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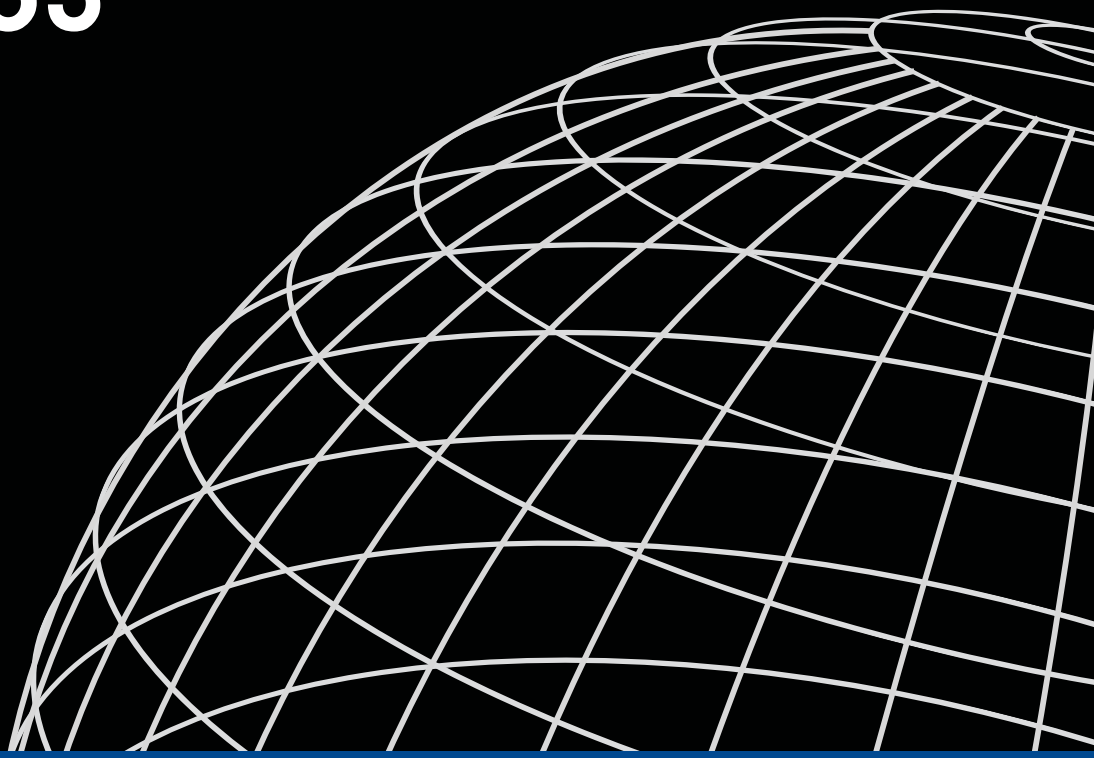
# AN INVENTORY OF ALCOHOL-RELATED QUESTIONS IN THE DEMOGRAPHIC AND HEALTH SURVEYS AND AN ANALYSIS OF ALCOHOL USE AND UNSAFE SEX IN SUB-SAHARAN AFRICA

## DHS ANALYTICAL STUDIES 53



**September 2015**

This publication was produced for review by the United States Agency for International Development. It was prepared by Lindsay Mallick and Shireen Assaf of ICF International.

DHS Analytical Studies No. 53

# An Inventory of Alcohol-Related Questions in the Demographic and Health Surveys and an Analysis of Alcohol Use and Unsafe Sex in Sub-Saharan Africa

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**Acknowledgment:** The authors are grateful for the comments provided by Sarah Woolf-King and Kia Reinis on an earlier version of the report. The authors thank Elizabeth Britton for a thorough and rapid search of questions in all surveys and Tom Pullum for developing Stata code to extract data on alcohol in DHS surveys. The authors would also like to thank Bryant Robey and Sidney Moore for editing the report and Natalie La Roche for formatting it.

Editors: Bryant Robey and Sidney Moore
Document Production: Natalie La Roche

This study was carried out with support provided by the United States Agency for International Development (USAID) through The DHS Program (#AIDOAA-C-13-00095). The views expressed are those of the authors and do not necessarily reflect the views of USAID or the United States Government.

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Recommended citation:

Mallick, Lindsay and Shireen Assaf. 2015. *An Inventory of Alcohol-Related Questions in the Demographic and Health Surveys and an Analysis of Alcohol Use and Unsafe Sex in Sub-Saharan Africa.* DHS Analytical Studies No. 53. Rockville, Maryland, USA: ICF International.

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# Preface

The Demographic and Health Surveys (DHS) Program is one of the principal sources of international data on fertility, family planning, maternal and child health, nutrition, mortality, environmental health, HIV/AIDS, malaria, and provision of health services.

One of the objectives of The DHS Program is to analyze DHS data and provide findings that will be useful to policymakers and program managers in low- and middle-income countries. DHS Analytical Studies serve this objective by providing in-depth research on a wide range of topics, typically including several countries and applying multivariate statistical tools and models. These reports are also intended to illustrate research methods and applications of DHS data that may build the capacity of other researchers.

The topics in the DHS Analytical Studies series are selected by The DHS Program in consultation with the U.S. Agency for International Development.

It is hoped that the DHS Analytical Studies will be useful to researchers, policymakers, and survey specialists, particularly those engaged in work in low- and middle-income countries.

Sunita Kishor
Director, The DHS Program

# Abstract

This report provides an overview of DHS survey questions related to alcohol consumption and an analysis of outcomes from these questions in DHS surveys. It first examines the questions on alcohol use and the response categories in all surveys that included questions about ever, typical, or current alcohol consumption. The inventory found that alcohol questions were included in 65 surveys in 42 developing countries between 1987 and 2014, and 19 different questions related to alcohol consumption were identified. The most common question asked if the respondent had ever drunk alcohol. Responses to this question were used to calculate the prevalence of ever-drinking in 36 surveys. Prevalence varied substantially within and across regions and between men and women. The study then uses multivariable logistic regression to examine the association between alcohol use and unsafe sex in eight countries in sub-Saharan Africa known to have high HIV prevalence. The regression analysis of the global association between self-reported drinking status and unsafe sex was not found to be significant except among men in Zambia, where the odds of engaging in unsafe sex for a current drinker were lower than for a non-drinker (opposite the expected outcome). At the event level, alcohol consumption at last sex was an inconsistent predictor of unsafe sex. For both men and women, the strongest predictor of engaging in unsafe sex was age of respondent—higher odds for those 15-24 compared with those 35 and older. For women, lifetime number of sexual partners also strongly predicted unsafe sex. The authors suggest using validated scales to assess harmful drinking.

KEY WORDS: alcohol, heavy drinking, harmful drinking, risky sexual behavior, unsafe sex, condom, event-level study, sub-Saharan Africa

# Executive Summary

## Introduction

The consumption of alcohol in various forms is—and has historically been—common in many countries. Levels of alcohol use, along with commercial production and distribution of alcohol, are rising in low- and middle-income countries, as their economies develop. The increase in alcohol consumption has many health-related consequences. Alcohol use is among the top three leading risk factors for disease burden, just behind high blood pressure and tobacco use, and contributes to over 200 types of diseases. There are also strong associations between alcohol use and some infectious diseases, including HIV/AIDS. Some research studies and review articles have found a relationship between alcohol use and risky sexual behavior or other outcomes related to HIV/AIDS, although other studies have found no relationship.

This report reviews survey questions and data related to alcohol use in countries that have conducted Demographic and Health Surveys (DHS). The report has two main objectives: The first is to present an inventory of the alcohol-related questions included in DHS surveys and to provide an overview of the questions and response options. The second objective is to present examples of analyses that can be conducted with existing DHS data on alcohol use. The examples include 1) calculating the prevalence of ever-drinking and 2) examining alcohol use as a predictor of unsafe sex. The report presents results from logistic regression analyses of data from selected DHS surveys and AIS surveys (AIDS Indicator Surveys) carried out in sub-Saharan countries with high HIV prevalence. The analyses examine the association between alcohol use and unsafe sex, which is defined in this report as sex with a non-cohabitating partner without the use of a condom at last intercourse.

## Methods

For the inventory of alcohol-related questions, The DHS Program Survey Search tool populated a list of all DHS surveys that included questions on alcohol use. The list was then narrowed to include only questions that pertained directly to respondent's ever, current, or typical alcohol use, reducing the list to 65 surveys, which were included in the inventory. Prevalence of ever-drinking was calculated only using surveys that asked all adults if they had ever consumed alcohol. For analysis of the relationship between alcohol consumption and health behavior (in selected sub-Saharan countries with high HIV prevalence), logistic regressions were performed on DHS and AIS data using alcohol-related factors as the main independent variables and unsafe sex as the dependent variable, or outcome. The sub-Saharan countries analyzed included Kenya (men and women), Lesotho (only men), Mozambique (only women), Namibia (men and women), Swaziland (men and women), Uganda (only women), Zambia (men and women), and Zimbabwe (men and women).

## Results

Among the 65 surveys in the inventory, the authors found 19 different non-comparable questions on alcohol. The most common question was about ever having had an alcoholic drink. Using this question, the study assessed the prevalence of ever-drinking, which was found to vary greatly across countries and regions. The highest prevalence in DHS surveys was among men in the Dominican Republic 2002 survey (92 percent), while the lowest prevalence was among women in the Haiti 2000 survey, the India 2005-06 survey, and the Malawi 2000 survey (approximately two percent each). Within countries, there were substantial differences between men and women in the percentage ever-drinking. The largest differential was in the Guyana 2009 survey, a difference of 43 percentage points between men and women. The smallest difference, 15 percentage points, was in the Ukraine 2007 survey.

The logistic regression analysis conducted on selected sub-Saharan countries found that drinking status was not a significant predictor of risky sexual behavior, except among men in Zambia, where being a current drinker had lower odds of engaging in unsafe sex as opposed to being a non-drinker. In some countries, drinking at last sex was a significant predictor of unsafe sex; this was the case for men in Lesotho and Swaziland, men and women in Zambia, and women in Uganda. Among men and women, however, in all countries studied the strongest predictor of unsafe sex was age of respondent (higher for those 15-24 compared with those 35 or older). Among women, lifetime number of sexual partners was also a strong predictor of unsafe sex.

**Discussion and Recommendations**

The inventory of alcohol-related questions revealed substantial variation across surveys in both the types of questions asked and the response options. Even similar questions showed small variations in wording that make comparison of results across countries difficult. Across all regions and countries, a higher percentage of men compared with women reported ever consuming alcohol in their lifetime. The size of the male-female gap in ever-drinking differed substantially among countries.

The regression analysis found that men surveyed in the sub-Saharan countries studied drink more than women, as other studies also have shown. This was true for general alcohol-drinking status (drinks currently/ever/or not), frequency of alcohol consumption, and drinking at last sex. An association between alcohol consumption at last sex and risky sexual behavior was found in Zambia for both men and women, in Lesotho men, Swaziland men, and Ugandan women. The pathways and effects of alcohol on risky sexual behavior appear generally to differ between men and women, although there were variations in the results by both gender and country.

The variation in alcohol-related questions and responses, as well as the inconsistent findings on drinking status as a predictor of unsafe sex, suggests that a validated scale to assess alcohol use could yield a more consistent, comparable measure. Expert research in the field has supported the use of validated scales, such as AUDIT-C, developed by the World Health Organization (WHO). Adopting a standardized set of questions would allow researchers to monitor alcohol consumption and to make multi-country comparisons, which could inform policy decisions and focus interventions where needed. With the wide ranging consequences of heavy drinking for people's health, including risky sexual behavior, and increasing alcohol consumption in developing countries, there is a global responsibility to monitor alcohol consumption and harmful use of alcohol worldwide.

# 1. Introduction

The consumption of alcohol in various forms is—and has historically been—common in many countries and cultures around the world (McGovern 2009); however, wherever alcohol is consumed there are associated health problems. Although many people abstain from drinking alcohol, it remains a major contributing factor to international morbidity and mortality (Rehm, Mathers, et al. 2009). The latest global status report on alcohol and health by the World Health Organization (WHO) found that, worldwide, six percent of all deaths and five percent of the burden of disease and injury are attributable to alcohol use; it is among the top three leading risk factors for disease burden, just behind high blood pressure and tobacco use, including secondhand smoke (WHO 2014). Alcohol use contributes to over 200 types of diseases and injuries, including cancer, cardiovascular disease, liver cirrhosis, motor vehicle accidents, and epilepsy (Hahn, Woolf-King, and Muyindike 2011; Lim et al. 2013; Rehm, Mathers, et al. 2009; WHO 2014). Studies have also found associations between alcohol and some infectious diseases, such as HIV/AIDS and tuberculosis (Baliunas et al. 2010; Hahn, Woolf-King, and Muyindike 2011; Lönnroth et al. 2008; Rehm, Samokhvalov, et al. 2009). Additionally, alcohol use causes indirect harm to others, through injury, homicide, abuse, neglect, and fetal alcohol syndrome (WHO 2014). While light and moderate alcohol consumption can have some health benefits for individuals, such as reduced occurrence of cardiovascular disease (Rehm, Mathers, et al. 2009; WHO 2014), it is clear that heavy alcohol use has consequences that can lead to health-related, psychosocial, legal, and economic problems (Bush et al. 1998; Casswell, You, and Huckle 2011).

Several studies have found that alcohol use in low- and middle-income countries (LMICs) is rising, along with economic development and increased production and distribution of commercially produced alcohol (Obot 2006; Odejide and Ibadan 2006; Peltzer and Ramlagan 2009; Rehm, Mathers, et al. 2009). However, few studies have examined the consequences of increasing alcohol use, particularly in sub-Saharan Africa (Babor 2010; Obot 2006). Currently, there is little information available on harmful drinking patterns in low-income countries (Clausen et al. 2009). Survey data on alcohol consumption could be used to identify specific drinking customs that lead to health and/or social problems (Greenfield et al. 2006; Stockwell et al. 2004). Additionally, survey data could provide insight in areas where official statistics on alcohol consumption are not collected. It is important to ensure that survey data accurately reflect alcohol consumption patterns and adequately describe the associations between alcohol use and health outcomes.

This report seeks to provide insight on questions related to alcohol use in the DHS questionnaire and to provide examples of how to examine associations between alcohol consumption and various outcomes measured by DHS surveys. The report has two main objectives. The first is to examine how questions related to alcohol use are included in DHS surveys in LMICs in regions worldwide, with an overview of the questions asked and the response options. The second objective is to provide examples of how alcohol-related questions in the DHS can be used in analytical studies.

Two analyses are carried out to meet these objectives. The first is a calculation of the prevalence of ever having consumed alcohol, using 36 DHS surveys. The second is an analysis that predicts risky sexual behavior, specifically unsafe sex, which is defined in this report as sex with a non-marital, non-cohabitating partner without the use of a condom at last intercourse. This analysis uses data from several DHS surveys carried out in countries with high HIV prevalence in sub-Saharan Africa; therefore, the focus of this analysis will be on this region. Unsafe sex was selected for investigation because of the link found by several studies between alcohol consumption, several risky sexual behavior outcomes, and HIV infection (Dimbuene, Emina, and Sankoh 2014; Fisher, Bang, and Kapiga 2007; Kalichman et al. 2007; Woolf-King and Maisto 2011; Woolf-King et al. 2013). Additionally, the DHS questionnaire used in most countries contains a specific question on alcohol use at last sex; therefore, analysis of the data can establish a direct link between alcohol use and the behavioral outcome of interest. The authors conclude with technical guidance on the

use of alcohol-related questions in future DHS surveys. The technical guidance is designed to promote the use of a more quantifiable and standardized measure of alcohol consumption to produce more meaningful results from research on alcohol consumption and risky sexual behavior.

### 1.1. Measuring Global Variations in Alcohol Use

The point at which alcohol use becomes harmful has been defined in various contexts. The threshold of heavy use, compared to light or moderate use, as endorsed by the US Department of Health and Human Services, is when the level of consumption exceeds three drinks on any day or seven drinks per week for women or four drinks on any day or 14 drinks per week for men (DHHS 2010). Light or moderate use, in contrast, is defined as one drink per day for women and two per day for men. The National Institute on Alcohol Abuse and Alcoholism labels binge drinking, also heavy episodic drinking, as four or more drinks (women) or five or more drinks (men) in approximately two hours (NIAAA 2004). WHO has a more lenient standard for heavy episodic drinking—six or more drinks on one occasion, at least monthly (WHO 2014). Regardless of the cut points for classification of type of use—heavy vs. moderate or light—there is a dose-response effect related to volume of alcohol consumption and the potential for risks incurred (Rehm et al. 2003; Shield, Parry, and Rehm 2014). That is, the higher the volume, the more risk for harm. Alcohol use falls along a spectrum that ranges from the highest consumption and most risk to abstinence or low-risk (Saitz 2005). Long-term or lifetime volume, is associated with chronic, social or health problems and alcohol dependence; high quantities of alcohol in one episode, such as binge drinking, can contribute to acute problems such as accidents or risk-taking behavior (Chersich and Rees 2010; Saitz 2005). Binge drinking also has the immediate physiological consequences of alcohol toxicity on organs and tissues (WHO 2014). Consistent with the WHO International Classification of Diseases, 10$^{th}$ Revision, and the WHO global strategy to reduce the harmful use of alcohol, *harmful drinking* is used in this paper to mean any drinking or pattern of drinking that is known to cause mental, physical, or social harm (WHO 1992, 2010).

Certain patterns of drinking, for example drinking without food or drinking in a heavy episodic fashion, are linked to more harmful consequences and vary across cultures (Rehm et al. 2003). Although researchers have studied patterns of alcohol use through questionnaire screening in Europe and North America since the mid-20$^{th}$ century, the nuances of alcohol consumption in LMICs are less clear. Surveys carried out in these populations less commonly include questions on alcohol use (Demers, Room, and Bourgault 2000). The limited number of surveys reported in the literature have found that drinking patterns differ by culture, religion, gender, context, and social acceptability (Demers, Room, and Bourgault 2000; Peltzer and Ramlagan 2009). Compared with drinking patterns characterized by low levels of alcohol consumption and especially during mealtimes, some LMIC, such as those in sub-Saharan Africa, exhibit alcohol consumption behaviors that are typically heavy, albeit occasional, and usually take place at social gatherings (Chersich and Rees 2010; Demers, Room, and Bourgault 2000; Obot 2006; Peltzer and Ramlagan 2009). In Uganda, for example, it is common to drink home-brewed alcohol from a communal pot at social gatherings, using various means—large spoons, straws, or various sized containers, for example—which can affect the amount of alcohol consumed (Hahn, Woolf-King, and Muyindike 2011; Papas et al. 2010). The alcohol content of drinks, whether commercially or locally produced, also vary significantly (Greenfield and Kerr 2008; Papas et al. 2010; Stockwell et al. 2004). In Kenya, for example, there are two traditional home brews, busaa and chang'aa. The US standard drink size for busaa ranges from 0.6 to 2.7 drinks, while the standard drink size for chang'aa ranges from 1.4 to 8.3 drinks (Papas et al. 2010). In Namibia, one qualitative study found that the drinking patterns are either abstention or heavy episodic drinking—light or moderate drinking is not part of the drinking culture (LeBeau and Yoder 2006). Along with diverse customs affecting what type of alcohol or how much alcohol is consumed, consumption also varies by the time of year or day of the week. In some areas, drinking typically occurs more frequently and is heavier on weekends than weekdays, and around holidays or festivities (Stockwell et al. 2004).

