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# Mining and HIV/AIDS Transmission Among Marampa Mining Communities in Lunsar, Sierra Leone

Alphajoh Cham
*Walden University*

# Walden University

College of Health Sciences

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Alphajoh Cham

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Review Committee
Dr. Aimee Ferraro, Committee Chairperson, Public Health Faculty
Dr. Hadi Danawi, Committee Member, Public Health Faculty
Dr. Michael Dunn, University Reviewer, Public Health Faculty

Chief Academic Officer
Eric Riedel, Ph.D.

Walden University
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Abstract

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by

Alphajoh Cham


MSc Eng, Dresden University of Technology, Germany, 2001

BSc (Hons), University of Sierra Leone, 1994



Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Public Health



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Abstract

Since the human immunodeficiency virus/acquired immune deficiency syndrome (HIV/AIDS) was first reported in Sierra Leone in 1987, its prevalence rate has stabilized at 1.5% in the nation's general population. However, concerns exist regarding the potential increase in high-risk populations, particularly among mineworkers and commercial sex workers. The potential spread of HIV/AIDS as a result of labor migration may threaten the mining sector, which has been identified as a critical driver of recent economic growth and development. A gap remains in the literature regarding the contextual factors in mining communities that lead to high rates of HIV/AIDS. Therefore, the purpose of this study was to quantitatively examine the association between labor migration and of sexual risk behaviors among mineworkers in the Marampa Mines in Lunsar, Sierra Leone. Grounded in the ecological model and using a cross-sectional design, 296 mineworkers from the Marampa mining communities were surveyed using a standardized survey questionnaire. Research questions were answered using simple linear and binary logistic regression analyses. Analyses of the results indicated a significant relationship between labor migration and condom self-efficacy, where migrants were predicted to have condom self-efficacy scores 7 times higher than nonmigrants. However, the results showed no statistically significant relationship between labor migration and engagement in multiple sexual partnerships and commercial sex among the mineworkers. These findings will provide important implications for positive social change in the development of multilevel HIV intervention programs to reduce sexual risk behaviors that transmit HIV, thereby improving the health and wellbeing of miners and that of their partners and families in the mining communities.

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Dedication

This dissertation is dedicated to my late mother, Haja Ramatulai Cham, who had always wanted and inspired me to be a medical doctor. Acquiring an academic doctorate degree in public health is in my own way a fulfillment of your wish, Mom. May you continue to rest in peace.

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I would also like to express my heartfelt appreciation to the management and staff of the National HIV/AIDS Secretariat; Global Fund for HIV/AIDS; London Mining Company (TIMIS Mining Corporation); the Chairman of Port Loko District Council; the District Medical Officer; the P. C. Bai Koblo Queen II of Lunsar-Marampa Chiefdom; and the Senior District Officer, for their cooperation and approval to conduct the research study in Port Loko District. I am also very indebted to the Business Coalition for HIV/AIDS in Sierra Leone, which facilitated the data collection process, and the study participants who took part in the survey.

Most importantly, I am very grateful in a special way to the love of my life, Dr. Lucinda Cham, for the kind love, emotional support, and inspiration to complete the doctoral program.

To those who I did not mention by name, I thank you again very much. You will always be remembered in my heart and prayers for sharing this wonderful academic journey with me.

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Chapter 1: Introduction to the Study

**Introduction**

Since the human immunodeficiency virus and acquired immune deficiency syndrome (HIV/AIDS) was first reported in the United States in 1981 (Centers for Disease Control [CDC], 2006), the epidemic has disproportionately affected developing countries, especially in sub-Saharan Africa. Although sub-Saharan Africa makes up approximately 3% of the world's population, it accounted for 50% of the estimated 36.1% million HIV/AIDS cases in the world in 2000, with 8.8% of adults infected with HIV primarily through heterosexual intercourse (UNAIDS, 2000). Because no cure yet exists for HIV/AIDS, the epidemic remains a public health and developmental issue in sub-Saharan Africa (United Nations, 1994, 2002). In Sierra Leone, HIV/AIDS was first reported in 1987 (National HIV/AIDS Secretariat, 2005) and the prevalence rate has stabilized at 1.5% (Statistics Sierra Leone [SSL], 2014)). However, concerns have been raised regarding the potential spread of HIV/AIDS among the high-risk populations, including the mining communities.

This study examined the relationships between labor migration, as the independent variable, and dependent variables of sexual behavioral risk factors as the outcome measured by self-efficacy in condom use, multiple sexual partnerships, and commercial sex among miners in Sierra Leone. The study findings provide important implications for the development of multilevel HIV intervention programs to reduce the risk of contracting HIV, thereby improving the health and wellbeing of miners and that of their partners and families. Chapter 1 gives an overview of the study, including the

background, problem statement, theoretical and conceptual framework, nature of the study, and the significance of the study as it relates to social change.

## Background

In recent years, the mining industry has been under pressure to improve its social, developmental, and environmental performance in addressing issues of indigenous rights, social justice, and negative effects on local communities (Mining, Miner, & Sustainable Development [MMSD], 2003; World Bank, 2004). The effects of HIV/AIDS in mining communities reduce prospects for sustainable development and pose a significant challenge for the private sector. Hence, in developing countries, which account for approximately 95% of all HIV infections in the world, the epidemic is not only a health and humanitarian concern, but also a sustainable development issue. Winkler et al. (2010) conducted a health impact assessment (HIA) on the Moto Goldmines project in the Democratic Republic of Congo (DRC), with similar political, social, economic, and ecological settings as Sierra Leone's. Both an environmental impact assessment (EIA) and social impact assessment (SIA) were launched with the HIA and health risk assessment (HRA). However, no specific laws or regulations in DRC require an HIA or other studies be commissioned to assess the health risks of the project. The authors concluded that the Moto Goldmines mining project in DRC has the potential to demonstrate a "triple-win situation" for all major stakeholders, including the local communities, the country, and the private sector. It is hoped by the researcher that this will hold true for Sierra Leone as it witnesses the operations of iron-ore mining companies in the Northern Growth Pole of Port Loko and Makeni.

An important gap in the current literature exists regarding the epidemiologic context of the relatively high HIV/AIDS prevalence rate among miners in Sierra Leone, as well as the potential socioeconomic effects on the mining industry. Understanding the contextual factors in mining communities within a socioecological model has important implications for developing multilevel HIV intervention programs to reduce the risk of contracting HIV, thereby improving the health and wellbeing of miners and that of their partners and families.

## Problem Statement

### Logical Argument

Sierra Leone remains one of the countries least affected by HIV/AIDS since the first reported case in the nation in 1987 (National HIV/AIDS Secretariat [NAS], 2005). However, the prevalence rate in Sierra Leone had increased since 1987 from 0.9% in 2002 to 1.53% in 2005 (NAS, 2002, 2005). Further, and the rate stabilized at 1.5% between 2008 and 2013 in the general Sierra Leone population (SSL, 2014). The HIV/AIDS infections may be concentrated within high-risk populations, which include the military (foreign peacekeeping forces), ex-combatants, commercial sex workers, miners, truck drivers, the youth, internally displaced persons (IDPs), and refugees within the country (CDC, 2002). Different studies and reports have indicated a prevalence rate of 11% among the Nigerian peacekeeping forces returning from Sierra Leone in 2000 (Nigeria AIDS Bulletin, 2000), 8.5% among commercial sex workers in Sierra Leone (ARC, 2005), and 1.3% among miners in Sierra Leone (NAS, 2008). HIV/AIDS continues to disproportionately affect the youth group (18–39 years of age) in their peak

reproductive and economically productive years with ultimately serious socioeconomic effects for the communities and private companies operating within mining communities (SSL, 2014). The survival of this age group, which constitutes the nation's working age group, is critical to the socioeconomic and cultural development of the country with a population of 5 million people (SSL, 2006).

The prevention of new HIV infections has been cited as one of the national health priorities in the Sierra Leone's multisectoral National Strategic Plan on HIV/AIDS (2012–2017), which targets zero new HIV infections by 2017. So far, national intervention strategies to prevent HIV transmission have included the reduction of high-risk sexual behaviors among the sexually active and vulnerable populations, especially the youth, by encouraging condom use. Other interventions have included decreasing HIV transmission from mother to child; adopting safer blood transfusion practices; and awareness raising through testing, counseling, and information sharing to influence sexual behavioral change (NAS, 2008).

The problem is that the epidemiologic context of the relatively high HIV/AIDS prevalence rates (1.3% among miners and 8.5% among commercial sex workers) in mining communities and the potential socioeconomic effects are not yet fully understood by the mining companies and the government of Sierra Leone. This lack of understanding is hindering an adequate response to the epidemic. The initial literature review revealed that the HIV/AIDS epidemic affects markets, savings rate, investments, consumer spending, and the overall gross domestic product (GDP) growth by up to 2% by reducing the labor supply, productivity, and disposable incomes (Simon, Rosen, Whiteside,

Vincent, & Thea, 2000). Understanding the contextual factors, such as labor migration,

associated with HIV sexual risk behaviors in mining communities has important

implications for developing multilevel HIV intervention programs. The epidemiology of

HIV/AIDS and its dynamics in Sierra Leone are further discussed in Chapter 3.

**Justification**

Sierra Leone is rich in mineral resources, including diamonds, gold, iron ore, and

rutile bauxite, and the nation has proven offshore, deep-water oil reserves discovered in

2009 and 2010. The mining sector has been identified as one of the promising drivers that

will propel a second wind of economic growth and development (African Development

Bank, 2011) and has, therefore, been considered as critical to any medium-term poverty

reduction strategy in Sierra Leone (World Bank, 2012). The country is currently

witnessing large-scale extractive iron ore mining boom, as well as agroindustrial and

infrastructural development, in the Northern Growth Corridor, which includes the cities

of Port Loko, Lunsar, and Makeni. London Mining Company (now TIMIS Mining

Corporation Ltd.) at Marampa Mines in Lunsar, Cape Lambert, in Lunsar, and African

Minerals Limited (AML), in Tonkolili, are investing in large-scale iron ore production.

These mining companies are also engaged in large-scale transportation (road, river, and

rail) and port infrastructural development to transport iron ore to the global markets via

harbor facilities in and around Freetown (World Bank, 2013). The mining boom has the

potential to change the country's growth trajectory. As a result of the mining boom, the

country experienced a 15.2% GDP growth in 2012, and the GDP may grow by 15% in

2013 (World Bank, 2012). The government is expected to fund its national development

plans in the Agenda for Prosperity (Poverty Reduction Strategy Paper III [PRSP III]) primarily from the projected high mineral revenues in the short and medium terms to attain its aspiration of a middle-income country status by the year 2035 (World Bank, 2012). Export proceeds are estimated to increase from US$360 million in 2010 to approximately US$4.1 billion by 2015 (World Bank, 2012). Sierra Leone's iron ore deposits are known to be worth, measured at current prices, 38 times its GDP in 2011 (World Bank 2012).

The iron ore mining boom thus opens up areas of northern Province for further infrastructural development in the region, and such development also came with an accelerated depletion of nonrenewable mineral resources at a projected rate of 14%in 2012 and 21.5% in 2015 (World Bank, 2012). Further, large-scale infrastructure development projects in mining and natural resources management have been shown to have long-term negative health effects, especially in vulnerable local mining communities with weak health care systems (Birley, 2005; Jobin, 2003; Upton, 2008; Winkler et al.,2009). The spread of STIs, including HIV/AIDS, is one example of the potential health effects, and peripheral communities in mining project areas are known to be vulnerable to STIs (Birley, 2005).

Further, migration has been seen as an independent risk factor for HIV-1 infection among migrant gold mining workers in South Africa (Lurie et al., 2002). In-migration related health effects (diseases, including HIV/AIDS) have been identified by AML as potential negative effects of significance in its preliminary Environmental, Social and Health Impact Assessment (ESHIA) for Phase 1 (AML, 2010). In a study of migrant and

nonmigrant men and their partners in South Africa, Lurie et al.(2003) showed in a

multivariate analysis that the main risk factors for male HIV infection were (a) being a

migrant worker, (b) ever having used condoms, and (c) having lived in four or more

places during a lifetime. The odds of a migrant man being infected were 2.4 times than

that of a nonmigrant man being infected. However, being a regular partner of a migrant

worker was not a statistically significant risk factor for HIV infection among women

(Lurie et al., 2003).

Concerns have, therefore, been raised regarding the potential increase in the HIV

prevalence rate in the mining areas despite the comparatively low HIV/AIDS prevalence

rate reported to date. Population movement, related to employment, food security,

poverty, climate change, agriculture, and transport, usually triggers disease outbreaks

(Hsu, 2004). There had been huge labor and trade movements into the mining areas of

Lunsar, Makeni, and Port Loko in the northern Province mining corridor. These new

migration trends could worsen the HIV/AIDS epidemic with devastating socioeconomic

consequences for the mining communities, mining companies, and the local economy.

The threat of the spread of HIV/AIDS in the new mining corridor has the potential of

further destabilizing the economic recovery and social stability of the country. It lowers

the supply of labor, reduces income and productivity for mining workers, and

consequently reduces profitability for mining companies (Smart, 2004). Therefore, it is

crucial that we understand the epidemiologic dynamics between labor migration and the

sexual risk behaviors related to HIV transmission in mining communities in Sierra Leone.

Better understanding of the relationships between these factors in a mining context could

help to develop HIV/AIDS multilevel interventions programs that could ultimately curb the spread of HIV/AIDS. The significance of this study is discussed further at the end of this chapter.

## Purpose of the Study

The overall purpose of this study was to examine the association between labor migration and HIV behavioral risk factors as the outcome measured by self-efficacy in condom use, multiple sexual partnerships, and commercial sex, among miners in the Marampa mines in Lunsar in the northern Province of Sierra Leone.

## Research Questions and Hypotheses

The overarching study research question was, "Is there a relationship between labor migration (independent variable) and HIV risk behaviors (outcome) as measured by (a) self-efficacy for condom use, (b) multiple sexual partnerships, and (c) commercial sex?" HIV risk behaviors were measured using the HIV Behavioral Risk Index. The overarching research question is answered by the following subquestions:

**Research Question 1:** Is there an association between labor migration and self-efficacy for condom use (as measured by the Condom Use Self-Efficacy Scale)?

Null Hypothesis 1 ($H_{01}$): There is no association between labor migration and self-efficacy for condom use (as measured by the Condom Use Self-Efficacy Scale).

Alternative Hypothesis 1 ($H_{a1}$): There is an association between labor migration and self-efficacy for condom use (as measured by the Condom Use Self-Efficacy Scale).

**Research Question 2:** Is there an association between labor migration and having multiple sexual partners among miners (as measured by the Behavioral Risk Index)?

Null Hypothesis 2 ($H_{02}$): There is no association between labor migration and having multiple sexual partners among miners (as measured by the Behavioral Risk Index).

Alternative Hypothesis 2 ($H_{a2}$): There is an association between labor migration and having multiple sexual partners among miners (as measured by the Behavioral Risk Index).

**Research Question 3:** Is there an association between labor migration and engagement in commercial sex among miners (as measured by the Behavioral Risk Index)?

Null Hypothesis 3 ($H_{03}$): There is no association between labor migration and engagement in commercial sex among miners (as measured by the Behavioral Risk Index).

Alternative Hypothesis 3 ($H_{a3}$): There is an association between labor migration and engagement in commercial sex among miners (as measured by the Behavioral Risk Index).

## Theoretical and Conceptual Framework

The ecological or systems model, which is also referred to as the Transactional Model (Pervin, 1968; Endler & Magnusson, 1976), was adopted for this study. The ecological model focuses on individual behavior, as well as social and environmental determinants of health as targets for health interventions (McLeroy, Bibeau, Steckler, & Glanz, 1988). The ecological model assumes that effecting changes in the social and structural environment will influence individual behavior, and the model views patterned

behavior as the outcome of interest. Brofenbrenner's ecological model (Brofenbrenner, 1979, 1977) regards individual behavior as being affected by, and affecting, multiple levels of influence in the social and physical environment. Belsky (1980) used Brofenbrenner's ecological model to account for individual, family, social, and cultural influences in child abuse. Ecological models have also been used to assess health lifestyles (Winett, 1985); to address problems of community psychology (Seidman, 1988); and to integrate individual and environmental factors in studying behavior (Kersell & Milsum, 1996).

This study used the ecological model to examine the relationships between labor migration, as a result of mining operations, and individual behavioral risk factors for HIV transmission in the Marampa mining communities in Lunsar. Labor migration was seen in this study as the structural construct that influences the individual sexual risk factors of self-efficacy for condom use, engagement in multiple sexual partnerships, and commercial sex.

