An Equity Analysis of the Burden from Alcohol Consumption in South Africa

By
Mayara Correia Fontes

Thesis presented for the degree of
Doctor of Philosophy
In the School of Public Health and Family Medicine
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This thesis is presented in fulfilment of the requirements for the degree of Doctor of Philosophy (PhD) in the School of Public Health and Family Medicine, Faculty of Health Sciences, University of Cape Town. The work on which this thesis is based is original research and has not, in whole or in part, been submitted for another degree at this or any other university. The contents of this thesis are entirely the work of the candidate, or in the case of multi-authored published papers, constitutes work for which the candidate was the lead author. The contribution of the candidate to included multi-authored papers is further delineated in the preface to the thesis and in the introduction to each included paper as appropriate.

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Declaration

This thesis includes published papers, as per general provision 6.7 in the General Rules for the Degree of Doctor of Philosophy (PhD) of the University of Cape Town, and with the approval in 2019 of the University Doctoral Degrees Board.

I confirm that I have been granted permission by the University of Cape Town's Doctoral Degrees Board to include the following publications in my PhD thesis, and where co-authorships are involved, my co-authors have agreed that I may include the publications.

a. **Marx Fontes, M.,** London, L., Burnhams, N. H., & Ataguba, J.E. (2019). Usability of existing alcohol survey data in South Africa: a qualitative analysis. BMJ Open, 9(8), e031560. http://dx.doi.org/10.1136/bmjopen-2019-031560

b. **Marx Fontes, M.,** London, L., Harker, N., & Ataguba, J. E. (2019). Equity in household spending on alcoholic beverages in South Africa: assessing changes between 1995 and 2011. *International Journal for Equity in Health*, 18(1), 78. https://doi.org/10.1186/s12939-019-0985-3

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ABSTRACT

Background: Alcohol consumption remains one of the leading contributors to the risk of mortality worldwide. While literature sources are clear that alcohol consumption has a major negative impact on society and which is felt more severely amongst low-socioeconomic families, the literature on alcohol-related harm on individuals and households in South Africa, especially from different socio-economic backgrounds, is very limited. This study represents an initial attempt to assess inequalities and inequity in alcohol consumption, at the household and individual levels, in South Africa using national household data.

The objectives of this study are (1) to examine the usability of existing survey data in South Africa for assessing alcohol-related expenditure and impacts; (2) to provide a detailed description of alcohol consumption patterns in South Africa at the individual level using various equity stratifiers and (3) to assess the socioeconomic distribution of expenditure on alcoholic beverages at the household level in South Africa.

Methods. For objective 1, all publicly available alcohol data sources for South African populations were scanned to examine their usability. A set of qualitative interviews with 10 key researchers in the alcohol policy and economics field in South Africa were undertaken to capture their experience and perceptions of alcohol data in South Africa. The analysis involved identifying databases known to key informants, exploring challenges in using the datasets for research and further analyzing any recommendations for how routine datasets could be better used to inform policy. For Objectives 2 and 3, this study used publicly available secondary data, including the National Income Dynamics Study (NIDS) and the Income Expenditure Survey (IES). The data have been anonymized and can be accessed from the DataFirst website.

Results: There are differences in alcohol consumption patterns and alcohol expenditure among equity stratifiers. The findings show that the burden of alcohol consumption is heavier on the poor. Poorer

households spend a significantly larger share of their total household consumption expenditure on alcoholic beverages than richer households—a case of regressivity in spending on alcoholic beverages. Spending on alcohol beverages became less regressive (i.e. a pro-poor 'shift') between 1995 and 2000; and between 2005/06 and 2010/11. For alcohol consumption patterns, current drinkers are more prevalent among the rich; whereas binge drinkers are more prevalent among the poor. Binge drinking is a problem among the low-income, young individuals, male and African populations. The results also show that there are significant constraints limiting the quality and usefulness of alcohol data in South Africa. These constraints are related to (a) lack of accessibility of survey data, (b) lack of systematic and standardized measurement of alcohol consumption, (c) limited geographic coverage, (d) infrequent survey timing and (e) lack of public availability of industry data on price, production, distribution and consumption of alcohol.

Conclusion: This study provides evidence that alcohol consumption in South Africa may be a reflection of genuine differences in consumption patterns among socioeconomic status, and the burden falls most heavily on poorer households and individuals. Based on the results, there is an opportunity to further reduce the regressivity of alcohol expenditure by implementing comprehensive alcohol harm-reduction policies. This study supports recommendations for the South African government to continue to push for evidence-based alcohol policies aiming to decrease alcohol consumption, especially for risky drinkers. However, limited data accessibility in South Africa could potentially impact on the implementation, monitoring and evaluation of relevant policy and interventions to address alcohol-related harms. Thus, for implementing evidence-based alcohol policy in South Africa to be successful, the government must have accessible, reliable and meaningful data for stakeholders and researchers to evaluate interventions and assess whether national alcohol policies aiming to decrease alcohol consumption have achieved their intended objectives.

GLOSSARY

Term	Definition
Alcohol consumption expenditure	Amount spent in 2016 US dollars (exchange rate R14.71 to the dollar) on purchasing alcoholic beverages. Alcohol spending, alcohol expenditure and alcohol consumption expenditure will be used interchangeably throughout the study.
Alcohol consumption patterns	Measure the frequency and volume of alcohol consumption, for instance, binge and heavy drinking.
Harmful alcohol consumption	This includes exceeding the recommended number of standard drinks per drinking occasion (e.g. binge drinking) but can also include experiencing consequences as a result of drinking such as fighting, unwanted sex, missed days of work. In this study, harmful alcohol consumption also includes financial burden such as households that spend a high proportion of their income on alcoholic beverages.
Binge drinking	An adult (female or male) who is a current alcohol drinker consuming 5 or more standard drinks on a single occasion.
Concentration index (CI)	An index used to assess socioeconomic-related inequalities in alcohol variables including binge drinking, alcohol consumption expenditure. Using alcohol consumption expenditure as an example, it measures the extent to which alcohol consumption expenditure is concentrated among the rich (pro-rich) or the poor (pro-poor). It can vary from -1.0 (where the poorest household spends on all alcohol consumption expenditure) to +1.0 (where the all alcohol consumption expenditure is done by the richest household).
Current drinkers	An adult who consumes any amount of alcohol in the past 12 months.
Effective progressivity of alcohol expenditure	This uses the Kakwani index (defined below). A positive value ($K > 0$) means that alcohol expenditure is progressive as richer households spend proportionately more on alcoholic beverages than their share of consumption expenditure. A negative value ($K < 0$) means that alcohol expenditure is regressive (i.e. poorer households spend proportionately more on alcoholic beverages than their share of consumption expenditure).
Equity stratifiers	Population characteristics such as age, geographic location, race, socioeconomic status and gender used to assess differences in alcohol consumption patterns.

Gini Index (G)	It corresponds to consumption expenditure inequality. It can vary from 0 (perfect equality in the distribution of consumption expenditure) to 1 (perfect inequality in the distribution of consumption expenditure).
Heavy drinking	An individual who binge drinks on 5 or more days in the last 30 days.
Household consumption expenditure	An aggregate of spending on the cost of housing, education, food, alcoholic and non-alcohol beverages, clothing and footwear, health services, recreation and entertainment and own production and consumption of home-grown produce.
Inequality in alcohol consumption	Differences in alcohol consumption (e.g. current drinking and binge drinking) between populations or subgroups including age, gender, race, geographic location and socioeconomic status.
Inequity in alcohol consumption expenditure	When alcoholic consumption expenditure as a proportion of overall household consumption expenditure differs across households by socioeconomic status and other stratifiers.
Kakwani index (K)	This is the difference between the Gini index (G) of consumption expenditure and the concentration index (C) of expenditure on the specified alcoholic beverage (K = C – G). It is a measure that is used to assess effective progressivity (as defined above).
Pro-poor 'shift' in progressivity	A situation where the reduction in the share of income that poor households spend on alcohol beverages is greater than that among the rich or the increase in this share is greater among the rich than among the poor.
Pro-poor distribution of alcohol consumption	A situation where the concentration index (defined above) of alcohol consumption is negative.
Pro-rich 'shift' in progressivity	A situation where the reduction in the share of income that rich households spend on alcohol beverages is greater than that among the poor or the increase in this share is greater among the poor than among the rich.
Pro-rich distribution of alcohol consumption	A situation where the concentration index (defined above) of alcohol consumption is positive.
Social determinants of alcohol consumption	Social factors that impact alcohol consumption and spending such as sex, age, socioeconomic status, urban/rural, race, etc.
Socioeconomic inequality in alcohol consumption	Disparities in alcohol consumption along the lines of socioeconomic status.

Socioeconomic status (SES)	A measure of an individual's or household's economic and social status. This is usually assessed using income, expenditure, education, etc.
Structural progressivity of alcohol expenditure analysis	An assessment of the distribution of spending on alcohol beverages by comparing the share of household consumption expenditure on alcoholic beverages. Using different quantiles of household per capita consumption expenditure, alcohol expenditures are progressive if the share of consumption expenditure on alcohol increases with the quantiles (i.e. richer households spend a greater share of consumption expenditure on alcohol). While it is regressive if the share of consumption expenditure on alcohol decreases with the quantiles (i.e. richer households spend a smaller share of consumption expenditure on alcohol).
Usability of existing alcohol survey data	A qualitative assessment of the extent to which alcohol datasets can be used for alcohol analysis.
Characterization of race in the study: Disparities in alcohol consumption between race. Race in South Africa is divided into four major racial subgroups – African, coulored, white and Indian. This characterization was used throughout the study analysis.	

LIST OF ACRONYMS

APC	Per capita alcohol consumption
CI	Concentration index
CPI	Consumer Price Index
CSMs	Continuing sample members
CSMs	Continuing sample members
DALYs	Disability-adjusted life years lost
DASP	Distributive Analysis Stata Package
FAS	Family Affluence Scale
GDP	Gross Domestic Product
HIV	Human immunodeficiency virus
IAC	Alcohol Control Study survey
MeSH	Medical Subject Headings
NIDS	National Income Dynamics Study
RTDs	Ready to drink beverages
SA	South Africa
SALDRU	Southern Africa Labour and Development Research Unit
SAWIS	South African Wine Industry Information and System
SES	Socioeconomic status

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CHAPTER 1
INTRODUCTION

1.1. Introduction

Globally, alcohol is implicated in 5.3% of deaths and 5.1% of the burden of disease and injury, equivalent to 132.6 million disability-adjusted life years (DALY, defined by WHO as the time lost due to premature death and the time lost due to time lived in less than full health) (1). In Africa alone, alcohol was implicated in 6.4% of all deaths, and 4.7% of all DALYs lost in 2012 (2). Worldwide, alcohol is also considered one of the top three risk factors for disease and injury (1).

According to the World Health Organization report on alcohol and health (1), Europe has the highest per capita alcohol consumption (APC) (9.8 liter of pure alcohol) followed by the Region of Americas (8.0); the Western Pacific Region (7.3); Africa (6.3); the South-East Asian Region (4.5) and the Eastern Mediterranean Region (0.6). However, it is important to observe that the metric of per capita alcohol consumption record takes no account of the regions' alcohol abstinence rates and problem drinking patterns (such as binge[1] and heavy[2] drinking) and therefore may be an under/overestimate (3). Additionally, looking only at per-capita alcohol consumption by country may not adequately indicate the population vulnerable to alcohol-related harm. For instance, harm at a population level derives from the overall consumption of alcohol over the life course, the pattern of drinking (such as binge and heavy drinking) and the quality of alcohol consumed. Although lifetime abstinence and current abstinence affect overall consumption, their relationship with harm is different (e.g. people might currently abstain from alcohol because of harm from previous excessive drinking). Taking abstinence rates into consideration, countries like the Gambia, Chad, Mali, which report low alcohol consumption per capita at 3.4; 4.4 and 1.1 liters of pure alcohol, respectively, now have high alcohol consumption levels at 30.9, 33.9 and 29.3 liters of pure alcohol per drinker, respectively (4). That means that alcohol consumers usually drink large quantities of alcohol (2, 5-7).

[1] Defined as consumed 5 or more drinks for man and 4 or more drinks for women on a single occasion (Substance Abuse and Mental Health Services Administration [SAMHSA], 2016).

[2] Defined as consumed 5 or more drinks for man and 4 or more drinks for women on a single occasion on 5 or more days in the last 30 days (Substance Abuse and Mental Health Services Administration [SAMHSA]).

Previous studies using survey data found that approximately half the population of men and one-fifth of women consume alcohol in South Africa and those who consume alcohol have high rates of risky drinking such as binge and harmful drinking (8, 9). In 2015, the total per capita alcohol consumption in South Africa was 11.5 liters of pure alcohol; while, alcohol consumption per drinker was 27 liters of pure alcohol – one of the highest levels of alcohol consumption amongst drinkers in the world (10).

Alcohol consumption carries substantial consequences, with a negative impact on health, social, and economic outcomes (3, 9, 11-15). A systematic review by Rehm et al.(16) found that alcohol is associated with over 200 diseases and injuries (e.g. high blood pressure, HIV, cancer and stroke). More than 40 of these diseases are almost exclusively attributable to alcohol (e.g. cirrhosis and fetal alcohol syndrome) (13, 17-20).

Furthermore, in addition to the direct toxic effects of alcohol products, studies suggest that the risk of disease and injury from alcohol consumption increases as individuals increase their alcohol intake. The idea is that the more you drink, your likelihood of being exposed to, or participating in risky behavior increases (21). For instance, Taylor et al. (15) found in a meta-analysis that, for motor vehicle accidents and non-motor vehicle injury, the odds ratio increases by 1.24 and 1.30 per 10g of alcohol consumption, respectively. In another meta-analysis that looked at the risk of adverse events such as HIV infection, alcohol consumption was found to increase the relative risk of HIV infection by 98%. In addition, the risk of HIV infection doubles for binge drinkers compared to non-binge drinkers (22).

Moreover, harmful alcohol consumption affects both social and personal relationships by causing pain and suffering to family and friends of alcohol abusers (11). Micro-level studies show that the negative impacts of alcohol abuse (e.g., long-term health issues, job insecurity, and deteriorating family relations) are felt more severely amongst low-socioeconomic families (3). Alcohol abuse also reduces job productivity, employment, and ultimately income levels (11).

This thesis investigates inequality in alcohol consumption (volume and frequency) and inequity on consumption, as measured by spending on alcoholic beverages, at the individual and household levels in South Africa. The study was conducted due to the evidence, described below, that (a) alcohol consumption is a major problem in South Africa and (b) little is known about who in South Africa (i.e., individuals and households) is more exposed and vulnerable to alcohol harms. As the government of South Africa moves towards more restrictive alcohol policies, this study provides relevant evidence to the government that interventions should be targeting factors that increase people's susceptibility to the consequences of alcohol abuse, as well as addressing excessive alcohol consumption (such as binge drinking) where it is more commonly reported in the population.

1.1.1. Overview of the burden of alcohol consumption in South Africa

Evidence shows that alcohol consumption and alcohol-related harm have increased over recent years in South Africa. A recent publication, a cross-sectional analysis conducted in South Africa confirms an increase in the proportion of current drinkers (defined as consumed one or more drinks of alcohol in the past 12 months) from 15.8% in 2005 to 18.2% in 2008 and 21.7% in 2012 (23). In the same study, the number of occasional heavy drinkers (defined in the study as the same as binge drinking) increased from 9.8% in 2005 to 13.2% in 2012 (23).

The high intensity and frequency of alcohol consumption in South Africa is a risk factor for adverse health events, including death and disability, accidents and injuries. In 2000, alcohol was responsible for 7.1% of all deaths and 7.0% of all DALYs lost in South Africa. For men, alcohol was responsible for 10.5% of all deaths, while for women, alcohol was responsible for 2.0% of all deaths (9). Alcohol also plays a substantial role as a risk factor for disease and injury burden. In 2000, alcohol population-attributable fractions (PFAs) in South Africa was estimated at 43.9% for road traffic injuries, 41.2% for epilepsy, 17.3% for hypertension, 4.4% for Ischaemic heart disease and 25.2% – 40.4% for

cancer[3]. For injury burden, alcohol was responsible for 20.2% and 40.9% of unintentional and intentional injuries, respectively (9). Also, risky drinking patterns place an additional burden on individuals. For instance, the relative risks of hypertension for risky drinkers compared to abstainers are 1.4 for low drinkers; 2.0 for moderate drinkers and 4.1 for heavy drinkers (9).

Furthermore, alcohol abuse carries a substantial financial burden on the country's economy. In 2009, Matzopoulos et al. (12) estimated that the intangible and tangible costs of alcohol-attributable burden in South Africa were R300 billion, translating to about 10-12% of the country's GDP. The tangible costs such as health and crime expenditures alone were estimated at R37 billion or 1.6% of South Africa's GDP (in 2009).

This research evidence, although limited, points to the significant health and financial burdens of alcohol consumption in South Africa. The fact that research on the burden of alcohol consumption in South Africa is both limited and somewhat outdated may be related to limitations of current surveillance that makes it difficult to determine patterns beyond overall averages. To date, little research has explored the burden of alcohol consumption in South Africa from an inequality and inequity perspective. The most recent study on this topic found that low socioeconomic status (SES) individuals are more likely to practice lifetime abstinence (never used alcohol), while high SES individuals are more likely to be current drinkers. For risky drinking, middle SES individuals are more likely to binge drink, followed by low SES and high SES individuals (24). Consumption patterns are different for different alcoholic beverages. Wines and spirits are consumed mainly by high SES individuals, while beer is consumed mainly by low SES individuals (25).

Roche et al. (26) suggest that alcohol consumption patterns and associated social determinants impact alcohol-related harm. Therefore, investigating inequality and inequity in the consumption of alcoholic beverages in South Africa provides evidence on which individuals and households are more

[3] Cancer mouth/pharynx (25.2%); Cancer oesophagus (32.1%); Cancer liver (25.8%); Cancer larynx (40.4%)

exposed and vulnerable to alcohol harms, at least directly. This is important for the government of South Africa to implement effective and efficient regulatory (e.g. alcohol tax) and programmatic (e.g. public awareness) targeting of vulnerable populations.

1.2. Thesis aim

This thesis aims to investigate inequality in alcohol consumption (volume and frequency) and inequity on consumption, as measured by spending on alcoholic beverages, at the individual and household levels in South Africa.

1.3. Objectives

1. To examine the usability of existing survey data in South Africa for assessing alcohol-related expenditure and impact

2. To describe alcohol consumption patterns in South Africa at the individual level using the following equity stratifiers: age, geographic location, race, SES and gender.

3. To assess the distribution of expenditure on alcoholic beverages at the household level in South Africa according to socioeconomic status

1.4. Structure of the thesis

Chapter 1 starts off by presenting a general overview of the burden of alcohol globally and specifically in South Africa. It also describes the rationale and the importance of the study as well as outlining the overall aims and objectives.

Chapter 2 provides a comprehensive literature review documenting the relationships between socioeconomic status, inequality and alcohol consumption. The rationale of this chapter was to identify gaps in the literature, provide context for the thesis and research questions to be explored.

The next three chapters (3, 4 and 5) provide the empirical analysis to support the study aim. To address the aim of the thesis, one first needs to identify and document available alcohol datasets that could be used in the inequality and inequity analyses as well as other alcohol-related analysis. The original conception of this thesis was to conduct research to explore inequalities related to alcohol, in relation to consumption and to health outcomes, to develop a measure of relative burden of alcohol compared across different socio-economic groups. However, initial review of the availability of possible datasets for the analysis as well as feedback from reviewers suggested that health data linked to alcohol consumption would not be comprehensive or reliable. For that reason, the initial objective of mapping alcohol-related health outcomes across different groups was dropped from the thesis due to lack of data availability. In response to this gap, a separate study was undertaken (chapter 3) that critically reviewed existing datasets and identified what is needed for alcohol policy-oriented evidence in future. Chapter 3 therefore is the first substantive empirical chapter that critically assesses the usability of data from different surveys in South Africa containing alcohol variables.

The next step was to test if there is inequality in alcohol consumption (volume and frequency). For instance, are there differences in alcohol consumption patterns between subgroups such as SES, age, race, gender and geographic location in South Africa? Chapter 4 provides a detailed description of alcohol consumption patterns (current and binge drinking) in South Africa at the individual level using various equity stratifiers and datasets that span 10 years. If there is inequality in alcohol consumption, one needs to know if these inequalities are fair or not.

This leads to the last step of the thesis which is to assess inequity in alcohol consumption at household level. The focus of the investigation of inequity was thus on consumption, as measured by

spending on alcoholic beverages. Chapter 5 thus provides the first study of the progressivity and the changes in the progressivity of alcohol consumption expenditure at the household level in South Africa using datasets that span 15 years.

Chapter 6 summaries the most important findings from this thesis, analyses the strengths and limitations of the study and proposes recommendations for public health policies and future research directions arising from the thesis findings.

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CHAPTER 2

Conceptual framework and literature review

2.1. A conceptual framework for understanding the risk of vulnerability to alcohol consumption and alcohol related-harm and the rationale for the proposed research study

Alcohol consumption and alcohol related-harm are unevenly distributed between and within countries (1). That is because there are a variety of factors at the individual/household (e.g. age, race, education and income) and social (e.g. tax, increase in alcohol availability and norms) levels that can influence alcohol consumption and alcohol-related harm (2, 3). According to Dahlgren and Whitehead (4), people are born with pre-existing characteristics and are subjected to their communities' norms. They have different childhood experiences, education, and employment and housing opportunities. These social determinants make some individuals more exposed and vulnerable to alcohol-related harm than others. Moreover, these social determinants are responsible for health inequalities between genders, communities and societies (4).

Figure 1 – Determinants of health (4).

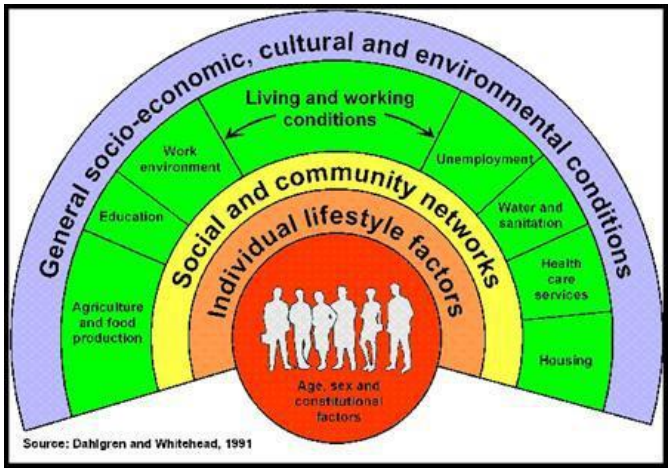
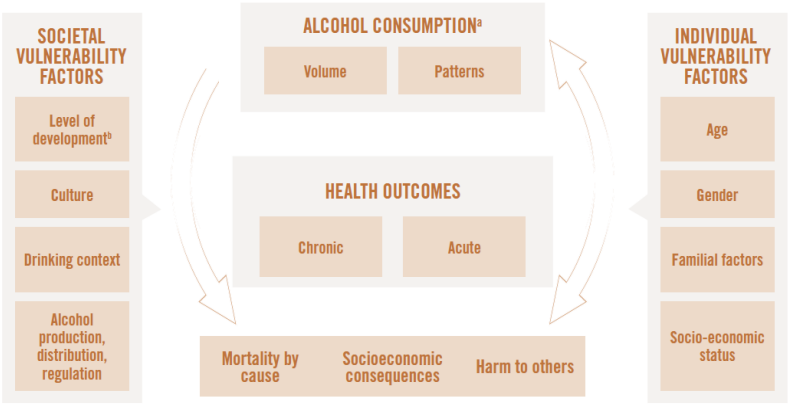


Figure 2 – WHO conceptual causal model of alcohol consumption and health outcomes (5)



Dalgrhen and Whitehead's social determinants of health model (figure 1) suggests that there are different mechanisms for increased vulnerability to alcohol-related harm. The most direct mechanism is through increased exposure to alcohol (e.g. drinking alcohol at high levels in one occasion). However, there is also increased vulnerability to alcohol-related harm because (a) for a given alcohol consumption level, some people will be at a higher risk to adverse outcomes (e.g. stroke) because they have higher rates of other risk factors (e.g. poor diet, high blood pressure) and will, therefore, suffer more harm because of these co-factors, (b) some people have limited ability to cope with exposure to alcohol (e.g. limited access to rehabilitation services for the consequences of alcohol dependence) because of their social circumstances. For instance, an individual might be more vulnerable to alcohol-related harms since he/she cannot pay for treatment or cannot afford to lose his/her job (6). This means that, financially, the burden of alcohol consumption on individuals and households can be experienced as high even when alcohol consumption is relatively low. Additionally, households and individuals can have a lower level of alcohol consumption but spend a higher proportion of their income on alcohol with significant financial burdens.

Table 1 - Overall pathways for increased risk based on the Dalgrhen and Whitehead's social determinants of health model
a) Increased exposure to alcohol (no specific inequity relationship) i. The more you drink, the more adverse impacts you suffer.
b) Social determinants such as low socioeconomic status i. Low SES may also increase your risk of risky drinking (binge drinkers or heavy drinkers) even if average drinking is lower.
c) For a given consumption i. Spend a bigger proportion of your income (so less disposable household income for other health-generating opportunities) ii. Comorbidity and other risks more common in low SES groups increase chances of adverse outcomes for a given alcohol intake iii. When you do experience an adverse outcome, you have less ability/resources to cope (e.g. access to treatment)

Most research on alcohol misuse and the impacts of alcohol misuse in South Africa is done at the "macro-level" or national level (e.g. (7-10) rather than at the "micro-level" – i.e. individual and household levels. However, according to researchers (3, 11-13), social determinates and inequities behind alcohol consumption play a key role in reducing alcohol-related harms. That is, one needs to understand who are the individuals and households that are more exposed and vulnerable to alcohol harms so that effective policies and interventions can be implemented to decrease inequities in alcohol-related harm.

2.2. Literature Review

2.2.1. The relationships between socioeconomic status, inequality and alcohol consumption

It is important to consider the relationships between socioeconomic status, inequality and alcohol consumption to provide an update on the current state of evidence on socioeconomic inequality in alcohol consumption. This literature review assists in identifying gaps in the current literature and providing context for the thesis and research questions. It summarizes the evidence of the relationship between socioeconomic status, inequality and alcohol consumption from local (South Africa) and international studies.

2.2.2. Search Strategy

The literature review was conducted searching subject-specific databases such as Medline through PubMed, Scopus and Google Scholar for studies using the search keywords “inequality”, “alcohol”, “alcohol consumption”, “alcohol drinking”, “social*”, “socioeconomic”, “socio-economic”, "socioeconomic factors" combined by the Boolean commands ‘AND/OR’. The keywords were drawn from the Medical Subject Headings (MeSH terms). Reference-list searching was done to identify additional articles. Medline through Scopus, PubMed, and Google Scholar databases were chosen to conduct the literature review search as these databases are popular and widely used for alcohol research.

