SCHOOL OF PUBLIC HEALTH

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EEFECT OF ALCOHOL USE ON RISKY SEXUAL BEHAVIOUR AND GONORRHOEA AND CHLAMYDIA INFECTION AT 37 MILITARY HOSPITAL

BY

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DECLARATION

I hereby declare that with the exception of cited references to other people's work which has been acknowledged, this work is as the result of my own research work done under supervision and has neither been presented elsewhere either in part or whole for another degree.

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7th October, 2017

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PROF. KWASI TORPEY Date

(Supervisor)

DEDICATION

Every challenging work needs sacrifice and dedication. This work is dedicated to my daughter Tara and to my mother Jane and father Eddy for all their sacrifice, support, care and prayers.

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Foremost, I would like to express my sincere gratitude to my mentor and supervisor Prof Kwasi Torpey for his advice, encouragement, enthusiasm and motivation.

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Lastly to my parents Jane and Edward for their continued sacrifice, support and prayers throughout my life.

ABSTRACT

Alcohol consumption is a known modifier of human behaviour that affects the decision-making process and reduces inhibitions. This leads to individuals taking risks they would normally not engage in such as unprotected sex and having multiple sexual partners. These behaviours could expose individuals to sexually transmitted infections. This study investigates the association between alcohol consumption and risky sexual behaviour.

A secondary analysis of a cross-sectional study that took place from 2013 to 2016 at 37 Military Hospital in Greater Accra was done. Data analysis was conducted using STATA 14 using descriptive statistics and multinomial logistic regression.

Thirty-two per cent of participants reported consuming alcohol. Alcohol consumption was significantly associated with gender ($p<0.001$). Similarly, alcohol consumption was significantly associated with condom use ($p<0.05$), number of sexual partners ($p<0.001$) and gonorrhoea infection ($p<0.01$). Multinomial logistic regression showed that participants who consumed alcohol were more likely to never use a condom during sexual relations ($p<0.01$), have more than one sexual partner ($p<0.01$) and have gonorrhoea ($p<0.001$).

The study confirms that alcohol consumption is associated with risky sexual behaviour in Ghana as has been shown in East and Southern Africa. Alcohol use needs to be considered as an important risk factor for risky sexual behaviour and STI infection.

Further research needs to be done on alcohol's association with risky sexual behaviour such as event level association and use validated methods such as AUDIT to measure alcohol consumption.

LIST OF ABBREVIATIONS

AIDS	Acquired Immunodeficiency Syndrome
AUDIT	Alcohol Use Disorders Identification Test
CDC	Centres for Disease Control and Prevention
HED	Heavy Episodic Drinking
HIV	Human Immunodeficiency Virus
HSV-2	Herpes Simplex Virus-2
NAMRU-3	United States Naval Medical Research Unit-3
PID	Pelvic Inflammatory Disease
PHRP	Protecting Human Research Participants
SSA	Sub-Saharan Africa
STI	Sexually Transmitted Infection
STD	Sexually Transmitted Disease
UNAIDS	Joint United Nations Programme on HIV/AIDS
WHO	World Health Organization

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CHAPTER ONE

1.0 INTRODUCTION

1.1 Background to the Study

Alcohol use has been a part of human history since ancient times as part of religious rites and social gatherings such as naming ceremonies and marriage (McGovern, 2009). It is one of the most widely marketed and accessible substances in the world. Alcohol is a psychoactive substance and results in dependence in those who consume it (Kalichman, Simbayi, Kaufman, Cain, Jooste, et al., 2007). It is consumed globally and is legal in most countries but there are certain regions where men and women abstain from alcohol for example in the Middle Eastern countries. Globally, individuals over the age of 15 years drink 15.2 litres of alcohol every year though their total per capita alcohol consumption varies in different regions with Europe and Americas having the highest consumption, followed by Africa and the Pacific regions and lastly South-East Asia and the Mediterranean regions (World Health Organization, 2014b). The difference in consumption levels could be due to level of economic development, socio-demographics and culture (World Health Organization, 2014b).

Low to moderate alcohol consumption among men and women have shown lower incidence of coronary heart disease (CHD) in Germany (Keil, Chambless, Döring, Filipiak, & Stieber, 1997), Japan (Kitamura et al., 1998) and United Kingdom (Doll, Peto, Hall, Wheatley, & Gray, 1994). A follow up of the National Health and Nutrition Survey I found that after 15 years of follow-up, the incidence of CHD among men was lower across all levels of consumption but for women incidence was reduced only among those who consumed low to moderate levels of alcohol (Rehm, Bondy, Sempos, & Vuong, 1997). A review by O 'keefe, Bybee, & Lavie (2007) concluded that alcohol consumption, just like exercise, offers cardio protection when done daily and in moderation. However, light to moderate drinking is not recommended to the

general public or even those with cardiovascular diseases. Harmful consumption of alcohol has been linked to cancers, infectious diseases such as tuberculosis and HIV/AIDS and mental health issues such as depression (World Health Organization, 2007). The latest causal relationships that the World Health Organization is encouraging research institutes to look into are between alcohol consumption and infectious diseases such as HIV/AIDS and tuberculosis. Harmful use of alcohol is the third most preventable cause of morbidity, mortality and disability and causes more than 200 diseases and injuries with 3.3 million deaths attributed to alcohol consumption (World Health Organization, 2014b). In 2012, 5.9% of global deaths were attributed to alcohol which is higher than HIV/AIDS (2.8%) or tuberculosis (1.7%) (Francis, Grosskurth, Changalucha, Kapiga, & Weiss, 2014). Alcohol consumption can cause harm to both the individual and the society. Mechanisms of harm to the individual can be through toxic effects to the tissues and organs, impairment of perception, behaviour and co-ordination and impairment of self-control (World Health Organization, 2014b). Harmful consumption of alcohol can have negative consequences for society as a whole such as increased injuries, decreased worker productivity, aggression and violence against others and child and spouse abuse (Moss, 2013).

In sub-Saharan Africa (SSA), alcohol consumption is common in both rural and urban areas and the heterogeneous distribution and the types of drinks differ geographically (Kalichman, Simbayi, Kaufman, Cain, & Jooste, 2007). It is an important part of local cultures playing a role in social gatherings and rites of passage (Kalichman, Simbayi, Jooste, Vermaak, & Cain, 2008). Around one third of alcohol consumed in the region is 'unrecorded', often being home brewed. The World Health Organization estimates that 70% of Africans abstain from alcohol and levels of alcohol consumption among 'drinkers' is as high as 35 litres of alcohol per year (S E Woolf-King, Steinmaus, Reingold, & Hahn, 2013), the second highest in the world. The pattern of alcohol consumption in the region has been described as 'heavy, episodic drinking',

with more than 6 drinks consumed in one sitting (S E Woolf-King et al., 2013). Countries with the highest per capita alcohol consumption among adults (15 years or older), were South Africa, Zimbabwe, Tanzania and Mali (World Health Organization, 2014a). The consumption in the region is likely to grow due to the growing young population in the continent who drive the market.

Alcohol related studies in SSA cover a variety of areas such as alcohol consumption in pregnant women (Culley et al., 2013; Adeyiga, Udofia, & Yawson, 2014) which have shown that women have little understanding of the effects alcohol can have on the unborn child. In addition, its influence on domestic violence (Russell, Eaton, & Petersen-Williams, 2013; Brisibe, Ordinioha, & Dienye, 2012; Zablotska et al., 2009) has been studied in Southern Africa; revealing women with spouses who consumed alcohol were more likely to suffer physical, sexual or verbal abuse. Alcohol impaired driving is a factor in one-third of traffic fatalities in the region which though there are laws put in place, are often poor implemented (Flowers et al., 2008; Ackaah & Adonteng, 2011). Its role in the transmission of (HIV/AIDS) Human immunodeficiency virus/acquired immune deficiency syndrome (Fisher, Cook, Sam, & Kapiga, 2008) and other sexually transmitted infections (STIs) have been researched extensively among various groups such as female sex workers, fishing communities, bar maids and truck driver. The role of alcohol consumption in HIV/AIDS has been looked at from different perspectives such as odds of infection (Woolf-King et al., 2013), effect on anti-retroviral treatment (Kalichman et al., 2009) and disease progression (Samet et al., 2007) and its effect on risky sexual behaviour. Though HIV/AIDS is the most common STI, other STIs, which have been shown to facilitate the sexual transmission of HIV, are often overlooked.

WHO/UNAIDS policy on primary prevention of STIs includes counselling and behaviour change (World Health Organization, 2016). Alcohol is known to modify behaviour change in

individuals and so including interventions that target harmful alcohol consumption in any national AIDS/STI policy is essential. Countries that have high alcohol consumption have high rates of HIV and STI infection, for example Uganda, Tanzania, Zimbabwe and South Africa (Woolf-King et al., 2013). The relationship between alcohol and risky sexual behaviour varies by region as studies in Eastern and Southern Africa have shown. However, countries in West Africa have done little research in this area (Woolf-King & Maisto, 2011). The association between alcohol consumption and risky sexual behaviour has been studied at three levels: global association, situational association and event-level association. Global association is done when participants provide information on alcohol use and risky sexual behaviour during the same period; the two sources are then tested for association. Situational association collects information whether participants engaged in sexual acts while intoxicated and is related to a type of sexual behaviour. When conducting an event-level study, more detailed information is collected; characteristics of a specific behaviour occurring on a particular occasion, for example, whether a condom was used, the type of relationship, amount of alcohol consumed.

Studies have shown that those who consume alcohol exhibit different forms of risky sexual behaviour such as engaging in transaction sex, multiple sexual partners, coercive sex, unprotected sex, and STI infection (Cooper, 2002a).

Ghana's alcohol per capita consumption in litres has increased from 3 litres from 2003-2005 to 4.8 litres in 2008-2010(World Health Organization, 2014c). The most popular alcoholic drinks were locally brewed such as palm wine, *akpeteshie* and *pito*[1] followed by beer and the prevalence of heavy episodic drinking was at 11.7% in 2010, up from 6.6% in 2005 (World

[1] Akpeteshie is a locally produced gin, distilled from fermented sugar-cane juice or palm wine, with an alcoholic volume of 40% to 50%. While pito is brew from millet and found mostly in the northern parts of Ghana. It contains lactic acid, sugar, amino acids and 2% to 3% alcohol and some vitamins. Palm wine is obtained from sugary sap of the palm tree and contains between 1.5% to 5.5% volume of alcohol depending on the number of days of fermentation.

Health Organization, 2014a). Alcohol is primarily consumed at social gatherings and entertainment spots with increase in alcohol consumption among high school and university students noted in several studies with 25% having had consumed alcohol in their lifetime (Adu-Mireku, 2003; Kabiru, Beguy, Crichton, & Ezeh, 2010). Studies in Ghana have looked at alcohol consumption in women (Adeyiga et al., 2014; Mwinilanaa Tampah-Naah & Twumasi Amoah, 2015; Tampah-Naah & Amoah, 2015), teenagers (Adu-Mireku, 2003; Balogun, Koyanagi, Stickley, Gilmour, & Shibuya, 2014) and its association with fatal car accidents (Ackaah & Adonteng, 2011; Damsere-Derry, Afukaar, Palk, & King, 2014). In West Africa studies have looked at alcohol and risky sexual behaviour among female sex workers in Nigeria (Izugbara, 2005), adolescents in Cameroon (Moore, Gullone, & McArthur, 2004a), adults in Cote d'Ivoire (Moatti et al., 2003) and men in Ghana (Adih & Alexander, 1999).

