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Risk factors for sexually transmitted infections among mine workers in Orkney, North West Province, South Africa

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A research report submitted to the Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, in partial fulfilment of the requirements for the degree

Of

Master of Science in Medicine in the field of Epidemiology and Biostatistics

Johannesburg, November 2014

DECLARATION

I, Bulelwa Magadla student number: 0316683A declare that this research report is my own work. It is being submitted for the degree of Master of Science in Medicine in the field of Epidemiology and Biostatistics in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at this or any other University.



14th of November 2014

DEDICATION

In loving memory of my beloved father Mr S. B Mabija (1929– 2010), my sister Ms Lulama Mabija (1963 – 2011) and my brother Mr Patuxolo Mabija (1965 - 2012)

May their souls rest in peace.

****

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My family Mr Martin Magadla (Husband), Ms Olwethu Magadla (Daughter) and Jnr Athi Magadla (Son) for all your love care and support throughout the difficult times.

ABSTRACT

Title: Risk factors for sexually transmitted infections among mine workers in Orkney, North West Province, South Africa.

Background: The role of mobile populations in the spread of HIV has been documented in several countries of the world. In South Africa, the relationship between mine migration and HIV has been studied in detail in the mining town of Carletonville and in Welkom. The link between HIV acquisition and transmission has been well documented. Prevention and early treatment of sexually transmitted infections have been identified as public health priorities as reflected in HIV/AIDS, TB and STI strategic plan of South Africa (2012 – 2016). In this study we sought to measure the prevalence of STIs among mine workers at baseline before a planned STI treatment intervention.

Objectives: To: 1) Measure the prevalence of STIs amongst the mine workers. 2) Describe the types of STI in the population. 3) Identify risk factors associated with genital ulcers diseases.

Results: The highest percentage of STI positivity 188 (10.6%) was observed in the youngest male group (<30) in the study population and decreasing by age (50-64) at 1.8%. We found that of the 1685 participants, 78 (4.6%) had any STI, with 46 (2.9%) having chlamydia, 20 (1.3%) having gonorrhea and 7 (0.4%) having genital ulcer STI. Age was found to be a significant predictor of Chlamydia status. Fitting a multiple logistic regression model showed that the age group of a participant and whom the participant lived with were the two major independent factors that were associated with the risk of a person having an STI.

Conclusion: There is a high demand for STI prevention programmes to focus on the younger age group. A ssurprising finding that in fact risk of STIs was higher among men living with their partners than among those in the single-sex hostels, where we expected to find the highest risk.

Targeted door to door prevention education campaigns may go a long way in modifying the behavior of having multiple sexual partners.

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GLOSSARY OF ABBREVIATIONS

1. NDOH – National Department of Health
2. DoH – Department of Health
3. NSP - National Strategic Plan
4. WAHR - Women at high risk
5. FSW – Female Sex Workers
6. STI - Sexually Transmitted Infections
7. STD - Sexually Transmitted Diseases
8. GUD - Genital Ulcer Disease
9. HIV - Human Immunodeficiency Virus
10. AIDs - Acquired Immuno-Defeciency Syndrome
11. AOR – Adjusted Odds Ratio
12. UOR – Unadjusted Odds Ratio
13. CI – Confidence Interval
14. LR - Likelihood Ratio

CHAPTER 1: INTRODUCTION

1.1 Background

Many studies have reported that the probability of HIV acquisition and transmission is enhanced in patients with neither ulcerative nor non ulcerative STIs [1-5]. It is also epidemiologically plausible that the high incidence of genital ulcerations in the mines during the early 1990s might have contributed to the rapid and explosive increase in HIV among miners with STIs [6].

Since 1994, several other intervention activities have been implemented that targeted both high- and low-risk population groups in the community residing in the areas surrounding the mines. These activities included the improvement in quality of STI care (by training and implementation of syndromic management); behavioural interventions including condom promotion,[6] and targeted interventions for high-risk women using periodic presumptive therapy for STIs [7]. A more effective contact tracing system was also implemented in collaboration with a network of private and public STI services situated in areas surrounding mines [8].

HIV/AIDS is a major threat to businesses in South Africa due to increased absenteeism because of illness and funeral attendance, loss in productivity due to sicker workforces and increased costs of health care. Several STIs have been shown to facilitate the transmission of HIV [11-12], therefore prevention and treatment of STIs may be useful in addressing the epidemic of HIV/AIDS. Prevention and early treatment of STIs is therefore a high public health priority in South Africa which is reflected in the HIV/AIDS/STI Strategic Plan for South Africa 2012-2016 of the National Department of Health.

Prevention and early treatment of STIs is therefore a high public health priority in South Africa which is reflected in the HIV/AIDS/STI Strategic Plan for South Africa 2012-2016 of the National Department of Health.

The role of mobile populations in the spread of HIV has been documented in several countries of the world [9–12]. The movement of individuals may be linked to permanent or seasonal migration [9, 13] or to occupations such as trading and truck driving [14, 15]. The mine workers are also classified as migrant workers as they are from all areas country wide and neighbouring countries.

