

2011

Education, Occupation, and Migration as Predictors of Multiple Sexual Partnerships Among People Tested for Hiv in Luderitz, Namibia

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EDUCATION, OCCUPATION, AND MIGRATION AS PREDICTORS OF
MULTIPLE SEXUAL PARTNERSHIPS AMONG PEOPLE TESTED FOR HIV IN
LÜDERITZ, NAMIBIA

A Thesis Presented

by

SIMA BLANK

Submitted to the Graduate School of the University of Massachusetts Amherst in partial
fulfillment of the requirements for the degree of

MASTER OF SCIENCE

May 2011

Public Health
Biostatistics and Epidemiology

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ACKNOWLEDGEMENTS

I would like to thank Katherine Reeves for her guidance and support through this process. I also am very grateful to Susan Sturgeon and Penelope Pekow for their advice. I wish to express my appreciation for Brooke Nichols, who allowed me to use her data, and for all her useful ideas and advice along the way.

ABSTRACT

EDUCATION, OCCUPATION, AND MIGRATION AS PREDICTORS OF MULTIPLE SEXUAL PARTNERSHIPS AMONG PEOPLE TESTED FOR HIV IN

LÜDERITZ, NAMIBIA

MAY 2011

SIMA BLANK, B.A. BARNARD COLLEGE

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Multiple sexual partnerships are associated with greater risk of HIV, sexually transmitted infections (STIs) and intimate partner violence. Namibia has an HIV prevalence of 18% and surveys have shown that up to 40% of men in parts of the country have multiple sexual partners; however, no studies have evaluated characteristics associated with this behavior.

We evaluated the relationship between education, occupation, and migration and multiple sexual partnerships among people tested for HIV in Lüderitz, Namibia. Data are taken from a cross-sectional study of 570 men and women conducted in a Voluntary Counseling and Testing Center from September-November 2009. Multinomial logistic regressions adjusted for relevant confounders suggest that employment other than manual labor is associated with a three-fold increase in the odds of having 4-6 partners over the lifetime (OR=3.44 95%CI: 1.29-9.15) and a non-significant two-fold increase in the risk of having 7 or more partners over the lifetime (OR=1.93 95%CI: 0.57-6.57). Stratification by gender shows that among women, employment other than manual labor

is associated with almost a five-fold increase in the odds of having 4 or more sexual partners over the lifetime (OR=4.58 95%CI: 1.48-14.23). Women with an education of grade 12 or higher also have increased odds of having 4 or more sexual partners over the lifetime (OR=3.78 95%CI: 1.26-11.36). Results show no significant associations with migration, or among men for any exposure variables. Although further studies are warranted, results suggest that programs for HIV and STI intervention and family planning among women should be aimed at workplaces.

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CHAPTER I

INTRODUCTION

The HIV prevalence in Namibia is among the highest in the world, with an estimated 17.8% of the population infected in 2008 (1). The Karas region, in which the city of Lüderitz is located, has an even higher prevalence of 23%, and similarly antenatal care surveillance data has indicated a prevalence of 22% in Lüderitz itself (2, 3). The Namibian Ministry of Health and Social Services (MoHSS) has noted that the highest burden of HIV is in areas with high levels of migration and migration-related occupations (1). Lüderitz is largely a migrant urban center, and an area of high concern in terms of the HIV epidemic.

The majority of HIV cases in Namibia are attributed to heterosexual transmission (3). Multiple and concurrent sexual partnerships are considered to be an important factor driving the epidemic, and the Namibian MoHSS has recognized the importance of directing prevention programs at groups amongst whom multiple sexual partnerships are frequent (3, 4). Multiple sexual partnerships have also been found to be associated with higher rates of STI infection and intimate partner violence in South Africa (3, 5).

Surveys conducted in Namibia show a wide range of people reporting multiple sexual partners. While the 2006 Namibian Demographic and Health Survey found that 3% of women and 16% of men reported multiple sexual partnerships over a 12 month period, other surveys showed this activity among up to 40% of men in certain communities (4, 7). It is possible that the wide range in these estimates reflects regional differences or that people respond differently to different survey methods.

Sociological research has attributed multiple sexual partnerships in southern Africa in part to changing gender roles and changes in the economy over the past several decades (8, 4). Changing gender roles are closely associated with economic changes. For example, many men have lost their traditional role as the head of a household and as a result sexual partnerships have taken on additional meaning as a reinforcement of their masculinity. On the other hand, many women have been left with minimal or no family support and have turned to sexual partners as a means of greater financial security (8,9). Education, occupation and migration may be useful predictors of multiple sexual partners for men and women due to the association of these variables with gender dynamics and economic status (4, 9).

No epidemiological studies on these associations have been conducted in Namibia. Studies in other African countries have yielded contradictory results concerning the relationship between education, occupation, and migration and multiple sexual partners among men and women (10-16). Some studies have found that higher levels of education or being in school are negatively associated with multiple sexual partners among both men and women (10). Other studies have found that education is positively associated with multiple sexual partners among men (11-13) but negatively associated among women (11, 14). In terms of occupation, one study found that compared to employment in agriculture, other categories of employment including unemployment and being a student were positively associated with multiple sexual partners (11), while another study found that agricultural work among women was associated with an increased risk for multiple sexual partners as compared to housewives (14). The few studies that have assessed the relationship between migration and multiple sexual

partners show conflicting results concerning the risk of multiple sexual partners (15, 10). These studies are limited in their generalizability to sexual partnerships in Namibia due to possible differences in social norms and practices among different cultures (4).

In conclusion, no studies have been conducted in Namibia to address the relationship between migration, education or occupation and multiple sexual partners. Previous research in other areas has led to inconsistent results. Additionally, multiple sexual partnerships have often been classified as a binary outcome, which lacks some specificity because there may be important differences in the risk of adverse outcomes between people who report ever having a small number of sexual partners, such as 2 or 3, as compared to those with who have had a large number of sexual partners. Lüderitz is a resource-limited setting with a 22% HIV prevalence, so it is critical to identify high-risk groups for behavioral interventions. This analysis assesses education, occupation, and several categorizations of migration as predictors of having multiple sexual partners both over the course of participants' lifetimes as well as over the year prior to the study.

CHAPTER II

SOCIOLOGICAL RELATIONSHIPS BETWEEN EDUCATION, OCCUPATION, AND MIGRATION AND MULTIPLE SEXUAL PARTNERSHIPS

Sociological studies have shown that economic and social factors have played a large role in gender relations (8, 10), and consequently the number of sexual partnerships in southern Africa (4). Sociological data have been collected in Namibia via key informant interviews and informal interviews (4), as well as by ethnographic observation (8). Education, migration, and occupation are variables that are closely related to a person's economic and social standing. It is important to take gender into account when considering these variables because of the social and economic differences between men and women. As some women are finding opportunities to work outside the home and thus gain financial independence, the social role previously held by men as the main providers and heads of household are being disrupted. This disruption has made multiple sexual partnerships for men an important way to reinforce their threatened masculinity (8). On the other hand, women are often in economically disadvantaged positions and turn to male sexual partners as a means of economic security (4).

Education is a powerful way for women to empower themselves which may put them in a less economically disadvantaged position; therefore, women with a higher education may be less likely to have many sexual partners because they are not financially dependent on men (4). On the other hand, some women may seek sexual partners to financially support themselves while they are students (4). Men, on the other hand, may have more sexual partners with increasing education because they may have

more money and higher social standing and therefore be more desirable to women (4). Different occupations may also be associated with greater economic stability than others. For women, this may mean fewer sexual partners, but for men this may mean more sexual partners once again due to their higher social desirability (4). Jobs that take people away from home and from their main partner for long periods of time may also result in more sexual partnerships (10, 15).

In a study conducted among men and women in Kenya, Brockerhoff et al. proposed that there are three main factors underlying the association between risky sexual behavior among migrants compared to non-migrants: 1) certain personal predispositions (such as a risk taking, because they are willing to leave a familiar place and seek out opportunities elsewhere), 2) changes in behavior resulting in prolonged separation from a partner, and 3) being placed in a new environment in which behavior modification occurs due to exposure to new social norms (10). These three factors are closely related to the Health Belief Model, according to which people's perceptions of the consequences of their actions are shaped not by an objective knowledge but rather by their personal characteristics, experiences, and surroundings (10). Migrants may be more likely to take risks such as moving away from their families to unfamiliar places; this underlying personality trait is heightened by prolonged separation from a partner and being in a new, often more sexually liberal environment, and as a result migrants often engage in riskier behaviors such as sex with many partners (10).

In summary, underlying sociological factors support the hypothesis that education, occupation, and migration are associated with multiple sexual partnerships in Lüderitz, Namibia. Sociological evidence also supports the possibility that these

relationships differ by gender due to the different social positions held by men and women.

CHAPTER III
EPIDEMIOLOGY OF EDUCATION, OCCUPATION, AND MIGRATION AND
MULTIPLE SEXUAL PARTNERSHIPS

To our knowledge, no epidemiological studies have assessed the association of education, occupation, or migration with multiple sexual partnerships in Namibia. Therefore, this review of the literature includes studies from other African countries. Studies that assessed the relationship between education and multiple sexual partners have found inconsistent results. All of these studies have been cross-sectional and questionnaire-based, and are presented in Table 1. Among five analyses (10-14), three found significantly greater risk for multiple sexual partners among men who had achieved some education compared to those who had none in the Central African Republic, Cameroon, and South Africa (11, 12, 13), while one study in Kenya found a significant decreased risk of multiple sexual partnerships among men with secondary school education (10). Two studies, one in the Central African Republic and one in Tanzania, found that educated women were significantly less likely to have multiple sexual partners than non-educated women (11, 14).

The relationship between occupation and multiple sexual partnerships was assessed in two studies. One study in the Central African Republic found a significant increase in risk of multiple sexual partners among men working in occupations other than agriculture as compared to those working in agriculture but no significant associations among women (11). Another study among women in Tanzania found no significant change in risk of multiple sexual partners among women who were employed compared

to housewives; however, the results suggest a possible, but non-significant, positive association among women working in agriculture and those occupying secretarial/professional positions compared to women who worked in the home (14).

Two studies assessed the relationship between migration and multiple sexual partnerships. A study in Kenya found that among women, migrants from urban areas were less likely to have multiple sexual partners than non-migrants from urban areas, while female migrants from rural areas were more likely to have multiple sexual partners than non-migrants from rural areas. Among men, migration from an urban area was positively associated with more sexual partners than among non-migrants (10). A study in South Africa found that female migrants had significantly more lifetime partners but fewer partners over the prior year than non-migrant women, and that migrant males had significantly more partners over the prior year than non-migrant men (15).

Education

Somse et al. conducted one of the first large studies about multiple sexual partners in 1993 in the Central African Republic (11). This was a cross-sectional analysis of 1257 men and 1324 women ages 15-50, and data were collected using a modified questionnaire based on the World Health Organization's Global Program on AIDS. Data were collected on education based on a question about ability to read, and results were classified into three categories: not at all, with difficulty, easily, or achieved higher studies. Having multiple sexual partners was self-reported and defined as engaging in sex with someone other than a spouse or regular partner in the past 12 months.

The study findings showed that men who could read with difficulty were 67% more likely to have multiple sexual partners (OR=1.67 95% CI [1.0, 2.79]), men who could read easily were 91% more likely to have multiple sexual partners (OR=1.91 95% CI [1.2, 3.03]), and men who had achieved higher studies were almost 3 times more likely to have multiple sexual partners (OR=2.84 95% CI [1.82, 4.43]) when men who could not read were used as the referent. In contrast, women who could read with difficulty were more than 70% less likely to have multiple sexual partners than women who could not read (OR=0.28 95% CI [0.12, 0.67]), although being able to read easily and achieving higher studies were not significantly related to having multiple sexual partners. A limitation of this study is the classification of multiple sexual partners as one or more (vs. none), which does not provide information on the difference between someone with one sexual partner over a year and someone who had more. In addition, the study only assessed the number of sexual partnerships in the prior 12 months, so previous sexual behavior is not taken into account. It is possible that the prior 12 months of some participants' sexual activity was not representative of their usual sexual activity.

Kapiga et al. conducted a similar cross-sectional study in 1995 among 2271 women who were married or had a regular partner and were attending family planning clinics in Dar-es-Salaam, Tanzania (14). The authors also used a questionnaire to collect information on education, multiple sexual partners in the prior year, and other variables. In terms of education, compared to women who had no education, women with 1-4 years of primary schooling were 40% less likely to have multiple sexual partners (OR=0.6 95% CI [0.4,1.0]), women with 5-7 years of primary schooling were 50% less likely to have multiple sexual partners (OR=0.5 95% CI [0.4,0.8]), and women with secondary

education were 90% less likely to have multiple sexual partners (OR=0.1, 95% CI [0.1, 0.3]). Overall, the authors found a negative trend between education achieved and multiple sexual partners (*p-trend*=0.0001). This study was limited in its generalizability because it included only women, and all the women were married or had regular partners. These women are likely to have different sexual behavior than unmarried women without regular partners. In addition, only one year of sexual activity was taken into consideration, which may not be representative of participants' usual sexual activity.

Occupation

Somse et al. also assessed the association between occupation and multiple sexual partnerships in the cross-sectional study described above. Data on occupation were collected and grouped as: agriculture, unemployed, other, housewife (for women) and student. The authors found that men who had an occupation classified as "other" were 72% more likely to have multiple sexual partners than those who did agricultural work (OR=1.72 95% CI [1.14, 2.60]). Men who were unemployed (OR=1.26 95% CI [0.78, 2.04]) and students (OR=1.53 95% CI [0.81, 2.86]) had an increased risk of multiple sexual partnerships, though non-significant. Among women, over a three-fold increase in risk of multiple sexual partners was associated with "other" employment as opposed to agricultural work (OR=3.17 95% CI [1.50, 6.72]), and almost twice the risk was associated with being a housewife (OR=1.88 95% CI [0.99, 3.59]). Compared to women working in agriculture, unemployment and being a student were likewise positively but not significantly associated with having multiple sexual partners (OR=1.32 95% CI [0.36, 4.87] and OR=2.16 95% CI [0.75, 6.27], respectively).