As earlier stated, it is necessary to look at alcohol consumption and its association with risky sexual behaviour to help monitor behaviour change as is part of the Ghana national AIDS/STI policy (Ghana AIDS Commission, 2013b). A study was conducted by the United States Naval Medical Research Unit-3 (NAMRU-3) in collaboration with the Ghana Armed Forces from 2013 to 2016 in Ghana. The surveillance focused on gonorrhoea and chlamydia infections in 5 sites in Ghana: 37 Military Hospital and Adabraka Polyclinic in Greater Accra and three Ghana Armed Forces Clinics in Takoradi and Sekondi in Western Region. This study focused on the association between alcohol consumption and risky sexual behaviour in the general population that attended the polyclinic at 37 Military Hospital from June 2013 to March 2016.

1.2 Problem Statement

In sub-Saharan Africa, the most commonly abused substance is alcohol (Parry et al., 2002). Consumption of alcohol is legal in countries across the region and is widely marketed in the media (Odejide & Ibadan, 2006). Alcohol consumption may lead to an individual exhibiting

less impulse control, strengthening their sense of insusceptibility, reduce their perception of high risk situations and reduce their ability to bargain in such situations (Oscar-Berman & Marinković, 2007). This leads to an individual engaging in risky sexual behaviour such as sex with multiple partners, unprotected sex, transactional sex and sexual coercion which puts them at risk of STIs (Thompson, Kao, & Thomas, 2005). Several studies have suggested an association between alcohol consumption and incidence of STIs, particularly HIV/AIDS (Baliunas, Jurgen, Irving, & Shuper, 2010; Fisher et al., 2008; Kalichman, Simbayi, Jooste, et al., 2008; Kalichman, Simbayi, Vermaak, et al., 2008; Chersich et al., 2007).

The National HIV and AIDS, STI policy in Ghana (Ghana AIDS Commission, 2013a) recognizes that one of the existing challenges related to STI research is the lack of population-based and special surveys to track behaviour trends. There are few studies in West Africa compared to East and Southern Africa, which have looked at alcohol consumption and its association with risky sexual behaviour. This study contributes to the gap in knowledge on whether the associations are similar to what has been found in East and Southern Africa. NAMRU-3 in collaboration with Ghana Armed Forces conducted a chlamydia and gonorrhoea surveillance study in Ghana, in five study sites. This study focuses on the 37 Military Hospital study site to look at correlates of alcohol consumption and association between alcohol consumption, risky sexual behaviour and gonorrhoea and chlamydia infection in attendees at the STI polyclinic from March 2013 to March 2016. The study focuses on *Chlamydia trachomatis* the most common bacterial STI in the world (Mylonas, 2012) and *Neisseria gonorrhoea*, the second most prevalent STI globally (Ohnishi et al., 2011).

1.3 Conceptual Framework

STI prevention campaigns need to be relevant and targeted if they are to be effective. Behaviour change is an area identified for primary STI prevention and with alcohol being a major modifier

of behaviour, studying associations between alcohol consumption and STI infection is needed. Alcohol consumption reduces inhibitions and decreases the negotiating power of an individual in high risk situations. Therefore, identifying groups at risk of alcohol consumption and risky behaviours they engage in is necessary for effective STI control. A number of factors have been linked to alcohol consumption such as demographic factors (gender, age and marital status) and socioeconomic status (education and occupation). These factors are also directly linked to risky sexual behaviours which in turn expose an individual to sexually transmitted infections.

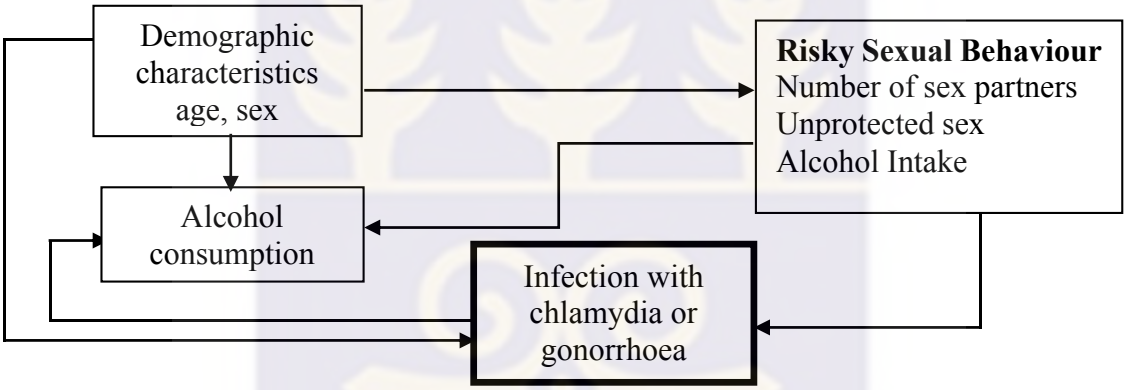

Figure 1 Conceptual Framework showing the link between alcohol consumption, risky sexual behaviour and gonorrhoea and chlamydia infection

Source: Author's own framework

1.4 Justification for the study

Studies done across the globe have shown an association between alcohol consumption, risky sexual behaviour and sexually transmitted infections. In Ghana, there is a growing percentage of adults consuming alcohol which puts them at risk of engaging in risky sexual behaviour (World Health Organization, 2014a). STI clinics are the main sites for diagnosing and treating STIs in individuals. A study of adolescents (15-24 years old) attending an STI clinic in Pittsburgh had high rates of alcohol consumption (Cook et al., 2006) and reported behaviours such as having multiple sexual partners, inconsistent condom use and anal sex. A similar study of adult STI clinic patients found 21% of alcohol abuse as well as associations with having

multiple partners, unprotected sex, sexual coercion and STIs (Cook & Clark, 2005; Weiser et al., 2006; Hutton, Mccaul, Santora, & Erbelding, 2008; Tumwesigye et al., 2012). STI clinics provide an opportune location to develop and provide innovative interventions to reduce both harmful alcohol consumption and risky sexual behaviours. Furthermore, the alcohol-risky sexual behaviour relationship needs attention in public health due to their co-existence in the same location (e.g. bars) or context (e.g. transactional sex).

This is the first STI survey of its kind in West Africa hence data collected on participants in the study would shed light on the relationship between alcohol consumption, risky sexual behaviour and gonorrhoea and chlamydia infection among the general population. This information would help 37 Military Hospital and the Ministry of Health to allocate resources and target tailor-made STI prevention programs to those at risk and evaluate the impact of any current interventions.

1.5 Objectives

The general objective of the study is to determine factors associated with alcohol consumption, risky sexual behaviour and gonorrhoea and chlamydia infection at 37 Military Hospital STI polyclinic from 2013- 2016. Specifically, the study seeks to:

1. To determine prevalence of alcohol consumption and binge drinking among those who presented with STI symptoms at 37 Military Hospital polyclinic.

2. To identify demographic characteristics associated with alcohol consumption among those who presented with STI symptoms at 37 Military Hospital polyclinic.

3. To determine contrasts in associations between alcohol consumption and risky sexual behaviour and STIs between men and women who presented with STI symptoms at 37 Military Hospital polyclinic

4. To investigate the effect of alcohol consumption on sexual behaviour and STI infection

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

This chapter provides an outline of the available literature on alcohol consumption and risky sexual behaviour. Alcohol is legally available across the globe and its consumption and related problems vary around the world. According to the Statistical Classification of Diseases and Related Health Problems (World Health Organization, 2004), alcohol has been found to be a causal factor in over 200 disease and injury conditions. Alcohol consumption is set to increase in the African and Asian regions in the next five years according to data from the World Health Organization.

Alcohol interferes with the processing of information which may influence the decision-making process leading to poor judgement. This would likely increase engagement in risky sexual behaviour due to a lowered perception of risk. Such behaviour puts an individual at risk of being infected with sexually transmitted infections such as gonorrhoea and chlamydia. Examples of risky sexual behaviour include unprotected sex, multiple partners, transactional sex and sexual coercion.

Sexually Transmitted Infections (STIs) are a common infection in adults often going undiagnosed or untreated (Workowski & Bolan, 2015). If STIs are left untreated, they can lead to life-long complications such as infertility, cancer, birth defects and pelvic inflammatory disease (PID) (Gottlieb, Low, Newman, Bolan, & Kamb, 2014). One of the focuses of public health is disease prevention and research has been carried out on testing STI interventions within populations such as microbicide gel (Howett & Kuhl, 2005), vaccines (Fairley & Read, 2012) and behavioural interventions (Kerrigan et al., 2006) are a vital part of protecting the public from infectious diseases.

As earlier stated, prevention is one of the cornerstones of public health and so looking at behavioural interventions is essential. Alcohol is a major modifier of behaviour and so studying its association with risky sexual behaviour and STIs will assist in understanding the strength of the association, those at risk of consuming alcohol and help develop appropriate interventions. This review will cover aspects of alcohol consumption and factors that affect alcohol consumption.

Alcohol consumption is a part of social gatherings in Ghana particularly during weddings and funerals. In sub-Saharan Africa, alcohol has been part of tradition; it was prepared by women and consumed by men. In recent times, alcohol consumption has increased among the youth leading to negative impacts such as alcohol addiction, risky behaviour, violence and traffic accidents. Alcohol is known to affect judgement and reduce inhibitions causing individuals to participate in high risk sexual behaviours.

High risk sexual behaviours have been linked to sexually transmitted infections such as HIV/AIDS, gonorrhoea, chlamydia and syphilis. Some of these infections often go undiagnosed and can lead to adverse conditions such as infertility, pelvic inflammatory disease and increased risk of contracting HIV.

The relationship between alcohol and risky sexual behaviour varies significantly by region as studies in Eastern and Southern Africa have shown, however West African countries are lacking in research in the area (Sarah E Woolf-King & Maisto, 2011). Studies have shown that those who consume alcohol exhibit different forms of risky sexual behaviour such as engaging in transaction sex, multiple sexual partners, coercive sex, unprotected sex and STI infection (Cooper, 2002a; Van Oers et al., 1999;Thompson, Kao, & Thomas, 2005).

2.2 Alcohol Consumption

According to the alcohol myopia theory proposed by Steele and his colleagues, alcohol leads to lack of restraint manifested by a disregard for social conventions, impulsivity and poor risk assessment (Steele & Josephs, 1990). Thus, more complex signals that would normally inhibit behaviour (e.g., the possibility of contracting an STI) are no longer properly processed.

