Time away from home	**N=55**		**N=248**		**0.146**	**N=169**		**N=343**		**0.180**
1 - 6 months	50	19.53	206	80.47		152	34.08	294	65.92	
6 - 12 months	5	10.64	42	89.36		17	25.76	49	74.24	
Last 12 months, lived outside of Chockwe district but within Mozambique for at least one month	**N=566**		**N=2,397**		**0.683**	**N=2,306**		**N=5,475**		**0.263**
Yes	31	17.92	142	82.08		58	26.24	163	73.76	
No	535	19.18	2,255	80.82		2,248	29.74	5,312	70.26	
Last 12 months, lived for at least one	**N=450**		**N=1,951**		**0.737**	**N=1,869**		**N=4,377**		**0.013**
Yes	20	17.54	94	82.46		98	36.70	169	63.30	
No	430	18.80	1,857	81.20		1,771	29.62	4,208	70.38	

3.6 Study participants' HIV sexual risk behaviours by sociodemographic characteristics

In this section, the study´s participants HIV sexual risk behaviours are presented accordingly to their sociodemographic characteristics.

3.6.1 Multiple sexual partnerships

Table 13 reports on the number of sexual partnerships by sociodemographic characteristics of the study participants. For both men and women, age was associated with the number of self-reported sexual partners in the 12 months preceding data collection (p=0,000). Among male participants, the data showed a peak in the number of sexual partnerships in the 20-24 age group, when 38.04% of men reported having three or more sexual partners. As age increased, men tended to report less frequently having had two or more sexual partners, and more often none or one sexual partner. Among female participants, most reported one sexual partner in the 15-19 and 35-39 age groups (over 85%). After that age, there was a substantial increase in the proportion of women who reported to not have had any sexual partner, with a peak at the age of fifty and above (40.26%).

Marital status also revealed an association with the number of sexual partners for both men and women (p=0.000). Single men reported more often to have multiple sexual partners (32.11% had three or more sexual partnerships). Additionally, reporting of a single sexual partner was higher among married men (61%) and lower among divorced, separated or widowed men (37.57%). The latter were also the ones who most reported to not have had any sexual partner (14.92%). Although with significantly lower proportions in comparison with men, single women also reported more frequently to have more multiple sexual partners (8.56% said they had two partners and 6.21% said they had three or more partners). Similar patterns were found among women, among married women a majority (89.94%) reported one sexual partner and no sexual partners were commonly reported among divorced, separated or widowed women (41.60%).

Occupation and number of sexual partners were also statistically associated for both male (p=0.026) and female (p=0.000) participants. Among men, students reported the highest number of sexual partners (23.13% of respondents said they had three or more partners). In contrast, men who did not have an occupation reported more often to have one sexual partner (64.58%) or no sexual partner. The highest proportion of female students reported a single sexual partner (83.82%), followed by two partners (7.14%) and 4.83% three or more. Additionally, the proportion of sexual partners was consistently lower among self-employed women, and 14,81% reported not having had a sexual partner.

Table 13: Multiple sexual partnerships by sociodemographic characteristics of study´s participants

	Number of sexual partners during past 12 months																	
	Men									Women								
	0		1		2		≥3		P	0		1		2		≥3		P
	F	%	F	%	F	%	F	%		F	%	F	%	F	%	F	%	
Age	**N=87**		**N=1,828**		**N=557**		**N=915**		**0.000**	**N=942**		**N=6,997**		**N=365**		**N=330**		**0.000**
15-19	18	1.91	476	50.58	175	18.60	272	28.91		34	3.04	956	85.4	77	6.88	53	4.73	
20-24	9	1.63	236	42.75	97	17.57	210	38.04		43	3.05	1,214	86.2	74	5.25	78	5.54	
25-29	4	1.17	160	46.78	50	14.62	128	37.43		44	3.94	970	86.8	54	4.83	49	4.39	
30-34	7	1.99	201	57.1	57	16.19	87	24.72		50	4.33	1,005	87.1	51	4.42	48	4.16	
35-39	7	2.15	199	61.23	46	14.15	73	22.46		71	6.50	943	86.3	48	4.39	31	2.84	
40-44	12	4.53	164	61.89	40	15.09	49	18.49		88	10.3	713	83.10	27	3.15	30	3.50	
45-49	5	2.91	108	62.79	23	13.37	36	20.93		112	17.5	502	78.3	13	2.03	14	2.18	
≥50	25	5.71	284	64.84	69	15.75	60	13.70		500	40.3	694	55.9	21	1.69	27	2.17	
Marital Status	**N=84**		**N=1,827**		**N=557**		**N=913**		**0.000**	**N=942**		**N=6,993**		**N=364**		**N=330**		**0.000**
Single	38	2.54	719	48.00	260	17.36	481	32.11		147	8.01	1,417	77.2	157	8.56	114	6.21	
Married/Non-marital partnership	22	1.29	1,040	61.00	264	15.48	379	22.23		238	4.36	4,906	89.9	144	2.64	167	3.06	
Divorced/Separated/Widowed	27	14.92	68	37.57	33	18.23	53	29.28		557	41.6	670	50	63	4.71	49	3.66	
Employment Status	**N=53**		**N=1,159**		**N=266**		**N=399**		**0.028**	**N=593**		**N=4,384**		**N=200**		**N=157**		**0.000**
Employed	9	2.47	220	60.27	61	16.71	75	20.55		25	9.77	213	83.20	10	3.91	8	3.13	
Self-employed	15	2.51	372	62.31	77	12.90	133	22.28		183	14.9	988	80.7	31	2.53	23	1.88	
Not employed/Stays at home	22	4.64	308	64.98	55	11.60	89	18.78		365	10.8	2,784	82.4	125	3.70	103	3.05	
Student	7	1.59	259	58.73	73	16.55	102	23.13		20	4.20	399	83.8	34	7.14	23	4.83	

3.6.2 Consistent condom use

All the sociodemographic characteristics analysed in the study were associated with consistent condom use for both male and female participants (p=0,000), as described in table 14. In all age groups, it was evident that men reported more often than women having used condoms consistently. Still, even in the age group in which this HIV-preventive behaviour was most frequently observed (15-19 years), the proportion was relatively low for both men (27.23%) and women (19.55%). Additionally, data indicated an identical pattern in the responses of both men and women marked by lower proportions of reporting consistent condom use in each the age group from of 15-19 to 40-44 years old. This trend was interrupted in the 45-49 age group when there was an increase in the percentage of affirmative responses from both groups. Subsequently, in the age group of 50 and above, there was a sharp drop to the lowest percentages reported for consistent condom use among all participants (4.74% for men and 1.73% for women).

For marital status, consistent condom use was most frequently reported by single men (27.72%) and women (20.17%). Although with similar proportions, this preventive behaviour was higher among men (8.24%) and women (5.52%) who were divorced, separated or widowed compared to male and female participants married or living in a non-marital partnership (8.10% and 3.20%, respectively).

Employment status also showed a similar pattern in the responses of both groups, with consistent condom use being reported most frequently by male (38.35%) and female students (31.94%). Interestingly, similar proportions of consistent condom use were reported among men (13.18%) and women (12.18%) working as employees. In contrast, reporting of consistent condom was lower among self-employed men (9.03%), though the same was not observed with women, 4.37% of self-employed and women reported consistent condom use and those who worked only in the home reported the lowest proportions of consistent condom use(4.2%).

Table 14: Consistent condom use by sociodemographic characteristics of study´s participants

	Used condoms consistently during past 12 months								
	Men					Women			
	Yes		No		p	Yes		No		p
	F	%	F	%		F	%	F	%	
Age	**N=595**		**N=2,940**		**0.000**	**N=644**		**N=8,287**		**0.000**
15-19	266	27.23	711	72.77		226	19.55	930	80.45	
20-24	141	24.10	444	75.90		137	9.49	1,306	90.51	
25-29	59	16.48	299	83.52		78	6.73	1,081	93.27	
30-34	45	12.10	327	87.90		67	5.55	1,140	94.45	
35-39	30	8.88	308	91.12		45	3.98	1,086	96.02	
40-44	15	5.47	259	94.53		35	3.91	859	96.09	
45-49	18	10.11	160	89.89		34	5.08	635	94.92	
≥50	21	4.64	432	95.36		22	1.73	1,250	98.27	
Marital Status	**N=595**		**N=2,937**		**0.000**	**N=643**		**N=8,283**		**0.000**
Single	436	27.72	1,137	72.28		387	20.17	1,532	79.83	
Married/Non-marital partnership	144	8.10	1,633	91.90		180	3.20	5,451	96.8	
Divorced/Separated/Widowed	15	8.24	167	91.76		76	5.52	1,300	94.48	
Employment Status	**N=349**		**N=1,661**		**0.000**	**N=399**		**N=5,209**		**0.000**
Employed	55	13.82	343	86.18		33	12.18	238	87.82	
Self-employed	57	9.03	574	90.97		55	4.37	1,205	95.63	
Not employed/Stays at home	56	11.00	453	89.00		150	4.20	3,423	95.8	
Student	181	38.35	291	61.65		161	31.94	343	68.06	

3.6.3 Symptoms of sexually transmitted infections

Tables 15 and 16 present results on self-reported symptoms (genital abnormal discharge or sores) of a sexually transmitted infection in the year preceding data collection. The statistical analysis presented mixed results in terms of the association of these variables with the study´s participants sociodemographic characteristics. For abnormal discharge from genitals, an association was found for all sociodemographic variables of men and women (p-value varied between 0.000 and 0.001). In

contrast, genital sores (ulcers) were only statistically significant for men´s age (p=0.000) and marital status (p=0.000).

3.6.3.1 Abnormal genital discharge

Abnormal penal discharge was more prevalent among men aged 25-29 years (9.47%) followed by those aged 30-34 years (8.36%) (Table 15). In contrast, this symptom was reported less often by men aged 50 and above (1.98%). When compared to men, self-reporting of abnormal vaginal discharge was higher in women of all age groups. Additionally, among women, the prevalence was higher in the 35-39 (17.56%) and 30-34 (17.45%) age groups, and lower among those aged 50 and above (6.88%).

The symptom was significantly higher among married men (6.60%) in comparison with their separated, divorced or widowed (3.8%) and single (3.49%) peers. In women, there were practically no differences between those who had steady partners (14.26%) and those who were separated, divorced or widowed (14.06%). Additionally, it was lower by almost five percentage points among single women (9.83%).

Men who reported to be employed (7.43%) tended to report this symptom more frequently than their peers that were self-employed (5.86%), did not have a professional occupation (2.75%) and were students (1.69%). In women, at the exception of student participants (5.71%), this symptom was similarly reported by women without a professional occupation (11.61%), employed (11.40%) and self-employed (11.20%).

Table 15: Abnormal discharge from genitals by sociodemographic characteristics of study´s participants

	Past 12 months, had abnormal/unusual discharge from vagina/penis								
	Men					Women			
	Yes		No		p	Yes		No		p
	F	%	F	%		F	%	F	%	
Age	**N=179**		**N=3,357**		**0.000**	**N=1,194**		**N=7,790**		**0.000**
15-19	23	2.36	952	97.64		80	6.90	1,080	93.10	
20-24	35	5.96	552	94.04		200	13.82	1,247	86.18	
25-29	34	9.47	325	90.53		173	14.86	991	85.14	
30-34	31	8.36	340	91.64		211	17.45	998	82.55	
35-39	22	6.53	315	93.47		200	17.56	939	82.44	
40-44	18	6.59	255	93.41		144	16.09	751	83.91	
45-49	7	3.89	173	96.11		97	14.35	579	85.65	
≥50	9	1.98	445	98.02		89	6.88	1,205	93.12	
Marital Status	**N=179**		**N=3,354**		**0.000**	**N=1,192**		**N=7,787**		**0.000**
Single	55	3.49	1,520	96.51		190	9.83	1,742	90.17	
Married/Non-marital partnership	117	6.60	1,657	93.40		805	14.26	4,841	85.74	
Divorced/Separated/Widowed	7	3.80	177	96.20		197	14.06	1,204	85.94	
Employment Status	**N=89**		**N=1,927**		**0.000**	**N= 711**		**N=5,044**		**0.001**
Employed	30	7.43	374	92.57		31	11.40	241	88.60	
Self-employed	37	5.86	594	94.14		143	11.20	1,134	88.80	
Not employed/Stays at home	14	2.75	495	97.25		419	11.61	3,190	88.39	
Student	8	1.69	464	98.31		29	5.71	479	94.29	

3.6.3.2 Genital Sores

Results of the univariate analysis for genital sores only showed a significant statistically significant association with men´s age (p=0.000) and marital status (p=0.001). Genital sores were more prevalent in the age groups of 35-39 (6.82%) and 25-29 years old (6.13%). In contrast, it was less commonly reported in the age group of 50 and above (0.88%). Additionally, men who were married or living in a non-marital partnership reported genital sores (4.57%) more often than their divorced, separated or widowed (2.72%) and single (2.29%) peers.

Table 16: Genital sores by sociodemographic characteristics of study´s participants

	Past 12 months, had sores in genital area								
	Men					Women			
	Yes		No		p	Yes		No		p
	F	%	F	%		F	%	F	%	
Age	**N=122**		**N=3,413**		**0.000**	**N=345**		**N=8,646**		**0.124**
15-19	15	1.54	959	98.46		36	3.10	1,125	96.90	
20-24	23	3.92	564	96.08		59	4.07	1,389	95.93	
25-29	22	6.13	337	93.87		38	3.26	1,127	96.74	
30-34	18	4.84	354	95.16		59	4.88	1,151	95.12	
35-39	23	6.82	314	93.18		53	4.66	1,085	95.34	
40-44	13	4.78	259	95.22		37	4.13	859	95.87	
45-49	4	2.22	176	97.78		24	3.54	654	96.46	
≥50	4	0.88	450	99.12		39	3.01	1,256	96.99	
Marital Status	**N=122**		**N=3,410**		**0.001**	**N= 344**		**N=8,642**		**0.272**
Single	36	2.29	1,538	97.71		66	3.41	1,868	96.59	
Married/Non-marital partnership	81	4.57	1,693	95.43		215	3.81	5,435	96.19	
Divorced/Separated/Widowed	5	2.72	179	97.28		63	4.49	1,339	95.51	
Employment Status	**N=51**		**N=1,965**		**0.102**	**N=172**		**N=5,498**		**0.651**
Employed	15	3.71	389	96.29		6	2.21	266	97.79	
Self-employed	19	3.01	612	96.99		40	3.13	1,237	96.87	
Not employed/Stays at home	11	2.16	498	97.84		114	3.16	3,499	96.84	
Student	6	1.27	466	98.73		12	2.36	496	97.64	

3.7 HIV sexual risk behaviours by migrant status

This section describes the results of the study´s participants sexual risk behaviours accordingly to their migrant status.