**Nature of the Study**

This study used a quantitative approach to examine the associations between labor migration and individual sexual risk factors for HIV transmission as the outcome measured by (a) self-efficacy for condom use, (b) multiple sexual partnership, and (c) commercial sex in mining communities. The study was a cross-sectional design in nature. The rationale behind the use of a cross-sectional design was to determine if there was association between the variables. Quantitative approach attempts to systematically bring evidence from scientific research studies to bear on questions of policy and practice

(Zara, et al., 2000). There were limitations to the nature of the study, which will be discussed in the limitations section.

A cross-sectional design was used to examine the association between labor migration and individual behavioral risk factors for HIV transmission in the Marampa mining communities in Lunsar, Port Loko, Sierra Leone. The cross-sectional design was selected because of its appropriateness for examining first-order associations, providing a snapshot of a pervasive public health issue. The study population was mineworkers between the ages of 18 and older residing in the Marampa mining communities in Lunsar, Port Loko. Participants were recruited using convenience sampling and the reading of a prior informed consent form was required for participation. Cohen's (1988) power analysis table was used to determine the study's sample size, estimated to be 249 miners. Public domain instruments, the Demographic Survey Questionnaire (CDC, 2012), the Condom Use Self-Efficacy Scale (Brafford, & Beck, 1991) and the Behavioral Risk Index (Donenberg, Emerson, Bryant, Wilson, & Weber-Shifrin, 2001) were used.

The Statistical Package for Social Sciences (SPSS) Version 11.5 was used to enter and analyze collected data. Descriptive statistics (mean, standard deviation, and frequency) were computed for participants' demographic characteristics and risk behavior characteristics to provide an overall description of the study sample. Bivariate correlations were determined among the independent and dependent variables to test the hypotheses using simple linear and binary logistic regression analyses.

**Definition of Terms**

The following were the definitions of key terms used in the study:

*Acquired immune deficiency syndrome* (*AIDS*): The end stage of a viral infection during which the body loses its ability to resist infection of any kind (Melnnis-Dittrich, 2002).

*Commercial sex*: The act of engaging in sexual intercourse for money (Orubuloye, 1997).

*Confounding*: The distortion of an exposure-disease association by a third factor that is related to both exposure and disease outcome (Dicker, 2008).

*High-risk sexual behavior*: Sexual intercourse (vaginal, anal or oral) with multiple sexual partners, unprotected sex without the use of condoms and engaging in sex with commercial sex workers (Vanlandingham, Grandjean, Sittitrai, & Suprasert, 1997).

*HIV seroprevalence*: The degree of HIV virus infection in a population (United Nations, 2002).

*Human immunodeficiency virus* (*HIV*): A group of viruses (retroviruses) that attack and destroy the body's immune system (T-cells or CD4 cells) (Melnnis-Dittrich, 2002)

*Labor migration*: The movement of people from one place to another temporarily, seasonally or permanently, for employment (Brummer, 2002).

*Multiple sexual partnerships*: Having more than one sexual partner, causal or regular.

*Self-efficacy for condom use*: The ability to engage in safe sex practices by obtaining condoms, keeping condoms, negotiating condom use and using condoms with a partner(s) to protect against contracting HIV (Ifegwu, 2013).

*Sexually transmitted diseases* (*STDs*): These are infections that can be transferred from person to person through sexual intercourse or sexual contact, such as gonorrhea, syphilis, chlamydia, chancroid and HIV/AIDS (Green, 1994).

*Social change*: Positive change in society brought about by the application of the results of scientific research (Kaplan, 1979).

*Vulnerability*: Vulnerability is related to social and environmental factors that leave people or groups of people at risk of HIV infection (Webb, 1997).

## Assumptions

The assumptions of this study were as follows:

1.  The study was based on self-reporting on sensitive sexual risk behaviors of participants, who may have felt uncomfortable about telling the truth in responding to the survey questions. It was assumed, therefore, that participants fully understood the questions and voluntarily responded to the survey questions truthfully and to the best of their ability.

2.  It was also assumed that miners who met the inclusion criteria were not refrained from participating in the study, and that the miners' consent and willingness to participate voluntarily in this study did not bias the study.

3.  The survey instruments for the study were standardized and validated. It was therefore, assumed that these instruments, the Demographic Survey Questionnaire, the Condom Use Self-Efficacy Scale and the HIV Risk Behavior Assessment Survey Questionnaire, were appropriate to accurately measure the designated study variables.

**Limitations**

The study was subjected to the following limitations:

1.  The study was limited by the use of the nonprobability convenience sampling technique, which makes the study sample inherently biased (selection bias) (Salazar, Crosby, & DiClemente, 2006). The study sample may not have been representative, and therefore, the study findings may not be generalized to the population of miners in the Marampa mining communities in Lunsar. However, the findings may provide insights into HIV/AIDS issues that are applicable to a broader cross-section of the mining communities. The study findings should therefore, be interpreted with caution.

2.  This study was cross-sectional in nature examining the association between labor migration and individual sexual risk behaviors (self-efficacy in condom use, multiple sexual partnerships and commercial sex). The cross-sectional nature of the study, which provides a snapshot in time, may have limited the ability of the study to determine cause and effect (Salazar, Crosby, & DiClemente, 2006).

3.  It is difficult to determine directional relationships between variables in a cross-sectional design (Heiman, 1999). However, it was hypothesized in the study that labor migration influences individual sexual risk behaviors for HIV transmission (condom use, multiple sexual partnership and commercial sex). Hence, the study used regression analysis to determine the direction of the relationship between these variables.

4. Confounding factors (Dicker, 2008), such as demographic characteristics, socioeconomic status and the use of alcohol or drugs, that influence HIV/AIDS risk factors may have affected the correct interpretations of the study findings, inferences and conclusions.

5. This study did not include a control group of non-mine workers, and the study did not allow for balance across the differing sexual risk behaviors. Therefore, differences observed may have been associated with extraneous variables, such as drug or alcohol use.

6. The accuracy of the survey data collected was dependent on self-reporting, and hence subjected to information biases (recall bias and interviewer bias) (Dicker, 2008). Recalling sexual activities or relationships in the past may have been difficult for some of the participants, and these difficulties may have resulted in inaccurate or biased recall. Review of the literature showed that the use of objective measures, alongside self-report data, at a minimum, provides stronger evidence for the validity of measures and results (Zimmerman, Atwood, & Cupp, 2006). How information bias was minimized in the research design and methodology is discussed in Chapter 3.

**Scope and Delimitations**

The scope and delimitations of the study were as follows:

1. The study was limited to mine workers residing Marampa mining communities in Lunsar, Port Loko District.

2. The study considered only HIV/AIDS, and no other sexually transmitted diseases or infections (STDs or STIs).

3. This study examined only one mining-related activity, which is labor migration, and its association with individual sexual risk behaviors. Gender differences in sexual risk behaviors were not considered in this study.

4. This study did not take into consideration normative factors such as knowledge, beliefs, attitudes, cultures, and values about HIV/AIDS.

5. The study did not consider the influences of drug or alcohol use on sexual risk behaviors of engagement in unprotected sex without condom use, multiple sexual partnerships, and commercial sex.

**Significance of Study**

Although the HIV prevalence rate in Sierra Leone has stabilized at 1.5% in the general population, HIV/AIDS is said to be concentrated in the high-risk populations, which include mineworkers and commercial sex workers in the mining communities, with prevalence rates of 1.3% and 8.5% respectively. Already, the Marampa mining community has the highest HIV/AIDS prevalence rate of 3.2%, compared to the national average of 1.3% for miners in the country (NAS, 2008). There is thus a potential for the spread of HIV/AIDS as a result of huge labor migration and trade movements in the mining areas of Lunsar, Makeni and Port Loko, where there is currently large-scale extractive iron ore mining going on. The potential spread of HIV/AIDS may threaten the mining sector, with devastating socioeconomic consequences for mining communities, mining companies and the national economy. This study could help us understand the

epidemiologic dynamics between labor migration and the sexual risk behaviors related to HIV transmission in mining communities in Sierra Leone. Thus, the findings of this study could help the government and private mining companies design and implement policies and programs aimed at pro-actively mitigating factors associated with increased HIV vulnerability or HIV resilience within affected mining communities at Marampa mines.

Further, identifying factors associated with increased HIV vulnerability or resilience is an important advocacy tool for social change. Such advocacy could enable political leaders, policy makers and mining companies to engage in developing intervention policies and programs to mitigate the spread of HIV/AIDS. Socio-ecological system behaviors, exhibited by population movement and associated with increased risk of HIV transmission, could be used as early warning system to monitor increasing risk (Hsu, 2004). Early warning system could help mining companies reduce risk and uncertainty, reduce waste and improve efficiency, and thereby earn good will and support from local communities (social capital), address society's expectation, enhance reputation from local communities and ultimately effect social change. Multinational corporations are now under growing pressure from financial institutions to report good environmental and social performance, as required in the safeguard policies advocated by the International Finance Corporation (IFC) (IFC, 2004). Corporate Social Responsibility (CSR) is thus an integral part of their operating performance and risk management, and the results of this study may give specific factors for the mining company to take action.

**Summary**

Sierra Leone remains one of the countries least affected by HIV/AIDS in West Africa, and the HIV/AIDS epidemic is concentrated within the high-risk populations, which include the mineworkers and commercial sex workers in mining communities. The large-scale extractive iron ore mining boom in the Northern Growth Pole opens the region to further infrastructural development projects and labor migration. Migration has been seen as an independent risk factor for HIV-1 infection among migrant gold mining workers in South Africa (Lurie et al., 2002). The threat of the spread of HIV/AIDS in the new mining corridor in the North has the potential of destabilizing the economic recovery and social stability in Sierra Leone. The study examined, using the ecological model, the relationship between labor migration and individual sexual risk factors in HIV transmission in a cross-section of mineworkers in the Marampa mines in Lunsar in the northern Province of Sierra Leone.

Chapter 2 reviewed the relevant existing literature on behavioral risk factors traditionally associated HIV/AIDS infections, especially in mining communities. The research methodology used in the study is described in detail in Chapter 3. Chapter 4 provides the details of the data analysis and findings. Chapter 5 provides a discussion and analysis of the study findings related to the research questions and hypotheses.

Chapter 2: Literature Review

**Introduction**

Concerns regarding the potential spread of HIV/AIDS in mining communities in Sierra Leone have been growing. The HIV/AIDS prevalence rate has stabilized at 1.5% in the nation's general population. The overall purpose of this study was to examine the association between labor migration (independent variable) and individual sexual behavioral risk factors for HIV transmission as the outcome measured by self-efficacy for condom use, engagement in multiple sexual partnerships, and commercial sex among miners. This chapter systematically reviews the relevant published literature on the relationship between mining-related labor migration and individual sexual risk factors for HIV transmission. An epidemiologic overview of HIV/AIDS in Sierra Leone was presented in Chapter 1. Chapter 2 starts with the research strategy and provides a theoretical framework on which the study was based. The chapter then assesses the sexual risk behaviors traditionally associated with HIV/AIDS infection and the relationships between these risk factors. The chapter closes with a summary of the justification for the study, the inherent literature gaps, and the future research needs.

**Literature Research Strategy**

Literature search was performed using several databases, which were listed in the Walden University Web portal. The databases included Academic Search Complete/Premier, ProQuest Central, CINAHL Plus with full text, Cochrane Database of Systematic Reviews, Health and Psychosocial Instruments, MEDLINE with full text, and Google Scholar. The keywords that were used for locating materials for this study

included *HIV/AIDS*, *prevalence*, *incidence*, *risk factors*, *condom use*, *self-efficacy*, *unprotected sex*, *susceptibility*, *vulnerability*, *social capital*, *social change*, *industrial mining*, *labor migration*, *interventions*, *care*, *treatment and social support*, *ecological theory*, and a combination of these terms. I reviewed articles and dissertations published between 2003 and 2013, and I reviewed other materials from previous years if relevant to the study. I requested assistance from the Walden University Writing Center for articles that I could not access. All of these resources were recorded and annotated in an excel spreadsheet.

## Theoretical/Conceptual Foundation

HIV is predominantly transmitted in Sierra Leone through heterosexual intercourse, so-called Pattern 2 transmission. Much of the HIV/AIDS studies in Sierra Leone are related to risk behavior (ARC, 2005; NAS, 2005, 2007). Hence, most of the strategic intervention policies and programs targeting the high-risk groups were aimed at conventional lifestyle behavior change through the use of condoms, diagnosis and treatment of STIs, counseling and testing, and promoting sexual awareness campaigns (NAS, 2006). These intervention strategies were based on the constructs of either the health belief model (HBM) (Rosenstock, 1974) or the theory of reasoned action (TRA) (Ajzen & Fishbein, 1980; Fishbein, 1972). These models assume that enhancing knowledge and attitudes about a disease will ultimately affect individual behavior change in eliminating behavioral risk factors (Ahlberg et al., 2001; Bahrs et al., 2003; Awofeso, 2004). However, longitudinal and meta-analytic studies have shown that increased knowledge by itself does not necessarily translate into risk behavior change (Joseph et al.,

1987; Harrison, Mullen, & Green, 1992). People with relatively high levels of knowledge about HIV/AIDS often indulge in high-risk sexual behaviors (Campbell & Williams, 1996). Socioecological factors are also known to influence high-risk sexual behaviors (Mechanic, 1990; Kippax & Crawford, 1993; Zwi & Cabral, 1991).

The ecological model was used to examine the association between labor migration, as a result of mining operations, and individual behavioral risk factors for HIV transmission in mining communities. The ecological model was selected because it examines multiple levels of influences on individual risk behavior. The ecological model assumes that effecting changes in the social and structural environment will influence individual risk behavior, and it views patterned behavior (of individuals or aggregates) as the outcome of interest. Brofenbrenner's ecological model (Brofenbrenner, 1977, 1979) thus regards individual behavior as being affected by, and affecting, multiple levels of influence in the social and physical environment. These levels of influence are intrapersonal factors, which include individual characteristics such as knowledge, attitudes, self-concept and skill; interpersonal factors, which include social network, social capital, and social support systems; institutional/structural factors, which include social institutions with structural and organizational characteristics; community factors, which include relationships among organizations and institutions; and public policy, which includes local, state, and national laws and regulations.

The multiplicity of these contextual influences ultimately tends to shape individual sexual risk behaviors. The ecological model provides a framework that allows the relational aspects of all these social and structural influences to be understood and

thus guides population-specific interventions. Therefore, individual sexual risk behaviors, which are self-efficacy for condom use, as well as engagement in multiple sexual partnerships and commercial sex, could be influenced by socioecological factors such as labor migration defined by residence. This study examined labor migration as a structural construct that influences individual sexual risk behavior associated with HIV transmission.

Few studies have used the ecological model to explain individual sexual risk behaviors related to HIV/AIDS infection. Belsky (1980) used Brofenbrenner's ecological model to account for individual, family, social, and cultural influences in child abuse. In various research disciplines, ecological models have been used to assess health lifestyles (Winett, 1985); address problems confronting community psychology using levels of analysis (Seidman, 1988); examine contextual influences on contraception and condom use in women (Bull, & Shlay, 2005); assess STI risk behaviors in adolescents (Voisin, DiClemente, Salazar, Crosby, & Yarber, 2006); and integrate individual and environmental factors in studying behavior (Kersell & Milsum, 1985).

Kersell and Milsum (1985) proposed a system model that demonstrated that health behavior change at the individual level is fundamentally influenced by multiple integrated factors rather than being caused by any single factor. The model attempts to integrate social, environmental, psychological, and physiological factors within a system for health behavior change. The model applies equally to prevention, cessation, or maintenance of health behaviors. Seidman (1988) used an ecological model to understand social intervention and change at each of four levels of analysis: individual, population,

setting, and mesosystem. Seidman pointed out that fundamental social regularities only arise as ecologically meaningful and salient constructs when the unit of analysis is the setting or mesosystem, which are characterized by connections, shared goals, relationships, continuity, or interdependencies with a higher degree of social complexities.

Using the concept of setting and mesosystem by Seidman (1988) is related to Bronfenbrenner's (1979) notion of microsystems or Barker and Neuhaus's (1977) term of *mediating structures*. Belsky (1980) used an integrated ecological model to demonstrate that child abuse as a social-psychological phenomenon is determined by multiple ecologically nested factors at work in the individual (ontogenic development), in the family/household (microsystem), in the community (exosystem), and in the culture (macrosystem) in which both the individual and family are embedded.