The role of truck drivers and commercial sex workers in the spread of HIV has been studied in many countries in Africa and elsewhere [16-20]. In South Africa the relationship between mine migration and HIV has been studied in detail in the mining town of Carletonville, which is similar to the mining town of Orkney but very few studies have been carried out on HIV among truck drivers and the sex workers with whom they interact [21]. Mining town of Carletonville has similar characteristics as Orkney since their economy is mining and they both attract workers from outside for mine work hence migrant workers are common in both towns.

A study was conducted in 2004 by Aurum Health Research on the prevalence of STIs among male mineworkers in Orkney as a baseline evaluation for a planned targeted community intervention on the education, condom distribution and syndromic STI management approach among women at high risk of HIV infection (WAHR). This was based on the premise that interventions targeting a core group of women who

contribute to the spread of STIs, could lead to a reduced STI incidence among mineworkers..

Due to financial constraints and change of interests from the funder (Mining sector) the intervention was not implemented as planned at all in Orkney.

In this study we sought to measure the prevalence of STIs among mine workers at baseline before a planned STI treatment intervention.

This study reports on a Secondary data analysis which was carried out on the baseline data to examine risk factors for STIs among mineworkers in Orkney, North West Province

1.2. Statement of the problem

The occurrence of STIs remains a problem in the mining community, despite interventions such as education on transmission and prevention using condoms, distribution of condoms and syndromic management of STIs according to DoH protocols, since STIs facilitate HIV transmission. Additional intervention strategies are needed to improve the control of STIs. Understanding the risk factors for STIs in the mining community will inform the development of new interventions. Improved control of STIs in our population is very important not only for reduction of new HIV infections but also reduction in STI complications especially in women and infants.

1.3. Justification of the study

In 2004, Aurum Health Research conducted a survey among approximately 1700 mineworkers from AngloGold in Orkney as a baseline evaluation of the impact of a planned targeted community intervention among women at high risk of contracting STIs. This report contains the findings from a secondary data analysis of risk factors for STIs from the baseline data that was collected. The secondary data analysis only focused on the risk factors of STIs which is important information for the public health interventions for reducing the prevalence of STIs

1.4 Literature review

The adult prevalence of HIV infection in South Africa at the time of the survey (2004) was estimated to be 11.1% and was consistently high, particularly in areas of the country associated with migrant labour[9].

The mining industry of South Africa is particularly exposed to the economic impact of the HIV epidemic. Some STIs facilitate the transmission of HIV. The risk of female to male HIV transmission is increased 3 – 5 times in the presence of a genital discharge, and 10 –300 times in the presence of a genital ulcer [11, 12].

A cross-sectional study conducted among mineworkers in Welkom from June to December 2000, found an STI prevalence of 8% (95% CI 7.1 – 8.7). Approximately 80% of the miners lived in single-sex hostels, and most were migrant laborers who visited their families infrequently [10].

The intervention programme that was implemented for mineworkers in the Carletonville area, a community intervention on the education, condom distribution and syndromic STI management approach among women at high risk (WAHR) of HIV infection**,** made a substantial effort to standardize STI treatment by all health service providers, most of whom were trained in syndromic management. Nevertheless, the prevalence of chlamydial infection, gonorrhoea and syphilis all increased, suggesting that much greater changes in behaviour would be needed to reduce their prevalence significantly.

The programme of presumptive treatment for sex workers was started only 9 months before the second survey in Carletonville but dramatic reductions in the prevalence of

STIs were reported among mineworkers and sex workers in a similar setting by Steen *et al* [11].

The intervention did not succeed in many of its aims. The implementation was very intense in certain places, in particular the 'hotspot' known as Leeupoort, but considerably less in other places and in particular among miners; the mines in Carletonville have only recently begun to intensify their workplace interventions[11].

Migration and rapid urbanization are demographic factors that play a major role in sexual behaviour within a community, and may result in a population consisting of many more men than women. As a result casual and commercial sex are major modes of sexual expression, increasing the risk of infection. There are few formal job opportunities for the local women. The presence of men who are staying apart from their families provides opportunities for commercial sex work. These factors along with other factors such as hostel accommodation, poverty and gender inequalities in women contribute to the spread of STIs. Factors such as age and sex have a combined biological and behavioral effect[13]**.** The younger age group of men is more sexually active than the older age group and the sexual behaviours are also different as younger men would have more sexual partners than older man who would be in more stable relationships.

Mineworkers have access to free health care services at their workplace for the management of STIs according to Department of Health guidelines. Workplace Primary Health Care services are open 24hrs and are attached to their accommodation at hostels and closer to their work. Early diagnosis of STIs remains a challenge among mineworkers due to denial and poor health seeking behavior.

Although traditional healers in South Africa (and other countries such as Uganda) have had training in HIV related skills such as prevention counselling and correct condom use, they are unable to prescribe antibiotics. Hence it is important that mineworkers use medical health care facilities even if they do consult traditional healers. [14]

A multi-city study conducted among FSWs in the Dominican Republic evaluated the addition of regional government sanctions to an intervention that included a 100% condom campaign, improved STI screening and treatment, and women's empowerment and performance reports that were shared with brothel owners.[15]

This is a study in a high risk community that showed STI control is achievable – but may be more stable than mining population, and may have cultural differences.