The aforementioned cross-sectional study by Kapiga et al. also assessed the association between occupation and multiple sexual partners. Data on occupation were categorized into the following groups: housewife, agricultural/manual, small scale trade, hotel work, secretarial/professional, and other. The authors found that women with occupations relating to agricultural/manual work were 70% more likely to have multiple sexual partners than housewives (OR=1.7, 95% CI [1.0, 2.7]). There was also a small but non-significant increase in risk associated with secretarial/professional work (OR=1.5, 95% CI [0.7-3.4]) and “other” work (OR=1.3, 95% CI [0.7-2.5]). Small scale trade work and hotel work were not associated with having multiple sexual partners.

Migration

One of the two studies to assess migration and multiple sexual partners was conducted in 1999 by Brockerhoff et al. using data from the 1993 Kenya Demographic and Health Survey (KDHS) for 7,540 women and 2,336 men of reproductive age (10). For this cross-sectional analysis, the authors defined migrants as people who resided in an area other than the one in which they lived at the time of the KDHS for a period of six months or more. The outcome variable, “high-risk sexual behavior,” was defined as having two or more sexual partners in the prior six months and non-use of a condom with any of these partners.

Among women living in an urban area, migrant women who migrated from an urban area were more than 50% less likely to exhibit high-risk sexual behavior as compared to urban non-migrants (OR=0.47, $p<0.05$) and those coming from a rural area were 30% less likely to exhibit such behavior (OR=0.71, $p<0.05$). On the other hand,

among women living in rural areas, migrant women were more likely to exhibit high-risk sexual behavior than non-migrant women. Women migrating from urban areas were 50% more likely (OR=1.47 $p<0.05$), while women migrating from rural areas were 70% more likely to exhibit high-risk sexual behavior than non-migrants (OR=1.71, $p<0.05$). Among men, migrant men in urban areas migrating from other urban areas were over two times more likely to engage in high-risk sexual behavior than non-migrant urban men (OR=2.18, $p<0.05$). Men migrating from rural to urban areas showed a non-significant increased risk of 24% (OR=1.24, $p>0.05$). In terms of men in rural areas, men migrating from urban areas showed a 38% increase in odds of high-risk sexual behavior than non-migrants (OR=1.38 $p<0.05$), while migrant men coming from other rural areas showed a non-significant decrease in risk ($P=0.70$, $p>0.05$). A limitation of this study is that the authors combined multiple partners and condom use as the outcome of interest, which excludes those people who use condoms but still have multiple sexual partners. Although condom use is important to consider when assessing sexual behavior, people who have multiple sexual partners but use condoms may still be at higher risk of certain adverse outcomes such as intimate partner violence, or HIV if condoms break or are used improperly. In addition, people who moved seasonally or were away from home frequently but did not reside elsewhere for more than six months were not included as migrants in the analysis, nor were those who engaged in risky sexual behavior prior to six months before the study. This may mean that many people who have migrant characteristics were not included in the study.

Another cross-sectional study concerning migration and multiple sexual partners was conducted by Camlin et al. in South Africa in 2010 (15). The authors used data from

the Africa Centre Demographic Information System based on data collected in 2003-2004 on 4,767 men and 6,910 women. Migrant status was defined as having moved at least once in the two years prior to data collection. Among men, migrants reported a higher number of lifetime sexual partners than non-migrants (mean number of partners 6.4 vs. 6.2, $p=0.06$) as well as significantly more sexual partners in the past year (mean number of partners 1.9 vs. 1.6, $p<0.0001$). Among women, migrants reported more lifetime sexual partners than non-migrants (mean number of partners 2.1 vs. 1.9, $p<0.0001$), but fewer partners in the past year than non-migrants (mean number of partners 0.78 vs. 0.83, $p=0.01$). This study, like the previous one, did not consider people who were away from home frequently or for prolonged period of time as migrants although those people may have the risk factors for having multiple sexual partners such as prolonged separation from their primary sexual partners or a predisposition to risky behavior (10, 15).

In summary, the results of previous studies have been contradictory when looking at education, occupation, and migration as predictors of multiple sexual partners in men and women. Definitions of migration and categorizations of occupation have also varied. No studies have evaluated these relationships in Namibia and it may be problematic to generalize results from other geographical areas to Namibia due to the culturally-specific nature of these variables (4). If the results are generalized to Namibia from areas with different gender dynamics and socioeconomic characteristics, the sociological mechanisms which predispose certain groups to having multiple sexual partnerships would also be different. In addition, studies that have looked at these associations in other countries have classified multiple sexual partners as a binary outcome, which is a

limitation due to the wide range of partners that people may report, and frequently have not assessed both long-term and short-term previous sexual activity.

CHAPTER IV

SUMMARY

Multiple sexual partnerships have been found to be associated with an increased risk of HIV, other STIs, and intimate partner violence. In Namibia, surveys have shown a up to 40% of men reporting having multiple sexual partners (4, 7). It is important to evaluate characteristics of people that correlate with multiple sexual partnerships in order to be able to implement effective education and prevention programs.

Education, occupation, and migration may be three predictors of multiple sexual partnerships due to their close relationship with socioeconomic status and cultural gender roles. Sociological research has attributed multiple sexual partners among men as a symbol of masculinity which has been threatened by changing cultural and economic conditions. Among women multiple sexual partnerships may be a reflection of economic and social vulnerability, and sexual partners may provide economic stability. Migrant men and women may be at particularly high risk because of prolonged separation from their families or main partners, risk-taking personalities, and economic insecurities among women.

Epidemiological studies have shown conflicting results. Some findings show education to be positively associated with multiple sexual partnerships and others show this relationship only among men; other studies show a negative association either for both genders or for women only. Data are also conflicting about the relationship between occupation and multiple sexual partners, and between migration and multiple sexual partners. No studies have been conducted in Namibia, and those that have been

conducted in other settings are often limited by their classification of multiple sexual partnerships.

In this study we evaluated the relationship between education, occupation, and migration and multiple sexual partnerships in Lüderitz, Namibia, using multiple outcome categories for sexual partnerships rather than a binary variable. We will assess multiple sexual partners both over a person's lifetime and over the one year prior to their interview. This study will also look for effect modification by gender, which is important given the different social contexts of men and women.

CHAPTER V
HYPOTHESES AND SPECIFIC AIMS

Using a cross-sectional study design, we evaluated the association between education, occupation, and migration and multiple sexual partnerships among men and women tested for HIV in Lüderitz, Namibia. The following aims were addressed:

Specific Aim: To examine the relationship between education, occupation, and migration and multiple sexual partnerships.

Hypothesis 1- The level of education achieved is associated with reporting multiple sexual partners. Among men, education is positively associated with multiple sexual partnerships but among women education is inversely associated with multiple sexual partnerships.

Hypothesis 2- Men who are employed full-time are more likely to report having multiple sexual partners than those who are employed part-time, and those who are employed part-time will be more likely to report having multiple sexual partners than those who are unemployed. Among women, there is an inverse association between employment and multiple sexual partners.

Hypothesis 3- Men who are employed in occupations other than manual labor are more likely to report having multiple sexual partnerships than those who work in manual labor

or are unemployed. Among women, there is an inverse association: those employed in non-manual labor will have fewer sexual partners than those employed in manual labor or unemployed.

.
Hypothesis 4- Migrants are more likely to have multiple sexual partners than non-migrants. This association will be stronger among men than among women.

Exploratory Study Aim: To assess whether age, marital status, and/or alcohol consumption act as effect modifiers in the association between education, occupation, and migration and multiple sexual partnerships in this population.

CHAPTER VI

METHODS

Study Design and Population

Data for this cross-sectional analysis of predictors of multiple sexual partnerships are from the Voluntary Counseling and Testing (VCT) Study, a cross-sectional study conducted in Lüderitz, Namibia at a VCT center between September and November of 2009. Lüderitz is a migrant town located on the southwest coast in the Karas region of Namibia, with a population of approximately 15,000 people. Migrant workers come mainly to work in the fishing industry or to mine diamonds and zinc. Namibian health care covers HIV testing once every three months, and people can voluntarily go to the VCT center for testing.

Participants for the VCT Study were selected from among all men and women who came in for VCT who were 18 or older, not prisoners, and who had never previously participated in the study. From among all 573 eligible individuals, 570 completed the survey and have available data for study use. All people who came in for VCT testing and met eligibility criteria were asked by VCT counselors, who were trained in interviewing techniques, to complete a questionnaire about their sexual behaviors, migration patterns, and other factors related to HIV. Those who agreed to participate signed a consent form which was available in English, Afrikaans, and Oshiwambo. After participants signed the consent form, the VCT counselor administered the questionnaire and collected data on sociodemographic factors, migration patterns, alcohol consumption, and sexual partners and behavior. Following the questionnaire, the HIV test was

administered. After the 15-20 minute wait-period, the results of the test were recorded on the questionnaire, and post-test counseling was administered (see Figure 1).

The questionnaire used in this study was adapted from the *Multicentre study on factors determining differences in rates of spread of HIV in sub-Saharan Africa: methods and prevalence of HIV infection* by Buvé et al. (18). It was shortened to from 150 to 38 questions, and from 23 to 8 pages. The questionnaire was also adapted to make it more relevant to a Namibian population.

Exposure Assessment

The three exposures considered in this study were education, occupation, and migration. Education level was measured using the question, “have you ever attended school?” and if the answer was affirmative the follow-up question asked was, “what was the highest level that you completed?” At the time of the interview the responses were broken down into 6 categories: primary, grade 10, grade 12, higher, primary not completed, or never. For this analysis, education was grouped into three categories: less than grade 10, completed grade 10 but did not complete grade 12, and completed grade 12 or higher. This categorization was chosen because all students in Namibia are required to take government exams at the end of 10th grade, and as a result many students drop out prior to completing this grade. Those who pass the exam are eligible to enroll in further education.

Occupation was assessed as type of occupation and occupation status. The type of occupation was assessed using the question “what is your usual occupation?” and if the participant was unsure how to answer the interviewer asked, “what kind of work do you

usually do?” The exact answer given was recorded, and then matched as closely as possible into one of 12 categories by the interviewer. The original categories in the questionnaire are as follows: fishing, farmer/works in agriculture, soldier/policeman, driver, manual worker, sales/service worker, clerical, professional/administrative, health care worker, mining, no employment, or other. For this analysis, the occupational categories were further condensed into one of three categories based on the type of work involved in each occupation: unemployed or student, occupations requiring manual work (agriculture, fishing, mining, manual labor), or other occupations. Further categorization into more distinct categories was not possible due to small numbers.

In addition, participants were asked about their current occupation status. The interviewer read out all the possible answers and asked the participants to select the best match for their current state of employment. Answers were originally grouped into one of the following 10 categories: regularly employed full-time in a job, employed seasonally or on a day-to-day basis, self-employed, unemployed or looking for work, a homemaker with some part-time work outside, a homemaker with no part-time work outside, student, retired or disabled, volunteer, or other. In this analysis, employment status was considered as one of four categories: unemployed or student (unemployed or looking for work, homemaker with no other work outside, retired or disabled, volunteer, or student), employed part-time (employed seasonally or on a day-to-day basis, self-employed, a homemaker with some part-time work outside), or employed full-time (regularly employed full-time in a job).

Migration characteristics were measured in the questionnaire via seven questions. Participant characteristics considered indicative of migrant status were assessed based on

response to the following questions: having been born elsewhere, having lived in Lüderitz for five years or less, moving from a rural area, moving for work, not intending to live in Lüderitz forever, being away from home for more than a month in the past year, and having an occupation generally filled by migrant workers (fishing, mining, and manual labor). Three migration variables were considered in this analysis. The first was a positive response to both of the following questions: moving to Lüderitz for work and not intending to stay in Lüderitz forever. The second variable was a positive response to having moved to Lüderitz for work as well as having an occupation in fishing, mining, or manual labor. The third variable considered was a positive response to spending more than one month in the past year away from home. Because migrant workers employed in mining, fishing, and manual labor may be predominantly male, the first category is more flexible in order to include female migrants who moved for other types of work. The last variable may take into account circular migrants (who leave their homes frequently for jobs) and seasonal workers.

Validity of Exposure Assessment

To our knowledge, no prior studies have assessed the validity of self-report of education, occupation, or migration in southern Africa. However, self-report of these variables has been used in previous studies of sexual activity, such as to assess the association between these variables and HIV in African countries (15, 19, 20, 21). In this study, the exact response to the level of education attained by each participant was recorded. The accuracy of the reporting of education is likely to be high because information about education is not very sensitive, and the answers are most likely well

known by the participants. However, there was no way to assess the validity of their reporting so there may be some misclassification of education.

Likewise, participants themselves were asked to select the category of occupational status that best described them (employed full-time, part-time, unemployed, homemaker, etc.). This question was meant to capture current occupational status. However, to capture what occupations participants were generally employed in, interviewers coded the participants' responses based on the 12 categories provided. There is, therefore, a possibility that some responses were incorrectly coded into categories and thus that the data do not provide a good description of the true occupation type in the population. However, the categories of occupation type were chosen based on the predominant forms of employment of people working in Lüderitz. Thus, we believe that misclassification by the interviewers was likely to be minimal. In addition, there was no way to assess how accurately participants were answering questions about occupation, although the accuracy is likely to be high for the same reasons described above for education.

