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The prevalence and correlates of alcohol use and alcohol use disorders among young people (15 – 24 years) and adults in eSwatini, Malawi and Zambia

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THE PREVALENCE AND CORRELATES OF ALCOHOL USE AND ALCOHOL USE DISORDERS AMONG YOUNG PEOPLE (15 – 24 YEARS) AND ADULTS IN ESWATINI, MALAWI AND ZAMBIA

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Declaration

I, Zethu Sandrah Msibi declare that this research report is my own work.
It is being submitted for the degree of Master of Science in Epidemiology in the field of Epidemiology and Biostatistics in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at this or any other University.



25th day of May 2022

Dedication

The research could have not been possible if God’s mercy and grace was not sufficient to make this work possible.

I dedicate this work to my spouse Thembinkosi Mamba, daughter Owenkosi Mamba and son Jayden Mamba.

ABSTRACT

Introduction

Globally, excessive alcohol use is a remarkable substantial risk for poor public health outcomes. It is escalating in Sub Saharan Africa due to marketing aggressively and lack of individual and policy level interventions. We used the national representative population-based HIV Impact Assessment (PHIA) data to determine the prevalence and correlates of 'alcohol use' (AU) and 'alcohol use disorders' (AUD) in young people and adults in Eswatini, Malawi and Zambia.

Methods

PHIA surveys 2015 – 2017 data was analyzed. The surveys employed a multistage sampling strategy to recruit study participants at household level. The sample in each country dataset were as follows Eswatini (n=9885) Malawi (n=19405), and Zambia (n=27,382). The analysis utilized multivariate logistic regression models that identify the correlates of AU and AUD. Analyses were adjusted for weights, stratification, and clustering using the survey platform analysis in Stata version 15. We considered the p values of <0.05 statistically significant.

Results

Alcohol use prevalence in young people and adults was 17.9% and 23.3% in Eswatini, 10.9% and 22.1% in Malawi, and 14.6% and 32.4% in Zambia. The prevalence of AUD in young people and adults was 9.1% and 14.2% in Eswatini, 3.5% and 11.2% in Malawi, and 7.6% and 20.6% in Zambia. The correlates which had more risk of alcohol use and AUD encompass being male (aOR: 4.62 (95% CI: 3.35 -5.79), 20 – 24 year age group, higher education level (aOR: 1.70, 95% CI: 1.16 -2.48), divorced or separated or widowed in all 3 countries (aOR: 1.96, 95% CI: 1.55 -2.48), HIV positive status in Zambia (aOR: 1.49, 95% CI: 1.12 -1.99), multiple sexual partners in Malawi (aOR: 11.90, 95% CI: 6.76 -20.93), employed class in Zambia (aOR: 2.06, 95% CI: 1.64 -2.59) and engaging in commercial sexual relations in Malawi.

Conclusion

The reported 'alcohol use and AUD' are common in youth and adults in Eswatini, Malawi and Zambia. 'Both alcohol use and AUD' are related with being male, age group 20 – 24 years old, educational level (higher), HIV status, transactional sex and multiple sexual partners, widowed

or separated and HIV status and risky sexual behaviours in the three countries. There is an urgent need for targeted alcohol interventions and such interventions could be integrated with sexual and reproductive health programs.

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ACRONYMS

APC	Alcohol per capita consumption
ART	Antiretroviral therapy
AUD	Alcohol Use Disorder
AUDIT-C	Alcohol Use Disorders Identification Test
EA	Enumeration areas
HIV	Human Immunodeficiency Virus
MOH	Ministry of Health
MPHIA	Malawi Population Based HIV Impact Assessment
PHIA	Population Based HIV Impact Assessment
SHIMS	Swaziland HIV Incidence Measurement Survey
TB	Tuberculosis
WHO	World Health Organization
ZAMPHIA	Zambia Population Based HIV Impact Assessment

CHAPTER ONE

INTRODUCTION, LITERATURE REVIEW, AIMS AND OBJECTIVES

This chapter covers the introduction to concepts of 'alcohol use and alcohol use disorder' in general. It further looks into the problem statement, study justification, study aim and objectives.

1.0 Introduction

Alcohol is a psychoactive substance that intoxicates an individual normally after use (Oxford English dictionary, 2019). Several undesirable outcomes result from using alcohol excessively over average levels (Francis et al., 2019). As an individual indulges in harmful alcohol use, it may result in harm to other people as well as to the individual (Anderson & Baumberg, 2006). Indulging in uncontrolled alcohol is a public health concern hence investigating the contributing factors to 'alcohol use and alcohol use disorders' is key (Knox et al., 2019). According to World Health Organization young people' covers the age range 10-24 years and an adult is a person older than 19 years of age unless national law delimits an earlier age.

Globally, 43% of the entire adult population indulged in alcohol use during the previous year (Hammer, Parent, Spiker, & Organization, 2018). The widespread presence of alcohol use disorders among adults stands at 5.1% worldwide in 2016 (Hammer, Parent, Spiker, & Organization, 2018). The total alcohol per capita consumption (APC) globally is 6.4 litres of alcohol content per annum on average among adults in 2016. This alcohol per capita consumption converts to consumption of 13.9 grams' alcohol in 24 hours.

Disease burden attributed by alcohol use was higher among certain countries where the population's income is low as well as in the middle lower earning countries in 2016 (Hammer, Parent, Spiker, & Organization, 2018). However, the morbidity caused by using alcohol was less in countries with upper middle and high income in the same year (Hammer, Parent, Spiker, & Organization, 2018). In 2016 there were three million alcohol related fatalities and 132.6 million disability-adjusted life years lost from excessive dangerous alcohol use which accounted for 5.3% of the total number of deaths globally (Hammer, Parent, Spiker, & Organization, 2018).

Several interventions have been done in East and Southern Africa such as limitation of young people alcohol use within the family, restriction to alcohol advertisements and difficult access to alcohol by young people (Francis et al., 2015). In the Sub Saharan Africa, there is evidence of continued increase of alcohol use accompanied by available high rate in alcohol marketing especially to the younger population (Francis et al., 2015). It is for the above stated reason that the region needs to focus on interventions targeted to consumption of alcohol (Letsela et al., 2019). There is need of sufficient knowledge on factors that drive alcohol use and disorders so that countries can plan for interventions to minimize alcohol use.

1.1 Literature Review

1.1.1 The prevalence of alcohol use globally, Sub Sahara Africa and Southern Africa

The prevalence of alcohol consumption globally stood at 43% during the year 2016. Alcohol Use and 'Alcohol Use Disorder (AUD)' are responsible for mortality, morbidity, violence, mental health disorders and injuries (Hammer, Parent, Spiker, & Organization, 2018). The links between alcohol use and alcohol use disorders with health problems has been established (Hammer, Parent, Spiker, & Organization, 2018).

In the African region, alcohol consumption rate was at 32.2% in 2016 (Hammer, Parent, Spiker, & Organization, 2018). The total recorded alcohol per capita consumption among adults with the age of fifteen years and above was 6.3 litres alcohol in Africa (Hammer, Parent, Spiker, & Organization, 2018), 9.9 litres in Eswatini, 3.7 litres in Malawi and 4.8 litres in Zambia (Hammer, Parent, Spiker, & Organization, 2018). The marketing of alcohol in Sub Saharan Africa is increasing (Francis et al., 2019). Unrecorded alcohol consumption globally accounts for 25% of alcohol drinkers, 4.3 litres per capita of pure alcohol consumed in Africa; Zambia 2.0, Malawi 1.7 and Eswatini 2.7 litres per capita and these may account to adverse events on alcohol use without being known (WHO Alcohol Report, 2018). Shebeens are a common informal alcohol trade sites in Southern Africa where AUD prevalence is high within their patrons (Scott-Sheldon et al., 2014).

Several studies have looked in depth into indulging in alcohol in a group of younger people and young adults of Sub Saharan Africa and the elderly population at the European region (Francis, Helander, Kapiga, Weiss, & Grosskurth, 2015). The studies conducted, did not use national representative data hence inference to entire population is not possible and this study will use

data that represent the national population. This investigation seeks to fill the blanks in investigating alcohol use among adults.

Table 1: AU & AUD Prevalence in Eswatini, Malawi & Zambia

Country	**AU Prevalence**	**AUD Prevalence**
Eswatini	44.2 %	7.1 %
Malawi	36.8 %	3.5 %
Zambia	41.3 %	5.5 %

1.1.2 Alcohol use and socio demographic factors

A South African study conducted in HIV infected patients demonstrated an association between alcohol use and socio-demographic, psychosocial factors and health outcomes. Results of this study will assist in identifying individuals from a medical area with risky factors of excessive alcohol use and may benefit from alcohol reduction activities. There is a positive association with risky drinking with males, high level of independence, never being married and symptoms of depression as compared to low risk drinking in three clinics in Pretoria. In these primary health clinics, an increased prevalence in excessive drinking was observed in patients living with HIV, particularly men (Veld et al, 2017).

Participants showed elevated odds of hazardous 'alcohol use' and reported higher previous month drinks and more alcohol effects when socio-demographic risk factors have been controlled (Roberts, 2020).

Parenthood and marriage have a putative causal association with 'alcohol use and alcohol use disorders'. These variables are also confounders in several studies that struggle to identify the causal effect. Women's marital and parental status were simultaneously predictors of alcohol use and alcohol use disorders. The study displays important sex differences in presenting alcohol use disorders among young adults (Dash et al, 2020).

Sex differences has been reported in the beginning of alcohol misuse and the evolution of alcohol use disorders. Among women, the effects of exposure to alcohol use disorder include trauma, stress, negative affect, victimization and anxiety disorders. The study did not focus on the other underlying factors to sex differences which also require further attention (Dash et al, 2020).

1.1.3 Alcohol use and infectious diseases

Studies have reported close links between HIV and TB infection risk with excessive alcohol use Lonroth et al (2008). According to WHO in 2016, the incidence of communicable disease caused by alcohol consumption was 11.2 % globally (Hammer, Parent, Spiker, & Organization, 2018). Across all age groups, the morbidity of communicable diseases attributed to alcohol in the African continent was higher as compared to other regions (Klein, Sterk, & Elifson, 2016).

The Sub-Saharan Africa region is overwhelmed by a public health concern of heavy drinking episodes and high rate of HIV infection (Hahn et al., 2014). Studies done in Southern Africa have indicated a significant relationship among current drinkers of alcohol and risky erotic behaviours which further gives rise to increased HIV incidence rate. A study conducted in Malawi among female sex workers showed that participants who were alcohol dependent and were eligible for Anti-Retroviral therapy were more likely not to use the therapy than female sex workers without alcohol dependency (Lancaster et al., 2016). Among people infected with HIV on antiretroviral therapy (ART) it was observed that alcohol consumption was not hazardous and non-hazardous drinking was reduced among adults who were initiated on ART (Hahn et al., 2014).

The prevalence of HIV in adults (15–49 years) was 27.3% in Eswatini, 9.2% in Malawi and 11.3% in Zambia (Government of Eswatini, 2019). Tuberculosis infection burden is still high in Southern Africa with an alarming high mortality rate despite the progress made in fighting it. Alcohol use disorders is associated with tuberculosis infection (Hammer, Parent, Spiker, & Organization, 2018). A study conducted in Zambia revealed that people infected with TB infection only were less likely to experience alcohol dependence.

1.1.4 Alcohol use and risky behaviours

The results of a study conducted in Tanzania is consisted with other studies that substantiates a significant relationship among indulging in alcohol with erotic risky behaviours among young people which was measured by having more than a single sexual partner in a given time period (Francis, Helander, Kapiga, Weiss, & Grosskurth, 2015). Francis and colleagues performed a study in South Africa which found an increased rate of alcohol use as related to risky sexual behaviours among adults (Francis et al., 2019). Therefore, it is of priority that interventions aimed at reducing sexual risks are essential for adults who indulge in alcohol and should be prioritized to target alcohol establishments (Kalichman et al, 2007). The repercussions of alcohol

use on sexual activity are further increased in vulnerable adult populations in Southern Africa (Bello et al., 2017).

1.1.5 Alcohol use and non-communicable diseases

Alcohol consumption results in increased mortality due to non-communicable diseases (Waja, Ebrahim, Yohannis, & Bedaso, 2016). Consuming alcohol as a different predisposing factor for individual's state of wellbeing and it causes several non-communicable diseases (Rehm, 2017)**.** Several studies have shown a dynamic association between the quantity and trends of drinking alcohol and the development of cardiovascular diseases (WHO Alcohol Report, 2018). Heavy alcohol drinkers have been seen to lead to insulin resistance development in subsequent times resulting in high risk of developing diabetes mellitus, hypertension and cancer (Hammer, Parent, Spiker, & Organization, 2018). Deaths due to alcohol consumption are higher than deaths caused by diabetes mellitus (Hahn et al., 2014).

1.1.6 Alcohol use and Injuries

Several injury and diseases are a consequence of detrimental alcohol consumption parallel to social and economic burden in societies worldwide (Klein, Sterk, & Elifson, 2016). The excessive alcohol use affects an individual's functioning of the cognitive system (WHO Alcohol Report, 2018). Consuming alcohol is a factor for individuals which causes several risks of accidents. Heavy alcohol consumption has been shown to increase risk of injuries due to impaired judgement (Rehm, 2017)**.** Greater alcohol consumption leads to greater injury severity.

