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Shonganye, Jean Shonganye

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The relationship between youth alcohol use and negative household events: analysis from the South African National Income Dynamics Study (NIDS) Wave 4

Jean Shonganye Shonganye
Student Number: 2252640

Supervisor: Associate Professor Sumaya Mall. Division of Epidemiology and Biostatistics, School of Public Health,Faculty of Health Sciences, University of the Witwatersrand.

Co-Supervisor: Adjunct Professor Lesley J. Robertson. Department of Psychiatry, School of Clinical Medicine,Faculty of Health Sciences, University of the Witwatersrand.

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Declaration

I Jean Shonganye Shonganye declare that this research report is my work. It is being submitted in partial fulfillment of the requirements for the degree of Masters of Epidemiology and Biostatistics. It has not been submitted before for any degree or examination at this or any other University.



04th November 202

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Abstract

Introduction

Problematic and non-problematic alcohol use is highly prevalent among youth globally including in South Africa. Stressful life events among individuals or households (known as negative household events (NHE)), where a group of individuals residing together, may be associated with any form of alcohol use. Little is known regarding alcohol use among South African youth and whether this is related to NHEs e.g., property destruction or crop failure. This study aimed to fill the gap by examining the prevalence and associates of any form of alcohol use and binge drinking among South African youth and their relationship to NHEs.

Methods

A secondary, quantitative analysis of cross-sectional data was conducted using the fourth wave of the National Income Dynamics Study (NIDS), a panel study assembled to track health status and various predictors over time. Bivariate analysis and hierarchical models were used to estimate the prevalence of alcohol consumption and its link to various NHEs included in the fourth wave of the NIDS. Potential confounding variables were adjusted for in the analysis.

Results

Of 12 213 youth, 30.45% reported using alcohol while 50.89% of those who used alcohol reported they were binge drinkers in the fourth wave of the NIDS data (2014-2015) from a total of 12218 youth. After adjusting for non-modifiable and modifiable risk factors, having experienced any NHE was found to be associated with increased odd ratio of alcohol use among youth 2.02(1.08-3.77). However, when considered individually, property destruction, death or disease of livestock and a major crop failure were found to be negatively associated with reduced alcohol use and the variable "any other negative household events" was not significantly associated with alcohol use. No relationship was found between NHE and binge drinking.

Conclusion

The data suggest that experiencing any NHE is associated with a risk of alcohol use among youth. However, NHEs were not found to be related to binge drinking. More research is needed to investigate complex epidemiological relationships of alcohol particularly through longitudinal studies.

Key words: Alcohol use, Binge drinking, Negative household events, stressors

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Nomenclature

AUDIT:	Alcohol use Disorders Identification Test
BD:	Binge drinking
CAGE:	Concern Cut down Anger Guilty and Eye-opener
CI:	Confidence Interval
HED:	Heavy episodic drinking
NESARC:	National Epidemiologic Survey on Alcohol and Related Conditions
NHE:	Negative household events
NIDS:	South African National Income dynamics survey
PSU:	Primary sampling units
SA:	South Africa
SADHS:	South African demographic and health survey
SAHS:	South African Stress and Health Study
SALDRU:	Southern African Labor and Development Research Unit
SA-NIDS:	South African National Income Dynamics Study
USA:	United States of America
WHO:	World Health Organization

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INTRODUCTION

Background

Global alcohol use

Global prevalence estimates of alcohol use from the World Health Organization (WHO) suggest that 43% of individuals aged 15 and above report alcohol use at least once in their lifetime. Of these, 26.5% of youth between the ages of 15 and 19 report alcohol use (1). The United Nations defines a youth as any person between 15 and 24 years of age.

Alcohol misuse or heavy episodic drinking (above 60 grams of alcohol in one sitting in the previous month) is potentially problematic. Alcohol misuse is associated with mortality, morbidity (e.g., cardiovascular or liver disease and cancers) and disability globally(2–4). Data from six national surveys in the United States of America (USA) found that binge drinking, a pattern of heavy alcohol drinking is the most frequent form of alcohol misuse among young adults and has been found to be associated with increased age, male sex, African race/ethnicity, and higher education level in the general population (5).

The 2018 WHO global status report on alcohol and health suggested that the African region reported the greatest burden of disease and injury attributable to alcohol worldwidealthough the highest per person alcohol consumption was observed in Central and EasternEurope. Despite the global alcohol misuse prevalence estimate decrease from 22.6 % to 18.2% from 2000 to 2016, heavy episodic drinking remains high in Eastern Europe and sub-Saharan Africa (over 60% of drinkers). The above data examining alcohol use do notdifferentiate or stratify between adults and adolescents or youth.

It is essential to give context to these high prevalence estimates presented above and what these might mean with regard the public health importance of alcohol use: Many associates, including physical and mental comorbidities and economic and social circumstances may influence high prevalence estimates of alcohol use. Various data from cross-sectional studies conducted in high income country contexts suggest that alcohol use can be comorbid with other physical and mental health conditions though these should be interpreted in the context of the limitation of cross-sectional studies' difficulty in inferring

causality (6). Data from the well-known USA based cross – sectional survey, the National Epidemiologic Survey on Alcohol and Related Conditions-III (NESARC), examined by Saha and colleagues suggests that alcohol use may also be comorbid with other substance use as well as psychopathologies (7). Data from an urban sample in the North-Western part of the United Kingdom suggested that physical comorbidities including hypertension, chronic obstructive pulmonary disease and pneumonia were associated with alcohol use. However, these results need to be interpreted in the context of a cross sectional's study's limited ability to infer causality i.e., not knowing whether the physical comorbidities came before the alcohol use or vice versa (8). Furthermore, in a meta-analysis, data from high and low and middle-income countries suggest that there are social and economic consequences of alcohol use for individuals' families, and the community. These include loss of propriety and human development index (define as a country's average estimation in three key domains of human development). Among youth the odd of alcohol related consequences was higher among males compares to females overall (9,10).

Studies have suggested a relationship between alcohol use and life events in the general population (11). In a t literature review with a focus on study designs, Veenstra and colleagues examined a connection between life events and alcohol use. Among cross-sectional studies included, about 33% reported higher episodic drinking during an adverse life event, 25% showed no relationship and 42 % were marginally significant. However, longitudinal studies suggested a relationship between retiring, a poor family relationship, and alcohol use, while financial hardship and health-related events were surprisingly negatively associated with alcohol use. These points were solidified through a prospective cohort examined by Glass and colleagues. This study examined the relationship between, the effects of negative life events and alcohol use among older adults. The authors found after controlling for relevant confounders including baseline alcohol status that for men above 65 years of age a spouse loss or severe injury was linked to an increased alcohol intake during follow-up visits. (12).

Alcohol use in South Africa

South Africa (SA), a low to middle income country has a high burden of alcohol use and abuse (1). Alcohol abuse as a pattern of drinking that hassevere and repeated negative consequences. South African data suggests a prevalence estimate of 59% of heavy episodic drinking among drinkers. Among those who report alcohol use, about 65% are youth aged between 15 and 19 years old. The 2018 per capita alcohol consumption in liters of pure alcohol per year was higher in SA (9.3 liters of pure alcohol) than in the African region (6.3 liters of pure alcohol). Data suggests a 12-month prevalence of 7% for alcohol use disorder and 2.6% for alcohol dependence. In SA, prevalence estimates of alcohol use are associated with several social and demographic associates including income and age. The covariate income is further examined below:

In 2016 according to the South African demographic and health survey (SADHS) conducted by Statistics SA, the alcohol drinking pattern varied by income category in SA (13). Participants who were classified in higher income categories reported a higher 12-month frequency of drinking alcohol (35%) compared to lower-income categories (16%). However, those in a lower-income bracket reported more alcohol abuse (3.7%) compared to higher-income drinkers (3.3%). Using alcohol earlier in life was associated with a higher risk of adverse outcomes (13). When examining data among youth more closely, 26 % of female youth below 20 years of age reported they had at least tasted alcohol and this proportion increased as age increased. These data suggest that there might be value to focusing on factors associated with youth alcohol use with the intention of tracking the trajectory of alcohol use over time. Further, youth are at a vulnerable stage of their psychological, neurological, and social development and may be at risk of harmful alcohol use (10). The life transition from adolescence to adulthood can also be associated with an increased vulnerability to psychopathologies and substance use. There may be critical windows to intervene during this stage of development (14).

About half of youth (15-25 years) in the city of Tshwane in the Gauteng Province of South Africa consume alcohol heavily as recently reported (15). In a cross-sectional analysis among youth (12-17 years) from the three most populated cities of SA (Johannesburg, Cape Town, and Durban) the authors reported a relationship between alcohol use and environmental stressors mediated by a low well-being (16). The data suggested a direct pathway between daily stressors, alcohol use, and physical (health problem) or

psychological problems (low self-esteem and depression). These relationships will be further unpacked in the literature review below particularly the connection between negative life events and alcohol use in SA. The terms: Negative Household Events (NHE) and the term stressors will be used interchangeably.

The South African Stress and Health study in collaboration with the WHO World mental health survey initiative confirmed the high burden of alcohol use in SA (17). In addition, the NIDS study, under examination for this research report has found that 33.1% of South African self-reported alcohol use and 43% of drinkers reported binge drinking (18). Binge drinking define as a drinking pattern of four drinks in a day females and fives drinks for males. The authors analyzed the South African National Income Dynamics Survey (NIDS). The NIDSis the first household panel survey studying the changing face of poverty in households over time from 2008 (19). The NIDS provides data on alcohol use and negative householdevents which are relevant for the current study.

LITERATURE REVIEW

Introduction

The literature review is organized under three main themes presented below aiming to expand on topics presented for the introduction:

1. Prevalence of alcohol in adults and youth globally and SA.
2. Relationship between alcohol use and stressors in youth in SA.
3. Household stressors.

Prevalence of alcohol use in adults and youth globally and SA

The 2018 WHO global status report on alcohol and health suggests that the South African lifetime alcohol drinking prevalence is just below half (46.5%) for the general population (1). In addition, the annual per capita consumption was 9.3 liters in 2018, slightly less than the per capita consumption in 2010 of 10.5 liters.

In 2009, the SASH study examined both the 12 months and lifetime prevalence of alcohol use in a sample of 4351 adults across SA. Alcohol and other substance use were assessed through the Composite International Diagnostic Interview and the Alcohol use Disorders Identification Test (AUDIT) estimated alcohol abuse. Although the SASH data is now over a decade old, the results have been instrumental for the field of psychiatric epidemiology on the African continent and for informing mental health policy. This studysuggests that alcohol was the first substance likely to be abused in SA reporting a lifetimeprevalence of 38.7%. A higher lifetime alcohol use prevalence was reported between the age groups of 35-49 years (12.8%) when compared to 18-30 years (11.1%). Alcohol abuse was significantly higher among males of all age groups compared to females.

In 2016, the SADHS estimated daily alcohol use and lifetime alcohol use (13). They surveyed over 11 000 households selected through a multistage sampling procedure across SA. They used a paper-based questionnaire and the CAGE test (Concern/Cut down Anger Guilty and Eye-opener) to assess symptoms of alcohol and problem drinking in the general population. Among females, the lifetime alcohol use was higher in Northern Cape (40%) Western Cape (38%), and Eastern Cape (28%) compared to the rest of SA. Among males on the other hand Northwest (79%) Limpopo (66%) and Gauteng (64%) had higher lifetime alcohol use prevalence. According to the data, lifetime alcohol use was slightly higher (27.6%) between 15-49 years compared to the population average (25.7%). Overall

the lifetime alcohol use was more than twice among males compared to females (60.2% vs 25.8% respectively) and more prevalent between 20-24 years in both sexes.

The SASH data also suggested that females experienced more severe 12-month mental disorders compared to males and stressors were common among females (18-34 years) with only a primary education. As age increased, males with a higher education were more vulnerable to alcohol and other drugs abuse due to a decreased trend to treatment (20). Individuals with a high-income level had an increased life stress compared to those with low-average income level. Stress related disorders were found to be disproportionate across South Africa with the highest rate in Western Cape (39.4%) and the lowest rate in Eastern Cape (25.7%). Of note, 66% of South the population live in urban areas (1).

An analysis of the relationship between alcohol use and depression from the 2014-2015 NIDS data also suggests important findings (18). In the study findings the prevalence of any alcohol use was found to be 25.2% among those between 15-24 years of age 42.5% among those between 25-34 years and 36.7% among 35-44-year-olds. Interestingly this statistic dropped to 23.2% among those over 65 years. The study reported that employed participants were more likely to drink alcohol (42%) compared to the unemployed (36%) or non-economically active (retired or studying) participants (22%). Further complexities suggested that employed male participants were more likely than females to drink alcohol. Race/ethnicity, another potential covariate examined in the above study is categorized as White, Black African, Asian/Indian and Colored as defined by Statistics SA (13). The authors suggest some differences concerning racial categories in SA. White and Colored participants were more likely to engage in drinking alcohol (54.1% and 45.2% respectively) compared to the black African and Asian population groups (29.4% and 28.9%).