The general ecological model of human development provides a conceptual framework for integrating and delineating the structural relationships among several divergent factors relating to the role of the child, parents' psychological make-up, family-interaction patterns, social stress, and cultural attitudes and values in the etiology of child maltreatment. Voisin et al. (2006) also used an ecological model to examine independent factors that are associated with STD risk behaviors among sexually active detained female adolescents in the U.S. state of Georgia by conducting a system-level assessment. The authors assessed individual characteristics, peer relations, community factors, and media influences, as well as the association between these factors and STD risk

behaviors. The study findings suggested an integrated ecological approach (person-in-environment context) for effective STD prevention initiatives among this population.

Bull and Shlay (2005) also used the social ecological model to identify causal, contextual, and intervening factors that influence dual protection from pregnancy and STDs. Using these study findings within the ecological model, the authors were able to illustrate combined-levels of intervention to promote contraceptive and condom use that include interventions at the structural/environmental level, the social/interpersonal level, and the individual level. Such an approach, the authors concluded, could increase the impact of intervention programs.

## Literature Review

This study examined the association between labor migration and individual behavioral risk factors for HIV transmission as outcome, measured by self-efficacy in condom use, engagement in multiple sexual partnership and commercial sex, among miners in the Marampa mines in Lunsar, Sierra Leone. The literature review started off with the epidemiologic profile of HIV/AIDS in sub-Saharan Africa, Sierra Leone, and mining communities. Then the literature review presented the relevant research related to industrial labor migration, self-efficacy for condom use, multiple sexual partnerships and commercial sex as they relate to the spread of HIV/AIDS in mining communities.

## Epidemiology of HIV/AIDS

The overwhelming burden of HIV/AIDS epidemic remains a public health as well as a development issue in sub-Saharan Africa. Sub-Saharan Africa makes up approximately 3% of the world's population, but accounts for globally 50% of the

estimated 36.1% million HIV/AIDS cases in 2000, with 8.8% of adults infected with HIV

primarily through heterosexual intercourse (UNAIDS, 2000). HIV prevalence rates

remain particularly high in eastern, and more so in southern Africa, with infection rates

ranging from 20 to 40% in South Africa, Botswana, Zimbabwe, and western Kenya

(UNAIDS, 2004). The relatively lower HIV prevalence rates in West Africa have been

attributed to the high male circumcision rate (Halperin, & Bailey, 1999; Weiss, Quigley,

& Hayes, 2000; Quinn, Wawer, & Sewankambo, 2000). The extensive HIV transmission

in the South has been strongly associated with long-term concurrent multiple sexual

partnerships among heterosexuals (Morris, 2002; Santelli, Brener, & Lowry, 1998;

Petifor, & Rees, 2004).

Despite the high prevalence rates of HIV/AIDS in sub-Saharan Africa, there had

been successful efforts in stemming the spread of the disease in a few countries like

Uganda and Senegal through multiple-level intervention programs. With strong high-

level political leadership and community support from non-governmental organizations

(NGOs), community-based organizations and religious groups, Uganda was able to

reduce the adult HIV prevalence rate from 14% in the early 1990s to 5% in 2001. The

Ugandan success was achieved through the WHO's ABC prevention model (ABC

standing for A: sexual abstinence, B: be faithful and monogamous, and C: use condoms)

(UN Special Session on HIV/AIDS, 2001). Through a similar comprehensive approach,

Senegal had the lowest HIV prevalence rates in 2002 among pregnant women attending

prenatal clinics in sub-Saharan Africa (UNAIDS, 2003), and only 0.8% of its adult

population (aged 15-49 years) is estimated to be HIV positive (UNAIDS, 2004). Given

that there is no cure or vaccine to date, intervention programs of HIV/AIDS in sub-Saharan Africa will continue to emphasize high-risk sexual behavior change, and better diagnosis and treatment of STIs.

The historic epidemiologic dynamics of HIV/AIDS transmission in Sierra Leone has not been well documented, resulting from the disruption of routine epidemiologic and behavioral surveillance infrastructure. The pre-disposing factor to HIV transmission in Sierra Leone is poverty, which is reflected in the country's low United Nations (UN) Human Development Index of 176 out of 177, among the poorest countries in the world. Sierra Leone is one of the Manor River Union (MRU) fragile fringe countries within the Economic Community of West African States (ECOWAS) region still recovering from its 10-year devastating civil war that ended in 2001. The country remains extremely poor and vulnerable with approximately 45 % of its population living with less than US$1.25 a day (Gross National Income per capita at US$340 in 2010) and having very low life expectancy (48 years old at birth) (World Bank, 2012).

The inconclusive national population-based HIV serosurvey in 2002 suggested a comparatively low HIV seroprevalence than in other sub-Saharan countries (NAS, 2002). While the positive trend in the stabilization of the HIV prevalence rate at 1.5% (1.4%-2.1%) between 2008 and 2013 in the general population (SSL, 2014), HIV/AIDS prevalence rates tend to be increasing, with higher rates in urban areas (2.1%) than rural areas (1.3%) (WHO, 2009). The epidemic continues to disproportionately affect the youth population (18–49 years age group) in their peak reproductive and economically productive years. Gender disparity in HIV/AIDS prevalence has also been documented ,

with 2% among females (aged 20-24 years) and 3.5% among males (aged 35–39 years) (NAS, 2005).

Very few surveillance studies on the prevalence of HIV/AIDS have been conducted in the different mining communities in Sierra Leone, revealing a prevalence rate of 1.3% among the general mining populations (NAS, 2008). The surveillance reports documented a prevalence rate of 3.2% among mineworkers in the London Mining Marampa mines in the Northern Growth Pole corridor (NAS, 2013), 2.4% among miners (employees) at the Sierra Rutile Limited in the South (NAS, 2008, 2012), 0.7% and 1.1% in the diamond mining communities of Koidu and Tongo Fields respectively in the East, 1.3% and 1.4% in the gold mining communities of Mongheri (South) and Bumbuna (North) respectively (NAS, 2012).

This study was limited to the mining communities around the Marampa Mines in Lunsar, Marampa Chiefdom, Port Loko District with two mining operators. London Mining Company (LMC) (now TIMIS Mining Corporation Ltd.) is operating the Marampa Mines and is engaged in high specification iron ore production for the global steel industry. The total investment of LMC is $120 million, lower than that of Sierra Rutile Limited ($179 million) (Sierra Rutile Limited, 2013) and African Minerals ($286 million) (African Minerals, 2013). London Mining started production in 2011, and is expected to increase production to 5 million tons per annum (Mtpa) in 2013 and to 16Mttpa in the subsequent years (LMC, 2013). Cape Lambert Resources Limited, an Australian exploration and development company, is at the feasibility and permitting stage in its Marampa Iron Ore (hematite) Project. It is expected to produce to 2.5 Mtpa of

iron ore in its first phase of production, increasing to 15 Mtpa in its second phase (Cape

Lambert Resources Limited, 2013). Therefore, this area is projected to receive a massive

influx of new mining workers, which may increase the threat of HIV transmission in the

community.

<div align="center">**The Behavioral Risk Factors of HIV/AIDS**</div>

**Labor Migration**

The levels of HIV infection are usually high among miners (Jochelson, Mothibeli,

& Leger, 1991; Williams & Campbell, 1996), whose life situation in a range of contexts

makes them particularly vulnerable to HIV infection (Hunt, 1989). Majority of miners

live some distance from their homes and families in mostly dangerous and highly

stressful living and working conditions (Leon, Davis, Salamon, & Davis, 1995; Molapo,

1995). Migration has been shown as an independent and significant risk factor for HIV-1

infection among both men and women mine workers. Large-scale migration tends to

accelerate the spread of HIV/AIDS (Anarfi, 1993).

The effects of migration on the spread of HIV/AIDS, and the reasons why people

become vulnerable as a result of migration have been discussed in several studies. In a

study of migrant and nonmigrant men and their partners in South Africa, Lurie, et al.

(2003) showed in a multivariate analysis that the main risk factors for male HIV infection

were - being a migrant worker, ever having used condom and having lived in four or

more places during a lifetime. The odds of a migrant man being infected were 2.4 times

that of a nonmigrant man being infected. However, the same study showed that being a

regular partner of a migrant worker was not statistically significant risk factor for HIV

infection among women. Another study conducted in South Africa showed that self-identified migrant women were 1.6 times more likely to be HIV-positive than nonmigrant women (Zuma, Gouws, Williams, & Lurie, 2003).

The mainly seasonal or temporary character of labor migration has been shown to facilitate the rapid spread of HIV/AIDS (Fages, 1999). Circular migration is usually common among adult men seeking employment opportunities in urban and industrial mining centers, and spend the majority of their time away from their wives or regular partners at homes (Lurie, Harrison, Wilkinson, & Abdool, 1997). South Africa is known to get almost 50 % of its gold miners from neighboring countries, including Botwana, Lesotho, Mozambique, and Malawi (Crush, 1995; McDonald, 2000). Frequently changing residence put mine workers at higher risk of HIV infection (Pison, Le Guenno, Lagarde, Enel, & Seck, 1993; Legarde, Pison, & Enel, 1996; Mbizvo, et al., 1996; Brewer, et al., 1998). Studies have shown that people who have recently changed residence within the last five years were three times more at risk of HIV infection than those who have lived in the same place for more than 10 years in Uganda (Nunn, Hand-Ulrich, & Kamali, 1995), or have stayed in the same place in South Africa (Abdool, Abdool, Singh, Short, & Ngxongo, 1992).

The conditions and structure of the migration process have been identified as the critical factors that put people at risk of infection with HIV and other STDs (Decosas & Adrien, 1997). In other words, it is the situations encountered and the behaviors engaged in during the process of migration or mobility that increase the vulnerability and risk regarding HIV/AIDS infection (UNAIDS, 2001). Furthermore, seasonally migrating

workers tend to have multiple sexual partners (Mbizvo, Machekano, McFarland, et al., 1996), and are therefore, more likely to be infected with HIV or other STDs (Mabe, & Mayaud, 1997). This put their regular partners and wives at risk of HIV infection when they return home on a periodic basis (Pison, Le Guenno, Lagarde, Enel, & Seck, 1993).

Ferguson et al. (2006) have shown that having multiple concurrent sexual partners in itself is a risk factor for HIV infection, especially so if condom is not used consistently during the course of intercourse. Seasonal labor migration has thus been shown as one of the significant social risk factors that have contributed to HIV transmission (Decosas & Adrien, 1997; Mabey & Mayaud, 1997), especially in Southern Africa with an advanced stage of HIV/AIDS epidemic. Seasonal labor migration is associated with separation of families and social disruption caused by repeated relocation.

It has been acknowledged at the same time that the role of migration in the spread of HIV/AIDS was likely more important in the earlier stages than in the later stages of the epidemic (Coffee, Garnett, & Lurie, 2000). Hence, it is difficult to isolate a single causal factor in a mature epidemic with already high prevalence rate. The study by Lurie et al. (2002) also demonstrated that migrant men miners were significantly more likely than nonmigrant men to have causal sex partners and to be HIV-positive. So, labor migration not only facilitates the spread of HIVAIDS along migration corridors, but also causes behaviors and situations, which facilitate HIV transmission (Caldwell, Anarfi, & Caldwell, 1997). In a complex mining environment characterized by promiscuity, and in which miners tend to lack control (Campbell, 1997) and lack social support (Campbell, 2001), self-efficacy is an important determinant of health-related behavior (Prieur, 1990).

**Self-Efficacy in Condom Use**

The consistent use of condom has been shown to be effective in preventing transmission of STIs or STDs, including HIV/AIDS (Roper, Peterson, & Curran, 1993). Oil companies in the oil-rich Niger Delta region of Nigeria achieved a 40% decrease in the spread of STDs within a year of a condom distribution program for their workers (Feleyimu, 1999). In Thailand, public policy mandating 100% condom use in brothels reduced the HIV prevalence rate by 14% among female commercial sex workers in Chiang Mai within a period of two years (Chaisiri, Danutra, & Limanonda, 1993; Siraprapasiri et al., 1991). Approximately 62% of men and 43% of women in Sierra Leone know that the consistent use of condoms prevents the spread of HIV (DHS, 2008).

However, knowledge of condom use by itself does not translate to consistent condom use without self-efficacy. Self-efficacy, the ability to perform an action that is required for a specifically desired outcome, has been shown to be a key determinant of behavior (Jukes and Desai, 2005). People with higher self-efficacy are more likely to carryout a desired or intended behavior, while those who lack self-efficacy are less likely to (Bandura, 1989)**.** Self-efficacy in condom use thus requires condom accessibility, communicating and negotiating condom use with sexual partners, using condoms consistently to avoid unprotected sex, and rejecting sex if a partner will not use a condom (Soler et al., 2000).

Several studies have shown that adolescents who tend to use condoms more often usually feel confident in their use of condoms (Sieving at al., 1997; Bandura, 1994; Jemmott III, Jemmott, Spears, Hewitt, & Cruz-Collins, 1992; Rosenthal, Moore, &

Flynn, 1991; Sionean et al., 2002), feel confident in their ability to negotiate condom use with partners (Sionean et al., 2002; DiClemente et al., 2001), say "no" to unprotected sex (Rosenthal, Moore, & Flynn, 1991), discuss sexual matters (i.e. previous partners, sexual histories) (Sieving et al., 1997; DiClemente et al., 2001; Crosby et al., 2002), and have low rates of STIs (Crosby et al., 2001). Adolescents who engage in unprotected sex tend to perceive more barriers towards condom use (Sieving et al., 1997; Crosby et al., 2000), believe that condoms results in less pleasure (Sieving et al., 1997; Jemmott III, Jemmott, Spears, Hewitt, & Cruz-Collins, 1992; Hingson, Strunin, Berlin, & Heeren, 1990), hold more negative attitudes towards condom use (Fisher, Fisher, & Rye, 1995; Norris, & Ford, 1995) and perceive low susceptibility to STIs and HIV (Zimet et al.,, 1992; Hingson, Strunin, Berlin, & Heeren, 1990).

Increased condom use among males has been associated with belief in male responsibility for contraception, partner communication about sexually related topics, perceptions of partners' sexual inexperience, and being in an early stage of a relationship (Jemmott III et al., 1992). Condom use among miners in Sierra Leone though has been reported to be very low. Approximately 82.4% of miners indicated they had never used condom in their sexual intercourse in the 2008 HIV surveillance report (NAS, 2008). The statistics demonstrate that the majority of miners, who may transmit the HIV virus to their sexual partners, have not achieved effective HIV/AIDS prevention through consistent condom use.

**Commercial Sex**

There are very limited empirical data on the role of commercial sex transactions in the spread of HIV infections in different populations at different stages of the HIV epidemic. Commercial sex workers are known to be highly seroprevalent with low level of HIV/AIDS knowledge, and hence a high-risk group for HIV infection. Shokunbi (1991) found that commercial sex workers have the highest level of HIV infections in the major industrial cities of Lagos, Ibadan, Calabar, Port Harcourt, Enugu and Maiduguri in Nigeria. Orubuloye (1997) reported very low level knowledge of HIV transmission processes among commercial sex workers in Lagos, Nigeria. Mathematical models also suggest that female commercial sex workers (FCSWs) are at high risk of transmitting HIV to their clients and sexual partners because they are highly vulnerable to infection with HIV (Plummer et al. 1991). In Ghana, HIV was introduced in the Volta region by Ghanaian commercial sex workers who had migrated to Abidjan, Cote d'Ivoire with already high HIV seropositivity rate, and return to the Volta region (Sauve et al., 2002).

Hence, in populations, such as mining communities, where many men have sex with FCSWs and their partners concurrently, there is the high possibility of the occurrence of HIV epidemics (Anderson, May, Boily, Garnett, & Rowley, 1991). The importance though of FCSWs in HIV epidemics diminishes over time as the HIV prevalence increases in the general population (Robinson, Mulder, Auvert, Whitworth, & Hayes, 1999; Kamenga, Denison, White, MacNeil, & Sweat, 1995). Morrison et al. (2001) conducted a cross-sectional study of commercial sex and the spread of HIV in four sub-Saharan Africa cities. They reported higher HIV prevalence among commercial

sex workers in the East African cities of Kisumu (Kenya) and Ndola (Zambia) with higher HIV prevalence than in the West African cities of Cotonou (Benin) and Yaounde (Cameron) with relatively low HIV prevalence. The estimated number of commercial sex workers per 1000 men was also reported to be higher in the cities with high HIV prevalence. The unexpected and relatively high HIV prevalence among commercial sex workers in Cotonou despite the relatively low HIV prevalence in the male population (3%) was attributed to migration as 86% of the commercial sex workers were reported to have migrated from other countries, Ghana, Nigeria and Togo. However, the use of a condom and the high number of circumcised males may have limited the transmission of HIV from commercial sex workers to the general population, accounting for the low HIV prevalence in the general population in the city. The use of a condom by commercial sex workers in Thailand has also been shown to reduce the spread of HIV infection in the country (Hanenberg, Rojanapithayakorn, Kunasoi, & Sokal, 1994).