3.7.1 Multiple sexual partnerships

As reported in table 17, living outside of Chókwè district for at least one month in the year preceding data collection was associated with the number of sexual partnerships of both men and women (p=0.000). Among migrant men, reporting of three or more sexual partnerships was more common (44.86%). This is in contrast with those who did not migrate and who tended to report more often just one sexual partner (56.34%). Although by a slight margin, migrants also reported more frequently to have had two sexual partnerships compared to their non-migrant peers (18.57% vs. 15.22%). Among migrant women, two (7.56%) and three or more (8.08%) sexual partners were also more commonly reported in comparison with non-migrants (3.99% and 3.49% respectively). By

contrast, it was found that the reporting of a single sexual partnership was higher among women who did not migrate (81.20% vs 79.26%), although the variation was less than two percentage points. Additionally, reporting of any sexual partner was twice as high among these women (11.32%) compared to migrants (5.10%). This difference was not found among men who reported similar proportions (about 3%).

The period that participants spent outside of Chókwè was associated with the number of sexual partners among men (p=0.007) but not among women (p=0.165). Interestingly, the proportion of men who reported having had three or more sexual partnerships was higher among those who migrated for less than six months (46.92%) compared to those who migrated for more than six months (33.33%). The same did not apply to the reporting of one (35% vs. 33.22%) and two (18.49% vs. 23.33%) sexual partners. Men who migrated for more than six months also reported more often not having had any sexual partnerships (8.33% vs. 1.37%).

Internal migration was found to be associated with the number of sexual partnerships in both genders (p=0.000). Most internal migrants (41.71%) said they had three or more sexual partnerships, in contrast to other men who reported most often only one sexual partner (55.08%). Reporting of two sexual partners was also higher among internal migrants (20.10%) than their male peers (16.22%). The absence of sexual partnerships was similar between both groups of respondents (2.01% vs. 2.60%). Among female participants, reporting of a single sexual partnership was the most common response among internal migrants (74.60%) and the other respondents (81.23%). However, migrant women stated more often that they had two (11.69%) and three or more sexual partners (6.45%) than the other women (4.01% and 3.74%, respectively). It is also important to note that the absence of sexual partners was lower among internal migrants (7,26%) than among the other participants (11,02%).

Migration to South Africa was associated with the number of sexual partnerships of men and women (p=0,000). Nearly half (48.51%) of the men who migrated to South Africa said they had three or more sexual partnerships, which was almost the double of what was observed among the other participants (25.26%). This difference was not observed in the reporting of two sexual partnerships, which was practically the same among migrant men (15.67%) and the others (16.01%). Male participants who did not migrate to South Africa reported more frequently a single sexual partnership (56.35%) in relation to their migrant peers (32.09%). Still, the absence of sexual partnerships was slightly higher among those who migrated to South Africa (3.73% vs 2.38%). Among women, the prevalence of a single sexual partner was dominant among those who migrated to South Africa (82.88%) and the other participants (80.66%). In addition, the reporting of two sexual partners was almost the same between the two groups (about 4.5%). Yet the reporting of three or more sexual partners was most observed among women who had been in South Africa (8.56% vs. 3.89%).

Conversely, women who did not migrate to South Africa tended to report more not having had any sexual partners (10.85% vs 3.46%).

Table 17: Study´s participants sexual partnerships by migrant status

	Number of sexual partners during past 12 months																
	Men									Women							
	0		1		2		≥3		P	0		1		2		≥3		P
	F	%	F	%	F	%	F	%		F	%	F	%	F	%	F	%	
Away from home more than one month last 12 months	**N=87**		**N=1,825**		**N=556**		**N=910**		**0.000**	**N=940**		**N=6,987**		**N=364**		**N=327**		**0.000**
Yes	9	2.57	119	34.00	65	18.57	157	44.86		29	5.10	451	79.26	43	7.56	46	8.08	
No	78	2.58	1706	56.34	491	16.22	753	24.87		911	11.32	6536	81.20	321	3.99	281	3.49	
Time away from home	**N= 9**		**N= 118**		**N=68**		**N=157**		**0.007**	**N=31**		**N=445**		**N=42**		**N=47**		**0.165**
1 - 6 months	4	1.37	97	33.22	54	18.49	137	46.92		26	5.30	391	79.63	32	6.52	42	8.55	
7 - 12 months	5	8.33	21	35.00	14	23.33	20	33.33		5	6.76	54	72.97	10	13.51	5	6.76	
Last 12 months, lived outside of Chockwe district but within Mozambique for at least one month	**N= 87**		**N=1,828**		**N=557**		**N=915**		**0.000**	**N= 942**		**N=6,997**		**N=365**		**N=330**		**0.000**
Yes	4	2.01	72	36.18	40	20.10	83	41.71		18	7.26	185	74.60	29	11.69	16	6.45	
No	83	2.60	1756	55.08	517	16.22	832	26.10		924	11.02	6812	81.23	336	4.01	314	3.74	
Last 12 months, lived for at least one month in South Africa	**N=67**		**N=1,511**		**N=438**		**N=723**		**0.000**	**N=728**		**N=5,585**		**N=305**		**N=282**		**0.000**
Yes	5	3.73	43	32.09	21	15.67	65	48.51		11	3.77	242	82.88	14	4.79	25	8.56	
No	62	2.38	1468	56.35	417	16.01	658	25.26		717	10.85	5343	80.86	291	4.40	257	3.89	

3.7.2 Consistent Condom Use

Consistent condom use reported by the study´s participants was associated with male migration (p=0.005) but not with female migration (p=0.061), shows table 18. Among men who migrated, 22.04% said they used condoms consistently in the previous year, against only 16.22% of participants who did not migrate.

Interestingly, consistent condom use was not associated with the period of migration of both men (p=0.993) and women (p=0.633).

Data from internal migrants was associated with consistent condom use reported by male (p=0.002) and female (p=0.002) participants. This HIV preventive behaviour was reported by 24.64% of migrant men but had a much lower prevalence among migrant women (13.10%). Among the other participants, 16.35% of men and 7.04% of women stated that they used condoms consistently.

Among the participants who emigrated to South Africa, no association with consistent condom use was observed for both men (p=0.974) and women (p=0.117).

Table 18: Consistent condom use by study´s participants migrant status

	Used condoms consistently during past 12 months								
	Men					Women			
	Yes		No		P	Yes		No		P
	F	%	F	%		F	%	F	%	
Away from home more than one month last 12 months	**N=593**		**N=2,933**		**0.005**	**N=643**		**N=8,271**		**0.061**
Yes	80	22.04	283	77.96		54	9.14	537	90.86	
No	513	16.22	2,650	83.78		589	7.08	7734	92.92	
Time away from home	**N=80**		**N=258**		**0.993**	**N=53**		**N=532**		**0.633**
1 - 6 months	14	21.88	50	78.13		8	10.53	68	89.47	
7 - 12 months	66	21.93	235	78.07		45	8.84	464	91.16	
Last 12 months, lived outside of Chockwe district but within Mozambique for at least one month	**N=595**		**N=2,940**		**0.002**	**N=644**		**N=8,287**		**0.000**
Yes	51	24.64	156	75.36		33	13.10	219	86.90	
No	544	16.35	2784	83.65		611	7.04	8068	92.96	
Last 12 months, lived for at least one month in South Africa	**N=495**		**N=2,389**		**0.974**	**N=539**		**N=6,650**		**0.117**
Yes	24	17.27	115	82.73		16	5.19	292	94.81	
No	471	17.16	2274	82.84		523	7.60	6358	92.40	

3.7.3 Symptoms of sexually transmitted infections

Symptoms suggestive of sexually transmitted infections and migration status are described in Tables 19 and 20. Abnormal genital discharge among men were associated with all forms of migration (p=0.002), period of migration (p=0.030), and internal migration (p=0.039), but not for migration to South Africa (p=0.676). Among women, a statistically significant association was found for all forms of migration (p=0.000), internal migration (p=0.048) and migration to South Africa (p=0.009) but not for migration period (p=0.811).

As for the reporting of genital sores, data from male participants showed an association with the variables all forms of migration (p=0.001), internal migration (p=0.008), and migration to South Africa (p=0.040). By contrast, the period of migration (p=0.923) was not statistically significant. Among women, an association was found with the variables all forms of migration (p=0.003) and migration to South Africa (p=0.016), but not for the period of migration (p=0.865) nor internal migration.

3.7.3.1 Abnormal genital discharge

Reporting of genital discharge was higher among men who said they had migrated (8.47%) compared to the other participants (4.65%). In relation to the length of the migration period, a higher proportion of men who had been away for less than six months (9.87%) reported having had an abnormal penal discharge than those who had migrated for more than six months (1.56%). This symptom was also more prevalent among participants who said they had migrated to another region of Mozambique (8.10%) than the other respondents (4.87%). Abnormal vaginal discharge in the 12 months that preceded data collection also was reported by a greater proportion of migrant women (18.41%) compared to participants who did not migrate (12.92%). This trend was observed both among women who were internal migrants (17.46% vs. 13.17%) and women who had migrated to South Africa (18.45% vs. 13.24%).

Table 19: Abnormal discharge from genitals by study´s participants migrant status

	Past 12 months, had abnormal/unusual discharge from vagina/penis								
	Men					**Women**				
	Yes		**No**		**P**	**Yes**		**No**		**P**
	F	%	F	%		F	%	F	%	
Away from home more than one month last 12 months	**N=178**		**N=3,349**		**0.002**	**N= 1,191**		**N= 7,776**		**0.000**
Yes	31	8.47	335	91.53		109	18.41	483	81.59	
No	147	4.65	3,014	95.35		1082	12.92	7293	87.08	
Time away from home	**N=31**		**N=337**		**0.030**	**N=106**		**N=480**		**0.811**
1 - 6 months	30	9.87	274	90.13		93	18.24	417	81.76	
7 - 12 months	1	1.56	63	98.44		13	17.11	63	82.89	
Last 12 months, lived outside of Chockwe district but within Mozambique for at least one month	**N=179**		**N=3,357**		**0.039**	**N=1,194**		**N=7,790**		**0.048**
Yes	17	8.10	193	91.9		44	17.46	208	82.54	
No	162	4.87	3164	95.13		1150	13.17	7582	86.83	
Last 12 months, lived for at least one month in South Africa	**N=147**		**N=2,738**		**0.121**	**N=975**		**N=6,268**		**0.009**
Yes	11	7.91	128	92.09		57	18.45	252	81.55	
No	136	4.95	2610	95.05		918	13.24	6016	86.76	

3.7.3.2 Genital Sores

There were smaller variations in the prevalence of genital sores among the different groups of participants. However, the reporting of genital sores also tended to be higher among male and female

migrants. In men, 6.56% of migrants reported this symptom against 3.07% of non-migrant participants. The trend was also observed in both internal migrants (6.67% vs. 3.25%) and migrants who had been in South Africa (6.47% vs. 3.24%). Among women, 6.09% of the participants who migrated reported this symptom against 3.67% of those who did not. This observation was most likely driven by women who migrated to South Africa (6.47%), which had a higher proportion of cases than the other participants (3.76%).

Table 20: Sores in genital area by study´s participants migrant status

	Past 12 months, had sores in genital area								
	Men					**Women**				
	Yes		**No**		**P**	**Yes**		**No**		**P**
	F	%	F	%		F	%	F	%	
Away from home more than one month last 12 months	**N=121**		**N=3,405**		**0.001**	**N=344**		**N=8,630**		**0.003**
Yes	24	6.56	342	93.44		36	6.09	555	93.91	
No	97	3.07	3,063	96.93		308	3.67	8075	96.33	
Time away from home	**N=24**		**N=344**		**0.923**	**N=36**		**N=550**		**0.865**
1 - 6 months	20	6.58	284	93.42		31	6.08	479	93.92	
7 - 12 months	4	6.25	60	93.75		5	6.58	71	93.42	
Last 12 months, lived outside of Chockwe district but within Mozambique for at least one month	**N=122**		**N=3,413**		**0.008**	**N=345**		**N=8,646**		**0.268**
Yes	14	6.67	196	93.33		13	5.16	239	94.84	
No	108	3.25	3217	96.75		332	3.8	8407	96.2	
Last 12 months, lived for at least one month in South Africa	**N=98**		**N=2,787**		**0.040**	**N=281**		**N=6,970**		**0.016**
Yes	9	6.47	130	93.53		20	6.47	289	93.53	
No	89	3.24	2657	96.76		261	3.76	6681	96.24	

3.8 Multivariate Logistic Regression: Associations between migration and HIV risk behaviours and HIV status

This section presents on the results of the multivariate logistic regression analysis that were conducted for testing the hypothesis that migration is associated with increased sexual risk behaviours and HIV positive status. To this end, five logistic regression models were built considering the dependent variables of interest multiple sexual partners, consistent condom use, abnormal discharge from genitals, genital sores and HIV status. The models were run separately for the independent variables all forms of migration, internal migration and migration to South Africa while accounting for

age and marital status. The tables shown in this section present a summary of the models considering the main outcomes of interest to this study.

3.8.1 All forms of migration

Table 21 indicates that men and women who reported to be at least one month outside of Chókwè district in the year prior data collection were two times more likely to report multiple sexual partners in comparison to non-migrant participants (aOR=2.32, 95% CI 1.84 - 2.94, p=0.000 and aOR=2.04, 95% CI 1.60 - 2.62, p=0.000).

Self-reporting of consistent condom use was associated with migration among male participants (aOR=1.45, 95% CI 1.09 - 2.91, p=0.009), but not among women (aOR=1.07, 95% CI 0.79 - 1.46, p=0.641), who had the same odds of reporting this HIV preventive behaviour than their non-migrant peers.

The likelihood of having had an abnormal discharge from genitals was almost 1.5 times higher among men (aOR=1.51, 95% CI 1.04 - 2.37, p=0.030) and women (aOR=1.49, 95% CI 1.20 - 1.86, p=0.000) who had travelled to outside of Chókwè district for more than one month.

Reporting of sores in genital area, another symptom indicative of a possible sexually transmitted infection, was also statistically associated with migration for both men (aOR=1.85, 95% CI 1.16 - 2.96, p=0.010) and women (aOR=1.70, 95% CI 1.18 - 2.43, p=0.004).

The HIV status of the study's participants was not statistically associated with migration as migrant men (aOR=1.04, 95% CI 0.73 – 148, p=0.796) and women (aOR=1.18, 95% CI 0.96 – 0.144, p=0.104) had the same odds of being HIV positive than their non-migrant peers.