Relationship between alcohol use and stressors in youth.

Alcohol is the most common substance likely to be abused among youth globally including in SA(1,2). Particularly, the amount of alcohol they useto drink at least five standard drinks on an average day which was classified as binge drinking(BD). In addition, in South Africa youth appear to experience high levels of stress (21).In 2014 the national youth policy reported that about 52 % of youth (15-34 years) were not schooling, discouraged job seekers or unemployed which may also lead to alcohol use (assuggested by a USA based cohort study tracking trajectories of unemployment andsubstance use) (22). Hopelessness and vulnerability to unemployment were more

significant among females (34.5%) than males (29.9%). The vulnerability to unemployment was two times higher among youths (36%) compared to the adult population (15%). In addition, a low-income family background exposed youth to school poor achievement and later unemployment in modern society. These findings suggests that it might be worth examining stress and alcohol use in youth.

Schooling and stressors

The third Youth Risk Behavior Survey, conducted in 2011 in South Africa among 10 997 learners from grades 8 through 11, suggested that half (50%) of participants reported ever using alcohol and 35% reported alcohol use in the past 30 days (defined as current drinking) (23). More than five percent of learners reported using alcohol under pressure from an adult on a special occasion (8% of males and 5.2% of females). Schools in the Northern Cape had the highest prevalence of alcohol use (48.8% females and 51.8% males) whereas those in Limpopo had the lowest (14.5% of females and 27.9%males). According to the findings, more than 10% of students attend school after drinking alcohol. The report was higher among males (13.5%) compared to females (6.4%) respectively. This survey did not examine stressors or negative life events.

Measurement tools and stressors

In a recent study conducted in Cape Town substance use was examined as a stress coping motive among 1149 school attending youth (14). Different measuring tools were used including: The AUDIT test for alcohol assessment, the Childhood Trauma Questionnaire to examine multiple domains of childhood trauma and the Coping Orientation test(A_COPE). The A-COPE is made of 54-item assessing the utilization of substance to cope when facing negative life events. The main question is 'When you face difficulties or feel tense, how often do you.' Different coping motives will be then assessed using a 5-point Likert scale depending on the frequency. The study participants' educational level ranged between grade 8-12, (13-23 years). The findings confirmed a relationship between stressors and alcohol use. The authors suggested that alcohol is a coping mechanism for emotional physical or sexual abuse leading to a vicious cycle. The relationship between alcohol use and childhood trauma was mediated by drugs including smoking as an additional coping motive. Among learners, just below half (46%) of males reported emotional effects compared to 36% of females. However sexual and physical abuse were higher among females compared to males. Alcohol was a leading coping mechanism compared to other way of stress avoidance when facing physical and sexual abuse. In a period following severe emotional distress 54% of males compared to 37% of females

reported drinking alcohol.

Another cross-sectional study of 20227 school attending learners between grade 8-10, (10-23 years) examined the connection between religiosity and substance use in the Western Cape (24). Religiosity was defined as attending at least one religious activity a month was reported by 74% of participants. Learners with high religiosity, compared to those with low religiosity, were less likely to engage in alcohol use, tobacco smoking, cannabis use and risky behaviors. Prevalence estimates of substances were: 23% for alcohol use, 19% for tobacco, and 8% for cannabis.

Parenting and stressors

A systematic review and meta-analysis of 131 longitudinal studies by Yap et al. suggested that youth alcohol initiation and alcohol misuse could be delayed by a well-coordinated parenting pattern (25). For a 12 months follow-up, the reviewers suggested that youth alcohol use risk is connected to positive parental mentalities towards alcohol and parental drinking. However, there is a negative association between alcohol misuse among youth and a good parenting. The parent–youngster relationship improved quality contribute towards a decline in alcohol misuse. After the death of parents according to an ethnographic study conducted in Cape Town by Cluver et al. (2007) youth are at risk of developing sadness and risky behaviors (26). The authors reported that a well-coordinated family with parental monitoring and moral values was protective against youth alcohol use. On the other hand, the death of an essential sponsor of the family and negative life events occurrence or a loss were significantly associated with early-life alcohol use initiation. Moreover, a recent analytic study on substance uses among youth (14-20 years) in Pretoria by Muchiri et al. (2018) reported that youth alcohol use likelihood increases with a lower parental control and discipline controlling for family socio-economic and demographic characteristics (27).

A review by Anne Enoch et al. (2011) interested in the relationship between early-life stress and youth alcohol abuse confirmed the existing relationship (28). Both preclinical and clinical studies emphasized neural plasticity during transitional life periods. Among youth, the vulnerability to stressful life events is higher and decreases with age. During this life period, alcohol use depends on the interaction between individual characteristics and environmental risk factors. For example, below twenty years, substance abuse vulnerability is higher for those with reduced self-control after a stressful life experience. Risk factors for young females in relation to alcohol use were poverty gender-based

violence and limited economic power (29).

Household stressors

There are few international studies of household level stressors among adolescents and adults. The 2015 Korea Youth Risk behavior web-based survey (KYRBS) suggested a that alcohol abuse in a parental generation affect individuals of the following generation.The high number of alcohol abusers from a grand-parent generation was found to be associated with alcohol abuse in parents and children from the same household (30). In this case, stressors are any negative or positive life events or transition occurring in the household. Experiencing many stressors have been associated with poor mental health in younger generations (31). Individual level coping motives are crucial when facing different nature and level of stressors in general. While adolescents from higher SES reported the academic performance as their major stressor, those from lower SES reported mainly family problems among other stressors. Relationship problems increased stress among female, while health and social issues affected more male. Social conflicts were a major stressor for middle school students, while poor family circumstances and academic performance affected more high school students. Parental conflict was a major stressor for youth in urban settlement, while poor peer relationship and teachers' conflicts were major stressors in rural settlement. Gender, education level, residential area and SES were major stressors reported among Korean adolescents.

Investigating the role of cultural-related stressors; Cervante et al. (2014) used data from 1651 Hispanic adolescents evaluated with the Hispanic Stress Inventory-Adolescent version. The results suggested self-harm behavior was associated with family drug stress, immigration stress and cultural stress. Cultural stress was measured using a composite tool of 71 items that measure exposure to life-event stressors.

To my knowledge there are few studies of household stressors in South Africa. An analysis of the fourth wave of the SA-NIDS study by Burger et al. (2017) of adults suggested that negative household events e.g., a property loss the death of a family breadwinner and a major chronic disease or painful conditions occurred in 30% of households in SA (32). Moreover, 25% of families recorded one or more negative household events. The study findings emphasized that the death of a family member who provided family support or a significant health problem (disease injury) was associated with depressive symptoms in the general population.

Problem statement

SASH data although dated suggests that there is a high prevalence of mental disorders within the broader population in South Africa. About 37% of South African are youth aged between 15-34 years of age with studies suggesting that alcohol use is highly prevalent among them (14,16,33). We know little of the relationship between alcohol use and NHE although previous work by Burger in the NIDS data has examined the relationship between negative life events and depression (34). In some ways, this study builds on Burger's study and hypothesizes a relationship between negative household events and youth alcohol use to fill this gap in SA. Literature cited above also suggests a relationship between childhood trauma and alcohol use. However, there is still limited engagement with NHE.

Justification

Alcohol use is a public health problem among youth in South Africa. One among three South African is a youth. The South African NIDS provides information on how negative and positive household events affect the population. There is a need to determine the connection between negative household events and youth alcohol use to inform health policy in South Africa. This study also uniquely considers how negative household events associate with alcohol use and alcohol misuse among youth in South Africa and may inform health policy.

Research question

Is there an association between negative household events and youth alcohol use in South Africa?

The subsidiary research questions for the study are presented below:

1.1.1. What is the prevalence of youth alcohol use in the fourth wave of the SA-NIDS data?

1.1.2. What is the prevalence of negative household events among youth in the fourth wave of the SA-NIDS data?

1.1.3. What is the relationship between negative household events and youth alcohol use in the fourth wave of the SA-NIDS data through unadjusted and adjusted analysis?

Aim and objectives

To examine the relationship between negative household events and youth alcohol use in South Africa using the SA-NIDS data. The specific objectives for the study are:

1. To estimate the prevalence of youth alcohol use in the fourth wave of the SA-NIDS data
2. To estimate the prevalence of negative household events among youth in the fourth wave of the SA-NIDS data
3. To examine the association between negative household events and youth alcohol use in the fourth wave of the SA-NIDS data through unadjusted and adjusted analyses.

METHODS

Study design

A quantitative, cross-sectional sample was analyzed employing data from the fourth wave of the NIDS.

Data source: Primary study - The National Income Dynamics Study

The NIDS is a population-based survey of nationally representative households in SA and presents a large available sample of households in SA. NIDS presents a wealth of data measuring several potential exposures and outcomes, e.g., food insecurity, hypertension, etc. (19). The data have been collected every second year since 2008 by the Southern African Labor and Development Research Unit (SALDRU) based at the University of Cape Town. At present five waves are available.

The fourth wave of data collected from September 2014 to August 2015 was used for this secondary analysis. Wave 4 is the most recent wave which included questions related to alcohol use and a questionnaire regarding NHE and is therefore appropriate to address the study question.

Measurement of the outcome and exposure variables

Regarding alcohol use, the outcome, respondents were asked two questions:

- "How often do you consume alcohol?"
- "What is the number of standard drinks consumed daily?".

NIDS uses a combination of household- and individual-level questionnaires. The data from the different questionnaires are recorded in separate files. These are flat files with one row per record (individual or household). For negative household events, the exposure variable, the household representative was asked if the household had experienced the following:

- a widespread death/disease of livestock occurred in the last 24 months?
- a significant crop failure occurred in this household in the last 24 months.
- a theft, fire or destruction of property occurred in the last 24 months.
- and if any other adverse event occurred in the last 24 months?

Sampling Strategy of the NIDS

The NIDS employed a two-stage sampling design. In the first stage, South Africa was divided into 3000 geographic areas known as primary sampling units (PSUs). After the

selection of 401 PSUs using random sampling, households were selected across the country. The data collection started in 2008 with an approximative sample of 28 000 participants in over 7300 households. Thereafter, individual and household information has been collected every two years.

Secondary analysis – alcohol use among youth and negative household events

The secondary analysis was based on a cross-sectional study of Wave 4 of the NIDS since being the more recent wave with questions related to alcohol use and presenting a simplified questionnaire of negative household events. The Wave 4 dataset has a total of 11 605 households and 26 804 participants.

Estimated sample size

This study used all available observations in the dataset fulfilling the inclusion criteria.
A preliminary examination of the wave 4 dataset indicated that 4899 (40.19%) of youth participants (15-34 years) consume alcohol.

Study population

Inclusion criteria

Participants aged between 15-34 years old participated in the fourth wave of the NIDS and responded to at least the first question on alcohol use during the survey. "How often the respondent consumes alcohol?". Moreover, the second question on alcohol asking about "the number of standard drinks consumed in a day" included any youth responding to the question.

Exclusion criteria

Participants aged 14 years or less and 35 years or more were excluded from the analysis.

Data access

The data were downloaded from the data-first website after ethical approval and authorization were granted. The spreadsheet was prepared to collect the following variables:

Demographic variables

Notable demographic variables were:
Age group is a categorical variable with four categories:'15-19'--'20-24'--'25-29'--'30-34.'
Sex is a categorical variable with two categories encoded as '1'for Male, '2'for Female

Education level is a categorical variable with four categories; encoded as ‘0’ for No education-- ‘1’for primary--‘2’for secondary-- ‘3’for tertiary.