There is no standard approach for classifying an individual as a "migrant." Other studies have classified migrants based on information such as at least one change of residence as an individual in the prior two years (15) or based on their residence in predominantly migrant centers such as mines and factories (21). We used three different categorizations of migration: one that addressed occupations predominantly held by migrants in Lüderitz, one that addressed a temporary residence in the city, and one which assessed for frequent trips away from home characteristic of circular migrants. We

believe that our multiple definitions of migrant status encompass all facets of migrancy in the Lüderitz population and therefore have minimized possible misclassification.

Outcome Assessment

The number of sexual partnerships in a participant's lifetime was determined by asking, "how many partners have you ever had penetrative sex with?" The number of sexual partners in the past year was determined by asking, "now I want you to think back on all of the partners you've had sex with in the past year: your spouse or regular partners, casual partners and those you've paid to have sex with. Altogether, how many people have you had sex with in the past 12 months?" For both questions, the number stated by the participant was recorded.

For this analysis, the number of sexual partners over the past year was evaluated as a dichotomous variable, with the categories 0-1 partner and 2+ partners. This is a similar categorization as used in other studies (22). The total number of lifetime sexual partners was divided into one of four categories: 0-1, 2-3, 4-6, and 7 or greater; these categories were chosen based on the distribution of participant responses. The first category combines those with no partners ever and those who only had one partner in order to increase the number of people in this category, and because those with only one lifetime partner have the most minimal level of risky sexual behavior.

Validity of Outcome Assessment

Buvé et al. have previously assessed the validity of their questionnaire on self-reported sexual behavior from which the questionnaire used in this study was adapted

(23). The original questionnaire was used for assessing sexual behaviors and risk of HIV in four cities in Kenya, Zambia, Benin, and Cameroon, using a population-based approach. The authors found that in all four cities in which the original study was conducted, approximately 1-9% of men and 6-18% of women under-reported their sexual activity. In addition, the authors compared their parameters with the Demographic and Health Surveys (DHS) conducted around the same time in the countries in which their study was based. They found that men and women consistently reported more non-spousal sexual partners in the DHS than in their survey, especially among never-married men and women ($p < 0.001$). Despite the likely underreporting of sexual behavior, self-report was the only reasonable means of collecting data for this analysis.

Covariate Assessment

Data on all covariates were collected during the interview. Covariates considered in this analysis were age (continuous), age at first sexual intercourse (continuous), gender, marital status (married /living with partner vs. single/separated/divorced/widowed), number of children (none/1-2/3+), alcohol use (don't drink/drink at home or friend's house/drink at bar or shebeen), condom use (always/usually vs. rarely/never), and whether or not the participant's sexual partner has other sexual partners (probably yes/probably no/or unsure). Prior studies have shown that these variables are likely to be associated with having multiple sexual partners (4, 9, 11, 12).

Data Analysis Plan

Specific Aim: To examine the relationship between education, occupation, and migration and multiple sexual partnerships.

Univariate Analysis

The number and percent of participants in the study population according to selected sociodemographic characteristics was calculated, and also stratified by gender (Table 2). The distribution of education, occupation, and migration characteristics (Table 3) as well as the distribution of sexual partnerships (Table 4) among all study participants were also calculated and stratified by gender. Statistical analysis was conducted using SAS 9.2 Software by SAS Institute Inc. (SAS, Cary, NC).

Hypothesis 1- The level of education achieved is associated with reporting multiple sexual partners. Among men, education is positively associated with multiple sexual partnerships but among women education is inversely associated with multiple sexual partnerships.

Bivariate Analysis

Covariates were tabulated across education categories (Table 5) and across outcome variables (Table 9) in order to evaluate for confounding. Education was also tabulated across outcome variables (Table 10). The cross-tabulations for categorical variables were assessed using chi-square tests to determine whether the observed distributions fit the expected distributions. Fisher's exact tests were used where expected

cell counts were less than 5. *P*-values from the chi-square tests or Fisher's tests are presented for all the covariates. Continuous variables were evaluated using the mean and standard deviation within each category of exposure or outcome, and *p*-values for these variables were calculated by an analysis of variance. Indicator variables were created for all categorical variables with >2 levels for the regression analyses.

Regression Analysis

The association of exposure variables with sexual partners in the lifetime, categorized as 0-1, 2-3, 4-6 or 7+ partners, was modeled using multinomial logistic regression. Multinomial logistic regressions were chosen over ordinal regressions to model the associations with lifetime sexual partners so that differences in the association of education with the number of sexual partners could be observed among the categories. The association of exposure variables with sexual partners in the past year, categorized as 0-1 or 2+ partners, was modeled using unconditional logistic regression.

Because we felt that crude relative risks were not informative given the gender dynamics of the population, gender-adjusted odds ratios (OR) along with 95% confidence intervals (CI) were presented to assess the crude association between education and categories of lifetime sexual partnerships, vs. 0-1 lifetime sexual partners, using multinomial logistic regression (Table 11A). To assess the crude association between education and 2+ sexual partners as compared to 0-1 partner in the past year, gender-adjusted unconditional logistic regression was used (Table 12). In all models, participants with less than grade 10 education served as the referent group and were compared to

those with higher levels of education, as they were hypothesized to be the group of lowest risk among men.

Multinomial logistic regression models were used to assess the relationship between education and number of lifetime sexual partnerships (vs. 0-1 partners) using odds ratios and 95% confidence intervals (Tables 11B-D). Only age was added to the first multivariable model (Table 11B). The second multivariable model included all covariates found to be significant as described below (Table 11C). The third multivariable model included all the terms in the previous model as well as an occupation and migration variable (see below) (Table 11D). Logistic regression was used to model the relationship between education and 2+ sexual partnerships in the past year (vs. 0-1 partners) using odds ratios and 95% confidence intervals. The first multivariable model included only age (Table 12). Selection of covariates is described below.

To determine which covariates were left in the model, we conducted univariate logistic regressions and put all variables with a p -value $<.25$ from a likelihood ratio test into a preliminary model including education. The significance of these variables was then tested using likelihood ratio tests at a $p=0.05$ level of significance by comparing a preliminary model with the variable to a model without. The final model for education included all covariates found significant after these steps were taken as well as covariates found significant for the other exposure variables considered. Therefore, the regression models for all the exposure variables were adjusted for the same set of confounders to aid in the clarity of comparison across these models. All continuous variables were assessed for linearity in the logit. Assessment for effect modification will be described below.

Hypothesis 2- People who have are employed full-time are less likely to report having multiple sexual partners than those who are employed part-time, and those who are employed part-time will be less likely to report having multiple sexual partners than those who are unemployed. This inverse association will be stronger among women than among men.

Bivariate Analysis

Covariates were tabulated across occupation status categories (Table 6) and across outcome variables (Table 9) in order to evaluate for confounding by these variables as described above for education. Occupational status was also tabulated across outcome variables (Table 10).

Regression Analysis

The crude regression analysis for occupation status was conducted the same way as in the analysis for education presented above (Tables 11A, 12). Participants with the occupation status of unemployed served as the referent category for the sake of consistency with occupational type.

To assess the relationship between occupation status and lifetime sexual partners we used multinomial logistic regression with all relevant confounders, as described for education (Tables 11A-D). To assess the relationship between occupation status and the number of sexual partners in the prior 12 months, we conducted a multivariate logistic regression with all relevant confounders, as described above (Table 12). The final model

for included all covariates adjusted for in the model with education to aid in the clarity of comparison of the results.

Hypothesis 3- People who are employed in highly skilled occupations are less likely to report having multiple sexual partnerships than those in other categories of occupation type. This inverse association will be stronger among women than among men.

Bivariate Analysis

Covariates were tabulated across occupation type categories (Table 7) and across outcome variables (Table 9) in order to evaluate for confounding by these variables as described above for education. Occupation type was also tabulated across outcome variables (Table 10).

Regression Analysis

The crude regression analysis for occupation status was conducted the same way as in the analysis for education presented above (Tables 11A, 12). Participants with the occupation type of employed served as the referent category for the sake of consistency with occupation status.

To assess the relationship between occupation type and the number of lifetime sexual partners we used multinomial logistic regression with all relevant confounders, as described for education (Tables 11A-D). To assess the relationship between occupation type and the number of sexual partners in the past 12 months, we conducted a multivariate logistic regression with all relevant confounders, as described above (Table

12). The final model for included all covariates adjusted for in the model with education to aid in the clarity of comparison of the results.

Hypothesis 4- Migrants are more likely to have multiple sexual partners than non-migrants. This association will be stronger among men than among women.

Bivariate Analysis

Covariates were tabulated across migration categories (Table 8) and across outcome variables (Table 9) in order to evaluate for confounding by these variables as described above for education. Migration variables were also tabulated across outcome variables (Table 10).

Regression Analysis

The crude regression analyses for the three migration variables were conducted the same way as in the analysis for education presented above (Tables 10, 11). Participants who were classified as non-migrants served as the referent category because they were hypothesized to be the group of lowest risk among men.

To assess the relationship between migration and the number of lifetime sexual partners we used multinomial logistic regression with all relevant confounders, as described for education (Tables 11A-D). To assess the relationship between migration and the number of sexual partners in the past 12 months, we conducted a multivariate logistic regression with all relevant confounders, as described above (Table 12). The final

model for included all covariates adjusted for in the model with education to aid in the clarity of comparison of the results.

Effect Modification

Study Aim: To assess whether or not the association between education, education, and migration and multiple sexual partnerships is different among men than among women.

To assess whether or not gender modified the relationship between education, occupation, or migration and multiple sexual partnerships, we included an interaction term in the final model for each exposure variable and gender (i.e. *gender *education*) and compared this to the model without the interaction term using likelihood ratio tests. We assessed for effect modification for lifetime sexual partners and sexual partners in the past year. Because interaction terms with gender resulted in unstable estimates due to small numbers in some response and predictor categories, we stratified models by gender and collapsed categories as necessary (Tables 13, 14, 15). For these analyses we further restricted to participants who reported at least one sexual partner in the lifetime (288 women and 266 men). Only associations with lifetime sexual partners could be assessed for women. Models for the stratified analysis were adjusted first for age and then for all variables included in the final analyses for the entire study population.

Study Aim: To assess whether or not age, marital status, or alcohol are effect modifiers of the association between education, education, and migration and multiple sexual partnerships.

To assess whether age, marital status, or alcohol use modified the relationship between education, occupation, or migration and multiple sexual partnerships, we included an interaction term in the final model for each exposure variable and these variables (i.e. for education: *age *education, marital status*education and alcohol use*education*) and compared this to the model without the interaction term using likelihood ratio tests. We assessed for effect modification for lifetime sexual partners and sexual partners in the past year.

Model Assessment

The goodness-of fit of the final unconditional logistic regression models was assessed using Hosmer-Lemeshow tests. Points that could have undue influence on the parameter estimates or the model deviance were identified using Hosmer-Lemeshow's delta deviance test and Pregibon's delta beta test (respectively). Points identified by these tests were excluded from the model and the resulting ORs were compared to the previous results. To assess multinomial models, we treated them as separate logistic regression models where each category of sexual partnerships was compared to the referent group (0-1 partners). Then, the procedures described above were repeated for every regression and assessed for agreement.

CHAPTER VII

SIGNIFICANCE

Namibia is burdened with the fifth highest HIV prevalence in the world (25), and a particular area of concern to the Namibian MoHSS are migrant centers such as Lüderitz where the HIV prevalence is over 20% (3). The HIV epidemic in Namibia is generally attributed to heterosexual transmission, and multiple sexual partnerships among men and women are considered to increase transmission of HIV in Namibia and in other nearby countries. Multiple sexual partners have also been found to be associated with higher rates of other STIs and with increased intimate partner violence (3-5).

No studies in Namibia have assessed the relationship between migration, education or occupation and multiple sexual partners, although surveys have reported up to 40% of men in certain communities reporting having multiple sexual partners (7). The research that has been conducted in countries near Namibia has shown inconsistent results. In addition, previous studies have addressed multiple sexual partners as a binary outcome. Given the importance of identifying groups with multiple sexual partners in an area with 23% HIV prevalence and limited resources for the sake of targeted behavioral interventions, results from this study could provide healthcare workers with information to improve intervention programs in a setting where HIV prevalence is extremely high yet resources for interventions are limited.

CHAPTER VIII

HUMAN SUBJECTS PROTECTION

The VCT Study was approved by the Institutional Review Board of the School of Public Health and Health Sciences (SPHHS) of the University of Massachusetts Amherst. The current analysis was approved by the SPHHS Institutional Review Board on December 7, 2010.

All participants first signed an informed consent, which was available in English, Afrikaans, and Oshiwambo, which indicated the content of the questionnaire and that they were not obligated to participate or could chose not to answer questions that they were not comfortable answering. All questionnaires were administered by trained personnel. Answers to the questionnaire and the results of the HIV test were linked to a study ID rather than to identifiable information.

There are no known potential risks to participants, other than the possible disclosure of their personal information by the staff who administered the questionnaire. This is highly unlikely given that all personnel were trained in privacy procedures.

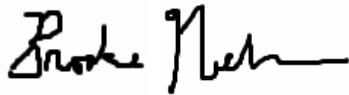
CHAPTER IX
PERMISSION TO ACCESS DATA

November 15, 2010

To Whomever it May Concern:

I, Brooke Nichols, give Sima Blank permission to use the data from my study (the VCT Study from Lüderitz, Namibia) for her thesis entitled "Education, Occupation, and Migration as Predictors of Multiple Sexual Partnerships among People Tested for HIV in Lüderitz, Namibia."

