

A Scoping Review on the Impacts of the Extractive Resource Industry on Sexual and Reproductive Health Outcomes of Mineworkers and Communities in Southern Africa

by

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Abstract

This capstone is a scoping review on the impacts of the extractive resource industry on sexual and reproductive health outcomes of mineworkers and communities in southern Africa. After a comprehensive search, 17 articles from the relevant literature were reviewed to develop a synthesis of key findings and recommendations. The reviewed studies suggest that poor sexual and reproductive health outcomes are linked to structural determinants of health and wellbeing, such as circular migration patterns; rural poverty; limited education and income opportunities; family unification and migration policies; housing and healthcare access; economic conditions; gender dynamics; weak industry regulation; and regional history and policies. Recommendations call for broadening the scope of sexual health interventions, addressing the determinants of health and wellbeing within mining areas, and strengthening sectoral regulation and responsibility among mining companies.

Keywords: extractive industry; mining; sexual and reproductive health; southern Africa

Dedication

To Ms. Dudley, who taught me that the love of learning truly is the main lesson.

To Tess, whose wit and courage I envy, and whose wisdom and friendship I treasure.

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To my family for their love, humour, patience, and faith in me, no matter what.

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List of Acronyms

AIDS	acquired immunodeficiency syndrome
CSR	corporate social responsibility
CSW	commercial sex worker
HIA	health impact assessment
HIV	human immunodeficiency virus
ICMM	International Council on Mining and Metals
IOM	International Organization for Migration
MPH	Master of Public Health
NGO	non governmental organization
SRH	sexual and reproductive health
STI	sexually transmitted infection
TB	tuberculosis
UNAIDS	Joint United Nations Program on HIV/AIDS
WHO	World Health Organization

Introduction

The AIDS and Rights Alliance South Africa has called the health conditions in southern African mines, “the greatest public health threat ever and a human rights scandal” (Stuckler, Steele, Lurie, & Basu, 2013, p.640). Health impacts from the extractive industry are commonly thought of as direct occupational hazards, such as accidents and chemical and dust exposure, or environmental damage to surrounding ecosystems. However, increasing focus on the determinants of health, “the social, economic, environmental and cultural factors – the living conditions - that indirectly influence health and wellbeing” (International Council on Mining and Metals [ICMM], 2010, p.11) has demonstrated that the public health impacts within the extractive resource sector are not limited to occupational or environmental issues. This complex relationship extends into the social and cultural environments, which greatly influences overall health outcomes among mineworkers and surrounding communities (World Health Organization [WHO], 2010).

It is well documented that there are epidemiological links between poor sexual and reproductive health (SRH) outcomes and mining communities worldwide, in particular the increased rates of sexually transmitted infection (STIs) and human immunodeficiency virus and acquired immune system deficiency syndrome (HIV/AIDS) (Dawson & Homer, 2013; Seguy et al., 2008; Stuckler et al., 2013; Zhang et al., 2010). Within southern Africa specifically, studies have reported prevalence rates as high as 35.3% among mineworkers (Htun, Radebe, Fehler, & Ballard, 2007), with some areas in South Africa having rates as high as 50% (International Organization for Migration [IOM], 2010). A survey in one of South Africa’s largest gold mines found that 25% of mineworkers and 69% of female commercial sex workers (CSWs) were HIV positive (Campbell, 2000). Although academic studies have investigated the poor SRH outcomes among mineworkers and communities, and many mining companies and global health organizations have broadened their impact assessments to include health impact

assessments (HIA), a thorough review of the existing literature would provide a deeper understanding of the structural links between extractive industry and SRH outcomes and inform recommendations for developing responsive programs, policies, and research.

I begin with a brief background on the extractive industry in southern Africa and the extent of poor SRH indicators within mining areas. I then describe the scoping study methods and present the results in a descriptive quantitative summary and a discussion of key qualitative themes. Following this, I discuss the significance of the results, identify gaps for future research, and present recommendations for developing future programs and policies. Finally, I reflect on the limitations within the capstone, as well as my personal reflections on the research question and process.

Objectives

- To investigate the impacts of the formal extractive sector on SRH outcomes of mineworkers and surrounding communities in southern Africa
- To develop an understanding of the determinants of health linking SRH outcomes and the extractive sector to inform future research areas and health programs
- To undertake a formal Master's project, which combines my research interests and professional experience with acquired knowledge from the Master of Public Health (MPH) program

Background

The term “extractive industry”, used interchangeably with extractive sector or mining, refers to the extraction of non-renewable natural resources, such as petroleum and natural gas, or minerals, such as gold, copper, and coal (Dawson & Homer, 2013). Extractive industries include both formal and informal activities. The informal extractive sector, also known as artisanal and small-scale mining, relies on individual subsistence mineworkers working without formal organization and in less mechanized conditions than in the formal sector. Small-scale and artisanal mining is a significant economic

sector even while there are questions of its legality in some countries (Hentschel, Hruschka, & Priester, 2002). The formal extractive sector is characterized by large-scale mechanized and commercialized activities, frequently with significant investment and ownership rights by multinational companies (Dawson & Homer, 2013; IOM, 2010). While informal mining is also impacted by poor SRH outcomes, there was significantly more research on the formal extractive industry.

The formal extractive industry in southern Africa¹ has historically been one of the most important economic sectors in terms of people employed and foreign exchange earnings on the export market (IOM, 2010) and continues to be a key industry in the region. The industry is structured around circular labour migration, which is one of the critical factors in the poor SRH outcomes among those linked to the sector. Gold deposits in South Africa were costly to extract so expenses were kept low by importing cheap labour from neighbouring countries, such as Mozambique, Lesotho, and Swaziland, and rural areas in South Africa (Hargrove, 2008). These mineworkers, almost exclusively black men with limited education and employment opportunities at home, were brought in for periods of temporary employment, with a short break back home, before returning to work in the mines. There was little opportunity for family reunification and this “entrenched culture of circular labor migration has characterized the social and cultural makeup of the communities from which migrants originate, as well as the epidemiological profile of their populations” (Barwise, Lind, Bennett, & Martins, 2013, p.702). This arrangement aligned with the economic imperative to keep operation costs low and with the apartheid regime, which sought to control black labour and mobility (Rees, Murray, Nelson, & Sonnenberg, 2010). The historical legacy of circular migration endures today and the sector continues to rely on low skilled and low wage labour from neighbouring countries and rural areas in South Africa.

Although STI and HIV/AIDS prevalence rates vary within countries and mining areas, there is consensus of higher rates overall among those linked to the extractive

¹ In this capstone, “southern Africa” refers to the 15 member states of the Southern African Development Community (SADC): Angola, Botswana, Democratic Republic of Congo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia, and Zimbabwe (South African Development Community [SADC], n.d.). (see Appendix A).

sector compared to the general population. Lightfoot, Maree, & Ananias (2010) monitored HIV prevalence in mineworkers in large Namibian mining areas and noted that it increased from 0.03% in 1987 to 27% in 2000. Case studies from 2003 and 2007 on migrant mineworkers in South Africa reported HIV prevalence rates of 25.9% and 28.7%, respectively (Rees et al. 2010). As an indicator of the impact of migration, provinces in Mozambique with the highest migration rates of men to South African mines also have the highest HIV rates in the country. The Mozambican province of Gaza has the highest number of men working in South African mines and its adult HIV prevalence rate of 25% is markedly higher than the overall national adult prevalence of 11% (Barwise et al., 2013). In Lesotho and Swaziland, mineworkers aged 30-44 years old are 15% more likely to be infected with HIV and women with partners in the mines are 8% more likely to be infected.