Alcohol consumption is measured in several ways, whether alcohol is consumed, the volume of alcohol, the pattern of drinking and the quality of alcohol (World Health Organization, 2014c). The volume of alcohol is usually measured as a 'standard drink', and the volume is different depending on the country, for example, in Australia, a standard drink is 10 grams of alcohol whereas in Japan, it is 20 grams of alcohol. The volume of alcohol informs 'How much' the individual drinks, whether it's a glass a day/week or a bottle a day/week. Past studies have shown that the low-moderate consumption offers some benefits to an individual such as protection from cardiovascular disease and stroke as shown by Di Castelnuovo and his colleagues where they found that drinking 150 mL of wine with a meal everyday offered a level of protection against cardiovascular diseases (Di Castelnuovo, Rotondo, Iacoviello, Donati, & de Gaetano, 2002). High volumes of alcohol consumption are associated with cancers, depression, liver cirrhosis and hypertension.

The pattern of drinking is used as a measure of alcohol consumption. This is concerned with how alcohol is consumed, that is, the frequency (how many times a week). One of the measures used is recurrent heavy episodic drinking (HED) which is also known as binge drinking and refers to having 5 or more alcoholic drinks in one occasion and is known to increase alcohol related harm involving violence and injury in the United States and Europe (Antai, Lopez, Antai, & Anthony, 2014; Measham & Brain, 2005). A case-control study in the UK showed that 86% STI clinic attendees drank heavily compared to the matched cohort from the General

Household Survey (Standerwick, Davies, Tucker, & Sheron, 2007). Chersich, Luchters et al. (2007) found that among female sex workers in Kenya, heavy episodic alcohol drinking was associated with unsafe sex and sexually transmitted infections.

A variety of factors have been identified that affect alcohol consumption at the individual level and are discussed below.

2.2.1 Age

Alcohol consumption varies over the lifetime of an individual. Studies have shown that the youth, those age 15-29 years, have higher frequency of alcohol consumption compared to those above 30 years of age. Binge drinking has been associated with adolescents and teenagers in Europe and America where there is a strong drinking culture (Antai et al., 2014; Measham & Brain, 2005; Popova, Rehm, Patra, & Zatonski, 2007). In Africa, there are increasing numbers of adolescents consuming alcohol with those over thirty years of age still consuming large volumes (Clausen, Rossow, Naidoo, & Kowal, 2009). The GENACIS project in 2009 found that the prevalence of high frequency drinking (>5 drinks in a week), increased with age from the youngest to the oldest age group (Wilsnack, Wilsnack, Kristjanson, Vogeltanz-Holm, & Gmel, 2009). This contradicts previous thoughts that alcohol consumption decreases with age (Eigenbrodt et al., 2001).

2.2.2 Gender

Traditionally, alcohol consumption was reserved for men and its preparation was done by women. Consumption of alcohol by men has been linked to their masculinity and a part of their identity (de Visser & Smith, 2007). In the 21st Century, these roles have changed and a growing number of women consume alcohol. Drinking among men is considered common place whilst among women drinking and drunkenness is less accepted and the women are often judged

negatively (de Visser & Smith, 2007). Understanding the difference in consumption pattern between men and women is necessary to estimate the prevalence and incidence of alcohol use disorders as well as develop targeted interventions. Patterns of alcohol consumption vary between genders though there have been an increase in consumption among women (Wilsnack, Vogeltanz, Wilsnack, & Harris, 2000) . The GENACIS project (Gender, Alcohol and Culture: An International Study) was ran from 1997-2007 in over 40 countries to look at difference in drinking patterns between men and women and if this difference is as a result of culture. Results from the study showed that men were more likely to be drinkers and women were more likely to be abstainers (Wilsnack et al., 2009). The study also found that men were more likely to be heavy episodic drinkers compared to women with advancing age. Heavy episodic drinking generally became less prevalent with advancing age. This has been shown to be true for women especially (Wilsnack et al., 2009). Among adolescents, there is little disparity between male and female drinkers and differences only appear after the age of eighteen (Young et al., 2002). A study in Cape Town, South Africa focused on alcohol consumption among female patrons in drinking venues. The study found that gender based violence and risky sexual behaviour was associated with alcohol consumption (Pitpitan et al., 2013). In Botswana, Weiser, Leiter, Heisler, McFarland, Korte, DeMonner, Tlou, Phaladze, et al. (2006) found in a population-based study that women consumed less alcohol than men though they were at risk of gender-based violence and HIV infection.

2.2.3 Socio-economic status

As alcohol has become more available and affordable over time, more of the population consumes alcohol consistently and in large volumes. The relationship between alcohol consumption and socio-economic status has been looked at in several studies and revealed a complex association. The association between socio-economic status and drinking are not

consistent and have varied by age, gender, country and alcohol consumption measures used. The mixed results may be explained by inconsistent definitions of alcohol consumption (e.g. weekly or monthly frequency of heavy drinking) and the variety of definitions of socioeconomic background used in measurement (e.g. income, occupation, employment status, level of education). In the United States, a study showed that binge drinking is more prevalent among people with higher incomes. However once they engage in binge drinking, people with lower incomes consume more alcohol more often (Kanny, Liu, & Brewer, 2011). Nevertheless, most evidence from multiple countries converge to the result that men and women with higher incomes are more likely to consume alcohol (Kuntsche et al., 2006).

A study conducted in Rotterdam showed that there was more abstinence in the lower socio-economic group compared with those in the high socio-economic group had more light and moderate drinkers (Van Oers, Bongers, Van De Goor, & Garretsen, 1999). They also found that there was a higher prevalence of excessive drinking in the lower socio-economic status despite having more abstainers within the group. A multi-national study showed a positive correlation between alcohol consumption and socio-economic status (Grittner, Kuntsche, Gmel, & Bloomfield, 2013). The study found that those in the middle class were more excessive drinkers compared to those in the low socio-economic group. Among the residents of Melbourne, Australia, men and women from a high socio-economic group were more frequent consumers of alcohol whereas those with a low socio-economic status drank larger quantities of alcohol on certain occasions (Giskes, Turrell, Bentley, & Kavanagh, 2011). Namibia ranks fifth in alcohol consumption in Africa and a study done found that those living in rural areas consumed more alcohol than those in urban areas (Medley et al., 2014). In Uganda, research has shown that those in urban areas drink more alcohol compared to those in rural areas, as they earn more money and have numerous drinking establishments in the area (Zablotska et al., 2006).

2.3 Alcohol and High Risk Sexual Behaviour

Alcohol interferes with processing of information by lowering the perception of risk and therefore increasing the likelihood of risky sexual behaviour (J. Norris, Masters, & Zawacki, 2004). Alcohol influences sexual risk behaviours through a direct effect on cognitive processes affecting reasoning skills, judgement, inhabitation, sense of responsibility and sexual desire (Wilson, 1977). Alcohol is the most common legally used substance and the most common modifier of behaviours associated with STIs (World Health Organization, 2014c). The relationship between alcohol and high risk sexual behaviour has been studied across the globe. In the United States, the National Institute on Alcohol Abuse and Alcoholism (NIAA) recognised the role of alcohol in developing effective STI and HIV prevention strategies (Bryant, 2006). Several studies in the region have shown an association between alcohol consumption and high risk sexual behaviour. Cooper (2002) showed several analyses such as, an individual who consumed alcohol was more likely to engage in risky sexual behaviour while an individual who consumes alcohol in a particular situation will likely participate in risky sexual behaviour in that situation. In China, Li, Xiaoming, & Stanton (2010) showed that women were more vulnerable to harm and sexual risk than men in the general population and in high risk groups. They also showed that alcohol was associated with diverse sexual risk including sexual coercion and violence making it a suitable target for behaviour intervention.

A study conducted among the Aborigines of Australia found that of the incidence cases of gonorrhoea, those who abused alcohol accounted for 57% (Miller, Law, Torzillo, & Kaldor, 2001). A chlamydia screening initiative in the east of England identified alcohol to increase risky sexual behaviour such as unsafe sex and the number of sexual partners (McMunn & Caan, 2007). In Moshi, Tanzania, women who abused alcohol were more likely to have multiple sexual partners and alcohol abuse was associated with STI symptoms though there was no

association between alcohol abuse and testing positive for an STI (Ghebremichael, Paintsil, & Larsen, 2009). A study looking at African-American women in Atlanta, Georgia who drank alcohol in the previous 30 days, found that they were more likely to never use a condom and test positive for chlamydia (Seth, Wingood, DiClemente, & Robinson, 2011). African-American adolescents who were part of a sexual risk reduction intervention reported a high quantity of alcohol intake and were shown to be more likely to not use a condom during sexual intercourse and have multiple sexual partners(Seth, Sales, et al., 2011). A cross-sectional study in Johannesburg, South Africa, STI reporting was associated with alcohol abuse use ($p<0.05$) (Basera, Takuva, Muloongo, Tshuma, & Nyasulu, 2016).

In sub-Saharan Africa, the evidence is more considerable with studies from Eastern and Southern Africa showing associations between alcohol consumption and HIV and STI infection. Studies in West Africa were few but their findings will be included in this review. Qualitative literature from Eastern and Southern Africa used focus group discussions, field observations and interviews (Sarah E Woolf-King & Maisto, 2011). Gender stood out as an important factor when looking into alcohol and sexual behaviour. Men's drinking was taken as normal and a way to show their masculinity whereas women's drinking was only for special occasions and generally frowned upon. Women who were seen drinking regularly were termed 'loose' making them vulnerable to advances. Alcohol was seen to lead to uninhibited sexual behaviour and increase the likelihood of casual sex (Mbulaiteye et al., 2000). Other research has shown that going to drinking spots was associated with seeking casual or transactional sex. Focus groups with women have shown that when their male partner has returned from drinking, they are forced to have sex and are unable to negotiate for condom use (Morojele et al., 2006).

Quantitative research in the region has employed various methodologies such as cross-sectional studies and longitudinal research designs. Different measures of alcohol consumption were

used in the studies such as a simple 'yes/no' self-report, drinking venue visits, frequency of alcohol consumption (how many times a week/month) and use of the standardized questionnaires AUDIT (Alcohol Use Disorders Identification Test) and CAGE. CAGE is a questionnaire that is used to identify those who drink excessively and need treatment. Participants in the studies range from women and men in the general population to female sex workers, female bar attendants, STI clinic patients, military and men who have sex with men, discordant couples and HIV+ men and women. Most of the high risk sexual behaviour was self-reported and have been discussed below.

2.3.1 Unprotected Sex

Condoms have been promoted as a barrier method to preventing STI and HIV/AIDS infections in health promotion strategies (Frieden, Jaffe, Cono, Richards, & Iademarco, 2015). In vitro studies have shown latex condoms to be effective in preventing transmission of STI pathogens (Lytle et al., 1997). A study by Adih & Alexander (1999) in Ghana looked at the frequency of alcohol consumption among men aged 15-24 years and its association with condom use at last intercourse. A cross-sectional study in Cameroon studied frequency of 'getting drunk' and its association with frequency of unprotected intercourse among adolescents (Moore, Gullone, & McArthur, 2004b). The study found that adolescents who reported frequently getting drunk were more likely to have unprotected sex. Among HIV+ adults, a study in Cote D'Ivoire found that patients who reported 'high' alcohol consumption had had unprotected sexual intercourse in the previous 6 months (Moatti et al., 2003). Two longitudinal studies in Uganda and Kenya have shown that alcohol use in the last six months was significantly associated with irregular condom use (Yadav et al., 2005; Zablotska et al., 2006). Cross-sectional studies in the region established a significant association between alcohol use and increased possibility of unprotected sex. In Tanzania, bar maids who consumed alcohol were more likely not to use

condoms compared to those who did not drink (Akarro, 2009) whereas young people in the country were shown to have inconsistent condom use (Babalola, 2006). A study in Rwanda and Zambia showed that HIV discordant couples where the males drank alcohol reported unprotected sex (Coldiron et al., 2008).