Significant improvements in FSWs' self-reported ability to reject unsafe sex and increase condom use with clients and intimate partners were observed only in the city that offered additional government enforcement through sanctions. In the one regulated city, STI prevalence was reduced by 43%.[16]

While the communities outside the mines are relatively stable, the mineworkers are mostly migrants from rural areas in South Africa or neighbouring countries and this contributes to the demand for commercial sex and the spread of HIV and other STI [17–21]. The extent to which the project in Carletonville succeeded in improving the quality of STI management in the public and the private sector is still uncertain and needs further investigation.

1.5.1 Study Aims

The aim of this secondary data analysis is to examine risk factors for STIs among mine workers in Orkney from the baseline survey.

1.5.2. Study Objectives:

. For the secondary data analysis objectives are:

- To measure the prevalence of STIs among mineworkers in Orkney.
- To describe the types of STIs in this population.
- To identify risk factors for STIs overall and for individual STIs with a prevalence of at least 2% (as a lower prevalence would not have sufficient cases to carry out the analysis)

CHAPTER 2: METHODOLOGY

2.1 Study design

The study design was a cross sectional survey. This report involves secondary data analysis from the survey.

2.2 Study population

All male mineworkers who participated in the survey will be included in the secondary data analysis of this study.

2.3 Study sample

The study consisted of 1700 participants and after data clean up, participants who had missing data on genital examinations and STI results were excluded for secondary data analysis. The dataset consists of 1685 participants in which all will be included for the secondary data analysis. A sample of 1685 participants allows us to examine a range of risk factors for STIs simultaneously; using the rule of thumb that one requires at least 10 participants with an STI and at least 10 participants without an STI for each variable to be included in a multiple logistic regression model.

2.4 Measurements

All male mineworkers voluntarily participated on the study and they signed informed consent forms. Structured questionnaires were used to collect the data on the demographics such as age, years working in the mining industry, accommodation, who they are living with, service of choice for STI management, signs and symptoms of STIs, genital examination was done to all participants, ulcer swab collection for any form of genital ulcer, urine collected for STI screening from all participants.

The following will be considered as potential risk factors for this study:

Age – grouped into four categories as follows; <30, 30 – 39, 40 – 49 and 50 – 64.

Years worked in the mining industry, categorized as follows; 1 -10, 11 – 20, 21 – 30 and 31 – 40.

Residential location, coded as 1= hostel, 2= informal housing, 3= single quarters, 4= house in suburb.

Who respondent lived with, categorized into four categories, spouse or partner, other family or nonfamily and alone.

The following tests were done in order to determine the presence or absence of an STI:

- Genital examination for presence of genital ulcers
- An ulcer swab was collected and tested for herpes simplex, *Treponema pallidum* and *Haemophilus ducreyi*.
- Urine was collected for STI screening. Urine samples were done using 'Probe Tec Strand Displacement Assay' for the detection of *Neisseria gonorrhoeae* and *Chlamydia trachomatis*.

Baseline demographic characteristics and prevalence of STIs in the cohort were described using proportions and percentages. The Pearson's Chi Square test was used to evaluate associations between potential baseline risk factors and overall STI positivity as well by STI type; that is; (Chlamydia, Gonorrhea and Ulcer).

Multiple logistic regression models were using to identify predictors of STI positivity. Univariate analysis was used to select variables that were significant determinants of treatment outcomes at the $p<0.20$ level of significance. These significant variables were then used to build the adjusted multivariate models. Log Likelihood ratio tests (lrtest) were used to select the final model using an Lrtest Chi-squared $p \leq 0.05$.

CHAPTER 3: RESULTS

3.1 Description of study participants

The baseline data set consisted of 1700 participants in which all will be included for the secondary data analysis. When data cleaning was conducted participants with missing data e.g genital examination results and or STI screening results were excluded for this study and a total of 1685 participants was adopted for analysis.

This secondary analysis was conducted on a total of 1,685 men working in the mine from the primary study. The overall demographic distribution of study participants is presented in Table 3.1 below. The highest percentage (42.4%) of participants was observed in men aged 40 to 49 while men younger than 30 years constituted 11% of the study population. A substantial proportion of the men (74%) lived in hostels during their employment, with 66% of the men having lived in the hostel for more than 10 years, with 20% of the men resident in informal settlements and only 2% in single quarters. More than three quarters (80%) of the participants lived alone (within or outside the hostel) while about 7% lived with other family/non family. Figure 3.1 shows the prevalence of STIs, overall and for each individual STI.