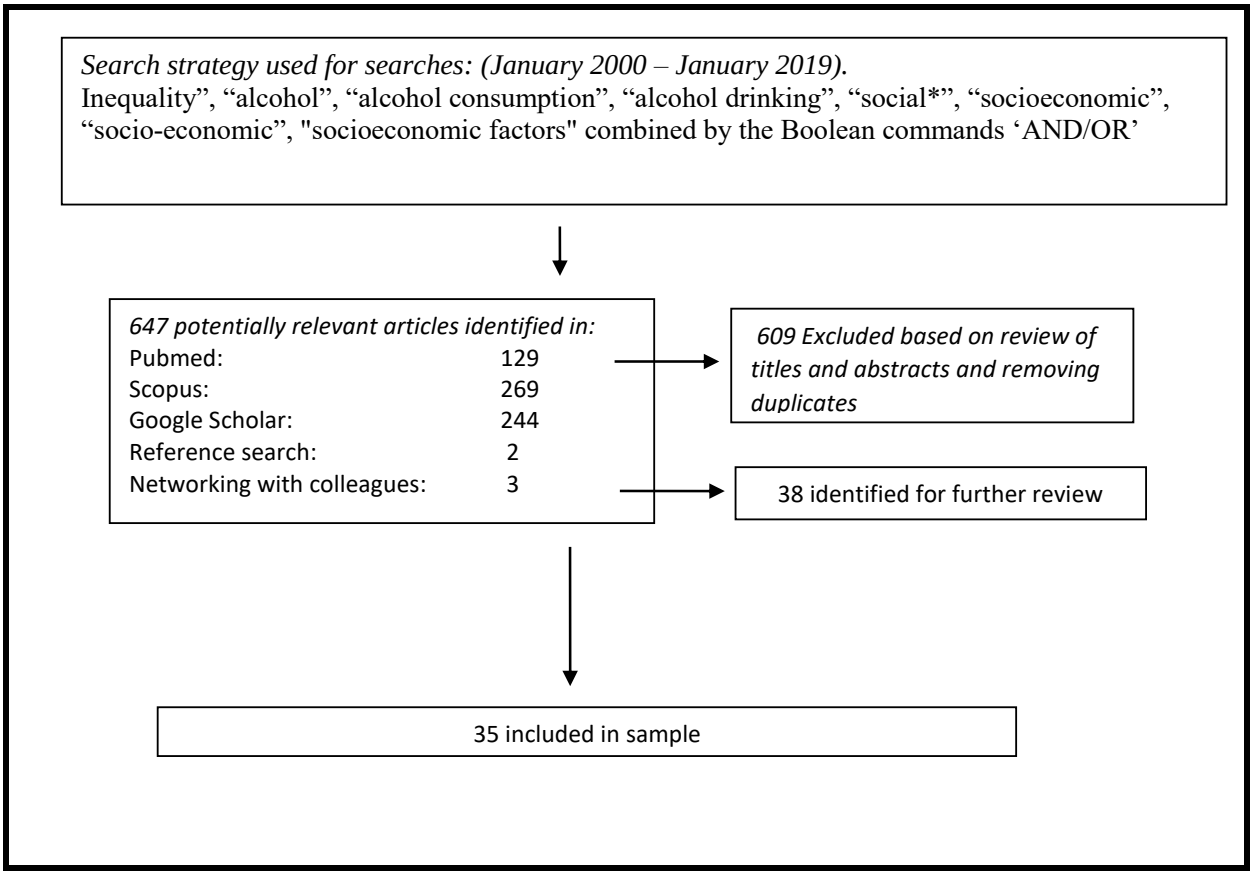
Based on the thesis aim, the following eligibility criteria were applied for studies to be included in the literature review: a) only English peer-reviewed articles; b) articles published between January 2000 and January 2019 exploring the relationships between socioeconomic status, inequality and alcohol consumption; c) for articles to be included in the review the primary outcome should be reflected as alcohol consumption (volume or/and expenditure). Articles addressing alcohol as covariant were excluded from the analysis.

2.2.3. Results

2.2.3.1. Study selection and description of studies

The review identified 647 potentially eligible studies that met the inclusion criteria. Following a process of reviewing the titles and abstracts, removing duplicates and articles that were not relevant (see Figure 3), 38 potentially eligible studies were subject to further analysis. Of the 38 potential studies, three were eliminated—two were commentaries without empirical data and one included data only on alcohol prices but not on alcohol consumption expenditure. The search strategy used for the identification and classification of papers is summarised in Figure 3. In total, 35 articles met the inclusion criteria (1, 14-46).

Figure 1: Flow chart indicating the search strategy and process



2.2.3.2. Location and measurements of SES and alcohol consumption

Table 2 summarizes these articles. Eight of the identified studies were conducted in multiple countries (14, 21, 24, 34, 37-39, 47). Three studies were each conducted in Australia (3, 35, 46), three in Brazil (16, 18, 32), three in the USA (22, 25, 27), three in Scotland (15, 23, 28) and three in Sweden (20, 36, 42). Two studies were each conducted in South Africa (17, 43), two in England (26, 41), two in the UK (19, 29), and two in Germany (44, 45), and one study was each conducted in the Czech Republic (31), Norway (33) and Thailand (40).

Eighteen studies used education as a proxy for SES (14-16, 18, 19, 24, 27, 29, 31-34, 36-38, 42, 45, 47); while 11 studies used wealth (16, 17, 20, 21, 28, 32, 39, 40, 43, 44, 46), ten studies used income (15, 18-20, 22, 27, 34, 35, 45, 46), six studies used employment (18, 29, 31, 33, 34, 45), three studies used deprivation (23, 26, 41) and one study used equality index to proxy SES (25). Only one study did not specify its measurement of SES (3).

For alcohol consumption measurements, the majority of the studies displayed in Table 2 had both frequency and volume as a measurement for alcohol consumption (14-22, 24, 25, 27, 28, 32, 33, 35, 37, 39-41, 43, 44, 47); while five studies used alcohol-related mortality (34, 36, 38, 42, 46), two studies used pure alcohol grams (20), one study used alcohol costs (45), one used alcohol outlets (26) and another study used alcohol-related consequences and dependence as a measurement of alcohol (23).

2.2.3.3. Descriptive summary of evidence on socioeconomic status, alcohol consumption and inequality

As mentioned in the conceptual framework in section 2.1, the interaction between innate individual characteristics and the social determinants, experienced through the full lifespan, increases people's exposure and vulnerability to health hazards. For alcohol consumption, one of the most important social determinants is socioeconomic status (48-50).

According to a systematic review looking at the relationship between SES, equity and alcohol consumption, social determinants such as SES can strongly influence inequities in alcohol consumption and related harms (3).

2.2.3.3.1. Summary of International Studies

Based on international evidence in Table 2, alcohol consumption is unevenly distributed across SES levels. A longitudinal analysis looking at income-related inequalities in alcohol consumption in Sweden suggests that alcohol consumption has a pro-rich inequality; meaning alcohol consumption is more concentrated among the rich (20). It is commonly accepted that low SES individuals have higher alcohol abstinence but are also at risk for risky drinking such as binge drinking (51). That means that the low SES individuals who consume alcohol usually drink large quantities of it over a short period of time, hence are more likely to be at risk for alcohol-related harms (51).

High SES status, on the other hand, according to the studies in Table 2 is usually associated with current drinking. Persons of high SES tend to have more drinking occasions than persons of low SES but consume lower quantities of alcohol (14). Nevertheless, this behavior pattern that high SES are less likely to be involved in risky drinking might not be seen across different countries. For instance, a cross-sectional analysis looking at inequalities in alcohol consumption using educational attainment as an indicator of socio-economic status in 15 countries found that although several countries followed the pattern of lower educated being more likely to be involved in risky drinking, some countries, such as Brazil and Mexico, show a different path where highly educated individuals are more likely to be risky drinkers (30). Another cross-sectional study looking at the relationship between SES, density of alcohol premises and alcohol consumption in Scotland found that high SES is more likely to be associated with binge drinking, while low SES are more likely to be associated with self-reported drinking problems defined in the study as ‘feeling ashamed of drinking, being annoyed by criticism about drinking, having shaky hands, drinking first thing in the morning, and being unable to stop drinking’ (15).

2.2.3.3.2. Summary of Studies from South Africa

Table 2 shows that only one study explored the socioeconomic inequality in alcohol consumption in South Africa (17). The published paper used cross-sectional survey data to explore socioeconomic inequalities in alcohol use by men living in informal settlements in South Africa. Lawana and Booysen (17) found that alcohol consumption, defined as whether the respondent consumed any alcohol beverage in the last 12 months, is more concentrated among men in the lower SES. While it is crucial to examine inequality in alcohol consumption in informal settlements in South Africa, the study only looked at a narrow SES band and did not provide a broad picture for the entire country, so its interpretation of the directionality of the association may be not be widely generalizable.

2.2.3.3.3. Socioeconomic inequalities in alcohol consumption by various equity stratifiers

Furthermore, there is an uneven pattern when decomposing socioeconomic inequalities in alcohol consumption by various equity stratifiers. Evidence from Table 2 shows that women in high SES are more likely to be risky drinkers (14, 29, 52), while the same for men in low SES (14, 31). Similarly, using education as a measure of SES, findings show that better-educated women are more likely to be heavy drinkers (29, 30, 52), while lower educated men tend to drink heavily, binge and report more alcohol problems (52). In the UK, for example, highly educated women are more likely to binge drink in their 20s. However, by their 40s, they are the group who binge drink the least (29). In countries such as Chile and Finland, women aged 45 to 64 in the high SES group are associated with higher weekly consumption of pure alcohol and heavy drinking (37).

Not all studies displayed in Table 2 support the hypothesis that high SES/ highly educated women are associated with higher alcohol consumption among women (25). A cross-section analysis looking at gender, socioeconomic status and alcohol consumption in the US found no evidence that suggests that women with high SES are associated with a higher level of alcohol consumption (25). These differences in findings may be due to (a) looking at the different population in the analysis (e.g. US vs the UK) and

(b) the differences in the construction of the independent variables (especially, SES) used to look at the association between SES and alcohol consumption among women. For instance, the studies which found that women with more education are more likely to be heavy drinkers used highest attained educational level and occupation level as the measures of SES; while Roberts (25) used "gender equality ratio" and "women's scores ration" which were created by using a mix of rations of women to men in labor force participation, types of occupation, living above the poverty line, percentage of female businesses owner.

Other pieces of evidence in the articles reviewed in Table 2 contradict the hypothesis that low SES is associated with risky drinking in men. For instance, a cross-sectional study in Australia examining the differences in socio-economic status and self-reported alcohol-related risk-taking behavior found that high SES reported higher levels of dangerous behavior such as public disturbance, damage to property, verbally and physically abusive behavior towards someone and stealing than their counterparts (35).

The contradictory findings for the association between SES and alcohol consumption may be explained by the differences in the studies' design. For instance, as it was mentioned in the conceptual framework, different populations have different alcohol consumption patterns and social determinants of inequalities which can impact alcohol-related harms differently. In addition, researchers use different measurements of SES and alcohol, according to the availability of the data, to address their study objectives. Therefore, one cannot assume that findings for one population or study is applicable to all.

Income inequality also influences alcohol consumption among young individuals (21, 42). A multilevel logistic cross-sectional analysis aiming to explore the relationship between income inequality and alcohol consumption and frequency of drunkenness in adolescents in 34 countries found that individuals aged 11 and 13 in countries of high-income inequality consumed more alcohol than their counterparts in countries of low-income inequality (21). Although, high SES adolescents seem to be more likely to experiences alcohol consumption at an earlier age than their counterparts (16, 39), growing up in a low SES household was associated with a higher risk of alcohol-related disorders than growing up in a

high SES household (42). The findings matched the general picture that burden of risky drinking such as binge and harmful drinking may fall more heavily on the low SES

2.2.3.3.4. Burden of alcohol consumption

Although evidence in Table 2 suggests that the burden of alcohol falls more heavily on the low SES, because low SES is associated with risky drinking patterns (e.g. conceptual idea that the more you drink, the more adverse impacts you suffer), other studies have suggested that even when low SES individuals have the same level of alcohol consumption compared to their counterparts, they still experience more harm than high SES individuals. This has been called 'alcohol harm paradox' (13, 41, 49, 51). Briefly, alcohol harm paradox relates to a situation where those with a relatively low alcohol consumption rate (e.g. low SES households) become more vulnerable to the harmful effect of alcohol consumption compared to their counterparts. A systematic review looking at the relationship between the social determinants of health, inequities and alcohol consumption found that with the same alcohol consumption level, the harm from alcohol consumption is higher among those with lower SES than among their richer counterparts (3).

Based on Dahlgren and Whitehead (4) social determinants of health model and the WHO conceptual causal model of alcohol consumption and health outcomes (5) frameworks described on Chapter 2.1, alcohol harm paradox may not be simply explained by the relationship between SES and alcohol consumption. There are indirect mechanisms (e.g. described on Table 1, c) such as differential financial resources, accessibility and availability of alcohol, lack of health literacy, power dynamics and drinking cultures, gender roles, social norms, clustering of unhealthy behaviours that could influence the relationship between SES and alcohol-related harms. One example of this indirect mechanism is that low SES individuals are more exposed and vulnerable to other health risk factors than high SES individuals (26, 41). For instance, Bellis, Hughes (41) looked at factors that may explain the alcohol harm paradox and found that with the same level of alcohol consumption, alcohol consumers in deprived areas are more

likely to smoke, be overweight and report poor diet and exercise. Another study examining the sociodemographic distribution of different types of alcohol outlets in England found that the most deprived areas have the greatest exposure to alcohol outlets (26).

Another example of indirect mechanism is that high SES households have resources available to pay for treatments (such as rehabilitation), economic security, healthier food nutrition and lifestyle to decrease the long-term health impacts of alcohol misuse; while lower SES individuals do not have enough resources to treat the burden of the diseases caused by alcohol consumption (53). For instance, alcohol consumers in deprived areas have a higher risk of injury and heart disease than alcohol consumers in non-deprived areas, even when their alcohol consumption levels do not differ (41).

Although there are empirical evidences that alcohol harm paradox association may be demonstrated in developed countries (41, 54, 55), there are limited evidences of it in developing countries (43, 56). In South Africa, a cross-sectional analysis using population-based survey found that low SES individuals are more likely to be involved in high-risk drinking than high SES individuals (43), which suggests a double disadvantage for alcohol-related harms—low SES individuals experience more harm for a given level of alcohol consumption and are more likely to drink at risky levels. This differences in consumption and the indirect mechanisms that influence the relationship between SES and alcohol-related harms might suggest that alcohol abuse in SA is not a reflection of genuine differences in consumption patterns among SES but may be a result of a more complex social problem.

2.2.4. Limitation

One of the research limitations is that the literature review only looked into three databases (Medline through Scopus, PubMed, and Google Scholar); yet, these databases are popular and widely used for alcohol research. Another limitation is that the review only included studies conducted in English. Some other studies that may meet the inclusion criteria but were written in other languages were

excluded. In addition, the quality of the studies has not been critically assessed; however, the studies have been used to provide context for the thesis and research questions and not used to drawn causalities.

2.2.5. Conclusion

While literature sources provide evidence that alcohol has a major negative impact on society and is felt more severely amongst low-socioeconomic families (53), this chapter shows that literature on alcohol consumption and harm on individuals and households in South Africa, especially from different socio-economic backgrounds, is very limited. Thus, in order to assess inequalities and inequity in alcohol consumption in South Africa, at the household and individual levels, the next step of this study is to document and critique existing data sources on alcohol expenditure, consumption and harms in South Africa. If excess alcohol consumption is indeed a deep social problem and the burden falls most heavily on poor households, this study can inform government interventions to target factors that increase both people's susceptibility to the consequences of harmful alcohol consumption as well as addressing measures to reduce alcohol consumption among high-risk drinkers.

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CHAPTER 3

Usability of existing alcohol survey data in South Africa: A qualitative analysis

3.1. Usability of existing alcohol survey data in South Africa: A qualitative analysis

Paper overview

This study used quantitative and qualitative analyses to document the extent to which data are available, their geographical coverage, the population surveyed, year of data collection, available co-variables, possible analysis of alcohol-related issues that can be conducted using the existing datasets in South Africa, and any limitations with these datasets.

Contribution to the thesis

The literature review (chapter 2) shows that there is limited research describing the burden of alcohol consumption in South Africa that uses an inequality and inequity perspective. This could be due to the data available being diverse in quality and details, limiting the ability to describe inequality and inequity adequately, especially if the analysis is to inform policy. Thus, this article gives a detailed description of publicly available alcohol datasets in South Africa and their characteristics, such as the possible analyses that could be done for epidemiology research on alcohol.

Role of candidate

The candidate led all aspects of the study, drafted the manuscript, incorporated inputs from supervisors who reviewed the manuscript and the candidate submitted the final manuscript for publication.

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Usability of existing alcohol survey data in South Africa: a qualitative analysis

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ABSTRACT

Objective This paper assesses the usability of existing alcohol survey data in South Africa (SA) by documenting the type of data available, identifying what possible analyses could be done using these existing datasets in SA and exploring limitations of the datasets.

Settings A desktop review and in-depth semistructured interviews were used to identify existing alcohol surveys in SA and assess their usability.

Participants We interviewed 10 key researchers in alcohol policies and health economics in SA (four women and six men). It consisted of academic/researchers (n=6), government officials (n=3) and the alcohol industry (n=1).

Primary and secondary outcome measures The desktop review examined datasets for the level of the data, geographical coverage, the population surveyed, year of data collection, available covariables, analyses possible and limitations of the data. The 10 in-depth interviews with key researchers explored informant's perspective on the usability of existing alcohol datasets in SA.

Results In SA, alcohol data constraints are mainly attributed to accessibility restrictions on survey data, limited geographical coverage, lack of systematic and standardised measurement of alcohol, infrequency of surveys and the lack of transparency and public availability of industry data on production, distribution and consumption.

Conclusion The International Alcohol Control survey or a similar framework survey focusing on substance abuse should be considered for implementation at the national level. Also, alcohol research data funded by the taxpayers' money and alcohol industry data should be made publicly available.

Strengths and limitations of this study

- ► Identifies publicly available alcohol datasets and its characteristics.
- ► This study provides recommendations for better alcohol data collection in South Africa using key informants' experiences of dealing with alcohol datasets.
- ► The desktop review looked into four data warehouses.
- ► Informants' solutions and recommendations are based on their own experiences.

INTRODUCTION

Alcohol abuse is a significant contributor to the global burden of disease and a cause of adverse economic impacts.[1 2] Alcohol abuse is associated with more than 60 long-term health conditions, including cancers, cardiovascular diseases, infectious diseases and development and cognitive delays in children.[1 3] It also affects social relationships by causing pain and suffering of family and friends of risky drinkers.[4] Alcohol abuse is reported to reduce job productivity, increase unemployment and a drop in income levels.[4]

South Africa (SA) has particularly alarming statistics; about 7.1% of all deaths and 7.0% of total disability-adjusted life years are associated with alcohol consumption in the country.[3] Previous studies using nationally representative survey data found that approximately half of men and one-fifth of women consume alcohol in SA and a high proportion of those who consume alcohol are likely to be involved in risky drinking.[3 5 6] In 2015, the total per capita alcohol consumption (APC) in SA was 11.5 L of pure alcohol; while, alcohol consumption per drinker was 27 L of pure alcohol—one of the highest levels of alcohol consumption in the world.[7]

Alcohol consumption in SA is, therefore, a major problem, but many of the pathways resulting in adverse impacts are unknown. One of the challenges is that most research on alcohol consumption and its impacts in SA have had difficulty in characterising the extent and distribution at the societal level of alcohol-related harm due to data constraints. For instance, data limitations may arise from under-reporting, lack of accurate prevalence data and a failure to standardise alcohol consumption measures. A modelling study using data from informant assessments and survey data estimated that the proportion contributed by unrecorded alcohol for high-income countries was between 2.4% and 16.4% of all alcohol consumed in 2015, while it was between 9.0% and 27.6% for upper-middle-income countries. The equivalent ranges were between 38.1% and 70.8% for lower-middle-income countries and between 26.5% and 59.7% in low-income countries.[8] Probst *et al*,[9] using data from five nationally representative

SA surveys, estimated that the surveys only captured between 11.8% and 19.4% of total alcohol consumed per capita. That is, more than 80% of APC was unrecorded. Also, although most survey data in SA record the amount of consumption using standard drinks, the frequency of drinking recorded across different studies used different time frames.

According to Chan *et al*,[10] household surveys are the main sources of data used for monitoring and evaluating health issues, especially in low-income and middle-income countries (LMICs). Therefore, reliable and accurate household data are crucial for tracking health progress and performance and monitoring the impact of health programmers and policies.[10] From 2002 to 2011, high-income countries had on average 16.8 household surveys while LMICs had, on average, 18.3 household surveys completed.[11] Although LMICs have more household surveys collected, most of the surveys are infrequently collected, are of poor quality or/and are not accurate.[11 12] Glassman and Ezeh[12] state that countries in Africa are in urgent need of better data. Data on poverty, births and deaths, taxes and trades, schooling and other health, economic or social welfare indicators are either missing or weak. This inadequacy impairs countries' abilities to implement efficient and effective policies.[12] For instance, Africa has the lowest coverage of birth (25%) and death (18%) registration compared with Europe, which has the highest data source on births (98%) and deaths (100%).[13] A lack of births and deaths data make it difficult to hold governments accountable for improvements in the countries' economic and social welfare.

For alcohol, survey data can provide valuable information on patterns or problems within a community of alcohol-related harms and is commonly used by stakeholders and researchers to support policy development for alcohol control. However, the lack of systematic and standardised alcohol data may result in policies failing to address alcohol-related harms adequately. For instance, in SA, alcohol outlets have restricted opening hours laws but a high number of unregulated outlets (known as shebeens), located especially in the poorest socioeconomic areas, continue to sell alcohol according to demand.[4]

To our knowledge, this paper represents the first critical assessment of the usability of data from different surveys in SA containing alcohol variables data for the assessment of alcohol consumption and related issues. This research aimed to answer the following important questions: what alcohol-related datasets are available in SA? Moreover, what are their geographical coverage, the population surveyed, year of data collection and available covariables? The research also asked what possible analysis of alcohol-related issues could be conducted using the existing datasets in SA and what are the limitations with these datasets to make recommendations for how routine datasets could be better assembled and used for informing policy? Critically, analysing the usability of alcohol data is important for, among other things, informing the effectiveness and efficacy of regulatory (eg, alcohol tax) and programmatic (eg, public awareness) interventions.

Box 1 Eligibility criteria for inclusion used to identify South Africa alcohol datasets

1. A local, provincial or national representative survey.
2. Contains alcohol data (either consumption or expenditure or both).
3. The database is publicly available.
4. Surveys conducted after 1994*.

* postapartheid period. Most surveys prior to 1994 (during apartheid) focused more on a particular racial group (whites) and urban locations; therefore, they were not included in the analysis.

METHODS

A theory-generating, two-step qualitative methodology was used for this study. First, a desktop review of existing datasets was undertaken by the first author (MFM) to identify whether and how alcohol data were recorded. These datasets were then further examined to gain an understanding of the gaps in the literature in terms of documenting alcohol survey data in SA. Then, key researchers in alcohol policies and economics in SA were interviewed by the first author (MFM) using a semistructured, in-depth interview guide to gain the participants' perspective on the usability of existing alcohol data in SA (online supplementary appendix 1).

Desk-top review

The desktop review consisted of identifying and reviewing SA datasets containing alcohol variables to assess the usability of each of the datasets in SA. The databases were identified by accessing datasets housed in data warehouses using the eligibility criteria for inclusion contained in box 1. Four data warehouses (DataFirst, the International Household Survey Network (IHSN), WHO Central Data Catalog and World Bank Central Microdata Catalog), which provide a comprehensive listing of available data, were used to search for eligible datasets.

Eligibility criteria for inclusion of a dataset are listed in box 1. The search filters are as follows; first 'alcohol' was used as a keyword in 'variable description'; 1994 was used in 'show studies conducted' to display only studies conducted after 1994. Filter by 'data access' options 'public use data files' and 'Data available from external repository' was used to display only possible publicly available datasets and 'SA' was selected on the 'country' filter. The initial search identified 38 potentially databases using DataFirst; 52 using the IHSN; 5 using WHO Central Data Catalog and 35 using the World Bank Central Microdata. A cross-examination was performed to eliminate duplicates and datasets that were available from other sources but was not publicly available. Also, during the search, surveys with more than one round (eg, Income and Expenditure Survey 2005 and 2011) were counted as

Box 2 Eligible datasets review

- Source—provides information where the dataset is housed.
- Level of data (household or individual)—provides information on the household and/or individual level.
- Geographical coverage—describes the locations covered by the survey.
- Universe—the population that is being surveyed.
- Survey year—the year that survey was conducted.
- Measures of alcohol consumption and/or expenditure.
- Scope—covariables available (eg, demographics, socioeconomic status, health outcomes and other).
- Type of analysis that can be done using alcohol information:
  - Pricing and expenditure (topics related to pricing, eg, determine alcohol pricing, price elasticity, alcohol tax or alcohol expenditure analysis).
  - Marketing of alcoholic beverages (topics related to marketing, eg, advertising, increasing in marketing share).
  - Availability of alcohol (to track and/or reduce/increase alcohol availability, eg, restriction on alcohol sale, places where alcohol is sold).
  - The burden of alcohol (topics related to harmful use of alcohol, harm reduction, alcohol-related diseases).
  - Tracking informal alcohol consumption or sale.
  - Other (specify).
- Limitations— limitation of the survey.

one main survey (or dataset). A total of 23 datasets were identified.

The eligible datasets identified were reviewed using the categories in box 2. The formulation of these categories in box 2 was based on surveys description documentation and categories most likely to be used in describing a dataset in an epidemiology alcohol research.

Key informant interviews

Recruitment processes and target population

The study population was key researchers in alcohol policies and related issues in SA. We identified all researchers in SA who have done work on alcohol-related research and policy from published papers, policies and legislature documents and their work with alcohol organisations. All suitable/eligible individuals were invited to partake in the study. We specifically focused on those who conduct alcohol-related research for government, academic/research institutions, non-government and community-based organisations (NGOs/CBOs) and the alcohol industry. Inclusion criterion to identify informants required that participants have either published research on alcohol or are associated with an organisation engaged in addressing the burden of alcohol, for example, NGOs/CBOs as well as the alcohol industry. Informants were approached via email to participate in the study and were enrolled after providing informed consent.

Patient and public involvement

Study participants had no involvement in the study design or conduct of the study. The findings from this study will be disseminated to the participants via email.

Data collection process

The semistructured interviews were done face to face and in one case via Skype. Data were collected using a structured interview guide (see online supplementary appendix 1 and lasted between 30 and 60 min. It explored the informants' professional background and their experiences of dealing with alcohol datasets in SA. The interview guide was supplied to participants before the interview due to concerns about the level of information sharing. Interviews were audiorecorded and transcribed verbatim to facilitate qualitative analysis. The main questions contained in the interview guide sought to explore (1) which alcohol datasets the respondent usually used in their research, (2) which datasets they know of but have not used and (3) the reasons for not using these other datasets. Questions were also included relating to the challenges in using the datasets for research and exploring any recommendations for how routine datasets could be better used for informing policy.

The informant participants were asked to name all the datasets that they know in SA that contain alcohol-related data. The datasets provided by the informants were displayed by the themes: (1) most cited, (2) most cited but have not been used and (3) accessibility score. Parts of questions 4- 'Do you know any dataset/s* that contains alcohol related data' (where to find it? Any restrictions? Have you used it (Y/N)? Why Not?) and 5-'Have you ever used a national or provincial dataset/s* that contains alcohol related data?' (Where to find it? Any restrictions?) from the questionnaire were used to compute the data accessibility scores. The scores were assessed on a scale of 1–5 where 1 signified most inaccessible (includes data no longer available or owners, funders or depositors of the data do not share it even if you apply for it or you only have access to the reports); 2- less accessible—(includes data that are available through reports); 3—somewhat accessible (includes data for which you must complete a form for authorisation or to request the data from the owner); 4—accessible (includes data for which you complete a form but do not need to wait for approval); 5—most accessible (data that can be accessed online without authorisation being requested). In addition, datasets cited by key informants were overlapped with the desktop review and assessed using 'Yes' if the dataset was displayed in the desktop results and 'no' if the dataset was not displayed in the desktop results.

Data analysis

All interviews were first transcribed and moved onto an Excel spreadsheet. Closed-ended questions were quantified (eg, SA alcohol datasets identified by experts) while open-ended questions (eg, What would be the possible solutions and recommendations for better alcohol data collection in SA?) were analysed manually using thematic analysis. Once the data were coded, the spreadsheet was sent to each coauthor to validate the results. Differences were discussed in the team and adjusted after reaching consensus.