There are also significant differences in SRH-related risk factors within the extractive industry compared to those without links to mining. Miners are 9.8% less likely to abstain from extra-marital sex and about 17% less likely to use a condom with occasional sex partners compared to non-miners (Corno & de Walque, 2012). STIs are considered a critical cofactor in HIV transmission and there are correspondingly higher rates of chlamydia, gonorrhea, syphilis, genital ulcer disease, and herpes simplex virus 2 amongst mineworkers and surrounding communities than the general population (IOM, 2010). HIV infection is a closely linked comorbidity with tuberculosis (TB) and the South African mining industry is considered to have one of the highest TB prevalence rates worldwide and a 70-80% co-infection with HIV (Barwise et al., 2013). While TB is an occupational risk due to working and living conditions within mining areas, it is also an important factor in the spread and disease profile of HIV/AIDS.

Methods

Scoping studies, also referred to as scoping reviews, are gaining traction within public health research as a method to efficiently map critical concepts and sources of evidence within a research area (Mays, Roberts, & Popay, 2001; Levac, Colquhoun, & O'Brien, 2010). The purposes of a scoping study include discovering the nature of research activity, identifying research gaps, and exploring the value of undertaking a full systematic review (Levac et al. 2010). The scoping review provides a descriptive or narrative summary of available research and serves as the starting point for more detailed undertakings or offer observations in their own right about future research. Arksey and O'Malley (2005) argue that a scoping study can also summarize and disseminate research findings to inform practice, which gives the scoping study its own inherent value. It is important to note that this method is distinct from a systematic review as scoping studies approach a topic more broadly by accepting a variety of study designs with less emphasis on formally assessing the type and nature of research methods.

This capstone follows the process outlined by Arksey and O'Malley's 2005 framework. This framework was chosen as Arksey and O'Malley are considered leaders in the scoping study methodology and have outlined the required steps for conducting a rigorous and transparent scoping study. The required stages include: identifying the research question; identifying relevant studies; selecting relevant studies; charting the data; and summarizing and reporting the results.

Identifying the Research Question

It is increasingly relevant to examine the determinants of health and SRH outcomes in communities linked with the extractive industry as the impacts of resource extraction become recognized as directly and indirectly influencing community health outcomes, especially in low-income countries. As a culminating academic experience,

this capstone question also combines my academic and professional interests with personal observations from my experience in northern Mozambique, which is an increasingly important player in the global extractive industry.

Identifying Relevant Studies

In order to generate the most relevant and comprehensive list of search locations, I consulted with the Faculty of Health Sciences librarian, Ms. Megan Crouch, to develop my search strategies and search locations. The following search locations were investigated due to their relevance in the field:

- Electronic databases: Medline; Sociological Abstracts; PAIS International; Web of Science
- Grey literature: World Bank Publications; World Health Organization Institutional Repository for Information Sharing; International Organization for Migration; International Organization of Labour
- Hand searches of key journals: African Journal of AIDS Research; Social Science & Medicine; Journal of Infectious Diseases; American Journal of Public Health; AIDS; International Journal of STDs & AIDS
- Reference lists from included articles

The creation of a list of search terms required ongoing enquiry into the field as well as process and content consultation with Ms. Crouch and my senior supervisor, Dr. Craig Janes. One of the hallmarks of the scoping study, in comparison to a systematic review, is the ability to redefine search terms while in the research process. Arksey and O'Malley (2005) argue that the search process is not a linear and static process, but one that calls for researchers to dynamically and reflexively engage with their research area as they become more familiar with the available literature at each stage. I did not strictly limit terms, but I continuously identified where additional terms may be relevant or require modification. The finalized terms were used in each search location in a variety of combinations using AND, OR, and wildcard symbols. The final key search terms included:

- sexual health, reproductive health, sex*, reproductiv*, sexually transmitted infection, sexually transmitted disease, HIV, AIDS, HIV/AIDS,

human immunodeficiency virus, acquired immune deficiency syndrome, epidemiology, prevalence

- southern Africa, mining, extractive industry, extractive sector, extractive resource, women, women's health, migrant, migration

Study Selection

Inclusion and exclusion criteria were developed during the pre-research stage as well as iteratively during the research process. Exclusion criteria included publication dates before 1996, non-English language publications, and lack of relevance to the research question or objectives. After a comprehensive search, I removed the duplicates and those ineligible due to exclusion criteria. The titles and abstracts of the remaining studies were screened according to the inclusion criteria of relevance of key search terms and the study's relationship to the research question. After this secondary screening, I read each article in its entirety and categorized them according to themes. This presented a final opportunity to remove studies from the finalized list of articles.

Charting the Data

"Charting" the data is a term adapted by Arksey & O'Malley (2005) to collect standard information with the intention to synthesize and interpret qualitative data according to key themes. I have also adopted this technique to summarize included articles. The standard collected information includes: author(s) and year of publication; study population and/or location; objectives; methods; and key findings. (see Appendix C).

Summarizing and Reporting Results

I have summarized and reported the findings in two ways in the Results section. The first is a descriptive numerical analysis of the included studies according to geographic distribution; publication timeframe; study populations; and methods. The second presentation of data includes a qualitative synthesis of six key themes.

Results

My search yielded 317 references from a scoping of electronic databases, grey literature, key journals, and reference lists (see Appendix B). After the comprehensive research process, I excluded 195 duplicates from the initial 317 results. I then screened the titles and abstracts of the remaining 122 articles for relevance to my research question and objectives. Those 122 articles were narrowed down to 31 articles, which I screened for a secondary review of inclusion and exclusion criteria. These 31 results were reduced to a final 17 articles, which satisfied all criteria and were included in the analysis.

The available research is relatively recent as the majority of articles (n=14, 82%) were written after 2000. Only three articles (18%) had been written prior to 2000, however they were all written by the same research team and reflected the preliminary investigations of the relationship between HIV/AIDS and the extractive industry in South Africa. The geographical distribution of the literature was shared between South Africa exclusively (n=8, 47%) and southern Africa (n=6, 35%). Separate individual studies in Tanzania (n=1, 6%), Namibia (n=1, 6%), and Mozambique (n=1, 6%) were also conducted. It is also important to note the nature of the extractive industry in addition to its geographic location. All of the studies were based in mineral mining areas, in particular gold mining, due to the literature's focus on South Africa. While I initially chose the key search term "extractive industry" and its variants, it soon became apparent that mineral mining was the focus of the current available literature.

Although the studies used a variety of research methods, qualitative methods were more common (n=10, 59%), using focus groups, in-depth interviews, participant observation, and literature reviews. The remaining studies used mixed methods (n=2, 12%) or quantitative methods (n=5, 29%) such as longitudinal or cross-sectional analysis, demographic surveys, and clinical records. 16 of the 17 articles (94%) were

found in peer-reviewed journals and one in the grey literature (6%) (a report from the IOM). The study populations described in the majority of articles were a combination of male mineworkers and the surrounding mining communities and/or the mineworkers' home communities (n=13, 76%). The remaining studies focused either exclusively on male mineworkers (n=3, 18%) or women from the surrounding mining communities (n=1, 6%).