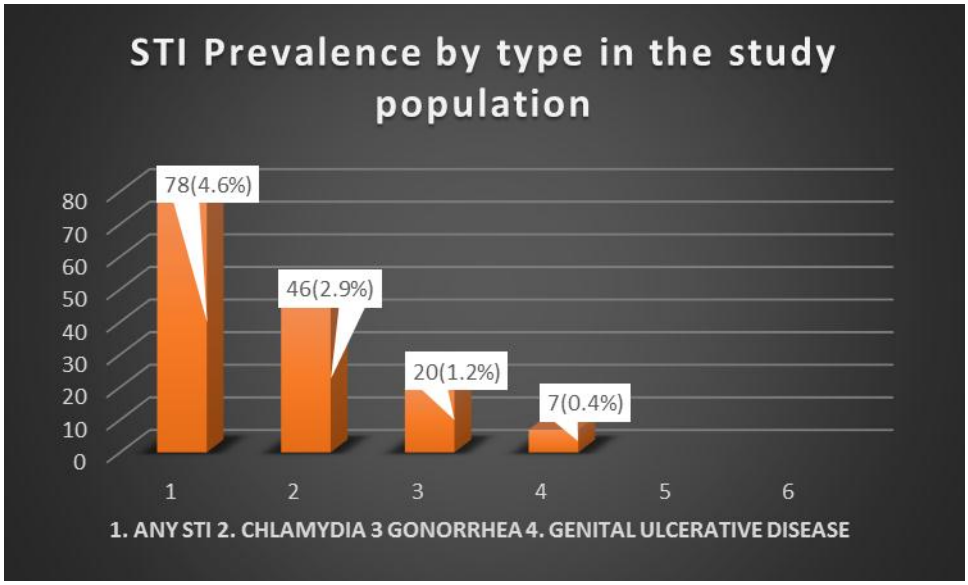


Fig 3.1 Overall and individual prevalence of STIs by type in the study population

Table 3.1: Overall description of study participants

Factor	Level	Frequency (n=1685)	%
Age group (years)	<30	188	11.2
	30-39	502	29.8
	40-49	715	42.4
	50-64	280	16.6
Years lived in Hostel	1-10	434	33.8
	11-20	528	41.1
	21-30	272	21.2
	31-40	51	4.0
Residential location	Hostel	1252	74.3
	Informal dwelling	343	20.4
	Single Quarters	30	1.8
	House in Suburbs	60	3.6
Who respondent	Spouse/Partner	220	13.1
lives with	Other family /nonfamily	112	6.7
	Alone	1353	80.3
STI status	Negative	1607	95.4
	Positive	78	4.6
Chlamydia	Negative	1553	97.1
	Positive	46	2.9
Gonorrhea	Negative	1579	98.8
	Positive	20	1.2
Ulcer Status	Negative	1673	99.3
	Positive	12	0.7

3.2 Prevalence of STIs in study participants broken down by risk factors

The results of the STI positivity tests for any STI and for each of the three STIs (Chlamydia, Gonorrhea and Ulcer) are presented in Table 3.1, while Table 3.2 gives the STI prevalence by each level of the potential risk factors. We found that of the

1685 participants, 78 (4.6%) had any STI, with 46 (2.9%) having chlamydia, 20 (1.3%) having gonorrhea and 12 (0.7%) having an ulcer STI.

Table 3.2: Prevalence of STIs by socio-demographic characteristics

Factor	Level (N)	STI positive N (%)	STI negative N (%)	P value
		78 (4.6)	1607 (95.4)	
Age group (years)	<30 (188)	20 (10.6)	168 (89.4)	<0.001
	30-39 (502)	28 (5.6)	474 (94.4)	
	40-49 (715)	25 (3.5)	690 (96.5)	
	50-64 (280)	5 (1.8)	275 (98.2)	
Years lived in Hostel	1-10 (434)	25 (5.8)	409 (94.2)	0.06
	11-20 (528)	16 (3.0)	512 (97.0)	
	21-30 (272)	9 (3.3)	263 (96.7)	
	31-40 (51)	0 (0.00)	51 (100.0)	
Residential location	Hostel (1252)	50 (3.9)	1202 (96.1)	0.22
	Informal dwelling (343)	22 (6.4)	321 (93.6)	
	Single Quarters (30)	2 (6.7)	28 (93.3)	
	House in Suburbs (60)	4 (6.7)	56 (93.3)	
Who respondent lives with	Spouse/Partner (220)	18 (8.2)	202 (91.8)	0.03
	Other family /nonfamily (112)	5 (4.5)	107 (95.5)	
	Alone (1353)	55 (4.1)	1298 (95.9)	

Results in Table 3.2 showed the distribution of participants according to their STI status. This provides the opportunity to conduct a descriptive profile assessment of those who had STI in the study population. Overall, a statistically significant association between the age of an individual and STI positivity was observed ($p < 0.001$). The highest percentage of STI positivity was observed in the youngest male group in the study population. A steady decline of STI prevalence with age was noted.

In addition, STIs were less common among men who had lived in hostels for more than a decade. The prevalence among men who had lived in a hostel for 10 years or less was about 6%. There was a marginally significant association between the number of years lived in the hostel and having an STI (p=0.06). On the other hand, the occurrence of STIs was fairly distributed across the residential location groups as shown in Table 3.2. There was no evidence of an association between residential location and the presence of an STI (p=0.22). However, on comparison, the burden of STIs in the affected respondents was almost twice among men living with partners or spouses.

As indicated in the secondary objectives of the study, we sought to identify risk factors associated with Genital ulcer disease, Gonorrhea and Chlamydia. However, due small numbers involved the results for Gonorrhea and Ulcerative disease are not shown. We describe the prevalence of Chlamydia below.

3.3 Prevalence of Chlamydia among study participants

The prevalence of Chlamydia by socio-demographic characteristics is shown in Table 3.3. The overall prevalence of Chlamydia in the study participants was 2.9%. The highest prevalence of Chlamydia was observed in men younger than thirty years (8%) while it was comparable in men in the middle age groups. There was overwhelming evidence of an association between age and having Chlamydia ($p<0.001$). A similar trend was observed between prevalence of Chlamydia and number of years lived in the hostel. Men who had only spent one to ten years recorded the highest prevalence of Chlamydia (4%) while there was no report of existence of Chlamydia among those who had spent more than thirty years. There was no evidence of an association between residential location and presence of Chlamydia (p=0.53) and also no

evidence of an association between who the respondent lives with and presence of Chlamydia (p=0.21). Fig 3.2 also shows the proportions of Chlamydia stratified by type of residence of respondents.