RESULTS

Desktop review

A survey dataset reference list was created by identifying existing alcohol survey datasets in SA (online supplementary appendix 2). A total of 23 survey datasets were identified using the eligibility criteria (box 1). Thirteen out of 23 datasets are more than 10 years old. All the datasets addressed the burden of alcohol in some way. Eleven surveys addressed the burden of alcohol at the national level, while 12 had either municipal or provincial level. For the measure of alcohol, 20/23 surveys have individual level data on alcohol; for instance, alcohol consumption volume and frequency, safety and crime and health alcohol data. Seven out of the 23 surveys have household level alcohol data (eg, alcohol expenditure, alcohol abuse in the household and neighbourhood) and 3/23 surveys have data on alcohol at the community level (eg, crime related to alcohol and number of establishments that sells alcohol). Most commonly, survey limitations include limited national coverage, infrequent data collection intervals and surveys not collecting data needed for epidemiology research. Specifically, alcohol volume and frequency data were missing in 12 surveys or when the surveys do provide the information, the time frame of alcohol consumption or the frequency was not provided. Also, alcohol expenditure data were almost nonexistent in many surveys in SA (online supplementary appendix 2).

Themes emerging from key informant interviews

Participants

The profile of key informants is summarised in table 1. In total, 16 key informants were invited to participate in the study but only 10 (4 women and 6 men) agreed to participate (63% participation rate). It consisted of academic/researchers (n=6), government officials (n=3) and the alcohol industry (n=1). The diversity of the informants enabled an in-depth exploration of possible solutions and recommendations for better alcohol data in SA.

Datasets cited by key informants

Table 2 shows that key informants were able to identify 24 datasets that contain alcohol data. All key informants reported use and/or had knowledge of at least one dataset. South African Demographic and Health Survey (SADHS) and National Income Dynamics Study (NIDS) were the most commonly cited datasets (n=7); however, four in seven informants have not used SADHS for analysis citing reasons such as (1) accessibility restrictions (eg, the Youth Risk Behaviour Survey has not been used because the owners, funders or depositors of the data does not share the data) and (2) the dataset contains variables that are extraneous to the informant's research interests. Only 5/24 datasets were considered most accessible and accessible (n=5 and 4); while 5/24 were somewhat accessible (n=3); 7/24 were less accessible (n=2) and 7/24 were considered inaccessible (n=1). For the top five most cited datasets, informants were more likely to use alcohol-related data for research on the burden of alcohol (topics related to harmful use of alcohol, harm reduction and alcohol-related diseases), followed by alcohol price and expenditure research (topics related to pricing, eg, to determine alcohol prices, price elasticity, alcohol tax or alcohol expenditure analysis).

In total, 6/24 datasets cited by key informants overlapped with the desktop review. The low dataset overlap was related to dataset accessibility (table 2—accessibility scores below 4). Eighteen datasets (n<4) cited by the key informants that were not identified by the desktop review are not publicly available data and can only be accessed through reports and/or are licensed data files which need authorisation from the owners, funders or depositors. Global Information System on Alcohol and Health (GISAH) was the only dataset that was identified by the

Table 1 Key informants' characteristics

Informant	Gender	Industry/sector	Primary role
Informant 01	Male	Academic/research	Researcher
Informant 02	Male	Academic/research	Researcher and manager
Informant 03	Female	Academic/research	Researcher and student
Informant 04	Male	Government	Policy-maker
Informant 05	Male	Academic/research	Researcher
Informant 06	Female	Academic/research	Researcher
Informant 07	Female	Academic/research	Researcher
Informant 08	Male	Industry	Manager
Informant 09	Male	Government	Policy-maker
Informant 10	Female	Government	Policy-maker

Four NGOs/CBOs were also invited to participate in the study but they either declined or had not replied by the time the study closed. Although no NGOs/CBOs directly participated in the analysis, some key informants work closely with NGOs/CBOs.
CBO, community-based organisation; NGO, non-government organisation.

Table 2 Alcohol datasets in SA identified by key informants (n=10)

	Datasets	Dataset most cited (total)	Dataset cited but not used	Accessibility score	Overlap with the desktop review
1	South African Demographic and Health Survey	7	4	2	Yes
2	National Income Dynamics Study	7		5	Yes
3	SAARF's All Media and Products Survey	5	1	3	No
4	South African National Youth Risk Behaviour Survey	4	2	1	No
5	South African Community Epidemiology Network on Drug Use	3		2	No
6	The International Alcohol Control Study (the IAC Study)—For SA—Pretoria	3	1	3	No
7	South African National HIV Prevalence, HIV Incidence, Behaviour and Communication Survey	3		4	Yes
8	Income and Expenditure Survey	3	2	5	Yes
9	South African National Health and Nutrition Examination Survey	2	1	5	Yes
10	Global Information System on Alcohol and Health	2	1	5	No
11	Khayelitsha Household Survey	2		3	Yes
12	South Africa Stress and Health	2		3	No
13	Department of Social Development, Western Cape Resources and Services Directory for the Reduction of Harmful Alcohol and Drug Use	2		1	No
14	National Injury Mortality Surveillance System	2		2	No
15	Fetal Alcohol Syndrome dataset	1		3	No
16	South African Wine information and Systems Data	1		2	No
17	High School Survey	1		2	No
18	IRI—Sales and Marketing, Pricing Information Data	1		1	No
19	DUNNHUMBY Shopper Data	1		1	No
20	NIELSEN Survey and Electronic Data (townships and Sheebens)	1		1	No
21	Consumer Research (Industry pays for data collection)	1		1	No
22	NIELSEN Home Panel	1		1	No
23	Western Cape Emergency Health Survey	1		2	No
24	Department of Transport and Public Works (Traffic Data)	1		2	No

The scores were assessed on a scale of 1–5 where 1 signified most inaccessible; 2-less accessible; 3-somewhat accessible; 4-accessible; 5-most accessible.
SA, South Africa.

key informants and had a 'most accessible' score (n=4) but does not overlap with the desktop review. The reason for that is that the GISAH is not housed in data warehouses but rather on WHO webpage[14] for 'easy and rapid access' to alcohol indicators.

Based on the desktop review and the key informants' interviews, the frequency and volume of alcohol consumption was the variable most commonly found across available datasets; while blood alcohol concentration, alcohol price, alcohol production and purchases for firm-level variables were the least commonly variables available in datasets. For non-alcohol variables, lower level geographical coverage (eg, suburbs and townships) was generally not available, limiting the potential usability of the datasets.

Key informants' feedback on alcohol data collection in SA

Key informants' views on alcohol data constraints in SA showed a high degree of consensus. The major constraints are presented in four categories : (1) alcohol consumption, (2) representative alcohol data (eg, substance abuse), (3) time period/ periodicity/ frequency and (4) public availability of data on production, distribution and consumption of alcohol.

Alcohol consumption

One of the major problems in collecting alcohol data is that questions on current alcohol consumption included in many surveys generally fail to capture the true extent of alcohol consumption. According to the informants, in most surveys, there is under-reporting of alcohol consumption.

> People very significantly underreport alcohol consumption and prevalence and that is a problem (Informant 02- Researcher and Manager).

One informant suggested that the survey 'under-reporting was massive. (That is) for every four drinks a person would have they would report about 1' (Informant 03- Researcher and Student).

Informants suggested that the reasons for alcohol being under-reported in surveys could be due to stigma, how the alcohol questions are framed, or simply because people do not know their alcohol intake levels.

One informant suggested that

> … stigma—possibly have to deal with the population group of the interviewer and the gender of the interviewer. So, you can have power imbalances in the collection of the data (Informant 02 - Researcher and Manager).

While another informant suggested that

> … for some reasons, people who drink alcohol seem to not quite face up to what they are drinking and also they might not be realizing how much they had. Like, if I say I had a glass and a half; I would probably say I had one glass, or I might be sitting on the interview saying oh I don't drink at all, never drink. (Informant 03- Researcher and Student).

In addition to the alcohol questions in SA, surveys struggled to report the correct frequency and volume of alcohol consumption. Another informant pointed out the need to collect data on specific liquor types such as sugar fermented beverages, beer, wine and spirits and not by categories of harms,

> At the moment, they collect separate excise taxes on beer on wine and spirts, but the definition of some of these drinks has to be improved. So, for example, the big problem is in the sugar fermented beverages (SFB). And those are really the cheapest alcohol made in this country (Informant 09- Policymaker).

No matter what the reason for under-reporting, one informant noted that

> we need to get a real understanding on how much alcohol, how much standard drinks are in those things. So, is it 3 drinks or it is 3 vintage [indistinct] which are 340 mL bottles that are 2% each or is it 3 black label quarts which are 750 mL at 5.5%. So, understanding pure alcohol content across all these instruments is really important (Informant 05- Researcher).

A possible solution to overcome under-reporting suggested was the use of the

> graduate frequency where you ask how often do you drink at this quantity? And also have relativity small time frames and explicit time frames to refer to. Definitely have at least quantity, frequency plus have heavy episode drinking and also possibly not just 5+drinks but 5+, 7+or like multiple categories or ask how many drinks do you drink on average on a heavy drinking occasion or like have a better assessment around heavy episodic drinking […] (Informant 06- Researcher).

In addition, to avoid stigma an informant suggested that matching interviewers to local demographics might improve the quality of data. Another informant commented on privacy as an issue for disclosing sensitive information such as alcohol consumption. 'I think [in] the informal housing area sometimes they don't have a private place to have a conversation' (Informant 06- Researcher).

Absence of a dedicated national survey for substance-related disorders including alcohol

Another alcohol data constraint cited by the informants is that there is no national dataset focusing specifically on substance abuse, especially on alcohol. According to one informant,

> we need studies that look just at substance use, not as part of a survey looking on everything because you get terrible data. You need more dedicated survey looking at alcohol and other drugs use (Informant 01- Researcher).

The lack of detailed and good quality data on substance abuse may negatively influence alcohol policy interventions as, without having a proper understanding of people's alcohol consumption risky behaviours, policy implementation is likely to be ineffective. One of the informants stated that

> I don't have a strong sense how to proceed on these program as a policymaker and funder. I got a perception that there is a massive substance abuse problem. I mean in the Western Cape there is a massive substance abuse problem both alcohol and drugs. I had very few requests from other departments, from the department of health or social services to say look here is a big problem we need to address in the following way etc. etc. You know, I am a bit puzzled, but they are not giving more attention to it because it is such a massive problem. There [is] a lot [of] missing information missing for supply and demand of treatment and gap. Very little is done on the control of alcohol (Informant 04- Policymaker).

Time period/periodicity/frequency

Informants mentioned that there is a need for more frequent alcohol data availability.

> I am not seeing regular data coming out […] to say that you know the number of cases of alcohol-related problems is on the regular bases. What happens with those trends and so on? So, that for me is missing. Not missing but weak. The biggest problem I am finding as we move towards to National Health Insurance [NHI] is that we have a lot of difficulties getting the Department of Health to work with [us] on the information system that is necessary (Informant 04- Policymaker).

Not having recent data available, policy-makers and researchers would not be able to provide support to advocate for policy interventions. For instance, an informant suggested that although there is data on alcohol burden, the data are not timeous.

> the problem with them being these big gaps […] it's that by the time you get numbers reported it's 2 years later and the situation could have changed. And it also does not help for planning. You know, you cannot plan. You are not working with real-time information. What ideally, we would like. I know at the moment we are trying to do this, but we need data that are more real-time from the industry and from departments that deal with social repercussion of health issues (Informant 10- Policymaker).

Public availability of data on the production, distribution and consumption of alcohol

According to the informants, there is a massive need for publicly available data on production, distribution and consumption of alcohol. Given there is a correlation between alcohol price and consumption,[15–17] without pricing data one cannot analyse the impact of regulatory alcohol policies that aim to reduce the affordability of alcohol beverages to decrease alcohol consumption and alcohol-related harms. One informant argued that

> we need information on distribution numbers and manufacturer numbers. The distribution which you know all [the] way down to where it is delivered to local pieces that you can almost track and trace. You [are] not going to be able to track and trace but you know where the final point of the arrival is. You need figures on sales data. You need figures on pricing desegregated by area. So, for example, at the moment it seems that the industry is adjusting prices based on the community. So, effectively what it seems to be happening is that in more dense population, in more poor areas they [industry] are selling at the lower price because the gain is that they will be pushing volume and that is how they're going to make their money as supposed to selling at a slightly higher places in more areas where there is less population but you are still going to get your targets because they will be able to afford it (Informant 10- Policymaker).

A major obstacle for alcohol-related harms research mentioned by the informants is the lack of data on the price of alcohol. According to an informant,

> quantity and prices are another key thing as well. The big barrier to prices are a massive drive of consumption. So, it's pointless knowing what volume of alcohol contain beverages are sold. We need to know how much alcohol is being sold and what prices are being sold at. Because you can put so many sorts of things in place but if the price per unit of pure alcohol is decreasing, your alcohol consumption and alcohol problem will increase. Accurate price per standard drink is crucial […] If the price of alcohol is decreasing, I guarantee the problems will increase (Informant 05- Researcher).

Possible solutions and recommendations for better alcohol data in SA

good data

When asked for their opinion on what would be a perfect dataset and examples of good alcohol datasets, informants provided the following responses. One informant suggested that, overall, a good alcohol dataset should be

> representative of the population sampled; clean; regularly updated; reliable and relevant to the study of interest (Informant 07- Researcher).

Another key informant agreed that a good dataset needed 'to be representative, especially Township representative' (Informant 08- Industry). As examples of good existing alcohol datasets, informants suggested WHO STEPwise approach to Surveillance (STEPS) and the International Alcohol Control Study (IAC). The STEPS

survey was described by one informant as 'a non-communicable disease risk factor survey but includes questions on alcohol which is quite good' (Informant 01- Researcher).

Another informant suggested that it

> would be nice to have something like [the IAC survey] that is very alcohol-focused and not just [a] sideshow within the bigger survey (Informant 02- Researcher and Manager).

What should the government do to collect better data

There was not a clear consensus among the informants on what the SA government should do to collect better data. The overall comments were that the government should have a clear understanding of the data needs and find proper funding to undertake data collection. It was mentioned that even when the collection of data is funded by the government, which would normally imply that these data should be publicly available, the investigators only release it after a long delay and, as a result, the data might not be as useful for research analysis. For example, one informant referred to the South African National Health and Nutrition Examination Survey as funded by the government for which data were collected in 2011 but only released publicly in 2018. The informant noted

> that is my tax money that has been used to buy data which I cannot use as a researcher. So, I think whatever the government funds, must be made public straight away. So, I think [there] needs [to be] a very open policy… (Informant 03- Researcher and Student).

In terms of alcohol industry data, it was argued that the government should enforce the public and transparent release of data on the distribution, manufacture and consumption held by the industry. One informant suggested that relying on legislation for Promoting Access in Information would not work well; rather there should be

> a legislative requirement on them [industry] to provide data. Because I don't think you're going to get through. I mean you could get [data] through applying for an application [PAIA]. But that means every time you have to get information, you have to go through a court channel as if there is a legislative requirement could be a little more ongoing and transparent. And in terms of that, we need information on Distribution numbers and Manufacturers numbers (Informant 10- Policymaker).

DISCUSSION

This study examined the usability of South African alcohol data sources by documenting the type of alcohol data available in different sources and what possible alcohol analysis could be done using these datasets. It also provides some recommendations for how routine datasets could be better used for informing policy. The results show that there are data constraints in alcohol data in SA. Through the desktop analysis, only 23 datasets met the eligibility criteria and most of these datasets are more than 10 years old and the principal agents for these surveys have now stopped collecting new data. Key informants identified 24 datasets that contain alcohol data, and 6 of them overlapped with the desktop review.

The minimal overlap between the data from the key informants and the desktop review has to do with accessibility. In the results, only 5 of the 24 datasets identified by the informants were considered 'most accessible' or 'accessible'. Accessibility restrictions to alcohol datasets pose a threat to new research and the replicability of findings.[18] For alcohol intervention programme and policy to be effective, they should be based on evidence-based components.[19 20] As governments are accountable for implementing evidence-based alcohol policy, a lack of data accessibility could potentially impact the implementation of relevant policy and programme aiming to address alcohol-related harms.[20]

A systematic review looking at the association between socioeconomic status and alcohol consumption within LMICs suggested that African surveys that collect alcohol data are 'complicated by small non-representative samples, weak methodologies and non-significant findings'.[21] However, none of the datasets included in the systematic review[21] was from SA. Different from the findings by Allen *et al*,[21] this study suggests that the constraints affecting alcohol datasets in SA are relate to access restrictions to survey data, lack of systematic and standardised measurement of alcohol, limited geographicl coverage, infrequent survey timing and lack of public availability of industry data on price, production, distribution and consumption of alcohol. This difference in findings may be related to political economy challenges faced by each African countries. Glassman and Ezeh[12] suggested that the main challenges of data collection and use in Africa are related to offices responsible for statistics not having autonomy and stable budgets to collect data; thus, they are likely to produce unreliable and bias data. Also, donors funding projects tend to dictate how the data are collected and usually are interested in collecting micro-oriented survey and once off impact evaluations. Lastly, even when accurate data are collected, access and usability are restricted or limited.[12]

Probst *et al*[9] confirm that alcohol consumption in SA using different nationally representative surveys is under-reported. Similar to Vellios and Van Walbeek,[6] our results suggested that alcohol under-reporting in SA surveys might be related to the lack of systematic and standardised measurement of alcohol consumption. For instance, the NIDS Adults Survey question 'how often respondent consumes alcohol' might not record the actual consumption due to the absence of any time frame or recall period. In addition, an interviewee might not feel comfortable in disclosing their consumption due to

stigma. Interviewees might also have to face the challenge of not understanding the definition of standard drinks, especially low-income individuals who are more likely to consume traditional drinks such as homebrews.[6]

As SA moves towards implementing additional alcohol policies,[22] it is imperative that good representative alcohol datasets are available to evaluate the effectiveness of alcohol policy interventions, among others. Therefore, this study suggests that alcohol data research in SA can be improved by making all datasets funded by the government and industry data (production, distribution and consumption data) including price data, publicly available. In addition to accessibility, substance abuse data should be collected more frequently so that policymakers have access to 'real-time' information to evaluate and implement community evidence-based programme and policy. Lastly, it is vital to develop and test a standard alcohol questionnaire guideline for SA to be used in a national survey similar to that reported by Roche *et al*[23] which includes WHO graduated quantity-frequency measures.[24] The ICA dataset was cited in our results as an example of a good dataset that could potentially be a framework to provide more accurate, unbias and consistent alcohol data in SA. Its approach to measure consumption, which accommodates country-specific beverages, was able to collect 90% of APC. Also, the IAC study provides a wide variety of relevant alcohol variables such as the frequency of drinking, typical occasional volume, quantity and alcohol purchase behaviour.[25] Implementation of the ICA survey at the national level may be a way to support better evidence-based alcohol programme and policy.

We believe that SA's experience may be quite different from other LMICs with different research and surveillance environments. However, for countries wishing to revamp or improve its collection of national alcohol data sources, we suggest the following steps in assessing the usability of alcohol datasets: (1) document all the datasets that exist, (2) consider measures to ensure public availability of data, (3) try to harmonies key measures (eg, how to measure alcohol consumption, how to measure alcohol spending, time periods linked to both) while allowing diversity in other variables collected and (4) include a measure of the quality of the data.

LIMITATION AND STRENGTH

One of the study's limitations is that the desktop review only looked into four data warehouses; however, these warehouses provide a comprehensive listing of many datasets conducted in SA. Key informants did not include medical professionals who might have a good insight on alcohol datasets. Another limitation is that informants' solutions and recommendations are based on their own experiences, making them vulnerable to bias. Nevertheless, they are stakeholders and have a good understanding of the data constraints. The advantage of using in-depth-interviews with key informant was that it enabled the identification of the alcohol datasets used by informants and their uses. These datasets overlapped with the publicly available data from the desktop review. This study was also able to provide recommendations for better alcohol data collection in SA using key informants' experiences of dealing with alcohol datasets. It also shows publicly available data and their characteristics.

CONCLUSION

Alcohol policy and programme interventions are more likely to have a more significant impact on decreasing harms when they are based on evidence. Based on the findings of this study, it is suggested that the ICA survey or a similar framework survey focusing on substance abuse may be considered for implementation on the national level. Also, alcohol data funded by the government and industry data should be made available to the public. It is by having accessible, reliable and meaningful data that stakeholders and researchers can evaluate interventions.

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Data availability statement The data that support the findings of this studyare available on request from the corresponding author, MFM and will be required to agree to the Terms and Conditions of a Data AccessAgreement (DAA), which aims to protect the privacy and interests of theresearch participants.

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CHAPTER 4

Assessing the changing patterns in socioeconomic inequalities in alcohol consumption in South Africa between 2008 and 2015

4.1. Assessing the changing patterns in socioeconomic inequalities in alcohol consumption in South Africa between 2008 and 2015

Paper overview

This study assessed inequality in alcohol consumption in South Africa with a focus on socioeconomic disparities in current and binge drinking. It documented the changes in socioeconomic inequality in alcohol consumption by exploring whether alcohol consumption is more prevalent among the rich (pro-rich) or poor (pro-poor) over time. This study used cross-sectional individual-level data from National Income Dynamics Study (NIDS) that span almost 10 years.

Contribution to the thesis

After identifying datasets that could be used to investigate inequality and inequity in alcohol consumption in South Africa (chapter 3), this study assesses disparity in alcohol consumption in South Africa across demographic groups and its changes over time. Looking at the differences in alcohol consumption over time can assist in detecting early changes in alcohol risk behaviors and can be used by the South African government as evidence to evaluate if current national alcohol policies have achieved their intended objectives. It also can be used as evidence to implement new interventions aiming to decrease alcohol consumption. The overall results show that in South Africa, there is inequality in alcohol consumption by different equity stratifiers (sex, age, race and geographical location (rural vs urban)) and the overall prevalence of alcohol consumption and binge drinking increased between 2008 and 2015.

Role of candidate

The candidate led all aspects of the study, drafted the manuscript, incorporated inputs from supervisors who reviewed the manuscript and the candidate submitted the final manuscript for publication.

Publication status

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Abstract:

Background: Although we know that South Africa (SA) has a significant alcohol problem, little is known of the magnitude of socio-economic inequality in alcohol consumption by demographic subgroups in the country. This paper assesses changes in the socioeconomic inequality in alcohol consumption by exploring whether alcohol consumption (current and binge drinkers) is more prevalent among the rich (pro-rich) or poor (pro-poor) over time, using datasets that span almost 10 years.

Methods: Data come from the 2008, 2010/11, 2012 and 2014/15 waves of the National Income Dynamics Study (NIDS). Various equity stratifiers (sex, age, race and rural/urban) are used to analyze the prevalence of alcohol consumption and to investigate differences in socioeconomic inequalities. Changes in socioeconomic inequality between 2008 and 2014/15 were also assessed using the concentration index.

Results: Current drinkers are more concentrated among richer South Africans, while binge drinkers are concentrated among the poorer population. For current drinkers, irrespective of sex, race, age and urban, socioeconomic inequality in alcohol consumption have become less pro-rich between 2008 and 2014/15; while inequality in binge drinking, outside of the Asian/Indian and rural categories, has become less pro-poor between 2008 and 2014/15.

Conclusion: The results show evidence that binge drinking is a bigger problem among those of low-SES, young individuals, male and African populations. This paper concludes that the SA government should continue to push forward policies aiming to reduce the prevalence of binge drinking.

Keywords:

Alcohol consumption, socioeconomic inequality, concentration index, health equity

1. Introduction

Alcohol use remains one of the biggest contributors to the risk of mortality worldwide. According to the World Health Organization (1), harmful alcohol use was responsible for 5.3% of deaths and 5.1% of the burden of disease and injury, equivalent to 132.6 million disability-adjusted life years (DALY, defined by WHO as the time lost due to premature death and the time lost due to time lived in less than full health). South Africa (SA) is particularly affected as 7.1% of all deaths are associated with alcohol use (2). Previous studies using survey data found that approximately half of men and one-fifth of women consume alcohol in South Africa. Of those who consume alcohol in South Africa, 48% of men and 32% of women binge drink (3). In 2015, the total per capita alcohol consumption in South Africa was 11.5 liters of pure alcohol, and alcohol consumption per drinker was 27 liters of pure alcohol—one of the highest levels of alcohol consumption in the world (4).

The World Health Organization (5) stresses the need to examine inequities behind alcohol-related harms to understand the individuals and households that are more exposed and vulnerable to alcohol harms. There are a variety of factors at the individual/household level (e.g. age, education and income) and the societal level (e.g. taxation policy, ease of alcohol availability and norms around alcohol consumption) that influence alcohol consumption and alcohol related-harm (1, 6). Dahlgren and Whitehead (1991) recognize that people are born with pre-existing characteristics and are subject to their communities' norms. They have different childhood experiences, education, and employment and housing opportunities (social determinants). These factors, involving interactions between individual characteristics and social determinants, experienced through the full lifespan, increase people's exposure and vulnerability to health hazards, including alcohol use (7). The inequalities in the distribution of these determinants are responsible for health inequalities between genders, communities and societies (7). Socioeconomic status (SES) remains one of the most important social determinants of alcohol-attributable harm (1, 8, 9).

A systematic review looking at the relationship between the social determinants, inequities and alcohol use found that with the same alcohol consumption levels, individuals from low SES households experience more harmful effects of alcohol consumption than those from richer households (6). Moreover, a UK study using a population-based survey found that low SES individuals are more likely to be involved in high-risk drinking, which suggests a double disadvantage for alcohol-related harms—low SES individuals experience more harm for a given level of alcohol consumption and are more likely to drink at risky levels (10). In SA, a cross-sectional analysis using population-based survey found that low SES individuals are more likely to practice lifetime abstinence (never used alcohol), while high SES individuals are more likely to be current drinkers. For risky drinking, middle SES individuals are more likely to be binge drinkers, followed by low SES and high SES individuals (11). The consumption patterns are different for different alcoholic beverages. Wines and spirits are consumed mainly by high SES individuals, while beer is consumed mainly by low SES individuals (12). These results might suggest that alcohol abuse in SA is not a reflection of genuine differences in consumption patterns among SES but may be a result of a more complex social problem.

This paper assesses changes in socioeconomic inequality in alcohol consumption by exploring whether alcohol consumption is concentrated among the rich (pro-rich) or poor (pro-poor). It also assesses whether these socioeconomic inequalities have changed over time. First, the paper identifies drinkers and their characteristics, such as demographics and drinking patterns. Then, using the concentration index (CI), borrowed from economics, the paper assesses socioeconomic inequality in alcohol consumption across demographic groups over time. It compares changes in socioeconomic inequality between 2008 and 2014/15. Based on current research, apart from an attempt to decompose socioeconomic inequality in alcohol consumption for men living in South African's informal settlements (13), this paper represents the first national analysis of changes in socioeconomic inequality in alcohol consumption in South Africa. It assesses this across various equity stratifiers (sex, age, race and geographical location (rural vs urban) using datasets that span almost 10 years. A Previous study assessing socioeconomic inequality (13)

found that alcohol consumption is more concentrated among men of lower SES, but was confined to examining drinking patterns only in men in informal settlements at one point in time. While it is crucial to examine inequality in alcohol consumption in informal settlements in SA, it does not provide a broad picture of the entire country. In this regard, this paper extends the analysis to the entire country using a nationally representative dataset and focusing on adults that consume alcohol and are more likely to binge drink. The analysis in this paper will assist in tracking South Africa's alcohol consumption patterns and socioeconomic inequality in alcohol consumption. This will assist in detecting early changes in alcohol risk behaviors such as an increase in binge drinking pattern by various equity stratifiers and in understanding whether national alcohol policies aiming to decrease alcohol consumption have achieved their intended objectives.

2. Methods

2.1. Data

This paper uses data from the National Income Dynamics Study (NIDS). The NIDS is a longitudinal study in South Africa that follows the same households over time (Wave-1 (2008), Wave-2 (2010-2011), Wave-3 (2012) and Wave-4 (2014-2015)). It uses a face-to-face data collection process. New members are added to each survey wave by joining the households of continuing sample members (CSMs). NIDS contains *household and adult surveys* that can be used to produce cross-sectional and longitudinal estimates for a wide *variety of adult* and family well-being indicators at the micro-level. The Southern Africa Labour and Development Research Unit (SALDRU) based at the School of Economics, University of Cape Town manages the NIDS. Data are freely available upon request at www.datafirst.uct.ac.za. The analysis in this paper uses the alcohol consumption data for the four NIDS waves in cross-section. While it is interesting to follow the same household over time, this paper adopted a different approach by looking at the entire population and how the distribution of alcohol consumption has changed in the entire population and across the selected equity stratifiers over time.