1.1.7 Alcohol use and Violence

In previous studies, alcohol use has shown to have a role to contribute in street violence especially with male to male violence. Alcohol consumption has shown a relationship with violence in family settings, relations of intimacy with sexual abuse (WHO Alcohol Report, 2018). Gender based violence among women is an epidemiological concern in Sub Saharan Africa with all types of intimate partner violence being prevalent in female adults living in this region. The most prevalent violence of all types is emotional violence (Muluneh et al., 2020). Men who indulged in alcohol were most likely to practice violence to the women they lived with as compared to husbands who were non-drinkers (Waja, Ebrahim, Yohannis, & Bedaso, 2016). Coerced sexual violence was more significant predictor of sexual abuse by men in Eswatini. Women who were sexually violated in Eswatini was prevalent among the women who had alcohol drinking problems (Alexander et al, 2019).

1.1.8 Alcohol use and Mental health

Mental health issues are of highly relevancy in Sub Saharan Africa as they have been neglected in health policies, public health programs and with research (Kabiru, Beguy, Crichton, & Ezeh, 2010). A relationship between symptoms of depression and alcohol use has been established by literature, Southern Africa showing a higher prevalence of depressive symptoms among alcohol users (Cerutti et al., 2016).

1.1.9 Alcohol use and other substance use

In a study conducted in clinics in Pretoria, risky drinking was associated positively with tobacco use as compared to low risk drinking (Veld, 2017).

Cigarette users drank a higher total number of alcohol drinks in the previous month than e-cigarette users. Comparing daily use of cigarette, the evidence of non-daily use was inconclusive with unfavorable alcohol use outcomes (Roberts, 2020).

1.1.10 Alcohol use and cultural norms

In one study conducted to examine the view of culture especially with regards to alcohol consumption in the continent of Africa, it was discovered that in Africa alcohol is mostly consumed during special ceremonies, rituals and family festivities. During special ceremonies, alcohol is given as gifts. Most of the alcohol consumers in Africa are both Christians and nonreligious individuals. Despite the age category, there is a gradually fading in cultural norms and alcohol use currently in the African region which is available across the entire population (Osain & Alekseevic, 2010).

MacArthur and colleagues investigated the impact of the interaction among social influences, cultural norms and social pressures. The normative social influence was studied to have effect in escalating the normal use of alcohol use among mid-adolescence. (Macarthur et al., 2020).

The findings of a study conducted in a rural community of South East Nigeria have revealed several cultural and social practices that have both the negative and positive Impact on ‘alcohol use and alcohol use disorders’ in a community that produce alcohol. The community of South Est Nigeria value palm wine alcoholic drink than other alcoholic drinks because it is believed that it is generally good. The palm wine alcoholic drink also served as an income source in the community. The consumption of palm wine was viewed as normal because it was believed to have health benefits (Nwagu, 2017).

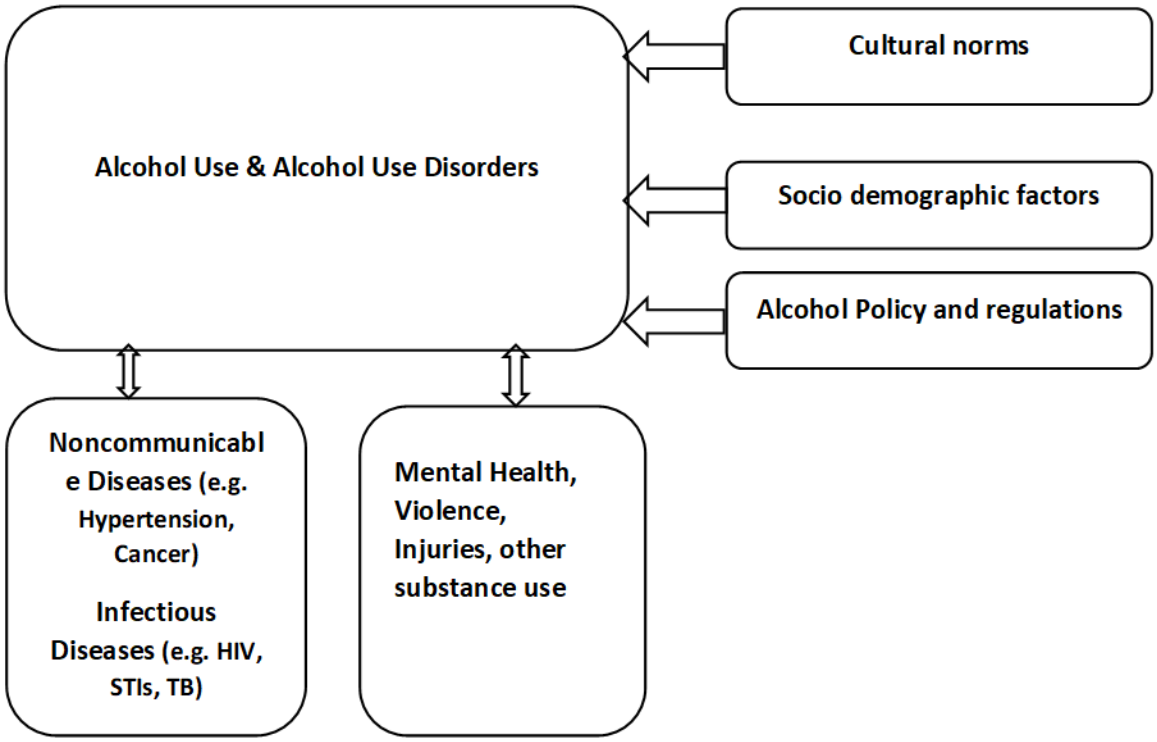
1.1.11 Alcohol use policies and individual and community levels interventions in Southern Africa

There is lack of interventions to address alcohol use disorders in Southern Africa. Therefore, findings of this study will make policy makers aware of the degree of the problem of alcohol use in Southern Africa which will further be key in decision making on activities focused on addressing the issue. For example, a lack of any national policy on alcohol in Eswatini may be one of the reasons for high prevalence of heavy drinking. Eswatini seems to allow alcohol market to trade whenever possible except restricting sales to certain hours only. In Eswatini there is neither a legally binding regulations on alcohol sponsorship nor health warning labels and sales promotion (Hammer, Parent, Spiker, & Organization, 2018).

In Zambia, there is no national policy adopted for alcohol consumption although applying tax on alcoholic beverages is practiced. Zambia is lagging behind with legally binding regulations on advertising and alcohol promotion (Hammer, Parent, Spiker, & Organization, 2018). In Malawi there is a national policy that speaks to alcohol and there is a functional plan on alcohol sales premises restrictions in place. Malawi has an absent system to regulate alcohol advertisement, promotion, sponsorship and placement (Hammer, Parent, Spiker, & Organization, 2018). There is therefore an emergency need for targeted activities to control 'alcohol use' in Southern Africa but that should be informed by studies implemented in the respective countries.

In light of the literature review covered in this protocol, the following framework summarizes the factors associated with 'alcohol use and alcohol use disorders'.

Figure 1: Conceptual Framework for alcohol and alcohol use disorder



1.2 Statement of the problem

'Alcohol use' is a crucial concern in Southern Africa with Eswatini having the highest burden among the three countries with pure alcohol use per capita of 9.9 litres, followed by Zambia at 4.8 litres of pure alcohol and lastly Malawi at 3.7 litres. In 2016, Eswatini had 44.2% of the adult population being alcohol drinkers, Zambia with 41.3% alcohol drinkers and Malawi with the least alcohol drinkers 36.8% (WHO report 2018). The trend of alcohol burden persisted to follow the above trend in the prevalence of alcohol use disorders with Eswatini leading with 7.1%. Zambia 5.5% and Malawi at 3.5%. Units of unrecorded alcohol consumption per capital consumption of pure alcohol stood at 2.7 litres in Eswatini, 1.7 litres in Malawi and at 2.0 litres in Zambia (Hammer, Parent, Spiker, & Organization, 2018). In Malawi, the alcohol per capita consumption reported was 4.9% among adults (Kabiru, Beguy, Crichton, & Ezeh, 2010) and especially more prevalent among female sex workers who were infected with HIV (Lancaster et al., 2016). A knowledge, Attitudes and Perception survey conducted Zambia showed a significant number of adults were indulging in alcohol use at a proportion of 61% followed by cigarette.

The estimated prevalence by WHO is known but the factors that are related to the consumption are not known and as a result there is a need to fill in gaps to inform potential interventions. As

evidence from the searched literature, several factors are related with 'alcohol use and AUD' such as cultural norms, socio demographic factors, mental health, non-communicable diseases and alcohol policy. The study investigated what drives the alcohol use and AUD in these three countries.

This work established the prevalence and correlates of 'alcohol use' and AUD in adults from a national representative sample of Eswatini, Malawi and Zambia. The study will then inform targeted interventions among adults in Southern Africa especially in Malawi, Zambia and Eswatini.

1.3 Justification of the study

Alcohol use and AUD are significant public health problems and associated with mortality and morbidity especially with common conditions in Southern Africa.

Despite it being a notable public health problem, there are no nationally representative studies and limited interventions in Sub Saharan Africa including Southern Africa and in Malawi, Zambia and Eswatini. The study will inform the need for interventions targeting reduction of 'alcohol use and AUD' and alcohol policy for young people and adults in Southern Africa.

1.4 Research question

1. What is the prevalence of 'alcohol use and alcohol use disorders' among young people (15 – 24 years) and adults (25 – 50+ years) in Eswatini, Malawi and Zambia?
2. What are the correlates of alcohol use and alcohol use disorders among young people (15 – 24 years) and adults (25 – 50+ years) in Eswatini, Malawi and Zambia?

1.5 Aim

To determine the prevalence and correlates of alcohol use and alcohol use disorders among young people and adults in Eswatini, Malawi and Zambia.

1.6 Objectives

1. To determine the prevalence of 'alcohol use and alcohol use disorders' among young people and adults in Eswatini, Malawi and Zambia.
2. To establish the correlates of 'alcohol use and alcohol use disorders' among young people and adults in Eswatini, Malawi and Zambia.

CHAPTER 2

MATERIALS AND METHODS

2.1 Introduction

This chapter discusses the methodology that was used in undertaking this study. The primary study description is also highlighted. The data management, analysis and ethical considerations are also discussed.

To achieve the above objectives, the secondary analysis of the 'population-based HIV Impact Assessment (PHIA)' data of the three countries (Eswatini, Malawi and Zambia) in Southern Africa was carried out (Zambia, 2019: Government of Eswatini, 2019; Malawi, 2019).

2.2 Study Design

The primary study design was a cross sectional, therefore secondary analysis using the primary dataset was utilized to address the objectives of the current study.

2.3 Description of the primary datasets

No primary data was collected. As stated above, the analysis utilized the PHIA data of Eswatini, Malawi and Zambia. The PHIA survey was conducted between August 2016 and March 2017 in Eswatini, June-December 2017 in Namibia and between March and August 2016 in Zambia. Briefly, the PHIA team collected the data using questionnaires embedded in the tablets and shared at a central point by a virtual network and then stored in a secured database. The data was cleaned using SAS 9.4. The final questionnaire was merged with laboratory data utilizing a different specimen barcodes and study identification numbers (Zambia, 2019). We requested permission to access the data from the University of Columbia by sharing the outline of the idea (as per the instruction on how to access the data) and therefore no requirement of an additional permission to use the PHIA data (Zambia, 2019: Government of Eswatini, 2019; Malawi, 2019).

2.4 Study population

Young people and adults aged 15 years and above living in Eswatini, Malawi and Zambia in 2015-2017.

2.5 Sample size estimation

The sample size for this secondary data analysis relied on the primary study dataset sample. The primary dataset sample sizes are as follows; Eswatini dataset (total sample 13, 339, and 11,884

(89.1%) responded to alcohol use frequency question), Malawi dataset (total sample 26,871 and 19,866 (73.9%) responded to alcohol use frequency question), and Zambia dataset (total sample 29,884 and 21,789 (72.9%) responded to alcohol use frequency question). Using OpenEpi Software (www.OpenEpi.com, updated 2013/04/06, accessed 2020/09/30) and utilizing the reported prevalence of alcohol use in the WHO report 2018 for Eswatini (44%), Malawi(36.8%) and Zambia (41.3%) and setting the marginal error of 2% and design effect of 3 because of the complex survey design required for national surveys, the estimated minimum sample size required for alcohol surveys in Eswatini, Malawi and Zambia are 7083, 6969, 6686 respectively. The PHIA dataset has sufficient sample for the estimation of alcohol use prevalence, AUD and the correlates of AUD in the respective countries.

2.6 Sampling approaches of primary study

The PHIA surveys employed a multi-stage sampling approach and strived to recruit a nationally representative sample of both male and female from the age of 15 years old and above. Specifically, PHIA survey used a stratified cluster sample design in all the 3 Southern Africa countries. During the initial phase, a proportional to size method was used to select cluster of households which were stratified by the geographic region and zones as defined in the specific countries (see the details below). In the second stage, households of enumeration areas as per each country's census were selected randomly with an equal chance of selection.

In Eswatini, all households were included with 2064 enumeration areas (EA) with an estimate of 212, 195 households. During the initial stage, 286 EAs were selected by a proportional to the size method. Stratification of the EAs was done by both the rural or urban status and by geographic regions which are Hhohho, Manzini, Shiselweni, and Lubombo). The subsequent phase selected a household sample randomly in each EA by an equal probability method. The range of household in each cluster was 15 to 43 household. A national representative sample size with a standard error of minimum 20% was calculated (Government of Eswatini, 2019). In Zambia, ZAMPHIA 2016 utilized a double-stage cluster stratified sample design, where the initial stage selected 511 enumeration areas (EAs) used a proportional to size method. The subsequent stage selected the sample on random basis of households and used an equal probability method. (Zambia, 2019: Government of Eswatini, 2019; Malawi, 2019).