Table 21: Summary Results of Logistic Regression Models for the association between all forms of migration and HIV risk behaviours, symptoms of STIs, and HIV status, adjusting for age and marital status

	Results of multivariate logistic regression models for all forms of migration*							
	Men				Women			
	F	aOR	95% CI	P	F	aOR	95% CI	P
Model 1 - *Multiple Sexual Partnerships*								
Away from home more than one month last 12 months	3,375				8,615			
No		Ref				Ref		
Yes		2.32	1.84 - 2.94	0.000		2.04	1.60 - 2.62	0.000
Model 2 - *Consistent Condom Use*								
Away from home more than one month last 12 months	3,523				8,911			
No		Ref				Ref		
Yes		1.45	1.09 - 1.91	0.009		1.07	0.79 - 1.46	0.641
Model 3 - *Abnormal Discharge from Genitals*								
Away from home more than one month last 12 months	3,524				8,964			
No		Ref				Ref		
Yes		1.57	1.04 - 2.37	0.030		1.49	1.20 - 1.86	0.000
Model 4 - *Genital Sores*								
Away from home more than one month last 12 months	3,523				8,971			
No		Ref				Ref		
Yes		1.85	1.16 - 2.96	0.010		1.70	1.18 - 2.43	0.004
Model 5 - *HIV Status*								
Away from home more than one month last 12 months	2,955				7,765			
No		Ref				Ref		
Yes		1.04	0.73 - 1.48	0.796		1.18	0.96 - 1.44	0.104

* All models adjusted for age and marital status

3.8.2 Internal Migration

Results on table 22 show an association between multiple sexual partnerships and internal migration with both male (aOR=2.08, 95% CI 1.54 - 2.18, p=0.000) and female (aOR=2.03, 95% CI 1.44 - 2.85, p=0.000) migrants. Migrants were twice as likely to report more than one partner in the previous year in comparison with the other respondents.

The model for consistent condom use and internal migration showed a statistically significant association for migrant men (aOR=1.52, 95% CI 1.07 – 2.14, p=0.017), who were about 1.5 times more likely to have used condoms consistently than their peers, but not for migrant women (aOR=1.15, 95% CI 0.77 – 1.71, p=0.483).

The odds of reporting an abnormal discharge from genitals in the previous year was 1.5 times higher among internal migrant women (aOR=1.51, 95% CI 1.12 - 2.68, p=0.009) in relation to the other female participants. By contrast, results for men, did not indicate a statistically significant difference between groups (aOR=1.58, 95% CI 0.93 - 2.20, p=0.087).

The model for genital sores presents a different pattern than was observed with sexually transmitted infection (abnormal genital discharge), with internal migrant men being almost twice as likely to report this symptom (aOR=1.98, 95% CI 1.10 - 3.56, p=0.021), but with no significant association found among migrant women (aOR=1.43, 95% CI 0.81 - 2.55, p=0.213).

As for HIV status, results suggest that the odds of being HIV positive were the same for internal migrants and the other participants, since no statistically significant difference was found among migrant men (aOR=1.13, 95% CI 0.71 - 1.80, p=0.578) and women (aOR=1.02, 95% CI 0.47 - 1.41, p=0.884).

Table 22: Summary Results of Logistic Regression Models for the association between internal migration and HIV risk behaviours, symptoms of STIs, and HIV status, adjusting for age and marital status

	Results of multivariate logistic regression models for internal migration*							
	Men				Women			
	F	aOR	95% CI	P	F	aOR	95% CI	P
Model 1 - *Multiple Sexual Partnerships*								
Lived outside of Chóckwè district but within Mozambique	3,384				8,629			
No		Ref				Ref		
Yes		2.08	1.54 - 2.18	0.000		2.03	1.44 - 2.85	0.000
Model 2 - *Consistent Condom Use*								
Lived outside of Chockwe district but within Mozambique	3,532				8,926			
No		Ref				Ref		
Yes		1.52	1.07 - 2.14	0.017		1.15	0.77 - 1.71	0.483
Model 3 - *Abnormal Discharge from Genitals*								
Lived outside of Chóckwè district but within Mozambique	3,533				8,979			
No		Ref				Ref		
Yes		1.58	0.93 - 2.68	0.087		1.51	1.12 - 2.20	0.009
Model 4 - *Genital Sores*								
Lived outside of Chóckwè district but within Mozambique	3,532				8,986			
No		Ref				Ref		
Yes		1.98	1.10 - 3.56	0.021		1.43	0.81 - 2.55	0.213
Model 5 - *HIV Status*								
Lived outside of Chóckwè district but within Mozambique	2,961				7,776			
No		Ref				Ref		
Yes		1.13	0.71 - 1.80	0.578		1.02	0.47 - 1.41	0.884

* All models adjusted for age and marital status

3.8.3 Migration to South Africa

As previously seen with internal migrants, table 23 shows that migration to South Africa also emerged in both genders associated with reporting of more than one sexual partnership in the past year, with approximately the double of the chances among migrant men (aOR=2.46, 95% CI 1.69 -

3.56, p=0.000) and women (aOR=2.03, 95% CI 1.22 - 2.48, p=0.002) when comparing with other participants.

When the model was updated to assess the relationship of consistent condom use and migration to South Africa no associations were found for both men (aOR=1.20, 95% CI 0.74 – 1.93, p=0.450) and women (aOR=1.80, 95% CI 0.43 – 1.63, p=0.421), which suggests that participants who had migrated to South Africa had the same likelihood of using condoms consistently than the other respondents.

The analysis for the association between migration to South Africa and the reporting of abnormal discharge from genitals indicates no statistically significant differences between groups of participants, for both men (aOR=1.22, 95% CI 0.63 – 2.35, p=0.538) and women (aOR=1.31, 95% CI 0.97 – 1.77, p=0.069).

Although men who had migrated to South Africa had the same odds of reporting genital sores than their peers (aOR=1.22, 95% CI 0.63 – 2.35, p=0.538), migrant women were 1.7 times more likely to report this indicative symptom of a sexually transmitted infection than the other female participants (aOR=1.71, 95% CI 1.06 – 2.75, p=0.025).

Modelling for HIV status and migration to South Africa was consistent with the findings of internal migrants, with no statistically significant difference found among migrant men (aOR=0.89, 95% CI 0.51 - 1.55, p=0.696) and women (aOR=1.29, 95% CI 0.99 - 1.69, p=0.054).

Table 23: Summary Results of Logistic Regression Models for the association between migration to South Africa and HIV risk behaviours, symptoms of STIs, and HIV status, adjusting for age and marital status

	Results of multivariate logistic regression models for migration to South Africa*							
	Men				Women			
	F	aOR	95% CI	P	F	aOR	95% CI	P
Model 1 - *Multiple Sexual Partnerships*								
Lived in South Africa	2,736				6,895			
No		Ref				Ref		
Yes		2.46	1.69 - 3.56	0.000		1.74	1.22 - 2.48	0.002
Model 2 - *Consistent Condom Use*								
Lived in South Africa	2,881				7,184			
No		Ref				Ref		
Yes		1.20	0.74 - 1.93	0.450		0.80	0.43 - 1.36	0.421
Model 3 - *Abnormal Discharge from Genitals*								
Lived in South Africa	2,882				7,238			
No		Ref				Ref		
Yes		1.22	0.63 - 2.35	0.538		1.31	0.97 - 1.77	0.069
Model 4 - *Genital Sores*								
Lived in South Africa	2,882				7,246			
No		Ref				Ref		
Yes		1.48	0.71 - 3.05	0.287		1.71	1.06 - 2.75	0.025
Model 5 - *HIV Status*								
Lived in South Africa	2,399				6,241			
No		Ref				Ref		
Yes		0.89	0.51 - 1.55	0.696		1.29	0.99 - 1.69	0.054

* All models adjusted for age and marital status

4. Discussion

In this section, the results presented in the previous chapter are discussed considering the study's objectives and a literature review focused on research conducted in Mozambique on HIV/AIDS and the dynamics involving migration and HIV in low- and middle-income countries. The findings are also analysed considering limitations of the study's design.

4.1 Study participants' sociodemographic characteristics

The analysis of the participants' sociodemographic data showed that more than two-thirds of the respondents were women (71.78%), highlighting marked differences in the demographic composition of the study population in relation to the Gaza province (55.3% female population) and the national average (52% female population) data of the latest census(102). If interpreted in the context of previous studies on migration in the southern provinces of Mozambique, these discrepancies suggest that, in fact, migration may have a considerably greater weight on the male population(9, 10, 18). Although the data analysis showed that there is a higher proportion of men who migrate, the number of women who reported having migrated was considerably higher (594 vs 367), which shows that the migration phenomenon should not only be observed from a male perspective, but rather from a comprehensive and inclusive gender approach. Additionally, considering the low number of participants who declared to work in the mining sector (seven), it is important to highlight the possible limitation of the study in terms of its ability to collect data from this migrant population group. This may be related with the time of the year in which the data was collected, and that may not have coincided with periods in which these groups are normally visit their communities of origin (mainly in December for the Christmas season)(18, 20). Still, the fact that almost 8% of the study population reported living more than one month outside of Chókwè in the year prior to data collection highlights a substantial relationship of the population of this district with migration, as documented in other studies(9, 13, 16). Concurrently, this data also points to the need for health interventions not to be focused exclusively on population groups whose migration is related to a certain sector of economic activity, and particularly with the mining sector.

It is relevant to highlight that the mobility reported by the participants can be framed in a context of short duration (85% said they had been away for less than six months), which underscores the importance of not limiting health interventions to migrants who traditionally stay away for long periods of time. Moreover, the sociodemographic profile of the participants shows that it is in the age groups between 20 and 49 years that migration has a greater weight. Combined with data on HIV prevalence, which increases dramatically after the age of 20 in women and 25 in men, the analysis substantiates the need for specific HIV prevention policies aimed at adolescents and young adults.

The analysis of the participants´ marital status showed marked gender discrepancies in the proportion of single and separated, divorced or widowed men and women. For respondents who reported being single, the proportion was 44.5% among men compared to 21.5% among women. Furthermore, the marital status of separated, divorced, or widowed was reported by 5.1% of men compared to 15.6% of women. Regarding this latter marital status, masculinity norms and other determinants linked to the acceptance and adherence to health services, and particularly to HIV/AIDS services, may explain differences in the average life expectancy of men and women, and contribute to asymmetries in population distribution between groups, especially if one considers that mortality tends to affect men more than women(103-107). In addition, differences in the proportion of singles may result from economic factors, in a social dynamic in which married men migrate to seek economic opportunities outside the district of Chókwè, while their partners remain in the area of residence, resulting in differences in the population distribution according to marital status between genders(9, 10, 18). In this context, it is important to highlight the IMASIDA findings on attitudes towards negotiating safe sex with steady partners, which show that in Gaza only 22.3% of women said that it is acceptable to refuse to have sex if they know that the husband has other sexual partners(5). Even when knowing that the male sexual partner has an sexually transmitted infection, 26.5% of women said that it is not acceptable to ask for condom use before sexual intercourse(5).

The primary survey that was used for the secondary data analysis of this study did not collect information that could allow to situate participants in a certain wealth quintile(101). Still, in a rural context marked by family farming, the findings showed that about half of the men have a source of income through work, against 30% of the women. If it is considered that almost two thirds of the women stated that they were either unemployed or staying at home, it is possible to perceive the existence of economic disparities between genders among the study´s population, whose analysis from a perspective of risk factors associated with HIV may indicate the difficulty of negotiating safe sexual behaviours among couples, as documented in other researches(18, 19, 22, 93, 95) .

The comparison of the sociodemographic data of internal migrants and those who migrated to South Africa points to differences in their migrancy profile and the underlying reasons that motivate migration. These can support the interpretation of gendered power dynamics within families exposed to migration. Notably, the differences in the number of female and male participants were much more pronounced among migrants who travelled to South Africa (139 men versus 310 women) with respect to internal migrants (210 men and 253 women). As for age, in both genders, it was noticeable that there were a larger number of younger participants (15-19 years-old) who migrated to other regions of Mozambique, compared to those who migrated to South Africa, and whose migration experience tended to occur after the age of 20. Among male internal migrants, no statistical association was found with their marital status, unlike what was observed with women. Still, it is important to note that most of

the men (108) and a substantial number of women (113) reported to be single. This contrasts with what was observed with the migrants that travelled to South Africa, and who were mostly married or living in a consensual union. Data on employment situation shows that education appears to have a greater weight in the reasons motivating internal migrancy, in comparison to migration to South Africa. Additionally, there is a higher number and proportion of self-employed women who migrated to South Africa relative to internal migrants, which is also observed with women who don´t work or stay at home. Research on Mozambican women's migration to South Africa is scarce, but their presence in migrant communities has been described as "noticeable", and they are known to be part of the economic fabric of South Africa's labour migration, including in the agriculture and commerce sectors. In fact, research with informal Mozambican cross-border vendors known as "*Mukheristas*" as described this occupation as highly risky for women's sexual health due to the increased risk of gender-based violence(79). Additionally, as for women who travel due to family-related reasons, previous studies have highlighted that women of Mozambican migrant men working in South African mines travel on a periodical basis for short-term visits to their partners(9). These visits are also known to increase women's vulnerability to HIV-infection due to unprotected sexual intercourse with their partners(18, 20).

4.2 Study participants' HIV sexual risk behaviours

4.2.1 Multiple Sexual Partnerships

The study showed that multiple sexual partnerships (two or more sexual partners) have a prevalence of over 40% among men and about 8% among women. These data signal a markedly different profile for the district of Chókwè compared to the provincial (24.7% for men and 2.1% for women) and national (20.4% for men and 2.6% for women) averages observed in the last HIV seroprevalence survey conducted in the country, although it is important to note that the present study only considered participants who had ever had sexual intercourse(5). The statistical analysis showed an association between age and reported number of sexual partners, with younger participants having the highest prevalence of multiple sexual partnerships. Among men, the prevalence was about 50% in the ages of 15-29 years-old, compared to approximately 10% among women. Such results also show a discrepancy with the national average (below 29% among men and 4% among women aged 15-30 years), and reinforce the relevancy of additional studies that allow for a better understanding of the factors that may be linked to the high prevalence of multiple sexual partnerships in the Chókwè district(5).

Results showed an association between participants' marital status and the number of reported sexual partners. For both men and women, having more than one sexual partner was higher among single participants (about 50% in men and 15% among women), although with significant differences between men (about 50%) and women (15%). In addition, reporting of multiple sexual partnerships had

a prevalence of 47.51% among divorced, separated or widowed men and 37.71% among married or in a non-marital union, compared to 8.37% and 5.7% of women, respectively. Compared to the national average, these data also show that multiple sexual partners are more prevalent in the Chókwè district among this population groups(5). For example, among those who are married or living in a non-marital union, the national indicators point to a prevalence of multiple sexual partnerships of 22.4% among men and 2% among women. Still, it is important to note that the observed gender disparity is consistent with the findings of other studies, which show that multiple sexual partnerships tend to be more frequently reported by men than women(56, 57).