Financial incentive has been shown to drive the commercial sex trade in most countries as commercial workers use sex as their main source of income (Morrison et al., 2001). Miners usually engage in multiple sexual partnerships, particularly with commercial sex workers. Campbell (1997) showed that unprotected sex with commercial sex workers was very common, a compelling behavioral lifestyle choice, among underground migrant mine workers in the South African gold mines. Such a lifestyle choice was attributed to the stressful and socially impoverished working and living conditions of this particular group of mine workers in South Africa.

**Multiple Sexual Partnerships**

Relational characteristics have also been shown to play a critical role in influencing individual sexual risk behavior and the likelihood of acquiring STIs, including HIV/AIDS. Relational factors associated with high-risk sexual behavior or acquiring HIV infection among adolescent females include engagement in multiple sexual partnerships (Boyer et al., 2000; Fortenberry et al., 1999; Johnson, Nease, Parker, Fortenberry, & Cowan, 1993; Lewis, Melton, Succop, & Rosenthal, 2000; Rosenthal, Biro, Succop, Bemstein, & Stanberry, 1997; Millstein & Moscicki, 1995), longer duration of partnerships (Crosby et al., 2000; Fortenberry, Tu, Harezlak, Katz, & Orr, 2002; Plichta, Weisman, Nathanson, Ensminger, & Robinson, 1992), lack of relationship control (Crosby et al., 2000), fear of condom use negotiation (Sionean et al., 2002), and less frequent partner communication about sexually related topics (Sieving et al., 1997; Catania, Coates, Greenblatt, & Dolcini, 1989; Begley, Crosby, DiClemente, Wingood, & Rose, 2003).

African heterosexual men and women often tend to have long-term concurrent multiple sexual partnerships. This behavioral pattern may explain why HIV has spread so much more extensively in southern African states (Tanzania, Kenya, Uganda Lesotho and Zambia) with fewer lifetime sexual partners than in Thailand and Brazil (Rio de Janeiro), where men are more likely to report five or more causal sexual partners (Morris, 2002). The duration of the sexual partnership, the rate of sexual partner changes and the cumulative effect of the sexual acts in a given population seem to drive the spread and sustainability of HIV infection (May & Anderson, 1987). Using mathematical modeling,

Morris and Kretzschmar (1997) demonstrated that HIV transmission was much more rapid, and the resulting HIV epidemic ten times greater, in populations in which long-term and concurrent multiple sexual partnerships were common than in populations in which serial monogamy was the norm. The rapid spread of HIV was exacerbated by the higher viral load, and thus the infectivity of the virus (Quinn, Wawer, & Sewankambo, 2000), during the early period of the HIV infection (Pilcher, Tien, & Eron, 2004). The higher viral load puts everyone in the concurrent partnership network at risk of infection after the initial infection.

Long-term multiple sexual partnerships have proven a formidable challenge for the consistent use of condoms (Epstein, 2004; Hearst & Chen, 2004; Green, 2003; Ahmed, Lutalo, & Wawer, 2001; Bessinger, Akwara, & Halperin, 2003). People worldwide, including Africans, are likely to use condoms during casual and commercial sex transactions/encounters, but seldom used condoms consistently in longer-term sexual relationships in which there is a sense of commitment and trust (Hearst & Chen, 2004; Meekers, Klein, & Foyet, 2003; Flood, 2003).

### Review of Literature Related to Methods

Most epidemiologic research studies have used descriptive cross-sectional design to study sexual risk behaviors related to HIV/AIDS transmission and other STDs. The cross-sectional design seems appropriate for examining first-order associations, providing a snapshot of a pervasive public health issue, such as HIV/AIDS, and thereby helps assess the prevalence of a disease. It is also appropriate for estimating levels of knowledge about any given health threat or health protective behavior, and health-related

attitudes, beliefs, opinions and behaviors. It is suitable for identifying the association between behavioral variables for a given population, without modifications by research treatments (Aczel & Sounderpandian, 2006; Leedy & Ormrod, 2010; Simon, 2006).

Using cross-sectional design in assessing the prevalence of STDs, DiClemente et al. (2004) found a 24% prevalence rate of four STDs (Chlamydia trachomatis, Neisseria gonorrhoeae, Trichomonas vaginalis, or Treponema pallidum) among urban African American adolescent females attending a prenatal clinic in the southeast. Several studies have also used cross-sectional design to identify association between behavioral variables. Salazar et al. (2004) used cross-sectional design to demonstrate a significant association between self-concept (including self-esteem, body image, and ethnic identity) and the frequency of refusing unsafe sex among African American adolescent girls. Stulhifer et al. (2007) used cross-sectional design to show that knowledge about HIV/AIDS and the individual's perceived risk of HIV infection have marginal effects on heterosexual condom use among young adults in Croatia.

Moreover, cross-sectional design has also been used to evaluate the level of knowledge and condom use practices among commercial sex workers. Couture et al. (2010) demonstrated that more accurate HIV/AIDS knowledge and more favorable attitude towards condom use were good predictors of condom use intention among female commercial sex workers. Morrison et al. (2001) used standardized cross-sectional survey to show that the observed commercial sex patterns did not explain the differential spread of HIV in two cities with high HIV prevalence and two with relatively low HIV prevalence. However, they concluded that the high levels of condom use among

commercial sex workers may have slowed the spread of HIV infection from commercial sex workers in Cotonou, Benin, highlighting the importance of interventions among commercial sex workers and their clients. Lurie et al. (2002) also used cross-sectional design to investigate the association between migration and HIV infection among migrant and nonmigrant men and their rural partners in South Africa. The goal of the study was to determine risk-factors for HIV-1 infection, and concluded that migration is an independent risk factor for HIV infection among men.

Cross-sectional designs are very useful at determining or identifying associations between behavioral variables. However, they are limited in inferring causation and establishing directionality or distinguishing cause from effect (Salazar, Crosby & DiClemente, 2006). The use of successive independent samples design improves upon the time limitations of cross-sectional designs by incorporating a series of cross-sectional studies conducted over a period of time, often referred to as trend study (Salazar, Crosby, & DiClemente, 2006). Nonetheless, this quantitative study used a cross-sectional design, and further description of the study design and its limitations are presented in Chapter 3.

**Summary and Conclusions**

This chapter reviewed past literature that investigated behavioral risk factors of labor migration, condom use, multiple sexual partnerships and commercial sex related to HIV/AIDS infection. Seasonal labor migration has been shown as an independent and significant social risk factor for HIV-1 infection among both men and women mine workers, especially in Southern Africa with advanced stage of the HIV/AIDS epidemic. It has been demonstrated that it is the frequency of changing residence, the conditions and

structure of the migration process that put migrant mine workers at higher risk of HIV infection by engaging in unprotected sex without the use of a condom, concurrent long-term multiple sexual partnerships and commercial sex.

High self-efficacy and the consistent use of a condom have been shown to be effective in preventing sexual transmission of HIV/AIDS. However, the literature revealed that the effective HIV/AIDS prevention through consistent condom use has not been achieved by majority of miners in Sierra Leone, who may transmit the HIV virus to their sexual partners. People are likely to use condoms during casual and commercial sex transactions/encounters, but seldom use condoms consistently in longer-term sexual relationships in which there is a sense of commitment and trust. So, long-term multiple sexual partnerships pose a formidable challenge for the consistent use of condoms. Commercial sex workers are shown to be highly seroprevalent and thus a high-risk group of HIV infection, transmitting the virus to their clients and sexual partners.

Therefore, these relational factors are important to study within the burgeoning mining communities in Sierra Leone. An important gap in the current literature regards the full understanding the epidemiologic context of the relatively high HIV/AIDS prevalence rate (1.3%) among miners in Sierra Leone, and the potential socioeconomic effects for the mining industry. Understanding the contextual factors in mining communities within a socioecological model has important implications for the development of multilevel HIV intervention programs to reduce the risk of contracting HIV, thereby improving the health and wellbeing of miners and that of their partners and families.

Chapter 3 discussed the research methodology, population sampling, instrumentation, data collection and data analyses plan. Ethical standards and requirements in the conduct of the study were also discussed.

Chapter 3: Research Methodology

**Introduction**

The overall purpose of this study was to examine how mining-related labor migration influences HIV sexual behavioral risk factors of self-efficacy in condom use, multiple-sexual partnership, and commercial sex among miners in the Marampa Mines in Lunsar Town, Sierra Leone. This chapter presents the research methodology and the rationale of the study design to answer the specific research questions in the study. It further describes the survey instrumentation and the selection characteristics of the study population. Later, the chapter presents the data collection plan and analysis within ethical standard requirements. The concluding summary describes the assumptions and limitations of the study.

**Research Design and Rationale**

This quantitative study examined the associations between mining-related labor migration, as the independent variable, and dependent variables of HIV behavioral risk factors as the outcome measured by (a) self-efficacy for condom use, (b) multiple sexual partnership, and (c) commercial sex among miners in the Marampa mining communities in Lunsar Town, Port Loko, Sierra Leone. The rationale behind using the quantitative approach was that it attempts to systematically bring evidence from scientific research studies to bear on questions of policy and practice (Zara et al., 2000). A descriptive quantitative study may reduce researcher bias and produce data that may be measured in an objective fashion (Creswell, 1998, 2009).

A cross-sectional design was used to examine the association between labor migration and HIV behavioral risk factors. This study also included an examination of demographic, social, and behavioral data to help identify social and behavioral risk factors associated with HIV transmission in the study population.

## Sampling and Sampling Procedures

The study population for this research was mineworkers residing in the mining communities in Lunsar Town, Marampa Chiefdom, in Port Loko District in Sierra Leone. In 2004, Port Loko was the highest populated provincial district in the country with the total population of 453,746, occupying a total space of 5,719 km$^2$ (Bloch & Sesay, 2014). The bulk of the population was composed of persons between the ages of 18 and 35 years, with more women than men, and concentrated in four of the 11 chiefdoms of Kaffu Bullom, Koya, Marampa, and Maforki. As a consequence of mining, Lunsar's population is estimated to have tripled during the past 6 years (Bloch & Sesay, 2014)

Participants were recruited using a convenience sampling approach and they included miners 18 years of age and older working at the Marampa Mines in Lunsar. Statistical power analysis (Cohen, 1988; Lipsey & Wilson, 1993; Miles & Shevlin, 2007) was used to calculate the sufficient sample size for the study. An a priori analysis was performed using G*Power 3.0.10 statistical software (Faul, Erdfelder, Lang, & Buchner, 2007). Setting the alpha level at 0.05 (two-tailed), the effect size at 0.22, and 95% power for correlation, the sample size was estimated at 249 participants. The alpha level denotes that the probability of the research outcome being by chance is low and the chance of a null error is 5% (Goodwin, 2010). In investigating correlation between variables, the

effect size indicates how strong the relationship is between variables (Cohen, 1988). With

the power set at 0.95, there was 95% chance of detecting an existing association, which

was statistically significant. An a priori power analysis controls both the Type 1 error

probability α (i.e., the probability of incorrectly rejecting *H*o when it is in fact true) and

the Type 2 error probability β (i.e., the probability of incorrectly retaining *H*o when it is

in fact a false).

Table 1

*Protocol of Power Analysis using G\*Power*

| *t*-tests – Correlation: Point biserial model | | | |
|---|---|---|---|
| Analysis: | A priori: Compute required sample size | | |
| Input: | Tail(s) | = | 2 |
| | Effect size $\lvert\rho\rvert$ | = | 0.2236068 |
| | α err prob | = | 0.05 |
| | Power (1-β err prob) | = | 0.95 |
| Output: | Noncentrality parameter δ | = | 3.6201193 |
| | Critical t | = | 1.9696148 |
| | *df* | = | 247 |
| | Total sample size | = | 249 |
| | Actual power | = | 0.9501227 |

**Procedures for Recruitment, Participation, and Data Collection**

**Recruitment and Participation Procedures**

The recruitment procedure involved identification of potential participants

meeting a set of inclusion criteria, selection of participants using convenience sampling,

and the signing of the informed consent form (in English and Krio).

Convenience sampling was used to identify potential study participants who met the

following inclusion criteria:

1. Be a mineworker, 18 years or older.

2. Work at the Marampa mines in the Lunsar-Marampa Chiefdom, Port Loko
   District.

3. Reside in the mining communities in and around Lunsar Town, Port Loko
   District.

4. Ability to read and understand English and Krio, the lingua franca in Sierra
   Leone. Participants may withdraw participation immediately from the study if
   they could not understand the survey questions in English.

   The exclusion criteria included the following:

1. Potential participants outside the age specified in the inclusion criteria.

2. Potential participants who do not read and understand English.

3. Miners who are residing, but not working in the Marampa mines; they may be
   working at other mines outside of Lunsar.

The Human Resource Departments of London Mining Company (now TIMIS
Mining Corporation SL Ltd.) and facilitators from the Business Coalition on HIV/AIDS
in Sierra Leone provided a list of potential study participants on a voluntary basis that
met the set inclusion criteria. Potential participants were screened to ensure they met the
inclusion criteria. The facilitators from the Business Coalition on HIV/AIDS in Sierra
Leone attached to the various mining companies are known to be influential and usually
deal with labor and HIV/AIDS related issues with company management. The consent
forms (in English and Krio), which doubled as invitation letters; solicited subject
participation; and clearly outlined the study's objectives, the conditions of participation,

and the possible health implications of the findings. The consent forms were handed over in person by the researcher to the selected participants to read before completing the survey questionnaires. The completion of the survey questionnaires by the participants indicated implied consent to the terms outlined in the consent form and willingness to participate in the study on a voluntary basis.

**Data Collection Procedures**

Demographic, social and behavioral data relating to HIV/AIDS infection in the study population were collected using the public domain instruments, the demographic survey questionnaire (CDC, 2012), the Condom Use Self-Efficacy Scale (Brafford & Beck, 1991) and the HIV Behavioral Risk Assessment Survey (Donenberg, Emerson, Bryant, Wilson & Weber-Shifrin, 2001). Standardized survey questionnaires (pencil-and-paper) with brief close-ended questions were used in a self-administered setting to conduct the survey. Collected data were entered manually into an excel spreadsheet for data cleaning and then transferred into the SPSS software for analyses. Details of these instruments are discussed in the next section.

Study participants who have consented to take part in the study after reading the informed consent form were given verbal instructions on how to complete the survey questionnaires on their own. Study participants were fully informed about their rights and the potential risks or benefits of the study as outlined in the consent form. They were allowed to complete the questionnaires at their place of work in a private room or their home without the presence of the researcher to ensure the protection of their privacy, anonymity and confidentiality. Completed survey questionnaires were returned to or

collected by the researcher. Participants were also not required to answer questions they were not comfortable with, do not want to answer or do not understand them in English, and may as a result discontinue their participation in the study at that point. No follow-up to check the completeness of the collected questionnaires was made to ensure the voluntary nature of the study. Hence, incomplete survey questionnaires were discarded.

To ensure good quality data, the following precautionary measures, as outlined below, were taken during the administration of the survey questionnaires:

- The survey questionnaires were administered to ensure strict adherence to sample design.

- The same question wording and definition of terms used in the questionnaire were maintained through the administration of the survey questionnaires.

- Completed survey questionnaires were reviewed immediately after being collected to check for completeness, accuracy, and consistency. Incomplete survey questionnaires were discarded.

### Instrumentation and Operationalization of Constructs

Standardized survey questionnaire was developed by adopting selected questions from the following public domain instruments: (a) the CDC demographic survey, (b) the Condom Use Self-Efficacy Scale, and (c) the HIV Behavioral Risk Assessment Survey. The survey questionnaire consisted of three sections: (a) Demographic data, (b) Self-efficacy in condom use, and (c) HIV/AIDS sexual risk behavior. The standardized survey questionnaire was used as a measurement tool in this study to collect information from a sample of miners to elicit responses about their demographic characteristics, social and

sexual behaviors. Prior to completing the survey questionnaires, study participants were instructed about how the response scales was used (e.g., the meaning of the scale categories) to ensure they understood the terms to provide appropriate responses.