2.3.2 Multiple sexual partners

Having multiple sexual partners is a significant behavioural risk factor for STIs (N & A, 2015). This is because the number of sexual networks is high and so increasing the risk of being exposed to STIs. Engaging in sexual activities with multiple partners has been associated with both frequent and excessive alcohol consumption. A study focusing on the youth and risky sexual behaviour in Ethiopia found that alcohol intake among the males was significantly associated with having sex with a commercial sex worker or someone who is not your main partner (Alemu, Mariam, Belay, & Davey, 2007). In Botswana, Weiser et al., (2006) found that among men, heavy alcohol consumption was associated with multiple partners (AOR = 3.08; 95% CI: 1.95-4.87) and unprotected sex (AOR = 3.48; 95% CI: 1.65-7.32).

2.3.4 Transactional sex

Transactional sex refers to when sex is exchanged for food, money, drugs, shelter or a favour. It is prevalent among women and girls who are not able to meet their basic needs which lead to increased risk for STI infection. Factors influencing have been shown to be women's economic dependence on men, poverty and in the case of younger women, to get necessities they cannot afford from older men (Wamoyi et al., 2010). The women lose power of negotiation in such sexual encounters and so likelihood of using a condom is reduced, increasing the likelihood of infection with STIs. In a plantation in northern Tanzania, women who do not work often turn to producing local brews for the workers on the farms (A. H. Norris, Kitali, & Worby, 2009). The women and girls at these informal establishments sell alcohol as well as

sex as a way to survive (A. H. Norris et al., 2009). For men who cannot pay, sex is often used as a currency. In both situations, condom use is unlikely and so the spread of STIs is likely. A study in southern Malawi looked at a fishing community and use of transactional sex in purchase of fish. The motivations given in the focus group discussions were economic need and the power position of men and women (MacPherson et al., 2012). The traders are mostly women and exchange sex for bigger pieces of fish whereas the men engage in transactional sex as it gives them a control in their trading (MacPherson et al., 2012). The women reported that drinking alcohol made it easier to submit to the fishermen's demands. Among South African women, problem drinking was related to having multiple sex partners as well as a history of transactional sex (Simbayi et al., 2006; Simbayi et al., 2004).

2.3.5 Sexual Coercion

Sexual coercion is a term that describes forced sexual activity, sexual violence or sexual assault with women being the primary victims. Sexual coercion poses an increased risk to STI infection as women have no power to resist the advances of men. A recent study in Uganda among college students found that students who had high alcohol consumption before having sex were more likely to experience sexual coercion (Mehra, Agardh, Stafström, & Östergren, 2014). A study in Uganda found that alcohol use before sex was associated with physical violence and sexual coercion, and both were associated with the risk of HIV infection among women (Zablotska et al., 2009b). Other studies have shown that a woman's own alcohol consumption is not associated with experiencing sexual coercion but it is having a male partner who consumes alcohol that is associated with sexual coercion (Abrahams, Jewkes, Hoffman, & Laubsher, 2004; Koenig et al., 2004; Simbayi et al., 2004).

2.3.6 STI Infection

Among African-American women, a longitudinal study found that alcohol consumption was predicted positive results for chlamydia (Seth, Wingood, Diclemente, & Robinson, 2011). A study in India among married men found that those who reported daily alcohol consumption were four times more likely to have gonorrhoea and chlamydia infection and three times more likely to have had past exposure to herpes simplex virus-2 (HSV-2) (Saggurti, Schensul, & Singh, 2010). Though HIV/AIDS is of major concern in SSA, other STIs are important to consider because having an STI can increases susceptibility to HIV infection (Corey, Wald, Celum, & Quinn, 2004). (Gwati, Guli, & Todd, 1995) found that STD infection was strongly associated with alcohol consumption (OR = 7.1, 95% CI: 2.8-18.7). A study in Botswana showed that men who reported having 'ever' consumed alcohol had developed STI symptoms in the previous 12 months such as genital ulcers and discharge (Langeni, 2005). A longitudinal study (2 years) among female sex workers in Kenya collected data on their daily consumption of alcohol over the period of the study (Yadav et al., 2005). The study found that alcohol use was associated with higher gonorrhoea and chlamydia infection. Kalichman, Simbayi, Vermaak, et al. (2008) used AUDIT as a measure of alcohol consumption to study risks of contracting an STI among those who drink at informal drinking establishments in South Africa. The study found that those who consumed alcohol more frequently at the establishments were more likely to be diagnosed with chlamydia, gonorrhoea or trichomoniasis. A cross-sectional study in Zambia found that there was an association between chlamydia and gonorrhoea infection and alcohol use before sex (OR = 9.I, 95% CI = 0.59-0.15) (Saggurti et al., 2010).

2.4 Summary

The studies reviewed above show a clear association between alcohol consumption and risky sexual behaviour. Most of the papers used were from Eastern and Southern Africa with a few

from Western Africa which focused on HIV risks among female sex workers in Nigeria (Izugbara, 2005) and Moore et al., (2004) who looked at the frequency of getting drunk and its association with HIV status and unprotected sex. In Ghana, a previous study looked at men and their frequency of drinking beer or gin in association with condom use at last intercourse (Adih & Alexander, 1999) and in Cote d'Ivoire they looked at HIV+ individuals, their alcohol consumption and its association with unprotected sex.

During review of literature, studies in West Africa looked at alcohol consumption and its effect on society (Luginaah, 2008) and its perceived effects on the health of male university students (Chikere & Mayowa, 2011). A study in the Ashanti Region of Ghana looked at consumption of alcohol among pregnant women and knowledge of its harmful effects (Adusi-Poku et al., 1997). In Ghana, two previous studies studied alcohol impaired driving and the use of breathalyser (Charles Mock, Asiamh, & Amegashie, 2001) and the knowledge and attitude of commercial drivers (C Mock, Amegashie, & Darteh, 1999). Other than studies earlier mentioned, no recent study was found looking at the association of alcohol consumption and risky sexual behaviour in Ghana. This study would be the first provide insight into how alcohol consumption is associated with various measures of high risk sexual behaviour in Ghana and help to setup targeted behavioural interventions to stop STI infections.

CHAPTER THREE

3.0 METHODS

3.1 Introduction

This study was a secondary analysis of a cross-sectional study that took place from 2013 to 2016 at 37 Military Hospital in Greater Accra. The data were collected from patients presenting with symptoms satisfying the case definition for gonorrhoea or chlamydia.

3.2 Study location

This study was conducted at 37 Military Hospital which is the largest military hospital in Accra, Ghana. It is a specialist hospital open to the public and serves both military personnel, their families and the public. It is one of five study sites selected by the NAMRU-3 to carry out gonorrhoea and chlamydia surveillance and build laboratory capacity to identify, isolate and report the impact of STIs on the military and the host country populations. It is a major referral hospital although there are other smaller health facilities in the area. The hospital is estimated to see 500 sexually transmitted infections annually.

3.3 Study variables

In this study, there were several dependent variables which were looked at. First, alcohol consumption was assessed with the following question 'Do you drink alcohol?'. There was no time frame specified for alcohol consumption. Frequency of consumption was determined by 'How often do you drink alcohol?'. Binge drinking was measured by asking 'How often do you binge drink (greater than 3 drinks) in one occasion?'. 3 drinks were defined as more than three bottles of beer or more than 6 shots of spirits. The second dependent variable of interest was risky sexual behaviour which was determined by condom use and having multiple partners.

The third dependent variable was STI symptoms, defined as a positive response if they had the following symptoms at the time of the interview: burning sensation during urination, discharge from penis (male) or vagina (female), bleeding from penis (male) or vagina (female), foul smell from urine, pain in penis (male) or vagina (female), pain when having sex, ulcers on genital parts and warts on genital parts. Testing for STIs was carried out by testing urine samples collected from the study participants using the nucleic acid amplification test (NAAT) (Duplessis et al., 2015).

The major independent variables of interest were demographic factors and socioeconomic status. Under demographic factors, variables of interest were age, gender and marital status. Age was measured at last birthday whereas socioeconomic status was measured by level of education.

3.4 Sampling Method

The larger study was a cross-sectional study that sampled all those who presented at the clinic with symptoms of a sexually transmitted infection. These symptoms included burning during urination, pain at or around the penis or vagina, discharge from penis or vagina, bleeding from penis or vagina, pain when having sex, ulcers or warts on genitals and a foul smell from urine.

The inclusion criteria for the study included:

1. Patients who showed chlamydia-like symptoms at the clinic such as abnormal vaginal or penile discharge, pain when having sex, pain when urinating, itching or burning sensation around the penis or vagina
2. Patients presenting with gonorrhoea-like symptoms such as swelling of the foreskin in men, abnormal penile or vaginal discharge, pain or burning sensation when urinating, pain or tenderness in the testicles

3. Patients who were 18 years of age and above who were able to give informed consent and understand English
4. Those below 18 years of age would have to get parental consent before participating
5. Pregnant women were included

The exclusion criteria were as follows:

1. For those over 18 years of age who did not provide consent
2. For those under 18 years of age and were not able to get parental consent
3. Those who were able to provide consent but did not have gonorrhoea or chlamydia symptoms

3.5 Data collection method

This study was a collaboration between US Naval Medical Research Unit 3 and the School of Public Health, University of Ghana, Legon. Permission was granted to access the data collected from March 2013 to March 2016 at 37 Military Hospital. Data were extracted from the database using a data extraction questionnaire for all the variables of interest. This was overseen by the project leader and the lead data analyst of the project. The data extraction questionnaire was used to extract variables of interest from the database for each study participant in the study site. The data collected included participant's demographics, alcohol intake, sexual behaviour, STI symptoms and infection with gonorrhoea or chlamydia.

3.6 Data collection tool

A data extraction questionnaire as shown in **Appendix 1** was used in collecting variables of interest from the database by the principal investigator. The questionnaire was divided into five parts which are: demographics of the participant (month and year of clinic visit, age, gender, occupation, education and marital status), alcohol consumption, risky sexual behaviour

(condom use, number of partners) and whether they are infected with chlamydia or gonorrhoea or neither of the two. A sample of the data extraction questionnaire is in Appendix 1.

3.7 Data processing

De-identified data from the database was entered into Microsoft Excel to clean it up by removing duplicate records using filters and ensuring that all questionnaires were filled correctly and completely. Coding guidelines were established for questions that had 'other-specify' items given by the participants. Validity was done within and across variable to identify gaps, outliers and inconsistencies such as the wrong capture of respondent's age and other variables using the command **codebook** which gave values for all variables created. The final file was then saved and stored under password protection, accessible only by the student, supervisor and project leader.