To account for variation in drinking patterns both between and within countries, researchers have suggested more detailed methods of collecting information on alcohol consumption (Greenfield and Kerr 2008; Stockwell et al. 2004). A comprehensive set of questions in surveys could provide an accurate picture of volume or quantity and pattern of drinking and provide data that enable researchers to study the context and consequences of alcohol use, particularly harmful alcohol use, in different settings. While WHO collects data from their member states around the world on alcohol use and several alcohol-related indicators, individual-level data are not available for public use (WHO 2014). Additionally, data on other health outcomes are not analyzed in this global status report and the potential for analysis is limited.

### 1.2. Prevalence of Alcohol Consumption across the World

In its 2014 version of the "Global status report on alcohol and health", WHO documents alcohol consumption around the world (WHO 2014). The report finds that the highest per capita alcohol consumption is in high-income countries; however, total consumption varies across and within regions. In addition to economic factors, these variations can be attributed to abstention rates (i.e. non-drinkers), culture or religion, and other sociodemographic factors (WHO 2014). The global abstention rate is 48 percent, with the highest rates in the Eastern Mediterranean Region (90 percent), the lowest in the Americas and Europe (approximately 20 percent for each), with the African Region being in between (57 percent). Per capita consumption was found to be positively associated with the prevalence of heavy episodic drinking in the general population; however, among current drinkers, the relationship was not consistent (WHO 2014). For example, in the African Region, although total alcohol per capita consumption was low, among drinkers it was higher than in both the Americas and Europe. This implies that among those who drink in Africa, alcohol is consumed heavily. In addition, the pattern of drinking, as examined in the WHO report, was found to be riskier in sub-Saharan Africa than in North America and Western Europe. In fact, the WHO report finds that over 95 percent of LMICs have a score of three or more (out of five) in the ranking of risky drinking globally (WHO 2014).

### 1.3. The Link between Alcohol and Risky Sexual Behaviors in Sub-Saharan Africa

One concern about the consequences of alcohol use is its possible link to HIV infection, particularly in sub-Saharan Africa, where HIV prevalence is the highest in the world (Hahn, Woolf-King, and Muyindike 2011). Several studies and review articles have found a relationship between alcohol consumption and risky sexual behaviors—for example, sex with multiple partners, sex with casual partners, unprotected sex, transactional sex, and sexual coercion—as well as increased risk of contracting HIV or STI infection (Cooper 2002; Fisher, Bang, and Kapiga 2007; Kalichman et al. 2007; Leigh and Stall 1993; Woolf-King and Maisto 2011). However, the nature of this relationship is complex, and may be either causal or spurious (Cooper 2002, 2006). The theory of alcohol myopia and the expectancy theory support a causal explanation by describing the pharmacological or psychological mechanisms by which alcohol use leads to risky sexual behavior. In the alcohol myopia theory, risky sexual behavior is explained by the diminished cognitive abilities of drinkers, which causes them to focus on the most salient cues in their environment, thereby affecting their behavior and judgment (Cooper 2006; MacDonald et al. 2000; Weinhardt and Carey 2000). In expectancy theory, an individual's behavior is explained by his or her pre-existing beliefs on alcohol and its effects, which cause people to act in ways expected of them (Cooper 2002, 2006). Cooper (2006) also describes a reverse causal explanation in which individuals who want to engage in risky sex will use alcohol to facilitate their desire. Because most studies on alcohol use and risky sexual behavior are cross-sectional, it is not possible to know in which direction the causal relationship goes, if one exists. However, one experimental study on men who have sex with men has found support for the hypothesis of the enhanced effect of alcohol on sexual risks by both sexual arousal and expectancies (Maisto et al. 2012). Alternatively, a spurious or third-variable explanation does not emphasize a direct link between alcohol and risky sexual behavior but rather describes the importance of other individual variables, such as personality and attributes that directly affect behavior (Cooper 2002, 2006). In other words, coping mechanisms, risk-seeking

behavior, or lifestyle could cause these behaviors, whether drinking or having risky sex. A longitudinal study involving 7,511 discrete sexual events revealed that the majority of differences in risky behaviors were explained at the within-person level—that is, changes in personality, the situation, and the relationship context (Cooper 2010).

Review articles on the link between alcohol and risky sex have grouped studies into three main types: global association studies, situational association studies, and event-level studies (Cooper 2002; Kalichman et al. 2007; Leigh and Stall 1993; Woolf-King and Maisto 2011). Global association studies examine whether a person who engages in one behavior (alcohol intake, including frequency) is more likely to engage in another behavior (risky sexual activity, such as sex with multiple or casual partners and unsafe sex). These studies include examining the relationship between alcohol consumption and HIV or other STI status. While the review by Leigh and Stall (1993) mainly focused on studies conducted in the United States and European countries, Cooper (2002) focused on studies involving college students and youth, while still other reviews focused on studies in sub-Saharan Africa (Kalichman et al. 2007; Woolf-King and Maisto 2011). All of these review articles found that the majority of global association studies support an association between history (or frequency) of alcohol use and several risky sexual behavior outcomes, including HIV and STI status. Cooper (2002), however, found an inconsistent relationship between alcohol consumption and protective behaviors such as condom use.

Situational association studies examine the link between risky sexual behavior and use of alcohol at the same time (or situation) as the sexual activity, while event-level studies examine a specific occasion (for example, the last sexual encounter). In general, the findings from situational association studies support the findings of global association studies, that there is an association between alcohol use and risky sexual behavior, while findings from event-level studies are mixed. Leigh and Stall (1993) found several studies that indicate no relationship between substance abuse (drugs or alcohol) and use of condoms or other contraceptives in recent encounters. Cooper (2002) found that drinking was strongly associated with decreased protective behaviors among younger individuals at first intercourse, and at events that occurred in the distant past. A review article covering only event-level studies from the United States (Weinhardt and Carey 2000) did not support a link between alcohol use and protective behaviors (such as condom use). Woolf-King and Maisto (2011) found two event-level studies in South Africa, both of which showed a significant negative effect of alcohol consumption and condom use. The event-level study by Myer, Mathews, and Little (2002) in South Africa found that alcohol use was negatively associated with condom use, and Kiene et al. (2008) found that consuming alcohol before sex by either or both partners, in a sample of HIV-positive men and women in South Africa, was significantly associated with an increased proportion and an increased number of unprotected sexual events reported per day. An event-level study of countries in sub-Saharan Africa by Kiene and Subramanian (2013) found that among men in Southern Africa, being drunk before most recent sex had a negative effect on condom use with steady partners, but that among women, the effect was only marginally significant. The study also found that in Southern and Eastern Africa men had increased odds of condom use during most recent sex with casual partners if they were drunk (Kiene and Subramanian 2013).

The review of sub-Saharan African studies by (Woolf-King and Maisto 2011) discusses the importance of the partner in unsafe sex, including partner drunkenness and partner type. Qualitative studies revealed situations in which women were forced to have sex after their partners returned home from drinking. This finding was also supported by a few of the quantitative studies in the review, such as in the event-level study by Kiene et al. (2008), which found that the odds for engaging in unprotected sex were highest when the male partner had been drinking. Similarly, data from the 2006 Uganda Demographic and Health Survey found that intoxication before last sex was only a significant predictor of unprotected sex when the woman's partner was intoxicated and not when the woman herself was intoxicated (Tumwesigye, Wanyenze, and Greenfield 2012). A study among women bar and hotel workers in Northern Tanzania found that alcohol use two hours before sex was not a significant predictor of condom use (Fisher, Cook, and Kapiga 2010).

Partner type is also an important factor with regards to unsafe sex, especially in terms of HIV risk. Having sex outside of a cohabiting relationship without using a condom has greater risk of HIV infection than marital sex (Ezzati 2004). The review by Woolf-King and Maisto (2011) also found several studies that indicate an increased likelihood of having multiple and/or casual partners with different measures of alcohol consumption. The same review found that self-reported harmful alcohol use was associated with increased likelihood of participating in transactional sex (Woolf-King and Maisto 2011). Another qualitative study in Namibia noted the well-known transactional relationship that occurs at bars (LeBeau and Yoder 2009). In this report, it was common knowledge that women who frequent bars and allow men to buy them drinks are expected have intercourse with the man; often this exchange is unprotected because it involves drinking. Sex-workers also frequent bars in the area studied (LeBeau and Yoder 2009).

The conflicting findings in the literature on the link between alcohol consumption and risky behaviors (including unsafe sex), especially in event-level studies, highlight the need for more studies in this area. The analysis in this report will explore the link between alcohol consumption and unsafe sex in sub-Saharan Africa using both a global measure of alcohol consumption and an event-level measure. Meanwhile, the inventory of alcohol-related questions in DHS surveys will provide an overview of how these questions are asked, which will aid in assessing the inclusion of variables related to alcohol use in future surveys.

# 2. Data and Methods

Several methodologies were applied in this study to meet the objectives. The first examined alcohol-related questions in the DHS surveys by creating an inventory of all questions related to alcohol consumption that have been included in DHS surveys. The second used two analyses to examine the relationship between alcohol consumption and health behaviors: 1) the prevalence of ever-drinking in DHS surveys, and 2) alcohol consumption as a main predictor of unsafe sex in sub-Saharan Africa.

## 2.1. Inventory of Alcohol-Use Questions in DHS Surveys

### *2.1.1. Data used in inventory*

A search through all DHS surveys produced a list of 139 surveys that contained alcohol-related questions. In a second step, surveys that only asked questions about the consequences of alcohol use were excluded. Examples of such questions were: "To lower your hypertension or high blood pressure, are you […] cutting down on alcohol?" or "Have you ever had difficulties at work or school because of drinking?" Surveys were also excluded if the questions were about the partner's alcohol use—such as, "Does your husband drink alcohol/Did your last husband drink alcohol?"—if the survey did not also ask questions about the respondent's ever, typical, or current consumption of alcohol. Three surveys were excluded because they only asked about drinking during pregnancy. Additionally, surveys that only asked questions about alcohol at last sex—for example, "The last time you had sexual intercourse with this person, did you or this person drink alcohol?"—were excluded from the inventory unless there were additional direct questions about the respondent's alcohol consumption. Table 1 shows the characteristics of the 65 surveys remaining in the inventory of DHS questions related to alcohol consumption, following these exclusions.

## Table 1. Characteristics of DHS surveys that include questions on alcohol consumption, 1987-2014

| Country | Year | Type | Eligibility criteria | Number of women | Eligibility criteria | Number of men | Eligibility criteria |
|---|---|---|---|---|---|---|---|
| **sub-Saharan Africa** | | | | | | | |
| Benin | 2006 | DHS | All women, 15-49 | 17,794 | All men, 15-64 | 5,321 | All men, 15-64 |
| Benin | 2001 | DHS | All women, 15-49 | 6,219 | All men, 15-64 | 2,709 | All men, 15-64 |
| Burkina Faso | 2003 | DHS | All women, 15-49 | 12,477 | All men, 15-59 | 3,605 | All men, 15-59 |
| Cape Verde | 2005 | DHS | All women, 15-49 | 5,505 | All men, 15-59 | 2,644 | All men, 15-59 |
| Equatorial Guinea | 2011 | DHS | All women, 15-49 | 3,575 | All men, 15-59 | 1,825 | All men, 15-59 |
| Ethiopia | 2011 | DHS | All women, 15-49 | 16,515 | All men, 15-59 | 14,110 | All men, 15-59 |
| Ghana | 2008 | DHS | All women, 15-49 | 4,916 | All men, 15-59 | 4,568 | All men, 15-59 |
| Kenya | 2003 | DHS | All women, 15-49 | 8,195 | All men, 15-54 | 3,578 | All men, 15-54 |
| Lesotho | 2009 | DHS | All women, 15-49 | 7,624 | All men, 15-59 | 3,317 | All men, 15-59 |
| Lesotho | 2004 | DHS | All women, 15-49 | 7,095 | All men, 15-59 | 2,797 | All men, 15-59 |
| Liberia | 2013 | DHS | All women, 15-49 | 9,239 | All men, 15-49 | 4,118 | All men, 15-49 |
| Liberia | 2007 | DHS | All women, 15-49 | 7,092 | All men, 15-49 | 6,009 | All men, 15-49 |
| Madagascar | 2003-04 | DHS | All women, 15-49 | 7,949 | All men, 15-59 | 2,432 | All men, 15-59 |
| Malawi | 2004 | DHS | All women, 15-49 | 11,698 | All men, 15-54 | 3,261 | All men, 15-54 |
| Malawi | 2000 | DHS | All women, 15-49 | 13,220 | All men, 15-54 | 3,092 | All men, 15-54 |
| Mozambique | 2009 | AIS | All women, 15-64* | 6,413 | All men, 15-64 | 4,799 | All men, 15-64 |
| Mozambique | 2003 | DHS | All women, 15-49 | 12,418 | All men, 15-64 | 12,418 | All men, 15-64 |
| Namibia | 2013 | DHS | All women, 15-49 | 9,176 | All men, 15-64 | 4,481 | All men, 15-64 |
| Namibia | 2006-07 | DHS | All women, 15-49 | 9,804 | All men, 15-49 | 3,915 | All men, 15-49 |
| Namibia | 2000 | DHS | All women, 15-49 | 6,755 | All men, 15-59 | 2,954 | All men, 15-59 |
| Nigeria | 2003 | DHS | Ever married, 15-49 | 9,223 | All men, 15-59 | 3,549 | All men, 15-59 |
| Rwanda | 2005 | DHS | All women, 15-49 | 11,321 | All men, 15-59 | 4,820 | All men, 15-59 |
| Rwanda | 2000 | DHS | All women, 15-49 | 10,421 | All men, 15-59 | 2,717 | All men, 15-59 |
| South Africa | 2003 | DHS | All women, 15-49 | 7,401 | All men, 15-59 | 3,118 | All men, 15-59 |
| South Africa | 1998 | DHS | All women, 15-49 | 11,735 | n/a | n/a | n/a |
| Swaziland | 2006-07 | DHS | All women, 15-49 | 4,987 | All men, 15-59 | 4,156 | All men, 15-59 |
| Uganda | 2000-01 | DHS | All women, 15-49 | 7,246 | All men, 15-54 | 1,962 | All men, 15-54 |
| Zambia | 2013-14 | DHS | All women, 15-49 | 16,411 | All men, 15-59 | 14,773 | All men, 15-59 |
| Zambia | 2007 | DHS | All women, 15-49 | 7,146 | All men, 15-59 | 6,500 | All men, 15-59 |
| Zambia | 2001-02 | DHS | All women, 15-49 | 7,658 | All men, 15-59 | 2,145 | All men, 15-59 |
| Zimbabwe | 1999 | DHS | All women, 15-49 | 5,907 | All men, 15-54 | 2,609 | All men, 15-54 |
| **Asia and Europe** | | | | | | | |
| Albania | 2008-09 | DHS | All women, 15-49 | 7,584 | All men, 15-49 | 3,013 | All men, 15-49 |
| Armenia | 2000 | DHS | All women, 15-49 | 6,430 | All men, 15-54 | 1,719 | All men, 15-54 |
| Azerbaijan | 2006 | DHS | All women, 15-49 | 8,444 | All men, 15-59 | 2,558 | All men, 15-59 |
| India | 2005-06 | DHS | All women, 15-49 | 124,385 | All men, 15-59 | 74,369 | All men, 15-59 |
| India | 1998-99 | DHS | Ever married, 15-49 | 89,199 | n/a | n/a | n/a |
| Indonesia | 2012 | DHS | All women, 15-49 | 45,607 | Ever married, 15-54 | 9,306 | Ever married, 15-54 |
| Indonesia | 2012 | Special | Never married, 15-24 | 8,902 | Never married, 15-24 | 10,980 | Never married, 15-24 |
| Indonesia | 2007 | Special | Never married, 15-24 | 8,481 | Never married, 15-24 | 10,830 | Never married, 15-24 |
| Indonesia | 2002-03 | Special | Ever married, 15-24 | 1,815 | Ever married, 15-24 | 2,341 | Ever married, 15-24 |
| Kazakhstan | 1999 | DHS | All women, 15-49 | 4,800 | All men, 15-59 | 1,440 | All men, 15-59 |
| Kyrgyz Republic | 2012 | DHS | All women, 15-49 | 8,208 | All men, 15-59 | 2,413 | All men, 15-59 |
| Maldives | 2009 | DHS | Ever married, 15-49 | 7,131 | All men, 15-64 | 1,727 | All men, 15-64 |
| Moldova | 2005 | DHS | All women, 15-49 | 7,440 | All men, 15-59 | 2,508 | All men, 15-59 |
| Nepal | 2001 | DHS | Ever married, 15-49 | 8,726 | Ever married, 15-19 | 2,261 | Ever married, 15-19 |
| Philippines | 2003 | DHS | All women, 15-49 | 13,633 | All men, 15-54 | 4,766 | All men, 15-54 |
| Turkmenistan | 2000 | DHS | All women, 15-49 | 7,919 | n/a | n/a | n/a |
| Ukraine | 2007 | DHS | All women, 15-49 | 6,841 | All men, 15-49 | 3,178 | All men, 15-49 |
| Uzbekistan | 2002 | Special | All women, 15-49 | 5,463 | All men, 15-59 | 2,333 | All men, 15-59 |
| **Latin America/ Caribbean** | | | | | | | |
| Bolivia | 2008 | DHS | All women, 15-49 | 16,939 | All men, 15-64 | 6,054 | All men, 15-64 |
| Colombia | 2010 | DHS | All women, 13-49 | 53,521 | n/a | n/a | n/a |
| Dominican Republic | 2013 | DHS | All women, 15-49 | 9,372 | All men, 15-59 | 10,306 | All men, 15-59 |
| Dominican Republic | 2013 | Special | All women, 15-49 | 1,707 | All men, 15-59 | 2,101 | All men, 15-59 |
| Dominican Republic | 2007 | DHS | All women, 15-49 | 27,195 | All men, 15-59 | 27,975 | All men, 15-59 |
| Dominican Republic | 2007 | Special | All women, 15-49 | 1,575 | All men, 15-59 | 1,820 | All men, 15-59 |
| Dominican Republic | 2002 | DHS | All women, 15-49 | 23,384 | All men, 15-59 | 2,833 | All men, 15-59 |
| Guatemala | 1987 | DHS | All women, 15-44 | 5,459 | n/a | n/a | n/a |
| Guyana | 2009 | DHS | All women, 15-49 | 4,996 | All men, 15-49 | 3,522 | All men, 15-49 |
| Haiti | 2012 | DHS | All women, 15-49 | 14,287 | All men, 15-59 | 9,493 | All men, 15-59 |
| Haiti | 2005-06 | DHS | All women, 15-49 | 10,757 | All men, 15-59 | 4,958 | All men, 15-59 |
| Haiti | 2000 | DHS | All women, 15-49 | 10,159 | All men, 15-59 | 3,171 | All men, 15-59 |
| Honduras | 2011-12 | DHS | All women, 15-49 | 22,757 | All men, 15-59 | 7,120 | All men, 15-59 |
| Peru | 2013 | Continuous | All women, 15-49 | 22,920 | n/a | n/a | n/a |
| Peru | 2012 | Continuous | All women, 15-49 | 23,888 | n/a | n/a | n/a |
| Peru | 2011 | Continuous | All women, 15-49 | 22,517 | n/a | n/a | n/a |

### *2.1.2. Methods of conducting inventory*

A comprehensive list of DHS questions on alcohol was prepared and the questions were grouped by type, including 1) ever and current drinking, 2) frequency and quantity of drinking, and 3) heavy drinking. A Stata program enabled both the download of the corresponding datasets as well as tabulation of all questions and response options for questions containing the words "drink," "drunk," and "alcohol".