### Demographic Survey Questionnaire

The demographic survey questionnaire (Appendix A) adopted and modified from the CDC (2012), will be used to generate quantifiable data on age, sex, marital status, sexual orientation, educational level, housing status, migration status, employment status, and residency status/nationality. It was administered to measure the labor migration construct in the study. Labor migration was assessed by questions on place of birth (where is the miner born), place of work, residency status (where the miner lives and the length of residency) and family status (whether the miner lives with his/her family). Responses to questions on labor migration were coded as 1 = Yes, and 0 = No. Workers born outside the chiefdom and whose primary reason for residing in Lunsar was work were considered migrants. Local residents residing the mining communities were considered nonmigrants.

### Condom Use Self-Efficacy Scale

The Condom Use Self-Efficacy Scale (CUSES) (Appendix B), developed and validated by Bradford and Beck (1991), measured the condom use self-efficacy construct of the study. It assessed an individual's perception of his or her ability to use condoms in four subscales (Brien, Thombs, Mahoney, & Wallnau, 1994): 1) the mechanics (putting a condom on self or other), 2) partner disapproval (use of a condom with a partner's approval), 3) assertive (ability to persuade a partner to use a condom), and 4) intoxicants

(ability to use condom while under influence). This instrument has a significant degree of internal consistency supported by a Cronbach's alpha (entire scale) of 0.91 and a test-retest reliability (two-week) of 0.81.

In this study, the 10-item questionnaire used the Likert scale (Murphy & Likert, 1938). A Likert scale is an interval-level (sequential numerical) response format that uses a 5-point integer bipolar scale, ranging from 1 (*strongly disagree*) to 5 (Strongly *agree*) to analyze the responses, and determines the confidence levels for the respective opinions. A score of 1 (strongly disagree) implied "not confident" at all, while a score of 5 (Strongly agree) implied "completely confident". The final score for the respondent on the scale was the sum of the ratings for all of the items. The total score ranged from 5 to 50, with a higher scores indicating higher condom use self-efficacy.

### HIV/AIDS Behavioral Risk Assessment Survey Questionnaire

The HIV/AIDS Behavioral Risk Assessment Survey (ABRAS) questionnaire (Appendix C) was designed by Donenberg, Emerson, Bryant, Wilson, and Weber-Shifrin, (2001). This instrument was validated by Dowling, Johnson and Fisher (1994); showing high internal consistency measures, with Crohnbach's alpha ranging between 0.79 and 0.94. It assesses self-reported sexual behavior (e.g. lifetime sexual intercourse, frequency, contraceptive use, high-risk sexual behavior), drug/alcohol use (e.g., lifetime use, method of use, frequency), and needle use (e.g., sharing, tattooing, piercing) associated with HIV transmission in adolescents.

In this study, all the survey questions in the questionnaire were coded as 1 = Yes and 0 = No. Since questions on the "number of sexual partners" and the "number of times

a participants had sex" have a range of values, the responses were converted to $z$ score and then summed up to form a risk behavior outcome variable. The HIV/AIDS Behavioral Risk Index (HIV/AIDS-BRI) is being derived from the coded responses or $z$ scores to survey questions on condom use, multiple sexual partnerships, and commercial sex (Jones & Gulick, 2008; Susser, Desvarieux, & Wittkowski, 1998). This method of combining scores to create an index has been used in several studies investigating risk for HIV infection (Donenberg, Emerson, Bryant & King, 2006; Donenberg, Emerson, Bryant & Wilson, 2002; Jones & Gulick, 2008; Susser, Desvaieux & Wittkowski, 1998).

## Data Analysis Plan

The SPSS Version 11.5 was used to analyze the collected data. SPSS (Nie & Hull, 1968) is a widely used software application for statistical analysis in social science research by educational, marketing and health research institutions. The first step of the data analysis plan was a descriptive statistics computation (mean, standard deviation, and frequency) of the participants' demographic, social and risk behavior characteristics to provide an overall description of the study sample (Table 2). Inconsistencies and outliers were checked to ensure accuracy of data. Binary logistic regression analysis was used for the categorical variables (labor migration, multiple sexual partnerships and commercial sex engagement), and simple linear regression analysis was used for the ordinal variables (self-efficacy in condom use). The regression analysis assumed conditions of linearity of relationships, equal variance (homoscedasticity), and sampling independence from a population in which the variables have bivariate normal distributions (Gerstman, 2008). Linearity referred to the straight-line form of the independent and dependent variables.

Sampling independence relates to the sampling of bivariate observations, and there should be no pairing, matching, or repeated measurement of individuals. Normality referred to the distribution of residuals, and the spread of the residuals (variance) should be homogenous at all levels of the independent (explanatory) variable.

The next step was a determination of the bivariate and multivariate correlations among the independent variable (labor migration) and dependent variables (condom use self-efficacy, multiple sexual partnership and commercial sex) to test the hypotheses using simple linear and binary logistic regression analyses. Hypothesis testing was used to determine the statistical significance of the regression coefficient.

Table 2

*Study Variables and Their Nature*

| Variables | Nature |
| --- | --- |
| Independent variable - Labor migration | Categorical (nominal) |
| Dependent variable - Self-efficacy in condom use | Ordinal (summed scaled) |
| Dependent variable - Engagement in multiple sexual partnership | Categorical (nominal) |
| Dependent variable - Engagement in commercial sex | Categorical (nominal) |
| Demographic variables: Gender, marital status, nationality, religion, sexual orientation, educational level, employment status and place of birth | Categorical (nominal) |
| Demographic variable: Age and place of birth | Numerical (continuous) |

**Research Question(s)**

The overarching study research question was, "Is there a relationship between labor migration (independent variable) and HIV risk behaviors (outcome) as measured by

(a) self-efficacy for condom use, (b) multiple sexual partnerships, and (c) commercial sex?" HIV risk behaviors were measured using the HIV Behavioral Risk Index. The overarching research question was answered by the following subquestions:

**Research Question 1:** Is there an association between labor migration and self-efficacy for condom use (as measured by the Condom Use Self-Efficacy Scale)?

Null Hypothesis 1 ($H_{01}$): There is no association between labor migration and self-efficacy for condom use (as measured by the Condom Use Self-Efficacy Scale).

Alternative Hypothesis 1 ($H_{a1}$): There is an association between labor migration and self-efficacy for condom use (as measured by the Condom Use Self-Efficacy Scale).

**Research Question 2:** Is there an association between labor migration and having multiple sexual partners among miners (as measured by the Behavioral Risk Index)?

Null Hypothesis 2 ($H_{O2}$): There is no association between labor migration and having multiple sexual partners among miners (as measured by the Behavioral Risk Index).

Alternative Hypothesis 2 ($H_{a2}$): There is an association between labor migration and having multiple sexual partners among miners (as measured by the Behavioral Risk Index).

**Research Question 3:** Is there an association between labor migration and engagement in commercial sex among miners (as measured by the HIV Behavioral Risk Index)?

Null Hypothesis 3 ($H_{O3}$): There is no association between labor migration and

engagement in commercial sex among miners (as measured by the Behavioral Risk

Index).

Alternative Hypothesis 3 *($H_{a3}$)*: There is an association between labor migration

and engagement in commercial sex among miners (as measured by the Behavioral Risk

Index).

The data analysis matrix (Table 3) provides an overview of the data analysis plan.

Table 3

*Data Analysis Matrix*

| Research question | Data source | Level of measurement | Analysis procedures |
|---|---|---|---|
| Overarching research question: Is there a relationship between labor migration and HIV risk behaviors? | Survey Instrument: 1 – Demographic Survey; 2 - Behavioral Risk Index; | Ordinal, categorical variables and summed constructed variables (scale): Labor Migration (IV); Condom Use Self-Efficacy (DV); Multiple Sexual partnerships (DV); Commercial Sex (DV) | Descriptive statistics, logistic and linear regression analysis |
| Research Question 1: Is there an association between labor migration and condom use self-efficacy? | Survey Instrument: 1 – Demographic Survey; 2 -Condom Use Self-Efficacy Scale | Ordinal, categorical variables and summed constructed variables (scale): Labor Migration (IV); Condom Use Self-Efficacy (DV). | Descriptive statistics, logistic and linear regression analysis |
| Research Question 2: Is there an association between labor migration and having multiple sexual partners among miners? | Survey Instrument: 1 - Demographic Survey; 2 – HIV Behavioral Risk Assessment Survey | Categorical variables: Labor Migration (IV); Multiple Sexual Partnerships (DV). | Descriptive statistics, logistic regression analysis |
| Research Question 3: Is | Survey Instrument: 1 - | Categorical | Descriptive |

| there an association between labor migration and engagement in commercial sex among miners? | Demographic Survey; 2 – HIV Behavioral Risk Assessment Survey | variables: Labor Migration (IV); Commercial Sex (DV). | statistics, logistic regression analysis |

**Threats to Validity**

The validity and reliability of measurements of sensitive sexual risk behaviors are very important because the accuracy of measurements allow researchers to estimate their prevalence in the study population. The accuracy of measurement further allows for the assessment of the characteristics (behaviors) of the study sample and the socioecological environment associated with the risk (Zimmerman, Atwood, & Cupp, 2006). Such information helps in resource allocation and planning, rigorous evaluation of intervention programs, and in the development of theoretical models of behavior change. Validity (internal or external) is defined as the degree to which study variable and its response alternatives measure the study constructs they are suppose to measure, while reliability is the degree to which a measure produces stable and consistent results (Bainbridge, 1989). There are several threats to research validity when measuring sensitive sexual behaviors. Research validity refers to the best available approximation to the truth of a given proposition, inference, or conclusion about the quality of the research measures (Trochim & Donnelly, 2008). An instrumentation threat is not likely because the survey instruments have been standardized and validated in several research studies, and the study design does not involve participants who might improve or change over time during the conduct of the survey.

The use of the convenience sampling method makes the study sample inherently biased as it targets only miners residing in the Lunsar Township. The study did not include a control group of non-miners in the population. Convenience sampling is a nonprobability sampling method used to recruit participants on the basis of their availability and proximity during the conduct of the survey (Castillo, 2009). The convenience sample may be systematically different, and therefore, not representative of the population of miners in the district or country. This will limit the generalizability (external validity) (Cook & Campbell, 1979; Shadish, Cook & Campbell, 2002) of the study findings, inferences and/or conclusions to the wider mining population. Replicating this study in different mining populations in different parts of the country and at different times may strengthen the external validity.

Study participants often feel a bit uncomfortable about telling the truth in reporting health or sensitive sexual risk behaviors based on cognitive (or remembering of events) and/or situational factors (settings and circumstances of the survey administration) (Brener, Billy, & Grady, 2003). Such sensitive sexual risk behaviors included engaging in sex without a condom, commercial sex in exchange for money, and multiple sexual partnerships, Thus, biases may emerge when obtaining estimates of self-reported behaviors and during the design and administration of the survey questionnaires (Zimmerman, Atwood, & Cupp, 2006). Information bias (Dicker, 2008) may occur when respondents tend to under- or over-report sensitive risky behaviors in order to appear more socially desirable (DeMaio, 1984) or for fears of reprisal. Clearly explaining and

strictly adhering to the privacy and confidentiality guarantees provided in the consent form may reduce social desirability bias.

Another possible source of information bias that may have occurred is the recall bias, when some respondents are more likely than the others to remember and report a behavior. To minimize information bias, standardized survey questionnaires – (a) demographic survey, (b) condom use self-efficacy scale, and (c) HIV behavioral risk assessment survey – were used. Other measures were not to inform the study participants of the study's specific hypotheses, and participants provided with memory aids, such as calendars, to aid participants' recall. Direct and simpler questions, estimates on the most recent past and shorter periods on the frequency of a given behavior were asked to improve the accuracy and validity of responses (Brener, Billy, & Grady, 2003). The drawback to this approach however, could be that a relatively shorter period may not be long enough to capture sufficient numbers of events for meaningful statistical analysis. Attention was also paid on the sequencing and placement of questions. Sensitive questions were asked in the middle of the survey to increase the likelihood that respondents will answer them (Bachman & O'Malley, 1981).

## Ethical Procedures

The Protocol for Human Subjects in Research (PHSR) was completed and submitted to Walden University's Institutional Review Board (IRB) for approval. The IRB approval (No.: 05-28-15-0137459) to commence data collection was issued on the 28th May 2015 with an expiration date of 27th May 2016. Provisions in the protocol protect participants' rights and minimize the risk of harm. The conduct of this study was

guided by the principle of voluntary participation, and therefore, prospective study participants were required to read the informed consent form prior to commencement of data collection. The consent form (in English and Krio) clearly and fully described the nature of the study, research procedures, potential risks involved, and the right of the participants to withdraw from the study at any time without penalty or repercussions.

Further, to help protect the privacy of study participants, the principles of confidentiality and anonymity were strictly adhered to throughout the conduct of this study. Study participants were not assigned unique identification numbers to allow participants to remain anonymous throughout the study. Special attention were also paid to Protected Health Information as defined in the Health Insurance Portability and Accountability Act of 1996 (HIPAA), and therefore participants' names and other identifying elements or information (address, date of birth, etc.) were not collected and/or published in the dissertation or elsewhere. Data collected in this study will also be kept safe for seven years on a password-protected personal computer, and deleted thereafter.

## Summary

In this chapter, I described the research methodology, including the study design and rationale; sample size of study population; procedures for recruitment on a voluntary basis, and data collection using adopted survey instruments in the public domain; and the data analysis plan. The chapter also discussed the need to meet prescribed ethical standards and principles in protecting the rights and provide safety measures of potential study participants who might be at risk of harm during the conduct of the research. In Chapter 4, I presented details of the research findings and analyses of the results. In

Chapter 5, I discussed the findings from Chapter 4, and how they relate to the purpose of

the study, and the implications of the research for furthering educational and social

interventions for the prevention of HIV/AIDS transmission in mining communities.

Chapter 4: Results and Analysis

**Introduction**

The purpose of this study was to understand the epidemiologic dynamics between labor migration and the sexual risk behaviors related to HIV transmission in mining communities in Lunsar, Sierra Leone. Chapter 4 provides details of the sample data collected, a demographic description of the study sample, and analysis according to each research question. The chapter ends with a summary.

**Participants Recruitment and Data Collection**

Research approvals from the key community stakeholders, including the mining company, London Mining (now TIMIS Mining Corporation Ltd.), the Chairman of the Port Loko District Council, the Paramount Chief of Marampa Chiefdom, and the District Health Medical Officer of Port Loko District were sought to collect data for the study. The researcher contacted a total of 330 participants from the list the potential participants meeting the set inclusion criteria, and provided by the Human Resource Department of the mining company and the Business Coalition for HIV/AIDS. Participants were contacted by phone and handed a paper questionnaire, a "Thank You Card" and an informed consent form that doubled as invitation letter. Completion of the questionnaire indicated informed consent to the terms described in the consent form and the willingness to participate, and therefore participants were not required to sign the consent form to protect their privacy, confidentiality and ensure anonymity. As was required for IRB approval (No.: 05-28-15-0137459), the consent form in English was also translated into Krio (with back translation), the lingua franca in Sierra Leone, to ensure that participants

understand the content of the consent form. Completed survey questionnaires were returned to the researcher.

A total of 298 participants responded to the survey on a voluntary basis, a 90 % response rate. Participants were not required to answer questions they were not confortable with or do not want to answer or do not understand the question in English, and may as a result discontinue participation in the study at that point of the survey. Collected data were entered into an excel spreadsheet for data cleaning and later imported into SPSS software for analysis. Outliers were examined using standardized values of the variables; any scores greater than 3.29 or less than -3.29 were excluded as an outlier (Tabachnick & Fidell, 2012). Two participants were removed for outliers of age. Thus the number of participants used in the final analysis was 296.

## Sample Demographics

The majority of the participants were Sierra Leoneans (288, 97%), males (201, 68%), heterosexual (204, 69%) and married (162, 55%). A total of 191 (65%) identified as Muslim. Most of the participants' highest level of education was vocational schooling (111, 38%). The majority of the participants were local residents and were considered nonmigrants (253, 86%).

The frequencies and percentages of the demographics are reported in Table 4.