Exposure variables

Main exposure

Table 1: Negative household events (main exposure)

Variable	Categories
Widespread death/disease of livestock occurred in the last 24 months?	A categorical variable with two categories encoded as ‘0’ for No— ‘1’ for Yes
A significant crop failure occurred in this household in the last 24 months	A categorical variable with two categories encoded as ‘0’ for No— ‘1’ for Yes
Theft Fire or destruction of property occurred in the last 24 months?	A categorical variable with two categories encoded as ‘0’ for No— ‘1’ for Yes
Any other adverse event occurred in the last 24 months?	A categorical variable with two categories encoded as ‘0’ for No— ‘1’ for Yes
A composite binary measure was created for the total effect of negative household events.	Recoded as ‘1’ for yes if any of the four negative household events was present and ‘0’ no event was experienced

Other covariates

The different covariates were selected based on previous research and what was available in the NIDS dataset. Variables included:
smoking cigarette a categorical variable with two categories encoded as ‘0’ for No— ‘1’ for Yes. Geographic settlement a categorical variable with three categories encoded as ‘0’ for Rural— ‘1’ for Urban. Alcohol or other drug use in the neighborhood a categorical variable with eight categories encoded as ‘0’ for No— ‘1’ for Yes.
Religion affiliation importance in life a categorical variable with seven categories encoded as ‘0’ for No (Not important) — ‘1’ for Yes (Important), household income with 5 categories, and the above-mentioned demographics.

Outcome variables

Dichotomous variables were used for the answers to NIDS questions 1 and 2 about alcohol. These are presented in table 1 together with the variables collected in the NIDS

study. Alcohol use and binge drinking variables were recorded for the analysis. Any alcohol use (even drinking very rarely) was recorded as "yes", and binge drinking was defined as drinking 5 or more drinks in one day (18).

Table 2: Coding of "any alcohol use" and "binge drinking" variables

NIDS Questions	Variable collected	Variable used
How often the respondent consumes alcohol	A categorical variable with nine categories. Encoded as: • 1 for: I have never drunk alcohol • 2 for I no longer drink alcohol • 3 for: I drink very rarely • 4 for Less than once a week • 5 for one 1 or 2 days a week • 6 for on 3 or 4 days a week • 7 for on 5 or 6 days a week • 8 for Every day • 0 for unknown.	This variable was recorded as Yes or No (18). Variables encoded by NIDS as 3 or above were recorded as "Yes" and the unknown were missing.
Amount of standard drinks consumed in a day	A categorical variable with seven categories encoded as: • 1 for 13 or more standard drinks • 2 for 9 to 12 standard drinks • 3 for 7 to 8 standard drinks • 4 for 5 to 6 standard drinks • 5 for 3 or 4 standard drinks • 6 for 1 or 2 standard drinks • 7 for: unknown.	This variable was recorded as 'abstainers'(non-drinkers) and 'Yes' or 'No' for binge drinking (drinking ≥ 5 standard drinks on a day) (18) and the unknown were missing.

Sample distribution

From a total of 26 804 people surveyed, 12218(46%) youth participated in wave 4 of the NIDS. The first question on alcohol usage was answered by 12213(99.99%) of the youth surveyed. Of these, 8494(69.55%) didnot use alcohol and 3719(30.45%) used alcohol at least rarely. Among those who used alcohol(n=3719), 3653(92,22%) answered question two regarding the number of drinks consumed in a day when alcohol was used. Of these, 1859(50.89%) met the definition of binge drinking (five or more drinks in a day).

Figure 1. Below presents the flow chart sample distribution for alcohol use and binge drinking questions.

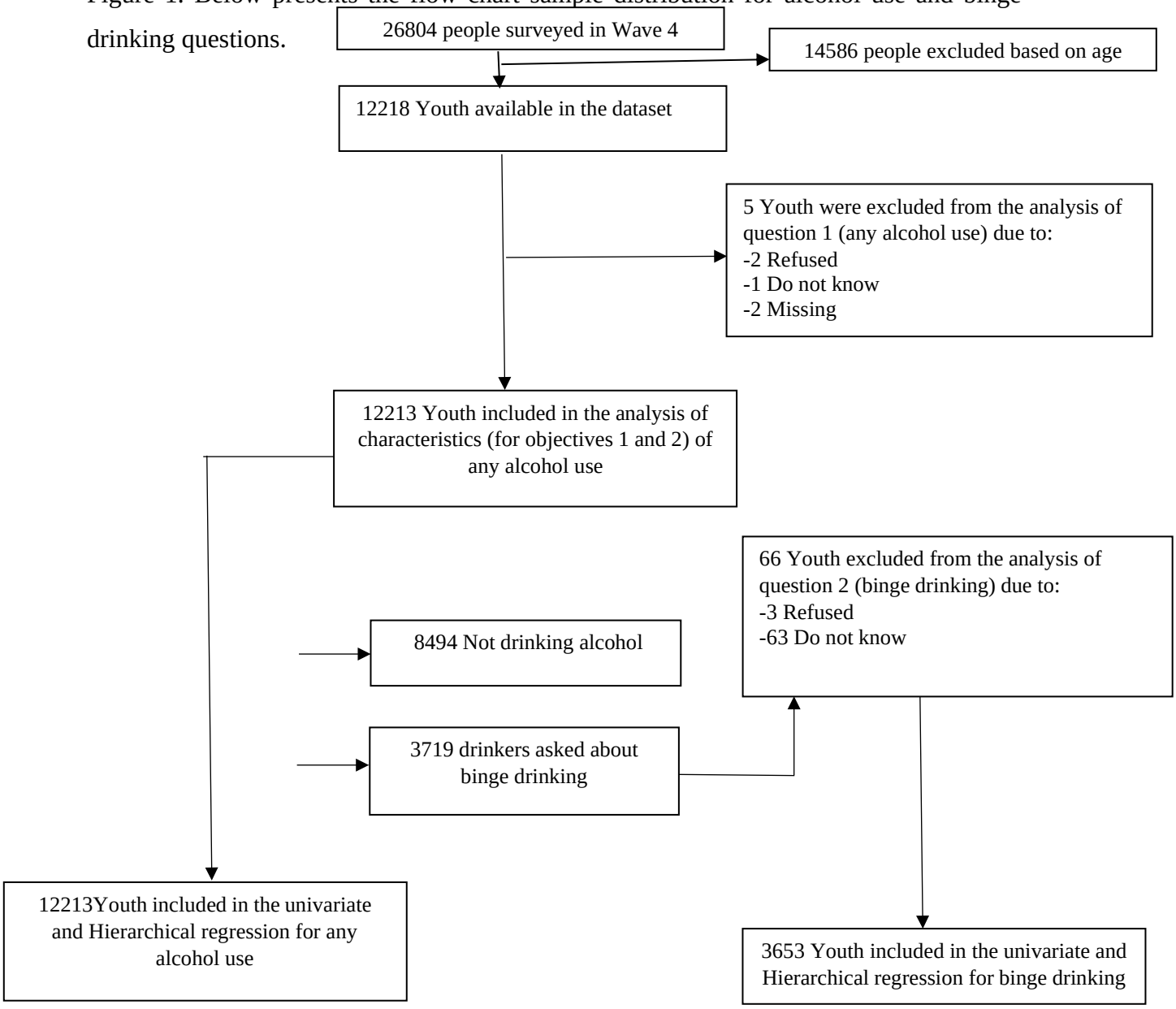


Figure 1: Flow chart showing sample sizes for any alcohol use and binge drinking

Data analysis

All the data were weighted and estimated using the statistical software STATA version 15.1. The data analysis was conducted first using the assumption of independence, then secondly adjusting for the clustering effect at the household level.

Statistical techniques to address each study objective are presented in Table 3 below:

Table 3: Method used to address each objective

Objective	Method	Estimates
To estimate the prevalence of negative household events among youth in the fourth wave of the SA-NIDS data	A descriptive statistic(tabulate) was computed in STATA	Reporting frequency and percentage
To estimate the prevalence of youth alcohol use in the fourth wave of the SA-NIDS data	A descriptive statistic(tabulate) was computed in STATA	Reporting the frequency, and percentage
To examine the association between negative household events and youth alcohol use in the fourth wave of the SA-NIDS data through unadjusted and adjusted analysis.	Hierarchical logistic regression was conducted using the robust standard error approach in STATA	Reporting unadjusted and adjusted odds ratio (Table3 and Table4)

In the hierarchical analysis, variables were grouped into blocks including non-modifiable and modifiable variables as well as negative household events as described below:

Table 4: Presentation of exposure variables by group

Group of variables	Variable name
➢ Non-modifiable factors	○ Age, sex, and race
➢ Modifiable factors	○ Education, religiosity, smoking,cigarettes, Income classification of household, alcohol and drug use in the neighborhood, and the province.
➢ NHE	• Theft fire or destruction of property occurred in last 24 months. • Widespread death/disease of livestock occurred in last 24 months? • A major crop failure occurred in this household in the last 24 months. • Any other negative event occurred in this household in the last 24 months?

In the bivariate analysis, I reported the crude odd ratios and the 95% confidence intervals, and a cut-off point of $P \leq 0.20$ was used to determine inclusion of a variable in the multivariable

analysis. The multivariable analysis of preference was the hierarchical model with three different blocks based on the directed acyclic graph shown below (Figure 2).

The directed acyclic graph (Figure 2) and the hierarchical model of variables (Figure 3) guided the order of entry of variable blocks in the hierarchical model. Firstly, the non-modifiable block (age, sex, race) was included in the model. These potential confounders and the design effect remained as a factor for the adjustment of all the other entries in the hierarchical model. Secondly, modifiable factors were included a cut-off point of $P<0.05$ was set for a variable to be maintained in the model after adjusting for the non-modifiable variable block. Lastly, we included the negative household events variables block and maintained in the model only the variable with a descriptive $P<0.05$ after adjusting for the non-modifiable variables block and significant modifiable variables block.

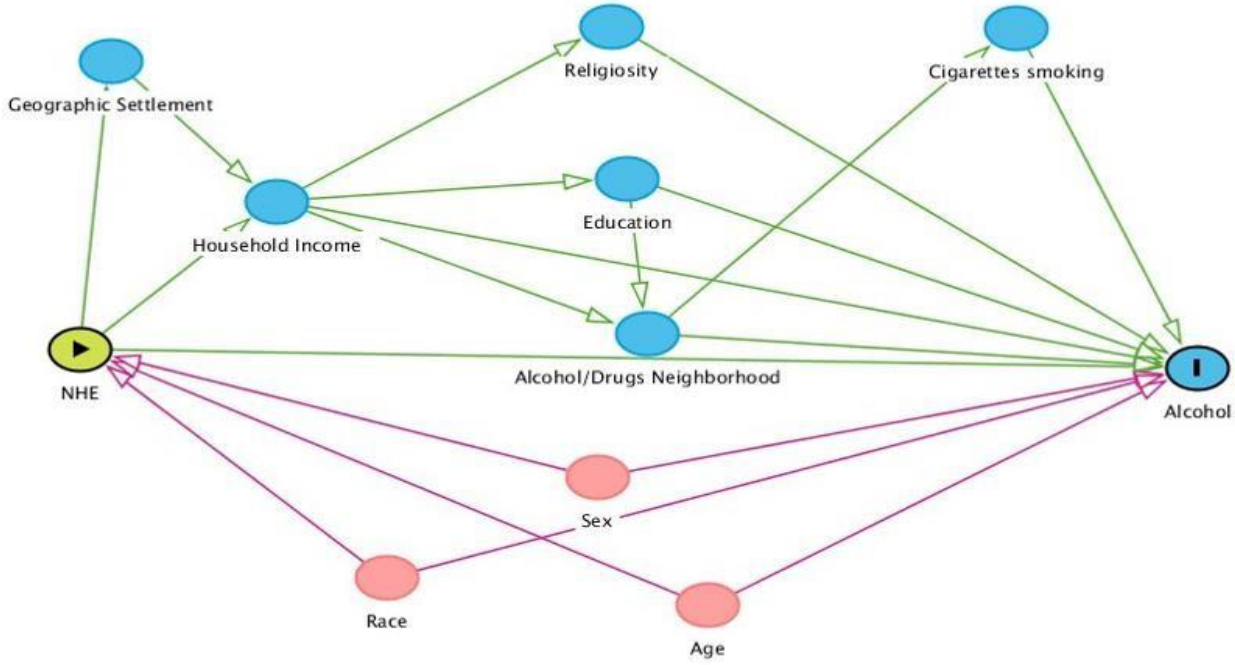


Figure 2: Directed acyclic graph

A hierarchical model will be used for different exposures regarding the outcome.