Key themes

SRH knowledge and practices

The literature reported relatively high levels of knowledge about HIV/AIDS and SRH among mineworkers in mining areas. This included mineworkers' self-reported knowledge about safe sexual practices, condom usage, and HIV/AIDS transmission routes. However, this health-related knowledge did not necessarily translate into changes in behaviour and practice. Even while self-reported knowledge levels were increasing, the literature described simultaneously higher HIV and STI rates, lower condom usage, and higher levels of extra-marital sex among mineworkers, mineworkers' home partners, and women in mining areas compared to the general population. The research also identified the challenges in identifying and isolating conventional high- and low-risk epidemiological groups within high-risk sexual networks and environments; the epidemiological synergies between high rates of STIs and of HIV/AIDS in mining areas; low levels of self-efficacy and risk perception regarding SRH; the tenuous interactions between biomedical health promotion, social and economic factors, and culturally understood SRH; and limited SRH healthcare access, quality, and services for mineworkers. Conventional health promotion programs had focused on education and condom distribution, yet increased knowledge did not result in improved SRH outcomes suggesting that there are more structural factors at play in determining SRH-related behaviour. Health promotion programs that focused on behaviour change through HIV/AIDS education were not successful because they did not target the determinants of health within mining areas or other factors such as their control over medical decisions, or masculine ideals that compete with safe sexual practices.

High-risk physical and social environments

The majority of articles described the mining area and surrounding communities as high-risk social and physical environments. The literature linked the concept of high-risk environments with the poor SRH outcomes among mineworkers and communities. The high-risk social and physical environment was characterized by hazardous working conditions and job responsibilities; limited occupational safety legislation; poor housing and living conditions in overcrowded and unsanitary single-sex hostels, lack of healthy recreational activities; prevalence of commercial sex work and substance abuse in lieu of recreation; and family and partner separation with concomitant loneliness and boredom. Authors argued that the dynamics of a high-risk environment were more influential in determining high STI and HIV/AIDS prevalence than the conventional epidemiological construct of high- and low-risk groups as this concept did not consider the sexual mixing and social, geographic, and environmental dynamics in a high-risk area.

Circular migration

Five of the articles focused specifically on the role of circular migration between mining areas and home communities as a determinant of SRH. The rest of the articles all referenced it as a major factor with multiple implications for SRH outcomes. As discussed in the introduction, circular migration refers to labour migration where workers temporarily migrate to a mining location, work for a designated time period, and then return home to their families for a short break before returning to the mines. Mineworkers may be in this circular migration process for their entire working careers. Circular migration was associated with the disruption of communities and separation of couples; removal of men from their traditional family roles in rural areas and subsequent effects on familiar gender dynamics; creation of complex geographic sexual networks linking mineworkers, casual sex partners, CSWs, and home communities; increased risk of HIV/AIDS and STI infection for the spouse remaining at home; economic and psychosocial impacts on the spouse who may be left with little financial or social resources in the absence of her husband; and limited continuity of treatment of STIs and HIV/AIDS for mineworkers in mining areas and upon return to their home communities.

Gender dynamics

Underscoring much of the research was the impact of gender dynamics in mining areas and on home communities. Authors observed how masculine identities were impacted by circular migration, as there were fewer opportunities to assert masculinity through conventional and familiar patriarchal settings, such as the rural homestead. In response to this and as a coping mechanism to dangerous working conditions, mineworkers constructed macho sexual identities through multiple concurrent partners and unprotected sex. There were also culturally constructed notions of health and masculine strength regarding the appropriate balance of blood and semen in the male body and the health impacts of abstinence while away from their spouses. Feminine identities were also constructed within the mining areas and intersected with constructed masculine identities. Female respondents noted the constrained economic contexts, potential social and financial benefits as the casual girlfriend of a mineworker, and additional economic or social incentives for unprotected sex. The prevalence of stigmatized transactional sex, lack of perceived social respectability, and reliance on men for financial and social survival led to women's forfeiting of the ability to demand health rights.

Economic conditions

The literature examined the economic context of mining and SRH in southern Africa. Within the mining workforce and home communities there are high levels of rural poverty and low education levels and income opportunities for men and women. Mining is one of the few income-generating opportunities for men and an industry that requires minimal formal training. Women capitalize on mining activities and take advantage of male mineworkers' disposable income through providing recreational activities such as transactional sex or running informal alcohol establishments. These individual and community economic incentives conflict with the conventional health promotion messages of abstinence and safe sexual practices. Also, the extractive sector is a major player in the national economies of mining countries and workers' remittances are critical for these men's home communities. National governments are reluctant to interfere with industries that are also crucial to national revenues, especially as much of SADC is

classified as low-income regions. Finally, there were critiques of the extractive industry and corporate interests as there is little incentive in the current economic system for mining companies to invest in preventative strategies as they can externalize costs to rural communities and have an endless supply of willing labour.

Political and historical contexts

Finally, several articles investigated the past policies and current challenges that influence mining areas and SRH. Common findings included how past migration and apartheid laws prevented permanent residence of mineworkers' families; the use of alcohol and CSWs as a strategy to discourage unionization or revolt; the current weak policy response and limited attention paid from major health and development agencies related to SRH in mining communities; historical emphasis on individual risk factors and behaviours in SRH (especially HIV/AIDS) and weak attention to broader community and social contexts; limited capacity of local governments for regulation and monitoring of corporate activities; and fragile health systems and weak regional policies for implementing cross-border care to address the spread of HIV/AIDS and TB between mining areas and home communities.

Discussion

According to the reviewed studies, almost all of the mineworkers and community members affected by poor SRH outcomes are men and women from rural areas in South Africa or surrounding countries with limited education and income-generating opportunities. Despite the fact that the mineworkers and surrounding community members are almost all black men and women, there was no explicit discussion of the role of race, or its intersection with gender or education and income as determinants of health in these communities. Although several studies acknowledged the role of apartheid policies in creating current health and social conditions in the mining industry, there was no discussion of how these SRH outcomes may be seen in other industries with similar characteristics. It would add value to the field if there were academic studies that compared the extractive industry in southern Africa with other industries that rely on migration, poorly paid and low-skilled labour pools that have experienced social oppression, and the creation of similar high-risk environments. Further exploration could focus on SRH outcomes, overall health status, access to healthcare, and treatment by institutions.

The scoping review suggests that there is a growing emphasis in academia and practice to acknowledge the relationship between the determinants of health in mining areas with SRH outcomes. It is interesting to observe how there is substantial overlap between the key themes that emerged from the academic literature and the International Council on Mining and Mineral (ICMM) Determinants of Health and Wellbeing Model (ICMM, 2010). (see Appendix D). This organization is influential within the industry and including determinants of health within a guide for managing the public health impacts of natural resource extraction activities is a positive step forward. The majority of the articles were from the last 5 years and with the increased attention to the impacts of mining on communities, I expect that this field will continue to expand. There is also the

potential for positive synergies by studying individual and community-level health outcomes alongside the physical environment and ecosystem.

I would recommend greater critical enquiry into the role and responsibilities of the private sector in regulating natural resource extraction and monitoring the industry's impacts on southern African communities. Mining companies have developed basic health interventions in response to the rise of HIV/AIDS, which feature peer education and condom distribution. However, in nations with weak institutional capacity among governments and unions, there is little corporate motivation for the extractive industry to look beyond disjointed aid projects. Excluding their roles and responsibilities not only neglects an important factor in addressing this public health problem, but also excuses them from any culpability in the SRH outcomes in communities linked to mining. Further research that incorporates both public health and corporate priorities could better guide policies for the extractive sector to work more closely and in collaboration with local communities, national governments, and regional policy bodies. This would ensure that the health and wellbeing of local communities is a priority along with corporate profits and government revenue.