Participants' occupation also showed an association with the reported number of sexual partners. The prevalence was higher among male (about 40%) and female (about 12%) students, which should be interpreted considering findings that showed that multiple sexual partnerships are more common among young people. Interestingly, it was possible to note that even among men who stated that were not employed, the prevalence of multiple sexual partnerships was close to 30%. For women, it was observed that the number of sexual partners was higher among participants with no formal source of income (6.75%) compared to those who were self-employed (4.41%). These results raise additional questions on the level of influence that income has on multiple sexual partnerships. Previous research has shown that economic hardship contributes to women of migrant men to engage in concurrent sexual partnerships and transactional sex(18, 108, 109). Yet, from the findings of this study, it is unclear the degree to which lack of income affects men's ability to have multiple sexual partners.

The results showed a statistical association between multiple sexual partnerships and the migration variables that were considered in the study, with the exception of migration period which was only statistically significant for men (migrants away for less than six months reported more sexual partnerships than those migrating for more than six months). Both migrant men and women reported more often to have had more than one sexual partner in comparison with participants who did not migrate. Similarly, the comparative data from internal migration and migration to South Africa also indicated that the prevalence of multiple sexual partners is higher among migrants of both sexes in comparison with other participants. In terms of cross-border migration, these findings are in line with studies conducted with Mozambican miners working in South Africa, which demonstrated that multiple sexual partnerships are common among this group(13, 14, 17). They are also in line with findings from studies conducted in other countries with migrant populations(23, 110, 111). In the national context, the study presents evidence that internal migration may have an influence on the number of sexual partnerships of migrant populations, as documented in studies conducted in other countries(112, 113). The findings align with the scientific consensus on the influence that migration may exert on individuals' engagement in risky sexual practices. Even in the context of a region where multiple sexual

partnerships are high, particularly among men, migration is a factor that exposes individuals to risky sexual behaviours that may facilitate HIV acquisition. Although the study only focused on multiple sexual partnerships, given the sociodemographic profile of the participants (a large percentage married or living in a consensual union), it is important to consider the implications of these findings in concurrent sexual partnerships, and the consequent risk of HIV transmission among serodiscordant couples(114, 115).

4.2.2 Consistent Condom Use

The research showed that consistent condom use in the 12 months preceding data collection was low in the Chókwè district, with only 16.83% of men and 7.21% of women reporting this HIV preventive behaviour. Showing a statistical association with the variables age, marital status, and employment status of men and women, the findings indicate that consistent condom use was most often reported by adolescents and young adults aged 15-29 (with a variation of 16% and 27% in men, and 7% and 20% among women), by participants that were single (28% in men and 20% in women), and by students (38% among men and 32% among women).

Given the high prevalence of multiple sexual partnerships in the Chókwè district seen in the previous section, the findings suggest that, even among the population groups that most often reported condom use, this preventive behaviour falls short of the level that would be desirable for a significant impact in reducing new HIV infections in the region. Still, the results suggest an alignment with condom use trends observed in other surveys conducted in the African continent, and in particular in the Southern African region(93). In general, these studies show that condom use is more frequently reported by young men, and in particular by those who live in urban areas, have a higher level of education, and have more economic capacity(93, 94, 116). Additionally, evidence suggests that a higher prevalence of condom use among young populations and individuals who are not in a long-term relationship is not necessarily motivated by reasons associated with prevention of sexually transmitted infections, including HIV, but rather because condoms are a form of contraception(117-119). It is also important to consider that young people tend to be more frequently targeted in HIV prevention interventions, which allows them to have more access to information and motivational messages for condom use, which may positively influence the adoption of this behaviour in this population group(93).

The study showed that consistent condom use also differed according to the type of migration and the migrants' gender. When aggregated in the bivariate analysis, migration data was only statistically associated with male migrants ($p=0.005$). Nonetheless, when the data was analysed considering migration destination, a significant statistical association was found for internal migrants of both genders. Yet, the multivariable analysis model confirmed that the association between migration and consistent condom use is only statistically relevant for internal migrant men (aOR=1.52, 95% CI

1.07 - 2.14, P=0.017). Regarding participants who migrated to South Africa there is no statistical association with consistent condom use reported by men and women.

Understanding the specific causes contributing to low condom use in the Chókwè district, and particularly among its migrant populations, will required additional research. Still, considering the findings of this study in the context of other research conducted in the Southern Africa region, it is important to note that condom use is often influenced by structural, social, and cultural factors that exert influence on individual decision making(93). Poverty, relationships with parents, peers and partners, access to health information, gender norms and power dynamics among couples, and beliefs and attitudes towards HIV are factors that have been identified as negatively influencing condom use in African societies(120-123). If the finding that only internal migration of men is associated with consistent condom use is considered, it will be important to note that internal migration in the district tends to be directed to urban areas, where access to information and to condoms is generally more facilitated than in rural areas(121, 124). Concurrently, regarding women's ability to negotiate condom use, the literature presents a "male model of control over sexuality" which is corroborated by evidence showing that when women are financially or educationally empowered, they tend to report condom use more frequently(93). Such conclusion has been demonstrated in Mozambique and may help to explain why women in the Chókwè district, and in particular those that are partners of migrant men, have reduced capacity to negotiate condom use with their sexual partners(23, 95, 125). In fact, aware of this challenge, researchers have already tried to verify the acceptability of alternative means of HIV prevention, and specifically HIV preventive prophylaxis (PrEP), with promising results for future health interventions targeting this population group(19, 20).

4.2.3 Sexually Transmitted Infections

The results indicate that about 5% of male participants and 13.2% of female participants reported having had an abnormal genital discharge in the 12 months prior to data collection. Additionally, about 3.4% of men and 3.8% of women reported having had genital sores in the previous year. Regarding this latest symptom suggestive of a sexually transmitted disease, the study results show an alignment to the provincial average (men: 3.4%; women: 3.3%) and a marginal difference to the national average (men: 3.2%; women: 2.1%) in the country's last HIV seroprevalence survey(5). Additionally, fewer men reported abnormal genital discharge when compared to the provincial average (Gaza - 6.7%; National: 4.7%) and there was a higher prevalence in women in comparison with the provincial and national data (Gaza: 9.9%; National: 4.5%)(5).

The findings indicated a statistically significant association ($p \leq 0.001$) between the sexually transmitted infection symptom abnormal genital discharge and all the participants' sociodemographic indicators. The reporting pattern of this symptom suggests a higher prevalence starting at age 25 in

men and 20 in women, among married individuals of both genders living with a partner and with an income, and female participants who do not work or stay at home. Additionally, concerning the reporting of genital sores, there was a statistical association (p≤0.001) with men's age and marital status, and, similar to what was observed with the other symptom suggestive of a sexually transmitted infection, the prevalence was higher among participants aged 25-49 years and married or living in a non-marital union. These findings suggest a relationship with condom use and multiple sexual partnerships as reported by these groups, but other determinants may also exert an influence on their vulnerability to sexually transmitted infections, including their level of education and economic status(126, 127).

Research conducted in Mozambique and countries in the region involving the clinical and laboratory diagnosis of sexually transmitted infections indicates that their prevalence may be higher than that reported in this study, which has the limitation of being based on participants' self-reporting(100, 128-130). The fact that these illnesses are often asymptomatic, combined with barriers to accessing health services, contributes to the limited diagnosis, treatment, and control of these diseases in the context of low- and middle-income countries, such as Mozambique. A 2010 study with women from a rural area of southern Mozambique, for example, found that almost 80% of participants had an active sexually transmitted infection(128). In this research, risk factors associated with sexually transmitted diseases included being divorced or widowed, having multiple sexual partnerships, and having a partner residing outside the study area.

The analysis of the study's migration variables showed mixed results for their statistical association with the symptoms suggestive of sexually transmitted infections. In both men and women, having lived outside of Chókwè showed an association with reporting abnormal genital discharge (p≤0.002), although among men this result was largely influenced by internal migrants (p=0.039), as no differences were found between migrants who travelled to South Africa and the other participants (p=0.121), this association was no longer statistically significant in the multivariable model when controlling for age and marital status. For women who migrated, the logistic regression model indicated that there was an association with this symptom (aOR=1.51, 95% CI 1.12 - 2.20, P=0.009). Additionally, regarding the reporting of genital sores, a statistical association was found with all forms of migration for both genders (p≤0.003), with women's results being influenced by migrants who travelled to South Africa (p=0.016) given that no differences were found among internal migrants and the other participants (p=0.268). Nevertheless, the results of the logistic regression analysis indicated that reporting of genital sores was only statistically significant for male internal migrants (aOR=1.98, 95% CI 1.10 - 3.56, P=0.021) and female migrants who lived in South Africa (aOR=1.71, 95% CI 1.06 - 2.75, P=0.025).

The apparent inconsistency of these findings limits the ability of this study to unequivocally show an association between migration and reporting of sexual infection symptoms, at least in a cross-cutting and comprehensive manner in terms of gender and migration destination in the context of the Chókwè district. Research studies in other settings have shown such an association, and, theoretically, the fact that migrant populations from Chókwè district are more likely to report multiple sexual partnerships than non-migrants suggests that they are at greater risk for contracting sexually transmitted infections(131-133). Still, determining this association will require other research methodologies based on clinical and laboratory diagnosis of these diseases. This knowledge gap thus opens new research opportunities that should be considered in future studies that intend to ascertain the impact that migration may have on the sexual health of the Chókwè district population.

4.2.4 Study participants' HIV status

This research found an HIV prevalence of 26.73% among the study´s participants, with a higher rate among women (29.64%) relative to men (19.10%). The results suggest a higher HIV prevalence in Chókwè district compared to the provincial (24.4%) and national (13%) average, and for both men (17.6% and 10.2%, respectively) and women (28.2% and 15.1%, respectively), determined in the 2015 HIV seroprevalence survey, but should be interpreted considering that only participants who had sexual intercourse in their lifetime were included in the study(5).

The bivariate analysis found a statistical association between participants' serostatus and their age, marital status, and employment status (p=0.000). Among men, HIV prevalence was highest among participants in the 40-44 age group (47.25%), divorced, separated or widowed (38.93%) and employed (26.01%). Women aged 35-39 (43.97%), divorced, separated or widowed (49.25%), and employed (36.79%) had the highest HIV prevalence rates. For age, the prevalence peak is in line with the IMASIDA findings for women (23.9%), but differs for men, who also have the highest prevalence in the 35-39 age group (17.5%)(5). As in this study, the IMASIDA data indicate that HIV prevalence is higher among people with work-related income (17.5% in women and 11.5% in men) and people who are divorced, separated or widowed (27.8% in women and 28.6% in men)(5).

Findings from the bivariate analysis of this study did not show a statistical association between migration and the participants´ HIV serostatus, at the exception of women who had migrated to South Africa (p=0.013), and who had an HIV prevalence of 36.70% in comparison with a rate of 26.62% found among the other female participants. Nonetheless, even among this group of migrants, the logistic regression model indicated that the association was not statistically significant (aOR=1.29, 95% CI 0.99 - 1.69, P=0.054), suggesting an influence of age and marital status on the results of the bivariate analysis. This evidence should be interpreted considering the limitations of a secondary data analysis, which originated from an HIV biobehavioural study conducted with a population of a health

demographic surveillance system, and that was not designed to specifically focus on migrant populations(101). A research study with migrant male miners in the southern region of Mozambique estimated an HIV prevalence of 22.3%, and therefore higher than that found among the migrant male participants in this study (18%)(14). Concurrently, in a community setting in Gaza province with households with ties to the mining sector labour migration, another survey found an overall prevalence of 24.2%, in line with the provincial IMASIDA seroprevalence survey estimates, but lower than the population prevalence rate found in this study (26.73%)(5, 15). This suggests that the findings of this study may portray a partial reality of the HIV prevalence situation among migrants in Chókwè (and focusing on short-term migrants, who represent the majority of the study participants), but still valid and accurate.

Despite the absence of a statistical association between migration and HIV status, the findings should not be interpreted as contradicting previous studies that have suggested such an association, and in particular in the context of the southern provinces of Mozambique(13-15, 18, 23-25). Rather, these findings can be considered in the context of research suggesting that population mobility alone is not a risk factor for the spread of HIV, and especially in geographic areas with well-established and mature epidemics(39, 65, 134). In Zimbabwe, for example, a study in rural areas that compared HIV incidence among participants who migrated to urban areas and non-migrants found no differences between the two groups, with its authors considering that this was a sign of the "maturity of the epidemic" in the country(135). In another longitudinal study in KwaZulo-Natal, South Africa, no significant differences were found between HIV prevalence and various migration indicators, although it was noted that seroprevalence was higher among people who had recently returned, which was explained by the fact that the participants were seeking health care since they were at an advanced disease stage(112). An ecological analysis of data from 141 countries also showed no association between migration intensity and HIV prevalence, with the same result when the analysis was restricted to 28 countries in the southern African region(134). In this study, data from South Africa were analysed separately and the authors concluded that HIV prevalence was not significantly higher among migrants compared to non-migrants. Such evidence demonstrates the validity of this study's findings and underscores the importance of attending to specific groups of migrant populations and the determinants that may influence their HIV risk behaviours. Concurrently, considering the high HIV prevalence among migrants and non-migrants in Chókwè district, these findings reinforce the need for health interventions that are equitably distributed across different groups in order to provide the needed opportunities for these populations to access HIV prevention and care and treatment services.

4.3 Limitations

This study's findings need to be interpreted considering limitations associated with its design. Firstly, it is important to note that this study conducted a secondary data analysis from a cross-sectional study not specifically designed for studying associations between migrancy status and HIV sexual risk behaviours and status(101). During the HIV surveillance rounds of the Chókwè HDSS, data was collected through interviews with participants that could be reached at their homes. For this reason, the HPS may be biased to the characteristics of those interviewees(101). This is a limitation to our analysis as it is possible that the migrant populations under analysis were underrepresented. Specifically, this was observed with the presence of very few male miners, possibly given that the data collection rounds took place at the time of the year in which this population group is normally working in South Africa. This may be true for other migrants employed full-time in other places. The current findings provide insights into shorter-term or temporary migration rather than longer term migration.

The individual analysis of the migrant variables internal migrancy and migrancy to South Africa did not exclude from the denominator (all participants) the other form of migration. This was due to the size of both groups (internal migrant: 3,68%; migrants who had been in South Africa: 4,71%), which was relatively small in comparison with the larger group of participants (non-migrants: 92,35%), but it may have caused greater confidence intervals. Recall bias and information bias regarding some of the sexual risk behaviours in analysis may also be a limitation, as participants could have provided inaccurate responses due to temporality or culturally sensitivity-related causes. Another important limitation was the fact that no information was collected in the original research to situate the participants in a certain education level and wealth quintile level, which constrained the study´s ability to further explore the association between the sociodemographic characteristics of the study´s participants and the outcomes of interest sexual risk behaviours and HIV status(101). Additionally, the clinical and laboratorial analysis of sexually transmitted infections may have provided more reliable data to help determine the prevalence of this diseases among the study´s participants, and its association with the migrant variables that were investigated.