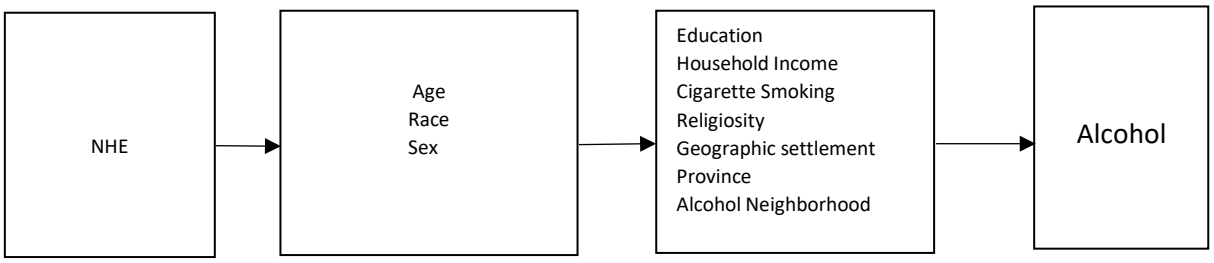


Figure 3. *The hierarchical model of variables was analyzed among South African Youths. Analyses from the South African National Income Dynamics Study (NIDS) wave 4*

Figure 3: Hierarchical model used in the analysis

Ethical Considerations and Approval

This protocol was approved by the Wits School of Public Health research protocolassessors concerning scientific content and compliance with the applicable research regulations. The Ethics Committee provided ethical approval at Witwatersrand University(WHREC) before starting under clearance certificate number M210148. The NIDS data is available online and free of charge at: ‘ http://www.nids.uct.ac.za/nids-data/data-access’. The NIDS has taken the responsibility toprotect the identities of the respondent by releasing to the public only anonymized data (35). The NIDS presents 4 types of consent forms, one for the adult questionnaire (15 + years) and one for the children questionnaire (0-14 years). Signature of caregiver was required if respondent is younger than 18 years of age. This questionnaire is to be administered to the mother/caregiver of the child or another household member who is knowledgeable about the child. The child can be present for all or part of the interview. A child is a resident member who is 14 years and younger. The household consent form, this questionnaire is to be administered to the mother/caregiver of the child or another household member who is knowledgeable about the child. The child can be present for all or part of the interview. A child is a resident member who is 14 years and younger. The proxy questionnaire consent form, a proxy adult questionnaire should be administered to a knowledgeable household member when it is not possible to interview the relevant individual (aged 15+) in person. NOTE: The proxy informant must be at least 18 years old.

RESULTS

The study results are presented in two sections: the first section reports on any alcohol use (Q1) and the second section reports on binge drinking(Q2).

SECTION I: Results regarding question 1 (Q1) (any alcohol use as outcome)

This section presents the sociodemographic variables and NHE for any alcohol use (Table 5 to 6). The unadjusted and adjusted odds ratios from the three different models used for any alcohol use are presented (Tables 7 to 9). The unadjusted odd ratios are from a bivariate logistic regression examining the relationship between any alcohol usage and NHE. The hierarchical model with three-block adjusted firstly for the household clusteringthen the non-modifiable factors and lastly adding the last block of modifiable factors to theanalysis is presented. The data for the analysis contains 12213 youth from 7065 households (Appendix A6). Of the 7065 households, more than half 3813(53.97%) had one youth per household, the most two populated households 2(0.03 %) had 9 youth each.

4.1 Sample socio-demographic characteristics for any alcohol use

Thirty-four percent (n=3,719) reported using alcohol. Gender distribution was 53.91 percent (n=6,584) females and 46.09 percent (n=5,629) men for the first NIDS alcohol question, with a mean age of 23 years and 5.59 months. Moreover, a third (30.6 percent) of the 3,744 youth were in the first quartile of their age (15-19years). Less than 1% of the participants in the research were Asian or Indian. At the time of the research, most participants (more than 70 percent) had at least a secondary education. Less than half of individuals were smokers (2,057). About nine out of ten of the people in the research said that their religious practices were essential to them. In addition, more than half of all youth resided in urban areas, compared to rural areas. Alcohol and drug use were frequent in the research participants' neighborhood for around nine out of ten of the youth enrolled in the study.

Table 5 . presents the socio-demographic factors by the category the any alcohol use (n=12 213) question.

Table 5: Socio-demographic characteristics of those who answered the NIDS Q1 on alcohol.

All participants(Q1)	All (n=12213)	No alcohol use (n=8494)	Any alcohol (n=3,719)
Variable	n (%)	n (%)	n (%)
Age (years)			
15 – 19	3744(30.66)	3218(37.89)	526(14.14)
20 – 24	3383(27.70)	2223(26.17)	1160(31.19)
25 – 29	2861(23.43)	1689(19.88)	1172(31.51)
30 – 34	2225(18.22)	1364(16.06)	861(23.15)
Sex			
Female	5629(46.09)	5319(62.62)	1265(34.01)
Male	6584(53.91)	3175(37.38)	2454(65.99)
Race			
White	109(0.89)	51(0.60)	58(1.56)
Asian/Indian	84(0.69)	65(0.77)	19(0.51)
Coloured	1475(12.08)	751(8.84)	724(19.47)
African	10544(86.33)	7627(89.79)	2917(78.44)
Missing	1(0.01)	0(0.00)	1(0.03)
Education			
No formal education	94(0.77)	68(0.80)	26(0.70)
Primary	1177(9.64)	842(9.91)	335(9.01)
Secondary	9103(74.54)	6461(76.07)	2642(71.04)
Tertiary	1839(15.06)	1123(13.22)	716(19.25)
Religious affiliation			
No	1050 (8.60)	586(6.90)	464(12.48)
Yes	11110 (91.97)	7874(92.70)	3236(87.01)
Missing	53(0.43)	34(0.40)	19(0.51)
Smoking cigarettes			
No	10144 (83.06)	7928(93.34)	2216(59.59)
Yes	2057 (16.84)	557(6.56)	1500(40.33)
Missing	12(0.10)	9(0.11)	3(0.08)
Household Income			

All participants(Q1)	All (n=12213)	No alcohol use (n=8494)	Any alcohol (n=3,719)
Variable	n (%)	n (%)	n (%)
Much below-average income	2,062 (16.88)	1543(18.17)	519(13.96)
Below average income	3158 (25.86)	2183(25.70)	975(26.22)
Average income	5400 (44.22)	3677(44.29)	1723(46.33)
Above-average income	855 (7.00)	581(6.84)	274(7.37)
Much above-average income	481 (3.94)	330(3.89)	151(4.06)
Missing	257(2.10)	180(2.12)	77(2.07)
Alcohol/drug use in the neighborhood			
No	710(5.81)	512(6.03)	198(5.32)
Yes	11437(93.65)	7930(93.36)	3507(94.30)
Missing	66(0.54)	52(0.61)	14(0.38)
Geographic settlement			
Urban	6329 (51.82)	3919(46.14)	2410(64.80)
Traditional	5171(42.34)	4103(48.30)	1068(28.72)
Farms	713(5.84)	472(5.56)	241(6.48)
Province			
Gauteng	1624 (13.30)	1005(11.83)	619(16.64)
Western Cape	1205 (9.87)	670 (7.89)	535(14.39)
Eastern Cape	1334 (10.92)	953 (11.22)	381(10.24)
Northern Cape	805 (6.59)	434 (5.11)	371(9.98)
Free State	719 (5.89)	405 (4.77)	314(8.44)
KwaZulu-Natal	3732(30.56)	3068(36.12)	664(17.85)
North-west	745 (6.10)	495(5.83)	250(6.72)
Mpumalanga	957 (7.84)	651(7.66)	306(8.23)
Limpopo	1092 (8.94)	813(9.57)	279(7.50)

4.2. The distribution of negative household events for any alcohol use

Table 6 presents the distribution of NHE among those who answered any alcohol use(Q1) question. In addition, NHE have been presented by geographic location (APPENDIX 4). 'Theft fire or destruction of property occurred in the last 24 months' the most common NHE occurred similarly in the Urban and rural location. However, 'Widespread death/disease of livestock occurred in the last 24 months?' and 'A major crop failure occurred in this household in the last 24 months?' were more common in the rural settlements.

The occurrence of "Theft fire or destruction of property occurred in the last 24 months" was the most reported NHE overall.

Table 6: The distribution of NHE among those who answered Q1 on alcohol.

All participants(Q1)	All (n=12213)	No alcohol uses (n=8494)	Any alcohol (n=3,719)
Variable	n (%)	n (%)	n (%)
Theft fire or destruction of property occurred in the last 24 months?			
No	11535 (94.45)	8004(94.23)	3,531(94.94)
Yes	667 (5.46)	480(5.65)	187(5.03)
Missing	11(0.09)	10(0.12)	1(0.03)
Widespread death/disease of livestock occurred in the last 24 months?			
No	11761(96.30)	8135(95.77)	3626(97.50)
Yes	430(3.52)	343 (4.04)	87(2.34)
Missing	22(0.18)	16(0.19)	6(0.16)
A major crop failure occurred in this household in the last 24 months?			
No	12030 (98.50)	8336(98.14)	3694(99.33)
Yes	170 (1.39)	148 (1.74)	22(0.59)
Missing	13(0.11)	10(0.12)	3(0.08)
Any other negative event occurred in this household in the last 24 months?			
No	11,878(97.26)	8282(97.50)	3596(96.69)
Yes	312(2.55)	193(2.27)	119(3.20)
Missing	23(0.19)	19(0.22)	4(0.11)
Total negative household events			
No	10779(88.26)	7460(87.83)	3319(89.24)
Yes	1434(11.74)	1034(12.17)	400(10.76)

4.3. Bivariate and multivariable logistic regression for any alcohol use(n=12213)

Table 7 presents the results of the analysis of Model 1. The unadjusted and adjusted odds ratios of NHE are presented. The reference group is no alcohol use (n=8494). The unadjusted results suggest that an isolated any other negative events than widespread death/disease of livestock and a major crop failure is more frequent among alcohol users.

Table 7: Model 1, for NHE and any alcohol use(n=12213)

Block 1: NHE	OR unadjusted	95% CI	OR adjusted	95% CI
Theft fire or destruction of property occurred in the last 24 months.				
No	Ref		Ref	
Yes	0.88	[0.74 1.05]	0.44**	[0.24 0.79]
Widespread death/disease of livestock occurred in the last 24 months?				
No	Ref		Ref	
Yes	0.57***	[0.45 0.72]	0.33***	[0.19 0.59]
A major crop failure occurred in this household in the last 24 months?				
No	Ref		Ref	
Yes	0.34***	[0.21 0.53]	0.25***	[0.13 0.48]
Any other negative event occurred in this household in the last 24 months?				
No	Ref		Ref	
Yes	1.42**	[1.12 1.79]	0.70	[0.38 1.28]
Total negative household events				
No	Ref		Ref	
Yes	0.87*	[0.77 0.98]	2.15*	[1.18 3.93]

*Significant level: *<0.05 **<0.01 ***<0.001
Model 1 standard errors were adjusted for household clustering

The adjusted logistic regression analysis suggests alcohol use is more frequent if any (i.e.,the total effect) negative household event was experienced (OR 2.15 (1.18 – 3.93)). However, alcohol use is reduced with the presence of isolated negative household events, except for the variable ‘any other negative event occurred in the household in the last 24 months’, which was non-significant after adjustment for the other NHEs.

4.4. Bivariate and multivariable logistic regression for any alcohol use(n=12213)

Table 8 presents the second model fitted (Model 2), which combines the occurrence of NHE and the non- modifiable factors (age, sex, and race group).

Table 8: Model 2 combines NHE and non-modifiable factors for Q1 on alcohol (n=12213)

NHE and non-modifiable	OR $_{unadjusted}$	95% CI	OR $_{adjusted}$	95% CI
Theft fire or destruction of property occurred in the last 24 months?				
No	ref		ref	
Yes	0.88	[0.74 1.05]	0.42**	[0.22 0.78]
Widespread death/disease of livestock occurred in the last 24 months?				
No	ref		ref	
Yes	0.57***	[0.45 0.72]	0.33***	[0.18 0.61]
A major crop failure occurred in this household in the last 24 months?				
No	ref		ref	
Yes	0.34***	[0.21 0.53]	0.29***	[0.15 0.56]
Any other negative event occurred in this household in the last 24 months?				
No	ref		ref	
Yes	1.42**	[1.12 1.79]	0.70	[0.37 1.37]
Total negative household events				
No	ref		ref	
Yes	0.87*	[0.77 0.98]	2.32*	[1.22 4.41]
Age				
15-19	ref		ref	
20 – 24	3.19***	[2.84 3.59]	3.71***	[3.26 4.22]
25 – 29	4.25***	[3.77 4.78]	5.43***	[4.75 6.21]
30-34	3.86***	[3.41 4.38]	4.74***	[4.12 5.45]
Sex				
Female	ref		ref	
Male	3.25***	[3.00 3.52]	3.88***	[3.55 4.24]
Race				
White	ref		ref	
Asian/Indian	0.26***	[0.14 0.48]	0.19***	[0.09 0.40]
Coloured	0.85	[0.57 1.25]	0.79	[0.48 1.29]
African	0.33***	[0.23 0.49]	0.28***	[0.17 0.44]

*Significant level: *<0.05 **<0.01 ***<0.001

Model 2: adjusted for non-modifiable variables (age, sex, race) and household clustering.