## 2.2. Prevalence of Ever Consuming Alcohol

### *2.2.1. Data used in calculating prevalence*

The question "Have you ever had an alcoholic drink?" was asked in 49 surveys in four regions. Four of these surveys were excluded from the prevalence calculations because the question was only asked of youth (ages 15-24), for example, in certain surveys in Liberia and Indonesia. Nine surveys were excluded because the data were not available in the public domain. Ultimately, a total of 36 surveys were used to calculate the adult prevalence of "ever having consumed alcohol."

### *2.2.2. Methods of calculating prevalence*

The prevalence of ever drinking alcohol was calculated from responses to survey questions that asked if a respondent had ever consumed alcohol. Missing values or respondents who said that they "don't know" were excluded from this calculation. Sample weights were applied to the prevalence calculation for each survey.

## 2.3. Regression Analysis of Unsafe Sex in Sub-Saharan Africa

### *2.3.1. Data used in regression analysis*

To examine the link between alcohol consumption and a health behavior outcome, regressions were performed using alcohol-related variables as the main independent variables and unsafe sex as an outcome (dependent variable). Data from DHS surveys (including one AIS survey) in countries in sub-Saharan Africa with high HIV prevalence were selected for analysis (Table 2). Only countries with surveys that included questions on alcohol consumption, either drinking status (ever or current) or alcohol consumption at last sex, were used in the analysis. These included Kenya 2008-2009 DHS (men and women), Lesotho 2009 DHS (men only), Mozambique 2009 AIS (women only), Namibia 2013 DHS (men and women), Swaziland 2006-2007 DHS (men and women), Uganda 2001 AIS (women only), Zambia 2013-2014 DHS (men and women), and Zimbabwe 2005-2006 DHS (men and women).

**Table 2. HIV prevalence among men and women age 15-49 in sub-Saharan Africa, DHS surveys 2001-2014**

| | Women | | Men | |
|---|---|---|---|---|
| Country and survey year | HIV prevalence | Number of women | HIV prevalence | Number of men |
| Kenya 2008-2009 | **8.0** | 3,641 | **4.3** | 3,066 |
| Lesotho 2009 | 26.7 | 3,778 | **18.0** | 2,856 |
| Mozambique 2009 | **13.1** | 5,229 | 9.2 | 3,832 |
| Namibia 2013 | **16.9** | 4,051 | **10.9** | 3,680 |
| Swaziland 2006-2007 | **31.1** | 4,424 | 19.7 | 3,763 |
| Uganda 2001 | **8.3** | 10,883 | 6.1 | 8,673 |
| Zambia 2013-2014 | **15.1** | 14,719 | **11.3** | 13,140 |
| Zimbabwe 2005-2006 | **21.1** | 6,947 | **14.5** | 5,848 |

Note: Figures in bold indicate surveys included in the regression analysis.

### *2.3.2. Construction of variables*

Unsafe sex was defined as sex within the last year with a non-cohabiting partner and without the use of a condom at last intercourse (Ezzati 2004). A non-cohabitating partner includes any non-marital partner not currently living with the respondent, such as boyfriend/girlfriend, casual acquaintance, or commercial sex worker. While some studies do not consider a non-cohabiting boyfriend/girlfriend as a casual relationship, this type of relationship was included in our outcome variable because having sex outside of a cohabiting relationship, without using a condom, is thought to carry a greater risk of HIV infection than marital sex (Ezzati 2004). At the same time, other measures of risky sexual behavior were not useful for this analysis. For example, having multiple partners, sex with a casual acquaintance, and having transactional sex all have very low frequencies, especially among women.

Two types of alcohol variables were included as independent variables in the regressions: 1) global level-general alcohol use—i.e. did the respondent ever drink or does the respondent currently drink, and if they drink, how frequently; and 2) event-level alcohol consumption, that is, drinking at last sexual event. The DHS surveys from Kenya, Mozambique, Uganda, and Zimbabwe did not include global questions on general alcohol use but did include questions on alcohol consumption at last sex. For Lesotho, Namibia, Swaziland, and Zambia, general alcohol questions were asked. In Lesotho and Namibia, the question referred to ever-consuming alcohol, while in Swaziland and Zambia, the question pertained to whether or not the respondent currently drinks alcohol. Each of these four surveys also asked about frequency of alcohol consumption; however, the questions and response categories differed among the surveys. Therefore, the alcohol frequency variable was coded separately for these countries. Namibia asked about frequency and quantity of alcohol use in general, but did not ask about alcohol use at last sex. For Swaziland, the answers to the alcohol frequency question were categorical and these categories were not changed for the analysis. For Lesotho, Namibia, and Zambia the responses to the question about frequency of alcohol use were numerical and these were generally categorized according to the distributions, with zero including those respondents who reported not drinking or not drinking in the time period specified by the question. Only Namibia asked about the quantity of alcohol the respondent drank in the specified time period; this was also categorized according to the distribution of the numerical responses, but it was not included in the regression analysis because it was the only country with this type of question and therefore no comparisons could be made.

The event-level question on alcohol consumption at last sexual event reads "The last time you had sexual intercourse with this/second/third[1] person, did you or this person drink alcohol?" and assesses whether the respondent or their partner were drunk. It contained these categorical responses: no, respondent drunk only, partner drunk only, both drunk, neither drunk but consumed alcohol. Due to the low frequencies in the responses that do not include 'no', this variable was coded as a binary variable to indicate whether the respondent consumed alcohol (i.e. combined respondent drunk, both drunk, and neither drunk but consumed alcohol) or did not consume alcohol (combined no and partner drunk only). Because this variable links alcohol consumption directly with the same occasion as the outcome (last sexual intercourse), it allows for a type of event-level analysis as described in the literature review.

The remaining independent variables included in the analysis were respondent's age (15-24, 25-34, 35 and over); locality by wealth (urban, rural non-poor, rural poor); respondent's education level (none or primary, secondary or more); and total lifetime number of sexual partners (one, two, three, four or more for women, and one-two, three-four, five-six, seven or more for men). The locality-by-wealth variable was created because of the high association between locality and the wealth index. All countries except Namibia had

[1] The question on alcohol use at last sexual event is asked three times: in relation to the last sexual partner, second to last sexual partner, and third to last partner. For the purposes of this report, the authors only examine condom use with last (most recent) sexual partner.

very low frequencies for the urban poor category (urban locality combined with the three lowest quintiles of the wealth index). Therefore, urban poor and urban non-poor were combined into one category to represent urban. Rural poor included respondents in a rural locality and also in the two lowest quintiles of the wealth index (poorest and poor), and rural non-poor included rural respondents in the three highest quintiles of the wealth index (middle, rich, and richer). Education of the partner was not included in the analysis because this was highly correlated with the respondent's education. Finally, lifetime number of sexual partners contained numerical responses that were categorized differently for women and men because of the different distributions of this variable by gender.

### *2.3.3. Regressions*

The regressions were restricted to men and women who had sex in the past 12 months and were age 15-49. A stratified sampling design was used, with the strata variable created from the locality (urban/rural residence) and region for each country. Unadjusted and adjusted logistic regressions were performed for all the countries. A separate analysis was conducted for the countries that had general alcohol consumption questions (Lesotho, Namibia, Swaziland and Zambia) and only included ever- or current drinkers. Alcohol frequency was an independent variable in the analysis; it was used to examine whether higher frequency of drinking (among drinkers) increased the odds of unsafe sex. All analyses were conducted with Stata/SE software, version 13.0.

# 3. Results

### 3.1. Inventory of Alcohol-related Questions in DHS Surveys

Sixty-five surveys carried out in 42 countries between 1987 and 2014 contained 19 different questions related to alcohol consumption. Six of those surveys did not include a man's questionnaire. Although most surveys asked questions about alcohol of both men and women—in countries where both were surveyed—some surveys only asked alcohol-related questions of one or the other (men or women). For example, DHS surveys in Benin in 2001 and 2006 asked the questions of women only, while Ethiopia 2011 and Nepal 2001 asked the questions of men only. Other surveys asked questions about alcohol only to a subsample of youth age 15-24, or the survey itself only included this population, as in Indonesia (Special DHS 2002-03, 2007, 2012). Tables 3 through 5 present the 65 surveys by region and type of question asked: alcohol consumption (ever, current, recent, typical), frequency or quantity of alcohol consumption, and heavy alcohol consumption. Table 3 shows surveys that asked about ever or current drinking as well as age at first drink, recent drinking, and type of drink typically consumed. The most common question was "Have you ever consumed alcohol?" or something similar such as "Have you ever had an alcoholic drink?" This general question was asked in 49 of the 65 surveys. At least one question about current drinking, such as "Do you drink?" or "Do you currently drink alcohol?" or "Did you drink in the last two weeks/month/ . . .?" was asked in 22 surveys.

**Table 3. DHS surveys that include questions related to alcohol consumption (ever, current, recent, typical), 1987-2014**

| Country and survey year | Have you ever consumed alcoholic beverages? | How old were you when you had your first drink? | Do you [currently] drink alcohol? | Did you drink in the last [time period]? | What type of alcoholic beverage do you typically drink? |
|---|---|---|---|---|---|
| **sub-Saharan Africa** | | | | | |
| Benin 2006 DHS** | ✓ | -- | -- | -- | -- |
| Benin 2001 DHS** | ✓ | -- | -- | -- | -- |
| Burkina Faso 2003 DHS | ✓ | -- | -- | -- | -- |
| Cape Verde 2005 DHS** | ✓ | -- | -- | -- | -- |
| Equatorial Guinea 2011 DHS | ✓ | -- | -- | -- | -- |
| Ethiopia 2011 DHS* | ✓ | -- | -- | -- | -- |
| Ghana 2008 DHS | -- | -- | ✓ | [7 days] | -- |
| Kenya 2003 DHS | ✓ | -- | -- | -- | -- |
| Lesotho 2009 DHS* | ✓ | -- | -- | -- | -- |
| Lesotho 2004 DHS | ✓ | -- | -- | -- | -- |
| Liberia 2013 DHS | -- | -- | -- | [month] | -- |
| Liberia 2007 DHS*** | ✓ | -- | -- | -- | -- |
| Madagascar 2003-2004 DHS | ✓ | -- | -- | -- | -- |
| Malawi 2004 DHS | ✓ | -- | -- | -- | -- |
| Malawi 2000 DHS** | ✓ | -- | -- | -- | -- |
| Mozambique 2009 AIS | ✓ | -- | -- | -- | -- |
| Mozambique 2003 DHS | ✓ | -- | ✓ | -- | ✓ |
| Namibia 2013 DHS | ✓ | -- | -- | [2 weeks] | -- |
| Namibia 2006-07 | ✓ | -- | -- | -- | -- |
| Namibia 2000 DHS | ✓ | -- | -- | -- | -- |
| Nigeria 2003 DHS | ✓ | -- | -- | -- | -- |
| Rwanda 2005 DHS* | ✓ | -- | -- | -- | -- |
| Rwanda 2000 DHS | ✓ | -- | -- | -- | -- |
| South Africa 2003 DHS | ✓ | -- | -- | [12 months] | -- |
| South Africa 1998 DHS | ✓ | -- | ✓ | -- | -- |
| Swaziland 2006-07 DHS** | -- | -- | ✓ | -- | -- |
| Uganda 2000-01 DHS | ✓ | -- | ✓ | -- | -- |
| Zambia 2013-14 DHS | -- | -- | ✓ | -- | -- |
| Zambia 2007 DHS | -- | -- | ✓ | -- | -- |
| Zambia 2001-02 DHS | ✓ | -- | -- | -- | -- |
| Zimbabwe 1999 DHS** | -- | -- | -- | -- | -- |

**(Continued)**

**Table 3. − *Continued***

| Country and survey year | Have you ever consumed alcoholic beverages? | How old were you when you had your first drink? | Do you [currently] drink alcohol? | Did you drink in the last [time period]? | What type of alcoholic beverage do you typically drink? |
|---|---|---|---|---|---|
| **Asia and Europe** | | | | | |
| Albania, 2008, DHS | ✓ | -- | -- | [12 months] | -- |
| Armenia 2000 DHS | ✓ | -- | ✓ | -- | -- |
| Azerbaijan 2006 DHS* | -- | -- | -- | -- | -- |
| India 2005-06 DHS | ✓ | -- | -- | -- | -- |
| India 1998-99 DHS**** | ✓ | -- | -- | -- | -- |
| Indonesia 2012 DHS | ✓ | ✓ | -- | -- | -- |
| Indonesia 2012 Special*** | ✓ | ✓ | -- | -- | -- |
| Indonesia 2007 Special*** | ✓ | ✓ | -- | -- | -- |
| Indonesia 2002-03 Special*** | ✓ | ✓ | -- | -- | -- |
| Kazakhstan 1999 DHS | ✓ | -- | -- | -- | -- |
| Kyrgz Republic 2012 DHS | ✓ | ✓ | -- | -- | -- |
| Maldives 2009 DHS*** | ✓ | -- | -- | -- | -- |
| Moldova 2005 DHS | -- | -- | -- | -- | -- |
| Nepal 2001 DHS* | ✓ | -- | -- | -- | -- |
| Philippines 2003 DHS* | ✓ | -- | -- | -- | -- |
| Turkmenistan 2000 DHS** | ✓ | -- | ✓ | -- | -- |
| Ukraine 2007 DHS | ✓ | -- | -- | -- | -- |
| Uzbekistan 2002 Special | ✓ | -- | -- | [12 months] | -- |
| **Latin America/Caribbean** | | | | | |
| Bolivia 2008 | -- | -- | ✓ | -- | -- |
| Colombia 2010 DHS** | -- | -- | ✓ | -- | -- |
| Dominican Republic 2013 DHS | -- | -- | -- | [30 days] | -- |
| Dominican Republic 2013 Special | -- | -- | -- | [30 days] | -- |
| Dominican Republic 2007 DHS | ✓ | -- | -- | -- | -- |
| Dominican Republic 2007 Special | ✓ | -- | -- | -- | -- |
| Dominican Republic 2002 | ✓ | -- | -- | -- | -- |
| Guatemala 1987 DHS** | -- | -- | -- | -- | |
| Guyana 2009 DHS | -- | -- | -- | [30 days] | -- |
| Haiti 2012 DHS | ✓ | -- | -- | -- | ✓ |
| Haiti 2005-06 DHS | ✓ | -- | -- | -- | ✓ |
| Haiti 2000 DHS | ✓ | -- | -- | -- | -- |
| Honduras 2011-2012 DHS | ✓ | -- | -- | -- | -- |
| Peru 2013 Continuous** | ✓ | -- | -- | [12 months and 3 months ] | ✓ |
| Peru 2012 Continuous** | -- | -- | -- | [month] | ✓ |
| Peru 2011 Continuous** | -- | -- | -- | [month] | ✓ |

Note: * men only, ** women only, *** youth age 15-24 only (women and men), **** head of household only

Table 4 shows that questions on the frequency of drinking were asked fairly consistently in 46 surveys. The question was often phrased as, “During the last [time period], how many days did you drink?” The most common time period was three months (in 23 surveys), although some surveys referred to seven days, two weeks, 30 days, one month, or 12 months. Some surveys referred to “occasions” or “times”, rather than “days”. Table 4 also shows that questions on the quantity of alcohol consumed were less likely to be included in surveys. Only 14 surveys asked about specific quantity of alcohol consumed, with variations focused on the quantity of recent drinking or the average amount consumed.