Table 3.3: Prevalence of Chlamydia by socio-demographic characteristics

Factor	Level (N)	Chlamydia positive N (%) 46 (2.9)	Chlamydia negative N (%) 1553 (97.1)	P value
Age group (years)	<30 (181)	15 (8.3)	166 (91.7)	<0.001
	30-39 (482)	14 (2.3)	468 (97.1)	
	40-49 (673)	14 (2.1)	659 (97.9)	
	50-64 (263)	3 (1.1)	260 (98.9)	
Years lived in Hostel	1-10 (420)	17 (4.0)	403 (96.0)	0.21
	11-20 (491)	7 (1.4)	484 (98.6)	
	21-30 (255)	6 (2.3)	249 (97.7)	
	31-40 (50)	0 (0.00)	50 (100.0)	
Residential location	Hostel (1183)	30 (2.5)	1153 (97.5)	0.53
	Informal dwelling (326)	12 (3.7)	314 (96.3)	
	Single Quarters (30)	1 (3.3)	29 (96.7)	
	House in Suburbs (60)	3 (5.0)	57 (95.0)	
Who respondent lives with	Spouse/Partner (209)	10 (4.8)	199 (95.2)	0.05
	Other family /nonfamily (109)	3 (2.7)	106 (97.3)	
	Alone (1281)	33 (2.6)	1248 (97.4)	

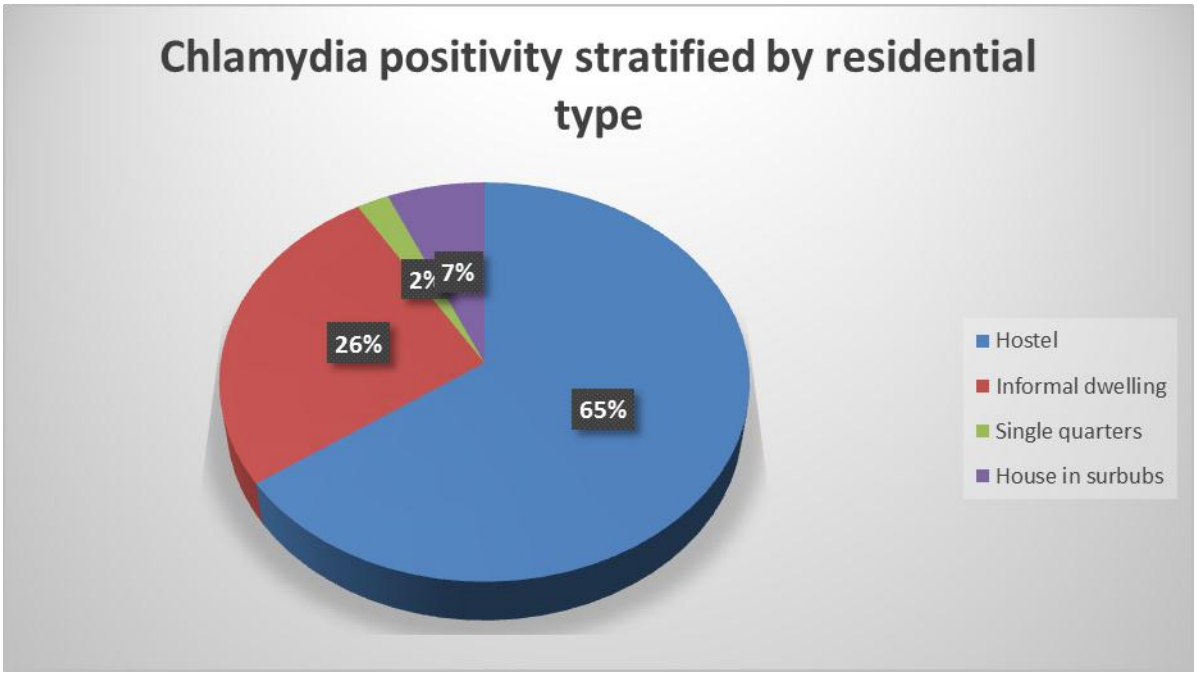


Fig 3.2 Chlamydia positive men stratified by location of residence

3.4 Risk factors for STI in the study population

Results of the multiple logistic regression modeling of STI risk factors are presented in Table 3.4. Predictors of STI positivity was modelled on only those participants that had data on STI positivity. Participants with missing data were excluded from the analysis to minimize bias. Two factors emerged as significant predictors of STI positivity (that is, STIs that participants tested for: Gonorrhea, Chlamydia and or GUD) in the adjusted model: Age group of the respondent and whom the participant lived with. We observed a statistically significant decrease in the likelihood of having an STI with increasing age ($p<0.001$). Compared to men aged under 30, the likelihood of an STI decreased in each successive age-group, and men aged 50-64 were 86% less likely to have an STI (aOR=0.14; 95% CI 0.05 – 0.4). Compared to the baseline of men who lived with a spouse or partner, men who lived with other family or non-family were less likely to have an STI (aOR=0.36; 95% CI 0.13 – 1.04) as were men who lived alone (aOR=0.46; 95% CI 0.26 – 0.80). The other factors considered,

namely number of years lived in the hostel and residential location, did not reach statistical significance.