The NIDS data have a nationally representative sample of 7,296 households and 16,871 individuals in 2008; 9,127 households and 21,880 individuals in 2010/11; 10,219 households and 22,466 individuals in 2012; and 11,895 households and 26,819 individuals in 2014/15. The response rates were 94.9% for wave 1, 82.3% for wave 2, 81.1% for wave 3, 64.7% wave 4 and 86.5% for wave 5. The latest NIDS data – Wave-5, collected in 2017, does not contain alcohol data and will not be included in this analysis.

2.2. Key variables and estimation strategy

Table 1 summarizes the key variables used in the analysis. Two binary alcohol consumption variables were constructed: current drinker (yes/no) and binge drinking among drinkers -sometimes referred to as binge drinkers in this paper (yes/no). The variables were constructed using the NIDS adults survey questions: "how often do you drink alcohol?" and "on a day that you have an alcoholic drink, how many standard drinks do you usually have (*a standard drink is a small glass of wine; a 330 ml can of regular beer, a tot of spirits, or a mixed drink)"*.

This paper uses household consumption expenditure to assess the socioeconomic status of households. In developing countries, household consumption expenditure is a preferable measure of living standards than income. That is because income may be saved, and many households may not report actual income for many reasons including multiple sources of income (14) or for fear of taxation, among other reasons (15). Although using household consumption expenditure may underestimate the living standards of households with savings, this is not problematic as the interest is in current consumption.

All data cleaning, exploration and analysis was conducted using Stata 12 statistical software (16).

Table 1 – Description of key variables

Variables	Definition
Current Drinkers*	"1" if an adult consumes any amount of alcohol "0" otherwise
Binge Drinkers Among the total population*	"1" if an adult is consuming 5 or more standard drinks on a single occasion for females** and males

	"0" otherwise
Binge Drinkers Among Drinkers*	"1" if an adult is a current alcohol drinker consuming 5 or more standard drinks on a single occasion for females** and males "0" otherwise
Total household consumption expenditure (per capita)	Total household expenditure on food and non-food items (includes total food expenditure; total non-food expenditure; rental expenditure and imputed rent for owner-occupied housing) divided by the household size.
Notes: * amongst individuals 15 years and older. ** although the international literature suggests the use of 4 standard drinks as the benchmark for females, this was not possible due to the way the NIDS alcohol data are collected (i.e. that the answers were grouped "1 or 2 standard drinks", "3 or 4 standard drinks", "5 to 6 standard drinks").	

2.3. Assessing and decomposing inequalities in alcohol consumption and other key variables

The concentration index (CI) was used in this analysis to assess socioeconomic-related inequalities in alcohol consumption (current and binge drinkers) in South Africa. The CI is a well-known and widely used index to assess socioeconomic inequality in health outcomes and indicators (17). The CI is derived from the concentration curve. Its values can vary from -1.0 (e.g., where all current drinking or binge drinking is concentrated in the poorest households) to +1.0 (e.g., where all current drinking or binge drinking is concentrated in the richest households).

The concentration indexes for alcohol consumption (current drinkers and binge drinkers) that measure the extent to which alcohol consumption is concentrated among the rich (pro-rich) or the poor (pro-poor), were calculated using the 'convenient regression' approach to control for other variables (e.g. gender, race, age and urban) in addition to SES (18). The convenient regression was performed in Stata 12 (16) to compute the concentration index (CI) using the following equation:

$$(1)\quad 2\sigma_r^2\left(\frac{h_i}{\mu}\right) = \alpha + \beta r + \gamma \boldsymbol{z} + \varepsilon_i$$

where σ^2 is the variance of the fractional rank (r) of household per capita consumption expenditure (SES), $\boldsymbol{z}$ is the vector of control variables, and the Ordinary Least Squares estimate, β, is the CI.

In addition to the CI for alcohol consumption, the Distributive Analysis Stata Package (DASP) (19) was used to assess the concentration indexes of various equity stratifying variables (e.g. sex, age groups, rural and urban) among current and binge drinkers. This was used to assess, for example, whether female binge drinkers are more prevalent among the poor or the rich. The DASP was also run using Stata 12 to obtain the CI as follows:

$$(2)\ CI = 1 - \frac{\hat{\xi}}{\hat{\mu}}$$

where $\hat{\xi} = \sum_{i=1}^{n}[\frac{(V_i)^2 - (V_{i+1})^2}{(V_1)^2}]h_i; V_i = \sum_{j=i}^{n} w_j$ (i.e. the summation of sampling weights, w_j) is such that the vector of total household consumption expenditure (SES), **x**, is arranged from the richest (x_1) to the poorest individual or household (x_n). $\hat{\mu}$ represents the weighted average of the variable of interest such as the different population groups (e.g. sex, age, rural and urban, etc.). h_i represents the value of the variable of interest for individual i.

The difference in the concentration indexes between two periods was computed using the DASP menu in Stata (19), accounting for the full sampling design. This difference can result in a pro-poor 'shift' or a pro-rich 'shift' (see Table 2 for details). Briefly, a pro-poor 'shift' occurs when the change (i.e. the difference) in the CI, between two time periods, is negative; while a pro-rich 'shift' occurs if this change is positive. Table 2 summarizes the broad scenarios that can cause pro-poor and pro-rich 'shifts' (see Ataguba (20) for additional details).

The prevalence of alcohol consumption and CI estimates for all the surveys years are also reported. Only the 2008 and 2014/15 data are used to analyze the changes in socioeconomic inequalities. In fact, the results for shorter time periods (e.g. between 2008 and 2010) were not different from those presented in this paper. In addition, although binge drinker's prevalence among total population is displayed, binge drinkers' results are reported among drinkers. That is because looking at binge among the entire population in SA may not adequately indicate the population vulnerable to alcohol-related harm as SA has a higher number of abstinences which may underestimate the binge harm. In fact, the results patterns

of the prevalence of binge drinkers among the total population and binge drinkers among drinkers rarely varies.

Table 2- Explaining a pro-poor and a pro-rich shift in the concentration index between two time periods

Pro-poor 'shift' $\Delta CI = CI_t - CI_{t-1}$ $=$ Negative result	1. A previously pro-rich distribution becomes pro-poor (e.g. If $CI_{t-1} = 0.5$ and $CI_t = -0.3$ then $\Delta CI = -0.8$) 2. A previously pro-poor distribution becomes more pro-poor (e.g. If $CI_{t-1} = -0.5$ and $CI_t = -0.7$ then $\Delta CI = -0.2$) 3. A previously pro-rich distribution becomes less pro-rich (e.g. If $CI_{t-1} = 0.5$ and $CI_t = 0.1$ then $\Delta CI = -0.4$)
Pro-rich 'shift' $\Delta CI = CI_t - CI_{t-1}$ $=$ Positive result	1. A previously pro-poor distribution becomes pro-rich (e.g. If $CI_{t-1} = -0.3$ and $CI_t = 0.5$ then $\Delta CI = 0.7$) 2. A previously pro-poor distribution becomes less pro-poor (e.g. If $CI_{t-1} = -0.7$ and $CI_t = -0.5$ then $\Delta CI = 0.2$) 3. A previously pro-rich distribution becomes more pro-rich (e.g. If $CI_{t-1} = 0.5$ and $CI_t = 0.7$ then $\Delta CI = 0.2$)

Source: Adapted from Ataguba (20).

Note: for a previously pro-poor distribution, the original concentration index (CI_{t-1}) is negative

for a previously pro-rich distribution, the original concentration index (CI_{t-1}) is positive.

3. Results

3.1. Descriptive statistics

As shown in Table 3, the proportion of current drinkers has increased over the years, from 26.9% in 2008 to 33.1% in 2014/15. African, coloured, all SES quintiles, adults aged 15 to 54 years old, rural and urban dwellers had experienced an increase in the prevalence of current drinking between 2008 and 2014/15. For the SES quintiles, the highest quintile has the highest current drinking rates; while the poorest

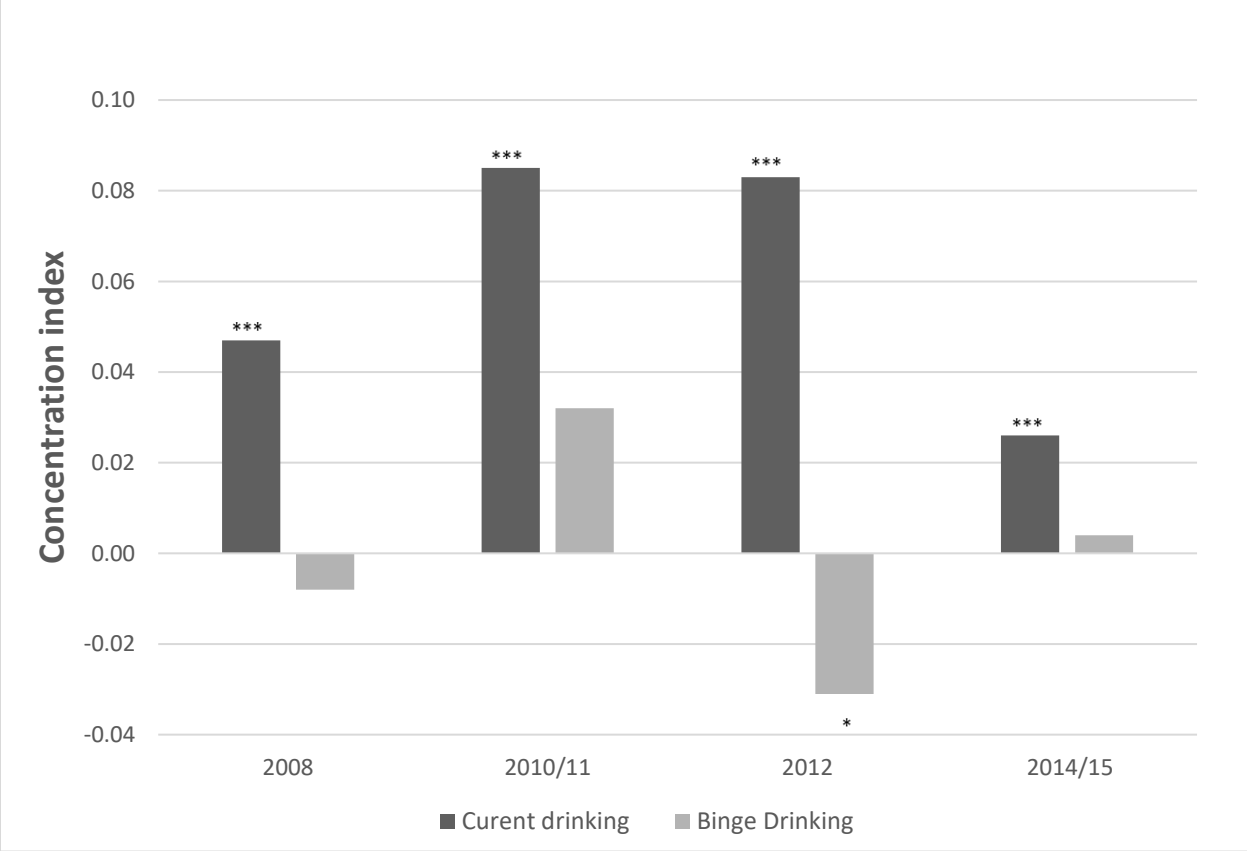
has the lowest rates. The prevalence of current drinking decreased for the Asian/Indian, white and adults aged at least 55 years between 2008 and 2014/15.

Binge drinkers (Table 4) increased slightly from 41.0% in 2008 to 43% in 2014/15. For the SES quintiles, the pattern is not uniform. The highest quintile has the lowest binge drinking rates; while the poorest and the fourth quintiles have very similar rates. Between 2008 and 2014/15, the proportion of binge drinkers increased in the poorest and the richest quintiles, while the middle three quintiles all had a decrease by 2014/2015 though there was much variability in the percentages over the time period. There was an increase in the prevalence of female binge drinking between 2008 and 2014/15, while the prevalence of male binge drinking remained approximately the same. Except for the African population group, the prevalence of binge drinking among the other race groups decreased between 2008 and 2014/15. Adults aged 25-34 and 55+ years experienced a decline in the prevalence of binge drinking, while those aged 15-24 years and 35-44 years had an increase in the prevalence of binge drinking. The prevalence of binge drinking declined in rural areas compared to a rise in urban areas between 2008 and 2014/5.

3.1.1. Socioeconomic inequality in current and binge drinking

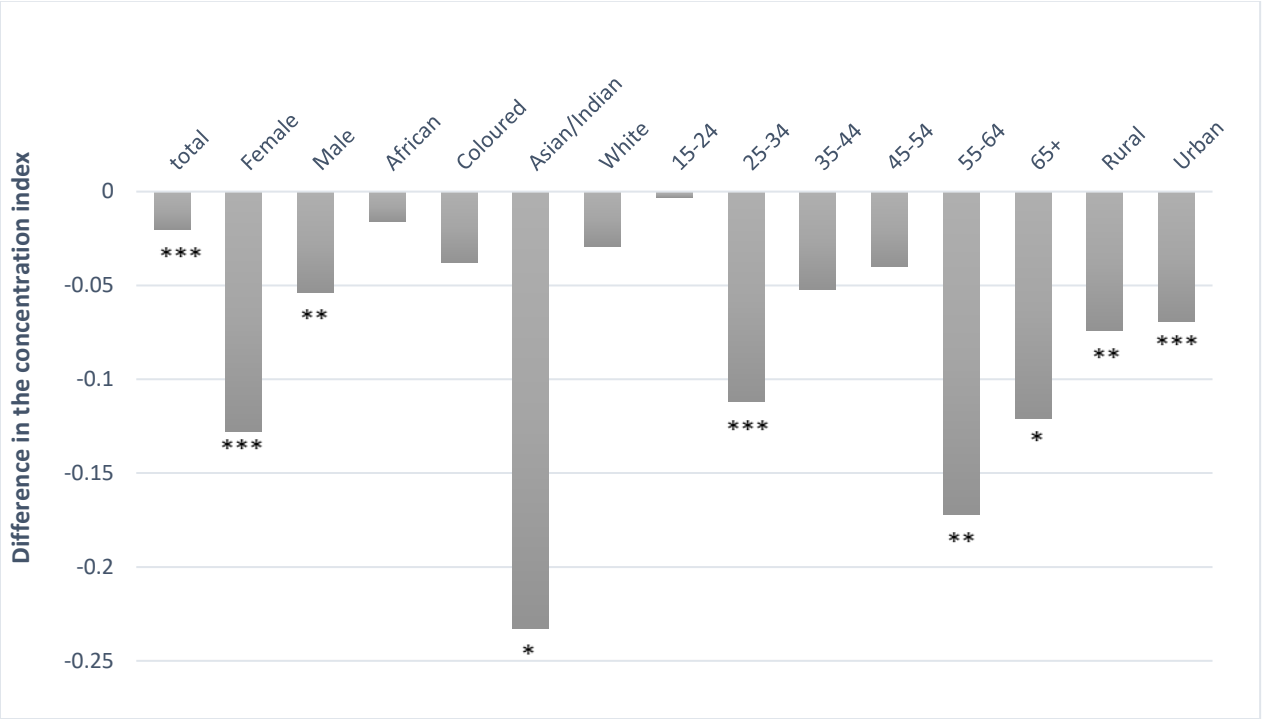
Table 5 shows that current drinking is more concentrated among richer individuals (a consequence of the positive concentration indexes in the "Total" row); while for binge drinking the pattern is not uniform. Figure 1 illustrates that the concentration indexes for current drinkers remain positive while for binge drinkers, the concentration indexes changed over the years. The difference in the CIs between two time periods (2008 and 2014/15) indicates that current drinking, for all the equity stratifiers (sex, race, age and rural and urban), had a pro-poor 'shift' (figure 2). That is, the distribution of current drinkers was pro-rich in 2008 and became less pro-rich in 2014/15. Figure 3 shows that, besides the Asian/Indian and rural population, which had a pro-poor 'shift', binge drinking for all other equity stratifiers had a pro-rich 'shift' between 2008 and 2014/15. That is, the distribution of overall binge drinkers was pro-poor in 2008 and became less pro-poor in 2014/15 (i.e. binge drinkers had shifted towards the richer group between 2008 and 2014/15).

Figure 2: Concentration indexes of current and binge drinkers from 2008 to 2014/15



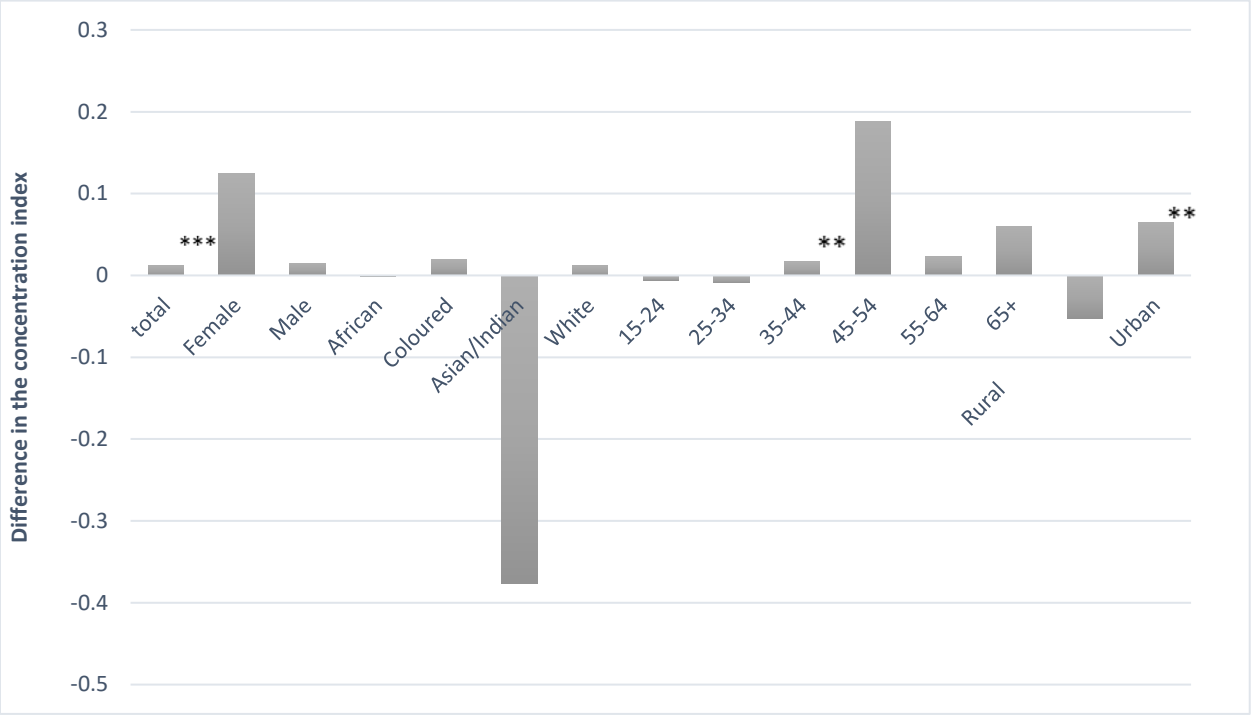
Note: A positive value signifies a pro-rich distribution while a negative value signifies a pro-poor distribution. Significance levels are denoted as follows: *** p< 0.01, ** p< 0.05, *p< 0.10. Convenient regression results controlling for gender, race, age and urban was used to calculate the concentration index.

Figure 2: Difference in the concentration index of current drinkers between 2008 and 2014/5



Note: A positive value signifies a pro-rich "shift" while a negative value signifies a pro-poor "shift". Significance levels are denoted as follows: *** p< 0.01, ** p< 0.05, *p< 0.10.

Figure 3: Difference in the concentration index of binge drinkers between 2008 and 2014/15



Note: A positive value signifies a pro-rich "shift" while a negative value signifies a pro-poor "shift". Significance levels are denoted as follows: *** p< 0.01, ** p< 0.05, *p< 0.10. [a] An adult (female or male) who is a current alcohol drinker consuming 5 or more standard drinks on a single occasion.

4. Discussion

The overall results show that in South Africa, the prevalence of alcohol use and binge drinking increased between 2008 and 2015. Besides, the Asian/Indian and coloured population, where current drinkers are concentrated more among the low-SES groups, current drinkers for all other equity stratifiers remain concentrated among the rich; whereas binge drinkers (assessed among current drinkers) are concentrated among the poor.

Results emerging from the analysis of the concentration indexes are consistent with inequalities in alcohol consumption patterns seen in the literature (21-23). For instance, Wood and Bellis (21) assessed socioeconomic inequality in alcohol consumption in European countries. Similar to our results, Wood and

Bellis (21) found that, overall, the individuals with high socioeconomic status (for males and females) are more likely to be current drinkers. Binge drinkers were found to be more concentrated among adults (males and females) with low SES; however, not all European countries had the same pattern. For instance, Portugal and Hungary reported binge drinking concentrated among the richest for males; while in Germany, binge drinking was more prevalent among the richest for females. Combes, Gerdtham (22) analyzed income inequality in alcohol consumption in Sweden over eight years and found that inequality in alcohol consumption is pro-rich. The study by Lawana and Booysen (13), the only South African study looking at socioeconomic inequality in alcohol consumption in informal settlements in SA, demonstrated results differing from those reported elsewhere in the literature. Their study found that men living in an informal settlement have a pro-poor alcohol consumption distribution. As mentioned in their research, one of the reasons why Lawana and Booysen's (13) results differ from those in the literature may be due to the use of a wealth index instead of income to measure socioeconomic inequality and the possibility of limited range of SES across which to measure distribution since their study targeted men living in a low socioeconomic area.

This paper found that socioeconomic inequality in alcohol consumption for current drinkers had a pro-poor 'shift'; while binge drinkers had a pro-rich 'shift' between 2008 and 2014/15. Current drinkers were more concentrated among the richer adults in 2008, but this concentration among the rich decreased in 2014/15. Binge drinkers, on the other hand, are more concentrated among poorer adults, but this concentration among the poor decreased between 2008 and 2014/15. This result was the case irrespective of gender, signifying that the prevalence of both current and binge drinking between the rich and the poor is slowly converging.

A possible explanation for the pro-poor 'shift' in current drinkers found in this paper could be an increase in overall alcohol consumption in South Africa, especially among low-SES adults. For both sexes, the concentration indexes were positive (pro-rich) for current drinking in all years, while the concentration indexes for binge drinking in 2008 changed over the years. When considering race profiles,

among Africans, current drinkers and binge drinkers were concentrated among the rich. This shift in alcohol consumption towards richer adults might be explained by the phenomenon of a recent growing African middle class (24).

The temporal increase in current drinkers and binge drinkers found in this paper is not surprising. Research suggests that one of the factors responsible for increases in alcohol consumption in Africa is the aggressive marketing strategies adopted by the alcohol industry (25-27). For instance, alcohol industries create new products such as the ready to drink beverages (RTDs) to attract new consumers (especially young people and women). Among other things, they are promoting drinking as a tradition and part of the culture, sponsoring sports events and celebrities to create the image that drinking alcohol is 'cool' and suggesting alcohol is 'good for health' (25). It seems that these marketing strategies have been successful in increasing consumption levels. According to the South African Wine Industry Information and System (SAWIS) data, all alcohol volume in the country increased by 12.3% (3.5 billion to 3.9 billion liters) between 2005/06 and 2014/15 (28).

The total alcohol per capita consumption in SA is expected to increase from 11.5 liters of pure alcohol in 2015 to 12.1 in 2025 (4). Therefore, unless there are major public health and policy interventions, alcohol-related harms are likely to increase due to increased exposure to alcohol consumption (e.g. drinking high level of alcohol in one occasion) (1, 25). Results in this paper identify the sociodemographic groups that are more likely to engage in high-risk drinking and be exposed to alcohol-related harms. Thus, to reduce risk by decreasing consumption levels, especially harmful consumption, this paper emphasizes that policies should target both the factors that increase people's susceptibility to the consequences of alcohol use, as well as measures to reduce or mitigate rising alcohol consumption.

Advertising restrictions is one mechanism to reduce harmful consumption levels (29, 30). In fact, policies aiming to decrease alcohol consumption through regulating advertising are on the policy agenda in South Africa in the form of two national alcohol bills under consideration. The first proposes changes to the National Liquor Act to enforce further restrictions on alcohol sales and consumption (e.g.

increasing the minimum drinking age from 18 to 21 years) (31). The second bill, presented by the Department of Health, the Control of Marketing of Alcohol Beverages Bill, imposes restrictions on advertising (e.g. prohibiting alcohol sponsorship). Despite being drafted many years ago (e.g. Control of Marketing of Alcoholic Beverages was drafted in 2012), both bills are still far from reaching parliament for public consultation (32, 33), and there is no envisioned timeframe for implementation.

4.1. Limitation and strength of this study

One of the study's strengths is that socioeconomic inequality in alcohol consumption was assessed using comparable nationally representative data that span almost 10 years. Also, this analysis provides an initial attempt to assess socioeconomic disparity in alcohol consumption over time using the concentration index that is suitable for assessing socioeconomic inequality. A study limitation is that the same amount of standard drink was used to generate the binge drinking and current drinking variables for males and females. Although the international literature suggests the use of 4 standard drinks as the benchmark for females, this was not possible as the NIDS dataset uses the same criterion for males and females. In addition, the NIDS adults' questionnaire does not specify the timeframe of consumption. This study also potentially underestimates socioeconomic inequality in alcohol consumption due to the underreporting of consumption often noted in the literature (3, 34). Also, differences in standard drink according to the type of beverage preference by SES (12) may result in differences in the total quantity of standard drink by SES. However, the bias might have a small impact on the results with similar patterns in underreporting of consumption by SES. Another limitation is the exclusion of the latest NIDS (2017-Wave 5) data. As noted earlier, alcohol questions were dropped from the wave 5 survey as the NIDs team could not get ethics approval (for fielding the alcohol questions) in time for the fieldwork.

5. Conclusion

This paper provides insight into the prevalence of alcohol consumption by demographic subgroups in SA. It also provides detailed insights into the magnitude and changing patterns of the socioeconomic

inequality in alcohol consumption in the country. The results show that the pattern of socioeconomic disparity in alcohol consumption in SA varied across demographic groups and had changed over time. Also, the results show that binge drinking is a bigger problem among selected population groups such the low-SES, young individuals, male and African populations. Based on the results, the SA government should continue to push forward policies aiming to decrease alcohol consumption for those who are more exposed and vulnerable to alcohol harms. For instance, the SA government should reduce access to retail outlets, especially in deprived neighborhoods. In addition, shebeens[4] in the townships should be regularized to control the quality and quantity of alcohol sold. To decrease young individuals' consumptions, SA government should increase age restrictions on the sale of alcohol (from 18 to 21 years) and ban alcohol advertising close to schools and in sports- from its junior competitions and at the national level.

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[4] A *shebeen is a*n informal unlicensed drinking place in a township.