**Table 4. DHS surveys that include questions related to frequency or quantity of alcohol consumption, 1987-2014**

| | Frequency of Drinking | | Quantity | | | |
|---|---|---|---|---|---|---|
| **Country and survey year** | **During the last [time period], how many days did you drink?** | **How often/ frequently do you drink alcoholic beverages?** | **In the past [time period], on the days that you drank, how many drinks did you usually have?** | **How many drinks do you have in a week/ weekend?** | **When you drink alcohol, how many drinks do you have each day?** | **In the past 30 days, what was the largest number of drinks you had on a single occasion?** |
| **sub-Saharan Africa** | | | | | | |
| Benin 2006 DHS** | [3 months] | -- | -- | -- | -- | -- |
| Benin 2001 DHS** | [3 months] | -- | -- | -- | -- | -- |
| Burkina Faso 2003 DHS | [3 months] | -- | -- | -- | -- | -- |
| Cape Verde 2005 DHS** | -- | -- | -- | -- | -- | -- |
| Equatorial Guinea 2011 DHS | [3 months] | -- | -- | -- | -- | -- |
| Ethiopia 2011 DHS* | [30 days] | -- | -- | -- | -- | -- |
| Ghana 2008 DHS | [7 days] | -- | -- | -- | -- | -- |
| Kenya 2003 DHS | [month] | -- | -- | -- | -- | -- |
| Lesotho 2009 DHS* | [3 months] | -- | -- | -- | -- | -- |
| Lesotho 2004 DHS | [3 months] | -- | -- | -- | -- | -- |
| Liberia 2013 DHS | [month] | -- | [month] | -- | -- | -- |
| Liberia 2007 DHS*** | -- | -- | -- | -- | -- | -- |
| Madagascar 2003-2004 DHS | [3 months] | -- | -- | -- | -- | -- |
| Malawi 2004 DHS | -- | -- | -- | -- | -- | -- |
| Malawi 2000 DHS** | [3 months] | -- | -- | -- | -- | -- |
| Mozambique 2009 AIS | [12 months] | -- | -- | -- | -- | -- |
| Mozambique 2003 DHS | [3 months] | ✓ | -- | -- | -- | -- |
| Namibia 2013 DHS | [2 weeks] | -- | [2 weeks] | -- | -- | -- |
| Namibia 2006-07 | [month] | -- | -- | -- | -- | -- |
| Namibia 2000 DHS | [month] | -- | -- | -- | -- | -- |
| Nigeria 2003 DHS | [3 months] | -- | -- | -- | -- | -- |
| Rwanda 2005 DHS* | [3 months] | -- | -- | -- | -- | -- |
| Rwanda 2000 DHS | [3 months] | -- | -- | -- | -- | -- |
| South Africa 2003 DHS | [12 months] | -- | [7 days] | -- | ✓ | -- |
| South Africa 1998 DHS | -- | -- | -- | -- | [week/weekend] | -- |
| Swaziland 2006-07 DHS** | -- | ✓ | -- | -- | -- | -- |
| Uganda 2000-01 DHS | [30 days] | -- | -- | -- | -- | -- |
| Zambia 2013-14 DHS | [7 days] | -- | -- | -- | -- | -- |
| Zambia 2007 DHS | [7 days] | -- | -- | -- | -- | -- |
| Zambia 2001-02 DHS | [1 month- men] [3 months- women] | -- | -- | -- | -- | -- |
| Zimbabwe 1999 DHS** | [30 days] | -- | -- | -- | -- | -- |
| **Asia and Europe** | | | | | | -- |
| Albania, 2008, DHS | -- | ✓ | -- | -- | ✓ | -- |
| Armenia 2000 DHS | [3 months] | -- | -- | -- | [week/weekend] | -- |
| Azerbaijan 2006 DHS* | [month] | ✓ | [month] | -- | -- | -- |
| India 2005-06 DHS | -- | ✓ | -- | -- | -- | -- |
| India 1998-99 DHS**** | -- | -- | -- | -- | -- | -- |
| Indonesia 2012 DHS | [3 months] | -- | -- | -- | -- | -- |
| Indonesia 2012 Special*** | [3 months] | -- | -- | -- | -- | -- |
| Indonesia 2007 Special*** | [3 months] | -- | -- | -- | -- | -- |
| Indonesia 2002-03 Special*** | [3 months] | -- | -- | -- | -- | -- |
| Kazakhstan 1999 DHS | [3 months] | -- | -- | -- | -- | -- |
| Kyrgz Republic 2012 DHS | -- | ✓ | [month] | -- | -- | -- |
| Maldives 2009 DHS*** | [month] | -- | -- | -- | -- | -- |
| Moldova 2005 DHS | -- | ✓ | [month] | -- | -- | -- |
| Nepal 2001 DHS* | [7 days] | -- | -- | -- | -- | -- |
| Philippines 2003 DHS* | [month] | -- | -- | -- | -- | -- |
| Turkmenistan 2000 DHS** | -- | -- | -- | ✓ | -- | -- |
| Ukraine 2007 DHS | -- | ✓ | [month] | -- | -- | -- |
| Uzbekistan 2002 Special | -- | -- | -- | -- | -- | -- |
| **Latin America/Caribbean** | | | | | | -- |
| Bolivia 2008 | -- | -- | -- | -- | -- | -- |
| Colombia 2010 DHS** | -- | -- | -- | -- | -- | -- |
| Dominican Republic 2013 DHS | [30 days] | -- | -- | -- | -- | -- |
| Dominican Republic 2013 Special | [30 days] | -- | -- | -- | -- | -- |
| Dominican Republic 2007 DHS | [3 months] | -- | -- | -- | -- | -- |
| Dominican Republic 2007 Special | [3 months] | -- | -- | -- | -- | -- |
| Dominican Republic 2002 | [3 months] | -- | -- | -- | -- | -- |
| Guatemala 1987 DHS** | -- | ✓ | -- | -- | -- | -- |
| Guyana 2009 DHS | [30 days] | -- | -- | -- | ✓ | ✓ |
| Haiti 2012 DHS | -- | ✓ | -- | -- | -- | -- |
| Haiti 2005-06 DHS | -- | -- | -- | -- | -- | -- |
| Haiti 2000 DHS | [3 months] | -- | -- | -- | -- | -- |
| Honduras 2011-2012 DHS | -- | ✓ | -- | -- | -- | -- |
| Peru 2013 Continuous** | [30 days] | | | | | -- |
| Peru 2012 Continuous** | [month] | -- | [last time] | ✓ | -- | -- |
| Peru 2011 Continuous** | [month] | -- | [last time] | ✓ | -- | -- |

Note: * men only, ** women only, *** youth age 15-24 only (women and men), **** head of household only

Table 5 shows that 44 surveys asked some variation of a question regarding heavy drinking, although the questions are mostly subjective and do not always specify a quantity of drinking that would allow for the clear classification of heavy or heavy episodic use. Eight different questions on heavy drinking were asked, some as general as, “Have you ever been drunk after drinking alcohol?” to more specific questions such as, “In the past [time period], how many times did you have four or more standard drinks of alcohol on one occasion?” Among the questions about heavy drinking, the question “In the last [time period], how many days have you been drunk?” was the most common, appearing in 19 surveys. Again, three months was the most common time period, used in 14 surveys.

**Table 5. DHS surveys that include questions related to heavy alcohol consumption, 1987-2014**

| Country and survey year | In the past [time period], have there been days when you had more than usual? | In the past [time period], how many times did you have four or more standard drinks (glasses, cups) of alcoholic drinks on one occasion? | In the past [time period], how many drinks did you have on the days that you drank more than usual? | How often did you drink that amount (more than usual)? | Have you ever been drunk after drinking alcohol? | In the last [time period], how many days have you been drunk? | In the last [time period] months, how often have you gotten drunk? | Do you usually binge drink? |
|---|---|---|---|---|---|---|---|---|
| **sub-Saharan Africa** | | | | | | | | |
| Benin 2006 DHS** | -- | -- | -- | -- | ✓ | [3 months] | -- | -- |
| Benin 2001 DHS** | -- | -- | -- | -- | ✓ | [3 months] | -- | -- |
| Burkina Faso 2003 DHS | -- | -- | -- | -- | ✓ | [3 months] | -- | -- |
| Cape Verde 2005 DHS** | -- | -- | -- | -- | ✓ | -- | [3 months] | -- |
| Equatorial Guinea 2011 DHS | -- | -- | -- | -- | -- | -- | [ever] | -- |
| Ethiopia 2011 DHS* | -- | -- | -- | -- | -- | -- | -- | -- |
| Ghana 2008 DHS* | -- | -- | -- | -- | -- | -- | [no time specified] | -- |
| Kenya 2003 DHS | -- | -- | -- | -- | -- | -- | -- | -- |
| Lesotho 2009 DHS* | -- | -- | -- | -- | ✓ | [3 months] | -- | -- |
| Lesotho 2004 DHS | -- | -- | -- | -- | ✓ | [3 months] | -- | -- |
| Liberia 2013 DHS | -- | -- | -- | -- | ✓ | -- | -- | -- |
| Liberia 2007 DHS*** | -- | -- | -- | -- | ✓ | -- | -- | -- |
| Madagascar 2003-2004 DHS | -- | -- | -- | -- | ✓ | [3 months] | -- | -- |
| Malawi 2004 DHS | -- | -- | -- | -- | -- | -- | [no time specified] | -- |
| Malawi 2000 DHS** | -- | -- | -- | -- | ✓ | [3 months] | -- | -- |
| Mozambique 2009 AIS | -- | -- | -- | -- | -- | -- | -- | -- |
| Mozambique 2003 DHS | -- | -- | -- | -- | ✓ | [3 months] | -- | -- |
| Namibia 2013 DHS | -- | -- | -- | -- | ✓ | -- | -- | -- |
| Namibia 2006-07 | -- | -- | -- | -- | ✓ | [month] | -- | -- |
| Namibia 2000 DHS | -- | -- | -- | -- | ✓ | [month] | -- | -- |
| Nigeria 2003 DHS | -- | -- | -- | -- | ✓ | [3 months] | -- | -- |
| Rwanda 2005 DHS* | -- | -- | -- | -- | ✓ | -- | -- | -- |
| Rwanda 2000 DHS | -- | -- | -- | -- | ✓ | -- | -- | -- |
| South Africa 2003 DHS | -- | -- | -- | -- | ✓ | -- | -- | -- |
| South Africa 1998 DHS | -- | -- | -- | -- | ✓ | -- | -- | -- |
| Swaziland 2006-07 DHS** | -- | -- | -- | -- | ✓ | [3 months] | -- | -- |
| Uganda 2000-01 DHS | -- | -- | -- | -- | ✓ | [30 days] | -- | -- |
| Zambia 2013-14 DHS | -- | -- | -- | -- | -- | -- | -- | -- |
| Zambia 2007 DHS | -- | -- | -- | -- | -- | -- | -- | -- |
| Zambia 2001-02 DHS | -- | -- | -- | -- | ✓ | [1 month-men] [3 months-women] | -- | -- |
| Zimbabwe 1999 DHS** | -- | -- | -- | -- | -- | [30 days] | -- | -- |

**(Continued)**

**Table 5. − *Continued***

| Country and survey year | In the past [time period], have there been days when you had more than usual? | In the past [time period], how many times did you have four or more standard drinks (glasses, cups) of alcoholic drinks on one occasion? | In the past [time period], how many drinks did you have on the days that you drank more than usual? | How often did you drink that amount (more than usual)? | Have you ever been drunk after drinking alcohol? | In the last [time period], how many days have you been drunk? | In the last [time period] months, how often have you gotten drunk? | Do you usually binge drink? |
|---|---|---|---|---|---|---|---|---|
| **Asia and Europe** | | | | | | | | |
| Albania, 2008, DHS | -- | -- | -- | -- | -- | -- | -- | -- |
| Armenia 2000 DHS | -- | -- | -- | -- | -- | -- | -- | -- |
| Azerbaijan 2006 DHS* | [3 months] | -- | ✓ | ✓ | -- | -- | -- | -- |
| India 2005-06 DHS | -- | -- | -- | -- | -- | -- | -- | -- |
| India 1998-99 DHS**** | -- | -- | -- | -- | -- | -- | -- | -- |
| Indonesia 2012 DHS | -- | -- | -- | -- | ✓ | -- | -- | -- |
| Indonesia 2012 Special*** | -- | -- | -- | -- | ✓ | -- | -- | -- |
| Indonesia 2007 Special*** | -- | -- | -- | -- | ✓ | -- | -- | -- |
| Indonesia 2002-03 Special*** | -- | -- | -- | -- | ✓ | -- | -- | -- |
| Kazakhstan 1999 DHS | -- | -- | -- | -- | ✓ | [3 months] | -- | -- |
| Kyrgz Republic 2012 DHS | [3 months] | -- | ✓ | ✓ | -- | -- | -- | -- |
| Maldives 2009 DHS*** | -- | -- | -- | -- | -- | -- | -- | -- |
| Moldova 2005 DHS | [1 month-women] [3 months-men] | -- | [1 month-women] [3 months-men] | -- | -- | -- | -- | -- |
| Nepal 2001 DHS* | -- | -- | -- | -- | -- | -- | -- | -- |
| Philippines 2003 DHS* | -- | -- | -- | -- | -- | -- | -- | -- |
| Turkmenistan 2000 DHS** | -- | -- | -- | -- | ✓ | -- | -- | -- |
| Ukraine 2007 DHS | [3 months] | -- | [3 months] | -- | -- | -- | -- | -- |
| Uzbekistan 2002 Special | -- | -- | -- | -- | -- | -- | -- | -- |
| **Latin America/Caribbean** | | | | | | | | |
| Bolivia 2008 | -- | -- | -- | -- | -- | -- | -- | -- |
| Colombia 2010 DHS** | -- | -- | -- | -- | -- | [12 months] | -- | -- |
| Dominican Republic 2013 DHS | -- | [30 days] | -- | -- | -- | -- | -- | -- |
| Dominican Republic 2013 Special | -- | [30 days] | -- | -- | -- | -- | -- | -- |
| Dominican Republic 2007 DHS | -- | -- | -- | -- | -- | -- | -- | -- |
| Dominican Republic 2007 Special | -- | -- | -- | -- | -- | -- | -- | -- |
| Dominican Republic 2002 | -- | -- | -- | -- | ✓ | [3 months] | -- | -- |
| Guatemala 1987 DHS** | -- | -- | -- | -- | -- | -- | -- | -- |
| Guyana 2009 DHS | -- | -- | -- | -- | -- | -- | -- | -- |
| Haiti 2012 DHS | -- | -- | -- | -- | ✓ | -- | -- | -- |
| Haiti 2005-06 DHS | -- | -- | -- | -- | ✓ | -- | -- | -- |
| Haiti 2000 DHS | -- | -- | -- | -- | ✓ | [3 months] | -- | -- |
| Honduras 2011-2012 DHS | -- | -- | -- | -- | -- | -- | -- | ✓ |
| Peru 2013 Continuous** | -- | -- | -- | -- | -- | -- | -- | -- |
| Peru 2012 Continuous** | -- | -- | -- | -- | -- | -- | -- | -- |
| Peru 2011 Continuous** | -- | -- | -- | -- | -- | -- | -- | -- |

Note: * men only, ** women only, *** youth age 15-24 only (women and men), **** head of household only

Table 6 lists all 19 of the alcohol-related questions from the DHS surveys by type of response elicited—yes or no (dichotomous), numerical (continuous), and categorical responses. This table highlights a major technical problem faced by researchers analyzing alcohol consumption. Similar types of questions involve different types of response options, therefore limiting comparison across countries. For example, questions about frequency of drinking can elicit either numerical or categorical responses, depending on the survey. An even greater problem occurs when the same question appears in different surveys but with different response options, a situation that can lead to overlapping categories or subjective measures. For example, response options to questions about frequency of drinking such as, "How often do you drink alcohol?" vary across surveys, as in this example from the Swaziland 2006-07 DHS:

Less than once a month
Once a month
Once a week
2-3 times per week
Every day
Other (specify)

Compared with the Albania 2008 DHS:

5 or more days per week
1-4 days per week
1-3 days per month
Less than once a month

Or the Honduras 2011-2012 DHS:

Frequently
Sometimes
Almost never

These different response options make it impossible to compare results across surveys. For example in Swaziland (2006-07), the category "once a week" could potentially be compared with either "1-3 days per month" or "1-4 days per week" in the Albania 2008 survey. Likewise, "1-4 days per week" in Albania could fall under either "once a week" or the "2-3 three times per week" in the Swaziland 2006-07 survey.

**Table 6. Questions on alcohol consumption included in DHS surveys by type of response elicited (yes/no, numerical, categorical)**

| |
|---|
| **Questions eliciting a dichotomous (yes/no) response:** |
| Have you ever consumed alcoholic beverages? |
| Do you [currently] drink alcohol? |
| Did you drink in the last [time period]? |
| In the past [time period], have there been days when you had more than usual? |
| Have you ever been drunk after drinking alcohol? |
| Do you usually binge drink? |
| **Questions eliciting a numerical response?** |
| How old were you when you had your first drink? |
| During the last [time period], how many days did you drink? |
| In the past [time period], on the days that you drank, how many drinks did you usually have? |
| How many drinks do you have in a week/ weekend? |
| When you drink alcohol, how many drinks do you have each day? |
| In the last [time period], how many days have you been drunk? |
| In the past [time period], how many drinks did you have on the days that you drank more than usual? |
| In the past 30 days, what was the largest number of drinks you had on a single occasion? |
| In the past [time period], how many times did you have four or more standard drinks (glasses, cups) of alcoholic drinks on one occasion? |
| **Questions eliciting a categorical response:** |
| What type of drink do you have most often? |
| How often/frequently do you drink alcoholic beverages? |
| How often did you drink that amount (more than usual)? |
| In the last [time period] months, how often have you gotten drunk? |

### 3.2. Prevalence of Ever Having Consumed Alcohol

The most common question, "Have you ever had an alcoholic drink?" appropriately elicits a yes or no response across all surveys where that question was asked. Using this question, prevalence of ever-drinking among all adults surveyed was assessed using data from 36 surveys in three regions. Figures 1 through 3 show the regional percentages of men and women who have ever had an alcoholic drink. Among men in sub-Saharan Africa (Figure 1), the range is from 30 percent in the Malawi 2000 survey to 76 percent in the Rwanda 2005 survey. Among women in sub-Saharan Africa, the range is from two percent in the Malawi 2000 survey to 58 percent in the Rwanda 2000 survey. Although not all surveys asked this question of both men and women, the survey with the largest differential between men and women in ever consuming alcohol was the Zambia 2001-02 survey, with a difference of 40 percentage points (63 percent for men and

23 percent for women). Ethiopia (2011) and Burkina Faso (2003) had the smallest differences between men and women, at around 10 percentage points each.