I would also encourage greater research and program development on the female partners' perspectives in both surrounding and sending communities. SRH is somewhat unique as it requires intimate contact with another human being. It is different from other medical conditions or occupational hazards that can be transmitted with little interaction. By treating this public health issue as one that can be isolated to the male mineworker fails to consider at least half of the issue. SRH is a complicated issue because it requires inquiry into intimate situations that extend beyond the workplace into the mineworker's personal environment. Conducting research that examines the full circle of interaction required in SRH would strengthen the response of programs and policies.

Recommendations

Public health interventions for mineworkers and surrounding communities need to holistically incorporate determinants of SRH and consider participatory health

promotion concepts that extend beyond a biomedical understanding of sexuality and a narrow focus on the individual mineworker. This includes expanding options for recreation activities on and off the mines; developing sustainable earning opportunities in rural areas; addressing women's economic dependence; mitigating the repercussions of circular migration; implementing and enforcing occupational safety legislation; constructing family hostels; and modifying immigration regulations for mineworkers' families (Campbell & Williams, 1999; Desmond et al., 2005; Lightfoot et al., 2010; Meekers, 2000; IOM, 2010). Studies that quantitatively examined STI and HIV/AIDS prevalence argued that curative and preventive services for STI treatment and management provided by the mining companies needed to extend beyond the individual mineworkers into the broader community of high-risk groups (e.g. CSWs). (Htun et al. 2007; Steen et al. 2000). These studies also recommended less focus on individual risk and behaviour change through factual knowledge and more emphasis on gender dynamics, social construction of sexual identities and behaviours, and self-efficacy and perceived control over health status (Campbell, 1997; Campbell & Williams, 1999; Campbell et al., 1998; Meekers, 2000).

Involving the wider community in the design and implementation of projects and extending programs to surrounding communities, especially CSWs, could potentially lead to more positive health outcomes and change (Campbell & Williams, 1999; Campbell et al., 1998; Meekers, 2000; Williams et al. 2000). This could include peer education, meaningful involvement with multiple stakeholders, and extensive monitoring and evaluation (Campbell et al., 1998, Williams et al., 2000). Campbell's research (2000) referred briefly to the potential benefits of employing an assets-based approach to the social organization of CSWs as opposed to focusing solely on male mineworkers. Many of the health programs studied focused on women and CSWs as vectors of disease and the recommendations extended only as far as symptom management of STIs and HIV/AIDS to protect the mineworkers. Neglecting to challenge assumptions that CSWs are solely defined by their income-generating activities, are a vector of infectious disease, possess minimal power or agency, or have little useful community knowledge counteracts other prevention strategies (Campbell & Mzaidume, 2001). Conducting further research to identify and enhance these women's social capital, for example

building informal sex worker unions as suggested by Campbell (2000), may better align with the overall goal of improving SRH outcomes.

Engaging with mining companies to address structural determinants that influence SRH is a strategic response to the impact of the extractive sector on local communities. The extractive sector has been active in promoting corporate social responsibility (CSR) initiatives that “integrate social and environmental concerns in their business operations and in their interaction with their stakeholders on a voluntary basis” (Littlewood, 2013, p.41). Although mining companies have committed to CSR programs, the voluntary and unregulated nature of CSR, especially in states with fragile governance and monitoring systems, allows for companies to do “good” so long as it complements their business operations (Hamann, 2004). CSR programs often focus exclusively on the individual project or company and may neglect the potential cumulative negative impacts or positive synergies in health outcomes. Tensions remain regarding the private sector’s scope of responsibility in health, environmental, and social impacts compared to the broader sectoral responsibilities and strategic responses needed to safeguard local communities (Hilson, 2012; Littlewood, 2013). One recommendation from the WHO is the use of policy or sector level HIAs at all stages of extractive activities (WHO, 2010). A sector level HIA can act as a strategic response to the determinants of health and assist in regulating activities and projects within a sector to better align and coordinate activities (WHO, 2010). As noted above from the literature results, structural determinants are influential in SRH outcomes and therefore a strategic response is necessary at the policy level so that regulations and policies are developed for an entire industry, instead of ad hoc CSR projects.

Limitations

A general limitation of scoping studies is that the methodology does not formally appraise the quality of evidence aside from its relevance to the research question. As a result, the researcher is tasked with prioritizing aspects of the literature, which may lead to bias in the study selection and categorization phase. Proponents of the scoping study method contend that it still maintains academic rigour and transparency. Mays et al. (2001) note that as long as the process is sufficiently documented as to allow replication,

“this explicit approach increases the reliability of the findings, and responds to any suggestion that the study lacks methodological rigour (in Arksey & O’Malley, 2005, p. 8).” In order to address this bias, I have attempted to clearly report my process in the sourcing, synthesizing, and inclusion and exclusion criteria of the selected literature.

I was limited by the exclusion criteria of non-English language articles and the number of databases, key journals, and organization publications that I could review as a single novice researcher. I compensated for this by hand searching key journals and reviewing the reference lists of relevant studies. As the scoping study method is still relatively new, there were limited resources available regarding protocol for reporting results and discussion points. I have attempted to emulate the results and discussion sections from scoping studies published in peer-reviewed academic journals so as to be consistent with others in the field.

Reflections

My capstone concludes almost two years of full-time study in the MPH program; not nearly enough time to make me an expert in anything, but enough to have keenly reflected on key messages from professors, readings, and class discussions that have led me to question the capstone process and research question.

I have attempted to highlight the structural factors that influence the relationship between the extractive industry and sexual health, yet there is little in my capstone that engages with or includes the communities under study in any meaningful way. That is partly the nature of a scoping study and somewhat out of my control as I am collating available research and not conducting my own. However, ethical considerations that have been posed since beginning of the program regarding community participation and fairness in research have left me wondering if I have done justice to the stories and voices of mineworkers and communities. Working on this capstone has emphasized the importance of respecting and representing the voices of those who entrust you with their sensitive stories of health.

While writing this reflection, I was assigned to read an article by two SFU professors (Dr. Kitty Corbett and my senior supervisor, Dr. Craig Janes) who posed the question of whether global health studies “raises the spectre of a new form of colonialism: extending uses of sites in the global south to study their disease burdens to satisfy the needs of science” (Corbett & Janes, 2009, p.176). The authors reference Paul Farmer and Jim Yong Kim from Partners in Health who note that, “we are now in the midst of a global ‘Tuskegee experiment’”² (Corbett & Janes, 2009, p.176). Given that my central focus is the sexual health of black men and women in southern Africa, I have questioned if my capstone perpetuates this “Tuskegee experiment” by pathologizing a region and populations that have become synonymous with risky sex and the HIV/AIDS epidemic (Epprecht, 2014). I have tried to focus the capstone on practical recommendations for developing more responsive programs that shift from individual behavior to structural determinants. While this capstone does satisfy the requirements of my MPH degree, I also think that this question and the issues the literature and capstone process has raised will inform my future practice.