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Tables

Table 3- Prevalence of current alcohol drinkers in South Africa from 2008-2015 by SES and other equity stratifiers

	2008	2010/11	2012	2014/15	Total Difference†
Total	26.9%	26.2%	27.8%	33.1%	6.2%***
	(0.003)	(0.003)	(0.003)	(0 .003)	(0.004)
Poorest	15.7%	15.2%	17.0%	23.1%	7.5%***
	(0.006)	(0.005)	(0.005)	(0.005)	(0.004)
2nd Quintile	21.3%	16.7%	19.8%	27.2%	5.9%***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.004)
3rd Quintile	21.8%	25.0%	25.5%	32.1%	10.3%***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.004)
4th Quintile	29.5%	27.6%	32.7%	36.7%	7.2%***
	(0.009)	(0.008)	(0.009)	(0.008)	(0.004)
Richest	45.8%	47.2%	44.3%	46.1%	0.3%
	(0.011)	(0.013)	(0.011)	(0.011)	(0.005)
Chi-Square (χ^2) [a]	686.1***	361.2***	483.7***	342.3***	
Female	15.7%	14.4%	16.3%	20.2%	4.4%***
	(0.004)	(0.003)	(0.003)	(0.003)	(0.004)
Male	41.1%	40.2%	41.6%	47.7%	6.6%***
	(0.006)	(0.006)	(0.006)	(0.005)	(0.005)
Chi-Square (χ^2) [a]	1.4e+03***	1.5e+03 ***	1.6e+03***	2.2e+03***	

African	21.5%	21.4%	23.5%	29.4%	7.9%***
	(0.004)	(0.003)	(0.003)	(0.003)	(0.004)
Coloured	36.5%	34.8%	38.7%	45.2%	8.7%***
	(0.010)	(0.010)	(0.010)	(0.009)	(0.005)
Asian/Indian	32.3%	29.4%	26.7%	28.9%	-3.3%***
	(0.031)	(0.034)	(0.032)	(0.031)	(0.004)
White	58.3%	57.2%	54.0%	54.1%	-4.2%***
	(0.016)	(0.023)	(0.022)	(0.022)	(0.005)
Chi-Square (χ^2) [a]	1.1e+03***	443.9***	611.3***	557.1***	
15-24	19.7%	18.5%	19.6%	25.2%	5.5%***
	(0.006)	(0.005)	(0.005)	(0.005)	(0.004)
25-34	29.1%	30.2%	35.6%	42.5%	13.3%***
	(0.008)	(0.008)	(0.008)	(0.007)	(0.005)
35-44	32.0%	34.0%	32.3%	36.7%	4.7%***
	(0.009)	(0.009)	(0.009)	(0.008)	(0.004)
45-54	28.5%	29.5%	28.7%	35.0%	6.5%***
	(0.009)	(0.009)	(0.009)	(0.008)	(0.004)
55-64	32.5%	25.7%	26.6%	27.9%	-4.6%***
	(0.0124)	(0.011)	(0.010)	(0.010)	(0.004)
65+	25.9%	19.4%	20.7%	22.7%	-3.2%***
	(0.012)	(0.010)	(0.010)	(0.010)	(0.004)
Chi-Square (χ^2) [a]	247.8***	272.8***	308.4***	580.6***	

Rural	17.4%	16.8%	19.5%	24.0%	6.6%***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Urban	32.7%	32.2%	32.5%	38.1%	5.4%***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.004)
Chi-Square (χ^2) [a]	473.7***	417.6***	385.7***	553.1***	

†Absolute difference between 2014/5 and 2008. Significance levels are denoted as follows: *** p< 0.01, ** p< 0.05, *p< 0.10. Standard error displayed in parentheses. [a]The Chi-Square (χ^2) tests the relationship between current drinking and equity stratification variables as categorical variables.

Table 4- Prevalence of Binge Drinkers[a] in South Africa from 2008-2015 by SES level and other equity stratifiers

	Binge Drinkers Among the Total Population					*Binge Drinkers Among Drinkers*				
	2008	2010/11	2012	2014/15	Total Difference†	2008	2010/11	2012	2014/15	Total Difference†
Total	11.0%	10.3%	10.8%	14.1%	3.1%***	41.0%	41.0%	39.1%	43.0%	2.1%**
	(0.007)	(0.008)	(0.005)	(0.006)	(0.007)	(0.008)	(0.009)	(0.007)	(0.006)	(0.005)
Poorest	7.6%	6.3%	8.3%	11.3%	3.7%***	48.4%	45.4%	49.7%	49.6%	1.2%
	(0.009)	(0.010)	(0.015)	(0.014)	(0.008)	(0.021)	(0.020)	(0.018)	(0.014)	(0.005)
2nd Quintile	9.8%	8.4%	8.6%	11.9%	2.1%**	46.4%	52.9%	44.5%	44.1%	-2.3%**

	(0.017)	(0.019)	(0.016)	(0.012)	(0.005)	(0.017)	(0.019)	(0.016)	(0.012)	(0.005)
3rd Quintile	10.8%	11.7%	11.5%	14.7%	3.9%***	49.3%	48.5%	45.8%	46.2%	-3.0%**
	(0.017)	(0.019)	(0.016)	(0.012)	(0.005)	(0.018)	(0.018)	(0.016)	(0.013)	(0.005)
4th Quintile	14.9%	13.6%	13.4%	18.0%	3.1%**	51.0%	51.7%	41.2%	49.3%	-1.60%
	(0.017)	(0.019)	(0.016)	(0.012)	(0.005)	(0.018)	(0.019)	(0.017)	(0.014)	(0.005)
Richest	11.8%	11.8%	12.1%	14.6%	2.8%**	25.8%	25.4%	27.5%	31.9%	6.1%***
	(0.017)	(0.019)	(0.016)	(0.012)	(0.005)	(0.0149)	(0.020)	(0.016)	(0.016)	(0.005)
Chi-Square (χ^2)[a]	88.37***	95.25***	80.82***	85.35***		148.04***	42.37***	38.75***	24.32***	
Female	3.9%	3.4%	4.1%	6.4%	2.5%***	24.8%	24.6%	25.8%	32.4%	7.6%***
	(0.017)	(0.019)	(0.016)	(0.012)	(0.005)	(0.012)	(0.014)	(0.012)	(0.010)	(0.004)
Male	20.0%	18.6%	18.6%	22.8%	2.8%**	48.8%	48.0%	45.3%	48.2%	-0.7%
	(0.017)	(0.019)	(0.016)	(0.012)	(0.005)	(0.010)	(0.010)	(0.009)	(0.008)	(0.005)
	968.05***	876.72***	998.46***	978.20***		125.87***	69.21***	93.97***	121.90***	
African	11.0%	10.6%	10.7%	14.6%	3.6%***	50.3%	52.2%	46.4%	50.4%	0.1%
	(0.017)	(0.019)	(0.016)	(0.012)	(0.005)	(0.010)	(0.010)	(0.009)	(0.007)	(0.005)
Coloured	17.0%	13.9%	17.2%	19.7%	2.7%**	46.4%	41.0%	44.8%	43.9%	-2.4%**
	(0.017)	(0.019)	(0.016)	(0.012)	(0.005)	(0.018)	(0.020)	(0.016)	(0.014)	(0.005)
Asian/Indian	7.8%	2.5%	6.7%	6.6%	-1.20%	24.3%	8.8%	25.2%	22.7%	-1.5%*
	(0.017)	(0.019)	(0.016)	(0.012)	(0.005)	(0.058)	(0.042)	(0.065)	(0.059)	(0.004)
White	9.0%	6.9%	5.7%	6.3%	-2.7%*	14.9%	12.3%	10.6%	11.6%	-3.3%***
	(0.017)	(0.019)	(0.016)	(0.012)	(0.005)	(0.015)	(0.023)	(0.018)	(0.019)	(0.003)
Chi-Square (χ^2)[a]	75.86***	34.20***	198.28***	96.46***		276.96***	96.97***	151.88***	153.92***	
15-24	8.6%	7.8%	8.8%	11.8%	3.2%***	44.2%	44.2%	45.7%	47.9%	3.7%***

	(0.017)	(0.019)	(0.016)	(0.012)	(0.005)	(0.018)	(0.018)	(0.016)	(0.012)	(0.005)
25-34	15.0%	15.0%	15.9%	20.8%	5.8%***	51.4%	51.0%	45.4%	49.4%	-2.0%*
	(0.017)	(0.019)	(0.016)	(0.012)	(0.005)	(0.017)	(0.017)	(0.014)	(0.011)	(0.005)
35-44	13.2%	12.7%	12.8%	16.2%	3.0%**	41.3%	38.6%	39.8%	44.2%	2.9%**
	(0.017)	(0.019)	(0.016)	(0.012)	(0.005)	(0.018)	(0.020)	(0.018)	(0.015)	(0.005)
45-54	10.5%	10.5%	7.8%	13.4%	2.9%**	36.7%	37.1%	27.6%	38.7%	1.9%*
	(0.017)	(0.019)	(0.016)	(0.012)	(0.005)	(0.018)	(0.020)	(0.017)	(0.017)	(0.005)
55-64	9.9%	6.8%	8.5%	7.1%	-2.8%**	30.4%	27.8%	32.7%	25.9%	-4.5%***
	(0.017)	(0.019)	(0.016)	(0.012)	(0.005)	(0.024)	(0.026)	(0.024)	(0.019)	(0.005)
65+	4.0%	3.2%	3.6%	3.3%	-0.70%	15.3%	17.8%	17.8%	14.8%	-0.50%
	(0.017)	(0.019)	(0.016)	(0.012)	(0.005)	(0.021)	(0.028)	(0.024)	(0.020)	(0.003)
Chi-Square (χ^2)[a]	180.81***	61.27***	227.13***	479.92***		100.74***	34.00***	104.62***	130.70***	
Rural	8.1%	8.1%	8.8%	10.4%	2.3%***	47.3%	51.4%	46.1%	44.0%	-3.3%**
	(0.017)	(0.019)	(0.016)	(0.012)	(0.005)	(0.014)	(0.014)	(0.012)	(0.010)	(0.005)
Urban	12.7%	11.8%	11.9%	16.2%	3.5%***	38.9%	37.7%	36.8%	42.7%	3.8%***
	(0.017)	(0.019)	(0.016)	(0.012)	(0.005)	(0.010)	(0.010)	(0.009)	(0.008)	(0.005)
Chi-Square (χ^2)[a]	129.19***	127.46***	95.04***	275.47***		4.99***	3.91***	7.46***	7.52***	

Significance levels are denoted as follows: *** p< 0.01, ** p< 0.05, *p< 0.10. Standard error displayed in parentheses.
[a] An adult (female or male) who is a current alcohol drinker consuming 5 or more standard drinks on a single occasion. †Convenient regression controlling for gender, race, age and urban was used to calculate the concentration index.

Table 5- Concentration indexes of current drinkers and binge drinkers (2008-2015)

	Current Drinkers				Binge Drinkers [a]			
	2008	2010/11	2012	2014/15	2008	2010/11	2012	2014/15
Total[†]	0.047***	0.085***	0.083***	0.026***	-0.008	0.032	-0.031*	0.004
	(0.007)	(0.008)	(0.008)	(0.006)	(0.021)	(0.023)	(0.019)	(0.012)
Female	0.318***	0.345***	0.289***	0.190***	-0.298***	-0.325***	-0.236***	-0.174***
	(0.024)	(0.027)	(0.024)	(0.021)	(0.037)	(0.044)	(0.042)	(0.032)
Male	0.124***	0.153***	0.118***	0.069***	-0.065***	-0.079**	-0.097***	-0.050**
	(0 .013)	(0 .014)	(0.014)	(0.012)	(0.019)	(0.025)	(0.028)	(0.019)
Race								
African	0.136***	0.172***	0.171***	0.120***	0.037**	0.025	0.001	0.036*
	(0.015)	(0.015)	(0.014)	(0.011)	(0.017)	(0.018)	(0.019)	(0.013)
Coloured	-0.001	0.045	0.029	-0.039	-0.087*	-0.001	-0.076	-0.0667*
	(0.035)	(0.043)	(0.032)	(0.025)	(0.047)	(0.080)	(0.046)	(0.035)
Asian/Indian	0.125	0.069	-0.070	-0.108	0.232	-0.153	-0.250	-0.145
	(0.089)	(0.103)	(0.110)	(0.094)	(0.179)	(0.221)	(0.170)	(0.196)
White	0.142***	0.185***	0.158***	0.113**	-0.117	0.010	0.160	-0.105
	(0.026)	(0.032)	(0.035)	(0.041)	(0.109)	(0.137)	(0.286)	(0.126)
Age								
15-24	0.193***	0.194***	0.208***	0.190***	-0.031	-0.076**	-0.064	-0.037
	(0.028)	(0.028)	(0.029)	(0.021)	(0.036)	(0.038)	(0.042)	(0.029)

25-34	0.188***	0.174***	0.180***	0.076***	-0.023***	-0.055***	-0.100*	-0.033
	(0.024)	(0.027)	(0.022)	(0.018)	(0.031)	(0.037)	(0.038)	(0.029)
35-44	0.163***	0.289***	0.169***	0.111***	-0.105**	-0.152**	-0.070	-0.088**
	(0.025)	(0.024)	(0.026)	(0.023)	(0.039)	(0.063)	(0.044)	(0.033)
45-54	0.189***	0.206***	0.189***	0.149***	-0.269***	-0.207***	-0.313***	-0.080
	(0.032)	(0.035)	(0.031)	(0.028)	(0.045)	(0.063)	(0.051)	(0.050)
55-64	0.274***	0.252***	0.229***	0.102**	-0.288***	-0.232*	-0.002	-0.265***
	(0.034)	(0.044)	(0.054)	(0.051)	(0.075)	(0.129)	(0.201)	(0.071)
65+	0.354***	0.341***	0.259***	0.233***	-0.497	-0.410***	-0.522***	-0.436***
	(0.033)	(0.055)	(0.051)	(0.052)	(0.068)	(0.096)	(0.065)	(0.075)
Rural/Urban								
Rural	0.192	0.188***	0.159***	0.119***	0.045*	0.026	-0.005	-0.008
	(0.021)	(0.020)	(0.020)	(0.016)	(0.026)	(0.023)	(0.025)	(0.021)
Urban	0.165***	0.197***	0.169***	0.096***	-0.181***	-0.173***	-0.166***	-0.116***
	(0.015)	(0.017)	(0.016)	(0.013)	(0.023)	(0.031)	(0.034)	(0.021)

Significance levels are denoted as follows: *** p< 0.01, ** p< 0.05, *p< 0.10. Standard error displayed in parentheses.

[a] An adult (female or male) who is a current alcohol drinker consuming 5 or more standard drinks on a single occasion. [†]Convenient regression controlling for gender, race, age and urban was used to calculate the concentration index.

CHAPTER 5

Equity in household spending on alcoholic beverages in South Africa: assessing changes between 1995 and 2011

5.1. Equity in household spending on alcoholic beverages in South Africa: assessing changes between 1995 and 2011

Paper overview

This paper documents the changes in the distribution of household spending on alcoholic beverages in South Africa between different socio-economic groups.

Contribution to the thesis

The findings in Chapter 4 show that there is inequality in alcohol consumption by subgroups in South Africa, prompting the next step of assessing fairness in the socioeconomic distribution of alcohol consumption in South Africa. Thus, this chapter focusses on investigating inequity in alcohol consumption, as measured by spending on alcohol at the household level. The chapter gives a detailed description of the changes in the progressivity of alcohol expenditure at the household level in South Africa. Looking at changes in the progressivity over time can assist in detecting early changes in inequity in alcohol consumption and can be used as evidence for interventions. In addition, it can be used to evaluate if existing alcohol regulatory policies implemented by the South African government have achieved their intended objectives. The overall findings show that alcohol consumption expenditure is inequitable, where poorer households spend a significantly larger share of their total household consumption expenditure on alcohol than richer households. In terms of progressivity of alcohol expenditure, spending on alcoholic beverages in South Africa became less regressive (i.e. a pro-poor 'shift') between 1995 and 2000; and between 2005/06 and 2010/11. This chapter further provided an insightful discussion on the opportunity to further reduce the regressivity using coherent alcohol policies.

Role of candidate

The candidate led all aspects of the study, drafted the manuscript, incorporated inputs from

supervisors who reviewed the manuscript and the candidate submitted the final manuscript for publication.

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RESEARCH Open Access

Equity in household spending on alcoholic beverages in South Africa: assessing changes between 1995 and 2011

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Abstract

Background: Globally, alcohol consumption accounts for a substantial burden of disease, which translates into high social and economic costs. To address this burden, several policies (e.g. age and trading hour restrictions, increasing alcohol taxation) were implemented. Despite the existence of these policies evidence shows that alcohol misuse and alcohol-related harms have increased in South Africa over recent years. The objective of this paper is to assess progressivity and the changes in progressivity of alcohol expenditure at the household level in South Africa using datasets that span 15 years.

Methods: Data come from the 1995, 2000, 2005/06 and 2010/11 South Africa Income Expenditure Survey. Distribution of spending on alcoholic beverages were analyzed using standard methodologies. Changes in progressivity between 1995 and 2000, and between 2005/06 and 2010/11 were also assessed using the Kakwani index.

Results: Alcohol spending was regressive between 1995 and 2011 as the fraction of poorer households' expenditure spent on alcohol beverage exceeds that for the richest households. Also, the difference in Kakwani indexes of progressivity indicates that spending on alcoholic beverages has become less regressive between the same time periods.

Conclusion: The results show no evidence that alcohol policy including taxation increased regressivity. Thus, there is an opportunity to further reduce the regressivity using coherent alcohol policies. This paper concludes that there is a need for further research to unpack why alcohol spending became less regressive over the years that goes beyond just looking at changes in the distribution of alcohol expenditure.

Keywords: Alcoholic beverages, Progressivity, Spending, Alcohol consumption, Alcohol policy

Background

Globally, alcohol is responsible for 5.9% of deaths and 5.1% of the burden of disease and injury, which is equivalent to 139 million disability-adjusted life years lost (DALYs) due to premature death and the time lost due to time lived in less than full health [1]. Worldwide, alcohol is also considered one of the top three risk factors for disease and injury [1]. To address this burden and to reduce alcohol-related harm, alcohol policies have been used extensively by governments [2]. Two classes of alcohol policies can be distinguished — allocative and regulatory [2]. Allocative alcohol policies are those that assist in raising resources (e.g. funding) to a group or organization to achieve public objectives. Cases where the government provides funding for education to prevent or reduce harm from alcohol in schools form an example of allocative alcohol policy [2]. Regulatory alcohol policies are designed to influence or control individuals and organizations' actions, behaviors, and decisions, for instance, price control, taxation, restrictions on alcohol sales, alcohol advertising and consumption [2].

Internationally, regulatory alcohol policies that aim to reduce affordability of alcohol beverages are widely used and are considered one of the most cost-effective strategies to decrease alcohol consumption and alcohol-related harms [3]. These price-base policy interventions are based on the premise that if the demand for alcohol is price elastic, then by increasing alcohol prices,

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consumers will consume less alcohol due to budget constraints. Nevertheless, the literature is mixed on the real size of the impact of alcohol price elasticity on alcohol consumption as different types of alcoholic beverages are closely related substitutes and might have different price elasticities [2]. For example, an increase in price of alcohol due to regulatory policy, e.g. tax, can result in a deadweight loss or an excess burden of taxation as consumers make inefficient choices like substituting their alcohol consumption for a cheaper, unregulated and lower quality version such as homemade brews [4] to avoid taxation. Thus, overall spending on alcohol might be reduced, but alcohol consumption and alcohol-related harm may not decline. Another example of unanticipated and undesirable effects of price increases is when consumers reallocate money that would be spent on some other household items to maintain the same level of alcohol consumption as before the increase in tax. This may contribute to further impoverishment of affected families with no beneficial impact on reducing alcohol consumption. Also, alcohol policies that aim to decrease affordability may not be equitable if alcohol taxes are regressive, meaning the poor pay proportionately more alcohol taxes than the rich when compared to their shares of income [5, 6].

In the last two decades in South Africa, alcohol pricing increases were implemented not only to raise revenue but also to decrease alcohol consumption and the negative impacts of alcohol misuse [7, 8]. Between 1994 and 2013, on average, alcohol tax rate increases have been higher than increases in the Consumer Price Index (CPI) [8]. For instance, between 1994 and 1995, malt beer, unfortified wine and spirits had a tax increase of 14, 24 and 10%, respectively while the CPI increased by 9%. While between 2011 and 2012, the equivalent increases were 10, 8 and 20%, respectively while the CPI increased by 6%. That means alcohol taxation in South Africa has been rising faster than the general prices levels (i.e. CPI). Nonetheless, compared to high-income countries, South African consumers pay far less tax on their alcohol. In South Africa, 20% of the final price of alcohol purchased off-premise comprises excise tax, while in Australia and New Zealand the percentage of excise tax off-premise were 30 and 37% of the final price, respectively. However, for middle-income countries the percentages are low- In Vietnam and St Kitts excise tax on alcohol purchased off-premise were between 7 and 8% of the final price [9].

While an increase in alcohol tax is expected to decrease alcohol consumption, evidence shows that alcohol misuse and alcohol-related harm in South Africa have increased in recent years. Cross-sectional analyses confirm an increase in current drinkers (defined as consuming alcohol in the past 12 months) from 15.8% in 2005 to 18.2% in 2008 and to 21.7% in 2012 [10]. Occasional heavy drinkers (defined in the study as the same as binge drinking or consuming 5 or more drinks for a man or consuming 4 or more drinks for women on a single occasion) increased from 9.8% in 2005 to 13.2% in 2012 [10].

Although alcohol pricing policy may appear to have no effect on decreasing overall alcohol consumption, one should consider that in the absence of these regulatory alcohol policies, alcohol misuse and alcohol-related harm in South Africa may have risen much more than it did. Other factors such as agressively marketing by the alcohol industry to attract new consumers (specially young people and women) and to normalize regular drinking [11] may have countered any effects arising from price increases.

With alcohol misuse and alcohol-related harms not expecting to slow down, many researchers are advocating for additional and tougher alcohol regulation and an increase in alcohol laws enforcement levels [11–14]. Thus, there is a need to understand how regulatory alcohol policies, especially exogenous tax increases that aim to reduce affordability affect spending on alcohol beverages at the household level. Thus, this paper assesses changes in the progressivity of spending on alcoholic beverages (i.e. how the share of such spending in total household income varies between richer and poorer households) in South Africa. This is done by comparing changes between 1995 and 2010/11. Specifically, changes between 1995 and 2000 are compared with changes between 2005/06 and 2010/11. As detailed below, the split in the comparison is motivated by similarities in the methodologies used for data collection between the1995 and 2000 period and between the 2005/06 and 2010/11 period but differences in methods between the two periods. To our knowledge, apart from a first attempt to assess progressivity in alcohol taxes in South Africa [6], this paper represents the first analysis of the progressivity and the changes in progressivity of alcohol expenditure at the household level in South Africa using datasets that span 15 years. The previous progressivity study [6] only looked at the effect of alcohol taxes. Thus, to fill up the gap, this paper looks at household expenditure on alcoholic beverages as many alcohol policies including tax will have significant effect on household spending. This analysis is useful in assessing, among other things, the impact of existing and future alcohol regulatory policies using price as a lever to reduce affordability of alcohol beverage over time.

Method

Data

This paper uses the Income and Expenditure Survey (IES) datasets compiled by Statistics South Africa, the national statistical authority. The IES is a national

household survey conducted every five years. It contains data on household expenditure on different items including housing, transportation, health, education, food and beverages. The IES provides data on the amount households spent on specific types of alcoholic beverage (e.g. how much was spent on beer or wine in the last month). IES datasets are used to calculate the South African CPI and a range of other socio-economic indicators used in many different analyses [15, 16]. IES datasets were accessed through DataFirst.[1]

Table 1 summarizes the methodology including the survey methods used in each IES round. The IES data have a nationally representative sample of 29,595 households in 1995; 26,265 households in 2000; 21,144 households in 2005/06 and 25,328 households in 2010/11. The main difference between IES rounds is that the IES 1995 and 2000 used face-to-face recall recorded by interviews at a household visit while the IES 2005/06 and 2010/11 used a mix of face-to-face recall by interview and diary method (i.e. households are given a new diary every week for four weeks to record actual purchases). In total, every household in the IES 2005/06 and 2010/11 was visited five times (one visit for the main questionnaire and four visits for the weekly diaries). Due to changes in the IES survey methodology, alcohol expenditure patterns will be stratified by comparisons between (a) 1995 and 2000 and (b) 2005/06 and 2010/11. The earliest IES data, collected in 1990, will not be included in this analysis since its methodology and data collection process are not comparable with subsequent IES rounds; it only covers 12 major metro/urban areas and data for the "white" population group are not available (Table 1).

Key variables and estimation strategy

Table 2 summarizes the key variables used in the analysis. Economic theory suggests that consumption, defined as resources consumed, is a preferable measure of living standards than income. This is because income can be saved and many surveys do not account for household production in its calculation [22]. Additionally, in developing countries income data are not reliable [23]. Thus, this paper uses household consumption expenditure (sometimes referred to as household expenditure in this paper) as a direct measure for living standards. Household consumption expenditure and all spending on alcohol beverages were adjusted by household size (Table 2). The 1995, 2000, 2005/06 and 2010/11 data were adjusted to 2016 prices using the South

Table 1 Income Expenditure Survey (IES) dataset summary - 1990 to 2010/2011

	1990	1995	2000	2005/2006	2010/2011
Number of Observations (Households)	47,781	29,595	26,265	21,144	25,328
Geographic Coverage	Twelve major metro/urban areas. Leaves out small towns and rural areas.	National Coverage-metropolitan, urban and rural areas.	National coverage. Covered de jure household members.	National coverage. Covered all household members.	National coverage. Covered all household members.
Geographic Unit	Magisterial district	Magisterial district	Magisterial district	Province	Province
Data Collection	Face-to-face. Recall Method.	Face-to-face. Recall Method.	Face-to-face. Cases where the household requested to complete the questionnaire themselves and have the completed questionnaire collected at a second visit. Recall Method.	Face-to-face. Combination of recall and diary method. Five separate visits to collect the diaries and questionnaires.	Face-to-face. Combination of recall and diary method. Five separate visits to collect the diaries and questionnaires.
Questionnaires	2 questionnaires-Long and short.	Questionnaire has monthly (1–31 October 1995) and annual (October 1994–October 1995) expenditure sections. The monthly expenditure was multiplied by 12.	Interview the household head or a responsible adult.	Households were given diaries and required to record their daily purchases over a period of 4 weeks. Fieldworker administered the main questionnaire.	Households were given diaries and required to record their daily purchases over a period of 4 weeks. Fieldworker administered the main questionnaire.
Units of Analysis	Household and individuals	Household and individuals	Household and individuals	Household and individuals	Household and individuals
Limitations	There is no data file for the "white" population group. Recall Method.	Recall Method	Recall Method	No estimates at a municipal or district level.	No individual unit. No estimates at a municipal or district level.

Source: [17–21]

Table 2 Description of key variables

Variables	Definition
Spirits (per capita)	Total annual spending on brandy, whisky, gin and other spirits (including liqueur) divided by the household size.
Beer (per capita)	Total annual spending on beer including lager and cider divided by the household size.
Sorghum (per capita)	Total annual spending on (pre-packed) and traditional beer divided by the household size.
Wine (per capita)	Total annual spending on table wines (including sparkling wine and juice/ wine mixtures), fortified wines (sherry and port.) and cooking wines divided by the household size.
Other (per capita)	Total annual spending on other alcohol divided by the household size.
Total expenditure on alcohol (per capita)	Total annual spending on spirits, beer, sorghum, wine and other divided by the household size.
Total household consumption expenditure (per capita)	Total annual spending on cost of housing, food, non- alcohol beverages, alcohol beverages, clothing and footwear, health services, recreation and entertainment and own production and consumption home grown products divided by the household size.

Note: Purchasing includes items and services purchased and consumed in cafes, restaurants, hotels, shebeens (defined as an informal unlicensed drinking place in a township), taverns. Purchased in shops, cafes, liquor outlets, formal or informal, but consumed elsewhere. Source: [17–21]

African CPI data. Then, the variables were converted into 2016 US dollars using the exchange rate R14.71 to the dollar. All data cleaning, exploration and analysis were done using Stata 12 statistical software [24].

Progressivity analysis

A progressivity framework borrowed from public sector economics, which has also been used in the assessment of progressivity in health financing [25, 26], was used in this analysis. Two approaches may be used to assess progressivity: structural and effective progressivity [25]. These were applied to estimate progressivity and the changes in progressivity of alcohol expenditure in South Africa.

Structural progressivity analysis

Structural progressivity is usually assessed by comparing the distribution of spending on alcohol beverages as a percentage of total household consumption expenditure in each quintile of household consumption expenditure per capita [22]. This was assessed in Stata using a user-written -fia- command [25]. If the share of consumption expenditure on alcohol increases with the quintiles (i.e. households that are richer spend a greater share of consumption expenditure on alcohol), then spending on alcohol beverages is progressive. If the share of consumption expenditure on alcohol decreases with the quintiles (i.e. households that are richer spend a smaller share of consumption expenditure on alcohol), then spending on alcohol beverages is regressive.

Effective progressivity analysis

The Kakwani index of progressivity [27] was used to assess effective progressivity of alcohol spending in South Africa. The Kakwani index is a well-known and widely used measure of progressivity. It compares the distribution of household consumption expenditure (using the Lorenz curve [Table 3]) with that of alcohol spending (using concentration curve [Table 3]).