3.8 Statistical Analysis

STATA version 14 was used for statistical analysis of the data. Descriptive statistics such as frequencies, percentages and bar graphs were used to describe the demographic characteristics, prevalence of alcohol use and binge drinking. Chi-square statistics was used to determine the association between alcohol use and socio-demographic characteristics, sexual behaviour and STI infection. Also, the association between the socio demographic characteristics, sexual behaviour and STI infection were stratified by gender. A multinomial logistic regression was fitted for condom use and multiple sexual partner with alcohol use. The model with alcohol use as the main independent variable was controlled with confounding variables such as age, gender, marital status and educational level. Adjusted and unadjusted logistic regression model was fitted for STI infection with alcohol use.

3.9 Quality Control and Ethical Clearance

For the original study, all field workers were trained on how to administer the questionnaire and completed the NIH Protecting Human Research Participants (PHRP) ethics course. A trained physician, healthcare worker or research assistant carried out the consent procedure. Informed consent from study participants was provided which included consent to acquire a urine sample. In the case of those under eighteen years of age, a child assent form with a parental consent form from the parent or guardian had to be submitted before participating in the study. The consent provided by participants covered sharing of the research data with a third party for future research purposes only. The questionnaire was filled in private and those who opted to fill in the forms on their own were made to fill out a Test of understanding of English form. Data entry checks were built in Microsoft Excel. Urine samples and vaginal swabs (females) or urethral swabs (males) were collected from all symptomatic study participants. The urine samples were stored at 4˚C on site for 3-5 days or frozen in case of long storage. Samples were transported from sites in cold packs to maintain them at 4˚C during transportation to the Noguchi Memorial Institute for Medical Research, Legon. The urine was tested for chlamydia and gonorrhoea using nucleic acid amplification testing (NAAT). The swabs collected were utilized for microscopic examination to diagnose gonorrhoea at the clinic site. If any of the tests resulted in a positive diagnosis, the patient was notified and treated.

Ethical approval was given by 37 Military Hospital Institutional Review Board. Permission was given by US Naval Medical Research Unit 3 for use of their data.

3.10 Subjects in the study and benefits of study

The study subjects are all patients who presented with symptoms at the 37 Military Hospital from June 2013 to March 2016. There were no potential risks foreseen in this study. Prevention is the main aim in public health and so identifying those at highest risk of alcohol consumption

and engaging in risky sexual behaviour in the general population will help to target interventions from the public and private sector to them.

3.11 Privacy and confidentiality

In this study, protecting the identity of the participants was necessary and so participants were identified by a unique code. The data extracted was saved as a password protected file only accessible by the primary researcher, supervisor and NAMRU-3 personnel who were part of the chlamydia and gonorrhoea surveillance team. The data collected was used for academic purposes only.

3.12 Withdrawal from the study

No incentives were given to participate in the study. Withdrawal at any point during the study was allowed and no consequences to the study participant.

3.13 Conflict of Interest and Funding

There was no conflict of interest in this study. Funding was provided by the primary researcher from private funds.

CHAPTER FOUR

4.0 RESULTS

A total of 321 individuals participated in the study from 2013-2016 at 37 Military Hospital. The responses of 293 participants were analysed as 28 had missing laboratory results.

4.1 Participant's Characteristics

Study participants were 53% (156) female and 85% (249) had above secondary level education as seen in Table 1. Over 68% (202) of the respondents were under the age of 30 and over 67% (199) reported they were single. Results from Table 2 show that 47% (138) of respondents reported never used a condom during sexual relations whereas only 15% (45) reported always used a condom during sexual relations. Four (4) respondents (1.3%) reported having exchanged sex for gifts or money. Seventy-eight per cent of participants (215) had one sexual partner in the last 6 months compared to 22% (78) who had more than one sexual partner over 6 months as shown in Table 2. Participants were tested for two STI infections, chlamydia and gonorrhoea. Thirty-two per cent (95) tested positive for gonorrhoea, while 10% (29) tested positive for chlamydia and 9 participants had co-infections.

Table 1: Socio-demographic characteristics of participants (n=293)

Variables	Total	Male n (%)	Female n (%)	P-value
Socio-demographic characteristics				
Age				
<25	80(27.3)	32(40.0)	48(60.0)	
25-30	122(41.6)	59(48.3)	63(51.7)	
31-35	38(13.0)	17(44.7)	21(55.3)	0.534
36-40	25(8.5)	13(52.0)	12(48.0)	
>40	28(9.6)	16(57.1)	12(42.9)	
Marital status				
Single	199(67.9)	97(48.7)	102(51.3)	0.152
Married	94(32.1)	40(42.5)	54(57.5)	
Education level				
No education	14(4.8)	8(57.1)	6(42.9)	
Primary education	30(10.2)	17(56.7)	13(43.3)	0.349
Secondary education and above	249(75.0)	112(45)	137(55)	
Alcohol Consumption				
Yes	95(32.4)	60(63.1)	35(36.9)	<0.001
No	198(67.6)	77(38.9)	121(61.1)	
Frequency of alcohol consumption				
Once a week	29(30.5)	25(86.2)	4(13.8)	
Twice a week	3(3.2)	3(100.0)	0(0)	
3-5 times a week	2(2.1)	2(0)	0(0)	0.001
Occasionally	57(60.0)	26(45.6)	31(54.4)	
Daily	4(4.2)	4(100.0)	0(0)	
Frequency of binge drinking				
Never	34(35.8)	26(76.5)	8(23.5)	
Rarely	17(17.9)	12(70.6)	5(29.4)	0.04
On most occasions	44(46.3)	22(50.0)	22(50.0)	

Source: Author's own computations

Table 2: Sexual behaviour of participants (n=293)

Variables	Total	Male n (%)	Female n (%)	P-value
Sexual Behaviour				
Condom use during sexual relations				
Never	138(47.1)	52(37.7)	86(62.3)	0.004
Rarely	50(17.1)	28(56)	22(44.0)	
On most occasions	60(20.5)	38(63.3)	22(36.7)	
Always	45(15.3)	19(42.2)	26(57.8)	
Number of sexual partners in past 6 months				
1	215(73.3)	82(38.1)	133(61.9)	<0.001
2	47(16)	37(78.7)	10(21.3)	
>3	14(10.7)	10(71.4)	4(28.6)	
STI Infection				
Gonorrhoea				
Yes	95(33.4)	65(68.4)	30(31.6)	<0.001
No	198(66.6)	72(36.4)	126(63.6)	
Chlamydia				
Yes	29(9.9)	21(72.4)	8(27.6)	0.004
No	264(90.1)	116(56.1)	148(43.9)	

Source: Author's own computations

4.2 Objective 1- Determining the prevalence of alcohol consumption and binge drinking among those who visited the facility

Thirty-two per cent of respondents reported drinking alcohol as reported in Table 1. Binge drinking (having more than three drinks in one occasion) was reported by 46% (44) of those who drink alcohol, with 50% men and 50% women reporting that they binge drink on most occasions. Sixty per cent of those who drank alcohol responded that they occasionally drank alcohol whereas 4.2% (4) drank alcohol daily as shown in the figure below.

4.3 Objective 2- Identifying demographic and behavioural characteristics associated with alcohol consumption

Of the 32% (95) who drank alcohol, 63.1% (60) males while 36.9% (35) were females as seen in Table 3. Alcohol consumption associated with gender was statistically significant (χ^2=15.19, p<0.001). Those in the age group 25-30 consumed the most alcohol (43.1%) with those above the age of 40 consuming the least amount (9.5%). Alcohol use was highest among those who had secondary school education or more (85.2%). Participants who were single (69.5%) consumed more alcohol compared to those who were married (30.5%). However, apart from gender, the other socio-demographic characteristics did not have an association with alcohol consumption.

Table 3: Association between alcohol use and socio-demographic characteristics

Variable	Total n (%)	Alcohol use n (%)	Alcohol non-use n (%)	P-value
Socio-demographic characteristics				
Gender				
Male	137	60 (43.8)	77 (56.2)	<0.001
Female	156	35 (22.4)	121 (77.6)	
Age(years)				
<25	80	22 (27.5)	58 (72.5)	0.795
25-30	122	41 (33.6)	81 (66.4)	
31-35	38	13 (34.2)	25 (65.8)	
36-40	25	10 (40.0)	15 (60.0)	
>40	28	9 (32.1)	19 (67.9)	
Education level				
No education	14	4 (28.6)	10 (71.4)	0.948
Primary education	30	10 (33.3)	20 (66.7)	
Secondary education and above	249	81 (32.5)	168 (67.5)	
Marital status				
Single	199	66 (33.2)	133(66.8)	0.693
Married	94	29 (30.8)	65 (69.2)	

Source: Author's own computations

Regarding sexual behaviour, Table 4 shows most participants never used condoms (47%) while (15%) always used condom during sexual relations. Alcohol consumption rate was high among those who never use condom (40%) as compared to those who always used it (14%) as seen in Table 4. This difference in consumption was statistically significant (χ^2=8.75, p=0.033). The difference in the alcohol consumption between those who had single sexual partner and multiple sexual partner in the past 6months was statistically significant (χ^2=16.67, p<0.001) as shown in Table 4 below. Of the two STI infections tested, 45.3% (45) of those who were infected with gonorrhoea consumed alcohol while 31% (9) who were infected with Chlamydia drank alcohol. Alcohol consumption was significantly associated with gonorrhoea infection (χ^2=10.58, p=0.001) but not with chlamydia infection.

Table 4: Association between alcohol consumption and sexual behaviour and STI infection

Variable	Total n (%)	Alcohol use n (%)	Alcohol non-use n (%)	P-value
Sexual behaviour				
Condom use				
Never	138	38 (27.5)	100 (72.5)	0.033
Rarely	50	25 (50.0)	25 (50.0)	
On most occasions	60	18 (30.0)	42 (70.0)	
Always	45	14 (31.1)	31 (68.9)	
Number sexual partners in the past 6 months				
1	215	58 (27.0)	157 (73.0)	<0.001
2	47	24 (51.1)	23 (48.9)	
>3	14	9 (64.3)	5 (35.7)	
STI Infection				
Gonorrhoea infection				
Yes	95	43 (45.3)	52 (54.7)	0.001
No	198	52 (26.3)	146 (73.7)	
Chlamydia infection				
Yes	29	9 (31.0)	20 (69.0)	0.866
No	264	86 (32.6)	178 (67.4)	

Source: Author's own computations

4.4 Objective 3- To determine contrasts in associations between alcohol consumption and risky sexual behaviour and STIs between men and women

In figure 2 below, men and women between 25-30 years of age participated in binge drinking on most occasions. The largest number of those who did binge drinking on most occasions were males between 25-30 years old. Comparing males and females under 25, more males reported never binge drinking compared to females who reported binge drinking on most occasions. Binge drinking among women was associated with number of sexual partners (χ^2=19.97, p<0.01) as seen in Appendix 3.