I also wanted to reflect on the capstone process and its connection to my practicum. Although I did my practicum with the United Nations High Commissioner for Refugees in Malaysia, arguably very different from my capstone’s focus, the most valuable parallel I see between the two is that, for public health professors and practitioners, health is the centre from which all other spheres of life extend. Yet, for other groups, where food scarcity, gender dynamics, limited formal education, economic precariousness, historical oppression, and political disempowerment are more tangible, health may not be the immediate priority. I am still reflecting on this, but my initial thoughts are that it becomes our responsibility to respect and acknowledge this difference, while working empathetically and patiently with communities to incorporate their unique visions of public health into all programs and policies.

² The 1932-1972 “Tuskegee Study of Untreated Syphilis in the Negro Male” was a research study conducted by the United States Public Health Service. Nearly 400 poor and uneducated African American men from rural Alabama, all known to be infected with syphilis, were intentionally left untreated so researchers could study the evolution and characteristics of the disease. The researchers knowingly withheld information regarding the men’s disease status and failed to offer penicillin treatment, even after it was established as an effective treatment (Walker, 2009).

I am certain that when I read this paper years from now, I will reflect more on my naiveté with the capstone process and this research question. I believe that my time in the MPH program has only initiated a lifetime journey of reflecting on my role in public health and being critical of the tensions inherent in global health.

Conclusion

In conclusion, this scoping review has summarized the nature of research activity and key findings related to the impacts of the formal extractive industry on SRH outcomes among mineworkers, their sexual networks, and surrounding communities. The results of this review demonstrate how the public health impacts of the extractive industry need to be understood as broader than just environmental or occupational hazards. It also demands that our understandings of SRH widen to include more than the biomedical need for symptom treatment or disease education. It is necessary but not sufficient to distribute condoms or provide education about transmission methods. As the literature has shown, programs that neglect to consider the bigger context influencing health outcomes within the extractive sector fail to adequately address the root causes and do not decrease STI and HIV/AIDS rates. Individual knowledge and behaviour will always be factors in influencing SRH outcomes, however SRH is an indicator of broader issues linked with the mining industry. The literature is almost unanimous in identifying how the broader determinants of health, such as high-risk physical environments, economic conditions, gender dynamics, and political and historical contexts can influence public health. By conducting this scoping review and using the concept of the determinants of health as a guide, we can better understand the structural factors that influence the epidemiological links between SRH outcomes and the mining industry. I hope the results and recommendations summarized from the scoped literature will be used to foster greater responsibility within the mining sector and to develop more responsive and effective programs for mineworkers, their families, and their communities.

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Appendix A.

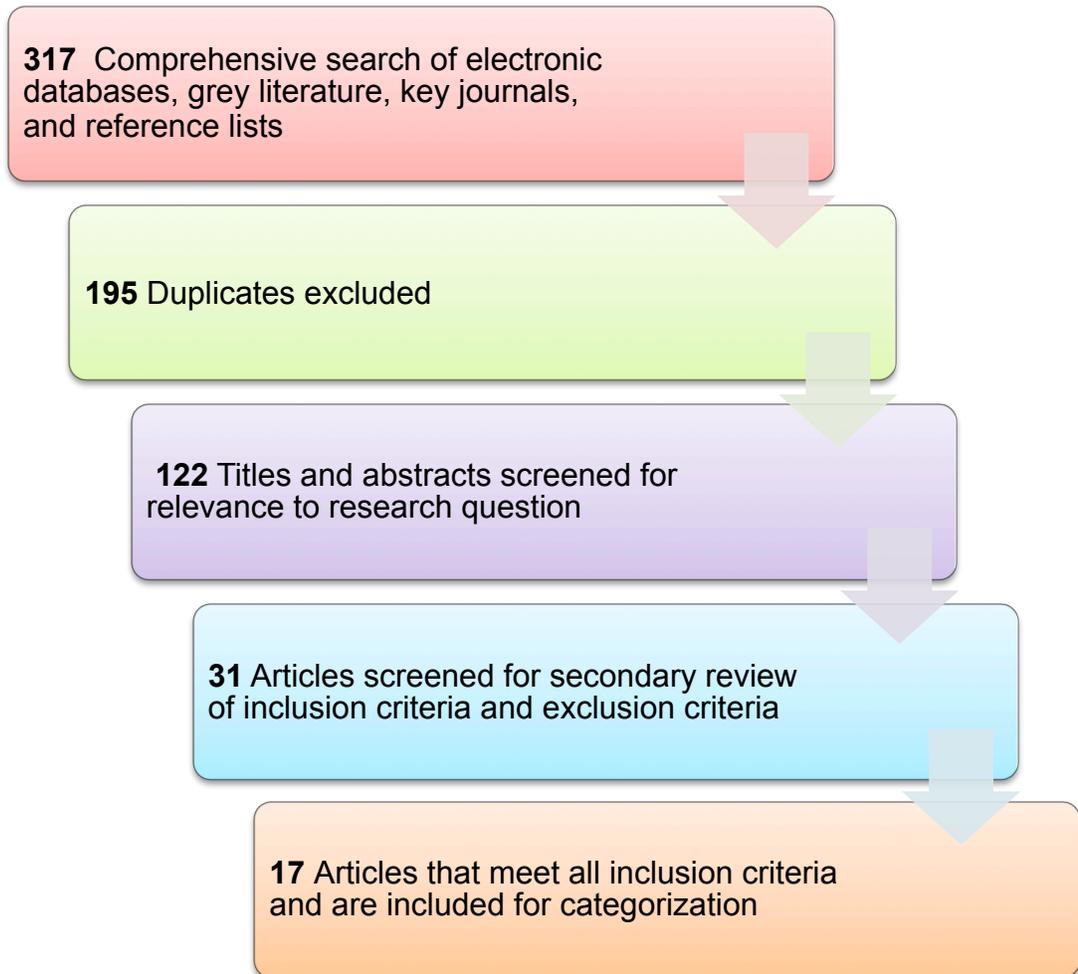
Map of Southern African Development Community



Source: Southern African Development Community (SADC). (n.d.).

Appendix B.

Study Selection Process



Appendix C.

Summary of Included Studies

Author, Year	Study population and/or location	Objectives	Methods	Key Findings
Banwise et al., 2013	Mineworkers and communities from Mozambique	To analyze regional and national policy developments and to make recommendations	Literature review	<p>150 year history of Mozambican circular migration to South African mines - economic benefits, but also epidemics of TB, silicosis, and HIV and inadequate public policy in Mozambique with estimates that financial burden for labour-supplying communities could be more than \$800 million USD per year</p> <p>Provinces with highest migration rates have highest HIV rates in country (Maputo, Gaza, Inhambane) and are markedly higher than national adult prevalence (25% in Gaza vs. 11.5% overall)</p> <p>Mozambican mineworkers' experience is characterized by single sex hostels and active sex industry, short visits with families and wives, poor treatment at mine clinics (no health insurance for Mozambicans), and wives at home with casual sexual partners</p> <p>Public health impact as cross-border migration can disrupt treatment and Mozambican health system is not equipped for referral and case absorption from South Africa and the Mozambican experience forms part of a larger and complex internal and cross-border sexual network within SADC</p> <p>National policies need to consider social, cultural, and economic determinants in addition to biological factors and interventions need to occur throughout migration cycle (origin, transit, destination, and return) with mineworkers and their families and communities</p> <p>Regional policies (South African Development Community Declaration on Tuberculosis in the Mining Sector and National Action Plan for the Health Care of Cross-Border Mozambican Mine Workers) need to coordinate full packages of HIV and TB prevention programs in sending and receiving countries and along transport corridors. Requires commitment to operationalize and</p>