The fitted model 2 suggests that any alcohol use is higher among males and increases with age. Compared to whites, any alcohol use is lower among African and Asian/Indian race groups. After adjusting for non-modifiable factors, having experienced the total effect of NHE was associated with increased alcohol use. However, in the adjusted analysis, the occurrence of a destruction of property, a death or disease of livestock, or crop failure, decreased any alcohol use. Any alcohol use increases with the occurrence of more than one negative household events (total effect of NHE). The adjusted analysis suggests that the significance for any other negative event occurred in this household in the last 24

months, however, the non-significance of the destruction of property was observed. The adjustment for clustering has resulted in wider confidence intervals.

Table 9 presents the third model fitted (Model 3), the third model is a combination of negative household events, modifiable and non-modifiable risk factors (age, gender, and race) for any alcohol use(n=12213).

Table 9: Model 3: combining NHE, modifiable and non- modifiable risk factors for Q1 on alcohol.

NHE and non-modifiable	$OR_{unadjusted}$	95% CI	$OR_{adjusted}$	95% CI
Theft fire or destruction of property occurred in the last 24 months?				
No	ref		Ref	
Yes	0.88	[0.74 1.05]	0.43**	[0.23 0.79]
Widespread death/disease of livestock occurred in the last 24 months?				
No	ref		Ref	
Yes	0.57***	[0.45 0.72]	0.48*	[0.26 0.86]
A major crop failure occurred in this household in the last 24 months?				
No	ref		Ref	
Yes	0.34***	[0.21 0.53]	0.34**	[0.18 0.65]
Any other negative event occurred in this household in the last 24 months?				
No	ref		Ref	
Yes	1.42**	[1.12 1.79]	0.73	[0.39 1.38]
Total NHE				
No	ref		Ref	
Yes	0.87*	[0.77 0.98]	2.02*	[1.08 3.77]
Age				
15-19	ref		Ref	
20 – 24	3.19***	[2.84 3.59]	2.86***	[2.50 3.27]
25 – 29	4.25***	[3.77 4.78]	3.83***	[3.21 4.42]
30-34	3.86***	[3.41 4.38]	3.24***	[2.78 3.76]
Sex				
Female	ref		Ref	
Male	3.25***	[3.00 3.52]	2.57***	[2.33 2.83]
Race				
White	ref		Ref	
Asian/Indian	0.26***	[0.14 0.48]	0.23***	[0.10 0.50]
Coloured	0.85	[0.57 1.25]	0.71	[0.41 1.21]
African	0.33***	[0.23 0.49]	0.46***	[0.27 0.78]
Smoking cigarettes				
No	ref		Ref	
Yes	9.63***	[8.65 10.73]	5.18***	[4.55 5.87]

NHE and non-modifiable	$OR_{unadjusted}$	95% CI	$OR_{adjusted}$	95% CI
Education				
No formal education	ref		Ref	
Primary	1.04	[0.65 1.66]	1.34	[0.77 2.31]
Secondary	1.07	[0.68 1.68]	1.56	[0.92 2.63]
Tertiary	1.66*	[1.05 2.65]	1.79*	[1.05 3.05]
Religiosity				
No	ref		Ref	
Yes	0.52***	[0.46 0.59]	0.74***	[0.63 0.88]
Income classification of household				
Much below average income	ref		Ref	
Below average income	1.33***	[1.17 1.50]	1.48***	[1.27 1 .72]
Average income	1.39***	[1.24 1.56]	1.42***	[1.23 1.63]
Above-average income	1.40***	[1.18 1.67]	1.30*	[1.06 1.60]
Much above average income	1.36**	[1.10 1.69]	1.65***	[1.26 2.16]
Geographic settlement				
Urban	ref		Ref	
Traditional	0 .42***	[0.38 0.46]	0.61***	[0.55 0.67]
Farms	0.83*	[0.70 0.98]	0.75**	[0.61 0.91]

*Significant level: *<0.05 **<0.01 ***<0.001

Model 3: adjusted for modifiable variables (Education, smoking cigarettes, religiosity, household income andgeographic settlement), non-modifiable variables (age, sex, race) and household clustering.

The fitted model 3 suggests that compared to those with no formal education any alcohol use is higher for those with tertiary education. Regarding race, whites were found to drink more frequently than Africans and Asian/Indians. However, a religious affiliation decreases the alcohol use prevalence. Any alcohol use is higher in urban versus rural settlement, is higher for smokers, is higher for males, and old age in higher household income compared to much below average income. After adjusting for all the above factors and the household clustering, youth experiencing the total effect of negative household events have twice a likelihood of any alcohol use 2.02(95% CI 1.08—3.77) than the comparative group. However, when considered separately , the odds of any alcohol use was lower 0.43(95% CI 0.23—0.79) for 'Theft fire or destruction of property occurred in the last 24 months?', 0.48(95% CI 0.26—0.86) for 'Widespread death/disease of livestock occurred in the last 24 months?' and 0.34(95% CI 0.18—0.65) for 'A major crop failure occurred in this household in the last 24 months?. The variable, 'Any other negative event occurred in this household in the last 24 months' was only significant in thebivariate. However, the variable theft fire or destruction of property was only significant in the adjusted analysis. When considering the distribution of NHEs by geographic settlement the findings (Appendix5) reflect a similar distribution of NHEs.

Appendix A contains the complete results ofthe analysis including the odd ratio confidence interval and p-value of the bivariate analysis.

SECTION II: Results regarding question 2 (Q2) (binge drinking as outcome)

A total of 3653 youth responded to the second question on the amount of alcohol they use to drink at least five standard drinks on an average day which was classified as binge drinking out of a total of 12213 youth who answered (yes/no) the first question on alcohol use. fifty-nine percent (n=1859) of those who answered the second NIDS question engaged in binge drinking among them, 34.05 percent (n= 1,244) females and 65.95 percent (n=2,409) males, with a mean age of 25 years and 4.9 years. The prevalence of binge drinking among youth under the age of 20 was 14.13 percent (516) compared to the youth over the age of 20.

4.5 Sample socio-demographic characteristics for any alcohol use

Table 10 presents the socio-demographic factors of those who answered the binge drinking (n=3653) question.

Table 10: Sample socio-demographic characteristics for those who answered the NIDS Q2 on alcohol.

All participants(Q2)	All (n=3653)	No binge drinking (n=1794)	Binge drinking (n=1859)
Variable	n (%)	n (%)	n (%)
Age (years)			
15 – 19	516(14.13)	1794(16.56)	219(11.78)
20 – 24	1135(31.07)	547(30.49)	588(31.63)
25 – 29	1149(31.45)	520(28.99)	629(33.84)
30 – 34	853(23.35)	430(23.97)	423(22.75)
Sex			
Female	1244(34.05)	720(40.13)	524(28.19)
Male	2409(65.95)	1074(59.87)	1335(71.81)
Race			
White	57(1.56)	49(2.73)	8(0.43)
Asian/Indian	19(0.52)	14(0.78)	5(0.27)
Coloured	718(19.66)	397(22.13)	321(17.27)
African	2858(78.24)	1333(74.30)	1525(82.03)
Missing	1(0.03)	1(0.06)	0(0.00)

All participants(Q2)	All (n=3653)	No binge drinking (n=1794)	Binge drinking (n=1859)
Education			
No formal education	26(0.71)	20(1.11)	6(0.32)
Primary	328(8.98)	160(8.92)	168(9.04)
Secondary	2596(71.06)	1258(70.12)	1338(71.97)
Tertiary	703(19.24)	356(19.84)	347(18.67)
Religious affiliation			
No	451(12.35)	215(11.98)	236(12.69)
Yes	3184(87.16)	1569(87.46)	1615(86.87)
Missing	18(0.49)	10(0.56)	8(0.43)
Smoking cigarettes			
No	2176(59.57)	1190(66.33)	986(53.04)
Yes	1474(40.35)	602(33.56)	872(46.91)
Missing	3(0.08)	2(0.11)	1(0.05)
Household Income			
Much below-average income	516(14.41)	264(14.72)	252(13.56)
Below average income	960(26.82)	495(27.59)	465(25.01)
Average income	1684(47.04)	784(43.70)	900(48.41)
Above-average income	270(7.54)	157(8.75)	113(6.08)
Much above-average income	150(4.19)	54(3.01)	96(5.16)
Missing	73(2.00)	40(2.23)	33(1.78)
Alcohol/drug use in the neighborhood			
No	193(5.28)	117(6.52)	76(4.09)
Yes	3447(94.36)	1,668(92.98)	1779(95.70)
Missing	13(0.36)	9(0.50)	4(0.22)
Geographic settlement			
Rural	1284(35.15)	665(37.07)	619(33.30)
Urban	2369(64.85)	1129(62.93)	1240(66.70)
Province			
Gauteng	603(16.51)	291(291)	312(16.78)
Western Cape	530(14.51)	279(15.55)	251(13.50)
Eastern Cape	374(10.24)	175(9.75)	199(10.70)
Northern Cape	368(10.07)	208(11.59)	160(8.61)
Free State	309(8.46)	105(5.85)	204(10.97)
KwaZulu-Natal	650(17.79)	327(18.23)	323(17.37)
North-west	245(6.71)	117(6.52)	128(6.89)
Mpumalanga	298(8.16)	152(8.47)	146(7.85)

All participants(Q2)	All (n=3653)	No binge drinking (n=1794)	Binge drinking (n=1859)
Limpopo	276(7.56)	140(7.80)	136(7.32)

4.6. The distribution of NHE for binge drinking

Table 11 presents the distribution of NHE among those who answered the binge drinking(Q2) question. The occurrence of "Theft fire or destruction of property occurred in the last 24 months" was the most common NHE overall.

Table 11: The distribution of NHE among those who answered Q2 on alcohol.

All participants(Q2)	All (n=3653)	No binge drinking (n=1794)	Binge drinking (n=1859)
Variable	n (%)	n (%)	n (%)
Theft fire or destruction of property occurred in the last 24 months?			
No	3469(94.96)	1704(94.98)	1765(94.94)
Yes	183(5.01)	89 (4.96)	94 (5.06)
Missing	1(0.03)	1(0.06)	0(0.0)
Widespread death/disease of livestock occurred in the last 24 months?			
No	3563(97.54)	1757 (97.94)	1806 (97.15)
Yes	84 (2.30)	36 (2.01)	48 (2.58)
Missing	6(0.16)	1(0.06)	5(0.27)
A major crop failure occurred in this household in the last 24 months?			
No	3628 (99.32)	1781 (99.28)	1847 (99.35)
Yes	22 (0.60)	12 (0.67)	10 (0.54)
Missing	3(0.08)	1(0.06)	2(0.11)
Any other negative event occurred in this household in the last 24 months?			
No	3533(96.72)	1744(97.21)	1789(96.23)
Yes	116(3.18)	47(2.62)	69(3.71)
Missing	4(0.11)	3(0.17)	1(0.05)
Total NHEs			
No	3263(89.32)	1619(90.25)	1644(88.43)
Yes	390(10.68)	175(9.75)	215(11.57)

4.7. Bivariate and multivariable logistic regression for binge drinking among StudyParticipants.

Model 1 suggests no relationship between NHE and binge drinking either in the bivariate or multivariate logistic regression.

Table 12: Model 1. for NHE and binge drinking(n=3653)

Block 1: NHE	OR $_{unadjusted}$	95% CI	OR $_{adjusted}$	95% CI
Theft fire or destruction of property occurred in the last 24 months?				
No	Ref		ref	
Yes	1.02	[0.76 1.37]	1.02	[0.75 1.39]
Widespread death/disease of livestock occurred in the last 24 months?				
No	Ref		ref	
Yes	1.30	[0.84 2.01]	1.30	[0.82 2.04]
A major crop failure occurred in this household in the last 24 months?				
No	Ref		ref	
Yes	0.80	[0.35 1.86]	0.80	[0.33 1.97]
Any other negative event occurred in this household in the last 24 months?				
No	Ref		ref	
Yes	1.43	[0.98 2.08]	1.43	[0.97 2.10]
Total NHEs				
No	Ref		ref	
Yes	1.21	[0.98 1.49]	1.21	[0.97 1.51]

*Significant level: *<0.05 **<0.01 ***<0.001
Model 1 for binge drinking was adjusted for household clustering.

Table 13 presents model 2 combining age, gender, race with NHE. However, binge drinking had no relationship with negative household events. On the other hand, increased age,male gender, and compared to white people, Coloured and black were positively associated with binge drinking.