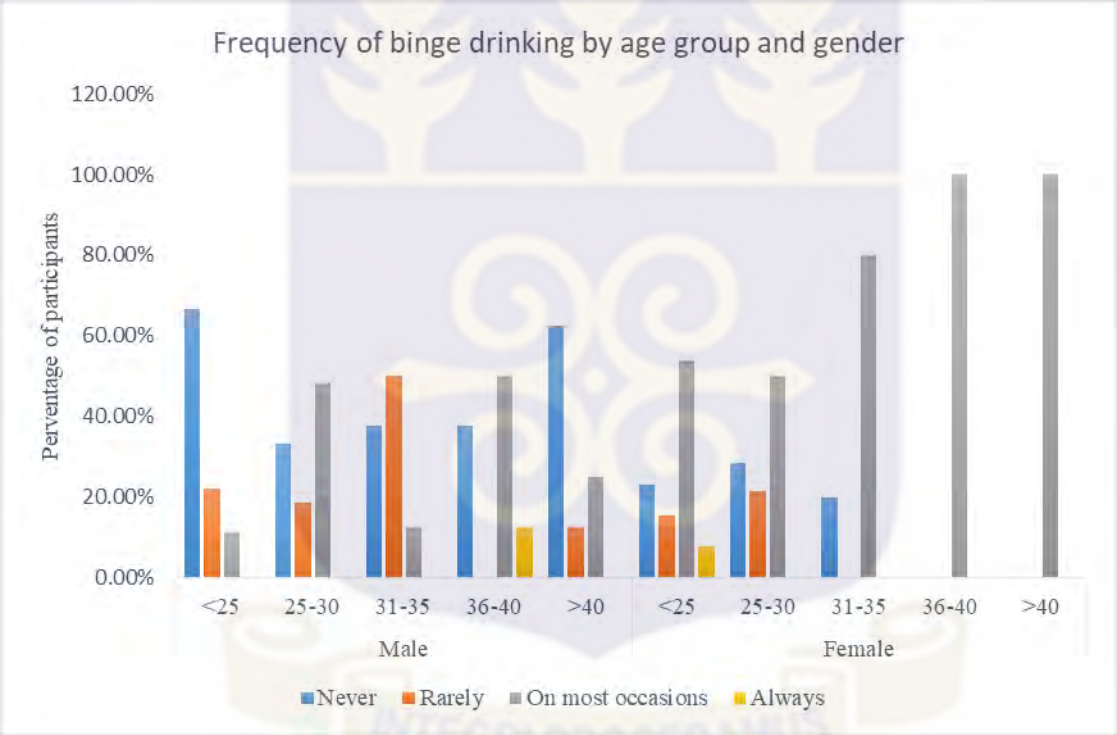

Figure 2: Frequency of binge drinking among male and females in different age groups

Table 5 below shows that among men, of those who consumed alcohol, there were more single (66.7%) than married (33.3%) men. Results from the Table 6 show that among men who responded 'rarely' on condom use during sexual relations, 64.3% consumed alcohol. Regarding number of sexual partners in the last 6 months, men who had more than one sexual partner, 61.7% consumed alcohol compared to 38.3% who did not consume alcohol. There was

significant association between number of sexual partners and alcohol consumption (χ^2=9.55, p=0.008) among men. For females, alcohol consumption was higher among those who were single (74.3%), compared to those who were married (25.7%), which is similar to what was found among men as seen in Table 5. Among women who consumed alcohol, 23.3% never used condoms and 19.2% always used condoms as shown in Table 6 below; no association was found between condom use and alcohol consumption. Gonorrhoea infection was identified in 31.4% of women who consumed alcohol compared to 15.7% who did not consume alcohol. There was a significant association between gonorrhoea infection and alcohol consumption among women (χ^2=4.32, p<0.05) but no association was seen among men.

Table 5: Differences in alcohol consumption by individual characteristics between men and women (n=95)

	Male			Female		
Variable	**Alcohol use n(%)**	**Alcohol non-use n(%)**	**P-value**	**Alcohol use n(%)**	**Alcohol non-use n(%)**	**P-value**
Socio-demographic characteristics						
Age(years)						
<25	9(28.1)	23(71.9)		13(27.1)	35(72.9)	
25-30	27(45.8)	32(54.2)		14(22.2)	49(77.8)	
31-35	8(47.0)	9(53.0)	0.261	5(23.8)	16(76.2)	0.695
36-40	8(61.5)	5(38.5)		2(16.7)	10(83.3)	
>40	8(50.0)	8(50.0)		1(8.3)	11(91.7)	
Education level						
No education	3(37.5)	5(62.5)		1(16.7)	5(83.3)	
Primary education	8(47.1)	9(52.9)	0.904	2(15.4)	11(84.6)	0.758
Secondary education and above	49(43.8)	63(56.2)		32(23.4)	105(76.6)	
Marital status						
Single	40(41.2)	57(58.8)	0.347	26(25.5)	76(72.5)	0.209
Married	20(50.0)	20(50.0)		9(16.7)	43(83.3)	

Source: Author's own computations

Table 6: Differences in alcohol consumption by risky behaviour between men and women

	Male			Female		
Variable	**Alcohol use n(%)**	**Alcohol non-use n(%)**	**P-value**	**Alcohol use n(%)**	**Alcohol non-use n(%)**	**P-value**
Sexual behaviour						
Condom use						
Never	18(34.6)	34(65.4)		20(23.3)	66(76.7)	
Rarely	18(64.3)	10(35.7)	0.074	7(31.8)	15(68.2)	0.517
On most occasions	15(39.5)	23(60.5)		3(13.6)	19(86.4)	
Always	9(47.4)	10(52.6)		5(19.2)	21(80.7)	
Number sexual partners in the past 6 months						
1	28(34.2)	54(65.8)		30(22.5)	103(77.5)	
2	22(59.5)	15(40.5)	0.008	2(20.0)	8(80.0)	0.427
>3	7(70.0)	3(70.0)		2(50.0)	2(50.0)	
STI Infection						
Gonorrhoea infection						
Yes	32(49.2)	33(50.8)	0.223	11(36.7)	19(63.3)	0.038
No	28(38.9)	44(61.1)		24(19.0)	102(81.0)	
Chlamydia infection						
Yes	14(66.7)	7(33.3)	0.294	2(33.3)	6(66.7)	0.858
No	63(54.3)	53(45.7)		33(22.3)	115(77.7)	

Source: Author's own computations

4.5 Objective 4- To investigate the effect of alcohol consumption on sexual behaviour and STI infection

Multinomial logistic regression was used to determine the effect of alcohol consumption[2] on sexual behaviour and logistic regression was used for STI infection and the results are as shown in Table 7 below.

In Model I, the unadjusted model indicated that participants who consume alcohol were more likely to rarely use condom. This was statistically significant (OR=2.63, 95% CI: 1.35-5.13). When the model was controlled for other confounding variables such as age, marital status, gender, and educational level, alcohol use was still associated with rarely use of condom though there was 11% reduction in the effect size.

Model II, the unadjusted model showed that those who consume alcohol were more likely to have more than one sexual partner in the past 6 months and this was statistically very significant. Controlling for confounders did not change the statistical association between alcohol use and the number of sexually partners an individual had in the past 6months. The effect size of alcohol use on those who had two sexual partners for the past 6months decreased by 20% when confounders were added whiles the effect size of alcohol use on those who had three or more sexual partners decreased by 0.6%.

Regarding Model III, the unadjusted model decreased the effect size of alcohol use on gonorrhoea infection by 16%. Alcohol use had a statistical significant association with gonorrhoea infection for both the unadjusted and adjusted model ($p<0.05$).

[2] It would have been more interesting to assess the effect of the frequency of alcohol consumption on the number of sexual partners and STI infection, however, due to the low responses to the frequency of alcohol use we resort to a binary response to alcohol use.

Table 7 Effects of alcohol use on condom use, number of sexual partners and STI infection

Dependent variable		Unadjusted Odds Ratio		Adjusted Odds Ratio	
		Odds Ratio (95% CI)	P-value	Odds Ratio (95% CI)	P-value
Model I: Condom use during sexual relations					
Rarely	Alcohol non-use	1.00	0.005	1.00	0.020
	Alcohol use	2.63(1.35-5.13)		2.35(1.15-4.83)	
On most occasions	Alcohol non-use	1.00	0.724	1.00	0.757
	Alcohol use	1.12(0.58-2.20)		0.89(0.44-1.83)	
Always	Alcohol non-use	1.00	0.644	1.00	0.73
	Alcohol use	1.19(0.57-2.47)		1.14(0.53-2.50)	
Model II: Number of sexual partners in past 6 months					
Two	Alcohol non-use	1.00	0.002	1.00	0.022
	Alcohol use	2.82(1.48-5.39)		2.24(1.12-4.45)	
>3	Alcohol non-use	1.00	0.006	1.00	0.009
	Alcohol use	4.87(1.57-15.14)		4.84(1.47-15.99)	
Model III: Gonorrhoea	Alcohol non-use	1.00	0.001	1.00	0.019
	Alcohol use	2.32(1.39-3.88)		1.94(1.11-3.38)	
Model IV: Chlamydia	Alcohol non-use	1.00	0.866	1.00	0.243
	Alcohol use	0.93(0.41-2.13)		0.59(0.24-1.44)	
*the odds ratios were adjusted for age, marital status, education level and gender					

4.6 Summary

This study found that alcohol consumption was higher among males than females. Results on binge drinking showed that there were equal numbers of males and females who responded that they binge drink 'on most occasions'.

Alcohol consumption compared with gender was seen to be statistically significant. Results showed alcohol consumption had statistically significant relationship with both condom use during sexual relations and number of sexual partners in the last 6 months.

Gender differences in binge drinking were noted; more men than women reported binge drinking. Considering marital status, there were no gender differences seen in alcohol consumption. Among men, alcohol consumption was significantly associated with the number of sexual partners in the last 6 months. Among women, a significant association was seen between alcohol consumption and gonorrhoea infection. Respondents who consumed alcohol were more likely to rarely use condoms and have more than one sexual partner and have gonorrhoea infection.

Other analyses was conducted that were not part of the main objectives of this study. **Appendix 2** presents data on the differences in binge drinking between men and women. **Appendix 3** presents data on multinomial logistic regression analysis of the effect of condom use on alcohol use, age, gender, marital status and education level. **Appendix 4** is a table showing a multinomial regression analysis of the effect of number of sexual partners on alcohol use, age, gender, marital status and education level. **Appendix 5** shows the results of logistic regression analysis of the effect of gonorrhoea infection on alcohol use, age, gender, marital status and education level. **Appendix 6** shows the results of logistic regression analysis of the effect of chlamydia infection on alcohol use, age, gender, marital status and education level.

CHAPTER FIVE

5.0 DISCUSSION

This study sought to establish alcohol consumption prevalence, differences between male and female alcohol consumption and effects of alcohol consumption on risky sexual behaviour and alcohol consumption.