				civil society to hold government and private sector accountable
Campbell, 1997	Male gold mineworkers in South Africa	<p>To examine how mineworkers construct their social identities within particular living and working conditions</p> <p>To identify key narratives used by mineworkers in their experience of health, HIV, and sexuality</p>	Semi-structured, open-ended interviews	<p>Sexuality and sexual behaviour is constructed within the norms and characteristics of our social groups and form the complexity of actions, emotions, and relationships which define boundaries – analyzing high-risk behaviour needs to understand social identities and conditions</p> <p>Characteristics of life on the mines: living away from families, overcrowded single sex hostels, no space for privacy or quiet and limited leisure opportunities, townships are close by with sex and drinking available daily, dangerous and physically intensive daily work and limited ability to maintain basic healthy habits</p> <p>Lack of control over job prospects (high levels of unemployment and chronic poverty in his rural place of origin) and sense of powerlessness and low self-efficacy which inform context of sexual identity and behaviour</p> <p>HIV/AIDS risk is minimal compared to conventional occupational health risks – unprotected sex becomes a wager and cost-benefit analysis as there is factual knowledge about the dangers of unprotected sex with multiple partners but this behaviour may be beneficial in stressful and socially impoverished living and working mine environments</p> <p>Construction of masculine identities within and socially impoverished context of life on the mines, however very sense of masculinity that assists men in their day-to-day survival also heightens their exposure to HIV infection risks</p> <p>Macho masculinity in mines compensates for reduced opportunities to assert masculinity in conventional settings – sending communities are often patriarchal rural communities where men construct identities through family leadership</p> <p>Characteristics of masculine identities on mines related to HIV: insatiable sexuality served by</p>

				multiple partners and flesh-to-flesh contact (only source of emotional intimacy in lonely and isolating environment), sex linked with physical and mental health (need balanced supply of blood and sperm), celibacy leads to poor health effects and cause a man to have uncontrolled desire only satisfied by commercial sex workers
Campbell et al., 1998	Male mineworkers and female commercial sex workers in Carletonville, South Africa	To examine how gender facilitates HIV transmission and how this can be used in designing prevention programs	Literature review, interviews, and focus groups	<p>Factual knowledge is a weak determinant of sexual behaviour and treating HIV as an individual biomedical problem neglects that sexual health is located within the broader contexts in which people live, with gender dynamics playing a key role in the structuring of these contexts</p> <p>Masculinity is constructed within mine work and serves as a coping mechanism for mineworkers to balance the dangerous working conditions. Masculinity is associated with high levels of sexual activity and these norms that allow for acceptance within the working environment serve to increase the risk of HIV transmission. Men are socialized to resist condom use and women are socialized to acquiesce to male demands and inadequate confidence to assert sexual health rights in the face of economic dependence</p> <p>Commercial sex workers originate from impoverished rural areas and follow mining activities to sell sex and alcohol. Many lose contact with families and must survive within mining squatter camps with high levels of violence and substance abuse. Given the highly stigmatised nature of their profession, low levels of self-respect, lack of perceived social respectability, and reliance on men for financial and social survival, women take on a lower social status and forfeit ability to demand health rights</p> <p>Obstacles to condom use in sex work: poverty and lack of job opportunities, more money for sex without a condom, lack of unity among commercial sex workers, lack of respect and competition within squatter community, fatalism, and low self-efficacy</p> <p>Traditional prevention programs assume that sexual behaviour is the result of informed individual decisions and understanding of health risks, however condom use and sexual behaviour is socially constructed. Interventions should increase participation and representation of community stakeholders - increase confidence among sex workers to</p>

				collectively negotiate safer sex, utilize peer education to increase level of perceived control over health and likelihood of engaging in health-enhancing behaviours
Campbell & Williams, 1999	Gold mining areas in SADC countries	<p>To examine the history of HIV/AIDS in the mining industry in southern Africa</p> <p>To analyze the response of key players in the mining industry to HIV/AIDS</p>	Key informant interviews, literature review, and case study	<p>HIV/AIDS epidemic in mining areas needs to be understood at the biomedical, psychological, and social levels (economic factors, working conditions, gender dynamics, low levels of self-efficacy, knowledge and beliefs that compete with health educational messages, and masculine identities)</p> <p>Influenced by factors such as rural poverty and low education levels in surrounding countries forcing men to become migrant mine workers and women from rural areas to become commercial sex workers</p> <p>Increased knowledge about HIV does not translate into behaviour change – women receive more money for unprotected sex, mining is a dangerous occupation and HIV is one of many (less immediate) health issues, masculine identities and sense that unprotected sex with many women equals fearlessness in the face of risks</p> <p>Perceived lack of control in one's life → lack of control of one's health → increased likelihood of unsafe sexual behaviour</p> <p>Interventions should focus on social and environmental determinants that impact behaviour and address structural factors related to health protection and risk taking (such as migrancy and housing, women's economic dependence, rural poverty, and safety legislation for workers). Interventions should include members of surrounding communities and be managed by an alliance of groups in order for beneficiaries to participate in the design and implementation of projects.</p>
Campbell, 2000	Female commercial sex workers in South African mining	To detail the social organization of sex work and	Semi-structured interviews and formal project	Sex workers' life histories influence their participation in sex work – death of a parent/parents; leaving school after becoming pregnant; leaving an abusive man; running away from difficult

	community	<p>psycho-social context of HIV transmission in a mining community</p> <p>To examine successes and challenges in a community-based peer education and condom distribution project aimed at vulnerable single women</p>	evaluation	<p>home lives</p> <p>Little interaction between sex worker and client – little room for discussion about condom use; women negotiate directly for themselves; colleagues provide physical protection during transaction</p> <p>Central narrative that these women were “alone” in the world, however there is a complicated social support network among sex workers and wider community members</p> <p>Factors that create vulnerability to HIV/AIDS transmission – client reluctance to use condoms; lack of unity in the community; confidence, dignity and self-efficacy</p>
Corno & de Walque, 2012	Mining communities in Swaziland, Lesotho, and South Africa	To explore whether mineworkers' migration into South Africa has increased the spread of HIV/AIDS and high prevalence in the countries of origin (Swaziland and Lesotho)	Demographic and health surveys	<p>3 factors in hypothesis that mining activities influences HIV infection: 1) temporary long-term migration from the household of origin increases likelihood of multiple concurrent sexual partners (casual and longer-term); 2) single-sex hostels boost sex industry in adjacent areas for mineworkers with disposable income; 3) wives waiting for husbands at home may engage in casual sex</p> <p>Zimbabwe used as control group (where mining industry uses local labour): no statistically significant association between mining activities and HIV prevalence, suggesting that the migration to the mines is relevant factor in HIV incidence and prevalence</p> <p>Mining is one of the occupations with the highest HIV prevalence rate in Lesotho and Swaziland. Miners aged 30-44 years old are 15% more likely of being infected and women with a partner in the mines are 8% more likely to be infected. Miners are 9.8% less likely to abstain from extra-marital sex and when compared with women with partners doing other types of jobs, a woman with a partner in the mines is almost 2% more likely to report extra-marital sex. Married women are 3.7% less likely to use a condom within marriage with their</p>