Table 3.4: Multiple Logistic regression modeling of risk factors of STI in the study population

		Univariate Regression	Multivariate Regression	
Factor	**Level (N)**	**UOR (95% CI)**	**AOR (95%)**	**LR Test P**
Age group (years)	<30 (181)	1.00	1.00	<0.001
	30-39 (482)	0.50 (0.27–0.90)	0.46 (0.25–0.84)	
	40-49 (673)	0.30 (0.17-0.56)	0.28 (0.15–0.52)	
	50-64 (263)	0.15 (0.06–0.41)	0.14 (0.05–0.4)	
Years lived in Hostel	1-10 (420)	1.00	-	
	11-20 (491)	0.51 (0.27–1.97)	-	
	21-30 (255)	0.56 (0.26–1.22)	-	
	31-40 (50)	-	-	
Residential location	Hostel (1183)	1.00	-	
	Informal dwelling (326)	1.65 (0.98–2.76)	-	
	Single Quarters (30)	1.72 (0.40–7.41)	-	
	House in Suburbs (60)	1.72 (0.60–4.92)	-	
Who respondent lives with	Spouse/Partner (209)	1.00	1.00	0.03
	Other family / nonfamily (109)	0.52 (0.19–1.45)	0.36 (0.13-1.04)	
	Alone (1281)	0.48 (0.27–0.83)	0.46 (0.26–0.80)	

LR Test: Likelihood Ratio Test; goodness of fit test: Prob > chi2 = 0.523;
UOR: unadjusted odds ratio; AOR: Adjusted odds ratio; 95%CI: 95% confidence interval.

3.5 Risk factors for Chlamydia infection in the study population

Table 3.5 shows the results of logistic regression modeling of risk factors of Chlamydia infection in the study participants. Age was found to be a significant predictor of Chlamydia status. A dose response pattern was observed between age group and Chlamydia infection. Chlamydia was less likely to be found among elderly men compared to the younger adults. That is, younger men are at greater risk of

infection while older men have a significant reduction in risk [AOR: 0.12; 95%CI (0.03-0.42)]. There was no statistical evidence for the association between who the respondent lived with and Chlamydia positivity.

Table 3.5: Logistic regression modeling of risk factors of Chlamydia infection

		Univariate Regression	Multivariate Regression	
Factor	**Level (N)**	**UOR (95% CI)**	**AOR (95%)**	**LR Test P**
Age group (years)	<30 (181)	1.00	1.00	<0.001
	30-39 (482)	0.33 (0.16–0.70)	0.30 (0.14–0.65)	
	40-49 (673)	0.24 (0.11-0.50)	0.21 (0.10–0.45)	
	50-64 (263)	0.13 (0.06–0.41)	0.12 (0.03–0.42)	
Years lived in Hostel	1-10 (420)	1.00	-	
	11-20 (491)	0.34 (0.14–0.83)	-	
	21-30 (255)	0.57 (0.22–1.47)	-	
	31-40 (50)	-	-	
Residential location	Hostel (1183)	1.00	-	
	Informal dwelling (326)	1.47 (0.74–2.90)	-	
	Single Quarters (30)	1.33 (0.17–10.05)	-	
	House in Suburbs (60)	2.02 (0.60–6.83)	-	
Who respondent lives with	Spouse/Partner (209)	1.00	1.00	0.14
	Other family / nonfamily (109)	0.54 (0.11–2.64)	0.34 (0.10–1.32)	
	Alone (1281)	0.25 (0.10–0.65)	0.50 (0.23–1.00)	

LR Test: Likelihood ratio tests, gof: Prob > chi2: 0.820; UOR: unadjusted odds ratio; AOR: Adjusted odds ratio; 95%CI: 95% confidence interval.

CHAPTER 4: DISCUSSION

In this chapter we provide an overview of the study's findings for each of the study outcomes and attempt to give possible explanations of their nature in comparison to current literature. Additionally, the chapter gives an overview of the importance of the findings in the management and surveillance of STIs among high risk male groups in the mining industry.

4.1. Risk factors for STIs in the study population

In this study, the age of an individual was found to be a significant independent predictor of whether or not they would test positive for any STI; the likelihood of having an STI decreased with increasing age-group, with those aged 50-64 being about seven times less likely to have an STI than those aged below 30. Similar findings have been reported elsewhere [23]. We attribute these findings to the fact that younger men are in the prime of their sexuality and are engaging in sexual activities while older males may be less involved due to ageing. Also, the former group may perceive having multiple sexual partners as a conquest and may even expose themselves to unsafe sexual practices and consequently increase their risk of contracting other STIs and HIV. This may be in keeping with established findings that although high risk groups like mineworkers are aware of the epidemic, condom usage is low.[24] Older men on the other hand may be presenting as the mature and work oriented group, focused more on earning a living than satisfying their sexual desires hence the lower prevalence of STIs.