In Malawi, the PHIA employed a stratified two-stage cluster sample design. The2008 Population and Housing Census households in Malawi were used in the sampling frame. The sampling frame had an estimated 2,869,933 households (Malawi, 2019). The initial phase sampled 500 EAs (clusters) by a probability proportional to size method. The sampled 500 EAs were

categorised into the seven geographical zones in Malawi which are, North, Central-East, Central West, Lilongwe City, South-East, South-West, and Blantyre City. The second stage randomly sampled households in each EA by an equal probability method. The range of the household in each cluster was from 15 to 60. The calculate sample size provided a national representative estimate of HIV incidence among adults.

2.7 Study Variables

2.7.1 Outcomes

The outcomes of interest for this study are Alcohol use frequency and Alcohol Use Disorder as defined below.

1. Alcohol use frequency (Monthly or less, 2-4 times a month, 2-3 times a week, 4 or more times a week).
2. Alcohol use frequency categorised as alcohol use <2-3 times a week and alcohol use ≥2-3 times a week.
3. Alcohol use disorders (AUD) – risky drinking as categorized by AUDIT-C. Risky drinking is indicated by AUDIT-C score above 4 in young and male adults and AUDIT-C score above 3 in young and women adults (Reinert & Allen, 2007).

2.7.2 Exposures

The analysis included the following exposure variables, 'socio- demographic variables' such as, sex, age, education level, marital status, and income. Other exposure variables captured in the study include HIV status, ART adherence, risky sexual behaviours, TB incidence and treatment outcomes, physical and sexual violence.

2.8 Data Preprocessing

Stata version 15 was used to manage the data. Data management included merging of the data, data cleaning and recoding of the data. As an initial step, the assessment of the nature of missingness was done and the data analysis was done on a complete case (excluded the missing data). The main outcomes are first outcome variable, alcohol use frequency '(Monthly or less, 24 times a month, 2-3 times a week, 4 or more times a week)' and this was further categorised into a binary variable as follows, alcohol use less than 2-3 times a week and alcohol use ≥2-3 times a week, the second outcome variable is AUD that is defined by AUDIT-c score categories as follows the score of 4 or more for males and 3 or more females. The AUDIT-c score was computed from the three AUDIT alcohol consumption questions. The analysis of the data was stratified by young people (15-24 years) and adults (≥25 years). Age variable was further

categorised as follows, 15-19 years, 20-24 years, 25-49 years (middle aged), ≥50 years (older age). In addition, all other exposure variables were assessed for a need to recode and recoded accordingly.

2.9 Data analysis

Analysis of the data utilized the survey mode in Stata. The survey platform allowed accounting for primary dataset sampling weight, clustering, and stratification. Due to variability of the countries, each country data analysis was carried out and reported separately by country. In addition, the analysis was stratified by age (young people vs adults). The descriptive data analysis was carried out and the presentation of categorical variables as proportions and the continuous variables presentation as mean as well as standard deviation and median and interquartile range for asymmetrically distributed data.

The bivariate association between each of the outcome variable (Binary alcohol frequency variable: alcohol use less than 2-3 times a week and alcohol use ≥2-3 times a week), and AUD) and the exposures were assessed for categorical variables using the Chi square or Fisher exact test and t-test for variables that were continuous, normally distributed and Wilcoxon-Mann Whitney for asymmetrical continuous distributed variables.

Each country's regression analysis was run separately by country. The multivariate logistic regression models were fitted per outcome (alcohol frequency variable: alcohol use less than 2-3 times a week and alcohol use ≥2-3 times a week, and AUD). In the multivariate models, age and sex were entered regardless of the p value in the bivariate analysis, because age and sex are known confounders of alcohol use and AUD. Other variables were entered into the multivariate models if the p value at the bivariate analysis is <0.20. The assessment of interaction between age, sex and alcohol use and AUD was assessed. The logistic regression output was reported as 'adjusted odds ratio (aOR)' and the p value of <0.05 was considered statistically significant.

2.10 Ethical considerations

Data use permission was sought from the University of Columbia, PHIA team, no additional special permission was needed as the data is open for public use as long as you present an outline of what you want to use the data for. The datasets for all the three countries have already been de identified (Zambia, 2019: Government of Eswatini, 2019; Malawi, 2019).
Ethics application was sought with the University of Witwatersrand Faculty of Health Science Research Ethics committee.

CHAPTER 3

RESULTS

3.1 Introduction

This chapter delineates the participants and the prevalence of 'alcohol use and alcohol use disorder' in the three countries and the associations of exposure variables to the outcome variables.

3.2 General characteristics of the study participants

The 3 countries datasets contained 18,421 (32.5%) young people and 38,251(67.5%) adult participants. There were 25, 647 (45.3%) males and 31,025 (54.7%) females from the three countries. The demographic characteristics varied among the age groups by marital status, education level, employment status, health status and sexual behaviours.

3.2.1 Young people participants

Among the young people, persons aged 15-19 were more (51.3%) than the 20 – 24 years old group (48.7%). Tables 2 describes the demographic characteristics of young people (15 – 24) in Eswatini, Malawi and Zambia. Among the sample of young people in Eswatini, there were more people (39.2%) with higher/tertiary education among young people compared to the situation in the other two countries. A higher number of young people had never been married, 3149 (92.8%). The unemployment rate was higher among young people, 2648 (76.2%). Most participants were HIV sero-negative in young people, 2337 (92.1%). In Malawi young people, the age 15 – 19 population was generally higher (54.8%) than the 20 – 24 years old group (45.2%). Unemployment rate was prevalent with the young people (77.6%). Few female young people (13.8%) experienced sexual violence. Most young people had one partner (64.5%). Zambia had a few young people with higher/tertiary education (4.3%). HIV infection was lower among the young people (2.0%) with fewer individuals not adhering to their ARV treatment (5.0%). Most people had one sexual partner in young people (59.3%).

3.2.2 Adult participants

The larger portion of adult participants were 15, 739 females (41.1%) in the age group of 25 – 49 years. Tables 3 describes the demographic characteristics of adults (25+) in Eswatini, Malawi and Zambia. In Eswatini, about half of the adults were married, 3512 (54.2%). Almost half the sample in adults was employed, 3122 (51.9%). Most participants were HIV seronegative in adults, 4062 (67.2%). Most male adults (2.4%) did not engage in transactional sex. In Malawi, the unemployment rate was also prevalent with adults (65.9%). A few female adults (8.7%) experienced sexual violence. Zambia had fewer adult people with higher/tertiary education (11.9%). HIV infection was lower among adults (13.6%) with fewer individuals not adhering to their ARV treatment (1.7%). Several participants had one sexual partner in adults (71.4%).

Table 2: Demographic characteristics of young people (15-24) in Eswatini, Malawi and Zambia.

YOUNG PEOPLE							
		Eswatini		**Malawi**		**Zambia**	
Characteristic	**Categories**	**N**	**%**	**N**	**%**	**N**	**%**
Sex	Female	1685	47.3	4075	51.6	4471	50.5
	Male	1714	52.7	3011	48.4	3465	49.5
Age (years)	15-19	1921	51.3	3496	54.8	4284	53.8
	20-24	1478	48.7	3590	45.2	3652	46.2
Education	None/ Primary	829	23.6	4123	64.5	3028	38.1
	Secondary	1314	37.3	2690	32.4	4600	57.6
	Higher	1256	39.2	273	2.2	308	4.3
Marital status	Never Married	3149	92.8	4422	65.2	5737	75.6
	Married	201	6	2286	29.8	1871	21.7
	Widowed	38	1.2	377	4.9	247	2.8
Employment	Employed	751	23.8	1593	22.4	1701	22.4
	Unemployed	2648	76.2	5493	77.6	6235	77.6
HIV Status	Positive	213	7.9	64	1.5	70	2
	Negative	2337	92.1	3474	98.5	3594	98
TB Infection	Never positive	3319	97.7	7051	99.7	7820	99.4
	Ever positive	74	2.3	28	0.3	50	0.6
ART adherence	Adhering	176	98.8	108	98.9	91	95
	Non adhering	3	1.2	1	1.1	6	5
Physical violence	Once	490	93.2	243	8.2	143	5.5
	Twice or more	34	6.8	2511	91.8	2498	94.5
Sexual violence	Yes	0	0	43	13.8	57	25.2
	No	17	100	288	86.2	160	74.8
Sexual partners	0	739	30.6	1131	22.1	1645	31.3
	1	1228	55.1	3524	64.5	3339	59.3
	2 or more	295	14.3	688	13.5	466	9.4
Transactional sex	Yes	8	0.4	486	12.6	455	10.1
	No	2289	95.6	3726	87.4	4487	89.9
N- total number of youth participants in each country, % -column percentage							

Table 3: Demographic characteristics of adults (25+) in Eswatini, Malawi and Zambia.

ADULTS							
		Eswatini		**Malawi**		**Zambia**	
Characteristic	**Categories**	**N**	**%**	**N**	**%**	**N**	**%**
Sex	Female	3463	49.6	7175	52.2	7330	51.4
	Male	3023	50.4	5144	47.8	5625	48.6
Age (years)	25-49	4467	75.9	10178	82.8	14293	86.8
	50+	2019	24.1	2141	17.2	5153	13.2
Education	None/ Primary	2747	37.6	8621	75.4	7098	53.1
	Secondary	1507	23.9	2984	20.6	4484	35
	Higher	2232	38.5	714	4	1373	11.9
Marital status	Never Married	1895	31.8	767	5.1	1256	11
	Married	3512	54.2	9701	80.7	9842	75.7
	Widowed	1077	14	1849	14.2	1836	13.4
Employment	Employed	3122	51.9	4439	34.1	5093	41.5
	Unemployed	3364	48.1	7880	65.9	7862	58.5
HIV Status	Positive	1965	32.8	1270	12.7	1284	13.6
	Negative	4062	67.2	7688	87.3	8022	86.4
TB Infection	Never positive	5844	90.3	11952	97.6	12441	96.3
	Ever positive	636	9.7	365	2.4	469	3.7
ART adherence	Adhering	1732	99.3	1418	98.1	1369	98.3
	Non adhering	12	0.7	27	1.9	22	1.7
Physical violence	Once	1798	94.6	581	9.7	354	6.6
	Twice or more	99	5.4	5177	90.3	5009	93.4
Sexual violence	Yes	4	4.8	43	8.7	39	14
	No	66	95.2	407	91.3	263	86
Sexual partners	0	1339	17.7	2011	16.1	2320	19.4
	1	4358	71.7	8724	73.9	8663	71.4
	2 or more	618	10.7	1086	10	1028	9.2
Transactional sex	Yes	87	1.4	1302	13.8	1072	10.4
	No	6337	98.6	8508	86.2	10342	89.6
N - total number of adult participants in each country, % - column percentage							

3.3 Prevalence of 'alcohol use and AUD' among young people

Alcohol use prevalence in young people was 17.9% (95% CI: 15.4 – 21.2) in Eswatini, 10.9% (95% CI: 9.4 – 12.7) in Malawi and 14.6% (95% CI: 12.6 – 16.8) in Zambia. AUD prevalence was 9.1% (95% CI: 8.0 - 10.3), 3.5% (95%: 3.0 - 4.0) and 7.6% (95% CI: 6.9 - 8.4) among young people in Eswatini, Malawi and Zambia respectively. AUD was more prevalent among males in young people in Eswatini (12.7%), as well as in Malawi and Zambia respectively (6.4%) and (11.9%).

Young people who drank 1 or 2 drinks in a day were highly prevalent (39.9%) in Eswatini. In Malawi and Zambia people who drank less than 1 drink per day in were common (58.9% and 47.3% respectively). Having daily 6 or more glasses of alcohol was not common with young people of Eswatini (1.2%), Malawi (1.7%) and Zambia (2.9%).

Table 4: Prevalence of reported alcohol use and AUD among young people and adults in PHIA survey data collected in Eswatini in 2016 – 2017.