Table 4

*Frequencies and Percentages of Demographic Features (n = 296)*

| Demographic | *n* | % |
|---|---|---|
| Gender | | |
| Male | 201 | 68 |

| | | |
|---|---:|---:|
| Female | 82 | 28 |
| Prefer not to answer | 13 | 4 |
| Marital status | | |
| Single | 88 | 30 |
| Married | 162 | 55 |
| Divorced | 19 | 6 |
| Widowed | 7 | 2 |
| Separated | 1 | < 1 |
| Prefer not to answer | | |
| Nationality | | |
| Sierra Leonean | 288 | 97 |
| Foreign national | 2 | 1 |
| Prefer not to answer | 6 | 2 |
| Religion | | |
| Muslim | 191 | 65 |
| Christian | 99 | 33 |
| Prefer not to answer | 6 | 2 |
| Sexual orientation | | |
| Heterosexual | 204 | 69 |
| Homosexual | 5 | 2 |
| Bisexual | 76 | 26 |
| Not Sure | 5 | 2 |
| Prefer not to answer | 6 | 2 |
| Level of Education | | |
| No schooling | 8 | 3 |
| Primary school | 12 | 4 |
| Secondary school | 103 | 35 |
| Vocational | 111 | 38 |
| College or Higher | 62 | 21 |
| Residence | | |
| Local residence (nonmigrants) | 253 | 86 |
| Company residence (migrants) | 36 | 12 |
| Prefer not to answer | 7 | 2 |

Note: Due to rounding, some percentages may not sum to 100%

Overall, the study sample consisted of 195 (66%) who reported engaging in multiple sexual partnerships and 108 (37%) in commercial sex in the past 12 months. Of the heterosexual subsample, 154 (76%) engaged in multiple sexual partnerships, and 82 (37%) engaged in commercial sex. Three (60%) of the homosexual sub-sample engaged in multiple sexual partnerships and 3 (60%) in commercial sex, whereas 35 (46%) of

bisexuals engaged in multiple sexual partnerships and 20 (26%) engaged in commercial

sex. Sixty-six percent (166) of the local residents engaged in multiple sexual partnerships

and 35 percent (89) engaged in commercial sex. Seventy-two percent (26) of the

company residents indicated engaging in multiple sexual partnerships and 42 percent (15)

in commercial sex.

Results of the risk behavior assessment are presented in Tables 5 and 6 below.

Table 5

*Instances of Multiple Sexual Partners Overall and for Different Sexual Orientations and Residence*

| HIV Risk behaviors | *n* | *%* |
|---|---|---|
| | | |
| HIV Risk behaviors (overall) | | |
| Multiple partners | 195 | 66 |
| One or fewer sexual partners | 101 | 34 |
| Risk behaviors by sexual orientation | | |
| Heterosexual | 204 | 69 |
| Multiple partners | 154 | 76 |
| One or fewer sexual partners | 50 | 24 |
| Homosexual | 5 | 2 |
| Multiple partners | 3 | 60 |
| One or fewer sexual partners | 2 | 40 |
| Bisexual | 76 | 26 |
| Multiple partners | 35 | 46 |
| One or fewer sexual partners | 41 | 54 |
| Risk behaviors by residence | | |
| Local residence (nonmigrants) | 253 | 86 |
| Multiple partners | 166 | 66 |
| One or fewer sexual partners | 87 | 34 |
| Company residence (migrants) | 36 | 12 |
| Multiple partners | 26 | 72 |
| One or fewer sexual partners | 10 | 28 |

Table 6

*Instances of Commercial Sex Overall and for Different Sexual Orientations and Residence*

| HIV Risk behaviors | *n* | % |
|---|---|---|
| HIV Risk behaviors (overall) | | |
|     Engaged in commercial sex | 108 | 37 |
|     Did not engage in commercial sex | 188 | 63 |
| Risk behaviors by sexual Orientation | | |
|     Heterosexual | 204 | 69 |
|       Engaged in commercial sex | 82 | 40 |
|       Did not engage in commercial sex | 122 | 60 |
|     Homosexual | 5 | 2 |
|       Engaged in commercial sex | 3 | 60 |
|       Did not engage in commercial sex | 2 | 40 |
|     Bisexual | 76 | 26 |
|       Engaged in commercial sex | 20 | 26 |
|       Did not engage in commercial sex | 56 | 74 |
| Risk behaviors by residence | | |
|     Local residence (nonmigrants) | 253 | 86 |
|       Engaged in commercial sex | 89 | 35 |
|       Did not engage in commercial sex | 164 | 65 |
|     Company residence (migrants) | 36 | 12 |
|       Engaged in commercial sex | 15 | 42 |
|       Did not engage in commercial sex | 21 | 58 |

Overall, 53% of the participants reported to sometimes use condoms in vaginal sex (*n* = 157), 66% reported to never used condoms in anal sex (*n* = 195), and 54% reported to never use condoms in oral sex (*n* = 159). Of the participants who reported to be heterosexual, 56% used condoms sometimes for vaginal sex (*n* =114), 64% never used condoms in anal sex (*n* = 131), and 52% never used condoms in oral sex (*n* = 105). The participants who stated they were homosexual, 40% said that they always used condoms for vaginal (*n* = 2), anal (*n* = 2), and oral (*n* = 2) sex. Of the bisexual participants, almost half use condoms sometimes during vaginal sex (37, 49%), while the majority never use

condoms for anal (59, 78%) and oral sex (48, 63%). Of the local residents, 49% used

condoms sometimes during vaginal sex ($n = 124$), but 66% never used condoms during

anal sex ($n = 168$) and 52% never used condoms during oral sex ($n = 132$). Of the

participants living at the company residence, the majority use condoms sometimes during

vaginal sex (29, 81%) and never during anal (22, 61%) and oral (22, 61%) sex. The

frequencies and percentages for levels of condom use are presented in Table 7.

Table 7

*Levels of Condom Use by Different Sexual Orientations and Residence*

| Condom use | Vaginal | | Anal | | Oral | |
|---|---|---|---|---|---|---|
| | *n* | % | *n* | % | *n* | % |
| Condom use (overall) | | | | | | |
| Always | 50 | 17 | 15 | 5 | 54 | 18 |
| Sometimes | 157 | 53 | 48 | 16 | 56 | 19 |
| Never | 88 | 30 | 195 | 66 | 159 | 54 |
| Do not participate | 1 | < 1 | 38 | 13 | 27 | 9 |
| Condom use by sexual orientation | | | | | | |
| Heterosexual | 204 | 69 | 204 | 69 | 204 | 69 |
| Always | 31 | 15 | 6 | 3 | 37 | 18 |
| Sometimes | 114 | 56 | 35 | 17 | 38 | 19 |
| Never | 58 | 28 | 131 | 64 | 105 | 52 |
| Do not participate | 1 | 1 | 32 | 16 | 24 | 12 |
| Homosexual | 5 | 2 | 5 | 2 | 5 | 2 |
| Always | 2 | 40 | 2 | 40 | 2 | 40 |
| Sometimes | 2 | 40 | 2 | 40 | 1 | 20 |
| Never | 1 | 20 | 1 | 20 | 2 | 40 |
| Do not participate | 0 | 0 | 0 | 0 | 0 | 0 |
| Bisexual | 76 | 26 | 76 | 26 | 76 | 26 |
| Always | 13 | 17 | 5 | 7 | 10 | 13 |
| Sometimes | 37 | 49 | 10 | 13 | 16 | 21 |
| Never | 26 | 34 | 59 | 78 | 48 | 63 |
| Do not participate | 0 | 0 | 2 | 3 | 2 | 3 |
| Condom use by residence | | | | | | |
| Local residence (nonmigrants) | 253 | 86 | 253 | 86 | 253 | 86 |
| Always | 47 | 19 | 14 | 6 | 52 | 21 |
| Sometimes | 124 | 49 | 42 | 17 | 52 | 21 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Never | 82 | 34 | 168 | 66 | 132 | 52 |
| Do not participate | 0 | 0 | 29 | 11 | 17 | 7 |
| Company residence (migrants) | 36 | 12 | 36 | 12 | 36 | 12 |
| Always | 2 | 6 | 1 | 3 | 1 | 3 |
| Sometimes | 29 | 81 | 4 | 11 | 3 | 8 |
| Never | 4 | 11 | 22 | 61 | 22 | 61 |
| Do not participate | 1 | 3 | 8 | 22 | 10 | 28 |

The youngest participant reported to be 18 years of age while the oldest participant was 61 years. The mean age was 33.58 ($SD = 7.90$). Condom self-efficacy scores for local residents ranged from 10 to 50 with $M = 31.75$ and $SD = 11.22$. Condom self-efficacy scores for migrants ranged from 19 to 50 with $M = 38.83$ and $SD = 6.38$. Condom self-efficacy scores for heterosexuals ranged from 10 to 50 with $M = 32.64$ and $SD = 10.33$. Condom self-efficacy for homosexuals ranged from 10 to 50 with $M = 35.20$ and $SD = 15.09$. Condom self-efficacy for bisexuals ranged from 10 to 50 with $M = 32.70$ and $SD = 12.08$. Condom self-efficacy for participants who responded "not sure" for sexual orientation ranged from 10 to 46 with $M = 26.00$ and $SD = 15.83$. The means and standard deviations for these continuous variables are presented in Table 8.

Table 8

*Means and Standard Deviations of Continuous Variables*

| Score | Min. | Max. | *M* | *SD* |
|---|---|---|---|---|
| Age | 18 | 61 | 33.58 | 7.90 |
| Condom self-efficacy for local residents | 10 | 50 | 31.75 | 11.22 |
| Condom self-efficacy for migrants | 19 | 50 | 38.83 | 6.38 |
| Condom self-efficacy for heterosexuals | 10 | 50 | 32.64 | 10.33 |
| Condom self-efficacy for homosexuals | 10 | 50 | 35.20 | 15.09 |
| Condom self-efficacy for bisexuals | 10 | 50 | 32.70 | 12.08 |
| Condom self-efficacy for uncertain sexual orientation | 10 | 46 | 26.00 | 15.83 |

**Results**

To examine each of the three research questions, a series of regression analyses were

conducted.

**Research Question 1*:***

Is there an association between labor migration and self-efficacy for condom use

(as measured by the Condom Use Self-Efficacy Scale)?

Null Hypothesis 1 ($H_{O1}$)*:* There is no statistically significant relationship between

labor migration and self-efficacy for condom use.

*Alternative Hypothesis* ($H_{a1}$)*:* There is a statistically significant relationship

between labor migration and self-efficacy for condom use.

To analyze Research Question 1, a simple linear regression was proposed by the

researcher. Before conducting the analysis, the assumptions of a simple linear regression

were assessed; specifically the researcher tested the assumptions of normality in the data

set and homoscedasticity of the error terms. To assess normality, the normal P-P plot was

used. As there were no major deviations from the hypothetical normal line, the

assumption of normality was met (Tabachnick & Fidel, 2012). To assess

homoscedasticity, or equal variance of error terms, a scatterplot of regression

standardized residual as a function of the regression standardized predicted values was

assessed. The scatterplot indicated that the assumption of homoscedasticity was met since

the plot did not deviate greatly from a random and rectangular distribution (Stevens,

2009).

Since the assumptions were met, the simple linear regression was conducted with residence as the independent variable and condom self-efficacy as the dependent variable. The results of this analysis indicated that residence is a significant predictor of condom self-efficacy ($F(1, 287) = 13.67$, $p < .001$, $R^2 = .05$). This suggests that the null hypothesis can be rejected in favor of the alternative. The coefficient of determination, $R^2$, of .05 suggests that 5% of the variation in condom self-efficacy scores was explained by the independent variable. Residence was found to be significant predictor using the $t$ test ($t = 3.70$, $p < .001$). The positive value of the regression coefficient ($B$) for the residence variable suggests that migrants have a level of condom self-efficacy 7.08 units greater than local residents. Results of the analysis are presented in Table 9.

Table 9

*Results of Condom Self-Efficacy regresses on Residence*

| Predictor | B | SE | β | t | p |
|---|---|---|---|---|---|
| Residence | 7.08 | 1.92 | .213 | 3.70 | < .001 |

*Note.* $F(1, 287) = 13.67$, $p < .001$, $R^2 = .05$

**Research Question 2*:*

Is there an association between labor migration and having multiple sexual partners among miners (as measured by the Behavioral Risk Index)?

Null Hypothesis ($H_{O2}$): There is no statistically significant relationship between labor migration and having multiple sexual partners among miners.

Alternative Hypothesis ($H_{a2}$): There is a statistically significant relationship between labor migration and having multiple sex partners among miners.

To assess Research Question 2, three binary logistic regressions were conducted in which the independent variable was residence and the dependent variable was multiple partners in the past 12 months. There was one regression analysis conducted for each type of sexual encounter (vaginal, anal, and oral). The only assumption to assess was a mutually exclusive and exhaustive dependent variable (Lehmann, 2006). The dichotomous nature of the dependent variable with responses yes and no means that it is mutually exclusive and exhaustive, and the assumption was met.

Since the assumption was met, the first binary logistic regression was conducted with vaginal sex with multiple partners in the past 12 months as the dependent variable and residence as the dependent variable. The results of the binary logistic regression did not indicate a significant relationship, $\chi^2(1) = 1.28$, $p = .258$, Nagelkerke $R^2 = .01$. Thus, the regression indicated that residence is not a predictor of vaginal sex in the past 12 months among miners, and the null hypothesis is accepted. Results of the regression are presented in Table 10.

Table 10

*Binary Logistic Regression with Residence Predicting Vaginal Sex in the past 12 Months Among Miners*

| Source | B | SE | Wald | p | OR | 95% CI for OR |
|---|---|---|---|---|---|---|
| Residence | 0.45 | 0.41 | 1.21 | .271 | 1.59 | [0.70, 3.49] |

*Note.* $\chi^2(1) = 1.28$, $p = .258$, Nagelkerke $R^2 = .01$

The second binary logistic regression was conducted to assess if residence is a predictor of anal sex in the past 12 months among miners. The results of the regression indicate that the model is not significant, $\chi^2(1) = .00$, $p = .993$, Nagelkerke $R^2 = .00$. Thus, we accept the null hypothesis that there is not a statistically significant relationship between residence and anal sex in the past 12 months. Results of the regression are presented in Table 11.

Table 11

*Binary Logistic Regression with Residence Predicting Anal Sex in the past 12 Months Among Miners*

| Source | B | SE | Wald | p | OR | 95% CI for OR |
|---|---|---|---|---|---|---|
| Residence | 0.01 | 0.52 | 0.00 | .993 | 1.01 | [0.37, 2.76] |

Note. $\chi^2(1) = .00$, $p = .993$, Nagelkerke $R^2 = .00$

The third binary logistic regression was conducted to determine if residence is a predictor of oral sex in the past 12 months among miners. The results of the regression suggest that there is not a significant relationship between the two variables, $\chi^2(1) = .51$, $p = .477$, Nagelkerke $R^2 = .00$. Thus, the null hypothesis is accepted that there is not a statistically significant relationship between residence and oral sex in the past 12 months. Results of the binary logistic regression are presented in Table 12.

Table 12

*Binary Logistic Regression with Residence Predicting Oral Sex in the past 12 Months Among Miners*

| Source | B | SE | Wald | p | OR | 95% CI for OR |
|---|---|---|---|---|---|---|
| Residence | 0.27 | 0.38 | 0.49 | .483 | 1.31 | [0.62, 2.80] |

Note. $\chi^2(1) = .51$, $p = .477$, Nagelkerke $R^2 = .00$

**Research Question 3***:*

Is there an association between labor migration and engagement in commercial sex among miners (as measured by the HIV Behavioral Risk Index)?

Null Hypothesis ($H_{O3}$): There is no statistically significant relationship between labor migration and engagement in commercial sex among miners.

Alternative Hypothesis ($H_{a3}$): There is a statistically significant relationship between labor migration and engagement in commercial sex among miners.

To assess Research Question 3, three binary logistic regressions were conducted; in each regression, residence was the independent variable and engagement in commercial sex was the dependent variable. Three regressions were conducted, with one for each of the three types of sex (vaginal, anal, oral) that were possible for commercial engagement. The assumption of a mutually exclusive and exhaustive dependent variable was met because the dichotomous dependent variable is either yes or no, which is mutually exclusive and exhaustive.

The first binary logistic regression for Research Question 3 assessed the relationship between residence and vaginal sex with a commercial sex worker. The regression indicated that there is not a statistically significant relationship between the two variables, $\chi^2(1) = .31$, $p = .580$, Nagelkerke $R^2 = .00$. Thus, the null hypothesis is accepted. Results of the regression are presented in Table 13.