5. Conclusions and recommendations

5.1 Conclusion

The study sought to investigate the associations of migration and HIV sexual risk behaviours and status in Chókwè district, a region known for having a high mobile population and one of the highest HIV prevalence rates in Mozambique(9, 16, 136). The findings suggest that Chókwè residents exposed to any form of migration (internal or cross border migration) were more likely to engage in risky sexual behaviours known to be associated with HIV serostatus conversion, and particularly multiple

sexual partnerships(137). While consistent condom use as an HIV protective factor was found to be associated with internal migration among men, the same was not found with women. Concurrently, low rates of condom use reported by men and women indicate that both migrant and non-migrant populations are at a high risk of HIV infection(138). Suggestive of increased sexual risk behaviours and vulnerability to HIV acquisition among migrant populations were the findings on the reporting of symptoms of sexually transmitted infections (abnormal discharge from genitals and genital sores), which also emerged associated with migration, although with variations between men and women and depending on the type of migration(139). Still, despite the observed increased risk to HIV acquisition that migrants demonstrated to have, the likelihood of having a positive HIV status was virtually the same for migrant and non-migrant populations living in Chókwè district, which should be interpreted in light of the epidemiological profile of the Chókwè district, which is marked by a high HIV prevalence and a well-established and mature epidemic.

5.2 Recommendations

Notably, this study generated additional evidence on the relationship between migration and risky sexual behaviours and HIV status in Chókwè district. In particular, the study presented findings on migration beyond the specific population group of migrant miners, which has been predominantly studied in Mozambique's southern region. Simultaneously, it generated evidence on internal migration, contributing to filling a knowledge gap in the study of HIV and its population mobility-related determinants in Mozambique. Indeed, the analysis on the numbers of internal and cross-border migrants demonstrated that both forms of migration have an equal importance and can be considered for HIV-related interventions directed at migrant populations of the Chókwè district. Moreover, while it was evident that migration has a greater weight in the male population, the findings showed that migration-related health policies will benefit from considering a gender inclusive perspective, as women are also part of the migrant population and are also exposed to risky sexual behaviours that can lead to HIV acquisition. Additionally, the results indicated that short-term migration was commonly reported among migrant populations, which further justifies the need of comprehensive health policies that account for different forms of population mobility. As for the comparative analysis of the HIV prevalence among migrant and non-migrant populations, the results of this study suggest that HIV control interventions need to account for a mature epidemic that poses a risk of seroconversion to non-migrant populations at the same level of that observed among migrant populations.

The study´s findings are also relevant to inform current HIV control programs that are implemented in the region. Firstly, the analysis of sexual risk behaviours, and in particular of multiple sexual partnerships, demonstrated the need to continue to focus on HIV prevention interventions targeting adolescents and youth, though a particular focus should be given to older individuals, and

especially those that are divorced, separated, or widowed. Continuing to expand programs that promote male engagement in the health services will be instrumental as men clearly presented increased sexual risk behaviours in comparison with women. Given the high prevalence of multiple sexual partnerships in the region, implications for sexual concurrency and HIV transmission can also be drawn from this analysis, especially if the low rates of condom use are taken into consideration. Understanding the barriers to condom use in the region may help to increase the uptake of this HIV preventive behaviour and to decrease the risk of HIV transmission. However, because condom use may not be in the control of both partners in equal circumstances, expanding access to other forms of HIV prevention, and most notably PreP, may offer women increased opportunities for HIV prevention. Another important consideration for future research is the study of sexually transmitted infections through the usage of research methodologies that can offer more insights about the prevalence of these diseases in Chókwè, including among ismigrant populations.

6. References

1. Opening of the 47th meeting of the UNAIDS Programme Coordinating Board: Hearing before the UNAIDS Programme Coordinating Board(15 December 2020, 2020).
2. AIDSINFO [Internet]. The Joint United Nations Programme on HIV/AIDS - UNAIDS. 2021 [cited 01/03/2021]. Available from: https://aidsinfo.unaids.org/.
3. UNAIDS report on the global AIDS epidemic shows that 2020 targets will not be met because of deeply unequal success; COVID-19 risks blowing HIV progress way off course [press release]. Geneva: Joint United Nations Programme on HIV/AIDS - UNAIDS 6 July 2020 2020.
4. HIV/AIDS JUNPo. Fast-track: ending the AIDS epidemic by 2030. Geneva: UNAIDS; 2014. 2017.
5. Ministério da Saúde (MISAU) INdEI, ICF, . Inquérito de Indicadores de Imunização, Malária e HIV/SIDA em Moçambique (IMASIDA 2015). Maputo: Ministério da Saúde 2015.
6. Governo da Provínica de Gaza. Plano Estratégico da Província 2018-2027. In: Direcção Provincial de Economia e Finanças de Gaza, editor. Xai-Xai2018.
7. Raimundo IM, Muanamoha RC. Cartografia da migração interna em Moçambique entre 1997 e 2007. Revista Interdisciplinar da Mobilidade Humana: REMHU. 2018;26(54):10.
8. Barwise K, Lind A, Bennett R, Martins E. Intensifying action to address HIV and tuberculosis in Mozambique's cross-border mining sector. Int J Health Serv. 2013;43(4):699-719.
9. Muanomoha RC. The dynamics of undocumented Mozambican labour migration to South Africa 2008.
10. Agadjanian V, Hayford SR. Men's migration, women's autonomy, and union dissolution in rural Mozambique. Journal of family issues. 2018;39(5):1236-57.
11. Shodell D, Nelson R, MacKellar D, Thompson R, Casavant I, Mugabe D, et al. Low and Decreasing Prevalence and Rate of False Positive HIV Diagnosis—Chókwè District, Mozambique, 2014–2017. Morbidity and Mortality Weekly Report. 2018;67(49):1363.
12. Foreit KF, Barreto AT, Noya PA, Nhatave I. Population movements and the spread of HIV/AIDS in Mozambique. Journal of health and human services administration. 2001:279-94.
13. Martins-Fonteyn E, Loquiha O, Wouters E, Raimundo I, Hens N, Aerts M, et al. HIV susceptibility among miners in Chokwe: a case study. International Journal of Health Services. 2016;46(4):712-33.
14. Baltazar CS, Horth R, Inguane C, Sathane I, César F, Ricardo H, et al. HIV prevalence and risk behaviors among Mozambicans working in South African mines. AIDS and Behavior. 2015;19(1):59-67.
15. Semá Baltazar C, DeLima YV, Ricardo H, Botão C, Chitsondzo Langa D, da Costa P, et al. HIV prevalence and TB in migrant miners communities of origin in Gaza Province, Mozambique: The need for increasing awareness and knowledge. Plos one. 2020;15(4):e0231303.
16. Feldblum PJ, Enosse S, Dubé K, Arnaldo P, Muluana C, Banze R, et al. HIV prevalence and incidence in a cohort of women at higher risk for HIV acquisition in Chokwe, southern Mozambique. PLoS One. 2014;9(5):e97547.
17. Martins-Fonteyn E, Loquiha O, Baltazar C, Thapa S, Boothe M, Raimundo I, et al. Factors influencing risky sexual behaviour among Mozambican miners: a socio-epidemiological contribution for HIV prevention framework in Mozambique. International journal for equity in health. 2017;16(1):1-14.
18. Crush J. Migration-induced HIV and AIDS in Rural Mozambique and Swaziland: African Books Collective; 2010.
19. Lahuerta M, Zerbe A, Baggaley R, Falcao J, Ahoua L, DiMattei P, et al. Feasibility, acceptability, and adherence with short-term HIV preexposure prophylaxis in female sexual partners of migrant miners in Mozambique. Journal of acquired immune deficiency syndromes (1999). 2017;76(4):343.
20. Cremin I, Morales F, Jewell BL, O'Reilly KR, Hallett TB. Seasonal PrEP for partners of migrant miners in southern Mozambique: a highly focused PrEP intervention. Journal of the International AIDS Society. 2015;18:19946.
21. Barwise K, Lind A, Bennett R, Martins E. Intensifying action to address HIV and tuberculosis in Mozambique's cross-border mining sector. International Journal of Health Services. 2013;43(4):699-719.

22. Agadjanian V, Arnaldo C, Cau B. Health costs of wealth gains: labor migration and perceptions of HIV/AIDS risks in Mozambique. Social forces. 2011;89(4):1097-117.
23. Corno L, De Walque D. Mines, migration and HIV/AIDS in Southern Africa. Journal of African Economies. 2012;21(3):465-98.
24. Lurie MN, Williams BG. Migration and health in Southern Africa: 100 years and still circulating. Health Psychology and Behavioral Medicine: an Open Access Journal. 2014;2(1):34-40.
25. Voeten HA, Vissers DC, Gregson S, Zaba B, White RG, de Vlas SJ, et al. Strong association between in-migration and HIV prevalence in urban sub-Saharan Africa. Sexually transmitted diseases. 2010;37(4):240.
26. Quinn TC. Global burden of the HIV pandemic. The lancet. 1996;348(9020):99-106.
27. Rife B, Salemi M. On the early dynamics and spread of HIV-1. Trends in microbiology. 2015;23(1):3-4.
28. Quinn TC. Population migration and the spread of types 1 and 2 human immunodeficiency viruses. Proceedings of the National Academy of Sciences. 1994;91(7):2407-14.
29. Sharp PM, Hahn BH. Origins of HIV and the AIDS pandemic. Cold Spring Harbor perspectives in medicine. 2011;1(1):a006841.
30. Gao F, Bailes E, Robertson DL, Chen Y, Rodenburg CM, Michael SF, et al. Origin of HIV-1 in the chimpanzee Pan troglodytes troglodytes. Nature. 1999;397(6718):436-41.
31. Faria NR, Rambaut A, Suchard MA, Baele G, Bedford T, Ward MJ, et al. The early spread and epidemic ignition of HIV-1 in human populations. science. 2014;346(6205):56-61.
32. Cassels S. Time, population mobility, and HIV transmission. The Lancet HIV. 2020;7(3):e151-e2.
33. Camlin CS, Cassels S, Seeley J. Bringing population mobility into focus to achieve HIV prevention goals. Journal of the International AIDS Society. 2018;21(Suppl Suppl 4).
34. Camlin CS, Charlebois ED. Mobility and its effects on HIV acquisition and treatment engagement: Recent theoretical and empirical advances. Current HIV/AIDS Reports. 2019;16(4):314-23.
35. Lagarde E, Schim Van Der Loeff M, Enel C, Holmgren B, Dray-Spira R, Pison G, et al. Mobility and the spread of human immunodeficiency virus into rural areas of West Africa. International journal of epidemiology. 2003;32(5):744-52.
36. Vearey J. Moving forward: why responding to migration, mobility and HIV in South (ern) Africa is a public health priority. Journal of the International AIDS Society. 2018;21:e25137.
37. Dzomba A, Tomita A, Govender K, Tanser F. Effects of migration on risky sexual behavior and HIV acquisition in South Africa: A systematic review and meta-analysis, 2000–2017. AIDS and Behavior. 2019;23(6):1396-430.
38. Joint United Nations Programme on HIV/AIDS - UNAIDS. The GAP Report 2014 - Migrants. Geneva: Joint United Nations Programme on HIV/AIDS - UNAIDS,; 2014.
39. Colebunders R, Kenyon C. Behaviour, not mobility, is a risk factor for HIV. The Lancet HIV. 2015;2(6):e223-e4.
40. Instituto Nacional de Estatística. Projecções de População 2017 - 2050. Maputo: Instituto Nacional de Estatística,; 2017.
41. Instituto Nacional de Estatística. IV Resenseamento Geral da População e Habitação 2017 - Resultados Definitivos. Maputo: Instituto Nacional de Estatística,; 2019.
42. United Nations Development Programme. About Mozambique: United Nations Development Programme, ; 2020 [Available from: https://www.mz.undp.org/content/mozambique/en/home/countryinfo.html.
43. The World Bank. World Bank Open Data Washington,: The World Bank,; 2020 [Available from: https://data.worldbank.org/.
44. Mitano F, Ventura CAA, Lima MCRAdAd, Balegamire JB, Palha PF. Direito à saúde:(in) congruência entre o arcabouço jurídico e o sistema de saúde. Revista latino-americana de enfermagem. 2016;24.
45. Alba Llop Gironés FB, Mireia Julià, Joan Benach,. Desigualdades em Saúde em Moçambique: necessidades, acesso, barreiras e

qualidade de atendimento. Relatório Técnico. . Barcelona: medicusmundi,; 2018.
46. Albasini NdPF. Saúde pública em Moçambique no atendimento rural. Unidade Sanitária Móvel: Universidade de São Paulo.
47. Instituto Nacional de Estatística. Anuário Estatístico 2019 - Moçambique. In: Empresas DdESed, editor. Maputo: Instituto Nacional de Estatística,; 2020.
48. VII Conferência do Observatório de Recursos Humanos para Saúde: Analísa a força de trabalho para a Saúde Materna, Neonatal, Infantil Adolescente e Nutricão em Moçambique em 2018 [press release]. 8/11/2019 2019.
49. Institute for Health Metrics and Evaluation. Mozambique: Institute for Health Metrics and Evaluation,; 2020 [Available from: http://www.healthdata.org/mozambique.
50. Health Policy Project. Mozambique Health Financing Profile. Washington, DC: Health Policy Project,; 2016.
51. Mahathir M. Women at greater risk of HIV infection. Arrows for change. 1997;3(1):1-2.
52. Audet CM, Burlison J, Moon TD, Sidat M, Vergara AE, Vermund SH. Sociocultural and epidemiological aspects of HIV/AIDS in Mozambique. BMC international health and human rights. 2010;10(1):1-10.
53. Underwood C, Skinner J, Osman N, Schwandt H. Structural determinants of adolescent girls' vulnerability to HIV: views from community members in Botswana, Malawi, and Mozambique. Social science & medicine. 2011;73(2):343-50.
54. Burke HM, Packer C, González-Calvo L, Ridgeway K, Lenzi R, Green AF, et al. A longitudinal qualitative evaluation of an economic and social empowerment intervention to reduce girls' vulnerability to HIV in rural Mozambique. Evaluation and program planning. 2019;77:101682.
55. Hawkins K, Price N, Mussá F. Milking the cow: Young women's construction of identity and risk in age-disparate transactional sexual relationships in Maputo, Mozambique. Global Public Health. 2009;4(2):169-82.
56. Bingenheimer JB. Men's Multiple Sexual Partnerships in 15 Sub-Saharan African Countries: Sociodemographic Patterns and Implications. Studies in family planning. 2010;41(1):1-17.
57. Macia M, Maharaj P, Gresh A. Masculinity and male sexual behaviour in Mozambique. Culture, Health & Sexuality. 2011;13(10):1181-92.
58. Staff PO. Correction: Predictors of high HIV+ prevalence in Mozambique: A complex samples logistic regression modeling and spatial mapping approaches. Plos one. 2020;15(6):e0235456.
59. U.S. President´s Emergency Plan for AIDS Relief - PEPFAR. 2020 Country Operational Plans - Strategic Direction Summary In: State USDo, editor. Washington, DC: U.S. President´s Emergency Plan for AIDS Relief - PEPFAR; 2020.
60. Douglas W MacPhersona BDG, Liane Macdonaldb,. Health and foreign policy: influences of migration and population mobility. World Health Organization,; 2007.
61. Glynn JR, Pönnighaus J, Crampin AC, Sibande F, Sichali L, Nkhosa P, et al. The development of the HIV epidemic in Karonga District, Malawi. Aids. 2001;15(15):2025-9.
62. Jochelson K, Mothibeli M, Leger J-P. Human immunodeficiency virus and migrant labor in South Africa. International Journal of Health Services. 1991;21(1):157-73.
63. Coffee MP, Garnett GP, Mlilo M, Voeten HA, Chandiwana S, Gregson S. Patterns of movement and risk of HIV infection in rural Zimbabwe. The Journal of infectious diseases. 2005;191(Supplement_1):S159-S67.
64. Deane KD, Parkhurst JO, Johnston D. Linking migration, mobility and HIV. Tropical Medicine & International Health. 2010;15(12):1458-63.
65. Coffee M, Lurie MN, Garnett GP. Modelling the impact of migration on the HIV epidemic in South Africa. Aids. 2007;21(3):343-50.
66. United Nations Human Settlements Programme - UN-Habitat. UN-Habitat Country Programme Mozambique 2018-2021. United Nations Human Settlements Programme - UN-Habitat,; 2018.
67. Vivet J. Déplacements forcés et citadinités. Les deslocados de guerra à Maputo (Mozambique). Carnets de géographes. 2011(2).