According to the results from this study, of the 32% of participants who consumed alcohol, 63% were male and 39% female. This is similar to findings from other studies in other parts of the world. A study at an urban STD clinic in Baltimore found that 35.3% of participants consumed alcohol, with 30% of women and 42% of men reporting alcohol consumption (Scott-Sheldon et al., 2009). The multinational GENACIS (Gender, Alcohol and Culture: An International Study) project carried out from 1997-2007 in 40 countries showed that men were more likely to consume alcohol than women and consume larger quantities as well (Wilsnack et al., 2009). In a community study in Sao Paulo, Brazil, they found that men were more likely than women to consume alcohol and be heavy, frequent drinkers (Macinko, Mullachery, Silver, Jimenez, & Libanio Morais Neto, 2015). A study of the 1998 South African Demographic and Health Survey, showed that alcohol consumption was reported by 45% of the men and 17% of women (Macinko et al., 2015). This shows that more men in Ghana consume alcohol compared to women. Interventions that target harmful alcohol consumption would have to put emphasis on educating men about the implications of harmful alcohol consumption. In sub-Saharan Africa, this difference in alcohol consumption can be attributed to cultural reasons; alcohol consumption among men is considered normal and is even encouraged whereas women seen to consume alcohol perceived to be immoral and looked down upon.

Among men, alcohol consumption was significantly associated with having more than one sexual partner in the last 6 months. This is in line with findings that have shown men who

consume alcohol tend to have more than one sexual partner compared to women in a study among patients attending a public STD clinic (Thompson et al., 2005). This is contrary to findings in the US where a study among STI clinic patients in Massachusetts showed stronger associations between alcohol use and risky sex were found for women even though men drank more than women and reported more sexual partners (Carey, Senn, Walsh, Scott-Sheldon, & Carey, 2016). The difference in results is due to different levels of analysis for each study. Thompson et al. (2005) conducted a global association study which looked at those who consume alcohol and their likelihood to engage in a risky sexual behaviour whereas Carey et al. (2016) conducted a situational analysis which investigated individuals who consumed alcohol before and found that they were more likely to engage in risky sexual behaviour.

Alcohol consumption was seen to be highest among those below the age of 30. This is consistent with findings that have shown that the youth are among the highest consumers of alcohol and are prone to heavy episodic drinking. This is because they are easily influenced by their peers; they want to appear to be part of the group. This age group is particularly susceptible to alcohol marketing which targets the youth (Swahn, Ali, Palmier, Sikazwe, & Mayeya, 2011). Other reasons that have been proposed are alcohol is used to mask deeper issues that the individual might be going through such as depression, anxiety or abuse (Cooper, 2002a). It is essential to target preventive interventions to those under 30 years of age to reduce alcohol consumption such as information, education and communication, ban promotion of events by alcohol manufacturing companies, and strengthen social and personal skills of the youth. Combined alcohol and sexual risk reduction efforts are needed especially among young people where the highest alcohol consumption coincides with the highest rate of STIs.

Age, education level and marital status showed no significant association with alcohol consumption. In a study in US, age was shown to be significantly associated with alcohol consumption (Eigenbrodt et al., 2001). Cross sectional studies have shown a lower level of

drinking at older ages (*IAS Factsheet :Older people and alcohol*, 2013) although some longitudinal studies have shown little or no influence of age on alcohol consumption. In sub-Saharan Africa, alcohol consumption is high among the youth and the reasons discussed earlier. It is interesting to note that studies in the region have not looked at the effect of age on alcohol consumption.

Findings from this study have shown that alcohol consumption was significantly associated with condom use during sexual relations. Those who consumed alcohol were more likely to 'rarely' use condoms during sexual relations compared to those who did not consume alcohol. Similar findings were reported in a cross-sectional study by (Tassiopoulos et al., 2006) and (Geibel et al., 2008) showed that the number of days per week alcohol is consumed was significantly correlated with frequency of condom use. Two longitudinal studies in Zimbabwe (Zablotska et al., 2009a) and female sex workers in Kenya (Yadav et al., 2005) showed that any alcohol use in the previous 6 months was significantly associated with inconsistent condom use. Consumption of alcohol leads to decreased coordination and poor reflexes, which could interfere with condom use. If the amount of alcohol were large, this would lead to the strong relationship between alcohol use and unprotected sex.

Growing evidence suggests that multiple sexual partnerships promote the spread of STIs. Findings from this study found that alcohol consumption was significantly associated with the number of sexual partners in the past 6 months and those who consumed alcohol were more likely to have more than one sexual partner. This is consistent with a study in Southern Africa, which found that men at STI clinics who reported having multiple recent sexual partners drank more alcohol than those who reported having one sexual partner (Sarah E Woolf-King & Maisto, 2011). A qualitative study in Namibia found that alcohol consumption was associated with concurrent sexual relationships (LeBeau & Yoder, 2009). Having multiple sexual partners increases one's opportunity to engage in high risk sex and is associated with alcohol

consumption. It is important to note that unprotected sex increases risk for STIs, not just having multiple sexual partners.

Although HIV is the STI often talked about in SSA, other STIs such as gonorrhoea and chlamydia are important to investigate. This is because having an STI can increase susceptibility to HIV. Findings from this study showed that those who consumed alcohol were more likely to test positive for gonorrhoea. A study in New Zealand showed clear and constant trends for increasing association between alcohol consumption and STI diagnoses (Boden, Fergusson, & Horwood, 2011). In Moshi, Tanzania, (Ghebremichael et al., 2009) and in Rakai, Uganda (Zablotska et al., 2006) both studies showed a consistent association between alcohol use and previously reported STI. Alcohol consumption might directly cause an increased risk of STI by its effects on normal behavior, adverse effects on the immune system and sexual arousal. Another aspect that could lead to increased risk of STI infection is 'sensation seeking'; individuals who seek varied, adventurous and stimulating experiences.

Findings from this study show that there was a difference in alcohol consumption with 43.8% of males and 22.4% of females consuming alcohol. This difference in alcohol consumption remains universal as studies in Uganda, South Africa, and United States have shown that more males than females consume alcohol but in some countries (Wilsnack et al., 2009); the differences may not be as large as in others. A study looking at alcohol consumption by gender in low and middle income countries showed that men consume more alcohol than women; however women are more vulnerable to alcohol-related risks (*Alcohol, Gender and Drinking Problems: Perspectives from Low and Middle Income Countries*, 2005). This risks are transactional sex, coercive sex, physical and verbal abuse and loss of power to negotiate condom use. The differences can be attributed to gender roles, social norms, genetics, motives and expectancies. Female respondents report less alcohol consumption and fewer alcohol problems whereas males often report heavy and problematic alcohol use. Social norms

surrounding alcohol often pass harsh judgement on women who drink and so women would be less likely to consume alcohol or report using it. Alcohol consumption prevention, however, must address the role of gender in alcohol use and risky sexual behaviour (Bryant, 2006; Exner et al., 2003). STI prevention frameworks are usually directed towards men and do not include information for women. It would be appropriate for women's issues such as sexual safety or condom negotiation to be portrayed as the two have more serious implications for women (Norris et al., 2004). The finding that gonorrhoea is associated with women who consume alcohol suggests the importance of developing targeted prevention strategies for this high-risk group of women, that is, those who consume alcohol.

An association between both gonorrhoea and chlamydia and alcohol consumption was expected. However, this study found an association only between alcohol consumption and gonorrhoea. It is common to see an association between alcohol consumption and one STI. Studies that have used general measures of alcohol consumption such as 'any alcohol use' have found associations with at least one STI. Poulin et al. (2001) found that men and women attending a HIV clinic who had consumed alcohol in the last 6 months had 5.7 the odds of having an STI compared to those who did not consume alcohol. A study done by Bjekić, Vlajinac, & Marinković (2000) found that men who consumed alcohol had 2.5 the odds of reporting an STI compared to those who did not consume alcohol. Alcohol consumption could directly lead to an increase in STIs due to its effects on sexual arousal and behaviour. STIs and alcohol consumption could be linked to a third confounding variable, sensation or thrill-seeking. In order to get strong evidence of this relationship, a randomized control trial would need to be carried out to establish a cause-effect relationship. However, due to ethical reasons, this will not be possible.

Given the relatively low frequency of alcohol consumption, it is noteworthy that even after controlling for socio-demographic characteristics, those who consumed alcohol were more

likely to 'rarely' use condoms, have more than one sexual partner and test positive for gonorrhoea. In conclusion, alcohol reduces an individuals' capacity to engage in functions such as reasoning, memory and attention. Instead, they become engrossed with intimacy and immediate pleasure without consideration risks involved with risky sexual activity. Intoxication, therefore, becomes an important determinant of risky sexual behaviour and STI infection.

The strengths of this study were that it was done at polyclinic which is a primary location for diagnosing and treating STIs. However, alcohol use and its association with risky sexual behaviours and STIs among STI patients has not been studied widely in West Africa despite previous studies having shown high alcohol consumption in STI patients in other parts of the world. Secondly, the sample had a full clinical evaluation so that STI diagnosis supported self-reported clinical symptoms. Third, this is the first study of its kind in Ghana which confirms alcohol consumption is associated with risky sexual behaviour as established in Eastern and Southern Africa. This study has several limitations. This was a cross-sectional study and therefore we cannot infer causality between alcohol consumption and risky sexual behaviour and STI infection. Secondly, recruitment was done from clinic submissions, essentially a convenience sample which may have resulted in sample bias. In addition, the study only focused on global association of alcohol consumption and risky sexual behaviour which in previous studies has shown associations between the two; situational and event-level studies may give a clearer picture. Moreover, the exclusive reliance on self-reported measures brings in issues such as social desirability and memory limitations that affect the accuracy of the data. In addition, the study was focused in an urban area and had a small sample size therefore findings may not be generalizable to the population. Finally, the measure of alcohol consumption used was general and such a broad measure combines different drinking patterns which could lead to erroneous conclusions. It should be clear that the original objectives of the

larger study were not to study the association between alcohol consumption and risky sexual behaviour and STI. A well validated measure of alcohol consumption and specific use of alcohol in association with behaviour should be used to help reach a clearer conclusion.

CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

This is the first study in Ghana to investigate the association between alcohol consumption, risky sexual behaviour and STI infection. The study revealed that alcohol consumption was associated with gender, condom use during sexual relations, number of sexual partners and gonorrhoea infection. Among men, alcohol consumption was significantly associated with the number of sexual partners in the last 6 months. Among women, a significant association was seen between alcohol consumption and gonorrhoea infection. Respondents who consumed alcohol were more likely to rarely use condoms, have more than one sexual partner and be infected with gonorrhoea. The study confirms that alcohol consumption is associated with risky sexual behaviour in Ghana as has been shown in East and Southern Africa. Alcohol use needs to be considered as an important risk factor for risky sexual behaviour and STI infection.

6.2 Recommendations to reduce alcohol consumption

In Africa, a perception exists that there are more urgent public health problems than harmful use of alcohol such as malaria and tuberculosis. Infectious diseases still outnumber chronic diseases as a cause of death in most SSA countries. The link between alcohol use and risky sexual behaviour and STI infection is poorly understood and so alcohol-related conditions continue to be neglected.