Table 13

*Binary Logistic Regression with Residence Predicting Vaginal Sex with a Commercial Sex Worker*

| Source | B | SE | Wald | p | OR | 95% CI for OR |
|--------|---|----|----|---|----|--------------| 
| Residence | 0.21 | 0.38 | 0.31 | .483 | 1.23 | [0.59, 2.57] |

Note. $\chi^2(1) = .31$, $p = .580$, Nagelkerke $R^2 = .00$

The second binary logistic regression examined whether residence is a predictor of anal sex with a commercial worker. The regression indicated that there was not a significant relationship between the independent and dependent variables, $\chi^2(1) = .79$, $p = .373$, Nagelkerke $R^2 = .01$. The null hypothesis, that there is not a statistically significant relationship between residence and anal sex with a commercial worker, is accepted. Results are presented in Table 14.

Table 14

*Binary Logistic Regression with Residence Predicting Anal Sex with a Commercial Worker*

| Source | B | SE | Wald | p | OR | 95% CI for OR |
|--------|---|----|----|---|----|--------------| 
| Residence | -0.83 | 1.05 | 0.63 | .427 | 0.44 | [0.06, 3.39] |

Note. $\chi^2(1) = .79$, $p = .373$, Nagelkerke $R^2 = .01$

**Summary**

Chapter 4 provided a discussion of the data collection procedure, sample population, and statistical analyses according to each research question. To examine Research Question 1, a simple linear regression was conducted wherein condom self-efficacy was regressed onto migration status. Results of this analysis indicated a significant relationship, where migrants were predicted to have condom self-efficacy scores 7.08 units higher than nonmigrants.

The analysis of Research Question 2 centered on three binary logistic regressions intended to determine the relationships between migrant status and multiple sex partners in the past 12 months. These analyses were conducted to predict instances of multiple sex partners for each sexual practice on the survey, including vaginal, oral, and anal sex. None of these models provided a good fit, and could not be used to predict instances of multiple partners in the past 12 months.

The analysis of Research Question 3 also included three binary logistic regressions. These were intended to determine the relationships between migrant status and sex with a commercial sex worker in the past 12 months. These analyses were conducted to predict instances of sex with a commercial sex worker for each sexual practice on the survey. As for the multiple sex partner variable, participants responded to questions regarding vaginal, oral, and anal sex. None of these models provided a good fit, and could not be used to predict instances of sex with a commercial sex worker. Chapter 5 will provide an interpretation of these results and discuss limitations and recommendations for action.

Chapter 5: Discussion, Conclusions, and Recommendations

**Introduction**

The overall purpose of this study was to examine the association between labor migration defined by residence, and the sexual risk behaviors related to HIV transmission as the outcome measured by self-efficacy in condom use, multiple sexual partnerships, and engagement in commercial sex among miners in the Marampa Mines in Lunsar, Sierra Leone. The study was grounded in the ecological model, and a cross-sectional design was used to survey 296 miners using a paper questionnaire constituting a demographic survey, the Condom Use Self-Efficacy Scale, and the HIV Behavioral Risk Assessment Survey. In Chapter 4, the results of the simple linear regression analysis of Research Question 1 indicated a significant relationship between labor migration and condom self-efficacy, where migrants were predicted to have condom self-efficacy scores 7.08 units higher than nonmigrants. However, the results of the binary logistic regression analyses of Research Questions 2 and 3 showed no statistically significant relationship between labor migration, and engagement in multiple sexual partnerships, and commercial sex among mineworkers in mining communities in Lunsar. Chapter 5 will provide an interpretation of these results and discuss limitations and recommendations for action.

**Interpretation of Results**

The results of the simple linear regression analysis of research question1 indicated a significant relationship between labor migration and condom self-efficacy, indicating that residence was a significant predictor of condom self-efficacy using the *t* test (t =

3.70, p < .001). Migrant mineworkers in company residence (12%) were thus predicted to have a level of condom self-efficacy 7.08 units higher than nonmigrants (local residents), which constitute 86% of the sample size. Labor migration was seen in this study as the structural construct that influences the individual sexual risk factors of self-efficacy for condom use.

The association between labor migration and condom use self-efficacy could be better explained by the ecological model, which assumes that affecting changes in the social and structural environment, in this case, residence in the local communities or company residence, will influence individual sexual risk behavior, condom use self-efficacy. According to Brofenbrenner's ecological model (1977, 1979), multiple levels of influence in the social and physical environment tend to shape individual sexual risk behaviors, and these levels of influence include institutional/structural factors such as mining company residence with structural and organizational characteristics, and community factors. As Seidman (1988) pointed out, these kinds of settings, company residence and local communities, are characterized by peculiar connections, shared goals, relationships, continuity or interdependencies with a higher degree of social complexities. Other studies have also shown that socioecologic factors, such as residence as is the case in this study, do influence high-risk sexual behaviors (Mechanic, 1990; Kippax & Crawford, 1993; Zwi & Cabral, 1991).

The consistent use of condom has been shown to be effective in preventing transmission of STIs or STDs, including HIV/AIDS (Roper, Peterson & Curran, 1993). The results of this study showed that the majority of migrant workers in company

residence use condoms during sex, and have higher level of self-efficacy in condom use than nonmigrant workers living in the local mining communities. This implies that migrant mineworkers are more likely to use condom more effectively and consistently to avoid unprotected sex (Bandura, 1989), putting them at a lesser risk of HIV infection (Crosby et al., 2001). A higher percentage of migrant workers, however, engaged in multiple sexual partnerships and commercial sex than local residents.

Consequently, the high condom use self-efficacy among company residents may also limit the transmission of HIV infection from the company residents to the general local communities (Hanenberg, Rojanapithayakorn, Kunasoi, & Sokal, 1994). On the contrary, mineworkers who are local residents with relatively lower level condom use self-efficacy may hold more negative attitudes towards condom use (Fisher, Fisher, & Rye, 1995; Norris & Ford, 1995), more likely to involve in unprotected sex, and as a consequence be more susceptible to HIV infection (Zimet et al. 1992; Hingson, Strunin, Berlin, & Heeren, 1990).

The result of the low level of condom use and low self-efficacy for condom use of local mineworkers is consistent with the 2008 HIV surveillance reports by NAS (2008), which showed that approximately 82% of miners in Sierra Leone indicated that they had never used condom in their sexual intercourse. This suggests that the potential spread of HIV in the Marampa mining communities in the event of an HIV outbreak is real. The Marampa mining workforce has been shown to have the highest HIV prevalence rate of 3.3% for miners (NAS, 2013), compared to the national average rate of 1.3% (NAS, 2008).

Condom use is central to the current national intervention strategies to prevent

HIV transmission, particularly among the sexually active and vulnerable populations,

including the mineworkers. Thus the low level of condom use self-efficacy may have

serious implications for successful implementation of HIV/AIDS intervention programs.

Therefore, there is every need for a multilevel population-specific intervention strategy at

the individual/intrapersonal, social/community, structural/institutional and public policy

levels that are well integrated. The multilevel ecological approach provides the

conceptual framework for integrating and delineating the structural relationships among

the several divergent factors relating to the role and responsibilities of the individual,

community, mining companies and the Local Government (Belsky, 1980).

Furthermore, the results of the binary logistic regression analyses of Research

Questions 2 showed no statistically significant relationship between labor migration and

engagement in multiple sexual partnerships in the past 12 months among mineworkers in

the Marampa mining communities in Lunsar. The results thus indicated that residence is

not a predictor of engagement in multiple sexual partnerships for all forms of sexual

practices (vaginal, anal and oral). However, the results indicated that higher percentage of

company residents (72%) engaged in multiple sexual partnerships than local residents

(66%) in the mining communities.

As pointed out by Decosas and Adrien (1997) and Fages (1999), it is mainly the

seasonal or temporal character and structure of the labor migration process, such as the

frequency of changing residence, separation of families and social disruption, that put

people at critical risk of HIV infection. This implies that it is the situations encountered

and the type of sexual risk behaviors engaged in during the process of migration or
mobility that increase the vulnerability and risk regarding HIV/AIDS infection
(UNAIDS, 2001). In the Marampa mining context in this study, however, being a migrant
or nonmigrant does not necessarily create a life situation of engaging in multiple sexual
partnerships that put mineworkers at risk of HIV infection. The majority of the
mineworkers though are local residents (86%) and married (55%), residing with their
families within the mining communities and do not have to leave their wives or regular
partners at home for job opportunities outside the communities. The low percentage of
company residents in the study sample (12%) could be attributed to the Ebola Public
Health Emergency in Sierra Leone (Government of Sierra Leone, 2014) that saw most of
the expatriate migrant mineworkers leaving the country for fear of being infected by the
Ebola virus. The company residence could be a well-structured environment with control
and social support provided by the mining company.

The study findings are at variance with the findings of most other studies, which
have shown that labor migration is an independent and significant social risk factor for
HIV-1 infection among both men and women mineworkers (Decosas & Adrien, 1997;
Mabey & Mayaud, 1997), and that having concurrent sexual partners in itself is a risk
factor for HIV infection (Ferguson et al., 2006). Lurie et al. (2003) showed in a
multivariate analysis study in South Africa that the main risk factors for male HIV
infection were - (a) being a migrant worker, (b) ever having used condom, and (c) having
lived in four or more places during a lifetime. Mbizvo et al. (1996), Mabey and Mayaud

(1997) also argued that seasonally migrating workers tend to have multiple sexual partners and are more likely to be infected with HIV/AIDS or other STDs.

Similarly, the results of the binary logistic regression analyses of Research Questions 3 showed no statistically significant relationship between labor migration and engagement in commercial sex in the past 12 months among mineworkers in the Marampa mining communities in Lunsar. The results thus indicated that residence is not a predictor of engagement in commercial sex (vaginal, anal and oral) in the Marampa mining communities. However, the results indicated that higher percentage of company residents (42%) engaged in commercial sex than local residents (35%) in the mining communities.

These results are not consistent with the literature that indicated that mineworkers usually engage in multiple sexual partnerships, particularly with commercial sex workers who are highly seroprevalent and a high-risk group for HIV infection (Shokunbi, 1991), and most likely to transmit HIV to their clients and sexual partners (Plummer et al., 1991). Mining communities are usually known to have high HIV/AIDS prevalence rate, which is partly attributed to the migration of commercial sex workers into these communities, as was the case in Ghana (Sauve et al., 2002). The Marampa mines in Lunsar has been reported to have the highest HIV/AIDS prevalence rate of 3.3% among mineworkers in Sierra Leone (NAS, 2013). All the reported positive cases in the NAS study were male mineworkers, constituting 83% of the study population. The Marampa mines is at the early stages of the HIV/AIDS epidemic, and therefore one would expect

commercial sex market to play a critical role in the transmission of HIV infection in the general mining communities.

Another key finding of epidemiologic interest in this study is the high percentage of bisexual mineworkers (76, 26%), compared to the relatively lower percentage of homosexual mineworkers (5, 2%) in the study population. Also, a higher percentage of bisexuals engaged in multiple sexual partnerships (46%) than in commercial sex (26%). Only approximately 49% used condom during virginal sex, with 66% who never used condom during anal sex.

The sexual behavior of lesbians, gays, bisexuals, transgender, and intersex (LGBTI) persons in relation to HIV/AIDS transmission in Sierra Leone has been scarcely studied. In 2008, approximately 2.4% of the incidence rate was attributed to infections among men having sex with men (MSM) (NAS, 2010). Bayer et al. (2010) also reported in a cross-sectional study about bisexual partnerships and concurrency among MSM in Malawi, Namibia, and Botswana. Bayer el al. associated the bisexual partnerships and concurrency with high condom use with sexual partners, being employed, lower likelihood of disclosure of sexual orientation to family, and having paid or received money for casual sex.

There is generally a strong feeling of homophobia against homosexuality and bisexuality in Sierra Leone. Reports have indicated that LGBTIs in Sierra Leone are frequently subjected to public discrimination, verbal insults, physical attack, and denied access to medical treatment (Global Rights, 2013). Consequently, the majority of LGBTI persons do not usually disclose their sexual orientation or preference to family members,

heterosexual friends, and health care workers or their association with groups made up

LGBTI persons. It is thus a cultural taboo to self-identify oneself as bisexual or

homosexual. The decision therefore for some participants in this study to disclose

(anonymously) their bisexual orientation or preference may reflect a cultural change in

these mining communities. Such a cultural change in attitude may have serious

implications for the transmission of HIV/AIDS in the mining communities. As a result of

the strong social stigma, LGBTIs may be reluctant or less likely to participate (openly) in

the fight against HIV/AIDS by either refusing to get tested or seeking needed HIV/AIDS

medical treatment. It may also make the trends regarding HIV/AIDS transmission

difficult to interpret in these communities.

HIV/AIDS is predominantly transmitted in Sierra Leone through heterosexual

intercourse, so called Pattern II transmission, and heterosexuals constitute 69 % of the

study population. The presence of a large percentage of bisexuals in the study population

may have considerable implications in changing the epidemiologic dynamics of HIV

transmission in the mining communities. However, there is currently no data in Sierra

Leone that link bisexuals to the spread of HIV/AIDS infection. The 2013 SLDHS report

(SSL, 2014) did not take into account bisexuality or homosexuality in the assessment of

sexual risk behaviors related to HIV/AIDS transmission, indicating the lack of attention

to the issues of homosexuality and bisexuality. Thus, HIV/AIDS intervention programs in

Sierra Leone do not address the issues of LGBTIs. Homosexuality and bisexuality are

known to form sex bridge to the general population in the context of HIV/AIDS

transmission (Thomas-Edwards, 2014). Sexual concurrency has been identified as the key

driver in sustaining the high HIV prevalence rates in sexual networks in southern sub-Saharan Africa (Mah & Halperin, 2008; Sandoy, Dzekedzeke, & Fylkesnes, 2008; Harrison, Cleland, & Frohlich, 2008; Carter et al., 2007). It is therefore important that HIV/AIDS intervention programs should also be design to address the issues of bisexuality and homosexuality with the focus on discouraging bisexual concurrency and partnerships.

## Limitations of the Study

The study established an association between labor migration and condom use self-efficacy, indicating that residence is a predictor of condom use self-efficacy. However, the study was not able to establish association between labor migration and engagement in multiple sexual partnerships and commercial. This may have been due to the small sample size of 296 mineworkers.

Confounding factors, such as demographic characteristics, socioeconomic status and the use of alcohol or drugs, that influence individual risk factors may have affected the relationships between these variables in the study.

The study may have been subjected to information bias (recall bias) (Dicker, 2008) as data were collected by self-reporting of sensitive health or sexual risk behaviors based on cognitive (or remembering of events), and situational factors. Recalling sexual activities or relationships in the past 12 months as of the date of the study may have been difficult for some of the participating mineworkers, and these difficulties may have resulted in inaccurate or biased recall. Participating mineworkers may have also under- or

over-reported sensitive sexual risk behaviors in order to appear more socially desirable or for fears of reprisal by their employer.

This study did not include a control group of non-mine workers, and therefore the study did not allow for balance across the differing sexual risk behaviors. Hence, the differences observed may be associated with extraneous variables, such as drug or alcohol use.

This study was limited to the Marampa mines in Lunsar that has the highest HIV/AIDS prevalence rate of 3.3% far above the national average of 1.3% for mineworkers. The use of the nonprobability sampling technique makes the study sample not representative, and therefore the study findings may not be generalized to the population of miners in the Marampa mining communities and the general mining population in the country.

**Recommendations for Further Studies**

Based on the results of this study and their implications or interpretations, the following recommendations for further research study are made:

A similar research study of a larger sample size with higher statistical power may be required to establish the relationships between labor migration and the individual sexual risk behaviors of condom use self-efficacy, engagement in multiple sexual partnerships, and commercial sex.

Further studies should be conducted to determine the moderating influence of confounding factors on the association between labor migration and the individual sexual

risk behaviors of condom use self-efficacy, engagement in multiple sexual partnerships, and commercial sex.

Further study may also be required to assess the extent to which bisexual partnerships and concurrency may drive the HIV transmission within the context of labor migration in mining communities. The findings may be essential for the design and implementation of HIV/AIDS intervention programs for LBGTIs.

Additional research that includes a control group of non-mineworkers may be required to study the balance across the different sexual risk behaviors. Such study may elicit information on the differences observed that may be associated with extraneous variables, such as drug or alcohol use.