				<p>miner husbands than married women not married with miners. Miners are less likely to use condoms when they have extra-marital sex – they are about 17% less likely to use a condom with occasional sex partners.</p>
Desmond et al., 2005	Female hospitality workers and male mineworkers in mining town in northwestern Tanzania	<p>To develop a typology of mining-related groups at high risk of HIV based on local cultural categories</p> <p>To suggest behavioural interventions based on sexual behaviour patterns</p>	Participant observation, informal questioning, and semi-structured interviews	<p>Difficulty in identifying high and low risk groups in high-risk environments as conventional epidemiological categories may not capture the complexity of sexual mixing between groups</p> <p>Mining towns as high-risk environments - income and social advancement opportunities in a context of rural poverty and limited employment for women with simultaneous influx of migrants</p> <p>Population mobility and separation from regular partners increases number of and mixing within sexual partnerships plus loneliness and freedom from social norms encourages risky sexual behaviour</p> <p>Sexual health promotion in mining communities should focus on an environmental and geographical approach to sexual risk and target recreation activities (including regulation of recreation choices outside the direct mining area), sustainable earning opportunities in rural areas, and building of family hostels for mineworkers to bring partners and children.</p>
Htun et al., 2007	Symptomatic STI patients from mines in Carletonville, South Africa	To explore the epidemiological synergy between STIs and the emergence of HIV infection	Analysis of medical records of STI patients presenting with new STI episodes	<p>HIV prevalence among STI patients increased significantly from 18% in 1992 to 51.6% in 1998 in mining suggesting epidemiological synergies operating between conventional STIs and HIV</p> <p>Increases in rates of genital ulcer diseases (herpes, syphilis, and chancroid) are linked with increases in HIV seropositivity among patients in clinics linked to mining areas and surrounding communities</p>
IOM, 2010	Mineworkers and communities in	Mining Sector Report: Regional	Literature review	Young men exposed to hazardous working conditions and risk of physical injury, masculine identities in mines encourage sexual activity and substance use. Risk taking is exacerbated by

	southern Africa	Assessment on HIV Prevention Needs of Migrants and Mobile Populations in Southern Africa	and surveys	<p>perceived lack of control, absence of social constraints, and poor living conditions.</p> <p>Single-sex hostels with limited home leave, families prefer to remain in rural homes as mining sites are often isolated and inhospitable with limited infrastructure, limited access to healthcare that is under-developed and under-utilized, disparities in health access as casual contracts unlikely to have benefits, limited recreational facilities (drinking and sex), limited social support and intimacy</p> <p>Nearby informal settlements to accommodate and service mineworkers serve as space where young women migrate for work to capitalize on mining income and are often only able to access sex work. Women with HIV+ migrant spouse may have barriers to negotiating condom use as she is socially and economically weaker and/or may engage in unprotected sex in the absence of her spouse</p> <p>Interventions need to acknowledge family separation, boredom, loneliness, social exclusion, masculine identity and gender inequality, limited access to healthcare, availability of sex and alcohol, treatment and education for partners of mineworkers, poor education and HIV knowledge, and low/inconsistent use of condoms</p>
Lightfoot et al., 2010	Mineworkers and community members in southern Namibian mining town	To investigate knowledge levels of the link between HIV and alcohol use and what mechanisms affect how alcohol consumption leads to higher-risk sexual behaviours	Focus groups and in-depth interviews	<p>High levels of knowledge regarding HIV and alcohol among mineworkers and community, however the social structure of the remote mining town created high-risk environment where high levels of alcohol use lead to higher-risk sexual behaviours</p> <p>Social structure of mining town encourages substance abuse: male migrants away from families in remote location, loneliness, boredom, limited recreation activities, disposable income, gender imbalance</p> <p>Alcohol consumption as a risk factor for HIV: lowered sexual inhibitions, transactional sex, barriers to condom use, coercive sex and violence, sex with multiple concurrent partners, sharing of sexual partners, increased courage and perceived immortality, social pressures, and</p>

				<p>release from dangerous occupation and stresses</p> <p>HIV-prevention programs that focus on HIV and alcohol use in addition to structural changes (family accommodation, varied recreation activities, substance abuse programs)</p>
Meekers, 2000	Male gold mineworkers in Welkom, South Africa	To examine trends in risk behaviour among South African gold mineworkers	Baseline and follow-up surveys	<p>Combating HIV infection in mining communities is a high priority because the working and living conditions make miners particularly vulnerable to HIV infection; mining is a vital part of the South African economy and provides family income; and migrant mineworkers may spread HIV to their home communities</p> <p>Prevention is challenging because mineworkers' social and work environment is conducive to high-risk behaviour – migrant work and prolonged separation from wives encourages extramarital sexual relationships and commercial sex work</p> <p>Low perceived control and high anxiety over ability to improve working and living conditions, particularly their health → seek pleasure and relaxation → alcohol use and casual sex are most available and popular → sex workers who are well-paid by mineworkers and casual sex is a symbol of masculinity in an environment where self-efficacy is low and the risk of HIV becomes smaller in relation to underground accidents</p> <p>Mining industry's health programs have increased knowledge but behaviour and STI rates remain of concern – they should target the mineworkers and their families and sexual partners, including peer education to encourage mineworkers to have fewer sexual partners, increase in mineworkers' access to and use of condoms, and training healthcare providers in syndromic management of STIs</p>
Rees et al., 2010	Mineworkers in southern Africa	To discuss the role of oscillating migration in fuelling HIV, tuberculosis, and	Literature review	<p>Difficulty in comparing diseases rates across occupations because of factors leading to employment in mining, however underlying source of high HIV infection rates is the breakdown of family structure associated with oscillating migration</p>