Effective progressivity was also computed using the -fia- command [25]. The framework for effective progressivity has been detailed elsewhere [25]. In brief, the Kakwani index (K) for any alcoholic beverage was computed as the difference between the Gini index (G) of consumption expenditure and the concentration index (C) of expenditure on the specified alcoholic beverage.

Table 3 Summary of measurements of effective progressivity of alcohol spending in South Africa

	Definition
Lorenz curve	The Lorenz curve assesses the degree of inequality in socio-economic status (SES) in South Africa.
Concentration curve	The concentration curve is the degree of inequality in alcohol expenditure between poor and wealthier households in South Africa.
The concentration index	The concentration index (C) is derived from the concentration curve. Its values can vary from − 1.0 (where all expenditure on alcoholic beverages is made by the poorest household) to + 1.0 (where all alcohol expenditure is made by the richest household).
The Gini index	The Gini index (G) is derived from the Lorenz curve. It corresponds to consumption expenditure inequality. It can vary from 0 (perfect equality in the distribution of consumption expenditure) to 1 (perfect inequality in the distribution of consumption expenditure).

Sources: [22, 25]

$$K = C - G \quad (1)$$

A progressive spending on alcoholic beverages occurs when $C > G$, while regressive spending occurs when $C < G$. Proportional spending on alcoholic beverages occurs when $C = G$. Numerically, the value of the Kakwani index can vary from −2 (most regressive) to 1 (most progressive). A positive value ($K > 0$) means that alcohol expenditure is progressive as richer households spend proportionately more on alcoholic beverages than their share of consumption expenditure. A negative value ($K < 0$) represents the opposite [25].

Effective progressivity between two-time periods was calculated by the difference in the Kakwani index between two-time periods [26].

$$\Delta K = K_t - K_{t-1} \quad (2)$$

From eq. 1,

$$\Delta K = (C_t - C_{t-1}) - (\ , G_t, -, G_{t-1}) \quad (3)$$

$$\Delta K = \Delta C - \Delta G \quad (4)$$

The difference in the Kakwani indexes between the two-time periods (eq. 4) can result in a pro-poor 'shift' or a pro-rich 'shift'. A pro-poor 'shift' occurs when the Kakwani index becomes more progressive or less regressive over time (e.g. $\Delta K > 0$; $\Delta C > \Delta G$); while a pro-rich 'shift' occurs if otherwise (i.e. $\Delta K < 0$; $\Delta C < \Delta G$) (see Ataguba [26] for additional progressivity or regressivity scenarios). The standard errors for differences in the indexes between time periods (e.g. $\Delta K = K_t - K_{t-1}$) were obtained using the bootstrap methods with 1000 resamples based on the full sampling structure (see also Hall and Wilson [28] for additional detail).

Results

Overall, per capita alcohol spending in South Africa has increased by $0.33 in real terms, between 1995 and 2000; while it decreased by $1.87 in real terms, between 2005/05 and 2010/11 (Table 4). In absolute terms, as expected, richer households spend much more on alcohol than poorer households.

Average per capita spending on spirits decreased for all quintiles over the years (Table 5). For wine, average spending per capita is approximately the same between 1995 ($0.45) and 2000 ($0.40); while it increased by $0.59 in real terms, between 2005/06 and 2010/11. Average spending per capita on beer increased by $0.50 in real terms, between 1995 and 2000; while it decreased by $2.23 in real terms, between 2005/06 and 2010/11. Excluding the 4th quintile, where average spending per capita on sorghum decreased from $1.53 in 2005/06 to $1.21 in 2010/11, sorghum is the only alcoholic beverage that average spending per capita increased over the years and across quintiles. Overall, the poorest quintile has a pattern of decreasing average spending on specific alcohol beverages over the years. The richest quintile has increased average spending per capita on wine and sorghum over the years and decreased average spending per capita on spirits over the years. For beer, average spending per capita for the richest households increased between 1995 and 2000; while it decreased between 2005/06 and 2010/11.

Assessing progressivity of spending on alcohol beverages in South Africa

Structural progressivity of alcohol expenditure in SA 1995 to 2011 results

The results in Table 6 show that overall alcohol spending as a share of total household consumption expenditure increased slightly by 0.03%, in absolute terms, between 1995 and 2000. However, this is not statistically significant. On the other hand, it decreased significantly by 0.19% between 2005/06 and 2010/11. The three middle quintiles spent the most on alcohol beverages as a share of their expenditure (particularly, the third quintile) at all time periods. Overall, there is an inverted J shape for the proportion of consumption expenditure spent on alcohol in South Africa. In this analysis, it is difficult to ascertain overall progressivity by only looking at the ratios in Table 6 as these may vary across the

Table 4 Average annual alcohol expenditure[a] per capita by quintile in South Africa ($US), 1995–2011

	(a) 1995	(b) 2000	(c) = (b)- (a) 2000–1995	(d) 2005/06	(e) 2010/11	(f) = (e)-(d) 2010/11–2005/06
Poorest	0.25	0.21	−0.04*	3.33	2.79	−0.54**
2nd Quintile	0.71	0.67	−0.04	9.19	8.52	−0.67
3rd Quintile	1.57	1.61	0.04	18.46	20.78	2.32*
4th Quintile	3.02	3.14	0.12	42.81	33.51	−9.30***
Richest	8.26	9.82	1.56***	71.61	70.46	−1.15
Total	2.76	3.09	0.33*	29.08	27.21	−1.87*

[a]Spending on all alcoholic beverages. Significance levels are denoted as follows: ***1%, **5%, *10%

Note: Consumption expenditures are expressed in 2016 dollars. The averages are computed for the entire population (includes household consumption expenditure of drinkers and non-drinkers)

Table 5 Average annual per capita consumption expenditure on specific alcohol beverages in South Africa ($US), 1995–2011

		Poorest	Q2	Q3	Q4	Richest	Total	Total Difference[a]
Spirits	1995	0.03	0.10	0.27	0.67	2.75	0.76	
	2000	0.01	0.06	0.15	0.47	2.38	0.61	−0.15***
	2005/06	0.24	1.03	2.50	6.88	24.17	6.96	
	2010/11	0.20	0.68	2.46	5.50	21.38	6.04	−0.92**
Wine	1995	0.02	0.08	0.20	0.27	1.69	0.45	
	2000	0.01	0.04	0.09	0.15	1.70	0.40	−0.05**
	2005/06	0.43	0.73	0.88	2.70	13.11	3.57	
	2010/11	0.35	0.73	1.09	1.10	17.51	4.16	0.59*
Beer	1995	0.12	0.37	0.87	1.88	3.57	1.36	
	2000	0.09	0.39	1.05	2.25	5.51	1.86	0.50***
	2005/06	1.76	6.25	13.12	31.64	33.98	17.34	
	2010/11	1.40	5.36	14.95	25.67	28.19	15.11	−2.23**
Sorghum	1995	0.08	0.14	0.21	0.19	0.17	0.16	
	2000	0.09	0.18	0.31	0.27	0.20	0.21	0.05***
	2005/06	0.87	1.11	1.83	1.53	0.04	1.08	
	2010/11	0.78	1.63	2.16	1.21	3.36	1.83	0.75**

[a]Difference in the total column. Significance levels are denoted as follows: ***1%, **5%, *10%
Note: Expenditures are expressed in 2016 dollars. The averages are computed for the entire population (includes household consumption expenditure of drinkers and non-drinkers)

entire distribution of consumption expenditure. However, the indexes in Table 7 provide the extent of progressivity of alcohol spending.

The Kakwani index of progressivity

Overall spending on alcohol beverages was regressive from 1995 to 2010/11 (Table 7). Expenditure on wine is consistently progressive over the years while expenditures on beer and sorghum were regressive over the years. Expenditure on spirits was progressive from 1995 to 2000, regressive in 2005/06 then progressive in 2010/11. The difference in Kakwani indexes between two-time periods (1995 and 2000; 2005/06 and 2010/11), indicates that spending on alcoholic beverages had a pro-poor 'shift' (less regressive) in progressivity between 1995 and 2000 and between 2005/06 and 2010/11. For instance, the Kakwani index for total alcohol beverages was estimated at − 0.073 in 1995 but it increased to − 0.056 in 2000; while in 2005/06 it was estimated at − 0.167 but increased to − 0.145 in 2010/11. This means that while, overall, spending on alcohol remains regressive, the changes over time (in the presence of significant increases in taxation on alcohol) show that this regressivity declined significantly.

The Kakwani index for spending on spirits and wine became more progressive (pro-poor 'shift') between 1995 and 2000, and between 2005/06 and 2010/11. Consumption expenditures on beer became less regressive (pro-poor 'shift') between 1995 and 2000 and slightly more regressive (pro-rich 'shift') between 2005/06 and 2010/11, although the changes were not statistically significant. Consumption expenditures on sorghum became more regressive (pro-rich 'shift') from 1995 to 2000 and

Table 6 Proportion of consumption expenditure spent on alcohol[a] in South Africa, 1995–2011

	(a)	(b)	(c) = (b)-(a)	(d)	(e)	(f) = (e)-(d)
	1995	2000	2000–1995	2005/06	2010/11	2010/11–2005/06
Poorest	0.10%	0.09%	−0.01%	1.16%	0.82%	−0.34%*
2nd Quintile	0.12%	0.13%	0.01%	1.60%	1.20%	−0.40%*
3rd Quintile	0.13%	0.16%	0.03%	1.83%	1.63%	−0.20%
4th Quintile	0.11%	0.15%	0.04%	2.00%	1.26%	−0.74%***
Richest	0.08%	0.11%	0.03%	0.71%	0.63%	−0.08%
Total	0.09%	0.12%	0.03%	1.03%	0.84%	−0.19%**

*[a]Spending on all alcoholic beverages. Significance levels are denoted as follows: ***1%, **5%, *10%. The averages are computed for the entire population (includes household consumption expenditure of drinkers and non-drinkers)*

Table 7 Progressivity of spending on specific alcohol beverages in South Africa, 1995–2010/11

	(a) 1995	(b) 2000	(c) = (b) -(a) [a] 2000–1995	(d) 2005/06	(e) 2010/11	(g) = (d) - (e) [a] 2010/11–2005/06
Gini index	0.652***	0.658***	0.006	0.664***	0.643***	−0.021***
	(0.0090)	(0.0095)	(0.0084)	(0.0207)	(0.0100)	(0.0108)
Concentration Index						
Total Alcohol Consumption	0.579***	0.602***	0.023***	0.497***	0.498***	0.001
	(0.0112)	(0.0125)	(0.0154)	(0.0172)	(0.0132)	(0.0228)
Spirits	0.691***	0.753***	0.062	0.664***	0.660***	−0.004
	(0.0131)	(0.0183)	(0.0189)	(0.0241)	(0.0172)	(0.0267)
Wine	0.690***	0.800	0.110***	0.698***	0.760***	0.620***
	(0.0179)	(0.0231)	(0.0260)	(0.0423)	(0.0287)	(0.0459)
Beer	0.529***	0.565	0.036***	0.427***	0.404***	−0.023***
	(0.0134)	(0.0110)	(0.0169)	(0.0196)	(0.0143)	(0.0287)
Sorghum	0.140***	0.117	−0.230***	−0.099***	0.171	0.270***
	(0.0399)	(0.0328)	(0.0510)	(0.0375)	(0.1532)	(0.1528)
Kakwani Index						
Total Alcohol Consumption	−0.073***	−0.056***	0.017***	−0.167***	−0.145***	0.220***
	(0.0238)	(0.0321)	(0.0152)	(0.0499)	(0.0346)	(0.0226)
Spirits	0.039	0.095	0.056***	- 0.0004	0.017	0.017
	(0.0329)	(0.0625)	(0.0193)	(0.0823)	(0.0575)	(0.0283)
Wine	0.038	0.143	0.105	0.034	0.117	0.083***
	(0.0387)	(0.0926)	(0.0243)	(0.0916)	(0.0830)	(0.0423)
Beer	−0.122***	−0.092**	0.030***	−0.237***	− 0.239***	−0.002
	(0.0327)	(0.0364)	(0.0180)	(0.0638)	(0.0380)	(0.0312)
Sorghum	−0.511	−0.540***	− 0.029	−0.764	− 0.472**	0.292***
	(0.0500)	(0.0451)	(0.0516)	(0.0605)	(0.2051)	(0.1536)

[a]*Bootstrap SEs using 1000 resamples are reported in parenthesis. Significance levels are denoted as follows: ***1%, **5%, *10%*

less regressive (pro-poor 'shift') from 2005/06 to 2010/11.

Discussion

This study shows that for both the structural and effective progressivity approaches, spending on alcoholic beverages is regressive; poorer households spend a significantly larger share of their total household consumption expenditure on alcohol than richer households. It became less regressive between 1995 and 2000; and between 2005/06 and 2010/11 (i.e. a pro-poor 'shift').

Based on the results in Table 7, one possible explanation for the pro-poor 'shift' in progressivity for spending on alcoholic beverages in South Africa is the reduction of inequality in consumption expenditure (a decrease in the Gini index). As noted before, changes in the Kakwani index of progressivity between two time periods (eq. 4) is driven by changes in the concentration index of spending on alcohol and changes in the Gini coefficient. The results show that there is no absolute change in the concentration index of spending on alcohol ($\Delta C \approx 0$) between 2005/06 to 2010/11, while there is a decrease in the Gini index ($\Delta G < 0$) between 2005/06 and 2010/11. Therefore, since the concentration index has not changed between 2005/06 and 2010/11, the pro-poor 'shift' results from an improvement in the distribution of consumption expenditure.

The results for progressivity by type of alcoholic beverages show that expenditures on spirits, wine and beer- although not statistically significant, became more progressive (pro-poor 'shift'); while, expenditures on sorghum became less regressive (pro-poor 'shift') between 2005/06 and 2010/11. This pro-poor 'shift' in expenditures on different alcoholic beverages between 2005/06 and 2010/11 resulted from a significant reduction in consumption expenditure inequality ($\Delta G < 0$) or an increased concentration in the consumption of alcoholic beverages among the rich. For example, for wine and sorghum, the pro-poor 'shift' resulted mainly from a positive change in the concentration index of spending on wine and sorghum ($\Delta C > 0$). The positive change in the concentration index may be explained by wine and sorghum spending being more concentrated among the richer households in 2010/11 than in 2005/06.

Results emerging from the progressivity analysis allow us to confirm alcohol consumption patterns seen in other alcohol literature sources [4, 6, 8]. For instance, Ataguba [6] found that poor households are more likely to consume sorghum beers while richer households are more likely to consume spirits and wines. In addition, our results confirm the assertion that alcohol consumption in South Africa differs by socio-economic status [6, 29, 30]. This difference in alcohol consumption pattern should be considered when alcohol policies are implemented given that South African alcohol consumers have different price elasticity of demand for different alcoholic beverages [8]. According to the National Treasury [8], spirits, malt beer and natural wine have price elasticity indicating that a 10% increase in price on spirits, malt beer and natural wine would decrease its demand by 7.5, 10.8 and 4.7%, respectively. Thus, although an increase in price may decrease the overall demand for alcoholic beverages, cross-price elasticity of alcoholic beverages may result in other shifts. For instance, an increase in price of spirits could lead to an increase in malt beer or natural wine consumption, while an increase in price for malt beer could increase the consumption of natural wine and vice versa. Sorghum is the only alcoholic beverage considered a "Giffen Good", where its consumption increases with a price increase. These price and cross-price elasticities effects contribute to explaining the results in Table 5, for instance, the decrease in spending on spirts and beer, while there is an increase in spending on wine and sorghum in 2010/11.

The shift in spending on different alcohol beverages suggest that South African alcohol consumers are mitigating the effect of the increase in alcohol prices. It could also be due to the alcohol industry's ability to reinvent itself. In South Africa, data from the South African Wine Industry Information & System (SAWIS) show that market share in volume decreased from 3.3% in 2006/2007 to 3.0% in 2010/11 for spirits and 8.2% in 2006/2007 to 7.5% in 2010/11 for wine; while it remained the same for unfortified wine (0.8%) and beer (79.2%). On the other hand, the ready to drink beverages (RTDs), such as alcoholic fruit beverages and spirit coolers, have substantially increased from 8.6% in 2006/07 to 9.5% in 2010/11. This increase in RTDs supports SAWIS' idea that alcohol market in South Africa is 'driven by innovation and new products' to attract new consumers (especially young people and women). For instance, cross-sectional analyses using the Youth Risk Behaviour Survey (YRBS) show that adolescents (young people aged 10–19) in South Africa experienced an increase in binge drinking from 29.3% for males and 17.9% for females in 2003 to 33.5 and 23.7%, respectively in 2008; and a slight decrease to 30.3% for males and 20.1% for females in 2011 [31].

Although spending on alcohol beverages has been decreasing (Table 1), alcohol consumption in South Africa has increased over recent years [10]. Data from SAWIS show that alcohol volume increased by 5.7% (3.5 billion to 3.7 billion liters) between 2006/07 and 2010/11 [32]. The results of the study demonstrated that the key driver of progressivity of spending on alcoholic beverages between 2005/06 and 2010/11 was a result of a more equal distribution of consumption expenditure. Thus, the fact that the concentration index of spending on alcohol has not been a major player in increasing progressivity means that there is an opportunity to increase progressivity using alcohol policies. If alcohol policy can reduce the absolute change in concentration indexes sufficient to offset the absolute change in the consumption expenditure inequality, then, following eq. 4, this change in the alcohol concentration index will positively impact the Kakwani index of progressivity creating a further pro-poor 'shift'.

Based on international evidence, there are other policy options, besides increasing alcohol taxes, to decrease alcohol-related harms [33, 34]. Examples of other cost-efficient policies include age restrictions on the sale of alcohol, reduced access to retail outlets, a comprehensive advertising ban, enhanced enforcement of on-premises policies and legislation, and interventions with at-risk drinkers. A combination of these policies is advocated. Currently, there are two alcohol policies under consideration by the South African government. First, the Department of Trade and Industry is proposing changes to the National Liquor Act to impose further restrictions on alcohol sales, increase the minimum drinking age from 18 to 21 years and ban the sale of alcohol in proximity to schools and places of worship [35]. The second is the Control of Marketing of Alcohol Beverages Bill proposed by the Department of Health, which, along with other restrictions, aims to ban any alcohol advertising in shops, media, radio, sports events, but does not ban advertising at the point of sale such as a *shebeen*, liquor store or bar. Neither bill address alcohol pricing nor taxation as a method of addressing alcohol-related harms. While pricing policies are effective, policymakers should exercise caution when applying them as the alcohol market is highly complex, thus monitoring pricing changes is advocated. Additionally, when using price policies, consideration should also be given to inequities behind alcohol consumption, such as who are more exposed and vulnerable to alcohol harms [36]. For future research, and as the policy space changes, impact evaluation methods could be used to assess the impact of alcohol policy on alcohol consumption by different population groups, including socioeconomic groups.

One of the study's strengths is that alcohol spending progressivity was assessed using comparable nationally

representative data. In addition, this analysis provides an initial attempt to assess progressivity of alcohol expenditure at the household level using two different progressivity approaches, structural and effective progressivity. A study limitation is that alcohol expenditures do not account for homemade alcohol production (called unrecorded alcohol). Homemade or informally produced alcohol beverages remain a big part of South African culture. According to the World Health Organization [1], in 2010 unrecorded per capita alcohol consumption (APC) in South Africa was estimated at 2.9 l in pure alcohol (26.4% of total APC). Thus, this study potentially underestimates alcohol spending for the poorest households since they are more likely to consume homemade or informally produced alcohol beverages [8, 36]. Another limitation is that there is a possibility that alcohol consumption and expenditure variables are underestimated due to recall bias for the 1995 and 2000 datasets. To minimize any potential bias, the 1995 and 2000 data, that were considered similar, were compared.

Conclusion

Spending on alcoholic beverages in South Africa remained regressive, albeit declining, between 1995 and 2010/11. This is because the fraction of consumption expenditure spent on alcoholic beverages remained higher for poorer households compared to richer households. Based on the results, there is an opportunity to further reduce the regressivity using coherent alcohol policies. For instance, if the South African government continues its gradual increase in alcohol taxation rates, this could continue to have a pro-poor effect on progressivity. However, price elasticities and substitution effects must be taken into consideration and trends monitored (e.g. pricing changes, consumption and spending patterns). Although the results presented in this paper are based on quantitative analysis, there is a need for further research, especially using qualitative methods, to unpack why alcohol spending became less regressive over the years. This must go beyond just looking at changes in the distribution of alcohol expenditure. In addition, further research needs to address the distribution of alcohol-related harm and the effects of alcohol consumption on health so that policymakers can implement additional alcohol policies to track consumption patterns and decrease alcohol-related harms.

Endnotes

[1]https://www.datafirst.uct.ac.za/

Abbreviations

APC: Per capita alcohol consumption; C: Concentration index; CPI: Consumer Price Index; DALYs : Disability-adjusted life years lost; G: Gini index; IES: Income and Expenditure Survey (IES); K: Kakwani index; RTDs: Ready to drink beverages; SAWIS: South African Wine Industry Information & System; SES: Socio-economic status; YRBS: Youth Risk Behaviour Survey

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Authors' contributions

MFM carried out the statistical analysis and led the writing of the manuscript. All authors helped to conceptualize the research, reviewed the results, helped to revise the manuscript, and approved the manuscript submitted for publication.

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Availability of data and materials

The datasets generated during and/or analysed during the current study are available in the Statistics South Africa repository, https://www.datafirst.uct.ac.za/

Ethics approval and consent to participate

The study was approved by the Human Research Ethics Committee of the Faculty of Health Sciences at the University of Cape Town (HREC reference number: 798/2017).

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests

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Publisher's Note

CHAPTER 6

Summary of study findings, conclusions and recommendations

6.1. Summary of study findings

This thesis has provided important insights on the individuals and households that are more exposed and vulnerable to alcohol harms in South Africa. Overall, it was found that South Africa experiences high levels of inequalities and inequities in alcohol consumption and spending.

For alcohol consumption patterns, richer individuals are more likely to be current drinkers, whereas poorer individuals are more likely to be binge drinkers (Chapter 4). Specifically, the findings show that socioeconomic inequality in alcohol consumption for current drinkers had a pro-poor 'shift'; while binge drinkers had a pro-rich 'shift' between 2008 and 2014/15. For spending on alcoholic beverages, the results show that spending on alcohol beverages has been decreasing over the years. In addition, the results show that spending on alcoholic beverages varies between poorer and richer households; the poorer households spend a significantly larger share of their total household consumption expenditure on alcohol than richer households (Chapter 5). Nevertheless, spending on alcohol beverages became less regressive (i.e. a pro-poor 'shift') between 1995 and 2000; and between 2005/06 and 2010/11. This means that relatively speaking, the poor make up a greater proportion of the drinkers, but the proportion of binge drinkers has reduced amongst the poorest. While the reasons for this are beyond this thesis and policies contribute only a small proportion of variation observed in a population, it does suggest measures to reduce easy accessibility to alcohol have been associated with the most dangerous forms of alcohol consumption, bingeing.

For appropriate policy making to reduce harmful use of alcohol amongst those most vulnerable to the consequences, detailed data are needed that link alcohol expenditure, alcohol consumption and health and social outcomes, at local geographical units appropriate to inform risk and changes in risk. However, this thesis shows that there are significant data constraints in alcohol data in South Africa (Chapter 3). These constraints pose a threat to the provision of reliable information for policymaking to address alcohol-related harms.

Conceptualizing inequalities and inequity related to alcohol consumption

The conceptual frameworks presented in Chapter 2 suggest that social determinants, such as gender, race, geographic location and unemployment, make individuals and households more exposed and vulnerable to alcohol-related harms. This happens through a direct mechanism when the more you drink, the greater the adverse impact you suffer and by indirect mechanisms when, for the same consumption, individuals/households have (a) the ability to cope with exposure to alcohol (e.g. have access to treatment) and (b) higher risk to adverse outcomes (e.g. stroke) because they have higher rates of other risk factors (e.g. poor diet, high blood pressure). The empirical findings from this study corroborate this conceptual framework and provide evidence supporting the current literature discussed in Chapter 2 which suggests that exposure (in this case alcohol consumption, as measured in proxy by expenditure) is differentially distributed by SES and other social stratifiers.

Repopulating the Table 1 from Chapter 2 with the study findings,

Table 1 - Overall pathways for increased risk based on the Dalgrhen and Whitehead's social determinants of health model
a) Increased exposure to alcohol (no specific inequity relationship) i. The more you drink, the more adverse impacts you suffer. **From the study findings:** **Social determinants such as low-income, young individuals, male and African populations have a higher risk to binge drinking**
b) Social determinants such as low socioeconomic status ii. Low SES may also increase your risk of risky drinking (binge drinkers or heavy drinkers) even if average drinking is lower.
c) For a given consumption

iv. Spend a bigger proportion of your income (so less disposable household income for other health-generating opportunities)

From the study findings:

The poorer South African households spend a higher proportion of their household expenditure on alcohol than the richer households

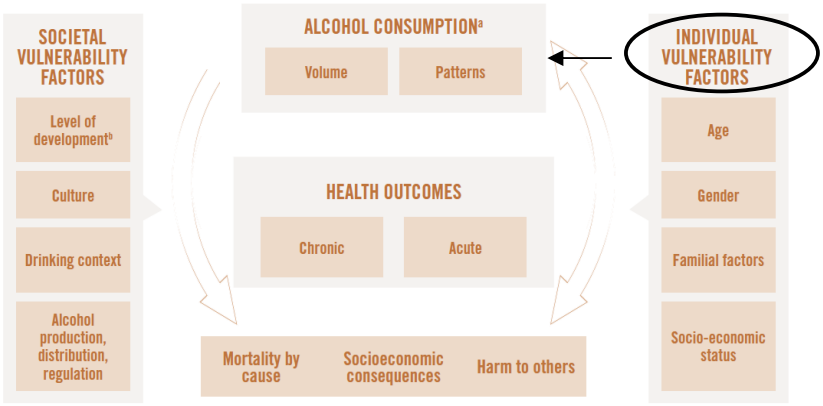
v. Comorbidity and other risks more common in low SES groups increase chances of adverse outcomes for a given alcohol intake

vi. When you do experience an adverse outcome, you have less ability/resources to cope (e.g. access to treatment)

That is, the results show that, in the South Africa context, social determinants such as low-income, young individuals, male and African populations have a higher risk to binge drinking (e.g. the more drinks you have on a single occasion the higher is the risk to adverse outcomes). In addition, financially, the poorer South African households spend a higher proportion of their household expenditure on alcohol than the richer households. Thus, low SES households are more exposed and vulnerable to alcohol harms than richer households. This can cause a significant financial burden for the poorer households as there is less disposable household income for other health-generating opportunities.

To the extent that the first part of the conceptual framework is confirmed, this study provides empirical evidence for a future wider analysis of inequity in alcohol harms (health outcomes).

From the figure 2 model bellow, the study has addressed the direct effect of “individual vulnerability factors” on alcohol consumption and alcohol consumption indirectly effect on alcohol-related harms. For instance, the results show that individuals vulnerability factors such as low-income, young individuals, male and African populations are more likely to be involved in risky drinking patterns such as binge drinking than their counterparts. While this harmful alcohol consumption (e.g. binge drinking) indirectly impact health outcomes and other harms (e.g. mortality by cause, socioeconomic consequences and harms to others); then point out what part of the model could be usefully addressed in other studies.



6.2. Strengths and limitations of the study

The cross-sectional and qualitative studies described in this thesis had a few notable strengths leading to novel findings highlighted below;

One of the strengths of this thesis is that South Africa's alcohol consumption patterns and socioeconomic-related inequality in alcohol consumption were assessed for the first time using the concentration index that is suitable for assessing socioeconomic inequality. Concentration index analysis in this thesis provides an overall picture of alcohol consumption inequality in South Africa. Another strength is that the study had national scope unlike previous research done in a single focused community. The analysis was done using individuals and households' samples by subgroups including age, gender, race, geographic location and SES.