**Figure 1. Percent of males and females who have ever had an alcoholic drink, sub-Saharan Africa**

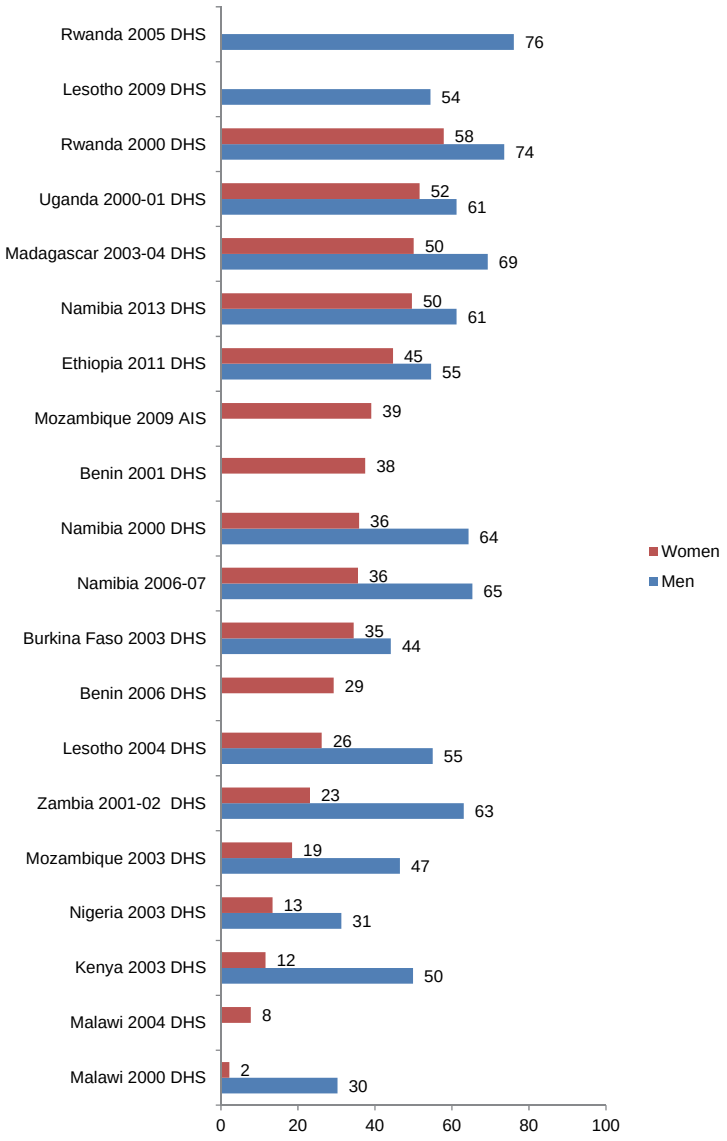


Figure 2 shows that in the Asia and Europe region, the Ukraine 2007 survey had the highest percentages of ever-drinking (90 percent for men and 85 percent for women), while the India 2005-06 survey had the lowest percentages of ever-drinking (32 percent for men and two percent for women). The gap between men and women was largest in the Armenia 2000 survey (37 percentage points) and smallest in the Ukraine 2007 survey (5 percentage points).

**Figure 2. Percent of males and females who have ever had an alcoholic drink, Asia and Europe**

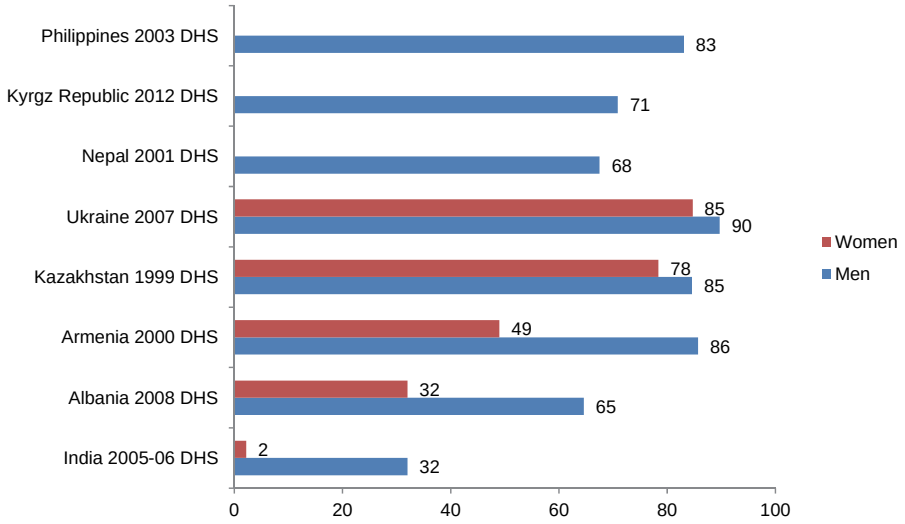
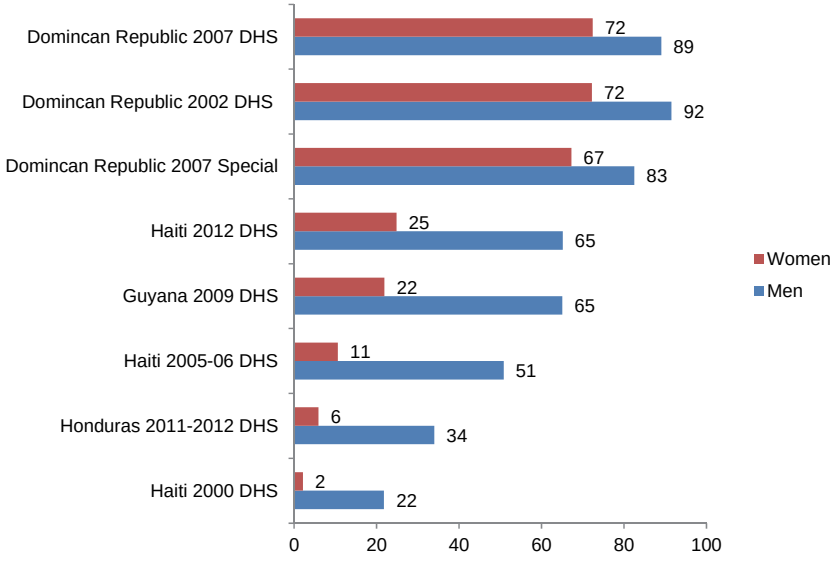



Figure 3 shows that in Latin America, men and women in the Dominican Republic had the highest percentages of ever-drinking (92 percent for men in the 2002 survey and 72 percent for women in both the 2002 and 2007 surveys), while men and women in the Haiti 2000 survey had the lowest levels of ever-drinking (22 percent and 2 percent, respectively). The smallest differentials between men and women were in the Dominican Republic 2007 survey and the Dominican Republic 2007 Special survey (15-16 percentage points). The largest differential was in the Guyana 2009 survey—a difference of 43 percentage points between men and women.

**Figure 3. Percent of males and females who have ever had an alcoholic drink, Latin America**



One other finding of note regarding the alcohol questions in DHS surveys is the general lack of specification of what constitutes a standard drink size. In the United States, a bottle of beer (12 oz) with 5 percent alcohol, a glass of wine (5 oz) with 12 percent alcohol, or a shot of liquor (1.5 oz) with 40 percent alcohol are considered standard drink sizes (DHHS 2010). Only three surveys (Azerbaijan 2006, Moldova 2005, and Ukraine 2007) defined a standard drink by the amount of pure alcohol in different types of beverages and specified the different sizes for each type.

## 3.3. Alcohol Use and Unsafe Sex in Sub-Saharan Africa

### *3.3.1. Descriptive results*

Table 7 summarizes the alcohol-related variables in DHS data for Lesotho, Namibia, Swaziland, and Zambia. These countries were used in the logistic regressions of unsafe sex, along with Kenya, Mozambique, Swaziland (men), Uganda, and Zimbabwe; however, the latter four countries do not appear in Table 7 because they did not include general questions about alcohol consumption, only questions about alcohol consumption at last sex. As indicated in Table 3, the question on alcohol consumption was for lifetime drinking status (ever drank alcohol) in Lesotho and Namibia and for current drinking status (currently drink alcohol) in Swaziland and Zambia. As Table 7 shows, almost half the men in Lesotho and half the women in Namibia, as well as 61 percent of men in Namibia, reported that they ever drank alcohol. In Namibia, reported alcohol use was higher among men than women (61 percent compared with 50 percent, respectively). In Namibia the frequency and the quantity of alcohol consumption was also higher among men than women. Approximately 32 percent of men in Namibia reported having had two or more drinks in the last two weeks compared with 14 percent of women, and 16 percent of the men reported drinking an average of four drinks or more per day compared with seven percent of women.

In Swaziland and Zambia the question on alcohol consumption was for current drinking status rather than ever-drinking status. For women in both Swaziland and Zambia, current alcohol consumption was relatively low, at about 10 percent or below. More Zambian men than women reported that they currently drink alcohol (37 percent versus 10 percent). The frequency of alcohol consumption among Zambian men was also higher than women—20 percent of men in Zambia reported drinking two or more drinks in the last week compared with three percent of women. Among women in Swaziland, only three percent reported that they drank once a week or more.

**Table 7. Alcohol consumption among men and women age 15-49 in Lesotho, Namibia, Swaziland and Zambia, DHS surveys 2006-2014**

| | Lesotho 2009 | | Namibia 2013 | | | | Swaziland 2006-2007 | | Zambia 2013-2014 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Men | | Women | | Men | | Women | | Women | | Men | |
| Variable | % | N | % | N | % | N | % | N | % | N | % | N |
| **Ever drank** | | | | | | | | | | | | |
| Yes | 53.3 | 1,602 | 49.6 | 4,545 | 60.8 | 2,443 | -- | -- | -- | -- | -- | -- |
| No | 46.7 | 1,405 | 50.4 | 4,615 | 39.2 | 1,577 | -- | -- | -- | -- | -- | -- |
| **Currently drink** | | | | | | | | | | | | |
| Yes | -- | -- | -- | -- | -- | -- | 7.2 | 357 | 10.4 | 1,707 | 36.8 | 4,986 |
| No | -- | -- | -- | -- | -- | -- | 92.8 | 4,627 | 89.6 | 14,699 | 63.2 | 8,573 |
| **Alcohol frequency: number of days had one drink in the last 2 weeks** | | | | | | | | | | | | |
| 0 | -- | -- | 78.2 | 7,067 | 60.4 | 2409 | -- | -- | -- | -- | -- | -- |
| 1 | -- | -- | 7.9 | 713 | 8.0 | 319 | -- | -- | -- | -- | -- | -- |
| 2+ | -- | -- | 13.9 | 1,258 | 31.6 | 1259 | -- | -- | -- | -- | -- | -- |
| **Alcohol frequency: How often do you drink alcohol** | | | | | | | | | | | | |
| Does not drink | -- | -- | -- | -- | -- | -- | 92.9 | 4,627 | -- | -- | -- | -- |
| Once a month or less | -- | -- | -- | -- | -- | -- | 4.3 | 214 | -- | -- | -- | -- |
| Once a week | -- | -- | -- | -- | -- | -- | 1.7 | 87 | -- | -- | -- | -- |
| More than once a week | -- | -- | -- | -- | -- | -- | 1.0 | 51 | -- | -- | -- | -- |
| **Alcohol frequency: Days drank alcohol in the last week** | | | | | | | | | | | | |
| 0 | -- | -- | -- | -- | -- | -- | -- | -- | 93.9 | 15,372 | 70.2 | 9,508 |
| 1 | -- | -- | -- | -- | -- | -- | -- | -- | 3.2 | 523 | 9.6 | 1,299 |
| 2+ | -- | -- | -- | -- | -- | -- | -- | -- | 2.9 | 483 | 20.2 | 2,729 |
| **Alcohol frequency: Number of days drank alcohol in the last 3 months** | | | | | | | | | | | | |
| None | 62.6 | 1,764 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1-3 | 18.1 | 508 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-9 | 8.8 | 247 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 10-90 | 10.5 | 297 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| **Average number of alcoholic drinks consumed per day in the last 2 weeks** | | | | | | | | | | | | |
| 0 | -- | -- | 79.7 | 7,067 | 62.3 | 2,409 | -- | -- | -- | -- | -- | -- |
| 1 | -- | -- | 5.7 | 503 | 6.4 | 247 | -- | -- | -- | -- | -- | -- |
| 2 | -- | -- | 4.4 | 388 | 9.0 | 347 | -- | -- | -- | -- | -- | -- |
| 3 | -- | -- | 3.0 | 270 | 6.5 | 250 | -- | -- | -- | -- | -- | -- |
| 4+ | -- | -- | 7.2 | 636 | 15.9 | 616 | -- | -- | -- | -- | -- | -- |

Table 8 shows the variables used in the regression analysis of men or women age 15-49 who had sexual intercourse in the past 12 months. The question on alcohol consumption at last (most recent) sex was available for all the countries in the analysis except Namibia, which only asked about general alcohol consumption. Women in Uganda reported the highest proportion drinking alcohol at last sex (13 percent); the highest for men was in Zambia (12 percent) (Table 8). As with general alcohol consumption, in Kenya, Swaziland, Zambia, and Zimbabwe—all of the countries where surveys for both men and women were conducted, except for Namibia, where this question was not asked—men were more likely than women to report drinking at last sex. In Kenya, Mozambique, Swaziland, Zambia, and Zimbabwe the proportions of women who reported drinking at last sex were low (approximately 2-3 percent). Figure 4 summarizes the DHS data on alcohol consumption, unsafe sex, and HIV-positive status in the sub-Saharan countries included in the analysis. Unsafe sex was most common among men in Lesotho (21 percent), followed by men in Swaziland (20 percent), and women in Namibia (19 percent); unsafe sex was lowest in Zimbabwe among women (6 percent) and men (9 percent).

**Table 8. Variables used in the regression analyses for men or women age 15-49 who have had sexual intercourse in the past 12 months, DHS surveys in sub-Saharan Africa, 2001-2014**

| Surveys that have alcohol consumption questions | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Lesotho 2009 | | Namibia 2013 | | | | Swaziland 2006-2007 | | Zambia 2013-2014 | | | |
| | Men | | Women | | Men | | Women | | Women | | Men | |
| **Variable** | % | N | % | N | % | N | % | N | % | N | % | N |
| **Unsafe sex with last sex partner** | | | | | | | | | | | | |
| Yes | 21.1 | 477 | 19.3 | 1,281 | 12.9 | 383 | 20.2 | 693 | 10.9 | 1334 | 15.2 | 1,519 |
| No | 78.9 | 1,780 | 80.7 | 5,351 | 87.1 | 2,581 | 79.8 | 2,745 | 89.1 | 10,909 | 84.8 | 8,506 |
| **Age** | | | | | | | | | | | | |
| 15-24 | 39.8 | 899 | 31.9 | 2,121 | 31.8 | 942 | 37.3 | 1,283 | 30.5 | 3,737 | 26.5 | 2,656 |
| 25-34 | 33.8 | 763 | 35.9 | 2,383 | 35.1 | 1,041 | 33.8 | 1,165 | 38.9 | 4,772 | 35.5 | 3,561 |
| 35+ | 39.8 | 899 | 32.2 | 2,135 | 33.1 | 983 | 28.9 | 994 | 30.5 | 3,743 | 38.0 | 3,810 |
| **Locality by wealth** | | | | | | | | | | | | |
| Urban | 28.6 | 646 | 58.6 | 3,889 | 59.8 | 1,775 | 27.8 | 957 | 42.6 | 5,218 | 42.9 | 4,298 |
| Rural non-poor | 37.8 | 854 | 16.1 | 1,066 | 16.6 | 492 | 39.8 | 1,369 | 21.3 | 2,611 | 21.8 | 2,191 |
| Rural poor | 33.5 | 757 | 25.4 | 1,683 | 23.6 | 699 | 32.4 | 1,115 | 36.1 | 4,424 | 35.3 | 3,538 |
| **Education level** | | | | | | | | | | | | |
| None or primary | 61.3 | 1,384 | 23.8 | 1,580 | 29.9 | 888 | 42.1 | 1,448 | 60.7 | 7,425 | 45.9 | 4,598 |
| Secondary or more | 38.7 | 873 | 76.2 | 5,059 | 70.1 | 2,079 | 57.9 | 1,993 | 39.8 | 4,815 | 54.1 | 5,424 |
| **Ever drank** | | | | | | | | | | | | |
| Yes | 59.2 | 1,336 | 54.5 | 3,612 | 67.9 | 2,013 | -- | -- | -- | -- | -- | -- |
| No | 40.8 | 921 | 45.5 | 3,016 | 32.1 | 953 | -- | -- | -- | -- | -- | -- |
| **Currently drink** | | | | | | | | | | | | |
| Yes | -- | -- | -- | -- | -- | -- | 8.8 | 301 | 11.7 | 1,439 | 44.3 | 4,446 |
| No | -- | -- | -- | -- | -- | -- | 91.2 | 3,137 | 88.3 | 10,811 | 55.7 | 5,580 |
| **Alcohol consumption at last sex** | | | | | | | | | | | | |
| Yes | 8.4 | 191 | -- | -- | -- | -- | 1.5 | 52 | 3.4 | 411 | 11.8 | 1,184 |
| No | 91.6 | 2,066 | -- | -- | -- | -- | 98.5 | 3,375 | 96.6 | 11,815 | 88.2 | 8,827 |
| **Lifetime number of sexual partners (women)** | | | | | | | | | | | | |
| 1 | -- | -- | 29.7 | 1,938 | -- | -- | 35.7 | 1,190 | 44.8 | 5,473 | -- | -- |
| 2 | -- | -- | 30.4 | 1,980 | -- | -- | 30.2 | 1,007 | 31.1 | 3,799 | -- | -- |
| 3 | -- | -- | 21.1 | 1,375 | -- | -- | 18.6 | 620 | 14.8 | 1,813 | -- | -- |
| 4+ | -- | -- | 18.9 | 1,230 | -- | -- | 15.6 | 520 | 9.2 | 1,127 | -- | -- |
| **Lifetime number of sexual partners (men)** | | | | | | | | | | | | |
| 1-2 | 27.1 | 578 | -- | -- | 28.7 | 791 | -- | -- | -- | -- | 26.8 | 2,661 |
| 3-4 | 27.8 | 592 | -- | -- | 24.8 | 684 | -- | -- | -- | -- | 31.1 | 3,095 |
| 5-6 | 17.9 | 381 | -- | -- | 16.0 | 442 | -- | -- | -- | -- | 18.5 | 1,842 |
| 7+ | 27.2 | 579 | -- | -- | 30.5 | 842 | -- | -- | -- | -- | 23.6 | 2,346 |