Table 13: Model 2 combines NHE and non-modifiable factors with for binge drinking(n=3653)

NHE and non-modifiable	$OR_{unadjusted}$	95% CI	$OR_{adjusted}$	95% CI
Theft fire or destruction of property occurred in the last 24 months?				
No	ref		ref	
Yes	1.02	[0.76 1.37]	0.45	[0.13 1.59]
Widespread death/disease of livestock occurred in the last 24 months?				
No	ref		ref	
Yes	1.30	[0.84 2.01]	0.57	[0.16 2.08]
A major crop failure occurred in this household in the last 24 months?				
No	ref		ref	
Yes	0.80	[0.35 1.86]	0.39	[0.11 1.40]
Any other negative event occurred in this household in the last 24 months?				
No	ref		ref	
Yes	1.43	[0.98 2.08]	0.69	[0.19 2.45]
Total NHEs				
No	ref		ref	
Yes	1.21	[0.98 1.49]	2.22	[0.62 7.95]
Age				
15-19	ref		ref	
20 – 24	1.46***	[1.18 1.80]	1.42**	[1.15 1.76]
25 – 29	1.64***	[1.33 2.02]	1.61***	[1.30 2.00]
30-34	1.33*	[1.07 1.66]	1.27*	[1.01 1.60]
Sex				
Female	ref		ref	
Male	1.71***	[1.49 1.96]	1.70***	[1.48 1.96]
Race				
White	ref		ref	
Asian/Indian	2.19	[0.62 7.75]	2.20	[0.61 7.89]
Coloured	4.95***	[2.31 10.61]	5.41***	[2.31 12.66]
African	7.00***	[3.31 14.85]	6.84***	[2.96 15.76]

*Significant level: *<0.05 **<0.01 ***<0.001

Model 2: adjusted for non-modifiable variables (age, sex, race) and household clustering.

Table 14 presents Model 3 which is the combination of NHE, modifiable and non-modifiable risk factors for any binge drinking (n=3653). Both before and after adjustment, binge drinking was found to have no relationship with negative household events. Binge drinking was found to be associated with being in the second decade of life, male, smoking, educated, living in an urban city. compared to White, African and Coloured aremore likely binge drinking. Further binge drinking was found to be associated with average and above-average income when religion decreases binge drinking.

Table 14: Model 3: combining NHE, modifiable and non- modifiable risk factors for binge drinking(n=3653)

NHE and non-modifiable	$OR_{unadjusted}$	95% CI	$OR_{adjusted}$	95% CI
Theft fire or destruction of property occurred in the last 24 months?				
No	ref		ref	
Yes	1.02	[0.76 1.37]	0.40	[0.12 1.35]
Widespread death/disease of livestock occurred in the last 24 months?				
No	ref		ref	
Yes	1.30	[0.84 2.01]	0.64	[0.19 2.22]
A major crop failure occurred in this household in the last 24 months?				
No	ref		ref	
Yes	0.80	[0.35 1.86]	0.38	[0.11 1.33]
Any other negative event occurred in this household in the last 24 months?				
No	ref		ref	
Yes	1.43	[0.98 2.08]	0.63	[0.18 2.13]
Total NHEs				
No	ref		ref	
Yes	1.21	[0.98 1.49]	2.34	[0.68 7.99]
Age				
15-19	ref		ref	
20 – 24	1.46***	[1.18 1.80]	1.33**	[1.07 1.66]
25 – 29	1.64***	[1.33 2.02]	1.50***	[1.20 1.88]
30-34	1.33*	[1.07 1.66]	1.21	[0.96 1.54]
Sex				
Female	ref		ref	
Male	1.71***	[1.49 1.96]	1.47***	[1.26 1.71]
Race				

NHE and non-modifiable	OR $_{unadjusted}$	95% CI	OR $_{adjusted}$	95% CI
White	ref		ref	
Asian/Indian	2.19	[0.62 7.75]	2.35	[0.63 8.67]
Coloured	4.95***	[2.31 10.61]	5.25***	[2.24 12.28]
African	7.00***	[3.31 14.85]	8.51***	[3.69 19.60]
Smoking cigarettes				
No	ref		ref	
Yes	1.75***	[1.53 2.00]	1.73***	[1.48 2.03]
Education				
No formal education	ref		ref	
Primary	3.50**	[1.37 8.94]	3.72**	[1.42 9.71]
Secondary	3.55**	[1.42 8.86]	3.70**	[1.44 9.53]
Tertiary	3.25*	[1.29 8.19]	3.37*	[1.30 8.77]
Religiosity				
No	ref		ref	
Yes	0.93	[0.77 1.14]	1.14	[0.91 1.42]
Income classification of household				
Much below average income	ref		ref	
Below average income	0.98	[0.79 1.21]	1.08	[0.86 1 .35]
Average income	1.20	[0.99 1.47]	1.34**	[1.08 1.66]
Above-average income	0.75***	[0.56 1.01]	0.81	[0.59 1.12]
Much above average income	1.86**	[1.28 2.71]	2.06**	[1.37 3.09]
Geographic settlement				
Rural	ref		ref	
Urban	1.17*	[1.02 1.34]	1.34***	[1.14 1.58]

*Significant level: *<0.05 **<0.01 ***<0.001

Model 3: adjusted for modifiable variables (Education, smoking, cigarettes, religiosity, household income and geographic settlement), non-modifiable variables (age, sex, race) and household clustering.

A significant crop failure occurred in this household in the last 24 months" "Theft fire or destruction of property occurred in this household in the last 24 months" "Widespread death or disease of livestock occurred in this household in the last 24 months" and "Any other negative event occurred in this household in the last 24 months" was not found to be significantly associated with binge drinking. Appendix B contains the complete results of the analysis including the odd ratio confidence interval and p-value of the bivariate analysis.

To summarize in the appendix C presenting the hierarchical unadjusted and adjusted odds ratios. The table presents the logistic regression odds ratios (standard errors in parentheses) for any alcohol use and binge drinking. So, from the simple logistic regression odds ratios compared to the clustered logistic regression odds ratios; the parameter estimates are unchanged, but the standard errors have increased overall.

5.DISCUSSION

Introduction

This chapter presents the discussion of the main findings of the study, places the findings in the context of previous literature and presents the strengths and limitations of the study. As per the results chapter the discussion is organized into any alcohol use and thenbinge drinking.

Overall results

The main findings of the study are: 12 213 youth, (30.45%) reported using alcohol at least rarely and 50.89% of those who used alcohol were binge drinkers. Males drink more than females 71.81% and 28.19% for binge drinking respectively. More than 60 percent of the study participants live in the urban settlement compared to those in rural. About 95 percent of the sample had Alcohol/drug use in the neighborhood. Compared to white African and Asian/Indian Were less likely to drink alcohol. However, African and Coloured were more likely to binge drink compared to white. The occurrence of "Theft fire or destruction of property occurred in the last 24 months" was the most common NHE overall.

After adjusting for non-modifiable and modifiable risk factors, having experienced any NHE was associated with double odd of alcohol use among youth. However, when considered individually, property destruction, death or disease of livestock and a major crop failure were negatively associated with reduced alcohol use, the variable “anyother negative household events” was not significantly associated with alcohol use. No relationship was found between negative household events and binge drinking.

The current study suggests that over 30% of youth self-reported alcohol use at least rarely and one among two alcohol users met the criteria of binge drinking. The findings of an such high prevalence of alcohol use and binge drinking were consistent with those of previous studies. The WHO observed that the South African lifetime alcohol drinking prevalence is just below half (46.5%) for the general population (1). Veillos and colleagues worked in SA where they investigated self-reported alcohol use and binge drinking in the general population (age ≥ 15 years) (18). They observed in the general population that just above a third (33,1%) was using alcohol and just below half (43.0%) was binge drinking. In their study, alcohol use and binge drinking estimates were highest among youth with almost a quarter of youth (15-34 years) using alcohol, and just below half of youth (15-

34 years) were binge drinking. Similarly, it was recently reported that about halfof youth (15-25 years) in the Tshwane, Pretoria consume alcohol heavily (15).

Any alcohol use and negative household events

NHEs are present in the general population in SA and among youth particularly. For the first NIDS question on alcohol use among youth, the data suggested a 11.74% (12.17% for no alcohol use and 10.76% for any alcohol use) prevalence of negative household events among youth. The occurrence of "Theft fire or destruction of property occurred in the last 24 months" was the most common in any alcohol use question. The adjusted logistic regression analysis suggests alcohol use is more frequent if any (i.e., the total effect) NHE was experienced. However, alcohol use is reduced with the presenceof isolated negative household events, except for the variable 'any other negative event occurred in the household in the last 24 months', which was non-significant after adjustmentfor the other negative household events. In the model examining age, sex and race alcoholuse was found to be higher among males and increase with age. Compared to whites, any alcohol use is lower among African and Asian/Indian race groups. After adjusting for non-modifiable factors, having experienced the total effect of NHE was associated with increased alcohol use. However, in the adjusted analysis, the occurrence of a destruction of property, a death or disease of livestock, or crop failure, decreased any alcohol use. Anyalcohol use increases with the occurrence of more than one NHE (total effect of NHE). The adjusted analysis suggests that the significance for any other negative event occurredin this household in the last 24 months, however, the non-significance of the destruction ofproperty was observed. The fitted model 3 suggests that compared to those with no formaleducation any alcohol use is higher for those with tertiary education. About race, whites were found to drink more frequently than Africans and Asian/Indians. However,a religious affiliation decreases the alcohol use prevalence. Any alcohol use is higher in urban versus rural settlement, is higher for smokers, is higher for males, and old age in higher household income compared to much below average income. After adjusting for all the above factors and the household clustering, youth experiencing the total effect of negative household events have twice a likelihood of any alcohol use than the comparative group. However, when considered separately, the odds of anyalcohol use were reduced for 'Theft fire or destruction of property occurred in the last 24 months?', reduced for 'Widespread death/disease of livestock occurred in the last 24 months?' and reduced for 'A major crop failure occurred in this household in the last 24 months? The variable, any other negative event occurred in

this household in the last 24 months was only significant in thebivariate. However, the variable theft fire or destruction of property was only significant in the adjusted analysis.

As this is a unique analysis examining these NHE, we find little comparison in previous literature. As per many South African analyses results suggest that alcohol use is unevenly distributed among the races. Contrary to Vellios and Van Walbeek's (2017, p. 36) findings that white and colored participants are more engaged in drinking, this research finds that colored individuals and Africans engage in any alcohol use and binge drinking. This means that the racial divide regarding alcohol abuse may require more comprehensive studies to fill the gaps in the literature. In South Africa, racial divides are complex and require epidemiological focus.

When it comes to the importance of a religious affiliation, this study found a 26 percent decrease in the use of alcohol among youth who are religious affiliated compared to those who are not. As there is a lower drinking problem from non-religious youth, these findings, in this case, corroborate to that of school going adolescents in SA (24), indicating that high religious affiliation is associated with low alcohol abuse. It may suggest that high religious affiliation reduces the levels of alcohol use by reducingthe stressors that aggravate its abuse. As per above, like race, religious affiliation could also be examined as it could act as a proxy for wellbeing.

This research suggests that smoking and alcohol abuse are positively associated, with any alcohol use at 59.63 percent for non-smokers and 40.38 percent for smokers. While the relationship between alcohol abuse among youth engaged in smoking is less significant, the evidence suggests that smoking and alcohol use are related. In this case, the findings indicate that smokers engage in higher levels of alcohol use than non-smokers. The smokers who engage in alcohol use represent almost half of their entire distribution, thus indicating they may be related. The finding is well corroborated in several previous studies: recent data of Korean Youth found that particularly in men, alcohol was strongly related to smoking (36,37).

Low-income families expose youth to poor life achievement and substance abuse (21). According to the findings of this research, income affects the prevalence of any alcohol use. In this case, results indicate higher alcohol abuse at 26.77 percent 25.47 percent regular drinkers and binge drinkers, respectively, for below-average income earners. On the other hand, above-average income earners report a 7.52 percent and 6.19 percent alcohol use and binge drinking. These figures point to an increased prevalence of alcohol abuse among families that experience financial difficulties, which may be a direct causativefactor for alcohol use among youth. Household income is a potent stressor aggravating alcohol abuse among youth in SA. As an associate of alcohol use, it may be further describedas a cause of most negative household events when it induces financial stress. The social condition of the youth is another associate of alcohol use among youth in SA, which has been considered in this research. There is a higher prevalence of alcohol abuse when druguse is observed in the neighborhood (17). This may represent the social influence of alcohol use among the investigated youth. In addition to this, as previous results point to higher abuse where other drugs and negative social environment are available, leading to stress, the affected areas may be associated with negative household events. In this research, findings indicate that negative environments may impact stress and further lead to alcohol and other substance abuse.