Another strength of the thesis is that the progressivity of alcohol expenditure at the household level was explored using two different progressivity approaches, structural and effective progressivity. These approaches complement each other as (1) provide the share of spending on alcohol (structural approach) and (2) provide indices of progressivity (effective approach). Together these approaches detail a picture of how equitable alcohol spending in South Africa is. In addition, the qualitative cross-sectional study in this thesis evaluated key researchers' experiences in dealing with alcohol datasets in South Africa. These key researchers had influenced and contributed to South African alcohol literature, policies

and legislature documents. Nevertheless, they are stakeholders and have a good understanding of what are the limitations of the alcohol data in South Africa.

The last strength is that the findings in this study, although specific to alcohol, might also be found with regard to risk factors typically associated with behavioral choices, but which are subject to intensive marketing and corporate influence – so-called 'corporate determinants of health'(1, 2). Detecting early changes in risk behaviors (such as an increase in binge drinking pattern in relation to alcohol consumption) by various equity stratifiers and understanding the actual impacts of alcohol spending on the relative distribution of household expenditure is important evidence to support equity-oriented policies not just for alcohol but for other Noncommunicable Disease (NCD) risk factors. Other studies involving other NCD risk factors might also usefully adapt these methods for their analyses.

There are some limitations in the thesis that are outlined below;

A limitation of this thesis is that Alcohol consumption (volume, frequency and spending) variable might be underestimated due to stigma, poor memory, bias, wording and timeframes of the survey questions, differences in standard drink according to the type of beverage preference by SES, informal brewing and consumption of alcohol, amongst other reasons. For instance, women and individuals with religious affiliation might be less likely to report binge drinking. However, the under-reporting might have a small impact on the results of equity analyses since the underreporting of consumption may differ by level of alcohol risk drinking rather than SES (3, 4).

Another limitation is that the datasets excluded individuals in hospitals and clinics, hotels and guesthouses, prisons, schools and student hostels at the time of the data collection who might have high alcohol dependence. This could potentially underestimate the burden of alcohol consumption in South Africa since those individuals might be likely to be involved in risky drinking such as binge drinking. In addition, other possible background variables, for example, working status, smoking habits and poor health that may affect alcohol consumption were not included in the analysis. This limitation should not

have an impact on the results, but they could be used as explanatory reasons for inequalities and inequity behind alcohol consumption.

One source of limitation in this thesis which could have affected binge drinking findings is that the measurement of binge drinking used was the same for males and females. Although the international literature suggests the use of 4 standard drinks as the benchmark for females, this was not possible as the NIDS dataset uses the same criterion for males and females (i.e. the NIDS groups the alcohol data answers by “1 or 2 standard drinks”, “3 or 4 standard drinks”, “5 to 6 standard drinks” for male and female). This could potentially underestimate or overestimate inequality in alcohol consumption for binge drinking between males and females.

Lastly, the findings are based on datasets that are more than five years old. Thus, one should be cautious on using these results on implementing future policies as alcohol consumption trends may have shifted during recent years.

6.3. Conclusion

This study provides evidence for differences in alcohol consumption patterns among SES, which reflect the harmful alcohol consumption falling most heavily on poorer households and individuals. That is, not only do poorer household spend a larger share of their expenditure on alcohol than their counterparts, they are also more likely to be risky drinkers such as binge drinking. This risky consumption and spending behavior among the poor increase their social, financial and health burden.

6.4. Recommendations

The recommendations bellow are tentative based on the study findings. One should be aware that alcohol consumption trends may have shifted during the years that are not part of the study.

- The regressivity of household spending on alcoholic beverages can continue to be reduced using coherent alcohol policies. For instance, the South Africa government can maintain its gradual

increase in alcohol taxation rates, as this policy could continue to have a pro-poor effect on progressivity. However, due to consumers shifting their type of alcohol beverages consumption to alleviate increasing alcohol prices as seen in chapter 5, price elasticities and substitution effects (for instance, an increase in price of spirits could lead a consumer to buy malt beer or natural wine instead) must be taken into consideration and trends monitored (e.g. pricing changes, consumption and spending patterns) when trying to implement alcohol policies. Complementary policy strategies, such as minimum pricing and ensuring tax increases are applied equally to all types of alcohol equally, may help to limit substitution effects. Otherwise, policies such as alcohol taxation aiming to reduce the affordability of alcohol beverage might inadvertently exacerbate alcohol-related harms as individuals may shift their consumption to a cheaper and alcoholic beverage. Cheaper alcoholic beverages often include poorer quality wines (e.g. papsak) which contain toxic substances such as heavy metals, phthalates and carcinogenic ochratoxin increasing adverse outcomes to consumers (5).

- Based on the results that binge drinking is a bigger problem among selected population groups such the low-SES, young individuals, male and African populations, a combination of the following cost-efficient policies is advocated: including age restrictions on the sale - increase age restrictions on the sale of alcohol (from 18 to 21 years (6)) and use of alcohol, reduce access to retail outlets, a comprehensive advertising ban such as a ban on alcohol advertising close to schools and in sports- from its junior competitions and at the national level, enhanced enforcement of on-premises policies and legislation, and interventions with at-risk drinkers.
- Based on the findings of Chapter 3 and also given the very high burden of alcohol related disease in South Africa, the government of South Africa should introduce regular surveillance (data collection at least every two years) for alcohol consumption. It is advised that the International Alcohol Control Study (IAC) survey or a similar framework survey that measures alcohol consumption using specific timeframes, differentiate the number of drinks between men and women and accommodates country-specific beverages and focus on substance abuse may be

considered for implementation at the national level. Another possibility is to strengthen the current NIDS survey questions on alcohol by standardizing the measurement of alcohol consumption and expenditure using the IAC framework or a similar framework.

- All datasets funded by the government as well as industry data (production, distribution and consumption data) including price data, should be made available to the public. In addition to providing accessible data to the public, alcohol data should be collected more frequently so that policymakers have access to "real-time" information to evaluate and implement community evidence-based programs and policy.

The following recommendations are made for future studies;

- Based on the results in Chapter 3, for countries wishing to revamp or improve its collection of national alcohol data or any other NCD risk factors, the following steps are suggested to be included in assessing the datasets: (1) document all the datasets that exist; (2) consider measures to ensure public availability of data; (3) work to harmonize key measures (e.g. how to measure alcohol consumption, how to measure alcohol spending, time periods linked to both) while allowing diversity in other variables collected and (4) include a measure of the quality of the data.
- There is a need for further research, especially using multidisciplinary approaches, to unpack why alcohol consumption in South Africa continues to increase.
- If better data are available, further research needs to address the distribution of alcohol-related harm and the effects of alcohol consumption on health so that policymakers can implement additional alcohol policies to track consumption patterns and decrease alcohol-related harms.

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APPENDICES

Appendix Table 2 - Studies on socioeconomic inequality in alcohol consumption

Table 2 - Studies on socioeconomic inequality in alcohol consumption								
#	**Author(s), year**	**Type of study; Country; Year of analysis**	**Study objectives**	**Measure of SES**	**Measure of Alcohol**	**Analytic methods for SES inequality assessment**	**Findings**	**Conclusions**
1	Roche, Ann, et al., 2015	Systematic review; Australia; 2000 to 2014	Relationship between SES, equity and alcohol consumption	SES not specified			Social determinants of health can strongly influence inequities in alcohol consumption and related harms. In general, lower socioeconomic groups experience more harm than wealthier groups with the same level of alcohol consumption.	
2	Grittner, Ulrike, et al., 2012	Cross-sectional in 33 countries; 1993 -2007	Relationship of country-level characteristics and individual SES on individual alcohol consumption in 33 countries	Highest attained education level	Drank any alcohol during the last 12 months; and monthly risky single occasion drinking (RSOD).	Multilevel logistic model	For both genders and all countries, higher individual SES was positively associated with current drinking. Higher country-level SES was associated with higher proportions of drinkers. Lower SES was associated with risky single-occasion drinking (RSOD) among men. Women of higher SES in low-income countries were more often RSO drinkers than women of lower SES. The opposite was true in higher-income countries.	SES findings and drinking in higher-income countries were expected

3	Shortt, N. K., Rind, E., Pearce, J., Mitchell, R., & Curtis, S.; 2018	Cross-sectional; Scotland; 2008-2011	Relationship between Individual SES; density of alcohol premises and alcohol consumption	Household income	Exceeding recommendations, harmful drinking, binge drinking, and problem drinking	Binary logistic regression models	Highest SES is more likely to report binge drinking or exceeding recommendations in all density categories. Lowest SES was more likely to report problem drinking across all density categories	Lower-income groups might be disproportionately affected by outlet density
4	Sanchez, Z. M., Locatelli, D. P., Noto, A. R., & Martins, S. S.; 2013	Cross-sectional; Brazil (5 regions); 2010	Association between SES and binge drinking	ABEP index - based on the educational level of the head of the household, possession of various types of household goods (e.g., television sets), and the number of housekeepers.	Binge Drinking (5 + standard drink)	Weighted logistic regression stratified by the five Brazilian macro-regions	Older boys studying in private school and those that belong to the highest SES are more likely to be involved in binge drinking. The poorer the region, the higher is the odds ratios of binge drinking in the highest socioeconomic classes.	As SES increased; the chance of having recently engaged in binge drinking also increased.
5	Lawana, N., & Booysen, F.; 2018	Cross-sectional; South African Informal Settlements; 2016	Decompose the socioeconomic inequalities in alcohol use by men living in informal settlements in South Africa.	Wealth index	Binary Alcohol consumption - respondent consumed any alcohol beverage in the last 12 months.	Decomposition analysis - Concentration Index	Found socioeconomic-related inequality in alcohol use against poor men. Inequality is more pronounced 15-35 and 35-44. Wealth status makes the biggest contribution to socioeconomic inequality in alcohol use	Inequality in alcohol consumption exists among both younger and older males. SES is the main contribution to inequality in alcohol consumption

6	Silveira, Camila Magalhaes, et al.; 2014	Cross-sectional; Sao Paulo Metropolitan - Brazil; 2000	Relationship between area-level neighborhood social deprivation (NSD) and individual SES and alcohol use	Education, employment status, and income.	Pass-year uses, regular uses and three levels of heavy drinkers	Bivariate analyses and multiple logistic regression	Living in less deprived neighborhoods was associated with being a past-year alcohol drinker while living in more deprived areas was associated with heavy drinking and some alcohol-related disturbances. Unemployed individuals often showed excess odds of alcohol-related disturbance.	Found an association between neighborhood socioeconomic deprivation with heavy drinking patterns and AUD.
7	Melotti, Roberto, et al.; 2013	Longitudinal Study; Southwest UK; 1990-2011	Relationship between socio-economic position in early life and later alcohol use and problem use among male and female adolescents.	Highest parental social class, maternal education and household disposable income	Heavy drinking, frequent drinking, binge drinking, alcohol-related psychosocial problems and alcohol-related behavioral problems.	Multivariable logistic regressions	Higher maternal education appeared protective in relation to alcohol-related problems, particularly among boys. Higher household income was associated with greater risk of alcohol use and problem use, most apparently among girls.	Children from higher SES in England have a greater risk of adolescent alcohol problems, and these risks appear different in girls compared to boys.
8	Combes, J. B., Gerdtham, U. G., & Jarl, J.; 2011	Longitudinal Study; Sweden; 1989-1997	Assess income-related inequalities in alcohol consumption and its changes over 8 years	Annual disposable income and annuity of net wealth.	Binary Alcohol consumption - respondent consumed any alcohol beverage in the last 12 months. Sensitivity analysis used pure alcohol grams	Decomposition analysis - Concentration Index	Inequality in alcohol consumption has a pro-rich inequality; meaning alcohol consumption is more concentrated among the rich. However, is decreasing over the years.	Pro-rich inequality in alcohol consumption is decreasing due to changes in the proportion of the population groups

9	Dietze, Paul M., et al.; 2009	Cross-sectional; Australia l; 2000	Relationship between income inequality and the rates of alcohol-attributable death and hospitalizations in Australia	ABS Socio-Economic Index for Areas. Weekly income	Alcohol-attributable hospitalization and alcohol-attributable mortality	Cross-sectional ecological analysis	Increasing LGA level income inequality was associated with increased rates of alcohol-attributable harm. No evidence of a relationship between income inequality and acute alcohol-attributable deaths.	Alcohol-attributable harms generally increased with increasing income inequality, alcohol-attributable hospitalizations actually showed the reverse relationship at low levels of income inequality.
10	Elgar, Frank J., et al.; 2005	Cross-sectional; 34 countries; 2001-2002	Explore the contextual influences of income inequality on alcohol use and frequency of drunkenness in adolescents	Individual material wealth - HBSC Family Affluence Scale (FAS)	Alcohol consumption scale (how often do you drink, and have you ever had alcohol that you were really drunk)	multilevel logistic regression models	11- and 13-year-olds in countries of high-income inequality consumed more alcohol than their counterparts in countries of are inequality. Income inequality was associated with drinking frequency among 11- and 13-year old and drunkenness among 11-year odds.	Income inequality influences adolescents alcohol consumption
11	Karriker-Jaffe, K. J., CM Roberts, S., & Bond, J.; 2013	Cross-sectional; South Africa; 2000 and 2005.	Relationship between state-level income inequality and alcohol outcomes is more evident with between-race inequality	Household income	Light vs heavy drinking, alcohol-related consequences and dependence	Multilevel linear and logistic regression	Inequality using poverty ratio was as positively associated with light and heavy drinking. Association were strongest for black and Hispanic compared to whites. Gini coefficient was not associated with light or heavy drinking. Gini showed	Poverty ratios were positively associated with alcohol; however, income inequality was not associated with alcohol. In

			measures than with the Gini coefficient.				a moderated association with alcohol dependence.	high-inequality states, higher levels of alcohol problems may be due to social context.
12	Johnston, M.C., Ludbrook, A. and Jaffray, M.A., 2012.	Cross-sectional; Scotland; 2009/2010.	Examine the distribution of the costs of alcohol misuse across Scotland in 2009/2010, in relation to deprivation.	Scottish Index of Multiple Deprivation. 1st- Most deprived to 5th—least deprived. Used Scottish Index of Multiple Deprivation to separate deprived areas.	Alcohol cost to society. Alcohol-related harmful effects (direct healthcare costs, intangible health costs, social care costs, crime costs and labor and productivity costs).	Cost of illness approach.	The overall cost was £7457 million. 40.41% of the total cost arose from 20% most deprived areas.	The burden of alcohol harmful effects is greater in deprived groups and these burdens do not simply arise from deprived groups but are also experienced more by these groups.

13	Bloomfield, K., Gmel, G. and Wilsnack, S., 2006.	Cross-sectional; 13 European and two non-European countries; 1993-2002.	Examine, across countries: (1) men's and women's drinking patterns, (2) the prevalence of men's and women's experience of alcohol-related problems, (3) gender differences in social inequalities in alcohol use and abuse, (4) gender differences in the influence of combinations of social roles on heavy alcohol use, and (5) how societal-level factors predict women's and men's alcohol use and problems on a regional and global level.	Measured through attained education	Current drinking status (drink in 12 months), heavy episodic drinking (or binge drinking) and heavy drinking in terms of volume (20g for women and 30g for men).	Logistic regression	Social inequalities in the likelihood of abstinence are basically similar for both men and women, with those of lower education being more likely to abstain. For heavy drinking, women of high education are the most likely to drink more heavily. Lower educated men were more at risk in some countries.	In many countries, higher educated women tend to be heavier drinkers, but there appears to be not much difference by education in reporting problems or in binge drinking, while in several countries lower educated men tend to be the heavier drinkers, tend to binge more and report more alcohol-related problems. No clear patterning or groupings of countries emerged from our present analysis.

14	Roberts, S.C., 2012	Cross-sectional; South Africa; 2000 and 2005.	Examine associations between five measures of state-level gender equality and five alcohol consumption measures in the United States	Used Gender equality and Women's scores created through factor analysis	Drinker status, frequency of alcohol consumption, frequency of consuming five or more drinks, the volume of alcohol consumption, and risky drinking in the past 30 days.	Hierarchical linear modeling (HLM)	Possibility of increased alcohol consumption among women should not be used as a reason to oppose policies that increase women's status or gender equality.	Most significant findings suggest that higher levels of equality are associated with less alcohol consumption overall. Findings do not support the hypothesis that higher gender equality or women's status is associated with higher alcohol consumption among women overall.
15	Angus, C., Holmes, J., Maheswaran, R., Green, M., Meier, P. and Brennan, A., 2017.	Longitudinal; England; 2003, 2007, 2010 and 2013.	Examine recent temporal trends in the sociodemographic distribution of spatial availability for different types of alcohol outlet in England.	Index of Multiple Deprivation (IMD)	Alcohol outlets - on-trade and off-trade.	Linear growth curve models fitted with the mixed function.	Most deprived areas have the greatest exposure to alcohol outlets. Alcohol availability has altered with a notable shift from on-trade to off-trade.	There are significant variations in trends by outlet type and deprivation level.

16	Lê, F., Ahern, J. and Galea, S., 2010.	Cross-sectional; USA- NY; 2005.	Examine the relation between neighborhood education inequality and alcohol use in New York City.	Education Gini coefficient. Income inequality	Alcohol Overall- binary variable for a respondent reported drinking at least 12 drinks in the previous 12 months. Level of alcohol consumption - the average number of days the respondent reported drinking per month by the average number of drinks he/she reported drinking on each drinking day divided by 30.	Logistic regression. Gini coefficient	Neighborhood-level education inequality was positively associated with alcohol use prevalence and negatively associated with average daily alcohol consumption among drinkers.	Provide further evidence of a relationship between education inequality and drinking behavior while illustrating the importance of considering different drinking outcomes and heterogeneity between neighborhood subgroups.

17	Batty, G.D., Lewars, H., Emslie, C., Benzeval, M. and Hunt, K., 2008.	Cross-sectional; West of Scotland; 1998/1990.	Examine the association of socioeconomic disadvantage across the life course with the risk of exceeding existing guidelines for 'sensible' alcohol consumption and problem drinking.	Early socioeconomic circumstances and assessment of adult socioeconomic circumstances	Recall of participants alcohol consumption over each of the seven days preceding the interview. Separate by alcohol types.	Logistic regression modelling. The relative index of inequality (RII)	Adult deprivation was more strongly related to our alcohol outcomes than early life deprivation. A substantial proportion of the influence of early life deprivation on alcohol intake was mediated via adult socioeconomic position. Material indicators of socioeconomic deprivation in adulthood – car ownership, housing tenure – were marginally more strongly related to heavy alcohol intake and problem drinking than education, income and occupational social class.	Exposure to disadvantaged circumstances throughout the life course, but particularly in adulthood, is associated with detrimental patterns of alcohol consumption and problem drinking in men in late middle age.
18	Jefferis, B.J., Manor, O. and Power, C., 2007.	Longitudinal; UK; Born in 1958.	To investigate (1) social gradients in non-drinking and binge drinking, and (2) changes in social gradients in drinking with increasing age.	Educational qualifications and occupation.	Abstainers ‘‘never’’ drank, binge drinkers consumed >10 units (men) and >7 units (women) per occasion.	Logistic and repeated measures models.	Social inequalities in non-drinking were stable over two decades, with higher levels of non-drinking in groups with the lowest educational levels. For binge drinking, the most educated men were consistently less likely to binge drink throughout adult life. The most educated women were more likely to binge drink in their 20s, but by their 40s they were least likely to be binge drinkers.	Stable gradients in non-drinking and trends in gradients in binge drinking may reinforce alcohol-related health inequalities over time.

19	Grittner, U., Kuntsche, S., Graham, K. and Bloomfield, K., 2012.	Cross-sectional; 25 countries.	Examine the influence of country-level characteristics and individual socio-economic status (SES) on individual alcohol-related consequences	Highest attained educational level.	(1) moderate drinkers (2) heavier drinkers (3) monthly RSO drinkers and (4) those who are both: heavy drinkers and monthly RSO drinkers.	Age-adjusted odds ratios (ORs) and multilevel logistic model. Gini coefficient.	Lower educated men and women were more likely to report consequences than higher educated men and women even after controlling for drinking patterns. For men, this relation was significant for both internal and external problems. For women, it was only significant for external problems. The GNI was significantly associated with reporting external consequences for men such that in lower-income countries, men were more likely to report social problems.	Those of lower educational achievement—especially men—appear to be more at risk of reporting negative alcohol consequences, and this appears to occur generally regardless of drinking patterns. Higher prevalence of external problems among men in lower-income countries.

20	Bloomfield, K., Grittner, U., Kramer, S. and Gmel, G., 2006.	Cross-sectional; 1997 to 2002; 15 countries.	Investigate the presence of social inequalities of alcohol use and misuse using educational attainment as an indicator of socio-economic status in 15 countries.	Attained educational level	Current drinking status, heavy episodic drinking (or binge drinking) and heavy drinking in terms of volume - average ethanol intake of >20 g per day for women and >30 g per day for men.	Basic prevalence and Logistic regression	Lowest educational attainment is most likely to abstain followed by those with middle education. This pattern is similar for men and women. In Germany, The Netherlands, France, Switzerland, and Austria higher educated women were most likely to drink heavily, while among men the lower educated were more at risk in most countries. For heavy episodic drinking, almost no significant differences were evident among women, but for men, a social gradient was observable with lower educated being more at risk in several countries. Brazil and Mexico results show that higher educated groups are more likely to consume alcohol in a risky manner.	Social inequalities in alcohol use differ by gender according to alcohol measure used and also differ across groups of countries.
21	Dzúrová, D., Spilková, J. and Pikhart, H., 2010.	Cross-sectional; Czech Republic.	Examines risk and protective factors for frequent alcohol consumption in the Czech population using multi-level analysis.	Education and economic activity.	Frequency of alcohol consumption and binge drinking (Both binary variables)	Random intercept logistic regression comprising two levels (individual and small-area level) in multilevel regression analysis.	Men, single, low educated and unemployed showed significantly higher odds ratios for binge drinking. Risk groups exist more often in socially disadvantaged areas of the Czech Republic, characterized by high unemployment, low social stability and various socio-pathological phenomena.	Problematic risk behaviors and risk groups of the population are concentrated in disadvantaged areas. Health problems tend to accumulate creating spatial notches of higher mortalities,

								risky behavior, problematic drinking, etc.
22	Almeida-Filho, N., Lessa, I., Magalhães, L., Araújo, M.J., Aquino, E., James, S.A. and Kawachi, I., 2005.	Cross-sectional; 2001 Bahia-Brazil.	Explores the independent and joint effects of inequalities related to gender, ethnicity, and socioeconomic origin on patterns of alcohol consumption, abuse and harmful use in Salvador, Bahia, Brazil.	Education and social class	Alcohol Consumption-Abuse (ACAb)-daily intake of more than two units of beverage, with drunkenness, or weekly binge drinking plus episodes of drunkenness, or any use of alcoholic beverages with frequent drunkenness, with failed attempts to stop drinking.	Logistic regression	Annual prevalence abuse was 7%, with an overall male: female ratio of 6:1. Found a positive association of ACAb prevalence with education and social class. Male gender and higher socioeconomic status were associated with increased odds of ACAb.	Higher socioeconomic status was associated with increased ACAb prevalence

23	Norström, T., Rossow, I. and Pape, H., 2018.	Cross-sectional; 2006 Norway.	Examine whether the SES difference in youth violence can be explained by differential exposure to and/or differential vulnerability to heavy episodic drinking (HED)	Parental SES - mother's and father's education level; employment	Heavy episodic drinking (HED)- 'About how many times have you been clearly intoxicated during the past year (past 12 months)?' and the seven response options ranged from never (coded 0) to several times per week.	Poisson regression and Sensitivity analyses	Violent behavior occurs more frequently among adolescents with low parental SES, compared with those with medium or high status. Exposure to HED is an important risk factor for violence. The link between HED and violence in the low-SES group is due to the higher than average score on impulsivity in low-SES groups.	Alcohol is a key determinant behind the SES difference in youth violence. Drinking has a stronger than average impact on violence risk because of their higher than average impulsivity score.
24	Probst, C., Roerecke, M., Behrendt, S. and Rehm, J., 2014.	Systematic review; All countries; until 2013	Test if independently of measurement (by education, occupation, employment status or income), the relative risk comparing low with high SES is larger for alcohol-attributable mortality than for all-cause mortality	Occupation, employment status, income, or education; SES is measured on at least two values; SES is measured at the individual level	Alcohol related mortality	Systematic review and meta-analysis (ratio of relative risks-RRR)	Lower SES leads to 1.5–2-fold higher mortality for alcohol-attributable causes compared with all causes.	Alcohol was identified as a factor underlying higher mortality risks in more disadvantaged populations. Can partially be due to the fact that it interacts with other risk factors such as nutrition, smoking behavior or health care utilization, all of which were unequally distributed

								across SES as well.
25	Livingston, M., 2014.	Cross-sectional; Australia; 2010.	Examine socioeconomic differences in self-reported alcohol-related risk-taking behavior to explore whether differences in risk-taking while drinking may explain some of the socioeconomic disparities in alcohol-related harm.	Quintiles based on their postcode of residence using the Australian Bureau of Statistics Index of Relative Socio-Economic disadvantage. Four household income groups.	Used graduated frequency approach. Volume and frequency of alcohol consumption. Risk-taking behavior while drinking.	Poisson regression and multilevel regression analysis.	Higher SES reported substantially higher rates of alcohol-related hazardous behavior than low SES. Controlling for age, sex, the volume of drinking and frequency of heavy drinking, Higher quintile of neighborhoods reported significantly higher rates of hazardous behavior than those in the lowest quintile. Household income shows a similar pattern.	High SES engage in alcohol-related risky behavior at higher rates than low SES Australians even with alcohol consumption controlled.

26	Budhiraja, M. and Landberg, J., 2015.	Cross-sectional; Sweden; 1991-2006.	Assess whether alcohol's contribution to the total mortality differentials by education has increased over time by calculating annual estimates of the proportion of excess mortality between low-educated and high-educated that is attributed to alcohol.	Education	Alcohol-related deaths	Ordinary least square (OLS) and Concentration index (CI).	Alcohol-related mortality was considerably higher in lower educational groups for both men and women. For men, the trends in alcohol-related mortality were roughly stable for all education groups, and there were no signs of increasing inequalities by education. For women, alcohol-related mortality increased significantly for the low-education group whereas the two higher education groups showed no significant time trends, thus resulting in a widened educational gap in alcohol mortality for women. Alcohol's contribution to the overall mortality differentials declined for men and was basically unchanged for women.	Provide some support to the hypothesis that the liberalizations of Swedish alcohol policy have been followed by a general increase in socioeconomic disparities in alcohol-related mortality.

27	Peña, S., Mäkelä, P., Valdivia, G., Helakorpi, S., Markkula, N., Margozzini, P. and Koskinen, S., 2017.	Cross-sectional; Chile and Finland; 2009–2010-Chile and in 2008–2011-Finland	Investigate the existence and patterns of socioeconomic inequalities in alcohol use in Chile and Finland using nationally representative data	Years of education	Abstinence, weekly consumption of pure alcohol, heavy volume drinking, and heavy episodic drinking (binge drinking).	Concentration index (CI)	Strong association was found between lower SES and alcohol abstinence in Chile and Finland. These were largely driven by inequalities among women in Chile and older subgroups in Finland. In both countries, women aged 45–64 of higher SES showed higher weekly consumption of pure alcohol and heavy volume drinking. Heavy volume drinking among Chilean women aged 45–64 showed the highest inequality, favoring higher SES. HED was equally distributed among SES groups in Chile; in Finland HED disproportionally affected lower SES groups.	Lower SES was associated with a higher prevalence of abstinence in both countries and heavy episodic drinking in Finland. Heavy volume drinking was more prevalent in middle-age women of high SES.
28	Menvielle, G., Kunst, A. E., Stirbu, I., Borrell, C., Bopp, M., Regidor, E., ... & Costa, G. 2007.	Longitudinal; 13 European Countries;1990s.	Investigate differences in socioeconomic inequalities in alcohol-related cancers mortality between Western European populations.	Educational level	Alcohol related cancers	Poisson regression analyses. Used relative [Relative index of inequality (RII)] and absolute (mortality rates difference) measures of inequality.	The contribution of alcohol-related cancer to socioeconomic inequalities in cancer mortality was 29–36% in France and the Spanish populations, 17– 23% in Switzerland and Turin, and 5–15% in Belgium and the Nordic countries.	Alcohol use substantially influences socioeconomic inequalities in male cancer mortality in France, Spain and Switzerland but not in the Nordic countries and nor in Belgium.