| Surveys that do not ask about general alcohol consumption but do ask whether the respondent or respondent's partner were drinking during most recent sex | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Kenya 2008-2009 | | | | Mozambique 2009 | | Swaziland 2006-2007 | | Uganda 2001 | | Zimbabwe 2005-2006 | | | |
| | Women | | Men | | Women | | Men | | Women | | Women | | Men | |
| **Variables** | % | N | % | N | % | N | % | N | % | N | % | N | % | N |
| **Unsafe sex with last sex partner** | | | | | | | | | | | | | | |
| Yes | 11.2 | 671 | 11.8 | 275 | 14.5 | 1,199 | 17.2 | 426 | 10.7 | 1,578 | 6.0 | 353 | 8.8 | 385 |
| No | 88.8 | 5,307 | 88.2 | 2,048 | 85.5 | 7,081 | 82.8 | 2,051 | 89.3 | 13,225 | 94.0 | 5,526 | 91.2 | 3,996 |
| **Age** | | | | | | | | | | | | | | |
| 15-24 | 29.5 | 1,765 | 25.9 | 601 | 33.6 | 2,788 | 30.5 | 755 | 29.5 | 4,365 | 34.7 | 2,039 | 28.9 | 1,195 |
| 25-34 | 39.7 | 2,373 | 37.4 | 870 | 34.7 | 2,880 | 37.0 | 918 | 36.4 | 5,395 | 39.0 | 2,293 | 42.3 | 1,751 |
| 35+ | 30.8 | 1,843 | 36.7 | 853 | 31.7 | 2,634 | 32.5 | 805 | 34.1 | 5,050 | 26.3 | 1,547 | 28.9 | 1,195 |
| **Locality by wealth** | | | | | | | | | | | | | | |
| Urban | 25.8 | 1,545 | 30.5 | 708 | 33.1 | 2,749 | 35.2 | 873 | 19.7 | 2,923 | 35.8 | 2,107 | 41.0 | 1,798 |
| Rural non-poor | 40.6 | 2,429 | 40.1 | 932 | 32.8 | 2,726 | 38.7 | 959 | 44.0 | 6,515 | 26.7 | 1,567 | 26.2 | 1,149 |
| Rural poor | 33.6 | 2,008 | 29.4 | 683 | 34.1 | 2,827 | 26.1 | 646 | 36.3 | 5,372 | 37.5 | 2,205 | 32.7 | 1,435 |
| **Education level** | | | | | | | | | | | | | | |
| None or primary | 67.7 | 4,052 | 53.8 | 1,249 | 81.5 | 6,767 | 39.5 | 979 | 70.5 | 10,448 | 40.6 | 2,389 | 28.6 | 1,255 |
| Secondary or more | 32.3 | 1,930 | 46.2 | 1,074 | 18.5 | 1,535 | 60.5 | 1,498 | 29.5 | 4,363 | 59.4 | 3,491 | 71.4 | 3,127 |
| **Alcohol consumption at last sex** | | | | | | | | | | | | | | |
| Yes | 1.6 | 97 | 6.8 | 159 | 2.6 | 219 | 8.2 | 202 | 13.3 | 1,966 | 1.9 | 113 | 9.3 | 407 |
| No | 98.4 | 5,869 | 93.2 | 2,164 | 97.4 | 8,049 | 91.8 | 2,273 | 86.7 | 12,837 | 98.1 | 5,763 | 90.7 | 3,950 |
| **Lifetime number of sexual partners (women)** | | | | | | | | | | | | | | |
| 1 | 42.5 | 2,519 | -- | -- | 29.6 | 2,267 | -- | -- | 25.0 | 3,602 | 66.8 | 3,914 | -- | -- |
| 2 | 30.4 | 1,800 | -- | -- | 25.2 | 1,927 | -- | -- | 23.7 | 3,409 | 20.8 | 1,220 | -- | -- |
| 3 | 16.5 | 978 | -- | -- | 16.7 | 1,280 | -- | -- | 18.2 | 2,617 | 7.5 | 440 | -- | -- |
| 4+ | 10.6 | 627 | -- | -- | 28.5 | 2,182 | -- | -- | 33.1 | 4,770 | 4.9 | 284 | -- | -- |
| **Lifetime number of sexual partners (men)** | | | | | | | | | | | | | | |
| 1-2 | -- | -- | 28.0 | 583 | -- | -- | 21.8 | 501 | -- | -- | -- | -- | 33.7 | 1,447 |
| 3-4 | -- | -- | 25.4 | 529 | -- | -- | 27.5 | 631 | -- | -- | -- | -- | 28.2 | 1,211 |
| 5-6 | -- | -- | 17.8 | 371 | -- | -- | 19.8 | 453 | -- | -- | -- | -- | 16.3 | 699 |
| 7+ | -- | -- | 28.7 | 596 | -- | -- | 30.9 | 709 | -- | -- | -- | -- | 21.8 | 936 |

**Figure 4. Percentage HIV positive, percentage who had unsafe sex with last sex partner, and percentage who consumed alcohol at last sex, DHS surveys in sub-Saharan Africa, 2001-2014**

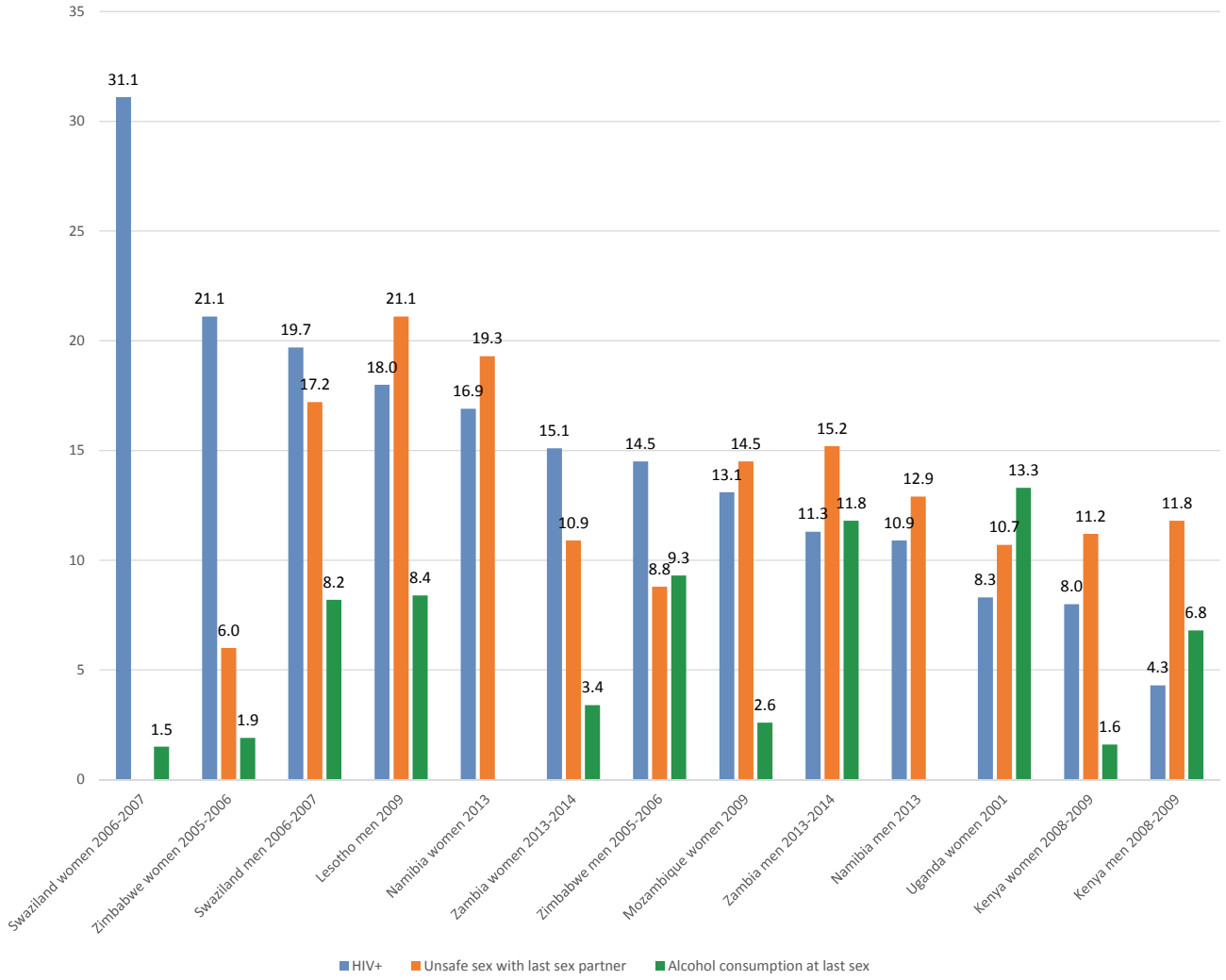



Table 9 shows the variables used in the regression analysis of men or women age 15-49 who had sexual intercourse in the past 12 months and who ever consumed alcohol or currently drink alcohol. The proportion of men who reported drinking at last sex was 13 percent in Lesotho and 25 percent in Zambia. Approximately 10 percent of women drinkers in Swaziland reported drinking at last sex compared with 14 percent of women drinkers in Zambia. It is important to note that the frequencies are small. For example, in the Swaziland survey, after selecting for women who were drinkers and who had sex in the past 12 months, only 29 of 299 women reported drinking at last sex. Unsafe sex among drinkers was highest for men in Lesotho and for women in Namibia and Swaziland (20-24 percent). Proportions in the highest alcohol frequency category (2+) were greater for men than for women in Namibia (57 percent and 31 percent, respectively) and Zambia (54 percent and 46 percent, respectively) (see Table 9).

**Table 9. Variables used in the regression analysis for men or women age 15-49 who have had sexual intercourse in the past 12 months and have ever consumed alcohol or currently drink, DHS surveys in sub-Saharan Africa, 2006-2014**

| | Lesotho 2009 | | Namibia 2013 | | | | Swaziland 2006-2007 | | Zambia 2013-2014 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Men | | Women | | Men | | Women | | Women | | Men | |
| **Variable** | % | N | % | N | % | N | % | N | % | N | % | N |
| **Unsafe sex with last sex partner** | | | | | | | | | | | | |
| Yes | 20.2 | 270 | 20.0 | 722 | 12.9 | 259 | 23.9 | 72 | 14.1 | 203 | 11.5 | 509 |
| No | 79.8 | 1,066 | 80.0 | 2,886 | 87.1 | 1,752 | 76.1 | 229 | 85.9 | 1,236 | 88.5 | 3,936 |
| **Age** | | | | | | | | | | | | |
| 15-24 | 35.3 | 471 | 31.2 | 1,128 | 33.2 | 669 | 30.8 | 93 | 19.5 | 281 | 16.9 | 753 |
| 25-34 | 35.2 | 470 | 36.9 | 1,332 | 36.5 | 735 | 29.5 | 89 | 40.4 | 582 | 39.4 | 1,750 |
| 35+ | 29.5 | 394 | 31.9 | 1,153 | 33.2 | 669 | 39.7 | 120 | 40.1 | 577 | 43.7 | 1,942 |
| **Locality by wealth** | | | | | | | | | | | | |
| Urban | 33.0 | 440 | 59.5 | 2,151 | 59.2 | 1,192 | 42.0 | 127 | 59.9 | 861 | 50.0 | 2,225 |
| Rural non-poor | 36.8 | 492 | 16.8 | 608 | 17.3 | 349 | 27.4 | 82 | 11.4 | 164 | 15.1 | 670 |
| Rural poor | 30.2 | 404 | 23.6 | 854 | 23.5 | 472 | 30.6 | 92 | 28.7 | 414 | 34.9 | 1,551 |
| **Education level** | | | | | | | | | | | | |
| None or primary | 58.0 | 774 | 22.2 | 801 | 28.5 | 574 | 42.1 | 127 | 54.2 | 780 | 45.6 | 2,025 |
| Secondary or more | 42.0 | 562 | 77.8 | 2,811 | 71.5 | 1,438 | 57.9 | 174 | 45.8 | 659 | 54.4 | 2,416 |
| **Alcohol frequency: Number of days drank alcohol in the last 3 months** | | | | | | | | | | | | |
| None | 22.7 | 267 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1-3 | 35.9 | 422 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-9 | 18.3 | 215 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 10-90 | 23.2 | 272 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| **Alcohol frequency: In past 2 weeks** | | | | | | | | | | | | |
| None | -- | -- | 51.5 | 1,808 | 30.5 | 605 | -- | -- | -- | -- | -- | -- |
| 1 | -- | -- | 17.4 | 610 | 12.9 | 255 | -- | -- | -- | -- | -- | -- |
| 2+ | -- | -- | 31.1 | 1,092 | 56.7 | 1,125 | -- | -- | -- | -- | -- | -- |
| **Alcohol frequency: how often do you drink** | | | | | | | | | | | | |
| Once month or less | -- | -- | -- | -- | -- | -- | 60.1 | 178 | -- | -- | -- | -- |
| Once a week | -- | -- | -- | -- | -- | -- | 24.3 | 72 | -- | -- | -- | -- |
| > Once week | -- | -- | -- | -- | -- | -- | 15.6 | 46 | -- | -- | -- | -- |
| **Alcohol frequency: In past week** | | | | | | | | | | | | |
| None | -- | -- | -- | -- | -- | -- | -- | -- | 38.7 | 547 | 18.2 | 804 |
| 1 | -- | -- | -- | -- | -- | -- | -- | -- | 32.1 | 454 | 26.1 | 1,156 |
| 2+ | -- | -- | -- | -- | -- | -- | -- | -- | 29.3 | 414 | 55.7 | 2,465 |
| **Alcohol consumption at last sex** | | | | | | | | | | | | |
| Yes | 13.1 | 175 | -- | -- | -- | -- | 9.7 | 29 | 14.1 | 203 | 25.4 | 1,127 |
| No | 86.9 | 1,161 | -- | -- | -- | -- | 90.3 | 270 | 85.9 | 1,234 | 74.6 | 3,308 |
| **Lifetime number of sexual partners (women)** | | | | | | | | | | | | |
| 1 | -- | -- | 25.7 | 910 | -- | -- | 14.0 | 39 | 30.1 | 428 | -- | -- |
| 2 | -- | -- | 30.3 | 1,075 | -- | -- | 20.3 | 57 | 29.0 | 413 | -- | -- |
| 3 | -- | -- | 22.3 | 790 | -- | -- | 25.8 | 72 | 19.7 | 280 | -- | -- |
| 4+ | -- | -- | 21.7 | 767 | -- | -- | 39.9 | 111 | 21.1 | 300 | -- | -- |
| **Lifetime number of sexual partners (men)** | | | | | | | | | | | | |
| 1-2 | 20.4 | 256 | -- | -- | 27.9 | 517 | -- | -- | -- | -- | 19.6 | 863 |
| 3-4 | 27.3 | 343 | -- | -- | 24.2 | 449 | -- | -- | -- | -- | 31.7 | 1,394 |
| 4-6 | 18.6 | 235 | -- | -- | 16.8 | 312 | -- | -- | -- | -- | 19.7 | 865 |
| 7+ | 33.7 | 424 | -- | -- | 31.1 | 576 | -- | -- | -- | -- | 29.0 | 1,275 |

### *3.3.2. Regression results*

#### *3.3.2.1. Alcohol variables*

Table 10 summarizes the unadjusted and adjusted logistic regressions for unsafe sex, which include the general alcohol consumption variable (ever drank and currently drink), to examine global associations and the event-level variable: alcohol consumption at last sex. In general, the global association between alcohol consumption and unsafe sex appeared weak, especially for lifetime drinking status. Ever-drinking was not a significant predictor of unsafe sex in Lesotho and Namibia, and current drinking status was only significant among men in Zambia, where current drinkers were less likely to engage in unsafe sex compared with non-drinkers (OR 0.7, $p < 0.001$).

The event-level analysis revealed that alcohol consumption at last sex was a significant predictor of unsafe sex among men in Lesotho (OR 1.8, p<0.01), men in Swaziland (OR 3.1, p<0.001), women in Zambia (OR 1.8, p<0.001), men in Zambia (OR 1.9, p<0.001), and women in Uganda (OR 1.3, p<0.01). The results indicate that in these countries respondents who drank at last sex had higher odds of engaging in unsafe sex compared with respondents who did not drink at last sex. This variable was not a significant predictor among women in Swaziland, women and men in Kenya, women in Mozambique, and women and men in Zimbabwe.