Characteristic	Categories	Young people							Adults						
		Male n (%)	**95% CI**	**Female n (%)**	**95% CI**	**Total N(%)**	**95% CI**	**P value**	**Male n (%)**	**95% CI**	**Female n (%)**	**95% CI**	**Total N (%)**	**95% CI**	**P value**
Alcohol use frequency	Never	1310 (74.4)	[72.0 - 76.7]	1542 (90.7)	[89.0-92.2]	2852 (82.1)	[80.4-83.6]	<0.001	1929 (63.4)	[61.3 - 65.5]	3121 (90.2)	[88.8 - 91.4]	5050 (76.7)	[75.2 - 78.1]	<0.001
	Monthly	240 (14.6)	[12.6-16.9]	106 (6.9)	[5.6 - 8.5]	346 (11.0)	[9.7 - 12.4]		528 (17.6)	[16.2 - 19.0]	197 (6.0)	[5.0 - 7.2]	725 (11.8)	[11.0 - 12.8]	
	2-4 times a month	129 (8.6)	[7.3 - 10.2]	33 (2.2)	[1.6 - 3.2]	162 (5.6)	[4.8 - 6.6]		311 (10.5)	[9.2 - 12.0]	90 (2.4)	[1.9 - 3.0]	401 (6.5)	[5.8 - 7.3]	
	2-3 times a week	25 (1.6)	[1.1 - 2.5]	1 (0.1)	[0.0 - 0.4]	26 (0.9)	[0.6 - 1.4]		170 (5.7)	[4.9 - 6.7]	34 (0.9)	[0.6 - 1.4]	204 (3.3)	[2.9 - 3.9]	
	4 or more times a week	10 (0.7)	[0.4 - 1.4]	2 (0.2)	[0.03 - 0.8]	12 (0.5)	[0.3 - 0.8]		84 (2.7)	[2.2 - 3.4]	21 (0.5)	[0.3 - 0.8]	105 (1.6)	[1.3 - 2.0]	
Alcohol drinks in a day	None or less than 1	90 (19.8)	[16.3 - 23.9]	48 (31.6)	[23.3 - 41.2]	138 (22.7)	[19.4 - 26.3]	0.01	170 (15.8)	[13.4 - 18.7]	82 (22.5)	[17.4 - 28.0]	252 (17.2)	[14.7 - 19.9]	<0.001
	1 or 2	154 (38.3)	[32.7 - 44.3]	64 (44.8)	[36.2 - 53.7]	218 (39.9)	[35.3 - 44.7]		414 (37.2)	[34.2 - 40.2]	146 (43.1)	[37.3 - 49.1]	560 (38.4)	[35.7 - 41.2]	
	3 or 4	95 (23.9))	[19.1 - 29.4]	13 (9.3)	[5.2 - 15.9]	108 (20.3)	[16.5 - 24.7]		263 (23.6))	[21.0 - 26.5]	78 (23.9)	[19.3 - 29.1]	341 (23.7)	[21.4 - 26.2]	
	5 or 6	33 (9.9)	[6.6 - 14.6]	9 (7.9)	[4.0 - 14.9]	42 (9.4)	[6.7 - 13.0]		129 (12.4)	[10.1 - 15.0]	20 (6.0)	[4.1 - 8.7]	149 (11.0)	[9.1 - 13.3]	
	7 to 9	9 (2.0)	[1.1 - 3.9]	3 (2.6)	[0.8 - 8.1]	12 (2.2)	[1.2 - 3.9]		43 (3.8)	[2.8 - 5.2]	9 (2.7)	[1.3 - 5.4]	52 (3.6)	[2.7 - 4.8]	
	10 or more	23 (6.1)	[3.9 - 9.4]	5 (3.9)	[1.6 - 9.0]	28 (5.5)	[3.6 - 8.3]		74 (7.2)	[5.7 - 9.1]	7 (2.1)	[1.0 - 4.3]	81 (6.1)	[5.0 - 7.6]	
Frequency of 6 or more drinks in an occasion	Never	183 (43.0)	[37.3 - 48.9]	70 (49.0)	[40.6 - 57.5]	253 (44.5)	[39.6 - 49.4]	0.188	366 (33.6)	[30.5 - 36.8]	155 (46.7)	[40.5 - 53.0]	521 (36.3)	[33.3 - 39.4]	<0.001

	Less than monthly	111 (26.9)	[22.2 - 32.1]	44 (30.6))	[22.5 - 40.0]	155 (27.8)	[23.7 - 32.3]		316 (29.0)	[26.2 - 32.0]	87 (25.4)	[20.7 - 30.9]	403 (28.3)	[25.7 - 31.0]	
	Monthly	74 (20.8)	[16.4 - 26]	20 (14.2)	[8.8 - 22.2]	94 (19.2)	[15.7 - 23.2]		216 (20.0)	[17.3 - 23.0]	62 (17.8)	[13.9 - 22.5]	278 (19.5	[17.1 - 22.2]	
	Weekly	32 (8.5)	[5.9 - 12.0]	6 (4.1)	[1.8 - 9.2]	38 (7.4)	[5.3 - 10.3]		149 (13.4)	[11.2 - 16.0]	26 (7.5)	[5.0 - 10.9]	175 (12.2)	[10.2 - 14.4]	
	Daily or almost daily	4 (0.8)	[0.3 - 2.6]	2 (2.1)	[0.5 - 8.3]	6 (1.2)	[0.5 - 2.8]		46 (4.0)	[3.0 - 5.4]	12 (2.6)	[1.4 - 4.8]	58 (3.8)	[2.8 - 4.9]	
Alcohol use disorder	Low risk drinking *	1525 (87.4)	[85.4 - 89.1]	1609 (95.0)	[93.7 - 95.9]	3134 (90.9)	[89.7 - 92.0]	<0.001	2370 (78.3)	[76.2 - 80.2]	3238 (93.6)	[92.3 - 94.6]	5608 (85.9)	[84.5 - 87.2]	<0.001
	High risk drinking	189 (12.7)	[10.9 - 14.6]	76 (5.1)	[4.1 - 6.3]	265 (9.1)	[8.0 - 10.3]		653 (21.7)	[19.8 - 23.9]	225 (6.4)	[5.4 - 7.7]	878 (14.2)	[12.9 - 15.6]	
*n- number of participants, %- column percentage, CI- Confidence Interval, * - includes non-drinkers*															

3.3 Prevalence of 'alcohol use and AUD' among adults

3.3.1 Eswatini

Among adults the alcohol use prevalence was 23.3% (95% CI: 21.0 – 26.0) in Eswatini. In Eswatini, alcohol use frequency among adults showed that individuals who had never drink alcohol were more than the other categories in adults (76.7%). AUD prevalence among adults was 14.2% (95% CI: 12.9 - 15.6) in Eswatini. Similar to young people, high risk drinking was common among males in adults in Eswatini (21.7%). Overall, alcohol use disorder was observed to be higher among adults as compared to the young people across Eswatini (14.2% & 9.1%). Among adult people, it was highly prevalent to have 1 or 2 drinks of alcohol in a day in Eswatini (38.4%). Having 6 or more glasses of alcohol daily was not common in adults (3.8%).

3.3.2 Malawi

Among adults the alcohol use prevalence was 22.1% (95% CI: 20.2 – 24.2) in Malawi. Alcohol use frequency among adults showed that individuals who had never drink alcohol were more than the other categories in adults (77.9%) in Malawi. AUD prevalence among adults was 11.2% (95% CI: 10.5 - 12.1). High risk drinking was common among males in adults in Malawi (21.2%). AUD was observed to be higher among adults as compared to the young people in Malawi (11.2% & 3.5%). In Malawi 43.9% adults drank less than 1 drinks in a day. Among adults, having 6 or more glasses of alcohol daily was not common (4.1%).

3.3.3 Zambia

Among adults the alcohol use prevalence was 32.4% (95% CI: 30.2 – 34.9) in Zambia. Alcohol use frequency among adults showed that individuals who had never drink alcohol were also more than the other categories in adults (67.6%). AUD prevalence among adults was 20.6% (95% CI: 19.7 - 21.6). AUD was common among males in adults in Zambia (33.2%). Higher prevalence of AUD was observed among adults when compared to the young people in Zambia (20.6% & 7.6%). In Zambia, it was highly prevalent to have 1 or 2 drinks of alcohol in a day among adults (38.2%). It was not common to have 6 or more glasses of alcohol daily among adults (6.2%).

Table 5: Prevalence of reported alcohol use and AUD among young people and adults in Malawi in 2016 - 2017.

Characteristic	Categories	Young people							Adults						
		Male n (%)	95% CI	Female n (%)	95% CI	Total N (%)	95% CI	P value	Male n (%)	95% CI	Female n (%)	95% CI	Total N (%)	95% CI	P value
Alcohol use frequency	Never	2321 (79.8)	[77.9 - 81.5]	3931 (97.8)	[97.3 - 98.3]	6252 (89.1)	[88.1 - 90.0]	<0.001	3053 (59.7)	[58. - 61.4]	6774 (94.6)	[93.8 - 95.3]	9827 (77.9)	[76.9 - 78.9]	<0.001
	Monthly	411 (12.4)	[11.1 - 13.8]	100 (1.5)	[1.2 - 2.0]	511 (6.8)	[6.1 - 7.6]		821 (15.7)	[14.6 - 16.9]	259 (3.4)	[2.9 - 3.9]	1080 (9.3)	[8.7 - 9.9]	
	2-4 times a month	161 (4.9)	[4.1 - 5.8]	23 (0.4)	[0.2 - 0.7]	184 (2.6)	[2.2 - 3.0]		570 (11.4)	[10.4 - 12.6]	74 (1.1)	[0.8 - 1.5]	644 (6.0)	[5.5 - 6.6]	
	2-3 times a week	80 (2.0)	[1.5 - 2.7]	11 (0.1)	[0.1 - 0.3]	91 (1.1)	[0.8 - 1.4]		408 (8.0)	[7.1 - 9.1]	41 (0.6)	[0.4 - 0.9]	449 (4.2)	[3.7 - 4.7]	
	4 or more times a week	38 (0.9)	[0.6 - 1.4]	9 (0.1)	[0.05 - 0.2]	47 (0.6)	[0.3 - 0.7]		292 (5.2)	[4.4 - 6.0]	27 (0.3)	[0.2 - 0.5]	319 (2.6)	[2.3 - 3.0]	
Alcohol drinks in a day	None or less than 1	370 (57.0)	[52.2 - 61.7]	102 (75.1)	[66.5 - 82.1]	472 (58.9)	[54.5 - 63.1]	0.003	784 (39.6)	[37.1 - 42.2]	291 (73.4)	[68.3 - 78.0]	1075 (43.9)	[41.7 - 46.2]	<0.001
	1 or 2	179 (26.1)	[22.1 - 30.7]	20 (11.9)	[7.1 - 19.2]	199 (24.7)	[20.9 - 28.9]		693 (33.5)	[31.1 - 35.9]	64 (16.2)	[12.0 - 21.5]	757 (31.3)	[29.2 - 33.4]	
	3 or 4	79 (9.9)	[7.5 - 13.1]	11 (7.6)	[3.5 - 15.7]	90 (9.7)	[7.4 - 12.6]		356 (17.1)	[15.5 - 18.9]	29 (6.8)	[4.3 - 10.5]	385 (15.8)	[14.4 - 17.4]	
	5 or 6	33 (3.7)	[2.5 - 5.5]	8 (4.7)	[2.2 - 9.7]	41 (3.8)	[2.7 - 5.5]		135 (5.4)	[4.3 - 6.6]	10 (2.5)	[1.2 - 5.1]	145 (5.0)	[4.0 - 6.2]	
	7 to 9	29 (3.2)	[2.0 - 5.1]	2 (0.7)	[0.2 - 2.9]	31 (2.9)	[1.8 - 4.7]		123 (4.4)	[3.6 - 5.4]	7 (1.1)	[0.4 - 2.8]	130 (4.0)	[3.3 - 4.9]	
Frequency of 6 or more drinks in an occasion	Never	284 (46.9)	[41.9 - 51.9]	75 (59.6)	[49.8 - 68.6]	359 (48.2)	[43.6 - 52.8]	0.062	646 (32.7)	[30.3 - 35.2]	225 (56.5)	[50.9 - 62.0]	871 (35.7)	[33.5 - 38.0]	<0.001
	Less than monthly	248 (32.8)	[28.6 - 37.3]	43 (27.8)	[19.8 - 37.5]	291 (32.3)	[28.4 - 36.4]		745 (35.6)	[33.1 - 38.2]	119 (29.0)	[23.6 - 35.0]	864 (34.8)	[32.4 - 37.2]	
	Monthly	77 (11.2)	[8.8 - 14.2]	12 (6.3)	[2.8 - 13.4]	89 (10.7)	[8.4 - 13.5]		261 (12.6)	[11.1 - 14.2]	28 (7.7)	[5.0 - 11.7]	289 (11.9)	[10.6 - 13.4]	
	Weekly	67 (7.3)	[5.4 - 9.8]	12 (6.3)	[3.3 - 11.6]	79 (7.2)	[5.4 - 9.5]		334 (14.7)	[13.1 - 16.5]	25 (5.5)	[3.7 - 8.3]	359 (13.5)	[12.1 - 15.1]	

	Daily or almost daily	14 (1.8)	[1.0 - 3.2]	1 (0.1)	[0.01 - 0.7]	15 (1.7)	[1.0 - 2.9]		105 (4.5)	[3.6 - 5.6]	4 (1.3)	[0.4 - 3.8]	109 (4.1)	[3.3 - 5.1]	
Alcohol use disorder	Low risk drinking *	2761 (93.6)	[92.4 - 94.6]	4023 (99.3)	[99.1 - 99.5]	6784 96.5)	[96.0 - 97.0]	<0.001	4002 (78.8)	[77.3 - 80.1]	7026 (97.9)	[97.3 - 98.4]	11028 (87.8)	[87.9 - 89.5]	<0.001
	High risk drinking	250 (6.4)	[5.5 - 7.6]	52 (0.7)	[0.5 - 0.9]	302 (3.5)	[3.0 - 4.0]		1142 (21.2)	[19.9 - 22.67]	149 (2.1)	[1.6 - 2.7]	1291 (11.2)	[10.5 - 12.1]	
*n- number of participants, %- column percentage, CI- Confidence Interval, * - includes non-smokers*															

Table 6: Prevalence (number of users segregated by gender) of reported alcohol use and AUD among young people and adults in PHIA survey data collected in Zambia in 2016 – 2017.