We also found that whom the respondent lived with was associated with STI positivity. We found that respondents who lived alone and those who lived with other family or non-family members were less likely to have an STI than respondents who lived with a spouse or partner. We suggest that this finding could be a result of engaging in sexual activity versus the absence of sex as well the frequency of it. The frequency of sexual activity in males who live alone is most likely to be less compared to those men who live with partners hence their risk of getting any STI becomes lower. It was very surprising that in fact risk of STIs was higher among men living with their partners than among those in the single-sex hostels, where we expected to find the highest risk. Research has shown that condom usage is low among casual partnerships in the migratory labour system hence explaining the standing of our results [24]. This has serious connotations on the spread and control of STIs and HIV. Migrant workers facilitate the transmission of HIV and increase infection rates in communities surrounding their place of employment as well as their place of origin when they return to their families.

Adjusting for age-group and with whom the participant lives, we found that there was no evidence of an association between place of residence and having an STI. This finding is somewhat unexpected as another study reported that hostel residents were more likely to have an STI, and were also more likely to be HIV-infected [23]. The hostel residence system is common among migrant labour dependent sectors such as mining, and it is known to attract sex workers and hence lead to a high prevalence of STIs [23].

It was very surprising that in fact risk of STIs was higher among men living with their partners than among those in the single-sex hostels, where we expected to find the highest risk.

4.2 Risk factors for Chlamydia infection in the study population

The age of a respondent was found to be a significant predictor of whether they would test positive for Chlamydia or not. A clear dose response relationship between age and the presence of Chlamydia was noted. Younger men were found to be a greater risk of having Chlamydia than the older males. This was consistent with our suggestion that younger, sexually active men are more likely to contract STIs from unsafe sexual practices. As mentioned previously, risk factors for Gonorrhea could not be analyzed due to very small prevalence records amongst the participants. We allude this to the potential success of previous STI treatment and control interventions in the area. Gonorrhea is the most common STI among men which could be well known and men with symptoms tend to seek medical help on time compared to Chlamydia that is not so common and therefore they might stay longer with symptoms without seeking medical care.

4.3 Limitations of the study

The study did not collect data on all mine shafts as was planned due to lack of consent for data collection at one of the biggest mines we could have used. Consequently results obtained may not be generalizable to other gold mines in Orkney. Other important variables like HIV status could not be analyzed as the owners of the data did not make this variable available for secondary analysis. It would have been important to look at risk factors for HIV infection as a study secondary objective. Such information would have shed light on the management and surveillance of Gonorrhea among mine workers. The literacy levels of the study population were not

collected which could assist in determining educational material as a prevention strategy that could qualify for this population.

Further research involving several mines may provide more conclusive results.

4.4 Conclusion

The age group and family support of a mine worker have significant impacts on the sexual behaviour and subsequent sexual reproductive health. A surprising finding that in fact risk of STIs was higher among men living with their partners than among those in the single-sex hostels, where we expected to find the highest risk. STI surveillance and management programmes must take cognisance of these two factors to improve their overall impact on the control and prevention of STIs and HIV in the mining sector.

4.5 Recommendations

Our findings suggest that young men who work in the mining sector have a very high risk of contracting STIs. This can be further extrapolated to HIV given the epidemiological synergy and interactions between HIV and STIs. We therefore suggest that workplace syndromic STI surveillance should be targeted at high risk groups so as to curb the scourge of HIV in the country. This can also be complemented by work place HIV/antiretroviral therapy programmes to manage the disease in the mining sector as stipulated in the Chamber of Mines of South Africa[25] Strengthening of Public Private Partnership with the mining sector for referral and contact tracing of mineworker partners in the management of STIs. Monitoring and evaluation of HIV and STI prevention and management programmes is the key in identifying gaps and development of quality improvement plans. The immediate need

is to develop and strengthen strategies as well as interventions for effective condom use, health seeking behaviour and proper management of STIs in the private sector according the Department of Health clinical guidelines. This may also go a long way in preventing HIV not only among men but also among their commercial and regular female partners and their partners

Advocacy for other social factors like stable family structures are encouraged to cultivate responsible behaviour among high risk groups to minimize prevalence of HIV and other STIs. This is particularly important in economic sectors that promote solitude i.e. migrant workers leaving behind their families to reside in single sex hostels hence destabilizing the family support structures. High levels of prevention knowledge and easy availability of condoms are clearly not enough, the interventions should focus on motivating community members and family units to engage in safe behaviours taking into account the high HIV prevalence, and understand the ways in which stigma, social exclusion and migration have driven men to engage in risky behaviour.

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REFERENCES

1. Mhalu FS. Inter-relationships between HIV infection and other sexually transmitted diseases. *AIDS 1993; 7: 95-102*.

2. Laga M, Manoka A, Kivuvu M, et al. Non-ulcerative sexually transmitted diseases as risk factors for HIV-1 transmission in women: results from a cohort study. *J Trop Med Hyg 1995; 98: 1-8*

3. Hayes RJ, Schulz KF, Plummer FA. The cofactor effect of genital ulcers on the per-exposure risk of HIV transmission in sub-Saharan Africa. *Epidemiology 1993; 4: 63-72*.