Research similar to the current study could also be conducted for other mining communities in the country, including the Sierra Rutile Limited in the South, the diamond mining communities of Koidu and Tongo Fields in the East, the gold mining communities of Mongheri in the South, and Bumbuna in the North to provide insights into the epidemiologic context of HIV/AIDS transmission in these mining communities in Sierra Leone. Such studies may address the limitations associated with non-representative study samples and hence improve the generalizability (external validity) of the study findings to the general mining population in the country.

Experimental studies that include HIV testing to verify HIV status of mineworkers in the various mining communities may also be relevant.

The higher percentage of bisexual in the study sample may be a new development in the social, and cultural settings in the mining communities. Therefore, further study

may be relevant to examine the risk difference based on sexual orientation. Bisexuals may have differential condom use patterns with males versus female sexual partners.

**Implications for Positive Social Change**

The HIV/AIDS current prevalence rate for mineworkers in Sierra Leone is at 1.3%, and mineworkers at the Marampa mines are reported to have the highest prevalence rate of 3.3%, far above the national average of 1.5% in the general population. The purpose of this study was to understand the epidemiologic dynamics between labor migration and the sexual risk behaviors related to HIV transmission as the outcome measured by (a) self-efficacy for condom use, (b) engagement in multiple sexual partnerships and (c) commercial sex among miners in the Marampa mining communities in Lunsar, Sierra Leone.

The results of this study showed a significant relationship between labor migration and condom self-efficacy, indicating that residence was a significant predictor of condom self-efficacy. Migrant mineworkers in company residence were thus predicted to have a higher level of condom use self-efficacy than nonmigrants (local residents). These results thus suggest that the local residents (nonmigrants) are much more at risk of HIV infection as they are more likely to engage in multiple sexual partnerships and commercial sex without effective and consistent condom use.

Hence, the implications for positive social change is the development and promotion of multilevel interventions and corporate policy frameworks centered around enhancing condom use self-efficacy of mineworkers to mitigate the sexual risk behaviors that aid enhancing HIV transmission in mining communities in Sierra Leone. Such

intervention programs may include distribution of free condoms, public health awareness-raising campaigns and training programs to enhance the communication and negotiating skills of mineworkers in negotiating condom use with sexual partners. Mining companies may, as part of their corporate social responsibility, expand and improve company residence facilities for more migrant workers with adequate social support.

The long-term public health implications thus include reduction in the HIV risk behaviors, and consequently the HIV/AIDS prevalence rate among mineworkers in Sierra Leone. This will further promote the wellbeing and enhance the productivity level of mineworkers, and subsequently the profitability of the mining companies, which will contribute to the overall economic development of the country.

<div align="center">**Recommendations for Action**</div>

There are possible interventions programs to effect social change based on the results and conclusions of this study. The overall strategy for such interventions is to develop and promote multilevel programs within an institutional policy framework centered around enhancing condom use self-efficacy of mineworkers. Higher self-efficacy for condom use will mitigate sexual risk behaviors of engagement in multiple sexual partnerships and commercial sex that aid HIV transmission in mining communities. These intervention programs must be integrated and complementary to get the desired effects. Uganda's success in decreasing the adult HIV/AIDS prevalence rate from 14% in the early 1990s to 5% in 2001was as result of an integrated approach, using WHO's ABC prevention model (UN Special Session on HIV/AIDS, 2001). Similar health outcome using an integrated approach was achieved in Senegal in reducing HIV

prevalence rate among pregnant women attending prenatal clinics in 2002 (UNAIDS, 2003).

**Distribution of Free Condom Program**

The study results showed that mineworkers engaged in high-risk sexual behaviors of multiple sexual partnerships and commercial sex, putting them at risk of HIV infection. Other studies have shown that the level of condom use among miners in Sierra Leone is low (NAS, 2008). The consistent use of condoms has been shown to be most effective in preventing transmission of STIs or STDs, including HIV/AIDS (Roper, Peterson & Curran, 1993). Therefore, there is need scale-up the distribution of free condoms to all mineworkers at strategic condom pick-up points in both the local communities and company residence. Specific sub-groups, particularly the commercial sex workers in brothels, private contractors, and truck drivers; and condom pick-up points in hotels, motels, bars, and restaurants should be targeted. Mandating 100% condom use in brothels reduced the HIV prevalence rate by 14% among female commercial sex workers in Thailand within a period of two years (Chaisiri, Danutra, & Limanonda, 1993; Siraprapasiri et al., 1991). The distribution of free condoms should be the responsibility of the mining companies as part of their corporate social responsibility to the mining communities and their staff. It should however be collaborated in partnership with the Ministry of Health and Sanitation and the National Secretariat for HIV/AIDS.

**Training Programs to Enhance Self-Efficacy for Condom Use**

The study results also showed that the local residents, who constitute the majority of the Marampa mining population, have lower self-efficacy for condom use, putting

them at higher risk of HIV infection as they engage in multiple sexual partnerships and commercial sex. Self-efficacy for condom use requires condom accessibility, communicating, and negotiating condom use with sexual partners; using condoms consistently to avoid unprotected sex, and rejecting sex if a partner will not use a condom (Soler, Quadagno, Sly, Riehman, Eberstein, & Harrison, 2000). There is therefore the need for training programs through workshops, seminars, radio, and TV programs to enhance self-efficacy for condom use of mineworkers.

**Public Health Awareness Campaign on HIV/AIDS**

The current study did not take into consideration normative factors, such as knowledge, beliefs, attitudes, and cultural values about HIV/AIDS. However, others studies have shown that these factors are critical in stemming the transmission of HIV/AIDS. Knowledge of condom use by itself does not translate to consistent condom use without self-efficacy. Therefore, free condom distribution and training programs must be combined with public health awareness campaigns with culturally sensitive health messaging to improve knowledge on condom use, practice of safe sex, change negative perceptions or beliefs about HIV/AIDS, promote positive attitudes towards HIV/AIDS prevention, and encourage sex abstinence, particularly by the youths, before they become sexually active. The HIV/AIDS health messaging should also incorporate stigma sensitivity.

**Establishing Systems of Diagnosis, Treatment, and Care**

The fact that Marampa mines has the highest prevalence rate of 3.3 far above the national average of 1.5% in the general population is a serious cause of concern. There is

therefore the urgent need for mining companies to improve on standards of diagnosis, treatment and care for miners and the mining communities. This is needed to prevent further spread HIV/AIDS to neighboring communities in the district. Standard care should ensure continuity of care and treatment for HIV-infected miners without being discriminated against because of their HIV status.

**Development of a Corporate Policy**

All of the above mentioned intervention programs could not be effectively implemented and monitored without the force of law and requisite policy framework. All mining companies should therefore be required by state law to develop HIV/AIDS policies that ensure the effective implementation and monitoring of intervention programs to prevent the further spread of HIV/AIDS in mining communities. Corporate HIV/AIDS policy should ensure the provision of health insurance for all mineworkers, irrespective of HIV/AIDS status. The cost of health insurance would provide financial incentives to mining companies to act on the structural drivers of the disease. These may include providing more family housing facilities in the company residence. London Mining's current policy does not provide for family housing; employees are not allowed to live with their families on company residence.

**Summary and Conclusions**

The fact that the Marampa mines has the highest HIV/AIDS prevalence rate of 3.3%, far above the national average of 1.5% in the general population shows that mining is contributing significantly to the epidemics of HIV/AIDS in Sierra Leone. The study findings indicated a significant relationship between labor migration and condom use

self-efficacy, where migrant mineworkers were predicted to have higher condom use self-efficacy than nonmigrants mineworkers in the Marampa mines in Lunsar, Sierra Leone. The mineworkers were also shown to engage in high-risk sexual behaviors of multiple sexual partnerships and commercial sex.

These findings are grounded in the ecological model, and are consistent with the findings of other studies in the literature. These findings thus contribute to understanding the epidemiologic dynamics between labor migration and the sexual risk behavior, self-efficacy in condom use, related to HIV transmission in mining communities in Lunsar, Sierra Leone.

The implication for social change is the development and promotion of multilevel interventions and corporate policy frameworks centered around enhancing condom use self-efficacy of mineworkers to mitigate the sexual risk behaviors of engagement in multiple sexual partnerships and commercial sex that aid HIV transmission in mining communities in Sierra Leone. The outcome of such policy framework and intervention programs may ultimately promote and protect the welfare of the mineworkers and the surrounding communities in Sierra Leone.

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**Appendix A: Demographic Survey Questionnaire**

| | Instructions: Please read each question and respond by check mark the corresponding answer. | |
|---|---|---|
| 1 | What is your age or date of birth? | Age [ ]  DOB    [ ] |
| 2 | What is your gender? | Male  [ ]  Female    [ ] |
| 3 | What is your marital status? | Single            [ ]<br>Married          [ ]<br>Divorced        [ ]<br>Widowed        [ ]<br>Separated       [ ] |
| 4 | What is your nationality? | Sierra Leonean       [ ]<br>Foreign National      [ ] |
| 5 | What is your religion? | Muslim          [ ]<br>Christian        [ ]<br>Other (specify) -------------- |
| 6 | What is your sexual orientation? | Heterosexual (straight)  [ ]<br>Homosexual (gay)     [ ]<br>Bisexual          [ ]<br>Not sure         [ ] |
| 7 | What is your highest level of education? | No formal schooling    [ ]<br>Primary           [ ]<br>Secondary         [ ]<br>Vocational         [ ]<br>College or higher      [ ] |
| 8 | What is your employment status? | Employed         [ ]<br>Unemployed        [ ]<br>Student          [ ]<br>Retired          [ ] |
| | Which mining company do you work for? | |
| 9 | Where do you work at the moment? (city, town or village) | |
| 10 | How long have you worked in Lunsar? | <1 year          [ ]<br>1 -2 years        [ ]<br>2 – 4 years        [ ] |
| 11 | What is your annual household income? | < LE1M          [ ]<br>LE1M – LE5M      [ ]<br>LE5M – LE10M      [ ]<br>> LE10M          [ ] |
| 12 | Where were you born? (Town and District) | |
| 13 | Where do you live at the moment? (Town and District) | |
| 14 | Where do you reside in Lunsar? | Company residence    [ ]<br>Local communities     [ ] |
| 15 | How long have you lived in Lunsar? | |
| 16 | How often do travel outside of Lunsar for weekend or vacation? | Weekly          [ ]<br>Biweekly         [ ]<br>Monthly          [ ]<br>Yearly          [ ] |
| 17 | Do you live with your family in Lunsar? | Yes            [ ]<br>No             [ ] |
| | | |

Note: Adopted from CDC (2014): http://www.cdc.gov/brfss/questionnaires/index.htm

**Appendix B: Condom Use Self-Efficacy Questionnaire**

| **Instruction: Using the scale below please indicate your agreement with the following statements by circling the appropriate number (1, 2, 3, 4, or 5)** | | | | | | |
|---|---|---|---|---|---|---|
| **Scale:** <br> **1 = Strongly agree; 2 = Agree; 3 = Undecided; 4 = Disagree; 5 = Strongly disagree** | | | | | | |
| 1 | I feel confident in my ability to put a condom on my self or my partner. | 1 | 2 | 3 | 4 | 5 | Remarks |
| 2 | I feel confident I could remember to carry a condom with me should I need one. | 1 | 2 | 3 | 4 | 5 | |
| 3 | I feel confident in my ability to suggest using a condom with a new partner. | 1 | 2 | 3 | 4 | 5 | |
| 4 | I feel confident I could suggest using a condom without my partner feeling "diseased". | 1 | 2 | 3 | 4 | 5 | |
| 5 | I feel confident I could use a condom during intercourse without reducing any sexual sensations. | 1 | 2 | 3 | 4 | 5 | |
| 6 | I feel confident that I would remember to use a condom even after drinking alcohol or being drunk. | 1 | 2 | 3 | 4 | 5 | |
| 7 | I feel confident that I could use a condom successfully. | 1 | 2 | 3 | 4 | 5 | |
| 8 | I feel confident that I could stop to put a condom on myself or my partner even in the heat of passion. | 1 | 2 | 3 | 4 | 5 | |
| 9 | I feel confident in my ability to use a condom correctly. | 1 | 2 | 3 | 4 | 5 | |
| 10 | If my partner's didn't want to use a condom during intercourse, I could easily convince him or her that it was necessary to do so. | 1 | 2 | 3 | 4 | 5 | |
| | | | | | | | |

Note: Adopted from the Center for HIV Identification, Prevention and Treatment Services (2012, February 6). *Health Belief Model - Condom use self-efficacy scale (CUSES)*. Retrieved August 19, 2014, at http://chipts.ucla.edu/resources/?did=279.

# Appendix C: HIV/AIDS Behavior Risk Assessment Survey Questionnaire

**Instructions: Please read each question and respond by check mark the corresponding answer.**
**Note: Sex is defined as vaginal, anal or oral sexual intercourse**

| | | Vaginal | | Anal | | Oral | |
|---|---|---|---|---|---|---|---|
| 1 | Have you had vaginal, anal or oral sex? | [ ] Yes | [ ] No | [ ] Yes | [ ] No | [ ] Yes | [ ] No |
| 2 | How old were you at the first time you had sex? | [ ] < 18<br>[ ] 18 – 21<br>[ ] 21-24<br>[ ] 24 – 30<br>[ ] > 30 | | [ ] < 18<br>[ ] 18 – 21<br>[ ] 21-24<br>[ ] 24 – 30<br>[ ] > 30 | | [ ] < 18<br>[ ] 18 – 21<br>[ ] 21-24<br>[ ] 24 – 30<br>[ ] > 30 | |
| 3 | As far as you know, have you had sex with a commercial sex worker? | [ ] Yes | [ ] No | [ ] Yes | [ ] No | [ ] Yes | [ ] No |
| 4 | As far as you know, have you had sex with anyone who has HIV/AIDS? | [ ] Yes | [ ] No | [ ] Yes | [ ] No | [ ] Yes | [ ] No |
| 5 | As far as you know, have you had sex with anyone who has injected drugs? | [ ] Yes | [ ] No | [ ] Yes | [ ] No | [ ] Yes | [ ] No |
| 6 | As far as you know, have you had sex with anyone whose sexual history you didn't know very? | [ ] Yes | [ ] No | [ ] Yes | [ ] No | [ ] Yes | [ ] No |
| 7 | Did you or your partner have sex without a condom during the time you had sex? | [ ] Yes | [ ] No | [ ] Yes | [ ] No | [ ] Yes | [ ] No |
| 8 | How often do you use condom when you have sex with your partner? | [ ] Always<br>[ ] Sometimes<br>[ ] Never | | [ ] Always<br>[ ] Sometimes<br>[ ] Never | | [ ] Always<br>[ ] Sometimes<br>[ ] Never | |
| 9 | Did you ever exchange sex for money? | [ ] Yes | [ ] No | [ ] Yes | [ ] No | [ ] Yes | [ ] No |
| 10 | How many sex partners have you had in the past 12 months? | [ ] 1<br>[ ] <5<br>[ ] 5 – 10<br>[ ] 10 – 50<br>[ ] > 50 | | [ ] 1<br>[ ] <5<br>[ ] 5 – 10<br>[ ] 10 – 50<br>[ ] > 50 | | [ ] 1<br>[ ] <5<br>[ ] 5 – 10<br>[ ] 10 – 50<br>[ ] > 50 | |
| 11 | The last time you had sexual intercourse, did you or your partner have sex without a condom | [ ] Yes | [ ] No | [ ] Yes | [ ] No | [ ] Yes | [ ] No |
| 12 | During your lifetime, how many people would you say you have had sex with? | [ ] 1<br>[ ] <5<br>[ ] 5 – 10<br>[ ] 10 – 50<br>[ ] > 50 | | [ ] 1<br>[ ] <5<br>[ ] 5 – 10<br>[ ] 10 – 50<br>[ ] > 50 | | [ ] 1<br>[ ] <5<br>[ ] 5 – 10<br>[ ] 10 – 50<br>[ ] > 50 | |
| 13 | Do you have a main partner, defined as someone who is your spouse, regular lover or anyone else you feel committed to or have a special relationship with? | [ ] Yes | [ ] No | [ ] Yes | [ ] No | [ ] Yes | [ ] No |

Source: Donenberg et al., (2001

Note: This survey questionnaire was adopted from and validated by the Center for HIV Identification, Prevention and Treatment Services, available at *chipts.ucla.edu/wp-content/uploads/downloads/2012/AIDS-Risk-Behavior-Assessment-ARBA.pdf*.