**Table 10. Unadjusted (UA) and adjusted (AD) logistic regressions of unsafe sex for men and women age 15-49 who had intercourse in the past 12 months, DHS surveys in sub-Saharan Africa, 2001-2014**

| | Lesotho 2009 | | Namibia 2013 | | | | Swaziland 2006-2007 | | Zambia 2013-2014 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Men | | Women | | Men | | Women | | Women | | Men | |
| Variable | UA OR | AD OR | UA OR | AD OR | UA OR | AD OR | UA OR | AD OR | UA OR | AD OR | UA OR | AD OR |
| **Age** | | | | | | | | | | | | |
| 15-24 | **3.0*** ** | **4.0*** ** | **2.4*** ** | **2.8*** ** | **2.2*** ** | **2.7*** ** | **3.7*** ** | **4.6*** ** | **5.1*** ** | **5.9*** ** | **20.6*** ** | **24.2*** ** |
| 25-34 | 1.3 | 1.4 | **1.5*** ** | **1.6*** ** | **1.8*** ** | **1.9*** ** | **1.5** ** | **1.6*** ** | 1.2 | **1.2* ** | **3.0*** ** | **3.2*** ** |
| 35+ | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. |
| **Locality by wealth** | | | | | | | | | | | | |
| Urban | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. |
| Rural non-poor | **4.5*** ** | **3.5*** ** | **1.5*** ** | **1.6*** ** | 1.3 | 1.1 | 1.1 | 1.2 | **0.8* ** | 1.0 | 1.2 | 0.9 |
| Rural poor | **5.5*** ** | **3.9*** ** | **1.6*** ** | **1.7*** ** | **1.7*** ** | **1.4* ** | **1.4** ** | **1.3* ** | **0.8* ** | 1.0 | 0.9 | **0.8* ** |
| **Education level** | | | | | | | | | | | | |
| None or primary | **3.3*** ** | **3.0*** ** | **1.2* ** | **1.2* ** | **1.6*** ** | **1.8*** ** | **1.3* ** | **1.2* ** | **0.5*** ** | **0.7*** ** | 0.9 | **1.3** ** |
| Secondary or more | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. |
| **Ever drank** | | | | | | | | | | | | |
| Yes | 0.9 | 1.1 | 1.1 | 1.1 | 1.0 | 0.9 | -- | -- | -- | -- | -- | -- |
| No | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | -- | -- | -- | -- | -- | -- |
| **Currently drink** | | | | | | | | | | | | |
| Yes | -- | -- | -- | -- | -- | -- | 1.3 | 1.2 | **1.4*** ** | 1.2 | **0.6*** ** | **0.7*** ** |
| No | -- | -- | -- | -- | -- | -- | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. |
| **Alcohol consumption at last sex** | | | | | | | | | | | | |
| Yes | 1.4 | **1.8** ** | -- | -- | -- | -- | 1.0 | 1.3 | **1.8*** ** | **1.8** ** | 1.1 | **1.9*** ** |
| No | Ref. | Ref. | -- | -- | -- | -- | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. |
| **Lifetime of sexual partners (women)** | | | | | | | | | | | | |
| 1 | -- | -- | Ref. | Ref. | -- | -- | Ref. | Ref. | Ref. | Ref. | -- | -- |
| 2 | -- | -- | **1.2* ** | **1.4*** ** | -- | -- | 0.9 | 1.1 | **1.4** ** | **1.5*** ** | -- | -- |
| 3 | -- | -- | **1.4** ** | **1.8*** ** | -- | -- | 1.2 | **1.6*** ** | **2.3*** ** | **2.8*** ** | -- | -- |
| 4+ | -- | -- | **1.4*** ** | **1.9*** ** | -- | -- | **1.4** ** | **2.2*** ** | **3.2*** ** | **4.3*** ** | -- | -- |
| **Lifetime of sexual partners (men)** | | | | | | | | | | | | |
| 1-2 | Ref. | Ref. | -- | -- | Ref. | Ref. | -- | -- | -- | -- | Ref. | Ref. |
| 3-4 | 1.3 | **1.5* ** | -- | -- | 1.1 | 1.1 | -- | -- | -- | -- | **0.8* ** | 1.2 |
| 4-6 | 1.2 | 1.4 | -- | -- | 1.2 | 1.3 | -- | -- | -- | -- | 0.8 | **1.5*** ** |
| 7+ | 1.1 | **1.6** ** | -- | -- | **1.4* ** | **1.8** ** | -- | -- | -- | -- | 0.9 | **1.8*** ** |
| **Observations** | | 2,115 | | 6,603 | | 2,737 | | 3,348 | | 12,175 | | 10,026 |

**(Continued)**

**Table 10. − *Continued***

| | Kenya 2008-2009 | | | | Mozambique 2009 | | Swaziland 2006-2007 | | Uganda 2001 | | Zimbabwe 2005-2006 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Women | | Men | | Women | | Men | | Women | | Women | | Men | |
| Variable | UA OR | AD OR | UA OR | AD OR | UA OR | AD OR | UA OR | AD OR | UA OR | AD OR | UA OR | AD OR | UA OR | AD OR |
| **Age** | | | | | | | | | | | | | | |
| 15-24 | **3.0*** ** | **3.4*** ** | **15.0*** ** | **16.3*** ** | **3.8*** ** | **4.8*** ** | **3.6*** ** | **4.1*** ** | **6.5*** ** | **8.7*** ** | **2.3*** ** | **3.0*** ** | **15.8*** ** | **16.9*** ** |
| 25-34 | 1.1 | 1.1 | **3.6*** ** | **3.6*** ** | 1.1 | 1.2 | **1.7** ** | **1.8** ** | **1.5*** ** | **1.6*** ** | 0.7 | 0.8 | **2.1** ** | **2.3*** ** |
| 35+ | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. |
| **Locality by wealth** | | | | | | | | | | | | | | |
| Urban | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. |
| Rural non-poor | **0.6*** ** | **0.7* ** | **2.1** ** | 1.6 | 0.8 | 0.9 | **1.6** ** | **1.4* ** | **0.8** ** | 1.0 | 0.8 | 0.8 | **1.5* ** | 1.2 |
| Rural poor | **0.6** ** | 0.8 | 1.4 | 1.0 | **0.6*** ** | **0.7* ** | **2.0*** ** | **1.4* ** | **0.5*** ** | **0.7*** ** | 0.7 | 0.7 | **2.6*** ** | **2.0*** ** |
| **Education level** | | | | | | | | | | | | | | |
| None or primary | **0.8** ** | **0.7** ** | **1.7** ** | **1.7* ** | **0.7*** ** | **0.7** ** | **1.6*** ** | **1.5** ** | **0.6*** ** | **0.8** ** | 0.8 | 0.9 | **1.9*** ** | **1.8*** ** |
| Secondary or more | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. |
| **Alcohol consumption at last sex** | | | | | | | | | | | | | | |
| Yes | 1.8 | 1.2 | 0.9 | 1.6 | 1.5 | 1.3 | **2.9*** ** | **3.1*** ** | 1.0 | **1.3** ** | 1.6 | 1.2 | 1.0 | 1.1 |
| No | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. |
| **Lifetime number of sexual partners (women)** | | | | | | | | | | | | | | |
| 1 | Ref. | Ref. | -- | -- | Ref. | Ref. | **--** | **--** | Ref. | Ref. | Ref. | Ref. | -- | -- |
| 2 | 1.3 | 1.3 | -- | -- | **2.2*** ** | **2.4*** ** | -- | -- | **1.3** ** | **1.3** ** | **3.1*** ** | **3.6*** ** | -- | -- |
| 3 | **1.7** ** | **1.9*** ** | -- | -- | **2.7*** ** | **3.2*** ** | **--** | **--** | **1.4*** ** | **1.8*** ** | **5.7*** ** | **7.0*** ** | -- | -- |
| 4+ | **2.9*** ** | **3.8*** ** | -- | -- | **3.1*** ** | **4.0*** ** | -- | -- | **1.6*** ** | **2.7*** ** | **7.8*** ** | **10.2*** ** | -- | -- |
| **Lifetime number of sexual partners (men)** | | | | | | | | | | | | | | |
| 1-2 | -- | -- | Ref. | Ref. | -- | -- | Ref. | Ref. | -- | -- | -- | -- | Ref. | Ref. |
| 3-4 | -- | -- | 0.7 | 0.7 | -- | -- | **0.6* ** | 0.9 | -- | -- | -- | -- | **0.6* ** | 0.7 |
| 5-6 | -- | -- | 0.6 | 0.7 | -- | -- | 0.8 | 1.1 | -- | -- | -- | -- | **0.6** ** | 0.7 |
| 7+ | -- | -- | 0.7 | 1.1 | -- | -- | 0.8 | 1.2 | -- | -- | -- | -- | 0.8 | 1.3 |
| **Observations** | 5,926 | | 2,137 | | 7,454 | | 2,333 | | 14,329 | | 5,819 | | 4,201 | |

*** p<0.001, ** p<0.01, * p<0.05
Note: Five surveys (Kenya 2008-09, Mozambique 2009, Swaziland 2006-07, Uganda 2001, Zimbabwe 2005-06) do not have alcohol consumption questions but do have the question on alcohol use at last sex.

Table 11 summarizes the same regressions for drinkers (ever drank or currently drink) only. The findings were consistent with those presented in Table 10. Alcohol consumption at last sex was again significant for men in Lesotho (OR 1.8, p<0.05) and women and men in Zambia (OR 3.3, p<0.001 and OR 1.7, p<0.001, respectively). For Zambian women, the magnitude of the ORs increased substantially for current drinkers. Among women in Swaziland, this variable remained non-significant.

**Table 11. Unadjusted (UA) and adjusted (AD) logistic regressions of unsafe sex for men and women age 15-49 who have ever consumed alcohol or currently drink and have had sexual intercourse in the past 12 months, DHS surveys in sub-Saharan Africa, 2006-2014**

| | Lesotho 2009 | | Namibia 2013 | | | | Swaziland 2006-2007 | | Zambia 2013-2014 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Men | | Women | | Men | | Women | | Women | | Men | |
| **Variable** | **UA OR** | **AD OR** | **UA OR** | **AD OR** | **UA OR** | **AD OR** | **UA OR** | **AD OR** | **UA OR** | **AD OR** | **UA OR** | **AD OR** |
| **Age** | | | | | | | | | | | | |
| 15-24 | **1.8**** | **3.4***** | **2.0***** | **2.6***** | **1.7*** | **2.2***** | **1.9*** | **2.8*** | **4.2***** | **4.3***** | **11.6***** | **13.4***** |
| 25-34 | 1.1 | 1.3 | **1.5**** | **1.6***** | **1.7**** | **1.8**** | 1.3 | 1.4 | **1.6*** | 1.5 | **2.6***** | **2.7***** |
| 35+ | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. |
| **Locality by wealth** | | | | | | | | | | | | |
| Urban | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. |
| Rural non-poor | **4.0***** | **3.5***** | **1.5**** | **1.6***** | 1.2 | 0.9 | 1.8 | 1.8 | 0.7 | 0.9 | 0.9 | 1.0 |
| Rural poor | **4.8***** | **3.2***** | **1.7***** | **1.8***** | **1.7**** | 1.4 | 1.3 | 1.6 | **0.4***** | **0.5**** | **0.5***** | 0.8 |
| **Education level** | | | | | | | | | | | | |
| None or primary | **3.1***** | **3.4***** | **1.4**** | 1.4** | **1.9***** | **2.0***** | 1.2 | 1.2 | **0.6*** | 1.2 | **0.7***** | 1.0 |
| Secondary or more | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. |
| **Alcohol frequency: Number of days drank alcohol in the last 3 months** | | | | | | | | | | | | |
| None | Ref. | Ref. | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1-3 | 0.8 | 0.7 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-9 | 0.9 | 1.0 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 10-90 | 1.3 | 1.4 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| **Alcohol frequency: In past 2 weeks** | | | | | | | | | | | | |
| None | -- | -- | Ref. | Ref. | Ref. | Ref. | -- | -- | -- | -- | -- | -- |
| 1 | -- | -- | 0.9 | 0.9 | 1.0 | 1.0 | -- | -- | -- | -- | -- | -- |
| 2+ | -- | -- | 1.0 | 1.0 | 1.3 | 1.3 | -- | -- | -- | -- | -- | -- |
| **Alcohol frequency: how often do you drink** | | | | | | | | | | | | |
| Once month or less | -- | -- | -- | -- | -- | -- | Ref. | Ref. | -- | -- | -- | -- |
| Once a week | -- | -- | -- | -- | -- | -- | 1.5 | 1.8 | -- | -- | -- | -- |
| > Once week | -- | -- | -- | -- | -- | -- | 1.3 | 1.4 | -- | -- | -- | -- |
| **Alcohol frequency: In past week** | | | | | | | | | | | | |
| None | -- | -- | -- | -- | -- | -- | -- | -- | Ref. | Ref. | Ref. | Ref. |
| 1 | -- | -- | -- | -- | -- | -- | -- | -- | 0.8 | 0.7 | **0.7*** | **0.7*** |
| 2+ | -- | -- | -- | -- | -- | -- | -- | -- | 1.0 | 0.7 | 0.9 | 0.9 |
| **Alcohol consumption at last sex** | | | | | | | | | | | | |
| Yes | **1.6*** | **1.8*** | -- | -- | -- | -- | 1.5 | 2.8 | **2.8***** | **3.3***** | **1.7***** | **1.7***** |
| No | Ref. | Ref. | -- | -- | -- | -- | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. |
| **Lifetime number of sexual partners (women)** | | | | | | | | | | | | |
| 1 | -- | -- | Ref. | Ref. | -- | -- | Ref. | Ref. | Ref. | Ref. | -- | -- |
| 2 | -- | -- | 1.3 | **1.4*** | -- | -- | 1.3 | 1.8 | **2.3*** | **2.1*** | -- | -- |
| 3 | -- | -- | **1.4*** | **1.7***** | -- | -- | 1.1 | 1.5 | **3.3***** | **2.5*** | -- | -- |
| 4+ | -- | -- | **1.5**** | **2.0***** | -- | -- | 0.9 | 1.2 | **4.5***** | **3.6***** | -- | -- |
| **Lifetime number of sexual partners (men)** | | | | | | | | | | | | |
| 1-2 | Ref. | Ref. | -- | -- | Ref. | Ref. | -- | -- | -- | -- | Ref. | Ref. |
| 3-4 | **2.1**** | **2.4***** | -- | -- | 0.9 | 0.9 | -- | -- | -- | -- | 1.2 | 1.5 |
| 4-6 | **2.2**** | **2.5**** | -- | -- | 1.1 | 1.2 | -- | -- | -- | -- | 1.3 | **1.7**** |
| 7+ | **1.7*** | **2.0**** | -- | -- | 1.3 | 1.5 | -- | -- | -- | -- | **1.7**** | **2.4***** |
| **Observations** | | 1,087 | | 3,319 | | 1,708 | | 285 | | 1,281 | | 4,241 |

*** p<0.001, ** p<0.01, * p<0.05

Table 11 shows that the frequency of alcohol consumption was not a significant predictor of unsafe sex, after selecting for ever- or current drinkers, except among men in Zambia. In Zambia, the finding was not in the expected direction. Men who reported having one drink in the past week actually had lower odds of engaging in unsafe sex compared with men who did not drink (OR 0.7, p<0.05). Because the questions on general alcohol consumption were not asked in Kenya, Mozambique, Swaziland (men), Uganda and Zimbabwe, this analysis could not be conducted for these populations.

#### ***3.3.2.2. Other variables***

The strongest predictors of unsafe sex for all countries in this analysis appear to be *age of respondent* and *lifetime number of sexual partners*. This pattern was observed especially for the youngest age category (15-24), for both men and women, and for women who had four or more lifetime sexual partners. As Table 10 shows, respondents age 15-24 had higher odds of engaging in unsafe sex compared with those age 35 and older, for all countries. Among men, the odds ratio in Zambia was 24.2 ($p<0.001$), and in Kenya and Zimbabwe it was between 16 and 17 ($p<0.001$ for both ORs). The high risk of unsafe sex found in these younger age groups may be partially due to the large proportion of unmarried men and women. The odds ratios of women's lifetime number of sexual partners increased with increasing number of sexual partners. In all countries, the highest category of lifetime number of sexual partners (four or more) had significant odds ratios compared with women with one lifetime partner, with the highest odds ratio for unsafe sex found for women in Zimbabwe (OR 10.2, $p<0.001$). High odds ratios tend to be observed for men and women with four or more lifetime partners in the remaining countries; the lowest odds ratio was for women in Namibia (OR 1.9, $p<0.001$). This predictor was not as strong for men, and was not significant for men in Kenya, Swaziland, or Zimbabwe. At the same time, however, men in Lesotho, Namibia, and Zambia who had seven or more lifetime partners had almost twice the odds of engaging in unsafe sex compared with men with one or two lifetime partners.

For the remaining independent variables, not all countries shared the same direction for odds ratios. For example, the locality by wealth categories of rural poor and non-poor had higher odds of engaging in unsafe sex compared with urban in men in Lesotho, Namibia, Swaziland, and Zimbabwe. For men in Kenya, Mozambique, Uganda, and Zambia the odds were in the opposite direction. Similar differences between countries were also found for the education variable, as shown in Table 10.

# 4. Discussion

### 4.1. Review of Findings

This report reviewed survey questions and data related to alcohol consumption from DHS surveys. It provided an inventory of questions related to alcohol consumption, identified variations in questions and response categories, calculated prevalence of ever consuming alcohol, and examined the associations between both global and event-level alcohol use and unsafe sex. The inventory of alcohol-use related questions revealed substantial variation across surveys in both the types of questions asked and the response options. Among the 65 surveys included in the inventory, a total of 19 different non-comparable questions related to alcohol consumption were asked, and even similar questions had small variations in wording. In addition, when countries asked a comparable question, such as on frequency of drinking, different surveys used different response options. These inconsistencies impede multi-country comparisons.

The inventory found that the most widely asked alcohol-related question was about ever having consumed alcohol. Tabulation of the responses showed a large range of prevalence of ever-drinking across countries and, in some areas, high rates of abstention. WHO has estimated that about 60 percent of the world's population is lifetime abstainers; also, more women abstain than men, in line with the high rates of abstention found in this analysis, particularly among women (WHO 2014). Regionally, the highest percentages of having ever consumed alcohol are found in countries in Eastern Europe and Central Asia, again in line with estimates from WHO (2014). This report found that over 60 percent of men in Eastern Europe and Central Asia have ever drunk alcohol; however, the analysis included only five surveys in an interval of 13 years (1999-2012). Across all regions and countries, a higher percentage of men compared with women reported having ever consumed alcohol. The gap between men and women in alcohol consumption varies substantially among countries, from a difference of five percentage points in the Ukraine 2007 survey to 43 percentage points in the Guyana 2009 survey. Similar differentials in the prevalence of ever consuming alcohol across countries and between men and women have been reported by other studies (Rehm, Mathers, et al. 2009; WHO 2014).

Several gender differences supported by the literature (Rehm, Mathers, et al. 2009; WHO 2014; Woolf-King and Maisto 2011) were noted in the analysis of unsafe sex in sub-Saharan Africa. First, men drink more than women. This was the case for general alcohol drinking status (ever or current drinking), frequency of alcohol consumption, and alcohol consumption at last sex. Second, the effects of general alcohol use on unsafe sex differ between men and women. For example, in Zambia, men who currently drink had significantly lower odds of engaging in risky sex (which was not in the expected direction). In contrast, women in Zambia who currently drink were more likely to engage in unsafe sex, although after controlling for other variables in the adjusted model, this relationship was no longer significant. Overall, the global associations of general drinking status (ever or current drinking and frequency of drinking) do not appear to be strong predictors of unsafe sex because drinking status and frequency of drinking were only found to be significant predictors of unsafe sex among men in Zambia.

The lack of significance in the statistical association between general drinking status and unsafe sex may be due in part to the measure of alcohol consumption being used. In Lesotho and Namibia, the question about drinking status was asked for ever-drinking, while in Swaziland and Zambia it was asked for current drinking. Despite the differences in the alcohol questions, after adjusting for other variables, a significant association was only found for Zambian men, among whom current drinkers were actually less likely to engage in unsafe sex compared to those not currently drinking. An association between ever having an alcoholic drink and current risky behavior is not expected, because ever drinking is not necessarily reflective of current drinking behavior, and does not indicate harmful drinking. The results showed that Lesotho and Namibia found no significant associations between ever drinking and unsafe sex in both the

unadjusted and adjusted regressions. It is possible that a better measure of current alcohol consumption, one that includes quantity as well as frequency, might have produced different results.

For the event-level analysis in which alcohol consumption at last sex was examined as a predictor of unsafe sex, this association was only found in a few countries, and mainly for men. The findings of this report indicated that men in Lesotho, Zambia, and Swaziland, and women in Zambia and Uganda, had significantly higher odds of engaging in unsafe sex with their last sex partner if they consumed alcohol on that occasion. Many countries, however, did not show significance for alcohol consumption at last sex, including women and men in Kenya and Zimbabwe, and women in Mozambique and Swaziland. While the results vary by country, these findings imply that there are pathways and effects of alcohol on unsafe sex that differ by gender, as was found in several other studies (Woolf-King and Maisto 2011). In addition, because alcohol consumption at last sex is the only survey question on alcohol that is standardized and comparable across countries, these inconsistent findings suggest that a link between alcohol consumption and unsafe sex depends on the setting.