Characteristic	Categories	Young people							Adults						
		Male n (%)	95% CI	Female n (%)	95% CI	Total N (%)	95% CI	P value	Male n (%)	95% CI	Female n (%)	95% CI	Total N (%)	95% CI	P value
Alcohol use frequency	Never	2760 (78.8)	[77.1 - 80.5]	4086 (91.9)	[90.9 - 92.8]	6846 (85.4)	[84.3 - 86.5]	<0.001	2865 (51.3)	[49.6 - 53.0]	6039 (82.9)	[81.7 - 84.0]	8904 (67.6)	[66.4 - 68.7]	<0.001
	Monthly	291 (8.7)	[7.5 - 10.0]	277 (5.9)	[5.3 - 6.7]	568 (7.3)	[6.5 - 8.1]		742 (13.3)	[12.1 - 14.6]	819 (11.0)	[10.2 - 11.9]	1561 (12.1)	[11.4 - 12.9]	
	2-4 times a month	168 (5.3)	[4.4 - 6.4]	66 (1.4)	[1.1 - 1.9]	234 (3.3)	[2.8 - 4.0]		695 (12.2)	[11.2 - 13.2]	233 (3.0)	[2.6 - 3.6]	928 (7.5)	[6.9 - 8.1]	
	2-3 times a week	192 (5.7)	[4.9 - 6.7]	25 (0.5)	[0.3 - 0.9]	217 (3.1)	[2.7 - 3.6]		905 (15.9)	[14.9 - 17.1]	165 (2.2)	[1.9 - 2.6]	1070 (8.9)	[8.3 - 9.5]	
	4 or more times a week	50 (1.5)	[1.1 - 2.0]	11 (0.2)	[0.1 - 0.4]	61 (0.8)	[0.6 - 1.1]		405 (7.3)	[6.5 - 8.2]	64 (0.8)	[0.6 - 1.1]	469 (4.0)	[3.6 - 4.4]	
Alcohol drinks in a day	None or less than 1	306 (41.2)	[37.2 - 45.4]	241 (63.0)	[57.7 - 68.0]	547 (47.3)	[44.0 - 50.7]	<0.001	866 (30.6)	[28.4 - 32.8]	757 (58.8)	[55.6 - 61.9]	1623 (38.2)	[36.5 - 40.0]	<0.001
	1 or 2	205 (29.7)	[26.2 - 33.5]	78 (21.9)	[17.9 - 26.6]	283 (27.5)	[24.6 - 30.7]		921 (33.2)	[31.4 - 35.2]	308 (23.9)	[21.3 - 26.6]	1229 (30.7)	[29.3 - 32.2]	
	3 or 4	104 (15.4)	[12.9 - 18.4]	36 (8.8)	[6.1 - 12.6]	140 (13.6)	[11.5 - 16]		560 (21.1)	[19.4 - 23.0]	136 (10.8)	[9.0 - 12.9]	696 (18.4)	[16.9 - 19.9]	
	5 or 6	52 (8.4)	[6.2 - 11.2]	10 (2.5)	[1.3 - 4.7]	62 (6.7)	[5.1 - 8.9]		225 (8.9)	[7.7 - 10.1]	41 (3.3)	[2.4 - 4.4]	266 (7.3)	[6.4 - 8.4]	
	7 to 9	34 (5.3)	[3.9 - 7.1]	14 (3.8)	[2.2 - 6.6]	48 (4.8)	[3.7 - 6.3]		175 (6.2)	[5.3 - 7.2]	39 (3.2)	[2.3 - 4.4]	214 (5.4)	[4.7 - 6.2]	
Frequency of 6 or more drinks in an occasion	Never	249 (35.1)	[30.9 - 39.7]	176 (46.1)	[41.0 - 51.2]	425 (38.2)	[34.6 - 41.9]	<0.001	748 (26.2)	[24.1 - 28.5]	547 (42.1)	[38.9 - 45.5]	1295 (30.5)	[28.8 - 32.3]	<0.001
	Less than monthly	150 (21.7)	[18.6 - 25.1]	114 (30.4)	[26.0 - 35.2]	264 (24.1)	[21.6 - 26.9]		565 (21.4)	[19.4 - 23.6]	347 (27.3)	[24.5 - 30.4]	912 (23.0)	[21.3 - 24.8]	
	Monthly	140 (19.6)	[16.4 - 23.4]	50 (14.5)	[11.1 - 18.7]	190 (18.2)	[15.6 - 21.1]		520 (18.6)	[16.9 - 20.3]	219 (17.1)	[14.9 - 19.6]	739 (18.2)	[16.9 - 19.5]	
	Weekly	136 (20.1)	[16.8 - 23.8]	32 (7.8)	[5.3 - 11.4]	168 (16.6)	[14.1 - 19.6]		710 (26.4)	[24.5 - 28.4]	131 (10.6)	[9.0 - 12.5]	841 (22.1)	[20.7 - 23.6]	

	Daily or almost daily	26 (3.5)	[2.3 - 5.3]	7 (1.3)	[0.5 - 3.0]	33 (2.9)	[2.0 - 4.2]		204 (7.4)	[6.3 - 8.7]	37 (2.8)	[2.0 - 4.0]	241 (6.2)	[5.4 - 7.1]	
Alcohol use disorder	Low risk drinking *	3078 (88.1)	[86.8 - 89.3]	4311 (96.5)	[95.8 - 97.1]	7389 (92.4)	[91.6 - 93.1]	<0.001	3767 (66.8)	[65.3 - 68.3]	6679 (91.3)	[90.4 - 92.1]	10446 (79.4)	[78.4 - 80.3]	<0.001
	High risk drinking	387 (11.9)	[10.7 - 13.2]	160 (3.5)	[2.9 - 4.2]	547 (7.6)	[6.9 - 8.4]		1858 (33.2)	[31.7 - 34.8]	651 (8.7)	[7.9 - 9.6]	2509 (20.6)	[19.7 - 21.6]	
n- number of participants, %- column percentage, CI- Confidence Interval, * - includes non-smokers															

3.6 Factors associated with 'alcohol use' among young people

'Alcohol use' was related with sex, age and risky sexual behaviors in young people as seen in Table 7. Being male was associated with 'alcohol use' in young people in the three countries as follows, Eswatini (aOR: 4.40; 95% CI: 3.35 – 5.79), Malawi (aOR: 11.34; 95% CI 8.93 – 14.40) and (aOR: 4.270; 95% CI: 3.79 – 4.81) in Zambia. Among the population aged 20 – 24 years old they had 70% higher odds of alcohol use than the ones aged 15 – 19 years old in Eswatini (aOR:1.70; 95% CI: 1.24–2.32) and Zambia 96% had higher odds of alcohol use than the ones aged 15 – 19 years old (aOR:1.96; 95% CI: 1.48–2.59).

Young people with various sexual partners were 11.9 times more at risk to drink alcohol than the young people with no sexual partner (aOR:11.90; 95% CI: 6.76–20.93) in Eswatini, 2.18 (4.14 – 28.41) in Malawi and the results were not statistically significant. Transactional sex was associated with alcohol use among young people in Malawi (aOR:10.84; 95% CI: 4.14–28.41). and Zambia (aOR:1.77; 95% CI: 1.45–2.13). Young people who were widowed or separated were at risk of alcohol use (Table 7).

Table 7: Factors associated with alcohol use among young people in Eswatini, Malawi and Zambia.

YOUNG PEOPLE										
Characteristic	**Categories**	**ESWATINI**			**MALAWI**			**ZAMBIA**		
		N (%)	**aOR (95%CI)**	**P-value**	**N (%)**	**aOR (95%CI)**	**P-value**	**N (%)**	**aOR (95%CI)**	**P-value**
Sex	Female	484 (22.0)	1		544 (12.2)	1		1660 (27.3)	1	
	Male	1497 (78.0)	4.40 (3.35 -5.79)	<0.001	2781 (87.8)	11.34 (8.93 – 14.40)	<0.001	3448 (72.7)	2.81 (2.21 – 3.57)	<0.001
Age	15-19	223 (10.2)	1		258 (7.6)	1		310 (6.3)	1	
	20-24	323 (19.6)	1.70 (1.24-2.32)	0.001	575 (16.4)	1.02 (0.42 – 2.46)	0.961	770 (17.7)	1.96 (1.48 – 2.59)	<0.001
Education	Primary	705 (32.2)	1		1971 (67.1)	1		2321 (42.4)	1	
	Secondary	483 (24.3)	1.31 (0.91-1.88)	0.151	1079 (27.6)	2.85 (0.81 – 9.98)	0.102	2176 (44.1)	1.20 (0.72 – 2.02)	0.485
	Higher	793 (43.5)	1.70 (1.16-2.48)	0.007	275 (5.3)	5.50 (0.75 – 40.30)	0.093	611 (13.5)	1.79 (0.99 – 3.25)	0.055
Marital status	Married	669 (32.5)	1		2119 (68.7)	1		3235 (61.0)	1	
	Never Married	1085 (57.8)	1.57 (0.85-2.89)	0.146	852 (21.9)	2.50 (1.07 – 5.87)	0.035	1233 (27.8)	1.71 (1.14 – 2.57)	0.010
	Widowed/separated	226 (9.7)	4.00 (1.40-11.39)	0.010	353 (9.4)	1.96 (0.63 – 6.07)	0.24	625 (11.3)	1.50 (1.10 – 2.05)	0.011
HIV Status	Negative	1308 (78.6)	1		2077 (90.7)	1		3185 (87.3)	1	
	Positive	387 (21.4)	0.74 (0.40 – 1.35)	0.324	246 (9.3)	1.93 (0.66 – 5.69)	0.231	472 (12.7)	1.49 (1.12 – 1.99)	0.006
TB infection	Never positive	1807 (92.0)	1		3245 (98.2)	1		4922 (96.6)	1	
	Ever positive	172 (8.0)	1.47 (0.46 – 4.76)	0.514	79 (1.8)	1.42 (0.55 – 3.64)	0.463	173 (3.4)	0.96 (0.75 – 1.24)	0.764
Employment status	Employed	980 (51.1)	1		1692 (53.6)	1		2710 (50.4)	1	
	Unemployed	1001 (48.9)	0.78 (0.58 – 1.05)	0.099	1633 (46.4)	2.18 (0.94 – 5.07)	0.071	2398 (49.6)	1.15 (0.92 – 1.42)	0.214
Sexual partners	None (0)	272 (12.7)	1							

	One (1)	1149 (63.1)	5.15 (3.18 – 8.33)	<0.001	1949 (63.7)	1				
	2 or more	431 (24.2)	11.90 (6.76 – 20.93)	<0.001	789 (24.0)	2.18 (0.95 – 4.96)	0.064			
Transactional sex	No	1841 (97.0)	1		1963 (73.6)	1		3634 (81.2)	1	
	Yes	55 (3.0)	2.38 (0.55 – 14.85)	0.209	775 (26.4)	10.84 (4.14 – 28.41)	<0.001	762 (18.8)	1.77 (1.45 – 2.13)	<0.001

N- total number of participant in each row category, % - row percentage , aOR – adjusted Odds Ratio

3.7 Factors associated with 'alcohol use' among adults

The male gender was also observed to be positively related to use of alcohol among adults in the three countries as follows, Eswatini (aOR: 4.62; 95% CI: 3.87 – 5.55), Malawi (aOR: 9.83 95% CI 8.01 – 12.05) and (aOR: 4.27; 95% CI: 3.79 – 4.81) in Zambia. Generally, widowed or separated adults had higher odds of alcohol use than the married adults in Eswatini 96% (aOR: 1.93; 95% CI: 1.52 – 2.45), in Malawi 136% (aOR: 2.36; 95% CI: 1.80 – 3.09) and in Zambia 50% (aOR: 1.50; 95% CI: 1.11 – 2.09). Alcohol use among the adult population was significantly (p = 0.001) dependent on transactional sexual intercourse (aOR: 2.58; 95% CI: 1.45 – 4.58) in Eswatini, Malawi and Zambia respectively (aOR: 1.77 (1.45 – 2.13) (aOR: 1.81; 95% CI: 1.06 – 3.10). The results were statistically significant in Malawi and Zambia (Table 9).

An HIV positive status was significantly associated with AU in Zambia (aOR: 1.51; 95% CI: 1.14 – 2.01).

Table 8: Factors associated with alcohol use among adults in Eswatini, Malawi and Zambia.