Sincerely,

A handwritten signature in black ink that reads "Brooke Nichols". The signature is written in a cursive style with a long horizontal flourish at the end.

Brooke Nichols

CHAPTER X

RESULTS

Demographic characteristics of the 570 participants of the VCT study are shown in Table 2. The study population was comprised of 275 (48.2%) men and 295 (51.8%) women. The mean age of the study population was 31.72 years, and the mean age of men was slightly higher than that of women (33.22 years vs. 30.32 years, $p<0.001$). The majority of participants (76.8%) were not married at the time of the study, had children (71.7%), did not think that their current partner had other partners (87.0%), and did not drink alcohol (69.3%). However, 84.3% of women did not drink as compared to 53.1% of men ($p<0.001$), and while no men reported that their partner likely had other partners almost 8% of women did ($p<0.001$). Over half of the population reported rarely or never using condoms.

The distribution of the exposure variables (education, occupation status, occupation type, and the three migration variables) in the study population is shown in Table 3. A total of 38.6% of participants achieved less than 10th grade, 33.7% achieved less than 12th grade, and 27.7% completed grade 12 or had higher education. More women than men achieved the highest level of education (32.9% vs. 22.2%, $p<0.001$). In terms of employment status, 35.3% of the population were unemployed or students, although this number was much higher in women compared to men (51.2% vs. 18.2%). A total of 16.3% of the population had part-time employment, and almost 50% had full-time employment. Full-time employment among men was higher than among women (60.7% vs. 36.9%, $p<0.001$). Over half of the men in the study population were employed

in manual labor, as opposed to 25% of women ($p<0.001$). When migration was defined as having moved to Lüderitz for work and being employed in fishing, mining, or manual labor, 54.5% of men were categorized as migrants compared to 22% of women (only 37.7% of the entire population fell into this category). When migration was defined as having moved to Lüderitz for work and not intending to stay forever, 77.1% of men and 50.5% of women (64% of the study population) were considered migrants. When we cross-tabulated these two migration categories to assess how the study population was distributed among them, we found that 31% of the study population fell into both categories (data not shown). A total of 15.1% of the study population reported having been away from home for over one month in the prior year.

The distribution of the number of sexual partners in the study population is shown in Table 4. A total of 89% of participants reported having 0 or 1 partner in the past 12 months, although this number was higher among women than men (97.6% vs. 80%, $p<0.001$). 18.7% of participants reported having 0 or 1 sexual partner in their lifetime (16 reported never having had a partner, data not shown). In terms of the categories of lifetime sexual partners, 42.6% of participants reported ever having 2 or 3 partners, 22.8% reported 4-6 partners, and 15.9% reported 7+ partners. More women than men fell into the lowest category of multiple sexual partners and only about 2% of women were in the highest category of both lifetime sexual partners and sexual partners in the past 12 months ($p<0.001$). Over 50% of those who reported 2 or more partners in the prior 12 months also reported 7 or more partners over the lifetime (data not shown).

Covariate distributions according to the number of sexual partnerships in the prior year as well as over the lifetime are shown in Table 9. People who had 2 or more partners

in the prior year were overall younger at first sexual intercourse and had fewer children than people who reported 0 or 1 partner in the past year ($p < 0.001$). In terms of lifetime sexual activity, those with more partners were generally older, younger at first intercourse, more likely to be married or living with a partner, and less likely to drink alcohol (significant at a $p = 0.01$ level). However, those who reported 7 or more sexual partners in the lifetime were also the most likely to drink alcohol at a bar or shebeen.

Education

As shown in Table 5, people with more education were more likely to be older, not married or living with a partner, have no children, and to use condoms (all these were significant at a $p = 0.01$ level). When education was tabulated across categories of lifetime sexual partners or sexual partners in the prior year no significant associations were found at the $p = 0.05$ level.

Multinomial logistic regression models of the association between education and sexual partners over the lifetime are presented in Tables 11A-D. Education was not found to be significant in any of these models. The results of the regression models assessing the relationship between education and sexual partners in the past 12 months are presented in Table 12. No statistically significant associations were found.

Because including an interaction term for gender resulted in unstable estimates due to small numbers in some response and predictor categories, we stratified the models by gender and collapsed categories as necessary. Table 13 shows the results of the multinomial logistic regression for the association between education and lifetime sexual partners among the 288 women in the study population who reported having at least one

sexual partner in the lifetime. Because there were too few women with 7 or more partners, the two highest categories were collapsed for this analysis, and alcohol use was re-coded as a binary variable. Results in the multivariate model show that women in the highest category of education (completed grade 12 or higher) have almost four-fold higher odds of being in the highest category of lifetime sexual partnerships (OR=3.78 95% CI: 1.26-11.36). There were no statistically significant associations found between education and multiple sexual partnerships over the lifetime or over the prior 12 months among the 266 men in the study population who reported having at least one sexual partner in the lifetime (Tables 14-15). However, as shown in Table 13, the point estimates indicate a non-significant increase in the odds of having multiple sexual partners in the lifetime among men who achieved an education of grade 12 or higher.

Occupation

The distribution of covariates according to occupational status is shown in Table 6. Increasing employment was associated with increased age, being older at first sexual intercourse, fewer children, and more alcohol consumption (all these were significant at a $p=0.01$ level). Those who were employed full-time were more likely to drink at home or at a friend's home compared to those who were part-time employed (16.4% vs. 10.9%), while those who were part-time employed were more likely to drink at bars or shebeens than those who were full-time employed (28.3% vs. 16.1%, $p<0.001$).

Table 7 shows distribution of covariates according to occupational type. Participants employed in manual work were overall slightly older, were slightly older when they first had sexual intercourse, and were more likely to be married or live with a

partner and to drink at a bar or shebeen ($p<0.01$). Those who were unemployed were more likely to have no children and to not consume alcohol.

Table 10 shows a cross-tabulation of occupation variables by multiple sexual partnerships. People who had 7 or more sexual partners over the lifetime were significantly more likely to be employed full-time, while those with 0-1 partner ever were most likely to be unemployed ($p<0.001$). Those with the highest number of lifetime sexual partners were also more likely to be employed in manual work. In terms of sexual partnerships in the prior year, people whose occupational status was unemployed were more likely to have had 0 or 1 partner in the past year ($p=0.03$), although no statistically significant associations were found when looking at employment type.

Multinomial logistic regression models of the association between education and sexual partners over the lifetime are presented in Tables 11A-D. In the gender-adjusted model, employment was found to be associated with having multiple sexual partners (Table 11A). Full-time employment was associated with an approximately two-fold increase for all categories of sexual partners, with the odds slightly higher for the higher categories (for 2-3 partners there was an 85% increased odds, 95% CI: 1.10-3.09, for 4-6 partners there was a 2.5-fold increased odds, 95% CI: 1.35-4.64, and for 7+ sexual partners there was a 2.35-fold increased odds, 95% CI: 1.09-5.04). Part-time employment was also significantly associated with an approximately three-fold increase in the odds of having 4-6 lifetime partners (OR=3.11 95%CI: 1.33-7.30) as well as non-significant increased odds of having 7 or more lifetime partners (OR=2.59 95%CI: 0.95-7.04). In terms of type of employment, those employed in manual labor were significantly more likely to have multiple sexual partners over the lifetime with odds highest in the highest

category of multiple sexual partners (OR=2.34, 95% CI: 1.10-5.37). Likewise, occupations that involved non-manual labor were also associated with increased odds of having multiple sexual partnerships (for 2-3 partners there was an 93% increased odds, 95% CI: 1.01-3.66, for 4-6 partners there was a 3-fold increased odds, 95% CI: 1.51-6.44, and for 7+ sexual partners there was a non-significant 2.37-fold increased odds, 95% CI: 0.95-5.92).

Results were attenuated after age was added to the model (Table 11B).

Occupation in work other than manual labor remained significantly associated with having 4-6 sexual partners in the lifetime (OR=2.44 95% CI: 1.16-5.15). The results of the multivariate model with all covariates found significant for the multinomial regression are presented in Table 11C. Covariates found to be significant after performing likelihood ratio tests were age, age at first sexual intercourse, gender, condom use, alcohol use, and number of children. Occupation in work other than manual labor was associated with significantly higher odds of having 4-6 sexual partners in the lifetime (OR=3.82 95% CI: 1.47-9.92), as well as 2-3 sexual partners in the lifetime (OR=2.60 95% CI: 1.14-5.95).

Occupation type and migration defined as moving to Lüderitz for work and not intending to stay forever were adjusted for in the model shown in Table 11D. Occupation in work other than manual labor was still associated with significantly higher odds of having 4-6 sexual partners in the lifetime although the association was slightly attenuated (OR=3.44 95% CI: 1.29-9.15), and it also remained significantly associated with having 2-3 sexual partners in the lifetime (OR=2.45 95% CI: 1.05-5.72).

The results of the regression models assessing the relationship between occupation variables and sexual partners in the past 12 months are presented in Table 12. No statistically significant associations were found. Because including an interaction term for gender resulted in unstable estimates due to small numbers in some response and predictor categories, we stratified the models by gender and collapsed categories as necessary. Table 13 shows the results of the multinomial logistic regression for the association between occupation and lifetime sexual partners among the 295 women in the study population. Because there were too few women with 7 or more partners, the two highest categories were collapsed for this analysis, and alcohol use was recoded as a binary variable. Results in the multivariate model show that women employed in non-manual occupations have almost five-fold odds of having 4 or more lifetime sexual partners as compared to women who were unemployed or students (OR=4.58, 95% CI: 2.48-14.23) and over 3-fold higher odds of having 2-3 sexual partners in their lifetime (OR= 3.71, 95% CI: 1.42-9.70). Women employed part-time also had three times higher odds of having 2-3 sexual partners in their lifetime as compared to women who were unemployed or students (OR=3.23, 95% CI: 1.06-9.67) and although results were not significant, point estimates suggested that women who were employed part time as well as full time had a higher odds of having more sexual partners than women who were unemployed (Table 13).

Neither occupation type nor occupation status was significantly associated with the number of lifetime sexual partners among men (Table 14). However, the point estimates in both the age-adjusted and the multivariate model are all less than one for categories of men who were employed. Men with full-time employment had a 75%

reduced odds of having 7+ sexual partners in the lifetime as compared to men who were unemployed (OR=0.25, 95% CI: 0.03-2.41), and men working in both manual labor and other occupations similarly had over a 70% reduced odds of having 7+ sexual partners in the lifetime as compared to men who were unemployed (OR=0.28, 95% CI: 0.03-2.95), though neither result was statistically significant (Table 14).

Migration

The distribution of covariates according to migration is shown in Table 8. Overall, people who moved to Lüderitz for work and were employed in fishing, mining, or manual labor were approximately 5 years older than those who did not, and had their first sexual intercourse approximately one year later. They also had more children and were more likely to consume alcohol, particularly in bars or shebeens. Migrants who moved to Lüderitz for work and did not intend to stay in Lüderitz forever were also approximately 2 years older than others, had their first sexual intercourse at a slightly older age, and 12.4% of these participants were unsure whether their partner had other partners as compared to 2.8% of other participants ($p<0.001$).

Migrants defined both as having moved to Lüderitz for work and working in fishing, mining, or manual labor and as having moved to Lüderitz for work and not intending to stay forever were more likely to have 7+ sexual partners in the lifetime than non-migrants ($p<0.001$) (Table 10).

Multinomial logistic regression models of the association between education, occupation, and migration variables and sexual partners over the lifetime are presented in Tables 11A-D. Migration, defined as moving to Lüderitz for work and not intending to

stay forever, was significantly associated with 68% higher odds of having 2-3 lifetime partners but not with higher categories of multiple sexual partners (Table 11A). We failed to find a significant association between migration variables and the number of sexual partners in the lifetime. However, there was a non-significant two-fold increase in the odds of having 7+ sexual partners in the lifetime among people who were away from home for a month or more in the prior year (OR=2.10, 95% CI: 0.78-5.54) (Table 11D).

The results of the regression models assessing the relationship between migration variables and sexual partners in the past 12 months are presented in Table 12. No statistically significant associations were found. There were also no significant associations found with any of the migration variables in the gender-stratified models (Tables 13-15). However, although the results are not statistically significant, among women there was a suggestion of a slightly increased odds of multiple sexual partners among those who were away from home for more than a month in the past year as compared to those who were not (Table 13). Among men, the odds of having 4-6 and 7+ sexual partners in the lifetime among men who were away from home for more than a month in the prior year is more than five-fold, although non-significant (OR=5.32, 95% CI: 0.60-47.01 and OR=5.20, 95% CI: 0.58-47.06, respectively) (Table 14).

The numbers in this study did not support assessing for interaction by age, marital status, or alcohol use. Hosmer-Lemeshow tests for all the logistic regressions yielded non-significant *p*-values, indicating no lack of fit. When the multinomial models were split up, all but one yielded non-significant *p*-values; in the model for education, 4-5 partners vs. 0-1 yielded a *p*-value of 0.01, indicating a lack of fit of the data. The Pregibon's delta beta test for all models yielded no points above the cutoff value of 1,

indicating that there were no potentially influential observations. The Hosmer-Lemeshow delta-beta test for all the models showed some points above the cutoff value of 3.84, indicating that the model does a poor job of predicting the outcome for these points; however, numbers were too low to exclude these points for a sensitivity analysis.