Based on the findings of this study, the following recommendations have been made at each level to reduce alcohol consumption and reduce risky sexual behaviour:

1) National Level
    a) Set up policies that ensure alcohol limits are in place and bar staff are trained on responsible service of alcohol in licensed establishments
    b) Marketing and advertising of alcohol should be regulated and use of media campaigns to highlight negative impact of alcohol consumption focusing on unique differences between men and women
    c) Ensure that drinking establishments have condoms available for patrons
    d) Combine STI services with services for alcohol and other substance abuse problems in healthcare environments
2) Community Level
    a) Comprehensive sex education provided through schools, churches, media that promotes safe sex and educates on dangers of alcohol consumption to reinforce awareness of the problems created by alcohol
    b) Workshops for girls and women that empower them to increase their awareness and life skills
    c) STI awareness campaigns should be carried out. Provision of diagnostic and treatment services should be made available
    d) The healthcare system should screen for alcohol problems among persons at risk for STIs and educate them on benefits of decreased alcohol consumption and provide treatment options
    e) Controls on selling and consumption venues such as regulating operation times

6.3 Recommendations for further research

1) Further research should be carried out in Ghana and West Africa on alcohol consumption and its relationship with STI-related sexual risk behaviour using the categories of alcohol consumption measures which are alcohol drinking status, volume of alcohol, frequency of alcohol consumption and context of alcohol consumption
2) Large-scale survey studies using situational and event-level assessment will be necessary to determine whether there is an association between alcohol use before/during sexual activity and sexual-risk behaviour
3) Research studies should focus on identifying mechanisms by which alcohol consumption leads to risky sexual behaviour and STIs
4) A randomized control trial looking at whether a decrease in alcohol consumption would lead to a decrease in risky sexual behaviour and STIs. Such a study would help in the understanding of the link between the three
5) Risks of alcohol consumption during pregnancy and how to prevent them as well as the impact of prenatal alcohol exposure on health of unborn child

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APPENDIX 1

Data Extraction Tool

Code: _____ Month/Year: _____

DEMOGRAPHIC DATA

1. Age _____
2. Gender _____
3. Marital Status _____
4. Highest level of education attained _____
5. Occupation _____
6. If female, are you currently pregnant _____

SYMPTOMS AND CURRENT HISTORY

7. Symptoms of study participant _____
   _____
8. How long participant had symptoms _____
9. Current STI, if any _____

RISKY SEXUAL BEHAVIOUR

10. Do they drink alcohol? _____
11. How often? _____
12. Frequency of binge drinking _____
13. Have they ever exchanged sex for gifts or money? _____
14. Frequency of using condoms during sex _____
15. Number of sexual partners in last 6 months _____
16. New sexual partner in the past month _____

17. Currently have more than one sexual partner _____

In case of any concerns contact:

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APPENDIX 2

Binge drinking differences between males and females

			Binge drinking: differences between male and female								
	Male				P-value		Female				P-value
Variable	Never	Rarely	On most Occasions	Always			Never	Rarely	On most occasions	Always	
Socio-demographic characteristics											
Age(years)											
<25	6(66.7)	2(22.2)	1(11.1)	0(0)			3(23.1)	2(15.4)	7(53.8)	1(7.7)	
25-30	9(33.3)	5(18.6)	13(48.1)	0(0)			4(28.6)	3(21.4)	7(50.0)	0(0)	
31-35	3(37.5)	4(50.0)	1(12.5)	0(0)	0.083		1(20.0)	0(0)	4(80.0)	0(0)	0.931
36-40	3(37.5)	0(0)	4(50.0)	1(12.5)			0(0)	0(0)	2(100.0)	0(0)	
>40	5(62.5)	1(12.5)	2(25.0)	0(0)			0(0)	0(0)	1(100.0)	0(0)	
Education level											
No education	1(33.3)	1(33.3)	1(33.4)	0(0)			0(0)	0(0)	1(100.0)	0(0)	
Primary education	0(0)	2(25.0)	5(62.5)	1(12.5)	0.041		0(0)	1(50.0)	1(50.0)	0(0)	0.79
Secondary education and above	25(51.0)	9(18.4)	15(30.6)	0(0)			8(25.0)	4(12.5)	19(59.4)	1(3.1)	
Marital status											
Single	18(45.0)	7(17.5)	15(37.5)	0(0)	0.797		7(26.9)	5(19.2)	13(50.0)	1(3.9)	0.213
Married	8(40.0)	5(25.0)	6(30.0)	1(5.0)			1(11.1)	0(0)	8(88.9)	0(0)	
Sexual behaviour											
Condom use											
Never	6(33.3)	7(38.9)	5(27.8)	0(0)			4(20.0)	3(15.0)	13(65.0)	0(0)	
Rarely	10(55.6)	3(16.7)	5(27.8)	0(0)	0.317		3(42.9)	0(0)	3(42.9)	1(14.2)	0.103
On most occasions	6(40.0)	1(6.7)	7(46.6)	1(6.7)			0(0)	2(66.7)	1(33.3)	0(0)	
Always	4(44.4)	1(11.2)	4(44.4)	0(0)			1(20.0)	0(0)	4(80.0)	0(0)	
Number sexual partners in the past 6 months											
1	12(42.9)	6(21.4)	9(32.1)	1(3.6)			5(16.7)	5(16.7)	20(66.6)	0(0)	
2	11(50.0)	1(4.6)	10(45.4)	0(0)	0.084		1(50.0)	0(0)	0(0)	1(50.0)	0.003
>3	1(14.3)	4(57.1)	2(28.6)	0(0)			1(50.0)	0(0)	1(50.0)	0	
STI Infection											
Gonorrhea infection											
Yes	13(40.6)	7(21.9)	12(37.5)	0(0)	0.682		1(9.1)	3(27.3)	6(54.5)	1(9.1)	0.14
No	13(46.4)	5(17.9)	9(32.1)	1(3.6)			7(29.2)	2(8.3)	15(62.5)	0(0)	
Chlamydia infection											
Yes	3(42.9)	2(28.6)	2(28.5)	0(0)	0.915		1(50.0)	0(0)	1(50.0)	0(0)	0.781
No	23(43.4)	10(18.9)	19(35.8)	1(1.9)			7(21.2)	5(15.2)	20(60.6)	1(3.0)	

APPENDIX 3

Multiple Multinomial Logistic Regression of Condom Use with Alcohol Use and Other Confounders

	Rarely		On most occasions		Always	
Variables	**Odds Ratio (95% CI)**	**P-value**	**Odds Ratio (95% CI)**	**P-value**	**Odds Ratio (95% CI)**	**P-value**
Alcohol consumption						
No	1		1		1	
Yes	2.43(1.18-4.99)	0.016	0.88(0.43-1.80)	0.726	1.12(0.51-2.46)	0.759
Gender						
Male	1		1		1	
Female	0.47(0.23-0.97)	0.04	0.31(0.16-0.61)	0.001	0.80(0.38-1.69)	0.567
Marital status						
Single	1		1		1	
Married	0.82(0.64-1.05)	0.114	0.80(0.64-1.00)	0.054	0.72(0.55-0.93)	0.011
Education level						
Primary level	1		1		1	
condary and above	7.12(1.57-32.25)	0.011	3.00(1.12-8.08)	0.029	3.90(1.10-13.87)	0.036
Age group						
<25	1		1		1	
25-30	0.71(0.31-1.64)	0.426	1.21(0.55-2.70)	0.636	1.53(0.65-3.64)	0.334
31-35	0.55(0.15-1.97)	0.359	0.77(0.23-2.57)	0.675	1.17(0.33-4.22)	0.806
36-40	0.46(0.08-2.80)	0.401	1.38(0.34-5.59)	0.649	1.77(0.35-8.94)	0.488
>40	0.69(0.15-3.24)	0.637	0.80(0.18-3.53)	0.777	1.43(0.28-7.36)	0.67

*those who attended no school was merged with those who attended up to primary level as the results could not be interpreted

APPENDIX 4

Multiple multinomial logistic regression of number of sexual partners with alcohol use and other confounders

	Two partners		3-5 partners	
Variables	**Odds Ratio (95% CI)**	**P-value**	**Odds Ratio (95% CI)**	**P-value**
Alcohol consumption				
No	1(ref)		1(ref)	
Yes	2.46(1.21-4.97)	0.012	4.73(1.43-15.65)	0.011
Gender				
Male	1(ref)		1(ref)	
Female	0.16(0.07-0.36)	<0.001	0.26(0.07-0.91)	0.035
Marital status				
Single	1(ref)		1(ref)	
Married	0.96(0.76-1.22)	0.745	0.84(0.54-1.30)	0.433
Education level				
No education	1(ref)		1(ref)	
Primary level	0.10(0.009-1.17)	0.066	0.41(0.03-6.00)	0.512
Secondary and above	0.67(0.16-2.90)	0.758	0.27(0.03-2.90)	0.279
Age group				
<25	1(ref)		1(ref)	
25-30	0.77(0.33-1.80)	0.549	0.71(0.19-2.61)	0.607
>31	0.42(0.14-1.29)	0.13	0.20(0.03-1.60)	0.128

*the last three age groups were merged as their results could not be interpreted

APPENDIX 5

Logistic regression of gonorrhoea infection with alcohol use and other confounders

Variables	Odds Ratio (95% CI)	P-value
Alcohol consumption		
No	1(ref)	
Yes	1.94(1.11-3.38)	0.019
Gender		
Male	1(ref)	
Female	0.26(0.15-0.45)	<0.001
Marital status		
Single	1(ref)	
Married	1.07(0.90-1.28)	0.438
Education level		
No education	1(ref)	
Primary level	0.64(0.15-2.76)	0.548
Secondary and above	0.80(0.23-2.73)	0.717
Age group		
<25	1(ref)	
25-30	1.21(0.62-2.34)	0.575
31-35	1.06(0.41-2.74)	0.896
36-40	0.35(0.1-1.25)	0.106
>40	0.26(0.07-0.97)	0.045

APPENDIX 6

Logistic regression of chlamydia infection with alcohol use and other confounders

Variables	Odds Ratio (95% CI)	P-value
Alcohol consumption		
No	1(ref)	
Yes	0.65(0.27-1.60)	0.335
Gender		
Male	1(ref)	
Female	0.28(0.12-0.69)	0.005
Marital status		
Single	1(ref)	
Married	0.87(0.66-1.14)	0.311
Education level		
No education and primary level	1(ref)	
Secondary and above	1.63(0.45-6.00)	0.459
Age group		
<25	1(ref)	
25-30	2.65(0.91-7.76)	0.075
>31	1.74(0.45-6.75)	0.419

Institutional Review Board
37 Military Hospital
Neghelli Barracks
ACCRA
Tel: 0302 769667
Email:irb37milhosp@hotmail.com

29 May 2017

ETHICAL CLEARANCE

37MH-IRB IPN 141/2017

On 28th March 2017, the 37 Military Hospital (37MH) Institutional Review Board (IRB) at a Board Meeting reviewed and approved your protocol.

TITTLE OF PROTOCOL: Alcohol Use, Risky Sexual Behaviour and Chlamydia and Gonorrhoea Infection at 37 Military Hospital, STI Polyclinic

PRINCIPAL INVESTIGATOR: Martha Nduta Mberu

Please note that a final review report must be submitted to the Board at the completion of the study.

Please report all serious adverse events related to this study to 37MH-IRB within seven (7) days verbally and fourteen (14) days in writing.

This certificate is valid until 28th March 2018.

DR EDWARD ASUMANU
(37MH-IRB, Vice Chairperson)

37 MILITARY HOSPITAL
INSTITUTIONAL REVIEW BOARD
DATE 29/05/17

Cc: Brig Gen EC Saka Jnr