ADULTS										
Characteristic	**Categories**	**ESWATINI**			**MALAWI**			**ZAMBIA**		
		N (%)	**aOR (95% CI)**	**P-value**	**N (%)**	**aOR (95% CI)**	**P-value**	**N (%)**	**aOR (95%CI)**	**P-value**
Sex	Female	484 (22.0)	1		544 (12.2)	1		1660 (27.3)	1	
	Male	1497 (78.0)	4.62 (3.87 – 5.55)	<0.001	2781 (87.8)	9.83 (8.01 – 12.05)	<0.001	3448 (72.7)	4.27 (3.79 – 4.81)	<0.001
Age	50+	223 (10.2)			258 (7.6)	1		310 (6.3)	1	
	25 – 49	323 (19.6)	0.88 (0.73 – 1.07)	0.201	575 (16.4)	0.92 (0.75 – 1.12)	0.412	770 (17.7)	0.77 (0.57 – 1.04)	0.089
Education	Primary	705 (32.2)	1		1971 (67.1)	1		2321 (42.4)	1	
	Secondary	483 (24.3)	0.84 (0.69 - 1.02)	0.114	1079 (27.6)	0.75 (0.55 – 1.03)	0.073	2176 (44.1)	1.22 (0.73 - 2.05)	0.485
	Higher	793 (43.5)	0.88 (0.73 - 1.05)	0.202	275 (5.3)	0.95 (0.62 – 1.45)	0.798	611 (13.5)	1.83 (1.01 - 3.32)	0.055
Marital status	Married	669 (32.5)	1		2119 (68.7)	1		3235 (61.0)	1	
	Never Married	1085 (57.8)	2.05 (1.70 - 2.48)	<0.001	852 (21.9)	1.25 (0.87 – 1.79)	0.221	1233 (27.8)	1.68 (1.12 - 2.54)	0.01
	Widowed/separated	226 (9.7)	1.93 (1.52 - 2.45)	<0.001	353 (9.4)	2.36 (1.80 – 3.09)	<0.001	625 (11.3)	1.53 (1.11 - 2.09)	0.011
HIV Status	Negative	1308 (78.6)	1		2077 (90.7)	1		3185 (87.3)	1	
	Positive	387 (21.4)	0.84 (0.70 - 1.01)	0.092	246 (9.3)	0.90 (0.71 – 1.13)	0.364	472 (12.7)	1.51 (1.14 - 2.01)	0.006
TB infection	Never positive	1807 (92.0)	1		3245 (98.2)	1		4922 (96.6)	1	
	Ever positive	172 (8.0)	1.17 (0.92 - 1.49)	0.25	79 (1.8)	0.86 (0.54 – 1.37)	0.521	173 (3.4)	0.89 (0.56 - 1.42)	0.764
Employment status	Employed	980 (51.1)	1		1692 (53.6)	1		2710 (50.4)	1	
	Unemployed	1001 (48.9)	0.92 (0.77 - 1.10)	0.283	1633 (46.4)	1.19 (1.01 – 1.41)	0.039	2398 (49.6)	1.15 (0.93 - 1.42)	0.214
Sexual partners	None (0)	272 (12.7)	1							
	One (1)	1149 (63.1)	1.36 (1.08 - 1.71)	0.005	1949 (63.7)	1				

	2 or more	431 (24.2)	2.45 (1.84 - 3.26)	<0.001	789 (24.0)	1.42 (1.17 – 1.74)	0.001			
	No	1841 (97.0)	1		1963 (73.6)	1		3634 (81.2)	1	
Transactional sex	Yes	55 (3.0)	2.58 (1.45 - 4.58)	0.001	775 (26.4)	1.77 (1.45 – 2.13)	<0.001	762 (18.8)	1.81 (1.06 - 3.10)	0.046
N- total number of participant in each row category, % - row percentage , aOR – adjusted Odds Ratio										

3.8 Factors associated with AUD among young people

From the study, being male was positively associated with alcohol use disorder in all three countries (p =<0.001): (aOR: 3.47, 95% CI 2.47 – 4.89) in Eswatini, (aOR:10.0; 95% CI: 6.87–14.53) in Malawi as well as Zambia (aOR:3.88; 95% CI: 3.31–4.53). The population aged 20 – 24 years old had 68% higher odds of having alcohol use disorder than the ones aged 15 – 19 years old (aOR:1.68; 95% CI: 1.14–2.48) in Eswatini and 96% higher odds of having 'alcohol use disorder' in Zambia (aOR:1.96; 95% CI: 1.34–2.85).

Young people with 2 or more sexual partners were 6.79 times at risk have 'alcohol use disorder' than the younger people with only one sexual partner (aOR:6.79; 95% CI: 0.41–12.90) in Eswatini, with 4.10 times more possible to have alcohol use disorder in Malawi and 4.10 times more likely to have alcohol use disorder in Zambia. This relationship was statistically significant (p = 0.018) in Eswatini and Malawi (p = 0.018) but not significant in Zambia (p = 0.077). Alcohol use disorder among young people was significantly associated with transactional sex respectively in the three countries (aOR: 5.93; 95% CI: 1.05 – 33.55), (aOR: 7.71; 95% CI: 1.73–34.43), (aOR:1.64; 95% CI: 1.13–2.37) and all results were statistically significant (p =<0.005). Being widowed or separated had a significant relationship with AUD in Malawi (aOR:0.19; 95% CI: 0.04–0.95) and Zambia (aOR:0.56; 95% CI: 0.31–0.99). HIV positive status was significantly related to AUD in Malawi (aOR:4.67; 95% CI: 1.59–13.78). In Zambia, unemployment was associated with high risk drinking (aOR:2.16; 95% CI: 1.64–2.85).

Table 9: Factors (adjusted Odds Ratio) associated with alcohol use disorder among young people in Eswatini, Malawi and Zambia.

YOUNG PEOPLE										
Characteristic	**Categories**	**ESWATINI**			**MALAWI**			**ZAMBIA**		
		N (%)	**aOR (95%CI)**	**P-value**	**N (%)**	**aOR (95%CI)**	**P-value**	**N (%)**	**aOR (95%CI)**	**P-value**
Sex	Female	301 (23.6)	1		201 (9.7)	1		811 (6.6)	1	
	Male	842 (76.4)	3.47 (2.47 – 4.89)	<0.001	1392 (90.3)	10.0 (6.87 – 14.53)	<0.001	2245 (24.4)	3.23 (2.41 – 4.32)	<0.001
Age	15-19	83 (6.7)	1		64 (3.2)	1		131 (4.6)	1	
	20-24	182 (19.5)	1.68 (1.14 – 2.48)	0.009	238 (13.2)	0.94 (0.21 – 4.13)	0.933	416 (16.1)	1.96 (1.34 – 2.85)	0.001
Education	Primary	424 (33.0)	1		888 (64.2)	1		1340 (40.8)	1	-
	Secondary	267 (23.6)	3.92 (0.56 – 27.28)	0.166	540 (28.7)	1.08 (0.20 – 5.72)	0.932	1320 (44.4)	0.93 (0.31 – 2.81)	0.898
	Higher	452 (43.4)	2.44 (0.35 – 16.89)	0.364	165 (7.1)	2.32 (0.17 – 31.66)	0.527	396 (14.8)	2.24 (0.67 – 7.45)	0.188
Marital status	Married	145 (10.7)	1		186 (10.0)	1		350 (10.5)	1	
	Never Married	605 (56.6)	0.95 (0.32 – 2.84)	0.925	371 (18.0)	1.39 (0.23 – 8.58)	0.721	715 (27.2)	0.79 (0.42 – 1.51)	0.479
	Widowed/separated	393 (32,7)	0.19 (0.04 – 0.95)	0.043	1035 (72.0)	0.25 (0.05 – 1.22)	0.087	1981 (62.3)	0.56 (0.31 – 0.99)	0.047
HIV Status	Negative	752 (77.8)	1		1008 (91.4)	1		1958 (87.9)	1	
	Positive	233 (22.2)	0.92 (0.41 – 2.06)	0.846	112 (8.6)	4.67 (1.59 – 13.78)	0.005	273 (12.1)	1.42 (0.57 – 3.54)	0.449
TB infection	Never positive	1046 (92.2)	1		1552 (98.0)	1				
	Ever positive	96 (7.8)	3.38 (0.71 – 16.07)	0.124	41 (2.0)	2.00 (0.50 – 7.81)	0.33			
Employment status	Employed	576 (52.2)	1		738 (50.1)	1		1509 (46.9)	1	
	Unemployed	567 (47.8)	0.48 (0.14 – 1.62)	0.232	855 (49.9)	2.16 (0.52 – 8.90)	0.285	1547 (53.1)	2.16 (1.64 – 2.85)	<0.001
Physical violence	Twice/more	21 (15.6)	1		18 (13.2)	1				

	Once	132 (5.6)	0.33 (0.09 – 1.28)	0.108	118 (86.8)	2.15 (0.88 – 5.28)	0.094			
Sexual partners	None (0)	148 (11.4)	1					516 (19.1)	1	
	One (1)	685 (63.7)	1.08 (0.10 – 12.17)	0.948	922 (63.2)	1		1821 (63.4)	1.29 (0.90 – 1.84)	0.163
	2 or more	265 (24.9)	6.79 (0.41 – 12.90)	0.18	449 (26.3)	4.10 (1.28 – 13.10)	0.018	469 (17.5)	1.54 (0.95 – 2.48)	0.077
Transactional sex	No	1082 (96.6)	1		910 (69.1)	1		2092 (77.5)	1	
	Yes	37 (3.4)	5.93 (1.05 – 33.55)	0.044	461 (30.9)	7.71 (1.73 – 34.43)	0.008	557 (22.5)	1.64 (1.13 – 2.37)	0.009

N- total number of participant in each row category, % - row percentage , aOR – adjusted Odds Ratio

3.9 Factors associated with AUD among adults

Being male is positively correlated with 'alcohol use disorder' in the countries examined respectively (aOR: 3.24 95% CI: 1.56 – 6.73), (aOR:10.0; 95% CI: 6.87–14.53) and (aOR:3.88; 95% CI: 3.31–4.53) and were statistically significant in Eswatini and Zambia but not significant in Malawi (p =<0.608). Married status in adults had 0.59 times higher odds of alcohol use disorder than the widowed/separated adults (aOR: 0.59; 95% CI: 0.14 – 2.49) in Eswatini, had 12% higher odds of in Malawi (aOR: 1.12; 95% CI: 0.26 – 4.87) and 0.66 times higher odds in Zambia (aOR: 0.66; 95% CI: 0.54 – 0.81). The results of the study divulged that 'alcohol use disorder' among adults in Zambia (aOR:2.06; 95% CI: 1.72–2.46) was notably dependent on transactional sex as well as in Eswatini (aOR: 13.64 95% CI: 1.63 – 114.19), (Table 10).

Table 10: Factors associated with alcohol use disorder among adults who participated in PHIA survey in Eswatini, Malawi and Zambia, 2016 -2017.

Characteristic	Categories	ESWATINI			MALAWI			ZAMBIA		
		N (%)	aOR (95%CI)	P-value	N (%)	aOR (95%CI)	P-value	N (%)	aOR (95%CI)	P-value
Sex	Female	301 (23.6)	1		201 (9.7)	1		811 (6.6)		
	Male	842 (76.4)	3.24 (1.56 – 6.73)	0.002	1392 (90.3)	1.46 (0.35 – 6.13)	0.608	2245 (24.4)	3.88 (3.31 – 4.53)	<0.001
Age	25-49	83 (6.7)	1		64 (3.2)	1		131 (4.6)	1	
	50+	182 (19.5)	0.23 (0.07 – 0.82)	0.024	238 (13.2)	0.86 (0.38-4.52)	0.828	416 (16.1)	1.11 (0.91 – 1.35)	0.32
Education	Primary	424 (33.0)	1		888 (64.2)	1		1340 (40.8)	1	
	Secondary	267 (23.6)	0.27 (0.06 – 1.12)	0.071	540 (28.7)	0.67 (0.02 – 18.64)	0.812	1320 (44.4)	1.39 (0.91 – 2.13)	0.124
	Higher	452 (43.4)	0.40 (0.12 – 1.31)	0.129	165 (7.1)	1.03 (0.03 – 40.08)	0.987	396 (14.8)	1.42 (0.91 – 2.20)	0.121
Marital status	Married	145 (10.7)	1		186 (10.0)	1		350 (10.5)	1	
	Never Married	605 (56.6)	1.94 (0.37 – 10.13)	0.431	371 (18.0)	5.19 (0.60 – 45.10)	0.135	715 (27.2)	1.14 (0.88 – 1.49)	0.313
	Widowed/separated	393 (32.7)	0.59 (0.14 – 2.49)	0.468	1035 (72.0)	1.12 (0.26 – 4.87)	0.882	1981 (62.3)	0.66 (0.54 – 0.81)	<0.001
HIV Status	Negative	752 (77.8)	1		1008 (91.4)	1		1958 (87.9)	1	
	Positive	233 (22.2)	0.77 (0.38 – 1.56)	0.463	112 (8.6)	1.08 (0.54 – 2.15)	0.827	273 (12.1)	1.17 (0.95 1.42)	0.133
TB infection	Never positive	1046 (92.2)	1		1552 (98.0)	1				
	Ever positive	96 (7.8)	0.35 (0.12 – 1.04)	0.06	41 (2.0)	0.40 (0.10 – 1.58)	0.19			
Employment status	Employed	576 (52.2)	1		738 (50.1)	1		1509 (46.9)	1	
	Unemployed	567 (47.8)	0.67 (0.28 – 1.64)	0.38	855 (49.9)	3.86 (1.30 – 11.44)	0.015	1547 (53.1)	1.16 (1.00 – 1.35)	0.54

Physical violence	Twice/more	21 (15.6)	1		18 (13.2)	1				
	Once	132 (5.6)	0.22 (0.06 – 0.79)	0.021	118 (86.8)	1.69 (0.83 – 3.42)	0.146			
Sexual partners	None (0)	148 (11.4)	1					516 (19.1)	1	
	One (1)	685 (63.7)	1.86 (0.27 – 12.91)	0.526	922 (63.2)	1		1821 (63.4)	1.22 (1.00 – 1.49)	0.055
	2 or more	265 (24.9)	13.42 (1.92 – 93.80)	0.009	449 (26.3)	3.06 (0.97 – 9.65)	0.056	469 (17.5)	1.73 (1.35 – 2.21)	<0.001
Transactional sex	No	1082 (96.6)	1		910 (69.1)	1		2092 (77.5)	1	
	Yes	37 (3.4)	13.64 (1.63 – 114.19)	0.016	461 (30.9)	0.90 (0.35 – 2.34)	0.833	557 (22.5)	2.06 (1.72 – 2.46)	<0.001
N- total number of participant in each row category, % - row percentage, aOR – adjusted Odds Ratio										

CHAPTER 4
DISCUSSION

4.1 Introduction

The section will deliberate on the interpretation of the study findings. The meaning of the results of the study in the context of the existing literature will be further be discussed in this chapter.