CHAPTER XI

DISCUSSION

In this cross sectional study of 570 men and women tested for HIV in Lüderitz, Namibia, occupation as a non-manual worker was found to increase the odds of having more sexual partners in the lifetime, particularly among women, but was not associated with the number of sexual partners in a 12-month period. There was a suggestion that employment (as compared to unemployment) among men was inversely associated with the number of sexual partners in the lifetime. Education was found to be associated with significantly higher odds of being in the highest category of lifetime sexual partners among women. We found no statistically associations between migration variables and the number of sexual partners over the lifetime or over a 12-month period, and no statistically significant associations between any of the exposure variables and multiple sexual partnerships among men. However, the point estimates suggested a pattern that employment among men was inversely associated with the number of sexual partners. There also appeared to be a suggestion that people who reported being away from home for more than a month in the past year, particularly men, were more likely to be in the higher categories of multiple sexual partnerships as compared to people who did not report being away frequently. Among men, those who moved to Lüderitz for work and did not intent to stay forever also consistently had slightly higher, though not statistically significant, odds of having multiple sexual partnerships.

Because the outcome assessed in this model is not rare, the odds ratios found in this study most likely overestimate the risk ratios; however, results still show that women

employed in non-manual jobs are more likely to have more sexual partners in the lifetime and that perhaps health workers in Lüderitz should focus STI and HIV prevention efforts at businesses and offices. Results also indicate that higher education and employment are characteristics which should be considered when planning programs or distributing information about safe sex and family planning among women. For men, there is a suggestion that those who are circular migrations (who make frequent trips away from home) in particular should be targeted for STI screening. However, circular male migrants may be more a more difficult group to identify than female members of the workforce.

It is possible that women employed in professions other than manual jobs are more likely to live alone without family members and perhaps live a more liberal lifestyle than women who are unemployed. It is also worthwhile to note that although education was not found to be significantly associated with multiple sexual partners among men the results still suggest a positive association. For women, it is possible that employment and education lead to multiple sexual partners because of the encouragement of predominantly male authority figures (11).

Our results are similar to findings by Somse et al., who found that occupation in non-agricultural work, as compared to agricultural work, was associated with more sexual partners among women (OR=3.17 95% CI: 1.50-6.72) (11). However, these results concerned sexual partnerships with someone other than a spouse over the prior year. Kapiga et al. found that women employed in manual work in Tanzania had a 70% increase in having more than one sexual partner in the prior year while women in more

skilled areas of employment did show an increase in the number of sexual partners, which we did not observe in our data (14).

Unlike prior cross-sectional studies, we found no significant increase in the number of sexual partners among men with higher levels of education, although there did appear to be a pattern indicating a positive association (11, 12, 13). We also found that education increased the odds of having multiple sexual partners in the lifetime among women, which is consistent with our findings concerning occupation status among women. However, we failed to find an association between education and the number of partners in the past year among women, while previous studies have shown a decreased risk (10, 11, 14).

Prior studies have also shown contradictory results concerning migration and sexual partnerships; while Brockerhoff et al. found that rural to urban migration was inversely associated with the number of sexual partners, Camlin et al. found that male and female migrants had more partners over the lifetime, and that male migrants had more partners over the past year while female migrants did not (10, 15). However, in both of these studies migration was classified based on changes in residence, while the characterizations used in this analysis were slightly more specific and covered a broad range of characteristics associated with migrant status (see Table 1). This difference in classification may explain the differing results.

It is possible that the size of our study population was too small to detect significant associations, and confidence intervals for our results were wide. There were not many people in the highest categories of sexual partnerships over the lifetime, but this category was retained because it could reflect people who engaged in transactional sexual

activity or worked as sex workers. Although adjusting for many confounders may also have reduced the power, because this was a predictor model we felt that their inclusion was justified.

It is also possible that our results were biased. All questionnaires were administered to the participants by trained interviewers during the same period of the HIV-testing process. It is possible that due to the high stress of waiting for HIV test results some participants incorrectly reported their education level, occupation information, or migration information. Such nondifferential misclassification of exposures would bias our results towards the null. However, this is unlikely because these questions are relatively impersonal and not difficult to remember. It is also possible that interviewers made errors when categorizing participant responses of occupation type or occupation status into the original categories. Because interviewers were trained and were also unaware of the study hypothesis, it is highly unlikely that any errors would be differential by number of sexual partners. However, because of small numbers we collapsed occupational categories into three groups which may be overly heterogenous, likely leading to nondifferential misclassification and an attenuation of our results.

The number of sexual partners in the past 12 months as well as the number of lifetime sexual partners was assessed during the course of the questionnaire. There was no other reasonable method available for collecting this information. Even though all participants were assured of their anonymity, nondifferential misclassification of these outcome variables is likely to be a problem due to the sensitive nature of this inquiry.

Sixteen people reported not being sexually active despite being recruited while getting tested for HIV after the age of 18. Although it is possible that these people are

getting tested because of other risk factors for HIV such as needle use or non-penetrative sexual activity, this may also reflect a lack of knowledge of risk factors for HIV. There were also very few people reporting 2 or more sexual partners in the prior year or 7+ over the lifetime. This may indicate reporting bias because having multiple sexual partnerships may be considered to be socially undesirable. Such bias could be nondifferential by exposure, in which it may have resulted in an attenuation of our results. However, it is possible that underreporting was differential by the level of education if people who are more educated are more likely to underreport the number of sexual partners they have had than those with less education. In this case, our results would show a smaller association between education and multiple sexual partnerships than is true in the population. Because data were collected in a VCT setting, participants may be more accurate in their responses as opposed to participants in a population-based survey because it is a clinical setting, which may minimize the degree of bias affecting the results.

It is unlikely that participation bias was present in this study due to refusal to participate, as only 3 people out of 573 refused to participate. Even if those people all belonged to one occupation, all had the same education status, and all had the same migration status, it is unlikely that they would influence the results of the study. However, if all of those who did not participate were more likely to have multiple sexual partners and were more likely to be less educated because these people were not as aware of the risk of HIV and the importance of being tested as people with higher education, then our results may slightly underestimate the true relationship between education and

multiple sexual partners. This is highly unlikely because HIV awareness is widespread in Namibia (24).

All interviews took place according to a standardized questionnaire, and information on all exposure characteristics was collected before questions were asked about sexual behavior. It is therefore highly unlikely that participants with multiple sexual partnerships were asked questions about exposure any differently than those without multiple sexual partnerships. In addition, participants and interviewers did not know the study hypotheses. It is also unlikely that participants who had multiple sexual partnerships answered questions about their education, occupation, or migration background differently than those who had different sexual behaviors. However, if information bias had occurred and people with multiple sexual partnerships were more likely to report being employed when in reality they were unemployed, then we would slightly underestimate the true relationship between unemployment and multiple sexual partnerships.

We evaluated confounders recognized in the literature using likelihood ratio tests, and all those found to be significant were included in the multivariable regression models. We are not aware of any confounders that are not available in the dataset. If some of the confounders in the dataset were improperly evaluated, then even after adjustment in the regression models there may be residual confounding which would bias our results in the direction of the measurement error. However, we believe that it is unlikely that residual confounding has had a meaningful impact on our findings.

This study is generalizable to all men and women over the age of 18 who are willing to undergo HIV testing in Namibia. Although the vast majority of people in

Namibia are aware of HIV/AIDS, the WHO reported that from 2006-2008 only about 46% of Namibians were tested for HIV in the previous year despite the high HIV rates in the country (24). There may be some behavioral or social differences among those who do not receive HIV tests, and perhaps a different perception of sexual risk behaviors. Generalizing the results beyond Namibia should be done with caution because sexual behavior is very culturally specific and must be looked at within its social context, although southern African countries may share cultural similarities and exhibit a mixing of populations (4). Countries with different gender relations and socioeconomic characteristics may have different sociological mechanisms because of which certain groups have multiple sexual partners.

If having multiple sexual partnerships preceded education level, occupation status, occupation type, or migration, there may be bias in our study due to issues of temporality. Although it is unlikely, it is possible that people who had multiple sexual partners over the past 12 months migrated to Lüderitz after their sexual encounters because of social ostracism in their previous residence or because their spouses divorced them. This would lead to a moderate overestimate of the true association between migration and multiple sexual partnerships.

In conclusion, our results indicate that employment in non-manual occupations is associated with a greater number of sexual partners over the lifetime, especially among women. Education and migration were not found to be associated with the number of sexual partners over the lifetime, and none of these variables were associated with the number of sexual partners in the prior year. It is possible that our study was limited by several biases, and we were limited by small sample size. Further research with larger

samples should be conducted for further results which could lead to more specific types of occupations associated with having more sexual partnerships. However, results suggest that work environments in Lüderitz, such as businesses and offices, would be a good place to target for STI and HIV prevention work.

Figure 1: Administration of Study Questionnaire within the VCT Testing Model (VCT Study- Lüderitz, Namibia 2009)

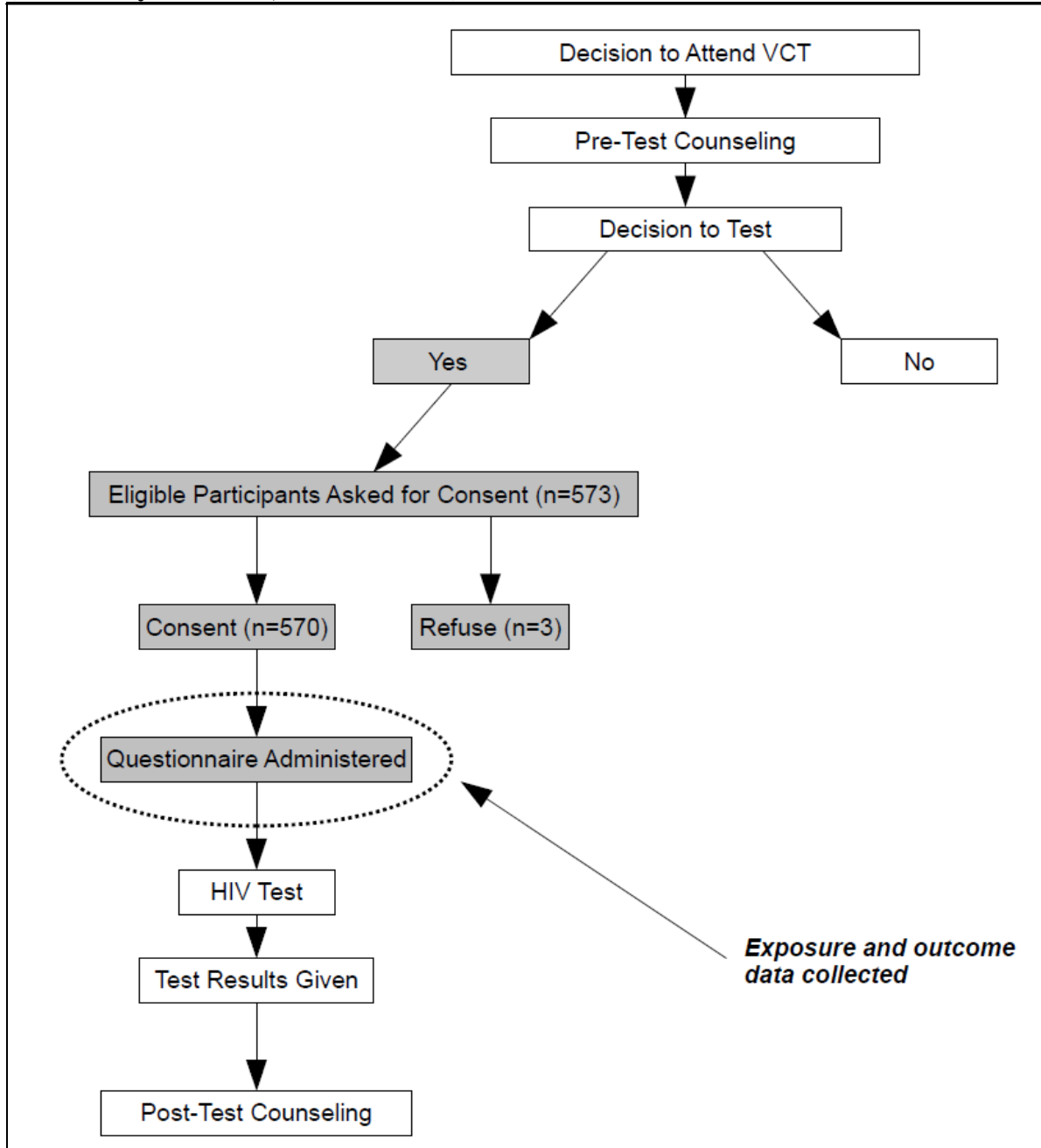


Table 1: Review of the Literature: VCT Study- Luderitz, Namibia 2009

Author, Year	Study Population	Exposure	Outcome	Results
EDUCATION				
Somse et al, 1993	Central African Republic: 1170 men, 1209 women ages 15-50 years	ability to read (none, with difficulty, easily, achieved higher studies) <i>referent=none</i>	sex with someone other than a spouse or regular partner in the past 12 months	MEN: with difficulty OR 1.67 (1.0-2.79), easily OR 1.91 (1.2-3.03) higher studies OR 2.84 (1.82-4.43). WOMEN: with difficulty OR 0.28 (0.12-0.67).
Kapiga et al, 1995	Dar-es-Salaam, Tanzania: 2285 women (reproductive age)	education (none/adult education, 1-4 years primary, 5-7 years primary, secondary) <i>referent=none/adult education</i>	>1 sexual partner in the past year	primary (1-4 yrs) OR 0.6 (0.4-1.0) primary (5-7 yrs) OR 0.5 (0.4-0.8) secondary OR 0.1 (0.1-0.3) p-trend=0.0001
Kongnyuy et al, 2007	Cameroon: 2678 married/cohabiting men aged 15 to 59 years	education (no school, primary education, secondary education) <i>referent=no school</i>	Extramarital sex (other than wife or cohabiting partner)	primary OR 3.04 (2.10-4.48) \geq secondary OR 4.30 (3.0- 6.29);
Kalichman et al, 2010	Cape Town South Africa: 529 men, 210 women receiving STI clinic services	education (years, continuous)	multiple partners in previous 2 months	men: OR 1.08 (1.01-1.16)
Brockerhoff et al, 1999	Kenya: 7540 women, 2336 men of reproductive age	education (less than secondary school, secondary school or higher) <i>referent=less than secondary school</i>	2+ sexual partners in past 6 months AND non-use of condom with any partner (vs. <2 sexual partners or use of condom with all partners)	urban men: OR=0.44 (p<0.01) rural women OR=0.44 (p<0.01)