4. Gray RH, Wawer MJ, Sewankambo NK, *et al*. Relative risks and population attributable fraction of incident HIV associated with symptoms of sexually transmitted diseases and treatable symptomatic sexually transmitted diseases in Rakai District, Uganda. Rakai Project Team. *AIDS* 1999; 13: 2113-2123.

5. Rottingen JA, Cameron DW, Garnett GP. A systematic review of the epidemiologic interactions between classic sexually transmitted diseases and HIV: how much really is known? *Sex Transm Dis* 2001; 28: 579-597.

6. Williams B, MacPhail C, Campbell C, *et al*. The Carletonville-Mothusimpilo Project: limiting transmission of HIV through community-based interventions. *S Afr J Sci* 2000; 96: 351-359.

7. Steen R, Vuylsteke B, DeCoito T, *et al*. Evidence of declining STD prevalence in a South African mining community following a core-group intervention. *Sex Transm Dis* 2000; 27:1-8

8. Wright JM, Leong MG, Ye Htun, Rasego B, Ballard RC. *Partner notification for STI patients in a South African mining community – bridging the gap between public and private sectors.* A paper presented at Biennial Meeting of Infectious Diseases and STI Society of Southern Africa. Cape Town, December 2002.

9. Colvin M et al. Migration and AIDS. *Lancet 1995: 346:1303 – 1304*.

10. Moloi V, Charalambous S, Corbett EL, Moyake T, Magcuntsu E, Zulu E, Grant AD, De Cock KM, Churchyard GJ. Establishing surveillance for HIV infection

using urine screening in a mining population. *Joint Congress of the Infectious Diseases and Sexually Transmitted Diseases Societies of Southern Africa.* Stellenbosch, December 2001. (oral presentation)

11. Steen R, B. Vuylsteke, T.De Coito and S. Ralepeli. 2000. " Evidence of Declining STD Prevalence in a South Africa Mining Community Following a core group intervention." *STD 21(7):1-11.*

12. Williams BG, Gouws E, Lurie M, Crush J. Spaces of Vulnerability: Migration and HIV/AIDS in South Africa. Southern African Migration Project, Queens University (Canada) 2002.

13. Lurie M, Williams BG, Zuma K, Mkaya-Mwamburi D, Garnett GP, Sturm AW. The Impact of Migration on HIV-1 Transmission in South Africa: A Study of Migrant Men and their Partners and Non-Migrant Men and their Partners. *Sexually Transmitted Diseases,* 2003, 30:149–156.

14. Zuma K, Gouws E, Williams B, Lurie M. Risk factors for HIV infection among women in Carletonville, South Africa: migration, demography and sexually transmitted diseases. *Journal of STD and AIDS in press.* 2002. Available from: http://journals.lww.com/aidsonline/Fulltext/2003/09260/Changing_patterns_of_knowledge,_reported_behaviour.11.aspx#P65

15. Kerrigan D, Ellen JM, Moreno L, Rosario S, Katz J, Celentano DD,et al. Environmental-structural factors significantly associated with consistent condom use among female sex workers in the Dominican Republic. *AIDS 2003;17:415-23.*

16**.** Kerrigan D, Moreno L, Rosario S, Gomez B, Jerez H, Barrington C, et al. Environmental-structural interventions to reduce HIV/STI risk among female sex workers in the Dominican Republic. *Am J Public Health 2006;96:120-5*.

17. O'Farrell N. Targeted interventions required against genital ulcers in African countries worst affected by HIV infection. *Bull World Health Organ 2001; 79(6):569-77.*

18. Gray RH, Wawer MJ, Brookmeyer R, Sewankambo NK, Serwadda D, Wabwire-Mangen F, Lutalo T, Li X, vanCott T, Quinn TC, Rakai Project Team. Probability of HIV-1 transmission per coital act in monogamous, heterosexual, HIV-1-discordant couples in Rakai, Uganda. *Lancet 2001; 357: 1149-53*.

19. Laga M. Epidemiology and control of sexually transmitted diseases in developing countries. *Sex Transm Dis 1994; 2: S45 – S50.*

20. Green EC, Zokwe B, Dupree JD. The experience of an AIDS Prevention program focused on South African traditional healers. *Soc Sci Med 1995; 40 :503-515.*

21. King R, Ssali A, Kitto D,et al. Traditional healers as AIDS educators and counselors in Kapanga Uganda. In: Abstract book of the Tenth International Conference on the AIDS/International Conference on STD. Yokohama, Japan: *Abstract PD0247;1994.*

22. Williams BG, MacPhail C, Campbell C, Taljaard D, Gouws E, Moema S, *et al*. The Carletonville-Mothusimpilo Project: limiting transmission of HIV through community-based interventions. *South African Journal of Science* 2000; 96: 351–359.

23. Ye Htun, F Radebe, H G Fehler, R C Ballard *Changes in the patterns of sexually transmitted infection among South African mineworkers, associated with the emergence of the HIV/AIDS epidemic*

24. Williams BG, Taljaard D, Campbell CM, Gouws E, Ndhlovu L, Van Dam J, Caraël M, Auvert B. Changing patterns of knowledge, reported behaviour and sexually transmitted infections in a South African gold mining community. *AIDS.2003;17:2099-107.*

25. ***Fact Sheet on the mining industry and HIV/AIDS***. 2001-2002: Chamber of Mines members begin signing specific HIV/AIDS agreements with labour unions.