4.2 Summary of the findings

Alcohol use and AUD prevalence are a cause for concern in the three countries. It emanated from this study that alcohol use and AUD prevalence are relatively high in Eswatini, Malawi and Zambia which is problematic for both health and socioeconomic reasons. The main finding in this study is that there is less AU and AUDs in Malawi compared to the other 2 countries. The prevalence of AU in young people and adults was 17.9% and 23.3% in Eswatini, 10.9% and 22.1% in Malawi, and 14.6% and 32.4% in Zambia. The prevalence of AUD in young people and adults was 9.1% and 14.2% in Eswatini, 3.5% and 11.2% in Malawi, and 7.6% and 20.6% in Zambia. There are a number of factors (sex, marital status, age, level of education, HIV status, socio economic status and sexual behavior) which are associated with AU and AUD.

4.3 'Alcohol use' prevalence

The prevalence of 'alcohol use' in Eswatini was higher among young people while in Zambia it was high among adults. Compared with the different age groups, the prevalence was 10.9 –17.9% for young people and 22.1 – 32.4% adults in the two countries respectively. These numbers were not only higher when compared with other in-country numbers for the different age groups but were also higher compared to the numbers from the other participating countries. It should however be noted that Eswatini population is largely youthful hence the utmost count of young people who had never indulged in any alcoholic beverage is comparable to that of Malawi and Zambia. Meanwhile, in Zambia, there were more adults who had never drank alcohol in their lifetime than those who did but comparing this ratio top that of the other countries, it emanated that more Zambians engaged in alcohol use. It was however common that there were more adults who have never indulged in any alcoholic beverage than those who have in all countries in the study.

4.4 Factors associated with alcohol use

This research pointed out many factors which could be linked to alcohol use in the three countries. These factors are common to both the younger and older persons. They include, age group, gender, education level, marital status, HIV status, ART adherence, the number sexual partners, payment for sex, employment status and physical violence.

4.4.1 Age group

From this study, it emanated that the youth aged between 20 – 24 years old in Eswatini had higher odds of alcohol use than those aged between 15 – 19 years. However, this is contrary to findings of a demographical study in Norway which showed that, on the average, a typical frequent drinker was younger in age with more years of education compared to the non-frequent drinker (Tevik et al., 2019). Such disparities could be of interest for further research to ascertain if the age differences may be due to younger people having less money to spend on alcohol or alcohol being less accessible to younger persons.

4.4.2 Gender

Our results showed that males were more positively associated with alcohol use compared to the females among young people in all three countries. This was further supported by the positive association of alcohol use among young people which was statistically significant in three countries with that of Eswatini being 4.4 times higher than that of Malawi and Zambia. This finding is in contrary to findings from the descriptive-analytical study conducted in Canada in school going learners enrolled in a study among Canadian youth which found that boys were less prone to alcohol consumption when compared to girls (OR = 0.87, 95% CI: 0.86– 0.88) (Holligan et al., 2020). In addition, the findings from this study are in congruence with those from a cross sectional study conducted in northern Tanzania which found that the prevalence of reported 'alcohol use' was inflated in males compared to females (Francis, Helander, Kapiga, Weiss, & Grosskurth, 2015). Moreover, (Quispe Fernandez et al., 2019) posit that drinking alcohol by university students depends predominantly on the subject's gender where the prevalence is higher for males than females which was also supported by findings from this study. Furthermore, it emanated, from this study, that adult males were positively associated with alcohol use than the females. This was common for all three countries participating in the study.

4.4.3 Education

Higher education was associated with AU among young people of Eswatini. This translates to the more young people get educated at tertiary level of education the increased the rate of drinking alcohol. Individual socioeconomic status, measured by high vs low education, and country-level economic development (high vs low Gross Domestic Product) among women was strongly associated with alcohol use. More highly educated women in lower-income countries were the most likely to engage in heavy episodic drinking (Wilsnack, 2012).

4.4.4 Employment status

In Zambia, unemployment was associated with high risk drinking (aOR:2.16; 95% CI: 1.64–2.85). There might be plenty of time for the unemployed individuals in Zambia to engage in hazardous drinking although further research needs to be conducted to establish the source of income. In high income countries with mothers who

engage in paid labor drank less alcohol than partnered mothers working for pay in countries with lower income (Morojele et al., 2021).

4.4.5 TB infection

There seem to be minimal evidence from this study of any relationship between TB and AU or AUD which is contrary to literature. Significant association of TB and AU or AUD was not identified from both groups. The WHO Global TB Report (2020) estimates that one-third of the global population is latently infected. Alcohol use is among the top modifiable risk factors for tuberculosis, with AUDs prevalent in 30% of patients with TB and 11.4% of TB mortality attributable to alcohol. Alcohol use is well established as a risk factor for incident TB, responsible for 17% of incident TB globally and poor TB outcomes overall (Morojele et al., 2021).

4.4.6 Marital Status

From this study it emanated that widowed or separated adults had higher odds of alcohol use than married adults. This was more prevalent in Malawi with some evidence also from Eswatini. This was consistence with results of a hospital based cross-sectional study conducted in Ghanaian women of childbearing age which also found marital and occupational status to be associated with the consumption alcoholic drinks. It posited that being single is one of the factors linked with 'alcohol use' in low- and middle-income countries (Emilia et al, 2014). There is an area of future research on why might single people drink more, if it is more freedom or being lonely.

4.4.7 Transactional sex and multiple sexual partners

This study identified transactional sex and having multiple sexual partners as independently significantly associated with alcohol use. This is evident from data analysis from both Malawi and Zambia which showed that alcohol use among the adult population was significantly dependent on transactional sex. This finding supports that found from a cross sectional study conducted among Malawian defense force personnel which also showed that transactional sex and having multiple sexual partners were associated with alcohol use. From that study, the adjusted odds of participating in sex trade were higher for men with an AUDIT score ≥ 8 than those with an AUDIT score of less than 7. Participants with several sexual partners were higher in men with an AUDIT score ≥ 8 than those with an AUDIT score less than 7 (Tran et al 2018).

4.4.8 HIV Status

The study revealed that young HIV positive Malawians were remarkably connected to 'alcohol use' with a ratio of 4.67 times than those who are negative. This could be a health concern as this could affect their adherence to ART. This investigation is in harmony with a meta-analysis study in HIV infected African population which concluded the linkages of being a male and an increased risk of AUD in HIV patients which was communicated in several studies. In the meta-analysis, HIV infected male patients on ART were 5.5 times increased chances of having 'alcohol use disorder' than their female counterparts (Necho et al., 2020).

4.5 AUD prevalence

This investigation identified the 'alcohol use disorder' prevalence as the highest among the youth in Eswatini. The prevalence of AUD among adults in Zambia was very high, at 20.6% which is almost double for Malawi. Comparing with the different age groups in Eswatini, the prevalence of AUD was 3.5 –9.1% for young people.

This was higher even when compared to the similar cohort in the other countries which participated in the study. Meanwhile, the prevalence of AUD was found to be higher across the three countries. In comparison to the other in country age groups the AUD prevalence was found to be 11.2 – 20.6% among adults in Zambia. It was also found to be higher when compared to similar cohort in Eswatini and Malawi. The pattern of the high prevalence of AU and AUD is consistent for young people in Eswatini. This pattern was also coherent with the findings of AU and AUD among Zambian adults.

Moreover, it was revealed that more Swazi males were involved in high-risk drinking. This was observation was consistent for both young and adult men as shown by the higher numbers on comparison, 12.7% and 21.7% respectively. Though (Moure-Rodriguez et al., 2018) argues that the prevalence of binge drinking might have been underestimated in women, this study finding is supported by other studies. In support to these findings (Holligan et al., 2020) argue that the rates of alcoholic beverages consumption have always been lower in women than in men. This finding is in congruence with all the other studies reviewed during the course of this study where all of them show that alcohol use and 'alcohol use disorder' has always been found to be lower in women than men.

4.6 Factors associated with AUD prevalence

This study identified some factors which may be said to be significant predictors of AUD in the three countries. These include age group (20 – 24 years old), gender, educational level, HIV status, transactional sex and multiple sexual partners. These factors are intertwined and affect each other in different ways as will be shown in the discussion below.

4.6.1 Age group

It emanated that AUD prevalence was the largest in Eswatini among young people, that is, people between the ages 20 – 24 years old. This supports findings from (Dorji et al., 2020) who argue that the prevalence of current alcohol use disorder was 19.4% in students attending a few colleges in Bhutan during the year 2019. This is in congruence with findings from this study in which it was found that there were more young people who drink at least one or two drinks daily in Eswatini. Furthermore, it was interesting to note that the age group of 20 – 24-year-olds had higher odds of having alcohol use disorder than those aged 15 – 19 years old. Though Eswatini had slightly higher numbers but this was true for Zambia as well. Analysis further revealed that Zambian adults showed the highest risk drinking than their counterparts in the two other countries. Though Eswatini and Malawi

showed lesser risk drinking than Zambia, but all countries generally showed a high risk drinking which higher for adults than young people than the annual average prevalence of AUD in South Africa, Nigeria and Uganda, which was 22.03% (95% CI: 17.18, 28.67) in 2020 (Necho et al., 2020).

4.6.2 Gender

Furthermore, it emanated from the study that young Swazi males had a higher risk drinking prevalence and were closely followed by their Zambian counterparts. Analysis further revealed that AUD was more prevalent among men in adults across the three countries. Moreover, this study revealed that male gender is positively associated with alcohol use disorder in all three countries as supported by the range of 3.47 – 10 times higher among adults. This result is congruent with the outcome from the analytical-descriptive study that was done among Canadian high school going students which showed that males were more likely to experience binge drinking (OR = 1.02, 95% CI:
1.00–1.03) (Holligan et al., 2020). This was further supported by findings from a demographic cross-sectional research explored in the Brazilian Federal District which posited that being male was displayed a robust connection with abusive consumption of alcoholic beverages. (Dos Anjos et al., 2021).

4.6.3 Marital status

This study showed that unmarried adults in Malawi had elevated odds of alcohol use disorder than their counterparts in Eswatini and Zambia where the association was less significant. This is in congruence with findings from a cross sectional study on the risks for ‘alcohol use’ in pregnant women in the United States in 2002 to 2017 which revealed that the risk for binge drinking in all pregnant women was seriously linked to being unmarried. It showed that women who were not married were associated with binge drinking. Furthermore, it revealed that the risk of alcohol use increased with those who had previously been married and those who had never married women when compared with the currently married (Shmulewitz & Hasin, 2019).

4.6.4 Number of sexual partners and Transactional sex

This study revealed that young people with multiple sexual partners were more prone to use alcohol than the young people with a single sexual partner though it was uncommon to drink more than six glasses per day. This finding supports the findings of the study which looked into the socioecological influences on hazardous ‘alcohol use’ among female sex workers in Malawi which revealed that the association of engagement of sex work for more than 2 years with excessive alcohol use where the adjusted prevalence ratio was 1.30, 95% CI: 1.02, 1.65 (Lancaster et al., 2016). Moreover, this study posits that alcohol use disorder among young people was significantly dependent on transactional sex respectively in all three countries.

4.5 Strengths and limitations of the study

The study sample was large. The representative of the sample resulted in generalization of findings to the population of Eswatini, Malawi and Zambia within all study sub age groups, that is, young people and adults. The study limitation is the cross-sectional design in nature which impede causal inference of the pointers related

to ‘alcohol use and AUD’ where the predictor and outcome variables were assessed concurrently. This study is also prone to recall bias and social desirability as the alcohol use data collected was self-reported. The direction of the associations cannot be confirmed as the assessment of the relationship between the exposures and outcomes was done simultaneously. There is missing data limitation because 9% and 27% of respondents in the 3 countries did not respond to the alcohol frequency question. Furthermore, there might be biases against women reporting alcohol use in Africa which could have affected the findings. Another limitation is the use of a 3 -item screening questionnaire (AUDIT-C) to assess AUD. This needs to be corroborated by further research using more valid tools to assess AUD such as the CIDI. With regard to further research, more longitudinal research needs to be conducted to assess the limitation of directionality.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter summarizes the evidence generated by the study and the possible action plan based on the findings.

5.2 Conclusion

Alcohol use is especially prevalent in young people in Eswatini and adults in Zambia and it is associated with being male, age group 20 – 24 years old, educational level (higher), HIV status, transactional sex and multiple sexual partners, being widowed or separated and HIV status. Moreover, alcohol use disorder is also prevailing with Swazi young people and Zambian adults. AUD is associated with are being male, age group 20 – 24 years old, multiple partners, HIV status, employment status, widowed/separated and transactional sex. Our study concludes that alcohol use and AUD is linked to several socio-demographic and behavioral adverse effects factors which may be manageable through certain interventions. Noteworthy is that alcohol use and AUD are denoting public health threats in Eswatini and Zambia, especially with young people and adults respectively.

This study contributes to the body of literature by more up-to-date information on AU and AUD in these three countries. It also highlights potentially very high levels of AUD in Zambia and the associate risk factors some of which are more open to intervention than others.

5.3 Recommendations

There is an urgent need of public health measures to curb alcohol use and AUD among these sub populations. The cost-effective interventions that can be undertaken for the high alcohol use prevalence among young people may include medical advice from primary care workers, alcohol advertisement bans especially in social media platforms. At primary health care, young people and adults may require alcohol use screening to ascertain the risk of developing AUD. Interventions to be implemented to address the hazardous drinking may entail taxation regulation of alcoholic drinks and legislation changes targeting areas dominated by males. In the areas where alcohol use and AUD is prevalent, taxation of alcoholic drinks need to increase and access to alcohol by young people should be prohibited.