68. Semá Baltazar C, Langa JP, Dengo Baloi L, Wood R, Ouedraogo I, Njanpop-Lafourcade B-M, et al. Multi-site cholera surveillance within the African Cholera Surveillance Network shows endemicity in Mozambique, 2011–2015. PLoS neglected tropical diseases. 2017;11(10):e0005941.
69. Collins A, Lucas M, Islam M, Williams L. Socio-economic and environmental origins of cholera epidemics in Mozambique: guidelines for tackling uncertainty in infectious disease prevention and control. International journal of environmental studies. 2006;63(5):537-49.
70. Von Seidlein L, Wang XY, Macuamule A, Mondlane C, Puri M, Hendriksen I, et al. Is HIV infection associated with an increased risk for cholera? Findings from a case–control study in Mozambique. Tropical Medicine & International Health. 2008;13(5):683-8.
71. Penvenne JM. A HISTORY OF AFRICAN LABOR IN LOURENCO MARQUES, MOZAMBIQUE, 1877 TO 1950. 1983.
72. Vidal D. A NOVA ERA DAS MIGRAÇÕES MO-ÇAMBICANAS EM JOANESBURGO. A Nova era das Migrações Moçambicanas Em Joanesburgo. 2004:7.
73. First R. Black Gold: The Mozambican Miner, Proletarian and Peasant. New York: St. Martin's Press; 1983.
74. International Organization for Migration. World Migration - Global Migration Stock 2019 [Available from: https://www.iom.int/world-migration.
75. Statistics South Africa. Community survey 2016, statistical release P0301. Statistics South Africa. 2016.
76. Steenberg B. HIV-positive Mozambican migrants in South Africa: loneliness, secrecy and disclosure. Culture, health & sexuality. 2020;22(1):48-63.
77. Raimundo IM. Migração e HIV/SIDA em Moçambique: Desafios da região centro de Moçambique. GEOUSP Espaço e Tempo (Online). 2011;15(2):43-55.
78. Botão C, Horth RZ, Frank H, Cummings B, Inguane C, Sathane I, et al. Prevalence of HIV and associated risk factors among long distance truck drivers in Inchope, Mozambique, 2012. AIDS and Behavior. 2016;20(4):811-20.
79. Salia JFVGT. Saúde sexual e reprodutiva no contexto das migrações em mulheres praticantes de comércio informal transfronteiriço em Moçambique. 2018.
80. Centers for Disease Control and Prevention. HIV Risk and Prevention EstimatesHIV Risk and Prevention Estimates Atlanta: Centers for Disease Control and Prevention,; 2019 [Available from: https://www.cdc.gov/hiv/risk/estimates/index.html.
81. Sharma M, Oppenheimer E, Saidel T, Loo V, Garg R. A situation update on HIV epidemics among people who inject drugs and national responses in South-East Asia Region. Aids. 2009;23(11):1405-13.
82. Kelly JA, Amirkhanian YA. The newest epidemic: a review of HIV/AIDS in Central and Eastern Europe. International journal of STD & AIDS. 2003;14(6):361-71.
83. Caraël M, Holmes KK. Dynamics of HIV epidemics in sub-Saharan Africa: introduction. Aids. 2001;15:S1-S4.
84. Akeroyd AV. HIV/AIDS in eastern and southern Africa. Review of African Political Economy. 1994;21(60):173-84.
85. Centers for Disease Control and Prevention. Factors Increasing the Risk of Acquiring or Transmitting HIV Atlanta: Centers for Disease Control and Prevention,; 2019 [Available from: https://www.cdc.gov/hiv/risk/estimates/riskfactors.html.
86. World Health Organization. HIV/AIDS: World Health Organization,; 2020 [Available from: https://www.who.int/news-room/fact-sheets/detail/hiv-aids.
87. Chapman J, do Nascimento N, Mandal M. Role of male sex partners in HIV risk of adolescent girls and young women in Mozambique. Global Health: Science and Practice. 2019;7(3):435-46.
88. Bajaj M. Sugar daddies and the danger of sugar: Cross-generational relationships, HIV/AIDS, and secondary schooling in Zambia. Gender, Equality and Education from International and Comparative Perspectives: Emerald Group Publishing Limited; 2009.
89. Joint United Nations Programme on HIV/AIDS - UNAIDS. Multiple Sexual Partnerships: Joint United Nations Programme on HIV/AIDS - UNAIDS,; [Available from: https://indicatorregistry.unaids.org/indicator/multiple-sexual-partnerships.

90. Pinkerton SD, Abramson PR. Effectiveness of condoms in preventing HIV transmission. Social science & medicine. 1997;44(9):1303-12.
91. Fonner VA, Kennedy CE, O'Reilly KR, Sweat MD. Systematic assessment of condom use measurement in evaluation of HIV prevention interventions: need for standardization of measures. AIDS and Behavior. 2014;18(12):2374-86.
92. Noar SM, Cole C, Carlyle K. Condom use measurement in 56 studies of sexual risk behavior: review and recommendations. Archives of sexual behavior. 2006;35(3):327-45.
93. Maticka-Tyndale E. Condoms in sub-Saharan Africa. Sexual health. 2012;9(1):59-72.
94. Adetunji J, Meekers D. Consistency in condom use in the context of HIV/AIDS in Zimbabwe. Journal of Biosocial science. 2001;33(1):121.
95. Patrão AL, McIntyre TM. Socio-demographic, marital, and psychosocial factors associated with condom use negotiation self-efficacy among Mozambican women at risk for HIV infection. International journal of behavioral medicine. 2017;24(6):846-55.
96. World Health Organization. Sexually transmitted infections: World Health Organization,; 2019 [Available from: https://www.who.int/health-topics/sexually-transmitted-infections#tab=tab_1.
97. Fenton KA, Johnson AM, McManus S, Erens B. Measuring sexual behaviour: methodological challenges in survey research. Sexually transmitted infections. 2001;77(2):84-92.
98. Organization WH. Sexually transmitted infections prevalence study methodology: guidelines for the implementation of STI prevalence surveys 1999. Manila: WHO Regional Office for the Western Pacific; 1999.
99. Colvin M. Sexually transmitted infections in southern Africa: a public health crisis. South African Journal of Science. 2000;96(6).
100. Chico RM, Mayaud P, Ariti C, Mabey D, Ronsmans C, Chandramohan D. Prevalence of malaria and sexually transmitted and reproductive tract infections in pregnancy in sub-Saharan Africa: a systematic review. Jama. 2012;307(19):2079-86.
101. Ricardo Thompson JB, Didier Mugabe, Jose Come, Stanley Wei, Isabelle Casavant, Andrew Auld, Laura Broyles, Sherri Pals, Robert Nelson, Dawud Ujamaa, Duncan MacKellar, . HIV Surveillance in the Chókwè Health and Demographic Surveillance System. In: Centro de INvestigação e Treino em Saúde de Chókwè INdS, Ministério da Saúde editor. Maputo2016.
102. Instituto Nacional de Estatística. IV Recenseamento Geral da População e Habitação, 2017. Maputo: Instituto Nacional de Estatística;, Direcção de Estatísticas Demográficas VeS; 2019.
103. Lopez-Varela E, Augusto O, Fuente-Soro L, Sacoor C, Nhacolo A, Casavant I, et al. Quantifying the gender gap in the HIV care cascade in southern Mozambique: We are missing the men. PloS one. 2021;16(2):e0245461.
104. Anderegg N, Hector J, Jefferys LF, Burgos-Soto J, Hobbins MA, Ehmer J, et al. Loss to follow-up correction increased mortality estimates in HIV–positive people on antiretroviral therapy in Mozambique. Journal of clinical epidemiology. 2020;128:83-92.
105. Timæus IM, Jasseh M. Adult mortality in sub-Saharan Africa: evidence from Demographic and Health Surveys. Demography. 2004;41(4):757-72.
106. Sileo KM, Fielding-Miller R, Dworkin SL, Fleming PJ. What Role Do Masculine Norms Play in Men's HIV Testing in Sub-Saharan Africa?: A Scoping Review. AIDS and Behavior. 2018;22(8):2468-79.
107. Nhacolo AQ, Nhalungo DA, Sacoor CN, Aponte JJ, Thompson R, Alonso P. Levels and trends of demographic indices in southern rural Mozambique: evidence from demographic surveillance in Manhica district. BMC public health. 2006;6(1):1-13.
108. Sabin M, Luber G, Sabin K, Paredes M, Monterroso E. Rapid ethnographic assessment of HIV/AIDS among Garifuna communities in Honduras: informing HIV surveillance among Garifuna women. Journal of human behavior in the social environment. 2008;17(3-4):237-57.
109. Dladla A, Hiner CA, Qwana E, Lurie M. Speaking to rural women: The sexual partnerships of rural South African women whose partners are migrants. Society in Transition. 2001;32(1):79-82.

110. Sanchez MA, Hernández MT, Hanson JE, Vera A, Magis-Rodríguez C, Ruiz JD, et al. The effect of migration on HIV high-risk behaviors among Mexican migrants. JAIDS Journal of Acquired Immune Deficiency Syndromes. 2012;61(5):610-7.
111. Cassels S, Jenness SM, Khanna AS. Conceptual framework and research methods for migration and HIV transmission dynamics. AIDS and Behavior. 2014;18(12):2302-13.
112. McGrath N, Eaton JW, Newell M-L, Hosegood V. Migration, sexual behaviour, and HIV risk: a general population cohort in rural South Africa. The lancet HIV. 2015;2(6):e252-e9.
113. Laurence P, Blower S. Mobility and circular migration in Lesotho: implications for transmission, treatment and control of a severe HIV epidemic. Journal of acquired immune deficiency syndromes (1999). 2015;68(5):604.
114. Mah TL, Halperin DT. Concurrent sexual partnerships and the HIV epidemics in Africa: evidence to move forward. AIDS and Behavior. 2010;14(1):11-6.
115. Halperin DT, Epstein H. Concurrent sexual partnerships help to explain Africa's high HIV prevalence: implications for prevention. The Lancet. 2004;364(9428):4-6.
116. Glick PJ, Sahn DE. Are Africans practicing safer sex? Evidence from demographic and health surveys for eight countries. Economic Development and Cultural Change. 2008;56(2):397-439.
117. Kirby DB, Laris BA, Rolleri LA. Sex and HIV education programs: their impact on sexual behaviors of young people throughout the world. Journal of adolescent Health. 2007;40(3):206-17.
118. Kabiru CW, Orpinas P. Correlates of condom use among male high school students in Nairobi, Kenya. Journal of School Health. 2009;79(9):425-32.
119. Maharaj P. Reasons for condom use among young people in Kwazulu-Natal: prevention of HIV, Pregnancy or Both? International family planning perspectives. 2006:28-34.
120. Leclerc-Madlala S. Youth, HIV/AIDS and the importance of sexual culture and context. Social dynamics. 2002;28(1):20-41.
121. Stephenson R. Community influences on young people's sexual behavior in 3 African countries. American journal of public health. 2009;99(1):102-9.
122. Obregon COA, Rafael. A critical assessment of theories/models used in health communication for HIV/AIDS. Journal of health communication. 2000;5(sup1):5-15.
123. Baylies C, Bujra J. AIDS sexuality and gender in Africa: Collective strategies and struggles in Tanzania and Zambia: Routledge; 2002.
124. Katz I. Explaining the increase in condom use among South African young females. Journal of health communication. 2006;11(8):737-53.
125. Prata N, Morris L, Mazive E, Vahidnia F, Stehr M. Relationship between HIV risk perception and condom use: evidence from a population-based survey in Mozambique. International family planning perspectives. 2006:192-200.
126. Hogben M, Leichliter J, Aral SO. An Overview of Social and Behavioral Determinants of STI. Sexually Transmitted Infections. 2020:25-45.
127. Dean HD, Fenton KA. Addressing social determinants of health in the prevention and control of HIV/AIDS, viral hepatitis, sexually transmitted infections, and tuberculosis. Sage Publications Sage CA: Los Angeles, CA; 2010.
128. Menéndez C, Castellsagué X, Renom M, Sacarlal J, Quintó L, Lloveras B, et al. Prevalence and risk factors of sexually transmitted infections and cervical neoplasia in women from a rural area of southern Mozambique. Infectious diseases in obstetrics and gynecology. 2010;2010.
129. Vuylsteke B, Bastos R, Barreto J, Crucitti T, Folgosa E, Mondlane J, et al. High prevalence of sexually transmitted diseases in a rural area in Mozambique. Sexually Transmitted Infections. 1993;69(6):427-30.
130. Torrone EA, Morrison CS, Chen P-L, Kwok C, Francis SC, Hayes RJ, et al. Correction: Prevalence of sexually transmitted infections and bacterial vaginosis among women in sub-Saharan Africa: An individual participant data meta-analysis of 18 HIV prevention studies. PLoS medicine. 2018;15(6):e1002608.