29	Liu, Y., Wang, M., Tynjälä, J., Villberg, J., Lv, Y., & Kannas, L. 2013.	Cross-sectional; Chile and Finland; 2008 China and in 2006 Finland	(1) What are the associations between the socioeconomic status and adolescents' alcohol use in China and Finland? (2) do socioeconomic inequalities in alcohol use of adolescent differ in these two countries?	Family Affluence Scale	Monthly frequency and volume. Initiation of alcohol use and drunkenness.	Binary logistic regression.	Chinese adolescents from the high FAS were more likely to report experiencing monthly alcohol use and early onset of alcohol use (girls), and early onset of drunkenness (boys). However, no statistically significant difference was found in three FAS groups for all four measures of alcohol use among Finnish adolescents.	Chinese 15-year-old students from socioeconomic inequalities in alcohol use of adolescents are more affluent families are more likely to experience alcohol use and drunkenness than those from lower affluent families. No significant association between family affluence and any measure of alcohol use in Finnish adolescents.
30	Intarut, N. and PukdeeSouth Africamai, P., 2017.	Cross-sectional; Thailand; 2015.	Investigate the impact of socioeconomic status on concurrent tobacco and alcohol consumption in Thailand.	Household assets -wealth index scores.	Current drinkers - consumed alcohol in the last 12 months	Weighted multiple logistics regression	The prevalence of co-use (tobacco and alcohol) increased across socioeconomic status with poorer households co-using more than richer households. Alcohol consumption only: richer households consumed alcohol more than poorer households across the socioeconomic status quintiles.	Shows an inequity in the prevalence of concurrent tobacco and alcohol consumption affecting persons of low socioeconomic status. Tobacco consumption only was also high among the poorest participants,

								while alcohol consumption only was high among the richest participants.
31	Bellis, M.A., Hughes, K., Nicholls, J., Sheron, N., Gilmore, I. and Jones, L., 2016.	Cross-sectional; England; 2013/14.	Assess which factors may explain the alcohol harms paradox.	Deprivation (Index of Multiple Deprivation based on nationally geographical areas.	Current drinkers - consumed alcohol in the last 12 months. Weekly drinking levels.	Chi-squared analysis	Independent of total consumption, deprived drinkers were more likely to smoke, be overweight and report poor diet and exercise. They were >10 times more likely than non-deprived counterparts to drink in a behavioral syndrome combining smoking, excess weight and poor diet/exercise. Differences by deprivation were significant but less marked in higher-risk drinkers (male >400 g, female >280 g alcohol/week). Current binge drinking was associated with deprivation independently of total consumption and a history of bingeing was also associated with deprivation in lower and increased risk drinkers.	Deprived increased/higher drinkers are more likely than affluent counterparts to consume alcohol as part of a suite of health challenging behaviors including smoking, excess weight and poor diet/exercise. More binge drinking in deprived individuals will also increase risks of injury and heart disease despite total alcohol consumption not differing from affluent counterparts.

32	Gauffin, K., Hemmingsson, T. and Hjern, A., 2013.	Longitudinal Study; Sweden; 1973-1984 follow up 2009.	Investigate whether socioeconomic position (SEP) in childhood predicts alcohol-related disorders in young adulthood in a Swedish national cohort.	Socioeconomic index (SEI) based on education and position in the working place.	Alcohol-related disorders- at least one entry in registers on alcohol-related medical care and alcohol-related mortality.	Cox proportional hazard models.	Low childhood SEP was associated with alcohol-related disorders later in life among both men and women in a stepwise manner. Growing up in a household with the lowest SEP was associated with risk for alcohol-related disorders of HR: 2.24 after adjustment for sociodemographic variables, compared with the highest SEP group.	The study demonstrates that low SEP in childhood predicts alcohol-related disorders in young adulthood.
33	Probst, C., Parry, C.D., Wittchen, H.U. and Rehm, J., 2018.	Cross-sectional; South Africa; 2015.	Investigate the mortality attributable to alcohol use in different socioeconomic groups in South Africa.	Asset score	Frequency (ranging from never to daily) and quantity (number of standard drinks per occasion ranging from 1 or 2 to 13 or more).	A comparative risk assessment. Sensitivity analysis.	Age-standardized, alcohol-attributable mortality rates per 100,000 adults were highest for the low SES group (727 deaths), followed by the middle (377 deaths) and high SES groups (163 deaths). The socioeconomic differences were highest for mortality from infectious diseases. People of low SES had a lower prevalence of current alcohol use but heavier drinking patterns among current drinkers. Among men, AAFs were elevated at low and middle SES, particularly for the middle and higher age groups (35+).	Elevated AAFs for people of low and middle SES arose from higher levels of consumption among current drinkers and not from the prevalence of current alcohol use per se.

34	Richter, M., Kuntsche, E., de Looze, M. and Pförtner, T.K., 2013.	Cross-sectional; North-Rhine Westphalia, Germany in 1994, 1998, 2002 and 2006.	Examine socioeconomic differences in adolescent alcohol use in Germany as well as their changes between 1994 and 2006.	Family affluence scale (FAS). Students Educational track.	Frequency	Log-binominal regression models.	An increase in weekly alcohol use between 1994 and 2002 was followed by a strong decrease from 2002 to 2006. Family affluence only had a weak effect on weekly drinking with a tendency for lower-affluent students. reporting less alcohol use. The educational track showed almost no relationship with weekly alcohol use. Trend analyses within the subgroups revealed that the overall trend in alcohol use was similar in all socioeconomic and educational groups.	Socioeconomic patterns in drinking behavior are not yet developed in 15-year-old adolescents.

35	Bloomfield, K., Augustin, R. and Kraus, L., 2000.	Cross-sectional; Germany; 1997.	Investigates social inequalities in drinking behavior in a sample of the German general population aged 25 to 59 years.	The Winkler index-educational attainment, income and occupation.	The Alcohol Use Disorders Identification Test (AUDIT)	ANOVA.	Abstinence showed a clear negative gradient with social status. When age was controlled, no differences were found in the prevalence of hazardous drinking. Men of high SES, men of middle SES had increased odds of consuming five or more drinks per day at least weekly and of a positive score on the AUDIT hazardous use measure, while men of lower SES had higher odds for dependence symptoms. Women of middle SES had significantly lower odds for reporting items of the CAGE alcohol screening instrument and DSM-IV alcohol abuse criteria in comparison to women of high SES. Thus, women of lower and higher SES resemble each other in drinking behavior.	The lack of clear social inequalities among the consuming German general population may be due to the widespread integration of alcohol drinking in everyday life.

Appendix Chapter 3 - Participant Invitation Letter

Dear …

I trust you are well.

You are being invited to participate in a research study- Utility of Existing Alcohol Survey Data in South Africa. Before you agree, you must understand what your participation would involve. Please take time to read the following information carefully.

Who am I?

I am a PhD student in the School of Public Health at the University of Cape Town. My project is to develop detailed equity analyses to explore the burden of alcohol consumption by socio-economic status in South Africa, at the individual and household levels, using national household data. As part of my studies, I am conducting the research you are being invited to participate in.

What is the research?

This study will examine the utility of South African alcohol data sources by documenting the type of alcohol data available in different sources and what possible alcohol analysis could be done using these datasets. The study will explore data limitations and make recommendations.

We are interested to know your experiences of dealing with alcohol datasets in South Africa. For instance, we would like to know what alcohol datasets resources you usually use in your research; what datasets do you know exist, but you have not used and why not? What are the challenges that you encounter by using these datasets and what would be the possible solutions?

This is a low-risk study. As far as we know, there is no major risk associated with this study.

The information that you provide for this study will be used to identify relevant alcohol datasets used for research and make recommendations for how routine datasets could be better used for informing policy.

What will your participation involve?

If you agree to participate, you will be asked to

- engage for 20-30 mins in a one to one informal chat on the topic of alcohol datasets
- you agree to the chat being recorded on a Dictaphone
- agree on a mutually agreeable location to meet or phone interview

I will then offer you an interview appointment date and time, depending on where you would like the interview (time/date at your convenience) to be conducted. You will be requested to complete a consent form when the interview takes place.

We will keep the information that you share with us confidential. We will not use your name when we write our reports. Your personal information will be stored in a secure computer only accessible to the researcher. You are able to withdraw from the interview at any time without any consequences.

Looking forward to hearing from you. **If you have any further questions, please feel free to contact at may.fontes@hotmail.com or call us at 066 221 4125.**

Best Regards,

Mayara Fontes

Appendix Chapter 3 - Consent Form

Consent Form

Study Title: An Equity Analysis of the Burden from Alcohol Consumption in South Africa

Study Subtitle: Utility of existing survey data in South Africa

This study will be conducted by the principal investigator, Mayara Fontes, from the University of Cape Town.

South African alcohol studies were not able to well document the impact of alcohol-related harm for individuals and at a societal level due to data constraints. This study will examine the usability of South African alcohol data by documenting the type of alcohol data available and what possible alcohol analysis can be done using South Africa datasets. Then, it will explore data limitations and make recommendations.

The information that you provide for this study will be used to identify relevant alcohol datasets used for research and make recommendations for how routine datasets could be better used for informing policy. There is no direct benefit in participating in this study. However, we hope that in the long run, the results will provide better data for alcohol research and policymaking.

We are interested to know your experiences of dealing with alcohol datasets in South Africa. For instance, we would like to know what alcohol datasets resources you usually use in your research; what datasets do you know exist but you have not used and why not? What are the challenges that you encounter by using these datasets and what would be the possible solutions?

This is a low-risk study. As far as we know, there is no major risk associated with this study.

It is up to you to decide if you want to participate in the study. If you do wish to participate, you can always change your mind later and we will withdraw your sample from the study.

Your personal information will be stored in a secure computer only accessible to the researcher. No personal information will be displayed in the analysis. We will replace your name with a code, which will be used on your sample and information about you.

When the study is finished, the results will be communicated through journal article publications and policy brief for researchers, parliamentary decisions makers and civil society advocacy groups.

I consent voluntarily to participate in this project. My signature says that I am willing to participate in this research.

_____
Participant name (Printed)

_____ _____
Participant signature Consent Date

_____

Witness to signed consent (Print)	
_____	_____
Signature of Witness	Date

Appendix Chapter 3 - Interview Guide

The researcher introduces herself and explains that the purpose of the research project is to examine the usability of South African alcohol data sources by documenting the type of alcohol data available in different sources and what possible alcohol analysis could be done using these datasets. The study will explore data limitations and make recommendations.

Before signing the consent form (annexure), issues of confidentiality and study risks will be discussed with each participant. The participant will be requested to sign a consent form if he/she agrees to continue the interview. The participant should be able to withdraw from the interview at any time without any consequences.

Questions:

1. Which of the following categories best describes the industry/sector you work in?

    - Government
    - Academic/Research
    - Non-government and community-based organizations (NGOs/CBOs)
    - Retail
    - Other (Specify)

2. Which of the following employment categories best describes your primary role in the industry?

    - Researcher
    - Policymaker
    - Manager
    - Administrator
    - Consultant

- Student
- Other (Specify)

3. Briefly describe the kind of work you do.

4. Do you know any dataset/s* that contains alcohol-related data?

    a. If yes, can you name the dataset/s that you know and where to find it (e.g. public domain)?

	Title	Nature of data? (E.g. Household-level data, individual-level data, firm-level data, spatial data)	Periodicity	Who controls the data	Where to find it? Any restrictions?	Have you used it (Y/N)? Why Not?
Dataset 1						
Dataset 2						
Dataset 3						
Dataset 4						

    b. If No, interview ends.

5. Have you ever used a national or provincial dataset/s* that contains alcohol related data?

*Explain dataset eligibility criteria for inclusion:
1) A local, provincial or national representative survey
2) Contains alcohol data (alcohol related harm or disease; either consumption or expenditure or both)
3) Database is publicly available
4) Surveys conducted after 1994

	Name	Nature of data? (E.g. Household-level data, individual-level data, firm-level data, spatial data)	Where to find it? Any restrictions?

Dataset 1			
Dataset 2			
Dataset 3			
Dataset 4			

6. What type of data on alcohol did the dataset contain (If multiple datasets make a note of that, ask about each dataset in the order that they are presented above. Check each box that applies per dataset)?

	Dataset 1	Dataset 2	Dataset 3	Dataset 4
Alcohol price				
Alcohol spending per household				
Alcohol spending per individual				
Alcohol pattern of drinking per individual				
Alcohol pattern of drinking per household				
Blood alcohol concentration (BAC)				
Alcohol informal (e.g. consumption of home brews or sale of alcohol informal sector)				
Any health data including alcohol-related diseases (at HH or individual level)				
Alcohol production and purchases for firm level data:				
Other:				

7. What did you use the alcohol related data for (Interviewees can choose more than one option)?

	Dataset 1	Dataset 2	Dataset 3	Dataset 4
Pricing and expenditure (topics related to pricing, for instance, determine alcohol pricing, price elasticity, alcohol tax or alcohol expenditure analysis)				

Marketing of alcoholic beverages (topics related to marketing for instance advertising, increasing in marketing share)				
Availability of alcohol (related to track and/or reduce/increase alcohol availability, for instance, restriction on alcohol sale, places where alcohol is sold)				
Burden of alcohol (topics related to harmful use of alcohol, harm reduction, alcohol-related diseases)				
Tracking informal alcohol consumption or sale				
Other (Specify)				

8. What are the strengths of the alcohol data that you used? (Please be specific and include all alcohol datasets applicable) [THE INTERVIEWER WILL REFER TO THE DATASETS FROM THE ANSWER TO QUESTION 5. FIRST ASK AS OPEN-ENDED THEN USE THE BOX BELOW]

Strengths	Dataset 1	Dataset 2	Dataset 3	Dataset 4
Level of data (household)				
Level of data (individual)				
Geographic Coverage				
Data Collection				
Frequency of data collection				
Most Recent year of the study				
Measures of alcohol consumption and/or expenditure				
Co-variables available [e.g. demographics, SES, health outcomes]				
Type of analysis that could be done				
"Can you comment on the quality of data in this dataset in your experience?"				
Other (Specify)				

9. What are the challenges that you encountered using these alcohol datasets? * (Please be specific and include all alcohol datasets applicable) [THE INTERVIEWER WILL REFER TO THE DATASETS FROM THE QUESTION 5 ANSWER] FIRST ASK AS OPEN-ENDED THEN USE THE BOX BELOW

Challenges/ Weaknesses	Dataset 1	Dataset 2	Dataset 3	Dataset 4
Level of data (household)				
Level of data (individual)				
Geographic Coverage				
Data Collection				
Frequency of data collection				
Most recent year of the study				
Measures of alcohol consumption and/or expenditure				
Co-variables available [e.g. demographics, SES, health outcomes]				
Type of analysis that could be done				
"Can you comment on the quality of data in this dataset in your experience?"				
Other (Specify)				

10. What would be the possible solutions and recommendations for better alcohol data collection in South Africa? *Probe them to suggest what an ideal database might look like? Is there an existing database outside of South Africa that provides "good" data? What should the government do to collect better data?*

11. Any additional comments?

At the end of the interview, the researcher will thank the respondent for their contribution and indicate that the findings will be written up in a report and is available for the participants on their request.

Appendix Chapter 3 - Eligible South African datasets housed in data warehouses

Eligible South African datasets housed in data warehouses										
#	**Dataset**	**Source**	**Level of data**	**Geographic Coverage**	**Universe**	**Survey Year**	**Measures of alcohol**	**Scope - Covariables available**	**Type of analysis that can be done with alcohol data**	**Limitation**
1	Ageing, Well-being and Development Project 2002, 2008	DataFirst	Households and individuals	Rural Eastern Cape and urban Western Cape.	All members of black households in the rural Eastern Cape and black and colored households in urban Western Cape	2002/03 and 2008/09	Household expenditure on alcohol for last month and 12 months. We do not get on anymore because of excessive alcohol and drug consumption by some in the household.	Individual: Demographic characteristics, mortality, financial, health, expenditure, disaster exposure, drugs, community facilities. Household Characteristics.	Prevalence Comparison with other countries. Price and expenditure. Burden of alcohol	Limited geographic coverage. Limited alcohol consumption data
2	Agincourt Integrated Family Survey 2002, 2004	DataFirst	Households and individuals	Rural sub-district in Mpumalanga Province	All household residents, Woman aged 60 and above and men aged 65 and above in the household	2002/03 and 2004/05	Adult expenditure on alcohol for normal month and 12 months. Do you ever drink alcohol or homebrew?	Income and consumption, health, morbidity, crime, social connectedness, intra-household relationships, and direct hedonic measures of well-being	Pricing and Expenditure. Burden of alcohol	Limited geographic coverage. Limited alcohol consumption
3	Cape Area Panel Study 2002-2009, Waves 1-5	DataFirst	Households and individuals	Metropolitan Cape Town.	Youths and young adults	2002 - Wave 1; 2003 (Wave 2a); 2004 (Wave 2b); 2005 (Wave 3); 2006 (Wave 4) and 2009 (Wave 5)	When you were growing up (up to age 14), did you live with anyone who was a problem drinker or alcoholic? Over the past month, have you consumed any alcohol? Do you ever drink alcohol or homebrew?	Schooling, employment, health, family formation, and intergenerational support systems.	Burden of alcohol. Longitudinal analysis	Limited geographic coverage, alcohol questions not consistent a crossed the waves

							Wave 5- includes alcohol frequency and volume			
4	Demographic and Health Survey	DataFirst (1998)	Households and individuals	National coverage.	Women age 15-49 and men age 15+	1998, 2003 and 2016	Have you ever drunk alcohol? Do you drink alcohol now? Alcohol volume and frequency questions; Is or was this person always, sometimes or never "on something" (drugs or alcohol) when he/she did this to you?	Basic demographic, fertility and mortality, contraceptive methods, breastfeeding practices, maternal and child health, HIV/AIDS, chronic health conditions, lifestyles, anthropometric indicators domestic violence	Burden of alcohol	DHS 2003 and 2016 not available in public domain. No alcohol expenditure questions
5	Department of Social Development Survey 2006-2008	International Household Survey Network	Households and individuals	Local municipality	All adult household members - aged 18 and above	2006-2008	Ever made use of the Alcohol and Drug Rehabilitation Center Biggest health problem facing the community?	Poverty, social capital, government services, development activity, health and sustainable livelihoods in the 22 nodes surveyed.	Burden of alcohol; follow up survey	Limited geographic coverage, alcohol questions
6	General Household Survey	DataFirst	Households and individuals	National coverage	All de jure household members (usual residents) of households in the nine provinces of South Africa and residents in workers' hostels.	2002-2017	What sort of illnesses or injuries did …… suffer from? Was it ….05 = Abuse of alcohol or drugs.	Household characteristics. Individuals' characteristics. Fertility	Burden of alcohol	No alcohol consumption. The survey does not cover collective living quarters such as students' hostels, old age homes, hospitals, prisons and military barracks

7	Impact Evaluation of the Upgrading of Informal Settlements Programme 2010	World Bank Central Microdata Catalog	Households and individuals	Limpopo, Free State and Gauteng provinces.	Households in: Disteneng and Greenside informal settlements. Grasslands settlement in the Free State. Chris Hani Settlement in Daveyton, Gauteng.	2010	Monthly expenditure on cigarettes/tobacco/alcohol together	Household demographics, education, economic activity, health, microenterprise, crime and violence, housing and tenure, infrastructure and service delivery Social capital and community participation, living conditions.	Price and Expenditure. Burden of alcohol	Limited geographic coverage. Alcohol monthly expenditure questions together with cigarettes and tobacco. Once off survey
8	Intervention with Microfinance for AIDS and Gender Equity 2001-2003	DataFirst	Households and individuals	Eight villages in the Sekhukhuneland region of South Africa's rural Limpopo Province.	All individuals aged 14-35 years in selected households in the eight participating villages.	2001-2003	The number of establishments that sell alcohol in that subsection. Ever drink alcohol?	Poverty and women's agency, household welfare, attitudes and behavior, HIV infections and gender-based violence.	Tracking informal alcohol consumption or sale. The burden of alcohol. Alcohol availability	Limited geographic and population coverage. Limited alcohol questions. Survey stopped. Old data.
9	Income and Expenditure Survey	Datafrist	Households and individuals	National coverage	Covered de jure household members.	1995,2000,2005/06 and 2010/11	Annual expenditure on alcoholic beverages	Provides data on the earnings and spending of South African households and household consumption	Price and Expenditure. Burden of alcohol	1990 limited race. 1995 and 2000-Recall Method; 2010/11-No individual unit. No alcohol frequency and volume data.

10	South African Integrated Family Survey 1999, (Langeberg Survey)	DataFirst	Households and individuals	Langeberg region of the Western Cape Province in South Africa	All de jure household members in the area of Langeberg	1999	Monthly expenditure on alcohol or tobacco (does not distinguish). Do you ever drink alcohol or homebrew? Do you typically drink more often than once a week? Do you think anyone in this household drinks too much?	Household demographics and health, dwelling characteristics, household goods and services, education, employment, mortality and migration, income and expenditure and data on social integration and life satisfaction.	Pricing and Expenditure. Burden of alcohol	Limited geographic coverage. Expenditure accounting for tobacco and alcohol. Once off data.
11	Khayelitsha Integrated Family Survey 2002-2005	Datafirst	Households and individuals	Khayelitsha, a township outside of Cape Town	Household members, woman 60+, men 65+	Wave 1- 2002 and 2003; Wave 2- 2004 and 2005	Monthly expenditure on alcohol and/or tobacco (does not distinguish). Do you ever drink alcohol or homebrew? Do you typically drink more often than once a week? Do you think anyone in this household drinks too much?	Income and consumption, health, morbidity, crime, social connectedness, intra-household relationships, and direct hedonic measures of well-being.	Pricing and Expenditure. The burden of alcohol. Longitudinal analyses	Limited geographic coverage. Expenditure accounting for tobacco and alcohol. Survey stopped.
12	Labour Force Survey 2003, March	Datafirst	Households and individuals	National Coverage	Non-institutional population except for workers' hostels.	2003	Types of illnesses or injuries (Abuse of alcohol or drugs)	Household characteristics, demographics, education, economic activity, business ownership, migration	Burden of alcohol	Limited alcohol question. No more alcohol data on the following years

13	National Income Dynamics Study	Datafirst	Households and individuals	National Coverage	Private households in all nine provinces of South Africa, and residents in workers' hostels, convents and monasteries. The frame excludes other collective living quarters, such as student hostels, old age homes, hospitals, prisons and military barracks.	Wave 1- 2008; Wave 2- 2010/11; Wave 3- 2012; Wave 4- 2014/15	Individuals- Alcohol consumption volume and frequency Household: Expenditure on alcoholic beverages How common is drug or alcohol abuse in your neighborhood?	Household characteristics, household roster, mortality history, living standards, expenditure, consumption, negative events, positive events, agriculture. Individuals: Demographics, education, labor market, income, health, well-being, numeracy, anthropometric data.	Pricing and Expenditure. The burden of alcohol. Availability of alcohol. Longitudinal analyses	Geographic units different between waves. Wave 5 (2017) does not provide adults with alcohol data. Alcohol consumption timeframe and standard drinks groups
14	National Victims of Crime Survey	Datafirst	Households and individuals	National Coverage	All households in South Africa	2003 and 2007	Was the attacker under the influence of alcohol or drugs? Were you under the influence of alcohol or drugs? Was the attacker under the influence of alcohol or drugs? Was alcohol or drugs involved?	Household demographic, services and facilities, HIV/AIDS within the household. Victim data, crime and personal safety, citizen interaction/community cohesion, police services and the courts, corruption.	The burden of alcohol. Availability of alcohol.	No separation of drugs and alcohol
15	People's Security Survey	International Labor Organization	Households and individuals	Cape Town, and Durban and Matatiele in Kwazulu-Natal.	Household members aged 15-64	2001	Crime activities in the area – b26 dealing with illegal alcohol	demographics, perceptions of insecurity and security, actual knowledge with regard to policies, coping mechanisms	The burden of alcohol. Availability of alcohol.	Limited geographic coverage. Once off data. Limited alcohol data.

16	South African Social Attitudes Survey	Human Sciences Research Council	Individuals	National Coverage	Adults (aged 16 and older)	2003-2016	Do you drink alcohol? What is the most important thing that keeps children away from school? Peer-group pressure (drugs and alcohol abuse). Advise to improve health: drink less/no alcohol	democracy, identity, public services, social values, crime, voting, demographics, families and family authority	The burden of alcohol. Availability of alcohol. Marketing of alcoholic beverages. Trends	No alcohol data after 2004 survey. Limited alcohol data.
17	Transitions to Adulthood in the Context of AIDS 1999-2002	DataFirst	Individuals and communities	Durban Metropolitan and Mtunzini Magisterial Districts of Kwazulu-Natal, South Africa.	Adolescents (ages 14-22) in selected households	1999 and 2001/2002	Frequency, alcohol and sexual encounter, alcohol education	Demographics, employment, a diary of their activities in the previous 24 hours, school-based Life Skills Programme, sexual health, connectedness to school, family and community, alcohol and drug use.	The burden of alcohol.	Limited geographic coverage. Adolescents only. Survey stopped. Old data.
18	Violence Prevention through Urban Upgrading 2012	DataFirst	Communities, households and individuals	Nyanga and Gugulethu, two adjacent former black townships located about 20 kilometers from Cape Town city centre along the N2 close to the Cape Town International Airport.	All adults (18+) in households in Nyanga and Gugulethu	2012	Consume alcohol?	Youth development, education, job opportunities and local development, access to public services & amenities, operation and maintenance of public infrastructure, and safety and security.	The burden of alcohol.	Limited coverage and alcohol questions
19	World Health Survey 2003, Wave 0	WHO Central Data Catalog	Households and individuals	National Coverage	Includes any adult, male or female age 18 or over living in private households	Wave 0- 2003	Alcohol dependence and alcohol consumption frequency	Health, health care expenditures, mortality, birth history and health interventions.	The burden of alcohol.	Wave 0 individuals not the same in the other waves. Limited

										alcohol questions
20	Study on Global Ageing and Adult Health (SAGE)	WHO Central Data Catalog	Households and individuals	National Coverage	All persons aged 18 years and older residing within individual households. As the focus of SAGE is older adults, a much larger sample of respondents aged 50 years and older were selected with a smaller comparative sample of respondents aged 18-49 years.	Wave 1- 2007/2008 and Wave 2- 2014/2015	Alcohol consumption volume and frequency last 7 days, month and 12 months (including, beer, wine, spirits).	Household characteristics, household and family support, household expenditure. Individual: demographic characteristics, health, anthropometrics, performance tests and biomarkers, health care utilization, social cohesion, subjective well-being and quality of life, caregiving.	The burden of alcohol. Longitudinal analysis	Wave 0 does not follow the same people on wave 1 and 2. Focus on older adults
21	HIV and Alcohol Prevention in Schools (HAPS) 2003-08 - KwaZulu-Natal	Human Sciences Research Council	Individuals	KwaZulu-Natal, Pietermaritzburg	Grade 9 students of peri-urban schools in Pietermaritzburg.	2003-2008	Alcohol consumption and frequency, alcohol behavior, future alcohol consumption, alcohol and sexual encounter	Health Behavior/ Sexual Health	The burden of alcohol.	Limited geographic coverage. School students only
22	South African National HIV Prevalence, HIV Incidence, Behavior and Communication Survey (SABSSM)	Human Sciences Research Council	Households and individuals	National Coverage	Individuals aged 2+ years	2002, 2005, 2008, 2012 and 2017	Alcohol consumption volume and frequency, alcohol behavior.	HIV, AIDS, alcohol abuse, care in the community, sexual health, individuals and household characteristics	The burden of alcohol. Availability of alcohol.	Alcohol expenditure. Type of alcohol beverages
23	South African National Health and Nutrition Examination	Human Sciences Research Council	Households and individuals	National Coverage	Individuals of all ages living in South Africa	2011/2012	Alcohol consumption volume and frequency.	Health and demographics	The burden of alcohol.	Does not have education or income questions.

	Survey (SANHANES)									Alcohol expenditure.