In this study, there is a powerful relationship between ‘alcohol use’ and sexual behaviours hence there should be more rigorous implementation of activities to alleviate alcohol harms as well as alcohol-HIV nexus mitigation.

Recommendation for further research on why AUD is so high in Zambia and the importance to verify the findings of such high levels of AUD in Zambia by doing further epidemiologic research using more comprehensive diagnostic instruments.

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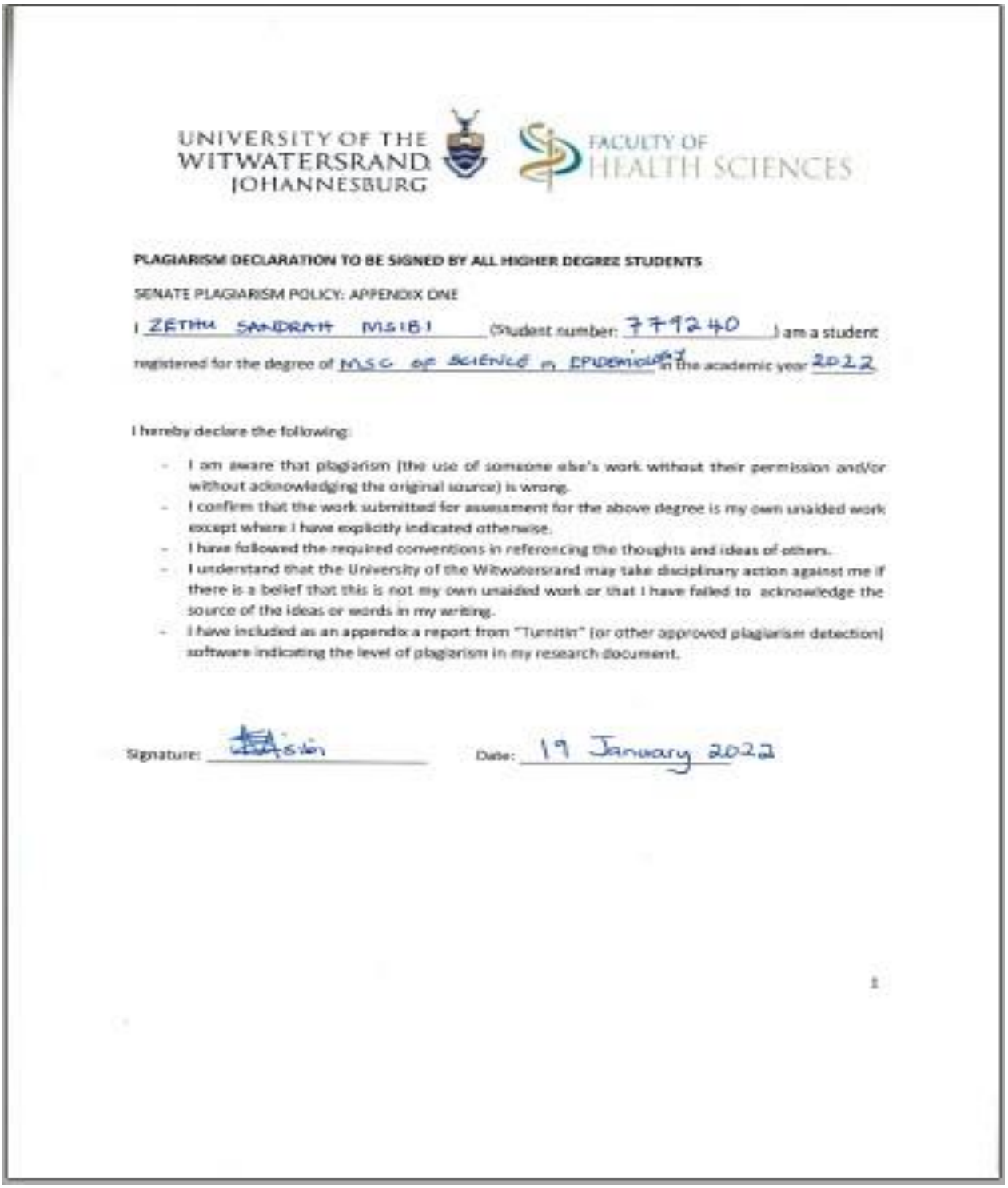
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APPENDICES

Appendix 1: Plagiarism declaration



UNIVERSITY OF THE WITWATERSRAND JOHANNESBURG

FACULTY OF HEALTH SCIENCES

PLAGIARISM DECLARATION TO BE SIGNED BY ALL HIGHER DEGREE STUDENTS

SENATE PLAGIARISM POLICY: APPENDIX ONE

I ZETHU SANDRAH MSIBI (Student number: 779240) am a student registered for the degree of MSC OF SCIENCE IN EPIDEMIOLOGY in the academic year 2022

I hereby declare the following:

- I am aware that plagiarism (the use of someone else's work without their permission and/or without acknowledging the original source) is wrong.
- I confirm that the work submitted for assessment for the above degree is my own unaided work except where I have explicitly indicated otherwise.
- I have followed the required conventions in referencing the thoughts and ideas of others.
- I understand that the University of the Witwatersrand may take disciplinary action against me if there is a belief that this is not my own unaided work or that I have failed to acknowledge the source of the ideas or words in my writing.
- I have included as an appendix a report from "Turnitin" (or other approved plagiarism detection) software indicating the level of plagiarism in my research document.

Signature: [signature] Date: 19 January 2022

1

Appendix 2: Ethics clearance letter

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

Office of the Deputy Vice-Chancellor (Research and Postgraduate Affairs

TO: Ms ZS Msibi and Dr J Kagura
School of Public Health
Division of Epidemiology and Biostatistics
Medical School
University

E-mail: zethumsibi@yahoo.com

CC: Supervisor: Dr J Francis
<Joel.Francis@wits.ac.za>
and <HREC-Medical Research Office@wits.ac.za>

FROM: Mr Iain Burns
Human Research Ethics Committee (Medical)
Tel: 011 717 1252

E-mail: Iain.Burns@wits.ac.za

DATE: 2020/12/22

REF: R14/49

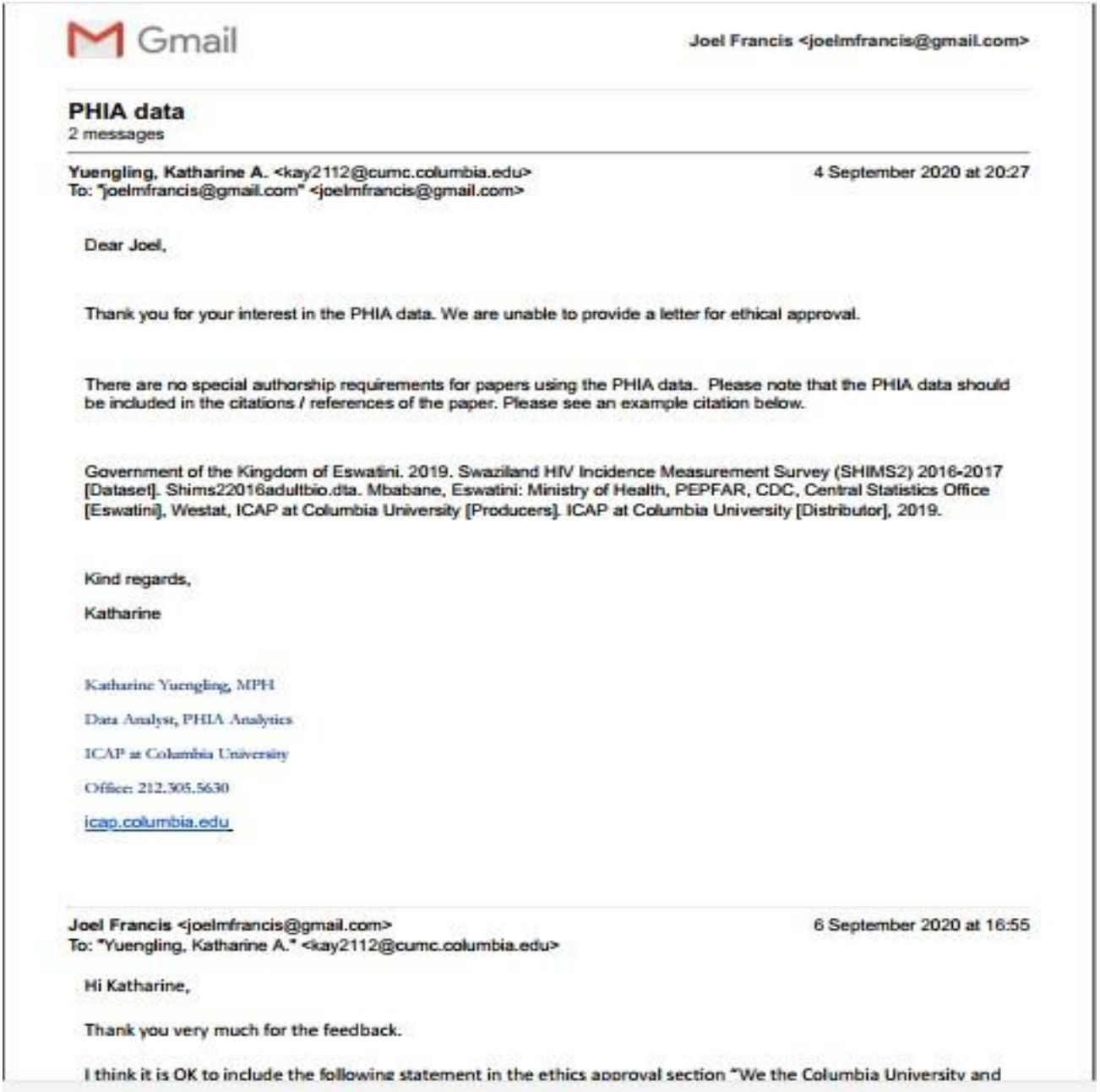
PROTOCOL NO: **M201196** (This is your ethics application reference number. Please quote it in all enquiries, oral or written, relating to this study.)

PROJECT TITLE: The prevalence and correlates of alcohol use and alcohol use disorders amongst young people (15–24 years) and adults in Eswatini, Malawi and Zambia

Please find attached the Clearance Certificate for the above project. I hope it goes well and that an article in a recognized publication comes out of it. This will reflect well on your professional standing and contribute to Government funding of the University.

MSWorks2000/Iain0007/Clearscan.wps

Appendix 3: Data permission letter



Gmail — Joel Francis <joelmfrancis@gmail.com>

PHIA data
2 messages

Yuengling, Katharine A. <kay2112@cumc.columbia.edu> — 4 September 2020 at 20:27
To: "joelmfrancis@gmail.com" <joelmfrancis@gmail.com>

Dear Joel,

Thank you for your interest in the PHIA data. We are unable to provide a letter for ethical approval.

There are no special authorship requirements for papers using the PHIA data. Please note that the PHIA data should be included in the citations / references of the paper. Please see an example citation below.

Government of the Kingdom of Eswatini. 2019. Swaziland HIV Incidence Measurement Survey (SHIMS2) 2016-2017 [Dataset]. Shims22016adultbio.dta. Mbabane, Eswatini: Ministry of Health, PEPFAR, CDC, Central Statistics Office [Eswatini], Westat, ICAP at Columbia University [Producers]. ICAP at Columbia University [Distributor], 2019.

Kind regards,

Katharine

Katharine Yuengling, MPH

Data Analyst, PHIA Analytics

ICAP at Columbia University

Office: 212.305.5630

icap.columbia.edu

Joel Francis <joelmfrancis@gmail.com> — 6 September 2020 at 16:55
To: "Yuengling, Katharine A." <kay2112@cumc.columbia.edu>

Hi Katharine,

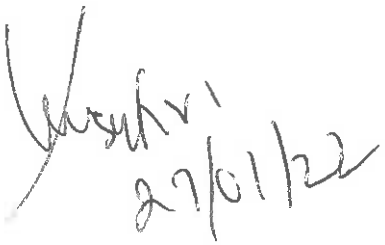
Thank you very much for the feedback.

I think it is OK to include the following statement in the ethics approval section "We the Columbia University and

Appendix 4: Turnitin Report

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by Zethu Msibi



Submission date: 26-Jan-2022 05:46PM (UTC+0200)
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Appendix 5: questionnaire

MTITLE	MODULE 10: ALCOHOL USE
INSTR	The next few questions will be on your use of alcohol. Remember, all the answers you provide will be kept confidential.

NO.	VARIABLE	QUESTIONS	CODING LABELS	CODING VALUES	SKIP PATTERNS	SKIP TO
1001	alcfreq	How often do you have a drink containing alcohol?	NEVER	0	IF 1001 = 0,-8,-9	1101
			MONTHLY OR LESS	1		
			2-4 TIMES A MONTH	2		
			2-3 TIMES A WEEK	3		
			4 OR MORE TIMES A WEEK	4		
			DON'T KNOW	-8		
			REFUSED	-9		
1002	alcnumday	How many drinks containing alcohol do you have on a typical day?	1 OR 2	0		
			3 OR 4	1		
			5 OR 6	2		
			7 TO 9	3		
			10 OR MORE	4		
			DON'T KNOW	-8		
			REFUSED	-9		
1003	alcsixmore	How often do you have six or more drinks on one occasion?	NEVER	0		
			LESS THAN MONTHLY	1		
			MONTHLY	2		
			WEEKLY	3		
			DAILY OR ALMOST DAILY	4		
			DON'T KNOW	-8		
			REFUSED	-9		