131. Zuma K, Lurie M, Williams B, Mkaya-Mwamburi D, Garnett G, Sturm A. Risk factors of sexually transmitted infections among migrant and non-migrant sexual partnerships from rural South Africa. Epidemiology & Infection. 2005;133(3):421-8.
132. Adimora AA, Schoenbach VJ. Social determinants of sexual networks, partnership formation, and sexually transmitted infections. The new public health and STD/HIV prevention: Springer; 2013. p. 13-31.
133. Vivancos R, Abubakar I, Hunter PR. Foreign travel, casual sex, and sexually transmitted infections: systematic review and meta-analysis. International Journal of Infectious Diseases. 2010;14(10):e842-e51.
134. Kenyon C, Colebunders R, Voeten H, Lurie M. Migration intensity has no effect on peak HIV prevalence: an ecological study. BMC infectious diseases. 2014;14(1):1-14.
135. Mundandi C, Vissers D, Voeten H, Habbema D, Gregson S. No difference in HIV incidence and sexual behaviour between out-migrants and residents in rural Manicaland, Zimbabwe. Tropical Medicine & International Health. 2006;11(5):705-11.
136. Pathmanathan I, Nelson R, de Louvado A, Thompson R, Pals S, Casavant I, et al. High Coverage of Antiretroviral Treatment With Annual Home-Based HIV Testing, Follow-up Linkage Services, and Implementation of Test and Start: Findings From the Chókwè Health Demographic Surveillance System, Mozambique, 2014–2019. JAIDS Journal of Acquired Immune Deficiency Syndromes. 2021;86(4):e97-e105.
137. Green EC, Mah TL, Ruark A, Hearst N. A framework of sexual partnerships: risks and implications for HIV prevention in Africa. Studies in Family Planning. 2009;40(1):63-70.
138. Weine SM, Kashuba AB. Labor migration and HIV risk: a systematic review of the literature. AIDS and Behavior. 2012;16(6):1605-21.
139. Fleming DT, Wasserheit JN. From epidemiological synergy to public health policy and practice: the contribution of other sexually transmitted diseases to sexual transmission of HIV infection. Sexually transmitted infections. 1999;75(1):3-17.

7. Appendices

Appendix 1 – Primary Study Questionnaire (extractions of the relevant sections to the secondary data analysis)

1. SOCIODEMOGRAPHICS				
NO	**QUESTIONS AND FILTERS**	**CODE**	**VAR**	**SKIP**
1.1	Sex of participant? (1. Male; 2. Female)	|____|	SEX	
1.2	How old are you in complete years?	|____|____|	AGE	
1.3	What is your country of citizenship? 1. Mozambique; 2. South Africa; 3. Zimbabwe; 4. Malawi; 5. Tanzania; 6. Nigeria; 7. Other	|____|	CITIZEN	
1.4	What is your current marital status? (1. Single; 2. Married; 3. Marital Union; 4. Divorced; 5. Separated; 6. Widow/er)	|____|	MARITAL	
1.5	In the last 12 months, have you been away from your home in Chókwè District for more than one month at a time? (1. Yes; 2. No)	|____|	TRVL1	**IF NO →1.10**
1.6	In the last 12 months, about how many months were you away from your home in Chókwè District? [ROUND UP OR DOWN NEAREST MONTH] (88. Not applicable; 99. Don't know)	|____|____|	TRVL2	
1.7	In the last 12 months, did you live in another country for at least one month? (1. Yes; 2. No; 88. Not applicable; 99. Don't know)	|____|____|	TRVL3	**IF NO →1.10**

1. SOCIODEMOGRAPHICS				
NO	**QUESTIONS AND FILTERS**	**CODE**	**VAR**	**SKIP**
1.8	In the last 12 months, in what countries did you stay for more than 1 month other than Mozambique? [CODE ALL THAT APPLY] a) South Africa b) Swaziland c) Zimbabwe d) Malawi e) Other_____ (1. Yes; 2. No; 88. Not applicable; 99. Don't know)	a) |____|____| b) |____|____| c) |____|____| d) |____|____| e) |____|____|	TRVL4 TRVL5 TRVL6 TRVL7 TRVL8	
1.9	What was the main reason for staying in [above country] for more than one month? [CODE ALL THAT APPLY] a) South Africa b) Swaziland c) Zimbabwe d) Malawi e) Other (1. Work; 2. To be with or help family; 3. To receive medical care; 4. Other; 88. Not applicable; 99. Don't know)	a) |____|____| b) |____|____| c) |____|____| d) |____|____| e) |____|____|	TRVL9 TRVL10 TRVL11 TRVL12 TRVL13	
1.10	Which of the following best describes your current work situation (1. Employed for wages; 2. Self-employed; 3. Out of work for more than a year; 4. Out of work for less than a year; 5. A homemaker, 6. A student; 7. Retired; 8. Unable to work; 88. Not applicable; 99. Don't know).	|____|____|	OCC1	**IF EMPLOYED (OCC1=1 OR 2) → 1.11; OTHERWISE → 1.12.**
1.11	What kind of work do you do? (1. Mining; 2. Truck driving; 3. Agriculture; 4. Vendor; 5. Construction; 6. Fishing; 7. Police; 8. Military; 9. Other, Specify _____; 88. Not applicable; 99. Don't know).	|____|____|	OCC2	**IF AWAY FROM HOME MORE THAN ONE MONTH A YEAR (TRVL1=1) → 1.12. OTHERWISE, → 1.13**

1. SOCIODEMOGRAPHICS				
NO	**QUESTIONS AND FILTERS**	**CODE**	**VAR**	**SKIP**
1.12	Which months of the year are you likely to stay in or near Chókwè? [SELECT ALL THAT APPLY] (a. January; b. February; c. March; d. April; e. May; f. June; g. July; h. August; i. September; j. October; k. November; l. December) (1. Yes; 2. No; 88. Not applicable; 99. Don't know)	a) |____|____| b) |____|____| c) |____|____| d) |____|____| e) |____|____| f) |____|____| g) |____|____| h) |____|____| i) |____|____| j) |____|____| k) |____|____| l) |____|____|	AVAIL1 AVAIL2 AVAIL3 AVAIL4 AVAIL5 AVAIL6 AVAIL7 AVAIL8 AVAIL9 AVAIL10 AVAIL11 AVAIL12	
1.13	When you are staying in or near Chókwè, which of the following weekday times are you likely to be available for a visit from the health department *in your home*, if any? [READ ALL CHOICES. SELECT ALL THAT APPLY] (a. Weekday very early morning from 5:00-6:00; b. Weekday morning from 6:00-12:00; c. Weekday lunch time from 12:00-14:00; d. Weekday afternoon from 14:00-18:00; e. Weekday evening from 18:00-22:00) (1. Yes; 2. No; 88. Not applicable; 99. Don't know)	a) |____|____| b) |____|____| c) |____|____| d) |____|____| e) |____|____|	AVAIL13 AVAIL14 AVAIL15 AVAIL16 AVAIL17	
1.14	When you are staying in or near Chókwè, which of the following times on Saturday are you likely to be available for a visit from the health department *in your home*, if any? [READ ALL CHOICES. SELECT ALL THAT APPLY] (a. Saturday very early morning from 5:00-6:00; b. Saturday morning from 6:00-12:00; c. Saturday lunch time from 12:00-14:00; d. Saturday afternoon from 14:00-18:00; e. Saturday evening from 18:00-22:00) (1. Yes; 2. No; 88. Not applicable; 99. Don't know)	a) |____|____| b) |____|____| c) |____|____| d) |____|____| e) |____|____|	AVAIL18 AVAIL19 AVAIL20 AVAIL21 AVAIL22	

1. SOCIODEMOGRAPHICS				
NO	**QUESTIONS AND FILTERS**	**CODE**	**VAR**	**SKIP**
1.15	When you are staying in or near Chókwè, which of the following times on Sunday are you likely to be available for a visit from the health department *in your home*, if any? [READ ALL CHOICES. SELECT ALL THAT APPLY] (a. Sunday very early morning from 5:00-6:00; b. Sunday morning from 6:00-12:00; c. Sunday lunch time from 12:00-14:00; d. Sunday afternoon from 14:00-18:00; e. Sunday evening from 18:00-22:00) (1. Yes; 2. No; 88. Not applicable; 99. Don't know)	a) |____|____| b) |____|____| c) |____|____| d) |____|____| e) |____|____|	AVAIL23 AVAIL24 AVAIL25 AVAIL26 AVAIL27	
1.16	When you are staying in or near Chókwè, which of the following weekday times are you generally willing and able to seek medical care outside your home, if any? [READ ALL CHOICES. SELECT ALL THAT APPLY] (a. Weekday very early morning from 5:00-6:00; b. Weekday morning from 6:00-12:00; c. Weekday lunch time from 12:00-14:00; d. Weekday afternoon from 14:00-18:00; e. Weekday evening from 18:00-22:00) (1. Yes; 2. No; 88. Not applicable; 99. Don't know)	a) |____|____| b) |____|____| c) |____|____| d) |____|____| e) |____|____|	AVAIL28 AVAIL29 AVAIL30 AVAIL31 AVAIL32	
1.17	When you are staying in or near Chókwè, which of the following times on Saturday are you generally willing and able to seek medical care outside your home, if any? [READ ALL CHOICES. SELECT ALL THAT APPLY] (a. Saturday very early morning from 5:00-6:00; b. Saturday morning from 6:00-12:00; c. Saturday lunch time from 12:00-14:00; d. Saturday afternoon from 14:00-18:00; e. Saturday evening from 18:00-22:00) (1. Yes; 2. No; 88. Not applicable; 99. Don't know)	a) |____|____| b) |____|____| c) |____|____| d) |____|____| e) |____|____|	AVAIL33 AVAIL34 AVAIL35 AVAIL36 AVAIL37	

1. SOCIODEMOGRAPHICS				
NO	**QUESTIONS AND FILTERS**	**CODE**	**VAR**	**SKIP**
1.18	When you are staying in or near Chókwè, which of the following times on Sunday are you generally willing and able to seek medical care outside your home, if any? [READ ALL CHOICES. SELECT ALL THAT APPLY] (a. Sunday very early morning from 5:00-6:00; b. Sunday morning from 6:00-12:00; c. Sunday lunch time from 12:00-14:00; d. Sunday afternoon from 14:00-18:00; e. Sunday evening from 18:00-22:00) (1. Yes; 2. No; 88. Not applicable; 99. Don't know)	a) |____|____| b) |____|____| c) |____|____| d) |____|____| e) |____|____|	AVAIL38 AVAIL39 AVAIL40 AVAIL41 AVAIL42	

7. SEXUAL BEHAVIOR				
NO	**QUESTIONS AND FILTERS**	**CODE**	**VAR**	**SKIP**
Now I would like to ask you some questions about your sexual activity. Let me assure you again that your answers are completely confidential and will not be told to anyone. If we should come to any question that you don't want to answer, just let me know and we will go to the next question.				
7.1	Have you ever had sexual intercourse? (1. Yes; 2. No; 99. Don't know)	|____|____|	SEX1	**IF NO →10.1**

7. SEXUAL BEHAVIOR				
NO	**QUESTIONS AND FILTERS**	**CODE**	**VAR**	**SKIP**
7.2	In the past 12 months, with how many partners who live in the following areas have you had sexual intercourse? PLEASE INCLUDE ALL PARTNERS INCLUDING CASUAL PARTNERS. How many of your sexual partners live or lived in: a) Chókwè District? b) Gaza Province, but not in Chókwè District)? c) In Mozambique, but not in Gaza Province? d) In South Africa? e) In another country:_____? (8888. Not applicable; 9999. Don't know)	a) |___|___|____|___| b) |___|___|___|___| c) |___|___|___|___| d) |___|___|___|___| e) |___|___|___|___|	SEX2 SEX3 SEX4 SEX5 SEX6	**IF ALL RESPONSES ARE ZERO→8.1**
Read: Now I'm only going to ask you some questions about the very last person with whom you had sex in the past 12 months. Again, please remember that your answers are confidential. I will not ask you the name of this last partner. Our intention is not to find out things about your specific partner, but rather to design better public health programs to serve people like you and your partner.				
7.3	Is this last person with whom you had sex a spouse, or a casual or exchange partner? (1. Spouse = married or living with as if married; 2. Casual partner = someone with whom participant had sex only once, a few times, or only occasionally; 3. Exchange partner = partner who is not a steady or casual partner who was paid or who paid participant to have sex; 88. Not applicable; 99. Don't know)	|____|____|	SEX7	
7.4	Where does this partner currently live? (1. Chókwè District; 2. Gaza Province, but not in Chókwè District; 3. Mozambique, but not in Gaza Province; 4. South Africa; 5. Other country)	|____|____|	SEX8	

7. SEXUAL BEHAVIOR				
NO	**QUESTIONS AND FILTERS**	**CODE**	**VAR**	**SKIP**
7.5	When was the last time you had sex with this partner? (1. Past week; 2. > 1 week and < 1 Month; 3. > 1 month; 88. Not applicable; 99. Don't know)	|____|____|	SEX9	
7.6	Think back to the very last time you had sex with this partner. Was a condom used the last time you had sex with him/her? (1. Yes; 2. No; 88. Not applicable; 99. Don't know)	|____|____|	SEX10	
7.7	Did you ever ask about his/her HIV status or whether he/she has tested for HIV? (1. Yes; 2. No; 88. Not applicable; 99. Don't know)	|____|____|	SEX11	
7.8	Has this last partner tested for HIV? (1. Yes; 2. No; 88. Not applicable; 99. Don't know)	|____|____|	SEX12	**IF NO /DK →7.12**
7.9	When did this last partner test for HIV? (1. ≤ 6 months ago; 2. 7-12 months ago; 3. > 12 months ago; 88. Not applicable; 99. Don't know)	|____|____|	SEX13	
7.10	What was this partner's HIV test result? (1. Positive; 2. Negative; 3. Indeterminate; 4. Did not receive result; 88. Not applicable; 99. Don't know)	|____|____|	SEX14	
7.11	How do you know your partner's HIV test result? (1. He/she told me; 2. Another told me; 3. Saw test result; 4. Tested together; 5. Only a guess; 6. Other; 88. Not applicable; 99. Don't know)	|____|____|	SEX15	
7.12	Did this last partner ever ask you about your HIV status or whether you have tested for HIV? (1. Yes; 2. No; 88. Not applicable; 99. Don't know)	|____|____|	SEX16	
7.13	Have you told this last partner the result of your last HIV test? (1. Yes; 2. No; 3. I have never tested for HIV; 88. Not applicable; 99. Don't know)	|____|____|	SEX17	**IF MALE → 7.14.** **IF FEMALE → 7.16.**
7.14	MEN Only: Have you ever had sex with another man? (1. Yes; 2. No; 88. Not applicable; 99. Don't know)	|____|____|	SEX18	
7.15	MEN Only: Do you have any sexual partners who are women between the ages of 15-24 years?		SEX19	**IF MALE → SECTION 8.**