Table 1 (continued): Review of the Literature: VCT Study- Luderitz, Namibia 2009

Author, Year	Study Population	Exposure	Outcome	Results
OCCUPATION				
Somse et al, 1993	Central African Republic: 1170 men, 1209 women ages 15-50 years	Occupation: (agriculture, other, housewife (fem. only)) <i>referent=agriculture</i>	sex with someone other than a spouse or regular partner in the past 12 months	MEN: "other" OR 1.72 (1.14-2.6) WOMEN: other" OR 3.17 (1.5-6.72) housewife OR 1.88 (0.99-3.59)
Kapiga et al, 1995	Dar-es-Salaam, Tanzania: 2285 women (reproductive age)	occupation: (housewife, agricultural/manual, small scale trade, hotel work, secretarial/professional, other) <i>referent=housewife</i>	>1 sexual partner in the past year	agricultural/manual OR 1.7 (1.0-2.7) small scale trader OR 1.0 (0.8-1.3) hotel worker OR 1.0 (0.3-3.2) secretarial/professional OR 1.5 (0.7-3.4) other OR 1.3 (0.7-2.5);
MIGRATION				
Brockerhoff et al, 1999	Kenya: 7540 women, 2336 men of reproductive age	migration (resided in area other than residence at time of data collection for >6 months) <i>referent=non-migrant</i>	2+ sexual partners in past 6 months AND non-use of condom with any partner (vs. <2 sexual partners or use of condom with all partners)	women: urban to urban migration OR=0.47 p<.05, rural-urban OR=0.71 p<.05, urban to rural OR=1.47 p<.05 rural to rural OR=1.71 p<.05 ; men urban to urban migration OR=2.18, urban to rural OR=1.38;
Camlin et al, 2010	Kwa-Zulu Natal, South Africa: 4767 men, 6910 women	migration: (at least one change of residence as an individual in the 2 years prior to testing or eligibility date) <i>referent=non-migrant</i>	lifetime partners, past year partners (continuous)	Number of lifetime partners: men- 6.4 vs. 6.3 (p=.06), women 2.1 vs. 1.9 (p<.0001) past year partners: men- 1.9 vs. 1.6 (p<.0001), women 0.78 vs. 0.83 (p=0.012)

Table 2. Demographic Characteristics of the Study Population (n=570): VCT Study- Lüderitz, Namibia 2009.

	Total		Men		Women		p-value
	N	%	N	%	N	%	
Total	570	-	275	-	295	-	
Age							
(Mean, SD)	31.72	9.1	33.22	9.3	30.32	8.7	<0.001
Age at first sexual intercourse							
(Mean, SD)	19.17	3.4	19.22	3.7	19.12	3.0	0.73
Gender							
Male	275	48.2	-	-	-	-	
Female	295	51.8	-	-	-	-	
Marital status							
Single/separated/divorced/widowed	434	76.8	211	76.7	223	76.9	0.96
Married/living with partner	131	23.2	64	23.3	67	23.1	
Missing	5						
Number of children							
0	161	28.3	89	32.5	72	24.4	0.03
1-2	267	46.9	114	41.6	153	51.9	
3+	141	24.8	71	25.9	70	23.7	
Missing	1		1		0		
Alcohol use- location							
Drink at home/friend's house	83	14.7	52	19.0	31	10.6	<0.001
Drink elsewhere (bar, shebeen, other)	91	16.1	76	27.8	15	5.1	
Don't drink	392	69.3	145	53.1	247	84.3	
Missing	4		2		2		
Partner has other partners							
Probably yes	20	4.0	0	0.0	20	7.8	<0.001
Probably no	434	87.0	218	90.5	216	83.7	
Not sure	45	9.0	23	9.5	22	8.5	
Missing	71		34		37		
Condom use during sex							
Always/ usually	239	47.1	110	44.7	129	49.4	0.29
Rarely/ never	268	52.9	136	55.3	132	50.6	
Missing	63		29		34		

SD=standard deviation, N=number

p-values for categorical variables based on chi-square tests or Fisher's exact tests for cell counts <5

p-values for continuous variables based on ANOVA

Table 3. Distribution of Education, Occupation, and Migration Characteristics among Study Participants (n=570): VCT Study- Lüderitz, Namibia 2009.

	Total		Men		Women		p-value
	N	%	N	%	N	%	
Total	570	-	275	-	295	-	
Education							
< Grade 10	220	38.6	109	39.6	111	37.6	0.01
Completed Grade 10, < Grade 12	192	33.7	105	38.2	87	29.5	
≥ Grade 12	158	27.7	61	22.2	97	32.9	
Occupation							
<i>Status</i>							
Unemployed/student	201	35.3	50	18.2	151	51.2	<0.001
Part-time employed	93	16.3	58	21.1	35	11.9	
Full-time employed	276	48.4	167	60.7	109	36.9	
<i>Type</i>							
Unemployed	208	36.5	50	18.2	158	53.6	<0.001
Manual	231	40.5	157	57.1	74	25.1	
Other (security, skilled, highly skilled)	131	23.0	68	24.7	63	21.4	
Migration							
<i>Migrant Status- occupation*</i>							
No	355	62.3	125	45.5	230	78.0	<0.001
Yes	215	37.7	150	54.5	65	22.0	
<i>Migrant Status- other**</i>							
No	206	36.1	63	22.9	149	49.5	<0.001
Yes	364	63.9	212	77.1	152	50.5	
Away from home ≤1 month in past year	484	84.9	226	82.2	258	87.5	0.08
Away from home >1 month in past year	86	15.1	49	17.8	37	12.5	

SD=standard deviation, N=number

* Moved to Lüderitz for work and is employed in mining, fishing, or manual labor

** Moved to Lüderitz for work and does not intend to stay in Lüderitz forever

p-values for categorical variables based on chi-square tests or Fisher's exact tests for cell counts <5

p-values for continuous variables based on ANOVA

Table 4. Distribution of Multiple Sexual Partnerships among Study Participants (n=570): VCT Study- Lüderitz, Namibia

	Total		Men		Women		p-value
	N	%	N	%	N	%	
Total	570	-	275	-	295	-	
Sexual partners in past 12 months							
0-1	492	89.1	212	80.0	280	97.6	<0.001
2+	60	10.9	53	20.0	7	2.4	
Missing	18		10		8		
Lifetime number of sexual partners							
0-1	106	18.7	27	9.9	79	27.0	<0.001
2-3	241	42.6	84	30.8	157	53.6	
4-6	129	22.8	78	28.6	51	17.4	
7+	90	15.9	84	30.8	6	2.0	
Missing	4		2		2		

N=number

p-values for categorical variables based on chi-square tests or Fisher's exact tests for cell counts <5

p-values for continuous variables based on ANOVA

Table 5. Distribution of Covariates according to Education Level (n=570): VCT Study- Lüderitz, Namibia 2009.

	Completed Grade						p-value
	< Grade 10		10, < Grade 12		≥ Grade 12		
	N	%	N	%	N	%	
Age							
(Mean, SD)	29.58	0.62	28.80	0.68	35.70	0.58	<0.001
Age at first sexual intercourse							
(Mean, SD)	19.00	0.25	19.16	0.27	19.33	0.23	0.63
Gender							
Male	109	49.5	105	54.7	61	38.6	0.01
Female	111	50.5	87	45.3	97	61.4	
Marital status							
Single/separated/divorced/widowed	139	64.1	168	88.0	127	80.9	<0.001
Married/living with partner	78	35.9	23	12.0	30	19.1	
Missing	3		1		1		
Number of children							
0	28	12.8	66	34.4	67	42.4	<0.001
1-2	105	47.9	91	47.4	71	44.9	
3+	86	39.3	35	18.2	20	12.7	
Missing	1		0		0		
Alcohol use- location							
Drink at home/friend's house	36	16.4	21	10.9	26	16.8	0.14
Drink elsewhere (bar, shebeen, other)	39	17.8	35	18.2	17	11.0	
Don't drink	144	65.8	136	70.8	112	72.3	
Missing	1		0		3		
Partner has other partners							
Probably yes	9	4.7	8	4.9	3	2.1	0.49
Probably no	168	88.0	138	84.1	128	88.9	
Not sure	14	7.3	18	11.0	13	9.0	
Missing	29		28		14		
Condom use during sex							
Always/usually	64	33.0	96	57.5	79	54.1	<0.001
Rarely/never	130	67.0	71	42.5	67	45.9	
Missing	26		25		12		

SD=standard deviation, N=number

p-values for categorical variables based on chi-square tests or Fisher's exact tests for cell counts <5

p-values for continuous variables based on ANOVA

Table 6. Distribution of Covariates according to Occupation Status (n=570): VCT Study- Lüderitz, Namibia 2009.

	Unemployed/ student		Part-time Employed		Full-time Employed		<i>p</i> -value
	N	%	N	%	N	%	
Age							
(Mean, SD)	27.66	0.61	32.17	0.89	34.52	0.52	<0.001
Age at first sexual intercourse							
(Mean, SD)	18.42	0.24	19.39	0.35	19.61	0.20	0.001
Gender							
Male	50	24.9	58	62.4	167	60.5	<0.001
Female	151	75.1	35	37.6	109	39.5	
Marital status							
Single/ separated/ divorced/ widowed	160	80.0	68	73.9	206	75.5	0.400
Married/ living with partner	40	20.0	24	26.1	67	24.5	
Missing	1		1		3		
Number of children							
0	78	38.8	26	28.0	57	20.7	<0.001
1-2	88	43.8	42	45.2	137	49.8	
3+	35	17.4	25	26.9	81	29.5	
Missing	0		0		1		
Alcohol use- location							
Drink at home/ friend's house	20	10.0	10	10.9	53	19.4	<0.001
Drink elsewhere (bar, shebeen, other)	21	10.4	26	28.3	44	16.1	
Don't drink	160	79.6	56	60.9	176	64.5	
Missing	0		1		3		
Partner has other partners							
Probably yes	10	5.9	1	1.2	9	3.7	0.395
Probably no	145	85.8	74	87.1	215	87.8	
Not sure	14	8.3	10	11.8	21	8.6	
Missing	32		8		31		
Condom use during sex							
Always/ usually	90	53.6	42	48.8	107	42.3	0.072
Rarely/ never	78	46.4	44	51.2	146	57.7	
Missing	33		7		23		

SD=standard deviation, N=number

p-values for categorical variables based on chi-square tests or Fisher's exact tests for cell counts <5*p*-values for continuous variables based on ANOVA

Table 7. Distribution of Covariates according to Occupation Type (n=570): VCT Study- Lüderitz, Namibia 2009.

	Unemployed		Manual		Other		p-value
	N	%	N	%	N	%	
Age							
(Mean, SD)	27.99	0.60	35.07	0.56	31.71	0.75	<0.001
Age at first sexual intercourse							
(Mean, SD)	18.47	0.24	19.71	0.22	19.28	0.29	0.001
Gender							
Male	50	24.0	157	68.0	68	51.9	<0.001
Female	158	76.0	74	32.0	63	48.1	
Marital status							
Single/separated/divorced/widowed	164	79.6	170	74.6	100	76.3	0.456
Married/living with partner	42	20.4	58	25.4	31	23.7	
Missing	2		3		0		
Number of children							
0	78	37.5	51	22.2	32	24.4	<0.001
1-2	92	44.2	104	45.2	71	54.2	
3+	38	18.3	75	32.6	28	21.4	
Missing	0		1		0		
Alcohol use- location							
Drink at home/friend's house	21	10.1	40	17.4	22	17.2	<0.001
Drink elsewhere (bar, shebeen, other)	22	10.6	58	25.2	11	8.6	
Don't drink	165	79.3	132	57.4	95	74.2	
Missing	0		1		3		
Partner has other partners							
Probably yes	10	5.7	6	2.9	4	3.4	0.278
Probably no	150	86.2	176	85.4	108	90.8	
Not sure	14	8.0	24	11.7	7	5.9	
Missing	34		25		12		
Condom use during sex							
Always/usually	91	52.6	91	42.7	57	47.1	0.150
Rarely/never	82	47.4	122	57.3	64	52.9	
Missing	35		18		10		

SD=standard deviation, N=number

p-values for categorical variables based on chi-square tests or Fisher's exact tests for cell counts <5

p-values for continuous variables based on ANOVA

Table 8. Distribution of Covariates according to Migration (n=570): VCT Study- Lüderitz, Namibia 2009.