This lack of consistent association between alcohol consumption and condom use was also found in a review by Weinhardt and Carey (2000), although the review did not include studies from sub-Saharan Africa. Among three event-level studies carried out with data from sub-Saharan Africa, one supports our findings (Kiene and Subramanian 2013) and two found a significant association between alcohol consumption at last sex and unprotected sex (Kiene et al. 2008; Myer, Mathews, and Little 2002). Both of the latter two studies, however, were conducted in South Africa and may not be generalizable to other sub-Saharan countries. In addition, the study by Kiene et al. (2008) only included participants who were HIV-positive, and therefore was not a sample of the general population. The lack of a consensus regarding the link between alcohol consumption at last sex and risky sexual behavior perhaps supports a *third-variable explanation* (Cooper 2002, 2006), which states that perhaps within-person variability is more important than between-person variability (Cooper 2010). Cooper (2006, p19) states that alcohol's acute causal effects on sexual behavior are more variable than previously thought and "drinking can promote, inhibit, or have no effect on behavior, depending on the interplay of factors governing behavior in a particular situation".

Several studies in the literature use different outcomes to define risky sexual behavior. This analysis uses non-cohabiting partner type and nonuse of condom as the unsafe sex outcome; other studies may define the unsafe sex outcome differently. While Weiser et al. (2006) found that in Botswana alcohol consumption was a significant predictor of unprotected sex with a non-primary partner, the article did not describe exactly what is meant by non-primary partner and whether this includes boyfriend/girlfriend relationships. Similarly, Wieser et al. (2006) used unprotected sex with a non-monogamous partner as the unsafe sex outcome; however, again it is not clear whether this categorization includes boyfriend/girlfriend relationships. A review by Woolf-King and Maisto (2011) examined several global association studies of alcohol use with various outcomes including: HIV status (mixed findings), STI infection (mixed findings), sexual activity (significant positive association in a small number of studies), sex with multiple or casual partners (significant positive associations in several studies), unprotected sex regardless of partner type (significant positive associations in several studies), transactional sex (significant positive associations in several studies), and sexual coercion (significant positive associations in several studies). Other global association studies in sub-Saharan Africa found significant associations between general alcohol consumption and other measures of risky sexual behavior outcomes such as HIV infection (Woolf-King and Maisto 2011). A meta-analysis of the relationship between alcohol consumption and HIV infection in sub-Saharan Africa found a pooled OR (all studies) of 1.61 (95% CI: 1.44-1.80) for HIV infection regarding drinkers versus non-drinkers (Woolf-King et al. 2013). The odds of HIV infection were higher for those who reported drinking in sexual contexts (OR 1.79, CI: 1.55-2.06). It is important to note that some of the studies in the review by Woolf-King and Maisto (2011) included participants from sub-populations, such as workers from a specific industry (mining, food, recreation, bar, hotel, armed forces), men who have sex

with men, and male and female sex workers. These categories are not comparable with analysis of data from DHS household surveys.

Partner's drinking status may also play an important role in unsafe sex. The study by Kiene and Subramanian (2013) used DHS data from sub-Saharan countries to examine the association between drunkenness at last sex and condom use at last sex; for women in the study, drunkenness at last sex refers to partners' drunkenness. The study grouped DHS countries into two regions (Southern Africa and East Africa), then analyzed the survey results for men and women. The results showed that male partner drunkenness at last sex significantly decreased the odds of condom use for men in Southern Africa but not for men in East Africa. Male partner drunkenness at last sex was only marginally significant (p=0.08) for women in Southern Africa (Kiene and Subramanian 2013). While the outcome variable used in the study was not the same as the one used in the present analysis—relationship type was not included in the outcome but was included as a covariate—and countries were grouped together for analysis, the results nevertheless support our finding of no significant associations between alcohol consumption at last sex and the unsafe sex measure for men and women in Kenya and Mozambique, and for women in Zimbabwe. Also, similar to the present analysis, Kiene and Subramanian (2013) found significant associations of alcohol consumption at last sex among men in Lesotho, Swaziland, and Zambia. When alcohol consumption at last sex in the present analysis was coded to match the variable used by Kiene and Subramanian (2013), i.e. male partner was drunk, the association with unsafe sex was still found for men in Lesotho and Swaziland. When the drunkenness status of the partner was used as a variable for the analysis of women's unsafe sex, this was not found to be significant (results not shown).

Among women in the present analysis, those in Swaziland reported the highest proportion of unsafe sex but also one of the lowest proportions of alcohol consumption, both at last sex and in general (in this case current drinking status). Because Swaziland has one of the highest levels of HIV prevalence for women, understanding the process through which women engage in unsafe sex requires further study; alcohol does not seem to be a factor for women in Swaziland. The same situation is seen for women in Mozambique, where almost 16 percent of women reported unsafe sex but only three percent reported alcohol consumption at last sex, which was a non-significant predictor of unsafe sex.

### 4.2. Limitations

A major strength of DHS data is the standardization of core questionnaires and formalized modules that allow for multi-country comparisons and trend analysis. The results of our inventory of DHS questions related to alcohol consumption, however, found that the alcohol questions are not standardized. This poses a substantial limitation to analysis of alcohol-related questions and data across countries. Conclusions about differences in alcohol consumption across countries or regions are limited to questions using the same wording and the same response options. The wording of questions on general alcohol consumption may also affect the findings (Bowling 2005; Schuman and Presser 1981). Additionally, type of question about alcohol use, frequency versus quantity, and other factors can affect associations between alcohol-related predictor variables and outcomes of interest. For example, the review of studies from sub-Saharan countries by Kalichman et al. (2007) found that, for people who drink, the quantity of alcohol consumed is a better predictor of risky sexual behavior than the frequency of drinking. The meta-analysis by Woolf-King et al. (2013) found that individuals whose drinking was suggestive of an alcohol-use disorder had almost twice the odds of being HIV-positive compared with non-drinkers. The present analysis of alcohol use and unsafe sex found that the variable measuring general alcohol consumption was only significant in the adjusted regression for men in Zambia. The frequency of alcohol consumption, as a predictor, was also only significant among Zambian men. More specific questions on alcohol consumption in a short-term time frame that includes frequency and quantity might improve the analytical value of indicators of drinking (Stockwell et al. 2004).

For this analysis, the use of alcohol-related questions is limited to the questions available in DHS surveys. Because the validity of the questions has not been studied, interpretations about the meaning of the results should be made with caution. It is unclear whether the questions measure what the analysis hopes they measure: a complete picture of alcohol consumption. For example, a response to a question about ever-drinking does not necessarily warrant classification of a respondent as a drinker or non-drinker. A person may have consumed alcohol in the past but not drink currently. Similarly, asking if a person is a current drinker does not provide information about whether the person is a heavy, heavy episodic, moderate or light drinker. Perhaps due to the vagueness of the general alcohol questions, the analysis conducted in this report has shown no significant global associations between ever-drinking and unsafe sex (just two countries) and only one survey (out of two) found a significant association between current drinking and unsafe sex. Further, questions concerning drunkenness are subjective and open to differences of interpretation (Greenfield and Kerr 2008). Finally, standard drink sizes were only defined in a few surveys, which leads to potential differences in interpretation across cultures and countries in measuring quantity of alcohol consumed. The problem of measurement standardization is a challenge for screening alcohol use, particularly in areas where alcohol is brewed at home or locally; alcohol concentration is not regulated and drinks can vary substantially in terms of size and alcohol content (Hahn, Woolf-King, and Muyindike 2011). Even in areas where alcohol is regulated and mass-distributed, descriptions of typical drink size and alcohol content vary from person to person and across regions (Greenfield and Kerr 2008). Therefore, lacking validation and standardization of the questions on alcohol consumption, conclusions cannot be stated with certainty, particularly in multi-country comparisons.

Under-reporting is common in the collection of survey data on alcohol consumption, along with other sensitive topics such as risky sexual behaviors (Hahn et al. 2010; Minnis et al. 2009; Stockwell et al. 2004; Woolf-King and Maisto 2011). There are several reasons for under-reporting of alcohol consumption in population studies. First, heavy drinkers, because of their lifestyle, may not be present for, or may be unfit to participate in, a household survey (Stockwell et al. 2004). Perception of stigma or social desirability bias may cause respondents to under-report alcohol use in order to present themselves more favorably to the interviewer (Bowling 2005; Greenfield and Kerr 2008; Hahn et al. 2010; Hawkins et al. 2007). Hahn et al. (2010) used biomarker testing and, based on the test results and sensitivity of the test, determined that an estimated 15 percent of self-reported abstainers actually tested positive for consuming at least 3.5-6 drinks daily, or almost daily, for at least the past 14 days. Under-reporting may be particularly pertinent regarding women's self-reported data on behavior related to sexual risk taking and alcohol use. A randomized control trial by Minnis et al. (2009) found that among HIV-negative women in Zimbabwe, who were surveyed using both self-administered questionnaires and face-to-face interviews, there was a discrepancy in the measures of semen exposure and self-reports of unprotected sex. The study found that tests of almost half of the women who reported no recent sexual intercourse, or reported using a condom at recent sex, indicated biological evidence of semen exposure (Minnis et al. 2009). These results and similar findings from other studies indicate potential social desirability bias in reports of unsafe sex (Gallo et al. 2006; Gallo et al. 2007). Finally, respondents may unintentionally misreport their behavior, particularly alcohol intake. The problem may be due in part to respondents' difficulty recalling accurately the exact amount of alcohol consumed, particularly when survey questions ask about consumption over periods longer than a week. This type of misreporting typically results in under-reporting and often occurs when reporting socially unacceptable behaviors such as heavy drinking (Greenfield and Kerr 2008; Leigh and Stall 1993; Stockwell et al. 2004).

A limitation of global association studies in which alcohol consumption in general is used to predict unsafe sex is that one does not know if the alcohol consumption and the unsafe sex occurred on the same occasion. Event-level analyses using alcohol consumption at last sex are also required (Leigh and Stall 1993). Another limitation of the present analysis is the inability to conduct a within-person analysis for the association of alcohol with unsafe sex. A within-person analysis can inform us whether a certain individual will exhibit the same behavior sober that they exhibit under the influence of alcohol. This type of analysis can control

for any third-variable explanations (Cooper 2002, 2006) such as changes in personality, the situation, or the relationship context, according to Cooper (2010). Finally, since DHS studies are cross-sectional, it is not possible to establish causality. In fact, it is often unclear whether alcohol consumption is a cause or a result of unsafe sex.

### 4.3. Considerations for Future Research

Given the interest in studying the nuances of alcohol consumption—as evidenced by the variety of questions included in DHS surveys—the authors suggest the inclusion (in a DHS optional module) of a standardized set of questions on this topic that draw from a validated scale. These questions can be used to explore other associations in DHS data with outcomes of interest. The use of validated scales such as AUDIT-C in similar studies has been supported by experts in the field (Chersich and Rees 2010; Weiser et al. 2006; Woolf-King et al. 2013). Alcohol screening methods attempt to identify different aspects of alcohol consumption that can directly affect health: past versus current, hazardous, harmful, or dependent drinking[2] (Saunders et al. 1993). The Alcohol Use Disorders Identification Test (AUDIT) was developed to identify heavy drinking, alcohol abuse, and alcoholism (Babor et al. 2001; Saunders et al. 1993). Although subjects tend to underestimate alcohol consumption when responding to the questions in AUDIT, it is still a valuable proxy for assessing heavy drinkers (Bradley et al. 1998). The authors of AUDIT incorporated categorical response options in an attempt to minimize under-reporting (Saunders et al. 1993). While evidence from this and previously mentioned studies demonstrates that event-level research on alcohol use produces stronger associations with recent risky sexual behavior, standardized, general alcohol-related questions could be used to examine other less-studied outcomes associated with alcohol-use in LMICs. For example, alcohol-use could be studied in relation to DHS data on reproductive health or maternal and child health outcomes.

AUDIT-C has been validated in a number of developed countries in Europe, the Americas, and Asia (Reinert and Allen 2007). Only the full 10-item version has been validated in developing countries, but an abbreviated three-question version has been shown to maintain high levels of sensitivity and specificity for identifying heavy drinking across ethnic groups (Bush et al. 1998; Reinert and Allen 2007). AUDIT-C poses questions on frequency of drinking in the past year, how much is typically consumed, and how often the respondent has had six or more drinks on one occasion. Table 12 presents the questions, responses, and scoring information for AUDIT-C. Points are assigned based on responses to each question and are summed to obtain a total score. The range of possible scores is zero to twelve. Hazardous drinkers are identified by a score of four or more for women and five or more for men (Bradley et al. 1998; Rumpf et al. 2002). While this may prove to be difficult in certain settings, the authors of AUDIT recommended clarifying the definition of a standard drink, which they note is approximately 10 grams of pure ethanol, or one 330 ml bottle of beer, 140 ml of wine, or 40 ml of liquor (Babor et al. 2001). The use of AUDIT-C questions could produce a more accurate description of alcohol consumption compared with the current alcohol questions used in DHS surveys. It would also create a standardized measure that could be used to compare alcohol consumption and its effects across countries.

[2] This paper uses WHO's previous definitions of alcohol use. Hazardous drinking is defined as alcohol use that carries the risk of harm whereas harmful use is defined as the presence of existing complications. Dependence is defined as "a cluster of cognitive, behavioral and physiologic symptoms that indicate a person has impaired control of psychoactive substance use and continues use of the substance despite adverse consequences" (Babor et al. 1994).

**Table 12. AUDIT-C Questionnaire and Scoring***

| Q1: How often did you have a drink containing alcohol in the past year? | |
|---|---|
| **Answer** | **Points** |
| Never | 0 |
| Monthly or less | 1 |
| Two to four times a month | 2 |
| Two to three times a week | 3 |
| Four or more times a week | 4 |
| **Q2: How many drinks did you have on a typical day when you were drinking in the past year?** | |
| **Answer** | **Points** |
| None, I do not drink | 0 |
| 1 or 2 | 0 |
| 3 or 4 | 1 |
| 5 or 6 | 2 |
| 7 to 9 | 3 |
| 10 or more | 4 |
| **Q3: How often did you have six or more drinks on one occasion in the past year?** | |
| **Answer** | **Points** |
| Never | 0 |
| Less than monthly | 1 |
| Monthly | 2 |
| Weekly | 3 |
| Daily or almost daily | 4 |

*Points from each question are summarized to create a score with a range from 0 to 12. Typical cut points for hazardous drinkers are 4 or more for women and 5 or more for men.

Screening instruments are less reliable for the general population compared with clinical settings because they are intended to identify individuals with a potential alcohol-use problem, who are then referred for additional testing (Rumpf et al. 2002). When such instruments are used in a population study, results should still be interpreted carefully and with cultural context in mind. For example, in countries where abstention is common, as in Muslim countries, low levels of alcohol consumption could be perceived as socially unacceptable. In countries where drinking is more common, the same low levels of alcohol consumption may be perceived as socially acceptable. The boundary between acceptable drinking and heavy drinking may be more rigid in countries with low drinking prevalence, resulting in a lower threshold for heavy or harmful drinking. Thus, population studies should consider the overall prevalence of drinking when interpreting scores, particularly in countries with low drinking prevalence.

Depending on interest in DHS countries, a survey question on alcohol consumption at last sexual intercourse would be useful for the continued study of unsafe sex. The question could lead to better event-level data for describing a potential link between alcohol consumption and unsafe sex.

# 5. Conclusion

Heavy use of alcohol can harm individual health, cause public health problems, and have negative social and economic consequences. It can cause immediate harm not only to the individual and associated persons in his/her social context, but also can contribute to non-communicable and infectious diseases such as cancer, HIV, and tuberculosis. Thus, knowledge of the magnitude of abstainers versus drinkers in a population, and the extent of alcohol consumption among those who drink, is important information for decision-makers at the national level. It is possible to at least estimate the proportion of heavy drinkers in a population based on the prevalence of abstention and drinking, and on per capita consumption data. Among those who do drink, WHO found that 16 percent are heavy episodic drinkers, indicating harmful drinking (WHO 2014). However, without further information of drinking patterns, per-capita estimates of consumption, particularly estimates based solely on abstention rates, will underestimate the amount consumed among those who drink and mask the true prevalence of heavy drinkers (Peltzer and Ramlagan 2009; WHO 2014). The large variation in ever-drinking found in this report encourages a deeper investigation of drinking patterns and the characteristics of those who consume alcohol.

The analysis of alcohol as a predictor of unsafe sex revealed that questions on global alcohol consumption, as currently asked in DHS surveys, were not significant predictors of unsafe sex in all the countries included in the analysis. This situation is perhaps due in part to the lack of a comprehensive picture of alcohol use at the individual level. Currently, no set of questions in any DHS survey fully gauges harmful drinking--which includes frequency, quantity, and objective measures of heavy drinking--in the way validated scales do. In this analysis, however, an important predictor of unsafe sex was alcohol consumption at last sex because, in some countries and among some groups of men or women, the consumption of alcohol at last sex was linked to unsafe sex.

This paper presents examples of how questions related to alcohol use in DHS surveys can be analyzed. It also shows how validated questions on alcohol use can be used to examine alcohol use as a risk factor for other demographic and health issues covered in DHS surveys such as household wealth, employment, reproductive health, maternal health, child health, domestic and sexual violence, and non-communicable diseases. Understanding the commonalities among those who drink alcohol can inform interventions capable of arresting or ameliorating the negative consequences of drinking. Several studies have examined the characteristics of people who are susceptible to alcohol over-use and found many varying and intertwined characteristics. These include societal variables such as cultural context, economic development, legal policies or availability of mass or locally produced alcohol, as well as individual variables, such as socioeconomic status (Babor 2010). Currently, as reported in this and other studies, more women than men abstain from drinking, although alcohol use among women is on the rise because of changes in women's economic situation and social equality (Martinez et al. 2011; Rehm, Mathers, et al. 2009; WHO 2014; Wilsnack, Wilsnack, and Kantor 2014). With the wide range of acknowledged consequences of alcohol abuse (including unsafe sex) and with use of alcohol on the rise in developing countries, there is a global responsibility to monitor alcohol consumption for harmful use. Adopting a standardized set of questions, such as a brief validated scale like AUDIT-C, would allow researchers to monitor alcohol consumption and make multi-country comparisons that inform policy decisions and focus interventions where most needed.

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