7. SEXUAL BEHAVIOR				
NO	**QUESTIONS AND FILTERS**	**CODE**	**VAR**	**SKIP**
7.16	Is your last partner male or female? (1. Male; 2. Female; 3. Other)	|____|____|	SEX20	**IF LAST PARTNER IS MALE → 7.17; OTHERWISE → SECTION 8.**
7.17	How old is your last partner in years? If you do not know for sure, please make your best guess. (88. Not applicable; 99. Don't know).	|____|____|	SEX21	
7.18	Which of the following best describes your last partner's current work situation (1. Employed for wages; 2. Self-employed; 3. Out of work for more than a year; 4. Out of work for less than a year; 5. A homemaker, 6. A student; 7. Retired; 8. Unable to work; 88. Not applicable; 99. Don't know).	|____|____|	SEX22	**IF LAST PARTNER IS EMPLOYED (SEX22=1 OR 2), → 7.19; OTHERWISE → 7.20.**
7.19	What kind of work does your last partner do? (1. Mining; 2. Truck driving; 3. Agriculture; 4. Vendor; 5. Construction; 6. Fishing; 7. Police; 8. Military; 9. Other, Specify _____; 88. Not applicable; 99. Don't know).	|____|____|	SEX23	
7.20	In a typical year, how many months does your partner stay in or near Chókwè? [DO NOT READ. CODE BEST POSSIBLE RESPONSE. IN OR NEAR CHÓKWÈ IS WITHIN DRIVING DISTANCE FOR HEALTH DISTRICT STAFF] (0 = <1month; 88. Not applicable; 99. Don't know).	|____|____|	SEX24	**IF < 1 MONTH (ZERO), → 7.21; OTHERWISE → 7.22.**
7.21	In the typical year, how many days does your partner stay in or near Chókwè? (88. Not applicable; 99. Don't know).	|____|____|	SEX25	

7. SEXUAL BEHAVIOR				
NO	**QUESTIONS AND FILTERS**	**CODE**	**VAR**	**SKIP**
7.22	Which months of the year is your last partner likely to stay in or near Chókwè? [SELECT ALL THAT APPLY] (a. January; b. February; c. March; d. April; e. May; f. June; g. July; h. August; i. September; j. October; k. November; l. December) (1. Yes; 2. No; 88. Not applicable; 99. Don't know)	a) |____|____| b) |____|____| c) |____|____| d) |____|____| e) |____|____| f) |____|____| g) |____|____| h) |____|____| i) |____|____| j) |____|____| k) |____|____| l) |____|____|	SEX26 SEX27 SEX28 SEX29 SEX30 SEX31 SEX32 SEX33 SEX34 SEX35 SEX36 SEX37	
7.23	When your last partner is staying in or near Chókwè, which of the following weekday times is your partner likely to be available for a visit from the health department, if any? [READ ALL CHOICES. SELECT ALL THAT APPLY] (a. Weekday very early morning from 5:00-6:00; b. Weekday morning from 6:00-12:00; c. Weekday lunch time from 12:00-14:00; d. Weekday afternoon from 14:00-18:00; e. Weekday evening from 18:00-22:00)	a) |____|____| b) |____|____| c) |____|____| d) |____|____| e) |____|____|	SEX38 SEX39 SEX40 SEX41 SEX42	
7.24	When your last partner is staying in or near Chókwè, which of the following times on Saturday is your partner likely to be available for a visit from the health department, if any? [READ ALL CHOICES. SELECT ALL THAT APPLY] (a. Saturday very early morning from 5:00-6:00; b. Saturday morning from 6:00-12:00; c. Saturday lunch time from 12:00-14:00; d. Saturday afternoon from 14:00-18:00; e. Saturday evening from 18:00-22:00)	a) |____|____| b) |____|____| c) |____|____| d) |____|____| e) |____|____|	SEX43 SEX44 SEX45 SEX46 SEX47	

7. SEXUAL BEHAVIOR				
NO	**QUESTIONS AND FILTERS**	**CODE**	**VAR**	**SKIP**
7.25	When your last partner is staying in or near Chókwè, which of the following times on Sunday is your partner likely to be available for a visit from the health department, if any? [READ ALL CHOICES. SELECT ALL THAT APPLY] (a. Sunday very early morning from 5:00-6:00; b. Sunday morning from 6:00-12:00; c. Sunday lunch time from 12:00-14:00; d. Sunday afternoon from 14:00-18:00; e. Sunday evening from 18:00-22:00)	a) |____|____| b) |____|____| c) |____|____| d) |____|____| e) |____|____|	SEX48 SEX49 SEX50 SEX51 SEX52	
7.26	Besides you, does your last partner have any other sexual partners? (1. Yes; 2. No; 88. Not applicable; 99. Don't know)	|____|____|	SEX53	**IF YES → 7.27; OTHERWISE → 7.28**
7.27	Besides you, how many other sexual partners does your last partner have? [ENTER 0 FOR NONE AND 99 FOR DON'T KNOW]	|____|____|	SEX54	
7.28	During the past 12 months, did you have sex with your last partner in exchange for things like food, shelter, transportation, money, or drugs? (1. Yes; 2. No; 88. Not applicable; 99. Don't know)	|____|____|	SEX55	
7.29	In the last 12 months, has your last sexual partner hit, slapped, kicked, or done anything else to hurt you physically? (1. Yes; 2. No; 88. Not applicable; 99. Don't know)	|____|____|	SEX56	
If total number of partners from 7.2 is 2, then repeat questions 7.3-7.27 substituting "second to last partner" for "last partner." If total number of partners from 7.2 is greater than or equal to 3, then repeat questions 7.3-7.27, substituting "third to last partner" for "last partner."				

10. ALCOHOL AND DRUG USE				
NO	**QUESTIONS AND FILTERS**	**CODE**	**VAR**	**SKIP**
Read: Now I am going to ask you some questions about your use of alcoholic beverages and drugs during the past 3 months.				
10.1	In the last three months, how often have you had a beverage containing alcohol? (1.Never; 2. Monthly or less; 3. Two to four times a month; 4. Two to three times a week; 5. Four or more times a week; 88. Not applicable; 99. Don't know	|____|____|	DRINK1	

10. ALCOHOL AND DRUG USE				
NO	**QUESTIONS AND FILTERS**	**CODE**	**VAR**	**SKIP**
10.2	In the last three months, have you used any of the following drugs? a) Marijuana b) Other (1. Yes; 2. No 88. Not applicable; 99. Don't know)	|____|____| |____|____|	DRUG1 DRUG2	
10.3	The last time you had sex, did you use alcohol or drugs before or during sex? (1. Yes; 2. No; 99. Don't know)	|____|____|	DRUG3	

11. SEXUALLY TRANSMITTED INFECTIONS (STIs) AND HIV TESTING				
NO	**QUESTIONS AND FILTERS**	**CODE**	**VAR**	**SKIP**
Read: These next few questions have to do with any experiences you have had with any infections in your private / genital area.				
11.1	Have you ever had an abnormal or unusual discharge from the vagina (women)/penis (men)? Please do not include discharge during sexual intercourse. (1. Yes; 2. No; 88. Not applicable; 99. Don't know)	|____|____|	STI1	**IF No→11.5**
11.2	In the past 12 months, have you had abnormal or unusual discharge from the vagina (women)/penis (men)? Please do not include discharge during sexual intercourse. (1. Yes; 2. No; 88. Not applicable; 99. Don't know)	|____|____|	STI2	**IF No→11.5**
11.3	In the past 12 months, did you receive treatment for the discharge? (1. Yes; 2. No; 88. Not applicable; 99. Don't know)	|____|____|	STI3	
11.4	In the past 12 months, did your sex partner(s) get treated for discharge? (1. Yes; 2. No; 88. Not applicable; 99. Don't know)	|____|____|	STI4	
11.5	Have you ever had sores in your genital area? (1. Yes; 2. No; 88. Not applicable; 99. Don't know)	|____|____|	STI5	**IF No→11.9**
11.6	In the past 12 months, have you had any sores in your genital area? (1. Yes; 2. No; 88. Not applicable; 99. Don't know)	|____|____|	STI6	**IF No→11.9**
11.7	In the past 12 months, did you receive treatment for the sores in your genital area? (1. Yes; 2. No; 88. Not applicable; 99. Don't know)	|____|____|	STI7	
11.8	In the past 12 months, did your sex partner(s) get treated for genital sores? (1. Yes; 2. No; 88. Not applicable; 99. Don't know)	|____|____|	STI8	
Read: Now I'm going to ask you some questions about testing for HIV.				

11. SEXUALLY TRANSMITTED INFECTIONS (STIs) AND HIV TESTING				
NO	**QUESTIONS AND FILTERS**	**CODE**	**VAR**	**SKIP**
11.9	Have you ever tested for HIV? (1. Yes; 2. No; 88. Not applicable; 99. Don't know)	|____|____|	TEST1	**IF YES→11.12**
11.10	Why have you not tested for HIV? [DO READ RESPONSES; CODE ALL THAT APPLY] a) Not at risk for HIV b) Afraid to learn he/she is HIV-positive c) If HIV+, will lose partner/family/friends d) If HIV+, will be beaten/hurt by partner e) Partner does not want me to test f) Family/friends do not want me to test g) Live too far from where he/she can be tested h) Costs too much money to test i) Health provider never offered test j) Didn't know where to test for HIV k) Other_____ (1. Yes; 2. No; 88. Not applicable; 99. Don't know)	a) |____|____| b) |____|____| c) |____|____| d) |____|____| e) |____|____| f) |____|____| g) |____|____| h) |____|____| i) |____|____| j) |____|____| k) |____|____|	TEST2 TEST3 TEST4 TEST5 TEST6 TEST7 TEST8 TEST9 TEST10 TEST11 TEST12	
11.11	Do you intend to test for HIV in the next 12 months? (1. Yes; 2. No; 88. Not applicable; 99. Don't know)	|____|____|	TEST13	**SKIP TO 11.20**
11.12	How many times altogether have you tested for HIV? (8888. Not applicable; 9999. Don't know)	|___|___|___|___|	TEST14	
11.13	In the last 12 months, have you talked with any of your sexual partners about testing for HIV together? (1. Yes; 2. No; 88. Not applicable; 99. Don't know)	|____|____|	TEST15	
11.14	In the last 12 months have you tested for HIV together with any of your sexual partners? (1. Yes; 2. No; 88. Not applicable; 99. Don't know)	|____|____|	TEST16	
11.15	When did you last test for HIV? (Month / Year; 88/8888. Not applicable; 99/9999. Don't know, if doesn't know month put 99/year)	|___|___| / |___|___|___|___|	TEST17	
11.16	Where did you test the very last time you tested for HIV? (1. Hospital or clinic in Chókwè District; 2. Home in Chókwè District ; 3. Work in Chókwè District ; 4 Other location in Chókwè District ; 5. Other location in Gaza Province, but not in Chókwè District; 6. Other location in Mozambique, but not in Gaza Province; 7. Other country; 88. Not applicable; 99. Don't know)	|____|____|	TEST18	**IF 2-7, → 11.18**

11. SEXUALLY TRANSMITTED INFECTIONS (STIs) AND HIV TESTING				
NO	**QUESTIONS AND FILTERS**	**CODE**	**VAR**	**SKIP**
11.17	In which hospital or clinic did you test? (1. Chókwè Rural Hospital; 2. Health Center Chókwè City; 3. Chókwè URBANO; 4. Health Center CARMELO; 5. Posto de saúde MASSAVASA; 6. Health Center CHIAQUELANE; 7. Posto de saúde DE MAPAPA; 8. Health Center HOKWE; 9. Health Center LIONDE; 10. Health Center MANJANGUE; 11. HC CHALOCUANE; 12. HC XILEMBENE; 13. HC CONHANE; 14. HC GUIJA; 15. Other _____; 88. Not applicable; 99. Don't know)	|____|____|	TEST19	
11.18	What was your test result the last time you tested for HIV? (1. Positive; 2. Negative; 3. Indeterminate; 4. Did not receive result; 88. Not applicable; 99. Don't know)	|____|____|	TEST20	
11.19	Have you ever tested positive for HIV? (1. Yes; 2. No; 88. Not applicable; 99. Don't know)	|____|____|	TEST21	**IF YES → 11.21.**
11.20	If you knew that your last partner was HIV positive, would you be willing to take a pill every day to prevent you from becoming HIV infected? (1. Yes; 2. No; 88. Not applicable; 99. Don't know)	|____|____|	TEST23	**SKIP TO SECTION 18**
11.21	When was the very first time you tested postiive for HIV? (Month / Year; Not applicable: 88/8888. Don't know: 99/9999. If don't know month put 99/Year)	|___|___| / |___|___|___|___|	TEST22	
IF FIRST TESTED HIV+ > 12 MONTHS AGO, SKIP TO SECTION 13 **IF FIRST TESTED HIV+ < 12 MONTHS, ADMINISTER SECTION 12**				

Appendix 2 – Ethics Approval HREC (Medical) Clearance Certificate N. 191105

UNIVERSITY OF THE WITWATERSRAND JOHANNESBURG

R14/49 Mr E Pereira

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
CLEARANCE CERTIFICATE NO. M191105

NAME: (Principal Investigator)	Mr E Pereira
DEPARTMENT:	School of Public Health Medical School University
PROJECT TITLE:	Influence of migrant status of HIV sexual risk behaviours in Chokwe district, Mozambique
DATE CONSIDERED:	2019/11/29
DECISION:	Approved unconditionally
CONDITIONS:	
SUPERVISOR:	Dr N Christofides
APPROVED BY:	Dr CB Penny, Chairperson, HREC (Medical)
DATE OF APPROVAL:	2020/01/31

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

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office Secretary on the 3rd Floor, Phillip Tobias Building, Parktown, University of the Witwatersrand, Johannesburg.
I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated, from the research protocol as approved, I/we undertake to submit details to the Committee. I **agree to submit a yearly progress report**. When a funder requires annual re-certification, the application date will be one year after the date when the study was initially reviewed. In this case, the study was initially reviewed in **November** and will therefore reports and re-certification will be due early in the month of **November** each year. Unreported changes to the application may invalidate the clearance given by the HREC (Medical).

Principal Investigator Signature _____ Date _____

PLEASE QUOTE THE CLEARANCE CERTIFICATE NUMBER IN ALL ENQUIRIES

Appendix 3 – Signed Plagiarism Form

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

FACULTY OF HEALTH SCIENCES

PLAGIARISM DECLARATION TO BE SIGNED BY ALL HIGHER DEGREE STUDENTS

SENATE PLAGIARISM POLICY: APPENDIX ONE

I Emmanuel Nouri Pereira (Student number: 1925417) am a student registered for the degree of Master of Public Health in the academic year 2018.

I hereby declare the following:

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

Signature: Emmanuel Pereira Date: 27 April 2021

1