The high prevalence of alcohol abuse in urban and rural areas is contrary to the previous research that negative household events related to financial status led to alcohol abuse (32). In this research, urban settlements in SA represent 64.80 drinkers while the rural areas represent 35.20 percent. These findings may suggest that other factors such as availability and social environment are related to alcohol use. In addition to this, the resultsmight be associated with income. As the previous results indicated, there is a highprevalence of alcohol use among educated youth in a below-average income household within urban settlements. The inconsistency in the alcohol use distribution may indicate the previous suggestion among the examined provinces. According to the findings of this research, KwaZulu, Gauteng, Western and Eastern Cape lead with alcohol usage at 17.79 percent, 16.51 percent, 14.39 percent, and 10.24 percent, respectively. Previous studies further indicate that these regions experience high alcohol abuse, thereby confirming the results of this research. In this case, study findings from SA (38), indicates an association between alcohol use and depression in KwaZulu and the Eastern Cape. It can be noted that there is significant abuse of alcohol in urban areas that need immediate public health attention.

Binge drinking and NHE

For the second question on binge drinking, about ten percent (9.75% no binge drinking and 11.57% binge drinking) experienced NHE. Theft fire or destruction of property was the most frequent NHE among alcohol users and binge drinkers. Widespread death/disease of livestock, a major crop failure and other NHE were also found to be present. To my knowledge, no other analysis has examined these specific NHE in relation to alcohol use apart from Burger and colleagues who also work with the NIDS data. Their longitudinal analysis of the first three waves of the NIDS suggested that one in four South Africans experienced at least one NHE from 2008-2012 (32). In the third NIDS wave, about 2.50% at least one loss of property event, 0.77% experienced at least one agricultural event, 6.48% at least one economic event and 24.48% experienced at least one health event. Even though these data are not fully comparable to the current analysis, they do suggest NHE are prevalent in SA and warrant further analysis.

NHE were not associated with binge drinking (a form of alcohol abuse), a surprising finding considering previous literature. Burger et colleagues (2017) found that NHE such as property loss, the loss of a family worker and a significant chronic disease or painful conditions happened in 30% of SA households in the first Three waves of the NIDS research. Furthermore, one-quarter of families (25%) reported at least one unpleasant home occurrence. The findings of the study highlighted that the loss of a family member who offered family support as well as a substantial health condition was linked to a stressful life and risky behaviors. However, the previous study analyzed different waves and different NHE found in the first three waves of the NIDS data.

Burger and colleagues suggest in another analysis of the relationship between NHE and depressive symptoms that NHE have a high impact on alcohol abuse in SA (32). Moreover, the current research suggests a positive relationship between the combined effect of NHEs and alcohol use. However, there are some other NHEs that were not included in this study. This could be understood in the fact that, for example, 94.97 percent of drinkers reported not losing property either to fire or theft; on the other hand, 5.03 percent of the drinkers reported losing property. The results indicated also that this indicates is that binge drinking is not

substantially associated with NHE. There are, however, other variables that may have a negative effect on the household environment affecting the use of alcohol. Income, for example, is an aspect that regulates the affordability of specific needs in the household. Income as a negative household event may be inferred with below-average value. This research has previously confirmed that below-average income induces the use of alcohol among youth in SA. Therefore, while there a relationship exists between NHEs and alcohol use, there are some other factors affecting the household environment to increase alcohol use in youth. Although dated Morejele and colleagues (2011) suggested that environmental stressors in terms of alcohol and drugs use in the neighborhood, violent victimization and psychosomatic disorders (stress related illnesses) were related. Beyond the association between alcohol and other drug in the neighborhood, environmental stress was associated with adolescents' alcohol use in SA (17).

Education is an important aspect of linking alcohol abuse in youth in SA. The current study suggest that alcohol use is more common among those with a tertiary education compared to those without a formal education. Moreover, having a formal education increases binge drinking among youth. The current study finding corroborate with previous reports about the education and alcohol use in SA. The SASH study suggested an increased alcohol use among SA with a higher education (17). However, the SA National youth policy suggested that education and unemployment linked to risky behavior and alcohol use (21). Given that alcohol use and binge drinking were common among youth with higher levels of education in SA, more campaigns to reduce alcohol abuse should target youth with higher education.

In SA, alcohol abuse is a public health issue among youth. It's worth noting that alcohol is the most often abused drug among youth. The NIDS in SA offers data on the impact of negative and positive domestic events on the population. To inform South African health policy it is necessary to identify the link between unfavorable home events and the youth alcohol use. This study is the first to look at how unfavorable home events affect alcohol use and abuse among SA youth. The use of hierarchical models which include both non-modifiable and modifiable factors is another of strength of this work

Strengths and limitations of the study

The strengths of this study include that it has use the NIDS a country wide population-based survey nationally representative of households in SA (19). The NIDS sample size was large. Another strength was that the alcohol use records which made up the outcome variable has been repeated across different waves of the NIDS which increased the reliability of the tools used. The first limitation is that the attempts to infer causality are tentative in this cross-sectional study. As a secondary data analysis, this study has a limited number of factors to be studied. Another limitation of the study is that more confounding factors associated with alcohol where not measured in the fourth wave of theNIDS which may lead to biased results. Perhaps further waves of the NIDS could measure the socioeconomic status, anxiety disorders or Post Traumatic Stress Disorder (PTSD) (20). Any misclassification in the primary data cannot be corrected during secondary data analysis, as selection and systematic bias has already occurred. there are geographic and time-bound limitations with respect to coverage of alcohol and NHEs given that with time some rural settlement tends to be urbanized.

6.CONCLUSION

Notwithstanding the limitations, this study is important in highlighting a possible role of negative household events in alcohol use among youth. negative household events induce stress, which may lead to alcohol use if a psychological support is not effectively provided. Although the associative coefficient is smaller, the study findings confirm that a relationship exist between alcohol use in South African youth and negative household events. Alcohol use is a problem affecting youth globally. While there is an association between this problem and negative household events, its high prevalence among educated male youthsliving in urban areas and with a lower household income indicates more to uncover. This research recommends that future research focus on the overall socioenvironmental stressors which lead to substance abuse among youths. In this case, there is a higher association between factors unaffected by negative household events. However, other social and environmental factors such as household income have a more evident outcome. This research concludes that there is an association between negative household events and alcohol use in South African youth while other socio-environmental factors also influence alcohol use such as the death of a parent or a person who provide a family financial support.

This research can be helpful to public health through leading future research into examining other negative household events which may have a relationship with alcohol use in youth to find a more comprehensive association. More research needs to be done on other negative household events and socioenvironmental challenges to fully understand the alcohol use problem among youth in SA, thus implementing effective policies.

In addition to this, this research will guide determining other factors that led to the high prevalence of alcohol use among youth in SA. This way, a more comprehensive solution-based approach to this problem will be produced to handle the situation sustainably in SA.

`Alcohol use is a systemic problem in SA and needs an integrated approach to solve the problem. The study findings suggest that all the categories of youth are concerned about the problem despite Race, age, education, and income level is important to implement policy measures to reduce the selling of alcohol mainly to youth below 18 years. In addition, a psychological support is important for youth especially those experiencing negative household events.

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8. APPENDIX

Note that Appendix A is the results of the remaining bivariate analysis and multivariate for any alcohol use.

APPENDIX A. Alcohol use (Any amount)

Appendix A1: Alcohol use by non-modifiable factors

Variable	Crude OR	Confidence-/interval **95% CI**	P-value
Age (years)	n (12213)		
15 – 19	1		
20 – 24	3.19***	[2.84 3.59]	0.001
25 – 29	4.25***	[3.77 4.78]	0.001
30 – 34	3.86***	[3.41 4.38]	0.001
Sex	n (12213)		
Female	1		
Male	3.25***	[3.00 3.52]	0.001
Population group	n (12212)		
White	1		
Asian/Indian	0.26***	[0.14 0.48]	0.001
Coloured	0.85	[0 .57 1.25]	0.406
African	0.34***	[0.23 0.49]	0.001

APPENDIX A2: Alcohol use by modifiable factors (intermediate conditions)

Education			
No formal Educ	1		
Primary	1.04	[0.65 1.66]	0.868
Secondary	1.07	[0 .68 1.68]	0.772
Tertiary	1.67*	[1.05 2.65]	0.030
Religiosity			
No	1		
Yes	0.48***	[0.42 0.54]	0.001
smoking cigarettes			
No	1		
Yes	9.63***	[8.65 10.73]	0.001
Income classification of household			
Much below average income	1		
Below average income	1.33***	[1.17 1.50]	0.001
Average income	1.39***	[1.24 1.56]	0.001
Above-average income	1.40***	[1.18 1.67]	0.001
Much above average income	1.36**	[1.10 1.69]	0.005
Alcohol and drugs use in the neighborhood			
No	1		
Yes	1.14	[0.96 1.35]	0.119
Geo_Type			

Farms	1		
Traditional	0.50***	[0.43 0.60]	0.001
Urban	1.20*	[1.02 1.42]	0.026
Province			
KwaZulu-Natal Gauteng	1		
Western Cape	3.69***	[3.20 4.25]	0.001
Eastern Cape	1.84***	[1.60 2.14]	0.001
Northern Cape	3.94***	[3.36 4.64]	0.001
Free State	3.58***	[3.02 4.24]	0.001
Gauteng	2.85***	[3.02 4.24]	0.001
North-West	2.33***	[1.96 2.78]	0.001
Mpumalanga	2.17***	[1.85 2.55]	0.001
Limpopo	1.58***	[1.35 1.86]	0.001

APPENDIX A3: Alcohol use by negative household events

Theft fire or destruction of property occurred in the last 24 months?			
No	1		
Yes	0.88	[0.74 1.05]	0.160
Widespread death/disease of livestock occurred in the last 24 months?			
No	1		
Yes	0.57***	[0.45 0.72]	<0.001
A major crop failure occurred in this household in the last 24 months?			
No	1		
Yes	0.34***	[0.21 0.53]	<0.001
Any other negative event occurred in this household in the last 24 months?			
No	1		
Yes	1.42**	[1.13 1.79]	0.003

APPENDIX A4: Negative household events by geographic type of location

Theft fire or destruction of property occurred in the last 24 months?	Farms Frequency (%)	Traditional Frequency (%)	Urban Frequency (%)	Total Freq (%)
		Fisher's exact = 0.068		
No	690(96.77)	4881(94.39)	5964(94.23)	11535(94.45)
Yes	23(3.23)	285(5.51)	359(5.67)	667(5.46)
Missing	0(0.00)	5(0.10)	6(0.09)	11(0.09)
Widespread death/disease of livestock occurred in the last 24 months?		Fisher's exact <0.001		
No	671(94.11)	4820(93.21)	6270(99.07)	11761(96.30)
Yes	42(5.89)	339(6.56)	49(0.77)	430(3.52)
Missing	0(0.00)	12(0.23)	10(0.16)	22(0.18)
A major crop failure occurred in this household in the last 24 months?		Fisher's exact < 0.001		
No	703(98.60)	5019(97.06)	6308(99.67)	12030(98.50)

Yes	9(1.26)	149(2.88)	12(0.19)	170(1.39)
Missing	1(0.14)	3(0.06)	9(0.14)	13(0.11)
Any other negative event occurred in this household in the last 24 months?				
No	689(96.63)	5067(97.99)	6122(96.73)	11878(97.26)
Yes	22(3.09)	87(1.68)	203(3.21)	312(2.55)
Missing	2(0.28)	17(0.33)	4(0.06)	23(0.19)

APPENDIX A5: Any alcohol use (Any amount)

From the table below one-third of youths, 3719 (30.44%) acknowledged the use of alcohol.

Current alcohol user category	Frequency	Percentage
No	8494	69.52
Yes	3719	30.44
Missing	5	0.04
Total	12218	100.00

APPENDIX A 6: Household composition for youth

Number of youths in the household	Number of households	Percentage
1	3813	53.97
2	2090	29.58
3	709	10.04
4	276	3.91
5	106	1.50
6	45	0.64
7	16	0.23
8	8	0.11
9	2	0.03
Total	7065	100.00

The distribution of any alcohol use in figure 4 and binge drinking in figure 6 have been presented using pie charts. Figure 4 presents the distribution of alcohol use in the study sample (n=12 213) and figure 5 presents the alcohol use age distribution. Figure 6 presents the distribution of binge drinking among alcohol consumers (n=3653) and figure 7 presents the binge drinking age distribution.