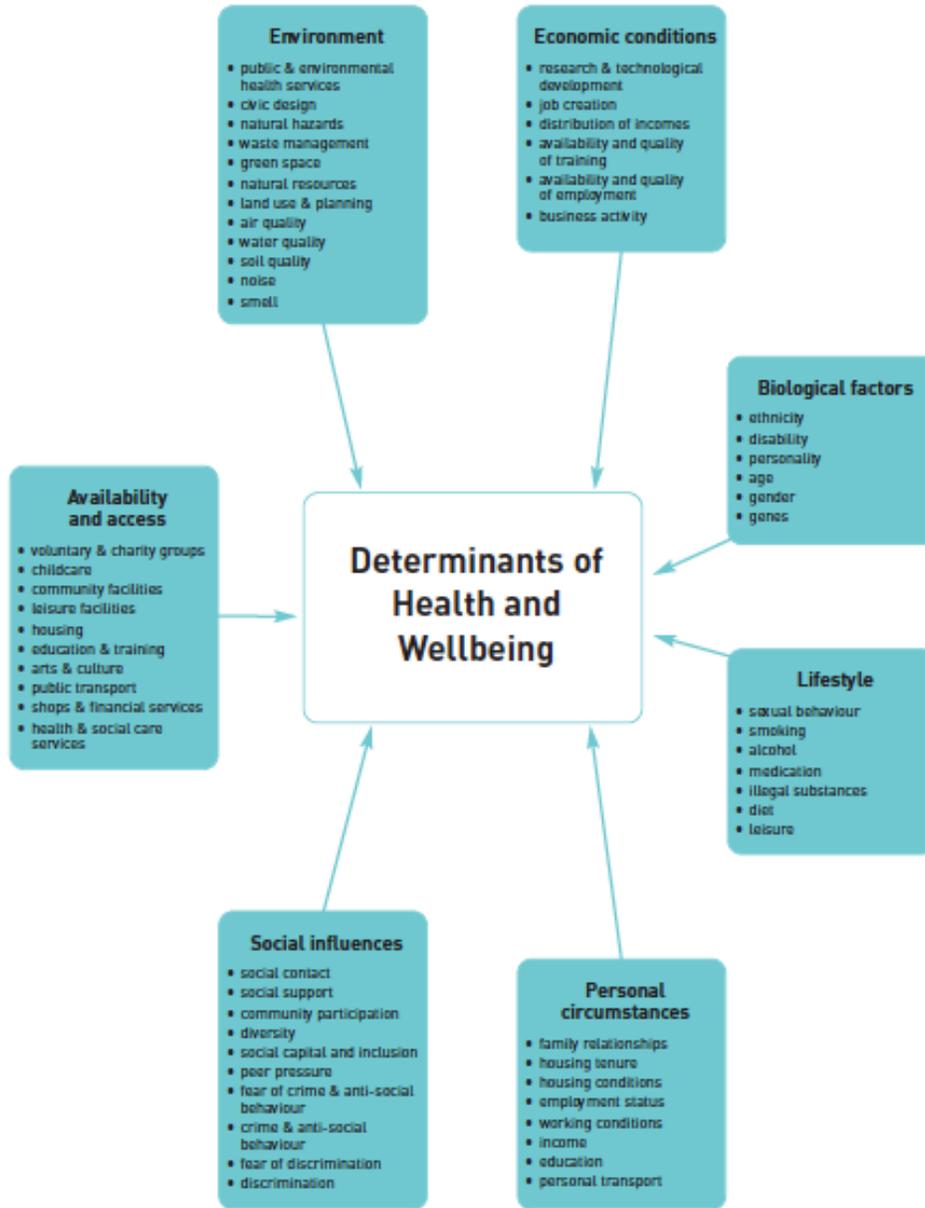
		silicosis infection in the gold mining industry		<p>South African gold mining industry's link with HIV is characterized by long separation from wives with little opportunities for stable intimate social relationships, population with existing high rates of STIs, dangerous working conditions encourage high-risk sexual behaviour, women in positions of economic necessity rely on commercial sex work</p> <p>Oscillating migration creates social and economic system that encourages multiple concurrent partners. HIV epidemic extends to entire region as there is a complex geographic sexual network: heterosexual mining community → surrounding communities → nearby urban areas → rural areas</p>
Steen et al., 2000	Women at high-risk for STIs living around the mine and mineworkers in Free State, South Africa	To assess the impact of STI treatment and prevention services for high-risk women and male migrant community	<p>Longitudinal study for STI testing and periodic treatment and education for women</p> <p>Cross-sectional samples at baseline and 9 months and routine disease surveillance to compare STI prevalence among mineworkers</p>	<p>Factors that lead to disruption of communities and separation of couples are known to enhance spread of STIs, commercial sex work flourishes in context of migrancy and mining companies' prevention efforts have focused on employees and not on sexual contacts</p> <p>Very high initial prevalence of STIs among high-risk women and male mineworkers decreased between baseline and follow-up and post-intervention attendance rates at mine clinics for men presenting with STIs decreased, however this decrease was inversely related to the distance of miner hostels to intervention area</p> <p>Effective periodic curative and preventive services to high-risk groups (e.g. commercial sex workers) → decreases in STI prevalence and increases in condom use → reduce women's burden of disease → transmission opportunities in high-risk encounters are reduced → transmission opportunities with mineworkers and partner at home are reduced → significant for community and STI control</p>
Stuckler et al., 2010	Mining industry in southern Africa	To analyze the governance of mining in southern Africa and to evaluate existing responses and	Literature review	Consistent and historical roots of disease and mining in southern Africa, including unique scale of international migration in southern Africa – current situation is inherited from past migration laws which prevented permanent residence of mineworkers' families and mine administrators used alcohol and commercial sex workers as strategy to reduce unionization or revolt

		future mechanisms for cross-border care and global norms of responsible mining		<p>HIV epidemic in the 1980s was fuelled by circular migration between mines and rural homelands (Lesotho, Swaziland, Botswana, Zimbabwe, and Mozambique) - shantytown residences filled with alcohol, drugs, and commercial sex work (including sex trafficking) which are all HIV risk factors and led to 1990s HIV-TB co-epidemic</p> <p>Weak policy response and limited attention to policies related to health consequences - focus is on individual risks and no recent UNAIDS, WHO, or World Bank documents that specifically link risks of TB and HIV and mining sector</p> <p>Little incentive in current economic system for mining companies to invest in preventative strategies – current set up externalizes costs of mining on rural labour supplying communities and defers responsibilities for occupational compensation by questioning whether HIV is an occupational disease</p> <p>Mining unions have low levels of awareness about link between mining and disease and are often xenophobic, geographically dispersed, and linguistically varied and government is challenged by cross-flow of workers, corruption and vested interests in mining, and weak bureaucratic capacity of institutions</p>
Stuckler et al., 2013	Mineworkers and communities in southern Africa	To evaluate the evidence on the effects of mining activity on HIV and alternative policies for mitigating the health impacts of mineral mining	Literature review	<p>Family segregation as legacy of apartheid migrational labour system increases likelihood of risky sexual activity, growth of sex trafficking, and sex trade</p> <p>Women in mine areas are at risk of STIs and HIV due to reliance on sex trade as income and women in rural areas are exposed to HIV and STIs from returning partners with limited knowledge and power to address the gendered risks</p> <p>Dangerous internal conditions in mines and external social conditions that create epidemics of HIV and STIs (about 1/3 of mineworkers become infected with HIV within 18 months of working on the mines)</p>

				<p>Circular migration spreads health consequences to sending communities and cross-border care is nonexistent or inadequate leading to multi-drug resistance and strain on the system</p> <p>Significant links found between mining activity and spread of HIV at population level in Africa – risks extend from mining areas into wider population and costs are externalized onto state and sending communities so mining companies maximize profitability</p>
Williams et al., 2000	Mineworkers and surrounding community in Carletonville, South Africa	To describe the Mofusimpilo-Carletonville HIV intervention project	Literature review, project evaluation, and survey	<p>Higher HIV and sexually transmitted infection rates among women in hot spots (mostly commercial sex workers) and mineworkers compared to general population; women had higher infection rates and were infected at a younger age overall compared to other survey groups</p> <p>Sexual behaviour is dictated within range of social, cultural, and normative constraints including perceived vulnerability and health-related beliefs, low self-efficacy, gender and masculinity norms</p> <p>Previous interventions relied heavily on biomedical understandings were not successful as factual knowledge did not translate to behaviour change and STI treatment was not extended to commercial sex workers</p>
Williams et al., 2003	Mineworkers and commercial sex workers in Carletonville, South Africa	To study changes in sexual behaviour and STI rates in response to HIV prevention program	Cross-sectional surveys analyzing demographic and behavioural factors and incidence of STIs and HIV	<p>HIV-related knowledge and risk perception increased over the course of the project cycle, however rates of syphilis, chlamydia, and gonorrhoea increased among all study populations</p> <p>Interventions need to include broader community, especially commercial sex workers and treatment of STIs</p>

Appendix D.

Determinants of Health and Wellbeing Model



Source: International Council on Mining and Minerals (ICMM). (2010).