	Migrant status- occupation*				p-value	Migrant status- other**				p-value	Time away from home in past year				p-value
	no		yes			no		yes			<1 month		>1 month		
	N	%	N	%		N	%	N	%		N	%	N	%	
Age															
(Mean, SD)	29.69	0.46	35.07	0.6	<0.001	30.56	0.63	32.38	0.48	0.022	31.69	0.41	31.88	0.98	0.859
Age at first sexual intercourse															
(Mean, SD)	18.77	0.18	19.82	0.23	<0.001	18.71	0.24	19.42	0.18	0.018	19.14	0.16	19.33	0.37	0.632
Gender															
Male	125	35.2	150	69.8	<0.001	63	30.6	212	58.2	<0.001	226	46.7	49	57.0	0.079
Female	230	64.8	65	30.2		143	69.4	152	41.8		258	53.3	37	43.0	
Marital status															
Single/ separated/ divorced/ widowed	277	78.7	157	73.7	0.174	147	72.4	287	79.3	0.064	366	76.3	68	80.0	0.45
Married/ living with partner	75	21.3	56	26.3		56	27.6	75	20.7		114	23.8	17	20.0	
Missing	3		2			3		2			4		1		
Number of children															
0	114	32.1	47	22.0	0.005	61	29.6	100	27.5	0.497	140	29.0	21	24.4	0.679
1-2	167	47.0	100	46.7		90	43.7	177	48.8		225	46.6	42	48.8	
3+	74	20.8	67	31.3		55	26.7	86	23.7		118	24.4	23	26.7	
Missing	0		1			0		1			1		0		
Alcohol use- location															
Drink at home/ friend's house	43	12.2	40	18.7	<0.001	25	12.3	58	16.0	0.126	73	15.2	10	11.6	0.338
Drink elsewhere (bar, shebeen, other)	38	10.8	53	24.8		27	13.2	64	17.7		73	15.2	18	20.9	
Don't drink	271	77.0	121	56.5		152	74.5	240	66.3		334	69.6	58	67.4	
Missing	3		1			2		2			4		0		
Partner has other partners															
Probably yes	14	4.6	6	3.1	0.093	11	6.2	9	2.8	<0.001	18	4.3	2	2.6	0.771
Probably no	270	88.5	164	84.5		161	91.0	273	84.8		368	87.0	66	86.8	
Not sure	21	6.9	24	12.4		5	2.8	40	12.4		37	8.7	8	10.5	
Missing	50		21			29		42			61		10		
Condom use during sex															
Always/ usually	154	50.2	85	42.5	0.092	84	46.9	155	47.3	0.944	198	46.4	41	51.3	0.422
Rarely/ never	153	49.8	115	57.5		95	53.1	173	52.7		229	53.6	39	48.8	
Missing	48		15			27		36			57		6		

SD=standard deviation, N=number

p-values for categorical variables based on chi-square tests or Fisher's exact tests for cell counts <5

p-values for continuous variables based on ANOVA

* Moved to Lüderitz for work and is employed in mining, fishing, or manual labor

** Moved to Lüderitz for work and does not intend to stay in Lüderitz forever

Table 9. Distribution of Covariates according to Multiple Sexual Partnerships (n=570): VCT Study- Lüderitz, Namibia 2009.

	Sexual partners in past 12 months				p-value	Lifetime sexual partners								p-value
	0-1		2+			0-1		2-3		4-6		7+		
	N	%	N	%		N	%	N	%	N	%	N	%	
Age														
(Mean, SD)	32.16	0.40	30.07	1.15	0.086	27.86	0.83	30.71	0.55	33.11	0.76	36.18	0.91	<0.001
Age at first sexual intercourse														
(Mean, SD)	19.39	0.15	17.35	0.43	<0.001	20.37	0.35	19.39	0.21	18.41	0.29	18.41	0.35	<0.001
Gender														
Male	212	43.1	53	88.3	<0.001	27	25.5	84	34.9	78	60.5	84	93.3	<0.001
Female	280	56.9	7	11.7		79	74.5	157	65.1	51	39.5	6	6.7	
Marital status														
Single/separated/divorced/widowed	369	75.6	48	80.0	0.450	83	79.0	196	82.4	92	71.3	61	67.8	0.013
Married/living with partner	119	24.4	12	20.0		22	21.0	42	17.6	37	28.7	29	32.2	
Missing	4		0			1		3		0		0		
Number of children														
0	123	25.0	22	37.3	0.128	47	44.3	71	29.5	25	19.4	18	20.2	<0.001
1-2	242	49.2	24	40.7		46	43.4	127	52.7	62	48.1	31	34.8	
3+	127	25.8	13	22.0		13	12.3	43	17.8	42	32.6	40	44.9	
Missing	0		1			0		0		0		1		
Alcohol use- location														
Drink at home/friend's house	73	14.9	6	10.2	<0.001	92	88.5	184	76.7	76	58.9	37	41.6	<0.001
Drink elsewhere (bar, shebeen, other)	64	13.1	25	42.4		9	8.7	29	12.1	21	16.3	23	25.8	
Don't drink	352	72.0	28	47.5		3	2.9	27	11.3	32	24.8	29	32.6	
Missing						2		1		0		1		
Partner has other partners														
Probably yes	19	4.3	50	87.7	0.680	3	3.8	13	6.0	4	3.4	0	0.0	0.245
Probably no	383	86.8	1	1.8		67	83.8	187	86.2	103	87.3	76	91.6	
Not sure	39	8.8	6	10.5		10	12.5	17	7.8	11	9.3	7	8.4	
Missing	51		3			26		24		11		7		
Condom use during sex														
Always/usually	208	46.3	31	53.4	0.307	36	43.9	114	52.5	58	46.8	31	37.3	0.108
Farely/ never	241	53.7	27	46.6		46	56.1	103	47.5	66	53.2	52	62.7	
Missing	43		2			24		24		5		7		

SD=standard deviation, N=number

p-values for categorical variables based on chi-square tests or Fisher's exact tests for cell counts <5

p-values for continuous variables based on ANOVA

Table 10. Distribution of Exposure Variables according to Multiple Sexual Partnerships (n=570): VCT Study- Lüderitz, Namibia 2009.

	Lifetime Sexual Partners								<i>p</i> -value	Sexual Partners in Past Year				<i>p</i> -value
	0-1		2-3		4-6		7+			0-1		2+		
	N	%	N	%	N	%	N	%		N	%	N	%	
Education														
< Grade 10	34	32.1	91	37.8	52	40.3	40	44.4	0.423	189	38.4	24	40.0	0.692
Completed Grade 10, < Grade 12	38	35.8	83	34.4	38	29.5	32	35.6		163	33.1	22	36.7	
≥ Grade 12	34	32.1	67	27.8	39	30.2	18	20.0		140	28.5	14	23.3	
Occupation														
<i>Status</i>														
Unemployed/ student	59	55.7	93	38.6	32	24.8	16	17.8	<0.001	172	35.0	15	25.0	0.028
Part-time employed	11	10.4	36	14.9	27	20.9	19	21.1		75	15.2	17	28.3	
Full-time employed	36	34.0	112	46.5	70	54.3	55	61.1		245	49.8	28	46.7	
<i>Type</i>														
Unemployed	61	57.5	95	39.4	35	27.1	16	17.8	<0.001	178	36.2	16	26.7	0.199
Manual	28	26.4	93	38.6	54	41.9	53	58.9		197	40.0	31	51.7	
Other (security, skilled, highly skilled)	17	16.0	53	22.0	40	31.0	21	23.3		117	23.8	13	21.7	
Migration														
<i>Migrant Status- occupation*</i>														
No	80	75.5	157	65.1	78	60.5	39	43.3	<0.001	310	63.0	30	50.0	0.051
Yes	26	24.5	84	34.9	51	39.5	51	56.7		182	37.0	30	50.0	
<i>Migrant Status- other**</i>														
No	52	49.1	84	34.9	46	35.7	23	25.6	0.007	181	36.8	15	25.0	0.072
Yes	54	50.9	157	65.1	83	64.3	67	74.4		311	63.2	45	75.0	
Away from home ≤1 month in past year	96	90.6	206	85.5	106	82.2	72	80.0	0.163	421	85.6	47	78.3	0.141
Away from home >1 month in past year	10	9.4	35	14.5	23	17.8	18	20.0		71	14.4	13	21.7	

SD=standard deviation, N=number

p-values for categorical variables based on chi-square tests or Fisher's exact tests for cell counts <5*p*-values for continuous variables based on ANOVA

* Moved to Lüderitz for work and is employed in mining, fishing, or manual labor

** Moved to Lüderitz for work and does not intend to stay in Lüderitz forever

Table 11(A). Associations between Education, Occupation, and Migration and Lifetime Number of Sexual Partners (n=570): VCT Study-Lüderitz, Namibia 2009: Gender-Adjusted Model.

	Gender Adjusted							
	0-1		2-3		4-6		7+	
	OR	OR	95%CI	OR	95%CI	OR	95%CI	
Education								
< Grade 10	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	<i>ref</i>	
Completed Grade 10, < Grade 12	1.00	0.78	0.45-1.36	0.56	0.29-1.07	0.55	0.27-1.12	
≥ Grade 12	1.00	0.76	0.43-1.34	0.84	0.44-1.61	0.56	0.25-1.26	
Occupation								
<i>Status</i>								
Unemployed/ student	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	<i>ref</i>	
Part-time employed	1.00	1.94	0.90-4.16	3.11	1.33-7.30	2.59	0.95-7.04	
Full-time employed	1.00	1.85	1.10-3.09	2.50	1.35-4.64	2.35	1.09-5.04	
<i>Type</i>								
Unemployed	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	<i>ref</i>	
Manual	1.00	1.98	1.13-3.47	2.06	1.06-4.01	2.43	1.10-5.37	
Other (security, skilled, highly skilled)	1.00	1.93	1.01-3.66	3.12	1.51-6.44	2.37	0.95-5.92	
Migration								
<i>Migrant Status- occupation*</i>								
No	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	<i>ref</i>	
Yes	1.00	1.49	0.87-2.56	1.28	0.70-2.35	1.73	0.89-3.38	
<i>Migrant Status- other**</i>								
No	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	<i>ref</i>	
Yes	1.00	1.68	1.04-2.71	1.18	0.68-2.07	1.26	0.64-2.49	
Away from home ≤1 month in past year	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	<i>ref</i>	
Away from home >1 month in past year	1.00	1.59	0.76-3.36	1.91	0.85-4.30	2.03	0.83-4.98	

SD=standard deviation, N=number

p-values for categorical variables based on chi-square tests or Fisher's exact tests for cell counts <5

p-values for continuous variables based on ANOVA

* Moved to Lüderitz for work and is employed in mining, fishing, or manual labor

** Moved to Lüderitz for work and does not intend to stay in Lüderitz forever

Table 11(B). Associations between Education, Occupation, and Migration and Lifetime Number of Sexual Partners (n=570): VCT Study-Luderitz, Namibia 2009: Age and Gender-Adjusted Model.

	Age and Gender Adjusted							
	0-1		2-3		4-6		7+	
	OR	OR	95%CI	OR	95%CI	OR	95%CI	
Education								
< Grade 10	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	<i>ref</i>	
Completed Grade 10, < Grade 12	1.00	0.95	0.54-1.68	0.81	0.41-1.60	1.05	0.48-2.29	
≥ Grade 12	1.00	0.97	0.53-1.75	1.28	0.64-2.56	1.08	0.46-2.56	
Occupation								
<i>Status</i>								
Unemployed/ student	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	<i>ref</i>	
Part-time employed	1.00	1.67	0.76-3.63	2.35	0.98-5.62	1.93	0.68-5.47	
Full-time employed	1.00	1.41	0.80-2.51	1.55	0.79-3.06	1.41	0.62-3.23	
<i>Type</i>								
Unemployed	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	<i>ref</i>	
Manual	1.00	1.45	0.77-2.75	1.19	0.57-2.47	1.38	0.58-3.28	
Other (security, skilled, highly skilled)	1.00	1.70	0.89-3.28	2.44	1.16-5.15	1.81	0.69-4.71	
Migration								
<i>Migrant Status- occupation*</i>								
No	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	<i>ref</i>	
Yes	1.00	1.10	0.61-1.99	0.80	0.41-1.54	1.08	0.53-2.22	
<i>Migrant Status- other**</i>								
No	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	<i>ref</i>	
Yes	1.00	1.51	0.93-2.46	1.04	0.58-1.84	1.13	0.56-2.30	
Away from home ≤1 month in past year								
	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	<i>ref</i>	
Away from home >1 month in past year								
	1.00	1.61	0.76-3.40	1.94	0.85-4.43	2.10	0.84-5.27	

SD=standard deviation, N=number

p-values for categorical variables based on chi-square tests or Fisher's exact tests for cell counts <5

p-values for continuous variables based on ANOVA

* Moved to Luderitz for work and is employed in mining, fishing, or manual labor

** Moved to Luderitz for work and does not intend to stay in Luderitz forever

Table 11(C). Associations between Education, Occupation, and Migration and Lifetime Number of Sexual Partners(n=570): VCT Study- Lüderitz, Namibia 2009: Multivariable Model 1.

	Multivariable Adjusted-1***						
	0-1		2-3		4-6		7+
	OR	OR	95%CI	OR	95%CI	OR	95%CI
Education							
Less than grade 10	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	<i>ref</i>
Less than grade 12	1.00	1.04	0.52-2.10	1.05	0.46-2.41	1.54	0.59-4.04
Completed grade 12 or higher	1.00	1.31	0.62-2.77	2.27	0.94-5.44	1.89	0.65-5.47
Occupation							
<i>Status</i>							
Unemployed/student	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	<i>ref</i>
Part-time employed	1.00	1.68	0.67-4.19	2.20	0.77-6.30	1.56	0.44-5.52
Full-time employed	1.00	1.80	0.90-3.60	1.84	0.81-4.22	1.32	0.47-3.68
<i>Type</i>							
< Grade 10	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	<i>ref</i>
Completed Grade 10, < Grade 12	1.00	1.21	0.57-2.56	0.89	0.36-2.17	0.83	0.29-2.40
≥ Grade 12	1.00	2.60	1.14-5.95	3.82	1.47-9.92	2.13	0.64-7.15
Migration							
<i>Migrant Status- occupation*</i>							
No	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	<i>ref</i>
Yes	1.00	0.83	0.41-1.65	0.56	0.25-1.24	0.73	0.30-1.77
<i>Migrant Status- other**</i>							
No	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	<i>ref</i>
Yes	1.00	1.30	0.73-2.35	0.94	0.47-1.89	1.07	0.46-2.50
<i>Away from home</i>							
Away from home ≤1 month in past year	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	<i>ref</i>
Away from home >1 month in past year	1.00	1.51	0.64-3.54	1.89	0.72-4.96	1.95	0.66-5.78

SD=standard deviation, N=number

p-values for categorical variables based on chi-square tests or Fisher's exact tests for cell counts <5

p-values for continuous variables based on ANOVA

* Moved to Lüderitz for work and is employed in mining, fishing, or manual labor

** Moved to Lüderitz for work and does not intend to stay in Lüderitz forever

*** Multivariable model 1 adjusted for age, age at first sexual intercourse, gender, condom use, alcohol use, and number of children

Table 11(D). Associations between Education, Occupation, and Migration and Lifetime Number of Sexual Partners (n=570): VCT Study- Lüderitz, Namibia 2009: Multivariable Model 2.

	Multivariable Adjusted-2							
	0-1		2-3		4-6		7+	
	OR	OR	95%CI	OR	95%CI	OR	95%CI	
Education^a								
< Grade 10	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	<i>ref</i>	
Completed Grade 10, < Grade 12	1.00	0.98	0.48-1.99	0.95	0.41-2.21	1.43	0.54-3.76	
≥ Grade 12	1.00	1.13	0.52-2.45	1.13	0.72-4.40	1.59	0.54-4.70	
Occupation^b								
<i>Status</i>								
Unemployed/student	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	<i>ref</i>	
Part-time employed	1.00	1.61	0.64-4.04	2.35	0.81-6.79	1.63	0.45-5.85	
Full-time employed	1.00	1.66	0.81-3.39	1.70	0.72-3.99	1.21	0.43-3.44	
<i>Type</i>								
Unemployed	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	<i>ref</i>	
Manual	1.00	1.13	0.53-2.43	0.89	0.36-2.22	0.82	0.28-2.42	
Other (security, skilled, highly skilled)	1.00	2.45	1.05-5.72	3.44	1.29-9.15	1.93	0.57-6.57	
Migration^c								
<i>Migrant Status- occupation*</i>								
No	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	<i>ref</i>	
Yes	1.00	0.76	0.37-1.56	0.57	0.25-1.29	0.71	0.28-1.78	
<i>Migrant Status- other**</i>								
No	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	<i>ref</i>	
Yes	1.00	1.24	0.68-2.56	0.91	0.45-1.86	1.04	0.44-2.48	
Away from home ≤1 month in past year	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	<i>ref</i>	
Away from home >1 month in past year	1.00	1.56	0.66-3.69	2.08	0.78-5.54	2.10	0.70-6.33	

SD=standard deviation, N=number

p-values for categorical variables based on chi-square tests or Fisher's exact tests for cell counts <5

p-values for continuous variables based on ANOVA

* Moved to Lüderitz for work and is employed in mining, fishing, or manual labor

** Moved to Lüderitz for work and does not intend to stay in Lüderitz forever

a= multivariable model 2 also adjusted for occupation type and "other" migration status (and covariates in 11C)

b= multivariable model 2 also adjusted for education and "other" migration status

c= multivariable model 2 also adjusted for education and occupation type

Table 12. Associations between Education, Occupation, and Migration and 2+ Sexual Partnerships in Past 12 Months (n=570): VCT Study- Lüderitz, Namibia 2009.

	Gender-Adjusted		Age and Gender Adjusted		Multivariable Adjusted-1***		Multivariable Adjusted-2	
	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI
Education^a								
< Grade 10	<i>ref</i>		<i>ref</i>		<i>ref</i>		<i>ref</i>	
Completed Grade 10, < Grade 12	1.01	0.53-1.91	0.70	0.35-1.37	0.72	0.34-1.52	0.73	0.35-1.54
≥ Grade 12	0.99	0.48-2.05	0.70	0.33-1.49	0.72	0.32-1.66	0.76	0.33-1.76
Occupation^b								
<i>Status</i>								
Unemployed/ student	<i>ref</i>		<i>ref</i>		<i>ref</i>		<i>ref</i>	
Part-time employed	1.16	0.52-2.62	1.34	0.58-3.09	0.97	0.39-2.40	0.91	0.36-2.28
Full-time employed	0.57	0.28-1.18	0.72	0.33-1.53	0.64	0.29-1.44	0.64	0.29-1.44
<i>Type</i>								
Unemployed	<i>ref</i>		<i>ref</i>		<i>ref</i>		<i>ref</i>	
Manual	0.66	0.33-1.35	0.84	0.39-1.80	0.79	0.35-1.76	0.75	0.33-1.69
Other (security, skilled, highly skilled)	0.60	0.26-1.38	0.70	0.30-1.93	0.67	0.26-1.73	0.68	0.26-1.77
Migration^c								
<i>Migrant Status- occupation*</i>								
No	<i>ref</i>		<i>ref</i>		<i>ref</i>		<i>ref</i>	
Yes	0.92	0.52-1.63	1.09	0.60-2.00	1.12	0.58-2.15	1.06	0.54-2.08
<i>Migrant Status- other**</i>								
No	<i>ref</i>		<i>ref</i>		<i>ref</i>		<i>ref</i>	
Yes	1.02	0.53-1.95	1.04	0.53-2.02	1.19	0.58-2.41	1.18	0.57-2.41
<i>Migration Status- other***</i>								
Away from home ≤1 month in past year	<i>ref</i>		<i>ref</i>		<i>ref</i>		<i>ref</i>	
Away from home >1 month in past year	1.44	0.72-2.88	1.48	0.73-2.99	1.27	0.59-2.72	1.24	0.57-2.66

OR=oddsratio, CI=confidence interval

* Moved to Lüderitz for work and is employed in mining, fishing, or manual labor

** Moved to Lüderitz for work and does not intend to stay in Lüderitz forever

*** Multivariable model 1 adjusted for age, age at first sexual intercourse, gender, condom use, and alcohol use

a= multivariable model 2 adjusted for occupation type and "other" migration status

b= multivariable model 2 adjusted for education and "other" migration status

c= multivariable model 2 adjusted for education and occupation type

Table 13. Associations between Education, Occupation, and Migration and Lifetime Number of Sexual Partners among Women (n=288): VCT Study- Lüderitz, Namibia 2009.

	Age- Adjusted (N=285)					Multivariable- Adjusted*** (N=259)				
	1 partner	2-3		4+	1 partner	2-3		4+		
	OR	OR	95%CI	OR	95%CI	OR	OR	95%CI	OR	95%CI
Education										
< Grade 10	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>
Completed Grade 10, < Grade 12	1.00	1.09	0.53-2.24	1.15	0.46-2.92	1.00	1.21	0.55-2.67	1.65	0.56-4.84
≥ Grade 12	1.00	0.73	0.36-1.47	1.32	0.55-3.18	1.00	1.06	0.47-2.42	3.78	1.26-11.36
Occupation										
<i>Status</i>										
Unemployed/ student	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>
Part-time employed	1.00	2.21	0.82-5.96	1.72	0.51-5.78	1.00	3.24	1.06-9.67	2.56	0.63-10.48
Full-time employed	1.00	1.73	0.86-3.47	1.46	0.62-3.44	1.00	2.05	0.95-4.41	2.03	0.77-5.36
<i>Type</i>										
Unemployed	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>
Manual	1.00	1.60	0.73-3.53	0.63	0.23-1.77	1.00	1.51	0.66-3.48	0.70	0.22-2.20
Other (security, skilled, highly skilled)	1.00	2.53	1.11-5.78	2.63	1.02-6.76	1.00	3.71	1.42-9.70	4.58	1.48-14.23
Migration										
<i>Migrant Status- occupation*</i>										
No	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>
Yes	1.00	1.04	0.49-2.22	0.41	0.15-1.12	1.00	0.96	0.43-2.17	0.40	0.15-1.34
<i>Migrant Status- other**</i>										
No	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>
Yes	1.00	0.96	0.43-2.17	0.44	0.15-1.34	1.00	1.65	0.88-3.07	0.85	0.38-1.91
<i>Away from home</i>										
Away from home ≤1 month in past year	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>
Away from home >1 month in past year	1.00	1.69	0.69-4.13	1.10	0.35-3.50	1.00	1.52	0.60-3.86	1.32	0.39-4.52

OR=odds ratio, CI=confidence interval

* Moved to Lüderitz for work and is employed in mining, fishing, or manual labor

** Moved to Lüderitz for work and does not intend to stay in Lüderitz forever

*** Adjusted for age, age at first sexual intercourse, condom use, children, and alcohol use (yes/ no)

Table 14. Associations between Education, Occupation, and Migration and Lifetime Number of Sexual Partners among Men (n=266): VCT Study- Lüderitz, Namibia 2009.

	Age- Adjusted (N=264)						Multivariable- Adjusted*** (N=262)									
	1 partner		2-3		4-6		7+		1 partner		2-3		4-6		7+	
	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI
Education																
< Grade 10	1.00		1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	<i>ref</i>	
Completed Grade 10, < Grade 12	1.00	0.58	0.18-1.94	0.46	0.14-1.56	0.68	0.20-2.26	1.00	0.68	0.19-2.43	0.63	0.17-2.39	1.06	0.27-4.12		
≥ Grade 12	1.00	2.12	0.37-12.25	2.14	0.37-12.45	1.55	0.26-9.32	1.00	2.01	0.33-12.45	2.37	0.37-15.24	1.96	0.29-13.32		
Occupation																
<i>Status</i>																
Unemployed/ student	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	<i>ref</i>		
Part-time employed	1.00	0.15	0.02-1.48	0.46	0.04-4.79	0.30	0.03-3.17	1.00	0.14	0.01-1.51	0.50	0.04-5.70	0.35	0.03-4.02		
Full-time employed	1.00	0.14	0.02-1.18	0.28	0.03-2.55	0.20	0.02-1.79	1.00	0.16	0.02-1.43	0.35	0.04-3.34	0.25	0.03-2.41		
<i>Type</i>																
Unemployed	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	<i>ref</i>		
Manual	1.00	0.18	0.02-1.56	0.34	0.04-3.10	0.28	0.03-2.55	1.00	0.18	0.02-1.62	0.34	0.03-3.38	0.28	0.03-2.81		
Other (security, skilled, highly skilled)	1.00	0.10	0.01-0.87	0.33	0.04-3.14	0.16	0.02-1.48	1.00	0.13	0.01-1.22	0.53	0.05-5.50	0.28	0.03-2.95		
Migration																
<i>Migrant Status- occupation*</i>																
No	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	<i>ref</i>		
Yes	1.00	1.00	0.35-2.84	0.97	0.34-2.80	1.27	0.44-3.69	1.00	0.82	0.26-2.61	0.79	0.24-2.60	1.00	0.29-3.40		
<i>Migrant Status- other**</i>																
No	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	<i>ref</i>		
Yes	1.00	1.03	0.30-3.54	0.94	0.27-3.24	1.01	0.29-3.52	1.00	1.32	0.36-4.88	1.47	0.38-5.71	1.71	0.43-6.91		
Away from home ≤1 month in past year	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	1.00	<i>ref</i>	1.00	<i>ref</i>	1.00	<i>ref</i>		
Away from home >1 month in past year	1.00	2.56	0.31-21.26	4.77	0.59-38.73	4.76	0.58-38.78	1.00	2.75	0.32-23.89	5.32	0.60-47.01	5.20	0.58-47.06		

OR=odds ratio, CI=confidence interval

* Moved to Lüderitz for work and is employed in mining, fishing, or manual labor

** Moved to Lüderitz for work and does not intend to stay in Lüderitz forever

*** Adjusted for age, age at first sexual intercourse, children, and alcohol use (yes/ no)

Table 15. Associations between Education, Occupation, and Migration and 2+ Sexual Partnerships in Past 12 Months among Men (n=275): VCT Study- Lüderitz, Namibia 2009.

	Age-Adjusted		Multivariable-Adjusted***	
	OR	95%CI	OR	95%CI
Education				
< Grade 10	1.00	<i>ref</i>	1.00	<i>ref</i>
Completed Grade 10, < Grade 12	0.69	0.34-1.42	0.74	0.36-1.60
≥ Grade 12	0.94	0.28-1.49	0.67	0.28-1.61
Occupation				
<i>Status</i>				
Unemployed/student	1.00	<i>ref</i>	1.00	<i>ref</i>
Part-time employed	1.17	0.47-2.93	1.32	0.52-3.41
Full-time employed	0.69	0.30-1.57	0.74	0.32-1.72
<i>Type</i>				
Unemployed	1.00	<i>ref</i>	1.00	<i>ref</i>
Manual	0.90	0.40-2.03	1.03	0.44-2.36
Other (security, skilled, highly skilled)	0.65	0.25-1.70	0.64	0.24-1.75
Migration				
<i>Migrant Status- occupation*</i>				
No	1.00	<i>ref</i>	1.00	<i>ref</i>
Yes	1.99	0.64-2.24	1.42	0.73-2.77
<i>Migrant Status- other**</i>				
No	1.00	<i>ref</i>	1.00	<i>ref</i>
Yes	0.96	0.46-2.00	1.11	0.52-2.35
Away from home ≤1 month in past year	1.00	<i>ref</i>	1.00	<i>ref</i>
Away from home >1 month in past year	1.76	0.84-3.67	1.88	0.87-4.07

OR=odds ratio, CI=confidence interval

* Moved to Lüderitz for work and is employed in mining, fishing, or manual labor

** Moved to Lüderitz for work and does not intend to stay in Lüderitz forever

*** Adjusted for age, age at first sexual intercourse, and alcohol use (yes/ no)

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