Note that appendix B1 to B3 are the results of my bivariate analysis for binge drinking

APPENDIX B

APPENDIX B1: Distribution of participants by non-modifiable factors

Variable	Crude OR	Confidence-/interval	P-value
Age (years)			
15 – 19	1		
20 – 24	1.45***	[1.18 1.79]	0.001
25 – 29	1.63***	[1.32 2.00]	0.001
30 – 34	1.30*	[1.05 1.62]	0.018
Sex			
Female	1		
Male	1.70***	[1.48 1.95]	0.001
Population group			
White	1		
Coloured	4.48***	[1.28 4.09]	0.001
African	6.47***	[3.1713.21]	0.001
Asian/Indian	1.94	[0.56 6.75]	0.295

APPENDIX B2: Distribution of participants by modifiable factors

Education			
No formal Educ	1		
Primary	3.65**	[1.43 9.31]	0.007
Secondary	3.67**	[1.47 9.16]	0.005
Tertiary	3.37*	[1.34 8.49]	0.01
Religiosity			
No	1		
Yes	0.99	[0.81 1.19]	0.890
smoking cigarettes			
No	1		
Yes	1.73***	[1.51 1.98]	0.001
Income classification of household			
Much below average income	1		

Below average income	1.00	[0.81 1.24]	0.971
Average income	1.24*	[1.02 1.51]	0.032
Above-average income	0.77	[0.57 1.04]	0.085
Much above average income	1.86**	[1.28 2.70]	0.001
Alcohol and drugs use in the neighborhood			
No	1		
Yes	1.59**	[1.19 2.13]	0.002
Geographic settlement			
Farms	1		
Traditional	1.68***	[1.25 2.24]	0.001
Urban	1.80***	[1.37 2.37]	0.001
Province			
KwaZulu-Natal Gauteng	1		
Western Cape	0.91	[0.72 1.15.]	0.425
Eastern Cape	1.15	[0.89 1.49]	0.279
Northern Cape	0.77	[0.60 1.01]	0.057
Free State	1.97***	[1.48 2.61]	0.001
Gauteng	1.09	[0 .86 1.35]	0.469
North-West	1.11	[0.83 1.49]	0.68
Mpumalanga	0.97	[0.73 1.28]	0.842
Limpopo	0.98	[0.74 1.30]	0.908

APPENDIX B3: Distribution of participants by negative household events

Theft fire or destruction of property occurred in the last 24 months?			
No	1		
Yes	1.03	[0.77 1.38]	0.859
Widespread death/disease of livestock occurred in the last 24 months?			
No	1		
Yes	1.33	[0.86 2.05]	0.193
A major crop failure occurred in this household in the last 24 months?			
No	1		
Yes	0.78	[0.33 1.80]	0.554
Any other negative event occurred in this household in the last 24 months?			

No	1		
Yes	1.44	[0.99 2.09]	0.054

APPENDIX B4: Distribution of participants concerning binge drinking

Binge drinking	Frequency	Percentage
Yes	1859	15.22
No	1794	14.69
Missing	66	0.54
Total	3719	100.00

APPENDIX B5: Distribution of negative household events by geographic settlements

	Rural		Urban	
	Frequency	Percent	Frequency	Percent
Theft fire or destruction of property occurred in the last 24 months?				
No	5576	94.77	5970	94.33
Yes	308	5.23	359	5.67
Widespread death/disease of livestock occurred in the last 24 months?				
No	5503	93.52	6280	99.23
Yes	381	6.48	49	0.77
A major crop failure occurred in this household in the last 24 months?				
No	5726	97.31	6317	99.81
Yes	158	2.69	12	0.19
Any other negative event occurred in this household in the last 24 months?				
No	5775	98.15	6126	96.79
Yes	109	1.85	203	3.21

APPENDIX B6: logistic regression of NHEs for binge drinking

Logistic regression of negative household events distribution among abstainers and drinkers (n=12147)

Block 1: Negative Household events	OR_{crude}	95% CI	$OR_{adjusted}$	95% CI
Theft fire or destruction of property occurred in the last 24 months?				
No	ref		ref	
Yes	1.12	[0.89 1.41]	1.12	[0.88 1.44]
Widespread death/disease of livestock occurred in the last 24 months?				
No	ref		ref	
Yes	1.92***	[1.36 2.71]	1.92**	[1.33 2.77]
A major crop failure occurred in this household in the last 24 months?				
No	ref		ref	
Yes	2.30**	[1.28 4.30]	2.30*	[1.13 4.69]
Any other negative event occurred in this household in the last 24 months?				
No	ref		ref	
Yes	0.96	[0.70 1.32]	0.97	[0.68 1.37]
Total negative household events				

Block 1: Negative Household events	OR_{crude}	95% CI	$OR_{adjusted}$	95% CI
No	ref		ref	
Yes	1.30**	[1.07 1.50]	1.27 *	[[1.06 1.53]

*Significant level: *<0.05 **<0.01 ***<0.001
In the adjusted logistic regression, the Std. Err. Were adjusted for household clustering.

APPENDIX B7: logistic reg. of NHEs and non-modifiable for binge drinking

Model 2: Negative Household events and non-modifiable	OR_{crude}	95% CI	$OR_{adjusted}$	95% CI
Education				
No formal Educ	ref		ref	
Primary	1.71*	[1.01 2.87]	1.44	[0.84 2.48]
Secondary	1.68*	[1.02 2.76]	1.33	[0.80 2.22]
Tertiary	1.12	[0.67 1.85]	1.11	[0.66 1.88]
Religiosity				
N	ref		ref	
Yes	1.58***	[1.34 1.86]	1.35**	[1.12 1.62]
Income classification of household				
Much below average income	ref		ref	
Below average income	0.79**	[0.67 0.92]	0.77**	[0.65 0 .92]
Average income	0.86*	[0.74 0.99]	0.94***	[0.79 1.10]
Above-average income	0.65***	[0.52 0.81]	0.73**	[0.58 0.93]
Much above average income	1.16	[0.85 1.58]	1.09	[0.79 1.52]
Geographic settlement				
Rural	ref		ref	
Urban	0.59***	[0.53 0.65]	0.83**	[0.73 0.94]

*Significant level: *<0.05 **<0.01 ***<0.001
Model 3: adjusted for modifiable variables (Education, smoking, cigarettes, religiosity, household income and geographic settlement), non-modifiable variables (age, sex, race) and household clustering.

APPENDIX C: Summary table of simple and clustered logistic regression

Table 15: Summary table of the simple and clustered logistic regressions odds ratios (Std errors in parenthesis)

	All participants		**Drinkers**	
	Any alcohol use (Q1)		Binge drinking (Q2)	
	All (n=12213)	Yes	All(n=3653)	Yes
	Simple logistic regression odd ratio (SE)	Clustered logistic regression Odd ratio (SE)	Simple logistic regression odd ratio (SE)	Clustered logistic regression odd ratio (SE)
NHE				
No	Ref	Ref	Ref	Ref
Yes	2.02*(0.68)	2.02*(0.64)	2.34 (1.47)	2.34 (1.47)
Theft fire or destruction of property occurred in the last 24 months?				
No	Ref	Ref	Ref	Ref
Yes	0.43*(0.14)	0.43**(0.13)	0.40 (0.25)	0.40 (0.25)
Widespread death/disease of livestock occurred in the last 24 months?				
No	Ref	Ref	Ref	Ref
Yes	0.48*(0.16)	0.48*(0.15)	0.64 (0.40)	0.64 (0.41)
A major crop failure occurred in this household in the last 24 months?				
No	Ref	Ref	Ref	Ref
Yes	0.34**(0.11)	0.34**(0.11)	0.38 (0.23)	0.38 (0.24)
Any other negative event occurred in this household in the last 24 months?				
No	Ref	Ref	Ref	Ref
Yes	0.73(0.25)	0.73(0.24)	0.63(0.39)	0.63 (0.39)
Age (years)				
15 – 19	Ref	Ref	Ref	
20 – 24	2.86***(0.19)	2.86***(0.20)	1.33** (0.15)	1.33** (0.15)
25 – 29	3.83***(0.27)	3.83***(0.28)	1.50***(0.17)	1.50*** (0.17)
30 – 34	3.24***(0.24)	3.24***(0.25)	1.21 (0.14)	1.21 (0.15)
Sex				
Female	Ref	Ref	Ref	Ref
Male	2.57***(0.12)	2.57***(0.13)	1.47***(0.11)	1.47***(0 .11)
Race				
White	Ref	Ref	Ref	Ref
Asian/Indian	0.23***(0.08)	0.23***(0.09)	2.34 (1.55)	2.34 (1.56)
Coloured	0.71(0.16)	0.71(0.20)	5.25***(2.08)	5.25***(2.28)
African	0.46**(0.10)	0.46**(0.12)	8.51***(3.33)	8.51***(3.62)

	All participants		Drinkers	
	Any alcohol use (Q1)		Binge drinking (Q2)	
	All (n=12213)	Yes	All(n=3653)	Yes
	Simple logistic regression odd ratio (SE)	Clustered logistic regression Odd ratio (SE)	Simple logistic regression odd ratio (SE)	Clustered logistic regression odd ratio (SE)
Education				
No formal education	ref	Ref	Ref	Ref
Primary	1.34(0.38)	1.34(0.37)	3.72**(1.82)	3.72**(1.82)
Secondary	1.56(0.42)	1.56* (0.42)	3.70**(1.77)	3.70**(1.79)
Tertiary	1.79* (0.49)	1.79*(0.49)	3.37*(1.63)	3.37*(1.65)
Religiosity				
No	ref	Ref	Ref	Ref
Yes	0.74***(0.06)	0.74***(0.06)	1.14(0.12)	1.14 (0.13)
Smoking cigarettes				
No	ref	Ref	Ref	Ref
Yes	5.18***(0.32)	5.18***(0.34)	1.73***(0.14)	1.73***(0.14)
Income classification of household				
Much below average income	ref	Ref	Ref	Ref
Below average income	1.48***(0.11)	1.48***(0.12)	1.08 (0.12)	1.08 (0.12)
Average income	1.41***(0.10)	1.41***(0.10)	1.34** (0.14)	1.34** (0.15)
Above-average income	1.30*(0.13)	1.30*(0.14)	0.81(0.13)	0.81(0.13)
Much above average income	1.65***(0.21)	1.65***(0.23)	2.06**(0.41)	2.06**(0.43)
Geographic settlement				
Rural	Ref	Ref		Ref
Urban	1.59***(0.08)	1.59***(0.09)	1.34*** (0.10)	1.34*** (0.11)

*Significant level: *<0.05 **<0.01 ***<0.001.

Household clustering and design effect accounted for in all analysis

APPENDIX D : Plagiarisme declaration

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

FACULTY OF HEALTH SCIENCES

PLAGIARISM DECLARATION TO BE SIGNED BY ALL HIGHER DEGREE STUDENTS

SENATE PLAGIARISM POLICY: APPENDIX ONE

I JEAN SHONGANYE SHONGANYE (Student number: 2252640) am a student registered for the degree of Master of Epidemiology in the academic year 2019.

I hereby declare the following:

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

Signature:  Date: 15/12/2021

APPENDIX E: Turnitin report



APPENDIX F: Ethical approval of the current study

UNIVERSITY OF THE WITWATERSRAND JOHANNESBURG

R14/49 Dr Jean Shonganye

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

CLEARANCE CERTIFICATE NO. M210148

NAME: (Principal Investigator)	Dr Jean Shonganye
DEPARTMENT:	Epidemiology and Biostatistics School of Public Health University of Witwatersrand
PROJECT TITLE:	The relationship between youth alcohol use and negative household events: analyses from the South African National Income Dynamics Study (NIDS) Wave 4
DATE CONSIDERED:	29/01/2021
DECISION:	Approved unconditionally
CONDITIONS:	
SUPERVISOR:	Dr S. Mall and Dr L. Robertson
APPROVED BY:	Dr CB Penny, Chairperson, HREC (Medical)
DATE OF APPROVAL:	25/02/2021

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office Secretary on the Third Floor, Faculty of Health Sciences, Phillip Tobias Building, 29 Princess of Wales Terrace, Parktown, 2193, University of the Witwatersrand. I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated, from the research protocol as approved, I/we undertake to resubmit the application to the Committee. **I agree to submit a yearly progress report.** The date for annual re-certification will be one year after the date of convened meeting where the study was initially reviewed. In this case, the study was initially reviewed in January and will therefore be due in the month of January each year. Unreported changes to the application may invalidate the clearance given by the HREC (Medical).

Principal Investigator Signature _____ Date _____

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES