ALCOHOL USE AMONG WOMEN ATTENDING ANTENATAL CARE IN BUFFALO CITY, EASTERN CAPE

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ABSTRACT

Alcohol use during pregnancy is known to cause neurodevelopmental disorders in offspring, known as Fetal Alcohol Spectrum Disorders (FASD). High prevalence of FASD has been observed in certain parts South Africa, but many areas of the country remain unstudied, and factors contributing to drinking among pregnant women are poorly understood. This study surveyed 1099 women attending antenatal care at public primary healthcare facilities in the Buffalo City Metropolitan Area in the Eastern Cape. Data was collected using the Alcohol Use Identification Test, a 10-item self-report measure of drinking behaviour in isiXhosa, English, and Afrikaans. Factors associated with alcohol use, risky drinking, binge drinking, and hazardous/harmful drinking were identified using logistic regression. A minority of the sample reported alcohol use (64%). Among those reporting alcohol use, most reported occasional binge drinking (63%) and met criteria for risky drinking (59%) and hazardous/harmful drinking (52%). Living with a regular drinker was significantly associated with alcohol use (OR 1.98, 95% CI 1.51 – 2.58), risky drinking (OR 2.03, 95% CI 1.49 – 2.76), binge drinking (OR 2.21, 95% CI 1.64 – 2.97), and hazardous/harmful drinking (OR 2.0, 95% CI 1.41 – 2.99). However, women who were married/cohabiting were less likely to report alcohol use (OR .71, 95% CI .53 - .95). Experiencing intimate partner violence during the current pregnancy was associated with alcohol use (OR 2.42, 95% CI 1.38 – 4.27) and hazardous/harmful drinking (OR 2.62, 95% CI 1.32 – 5.22). In this study, women who identified as Coloured were more likely to report alcohol use than Women who identified as African (OR 2.74, 95% CI 1.4 – 5.36). These findings simultaneously provide evidence of problematic drinking among pregnant women in a previously understudied area and show that external factors affect women's drinking behaviour during pregnancy. Interventions aimed at reducing the incidence of FASD should consider alcohol use by pregnant women in the context of their lived experiences.

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CHAPTER ONE
Introduction

1.1 Introduction

This study examines the self-reported alcohol use of women using antenatal care at primary public healthcare sites in the Buffalo City Metropolitan Area of the Eastern Cape. This first chapter introduces the reader to the main components of the research as well as the structure in which it is presented throughout the thesis. This chapter begins with a brief discussion of previous research on alcohol use in South Africa and especially among pregnant women. This is done to establish the topic as requiring urgent further investigation and to introduce key areas in which this study aims to contribute. The methods selected to achieve the aims of this study are then mentioned. Finally, the structure of the remaining chapters is introduced.

1.2 Context and Rationale

Alcohol is toxic to the human body and can lead to negative health outcomes such as cardiovascular disease (Roerecke & Rehm, 2014), liver disease (Rehm et al., 2010), and certain cancers (Boffetta & Hashibe, 2006). The consumption of alcohol can also influence infectious diseases through interaction with pharmacological treatment, immune system suppression, and risky behaviours associated with consumption (WHO, 2018, p.7).

The total volume consumed is a major determinant of risk, as is the pattern by which it is consumed (Rehm, Greenfield, & Rogers, 2001; Walsh & Rehm, 1996). Both aspects of alcohol consumption merit concern in South Africa. A minority of the population is responsible for the total volume consumed in the country, to the effect that the consumption per drinker in South Africa is among the highest in the world (WHO, 2014). In addition, the prevalence of risky practices such as heavy episodic drinking (6+ drinks per occasion) makes the South African pattern of alcohol consumption one of the most detrimental in the world (WHO, 2014). Over weekends, one third of adult drinkers engage in heavy episodic drinking (Parry, Pluddemann, Steyn, Bradshaw, Steyn, & Laubscher, 2005).

When alcohol is consumed during pregnancy, the developing foetus is exposed to the products of the metabolization of alcohol (Wattendorf & Muenke, 2005). Antenatal alcohol exposure disrupts the development of the foetus and can cause lifelong disturbances in physical development, cognitive abilities, and emotional wellbeing (Popova, Lange, Probst, Parunashvili, & Rehm, 2017). The neurodevelopmental conditions caused by antenatal alcohol exposure are collectively known as Foetal Alcohol Spectrum Disorders (FASD) and have been diagnosed in some communities in South Africa at rates that far exceed those observed in other regions of the world (May et al, 2005).

Focused research on antenatal alcohol use has mostly taken place in the Western Cape (Petersen-Williams, Mathews, Jordaan, & Parry, 2018), with one notable study of women using antenatal care in Mpumalanga (Louw, Peltzer, & Matseke, 2011). A recent study (Macleod, Young, & Molokoe, 2021) based on a portion of the data presented here reported the first analysis of social and personal factors associated with alcohol usage during pregnancy in the Eastern Cape.

Intervention to decrease antenatal alcohol consumption in the Eastern Cape is currently impaired by a lack of evidence of the problem in the province, a lack of data to identify those most at risk, and little evidence of effective means of intervention. This study reports data from a large sample of women using antenatal care in a peri-urban area of a previously unstudied province. Quantitative analysis of these data will describe not only the nature of the problem by the observed prevalence, but also test the relationship of related factors identified in other provinces to the self-reported alcohol use of participants in the study area.

1.3 Research Goals

From the rationale presented above, it follows that the goals of this study would be to describe the prevalence and factors associated with harmful drinking among participants. Two research questions are thus posed:

1. What is the prevalence of risky drinking, as defined by cut-off scores on the measure of alcohol use employed in this study, among women using antenatal care in the Buffalo City Metro?
2. To what extent are patterns of alcohol use predicted by age, employment, intimate partner violence, education, parity, gestation, and alcohol use by others in the home?

The measure used, as well as the various patterns of drinking investigated in this study, are described in the next section.

1.4 Methods

This study employed a cross-sectional design and collected survey data from consecutively sampled healthcare users at 16 sites in the Buffalo City Metropolitan Area. A questionnaire was developed for this study which included the Alcohol Use Disorder Identification Test (AUDIT) (Babor et al., 2001), a measure of problematic drinking used in previous South African research, and questions about numerous variables which were previously identified as related to antenatal alcohol use. The questionnaire was developed in the three main languages of the study area: isiXhosa, English and Afrikaans. In order to collect data from as large and representative a sample of possible, health service providers served as data collectors after receiving training in the administration of the questionnaire, which had been limited to 21 items in order to minimise disruption of service delivery at data collection sites.

Quantitative analysis was conducted on the self-reported data. Outcome variables were defined as reporting any alcohol consumption, reporting binge drinking (more than 6 drinks per occasion), scoring above cut-off points on all items related to consumption, and scoring above cut-off points on the full AUDIT. The predictor variables included in the questionnaire (age, race, parity, education, employment, relationship status, experience of partner violence, and living with a regular drinker) were each individually entered into bivariate analysis with each of the outcome variables. Those that were found related to an outcome variable in

bivariate analysis were entered into logistic regression models, the results of which were taken to indicate significant relationships with the outcomes of importance to this study. The analysis was conducted twice for each outcome variable, once including the whole sample, and once including only those who had reported some alcohol consumption.

1.5 Thesis Structure

The chapters that follow present the details of this research. Chapter two expands on the context provided above by discussing the existing literature in greater detail and pointing out findings that will inform the interpretation of results later. The methodology described briefly in the current chapter is thoroughly expanded in chapter three. To inform the interpretation of results described in chapter four, chapter three provides technical information including the cut-off points selected for the AUDIT scores, selected level of statistical significance for each step in the analysis, as well as a description of the sample and the relevant ethical considerations.

Chapter four describes the results of the analysis. First, the frequency and distribution of the outcome variables are presented. The results of initial bivariate and subsequent multivariate analysis are then presented separately for each outcome variable. Tables are included to serve as reference when the results are discussed in the following chapter. Results are interpreted in chapter five. Firstly, the rates of drinking and the frequency of other outcomes variables observed in this sample are compared to those previously observed. Factors associated with drinking as measured by any of the outcome variables are then discussed with reference to previous findings and theory that may explain observed effects. The impact of methodological differences between this and prior research on the interpretation of results is discussed. Chapter six then attempts to summarise the current study and provide suggestions for future research.

CHAPTER TWO
Literature Review

2.1 Introduction

The effects of alcohol exposure on the developing foetus are well-documented and prevalent in some South African communities at rates hardly seen elsewhere in the world (May et al., 2007). This chapter discusses literature surrounding the subject in a way that demonstrates the need for the current study.

In the first section, I discuss the current costs of problematic alcohol use to individual health and South African society. This is done to contextualise alcohol use by pregnant women as an extension of general pervasive patterns of alcohol use. Specific patterns of alcohol use are then examined to explain why South African alcohol use is especially harmful and why some drinkers are affected more severely than others. Finally, existing research on alcohol use during pregnancy in South Africa is discussed with reference to this study.

2.2 Behavioural Outcomes

Behavioural changes associated with alcohol consumption are diverse and may result from the context in which consumption takes place or the physiological effects of the substance. The purpose of this section is to show that, regardless of causal explanations, alcohol use coincides with behaviour that causes harm to the drinker and others to an extent that merits further investigation.

The neurochemical effects of alcohol on behaviour are worth a brief mention here, as these effects increase with dose and will thus differ by the drinking patterns which will be discussed in the next section. For the purpose of this section, it is sufficient to note that alcohol acts as a central nervous system depressant. In this regard, alcohol is similar to anxiolytic products such as benzodiazepines and is commonly used to produce a mild euphoria, but also increases reaction time while decreasing motor control and behavioural

inhibition (Hindmarch, Kerr, & Sherwood, 1991; Volkow et al., 2008; Weissenborn & Duka, 2003).

Accidental injuries are commonly associated with alcohol use. It is well known that the consumption of alcohol increases the risk of traffic accidents (Blomberg, Peck, Moskowitz, Burns, & Fiorentino, 2005; Peck, Gabers, Voas, & Romano, 2008). In the Medical Research Council's study of urban mortuaries in 2005, more than half of all South African traffic deaths involved alcohol consumption by the deceased. This included all victims of traffic fatalities, with pedestrians most likely to have consumed alcohol at time of death (Prinsloo, Kotzenberg, & Seedat, 2007). Alcohol has also been implicated in injuries resulting from falls (Johnston & Mcgovern, 2004; Kool, Ameratunga, Robinson, Crengle, & Jackson, 2008), burns (Palmu, Partonen, Suominen, Vuola, & Isometsä, 2018), and drowning (Peden, Franklin, & Leggat, 2017).

Alcohol use also appears related to intentional injuries. Research suggests that the majority of violent injuries involve alcohol consumption by the perpetrator, victim, or both (Cherpitel, Ye, Bond, Room, & Borges, 2012). In South Africa, a substantial minority of trauma centre admissions are preceded by alcohol consumption and those with violent injuries are most likely to have consumed at time of injury (Nicol et al., 2014; Pludemann, Parry, Donson, & Sukai, 2002). Mortalities due to violence are similarly related to alcohol consumption at the time of injury. In the mortuary study conducted by Prinsloo et al. (2007), victims of violence were even more likely to present high blood alcohol concentrations than were victims of traffic accidents. Similar effects have been observed for violence toward the self, such that large-scales studies found higher prevalence of post-mortem blood alcohol positivity among victims of suicide (Kaplan et al., 2014; Larkin, Griffin, Corcoran, McAuliffe, Perry, & Arensman, 2017).

Alcohol is implicated in intimate partner violence especially. In a large-scale study of arrests across three South African metropolitan areas, almost half (49%) of those arrested for domestic violence were alcohol involved at the time of the offense (Parry et al., 2004). Femicide by intimate partners occurs in South Africa at a rate that far exceeds that observed globally (Abrahams, Jewkes, Martin, Mathews, Vetten, & Lombard, 2009). Among women, 62% of murder victims in a representative Western Cape sample had blood alcohol concentrations above of 5mg/100ml at time of death (Mathews, Abrahams, Jewkes, Martin, & Lombard, 2009).

Alcohol consumption is reported to affect the intention to use condoms in controlled environments (Rehm, Shield, Joharchi, Shuper, 2012). Retrospective self-report data indicate that alcohol's effect on sexual behaviour in the real world is mediated by personality traits, relationship type, and aspects of the environment (Abbey, Saenz, & Buck, 2005; Cooper, 2010). A significant effect of drinking on condom use was observed at event level[1] among substance-using Pretoria women (Zule, Speizer, Brown, Howard, & Wechsberg, 2018), and at the aggregate level[2] among Western Cape construction workers (Bowen, Govender, Edwards, 2017). It is widely believed that alcohol use contributes to risky sexual behaviour and the transmission of HIV (Fritz, Morojele, & Kalichman, 2010; Schuper, Jojarchi, Irving, & Rehm, 2009; Simbayi et al., 2004).

Qualitative studies conducted in South African drinking establishments describe specific contexts in which alcohol consumption is associated with unprotected sex (Morojele et al., 2006; Rich, Nkosi, Morojele, 2015). These studies highlight how the performance of gender roles in the presence of alcohol produces specific outcomes such as transactional and/or unprotected intercourse. Given the involvement of alcohol in a large proportion of domestic

[1] Consumption of alcohol during sexual encounters.
[2] Consumption of alcohol not specific to sexual encounters.

violence arrests and fatalities, it is significant that men who report injuring their partners are more likely to coerce partners to forego condoms (Purdey, Abbey, & Jacques-Tiura, 2010). Women experiencing IPV are disproportionately affected by HIV, possibly because of a disadvantage in negotiating condom use (Peasant, Sullivan, Weiss, Martinez, & Meyer, 2017).

It is clear that the use of alcohol coincides with a variety of unfavourable outcomes, including accidental, violent, and irresponsible sexual behaviour. Some patterns of alcohol consumption are more likely to lead to negative outcomes than others, and these are discussed next.

2.3 The Burden of Disease

According to the World Health Organisation's most recent Global Status Report on Alcohol and Health, alcohol consumption caused 3 million deaths in 2016 (WHO, 2018). This figure represents 5.3% of global mortalities, thus causing more deaths than tuberculosis (2.3%), AIDS (1.8%), or digestive disease (4.5%) (WHO, 2018). Age-standardised analysis indicates that, per 100 000 people, 3044 years of life are affected by alcohol-related mortality, disability, or illness in Africa. This figure far exceeds the global average of 1759 life years per 100 000, even though per capita consumption in Africa (13.6g of pure alcohol per day) is slightly lower than the world average (13.9g per day).

The presence of alcohol in the body negatively affects the prognoses of many conditions. Where illness results from the presence of a foreign agent (i.e., infections), the immune system's ability to respond is reduced by alcohol through multiple pathways (Szabo & Mandrekar, 2009). Alcohol interferes with the nature and functioning of key pharmaceutical compounds that form the primary intervention in chronic illnesses such as HIV. In cases where compliance to treatment requires active participation such as taking medication at the right time or physically attending treatment, behavioural outcomes of alcohol consumption

also interfere with prognoses (Cichowitz, Maraba, Hamilton, Charalambous, & Hoffmann, 2017).

2.4 The Impact of Drinking Patterns

It has been shown that a given volume of alcohol is less harmful when consumed over more occasions (Chen, Rosner, Hankinson, Colditz, & Willett, 2011, Walsh & Rehm, 1996). This is because alcohol's effects on the individual depend on the concentration of alcohol in the blood. Meta-analyses of research on ischaemic heart disease and diabetes found that those who consumed more than 6 standard drinks per occasion were at much greater risk than those who drank less per occasion, even if they consumed the same volume over time (Roerecke & Rehm, 2010; 2014). Thus, alcohol related harm can be accurately predicted by the volume of drinks per occasion, or the number of occasions during which alcohol consumption exceeds recommended volumes (Cederbaum, 2012). Safe drinking patterns are thus those that result in the lowest concentration of alcohol in the blood, which are inevitably those that involve the least alcohol consumed per occasion.

It should be noted that women will show a greater blood alcohol concentration than men when given the same dose of alcohol per kilogram of body weight (Cederbaum, 2012). This is because of differences in body composition: alcohol is not soluble in fats, which are present at higher ratios in women than in men. The proportion of the body through which alcohol can distribute is thus smaller in women, and the toxin is more concentrated. Because a given dose will result in a higher concentration of alcohol in the body, women face a higher risk of negative outcomes related to alcohol from a given pattern of consumption (WHO, 2018).

2.5 Drinking Patterns in South Africa

In terms of pure alcohol, 9.3 litres are consumed for each South African person of drinking age (WHO, 2018). This represents a higher level of per capita consumption than the continent

of Africa as whole (6.4l) and the world in general (6.3l). Furthermore, alcohol is consumed by a smaller part of the population in South Africa than in other countries. In 2016, 69% of South Africans had not consumed alcohol in the 12 months before they participated in the WHO study, similar to the 72% consistently observed in other studies (Parry et al., 2005; Peltzer, Davids, & Njuho, 2011). Thus, the country's high alcohol consumption is accounted for by less than a third of the population.

In South Africa, then, a comparatively large quantity of alcohol is consumed by a relatively small group of people, with the effect of high per capita consumption among drinkers. Per drinker, 29.9l of pure alcohol is consumed in the country every year (WHO, 2018). This is more than the continental African per drinker consumption (18.4l) and almost double the world average of 15.1 litres per drinker per year. When 29.9l of pure alcohol is diluted in the form of 5% alcohol per volume beer, it converts to 598 litres of beer per drinker per year, or 1.6l per drinker per day. Expressed in consumer units, South African drinkers consume an average of 797 quarts (750ml beer bottles) per year, about 2 quarts per day.

Problematically, patterns of alcohol consumption are not regular. The 1998 Demographic and Health Survey estimated that one third of drinkers engaged in binge drinking[3] over weekends (Parry et al., 2005). 59% of drinkers in the South African sample of the WHO report had engaged in binge drinking in the month preceding the study (WHO, 2018). The physiological and behavioural effects of binge drinking are unique, due to the high concentration of alcohol in the blood created when compared to moderate drinking (Kuntsche, Kuntsche, Thrul, & Gmel, 2017). Binge drinking is thus a major contributor to the public health impact of alcohol in South Africa, where alcohol patterns of alcohol use have been described as among the world's most detrimental (WHO, 2018).

[3] Defined as per occasion consumption of more than 5 standard drinks/50g pure ethanol/1.26l of beer for men, and 3 standard drinks,/30g pure ethanol/ 0.76l of beer for women.

It has been noted that the risk of problematic alcohol use varies by demographic patterns. The 1998, 2003 and 2008 editions of the National HIV Prevalence, Incidence, Behaviour and Communication Survey (SABSSM) identified several factors associated with risky drinking (Parry et al., 2005; Peltzer et al., 2011)[4]. In comparison to binge drinking, which is defined solely in terms of alcohol consumed per occasion, risky drinking is defined as the likelihood that a person's pattern of drinking will cause them harm, determined by patterns of consumption, symptoms of alcohol dependence, and current alcohol-related harm (Babor, de la Fuente, Saunders, & Grant, 2001). For women, risky drinking was associated with urban residence, lower education, higher income, and identifying as Coloured (Parry et al., 2005; Peltzer et al., 2011). At this point in the discussion, the specific demographics identified in these surveys are less important than the observation that problematic alcohol use varies by social factors beyond individual choice to consume alcohol. This observation is crucial as the discussion turns to foetal alcohol spectrum disorders, which are often considered from a moral (i.e., individual making suspect choices), rather than a public health perspective.

2.6 Foetal Alcohol Spectrum Disorders

If alcohol is consumed during pregnancy, the foetus is placed at risk of alcohol-related harm (Koren, Nulman, Chudley, & Loocke, 2003; Sokol, Delaney-Black, & Nordstrom, 2003; Wattendorf & Muenke, 2005). Alcohol is distributed through the drinker's body as it travels from cells with a high concentration of alcohol to cells with a low concentration. The same happens at the site of nutrient and gas exchange between the mother and foetus, known as the placenta. Compounds which are concentrated in the mother's blood, such as sugars and protein from the diet, oxygen from respiration, and alcohol and acetaldehyde from drinking move to the foetal side of the placenta, where they are less concentrated. The foetal cells are

[4] Reports of subsequent surveys have excluded patterns of alcohol use.

then affected by the products of alcohol consumption until the toxins are removed or metabolised. Metabolism of alcohol and acetaldehyde occurs at a greatly reduced rate in the foetus, thus their concentration will remain elevated until the concentration on the maternal side decreases and the toxins move back across the placenta.

Foetal alcohol spectrum disorders (FASD) is a collective term used to denote the developmental disorders caused by foetal alcohol exposure, the manifestations of which include "a broad array of congenital anomalies and growth impairments, along with cognitive, behavioural, emotional, and adaptive functioning deficits, all of which can have lifelong implications" (Popova et al, 2017, p. 33). Streissguth et al. (1994) showed that such effects are rightfully considered lifelong, as the volume of maternal alcohol consumption per occasion continued to predict cognitive deficits in offspring 14 years later. Among other mental health problems (Barr, Bookstein, Malley, Connor, Huggins, & Streissguth, 2006) positive diagnosis of FASD has been found to predict substance abuse problems, occurring in one sample at a rate five times that of the general population (Streissguth, Barr, Kogan, & Bookstein, 1996).

The highest prevalence of FASD ever recorded was observed in a South African community in the Western Cape. When investigating only foetal alcohol syndrome (FAS), the most severe form of FASD, May et al. observed rates between 40 (in the year 2000), and 89 cases per 1000 children (in 2007). Comparatively, in the United States, where FASD is more common than other developed nations (Abel, 1995), communities considered to be at high risk rarely show rates of FASD above 10/1000 (May, 1991; May, Hymbaugh, Aase, & Samet, 1983). It can be argued that unique circumstances contribute to alcohol consumption in the study region, the Western Cape winelands. Historically, coloured farm labourers in the region were given crude wine as remuneration (London, 1999). The practice, known as the dop system, is believed to be the origin of a drinking culture that continues to affect the lives

of farmworker communities in the region (Lesch & Adams, 2016). In the country's other wine-producing area, similar circumstances contribute to the rates of FASD, but even higher rates were observed in a non-wine producing area of Northern Cape (Urban, Chersich, Fourie, Chetty, Olivier, & Viljoen, 2008). FASD has also been observed at rates far above the global average in the non-wine producing areas of Gauteng (Viljoen, Craig, Hymbaugh, Boyle, & Blount, 2003) and the Eastern Cape (Eastern Cape Liquor Board, 2016).

2.7 Factors Associated with Antenatal Alcohol Consumption

May et al. (2005) found mothers of children with FAS more likely than mothers of children who did not meet diagnostic criteria to come from alcohol-abusing families, to binge drink over weekends, and to report no decrease in consumption during pregnancy. The authors noted that mothers of children with FAS showed signs of antenatal alcohol exposure themselves. While this information is valuable, it is not a direct observation of drinking behaviour, and the outcome variable (positive FAS diagnosis) is influenced by other factors such as genetic makeup (Dodge, Jacobson, & Jacobson, 2014; Stoler, Ryan, & Holmes, 2002) and nutritional status (May et al, 2014). Thus, the rate of diagnosis does not represent the rate of antenatal alcohol consumption and is a less than ideal measure of drinking behaviour.

The authors of the described studies recommended "specific, targeted prevention, using selective approaches such as screening all women attending prenatal clinics" (May et al., 2007, p. 269). Since then, research involving systematic sampling of women at public antenatal care facilities has expanded understandings of risk factors associated with alcohol use during pregnancy in South Africa. One study in Mpumalanga found that 6.6% of women attending antenatal care were consuming alcohol, a substantial minority of whom (21%) reported binge drinking (Louw et al., 2011). The authors found those who had experienced intimate partner violence in the prior 6 months and those who reported more than one sexual partner in the prior 12 months were more likely to report alcohol consumption during

pregnancy. In Cape Town, another study of women attending public antenatal care sites found differences in rates of self-reported alcohol consumption by race, marital status, experience of aggression, and partner substance use (Petersen-Williams et al., 2018).

Evidence for attitudinal predictors of antenatal alcohol use is inconclusive. One mixed method study of women attending drinking establishments in Cape Town found that attitudes toward antenatal alcohol consumption were related to reported alcohol use during pregnancy (Fletcher, May, Seedat, Sikkema, & Watt, 2018). Women who reported the belief that alcohol use was not harmful during pregnancy were likely to report drinking during previous pregnancy. However, women who believed that alcohol was harmful during pregnancy were not significantly less likely than chance to report drinking during pregnancy, leading the authors to conclude that attitudes toward antenatal alcohol use did not sufficiently predict antenatal drinking.

Drinking patterns prior to pregnancy have been found to predict drinking during pregnancy (Ethen et al., 2009). Choi et al.'s research in the Western Cape (2014) replicated this finding, further noting that women with histories of experienced traumatic events increased their alcohol consumption after recognising pregnancy, regardless of consumption patterns prior to pregnancy recognition.

2.8 Conclusion

The literature discussed in this chapter demonstrates relationships between alcohol consumption and numerous undesirable outcomes, including chronic disease, accidental and violent injury and death, and neurodevelopmental disorders. These outcomes are prevalent throughout South Africa as a result of harmful patterns of heavy drinking. Pregnant women are especially vulnerable to harm to themselves and their offspring.

The factors that contribute to alcohol consumption during pregnancy are complex and not fully understood. The research on which current understanding is based lacks data from many

parts of the country, including the Eastern Cape, and few have described factors related to moderate drinking. This study will aim to address this by investigating social and personal factors associated with alcohol usage in the Eastern Cape, and by seeking to identify factors that vary between light and heavy drinkers. The methods selected for this study are described in the next chapter.

CHAPTER THREE
Method

3.1 Introduction

This chapter describes the methods by which this study aims to contribute information on antenatal alcohol use from a previously understudied area. The first section describes the ontological and epistemological approach selected for this research as well as the specific study design selected. The demographic characteristics of the sample are then discussed, followed by a reflection on the ethics principles most pertinent in collecting and handling these participants' data. The process of collecting the data is then described, including an overview of the instruments used. Finally, details of statistical analyses are provided to inform the interpretation of the results presented in the next chapter.

3.2 Research Design

This study is situated in a positivistic paradigm, which assumes the existence of objective, observable truth (Ryan, 2018). Within this paradigm, this study made use of a quantitative methodology which seeks to collect and analyse numerical data related to the study question. A survey method was employed to elicit responses to the same set of closed-ended questions from all participants (Stangor, 2014). Finally, a cross-sectional research design was employed. Cross-sectional research involves collecting data from multiple and diverse participants at one point in time and allows the researcher to investigate a 'snapshot' of the phenomenon in question (Rosner, 2015).

In this case, a positivistic, quantitative approach allows the observation and description of behavioural phenomena in a way that allows comparison of participants within the sample and of the sample to those observed in other studies. However, the survey research design does not yield directly observed behavioural data. Instead, data collected by the methods in this study represent self-reports of behaviour, which may differ from the actual behaviour (Van de Mortel, 2008). Thus, this method necessitates the assumption that the reported

behaviour, which is the focus of this study, is either accurately reported or misrepresented to the same extent and in the same direction (i.e., underreported) by all participants.

As no sampling frame was available for the sampled population, non-probability sampling methods were necessary. Among these, consecutive sampling involves recruiting every eligible participant and is more likely to represent the sampled population than other non-probability sampling methods (Mathieson, 2014).

3.3 Participants

A non-representative sample of 1099 women using antenatal care at 16 primary healthcare sites in different parts of the Buffalo City Metropolitan Area participated in the study over two phases of data collection. The first took place between September 2016 and August 2017, and the second between March and June 2019. The majority (69%) were unemployed. Few participants reported no formal education (0.8% of the sample), 5% had completed some primary school education, 37% some high school education, 42% had obtained a matric certificate, and 15% had completed higher education. Most (87%) were under the age of 35. The mean age of the sample was 27.8, *SD*=6.03. Most of the sample identified as African (96%), and 4% as Coloured[5]. A quarter of the sample (25%) were experiencing their first pregnancy. 20% of the sample were in their first trimester of pregnancy, 46% in the second, and 34% in the third. The mean gestational age was 21 weeks, *SD*=9.1. A third of the sample (34%) were married or cohabiting; 6% reported IPV during their current pregnancy; and 41% were living with a regular drinker. Demographic characteristics of the sample are displayed in Table 1.

[5] Race is used here as a socially constructed cultural concept, not a biological one. Although this research rejects the ideology that produced racial categories, it is acknowledged that racial identities continue to influence the lives of South Africans (Seekings, 2008).

Table 1

Sample Demographics

Variable	*n*	%
18-25 years old	440	40.0
26-35 years old	519	47.22
36-45 years old	136	12.37
>45 years old	4	0.36
No Formal Education	9	0.84
Some Primary School	55	5.14
Some High School	395	36.88
Matric Education	449	41.92
Higher Education	163	15.22
Employed (inc. Maternity Leave	336	31.46
Unemployed	732	68.54
Nulliparous	232	24.97
Multiparous	697	75.03
African	1049	96.15
Coloured	41	3.76
White	1	0.09

< 12 weeks pregnant	170	20.43
13 - 24 weeks pregnant	379	45.55
>24 weeks pregnant	283	34.01
Married/cohabiting	357	34.23
Not married/cohabiting	686	65.77
Partner violence during pregnancy	58	5.54
No partner violence during pregnancy	988	94.46
Regular drinker in the home	424	41.21
No other drinker in the home	605	58.79

3.4 Ethical Considerations

Permission for this study was obtained from the Rhodes University Ethical Standards Committee (ethical tracking number RU-HSD-16-05-0001) and the Eastern Cape Department of Health. Given that the data were being collected by the nurses who would provide the health services participants were seeking, informed and voluntary consent was of particular importance. For this reason, information sheets inviting women to participate in the study described the goal of the study and affirmed that refusal to participate in the study would not affect participants' access to service at data collection sites (Addendum B). No identifying

information was recorded as part of this study with the exception of birth dates and signatures, which were necessary to indicate consent. Only antenatal care users aged 18 or older were eligible for the study, as special permission needed for the recruitment of minors was not obtained. Contact details of the principal researcher were available on the information sheet, which was kept by participants.

Risk of harm to participants was judged to be low, although disclosure in response to certain items (such as experience of partner violence) could possibly have elicited aversive responses in some participants. In such cases, data collectors were well equipped to contain participants by virtue of being trained health service providers and familiar with referral resources in the area. Participants were expected to benefit from thorough screening for alcohol use and open, confidential discussion with health service providers.

3.5 Procedures

Health service providers (trained nurses) providing antenatal care at participating clinics were invited to a one-day workshop to introduce them to the goals of the study and familiarize them with the administration of the questionnaire. The workshop included mock interviews followed by critique and questions by each of the health service providers. Once health service providers were competent in administration of the questionnaire, they were given folders containing information sheets, consent forms, and questionnaires.

During the data collection phase, each pregnant woman over the age of 18 seeing one of the participating health service providers for antenatal care was presented with an information sheet and invited to participate in the study. If a participant was willing, both the participant and health service provider signed the consent form (Addendum B) and completed the questionnaire (Addendum C), either through self-report or interview in the participant's language of choice.

3.6 Measures

The questionnaire used in this study was kept as brief as possible in order to fit within the time usually allocated to discussion of alcohol use in consultations with pregnant patients. Thus, a 21-item questionnaire was used. Of these items, eleven enquired independent variables chosen for this analysis. These were age, gestation, race, parity, employment, education, being married or cohabiting with a partner, experiencing intimate partner violence during current pregnancy, and living with another regular drinker. The remaining ten items consisted of the alcohol use measure chosen for this study.

The Alcohol Use Disorder Identification Test (AUDIT) is a 10 item, zero-to-four Likert-scale measure of alcohol use developed by the World Health Organisation to aid early identification of problematic drinking (Babor et al., 2001). The AUDIT was developed using a multi-country sample with the intention of creating a measure that could identify those in need of intervention across cultural contexts (Saunders, Aasland, Babor, De la Fuente, & Grant, 1994). The AUDIT has been a staple of South African alcohol research over the last two decades and has been proven to be internally consistent as well as practical in research with pregnant women in the South African context (Brittain et al., 2017; Choi et al., 2014; Louw et al., 2011; Pengpid, Peltzer, & Van der Heever, 2011). In this study, the AUDIT achieved a level of internal consistency measured by Cronbach's alpha ($\alpha = .81$) that was consistent with previous research (Meneses-Gaya, Zuardi, Loureiro, & Crippa, 2009). An AUDIT score of 7 or higher was taken to indicate a pattern of consumption likely to cause harm in the future or already have caused harm, called hazardous/harmful drinking.

The AUDIT consists of three domains (WHO, 2001). The first, called Hazardous Alcohol Use, enquires the frequency of alcohol use, the typical quantity consumed, and the frequency of alcohol use that exceeds a certain threshold. This domain is also called the AUDIT-C and is a useful three-item measure in itself (Morojele et al., 2017). A score on the AUDIT-C of 3

or more was taken to indicate consumption likely to cause harm to the participant or foetus, hereafter called risky drinking, as in Peltzer and Pengpid's national study (2019).

The second domain, called Dependence, enquires the frequency of three symptoms conceptualized as related to dependence: impaired control of drinking, failure to fulfil expected roles as a result of drinking, and drinking in the morning to ease withdrawal. The last domain is called Harmful Alcohol Use and tries to ascertain the frequency of alcohol-related harm by checking experienced guilt after drinking, blackouts, injuries, and expressed concern by others.

All research materials were translated into Afrikaans and isiXhosa, two languages spoken in the study area, through backward and forward translation. With assistance from the Rhodes University School of Languages, the existing English questionnaire was translated into Afrikaans and isiXhosa. The result was then independently translated into English and compared to the original to check quality and comprehensibility. This was repeated until all parties, including the head researchers and native speakers of the destination languages, were satisfied.

3.7 Analysis

Data for this study were analysed using Stata 13 (Statacorp, 2013). Variables associated with reported alcohol consumption (AUDIT-C > 1) were identified using analysis involving the entire sample (N = 1099). Variables related to patterns of consumption, such as risky drinking (AUDIT-C>3), were analysed among the general sample and among only participants that reported drinking (n = 396). As is common in epidemiological research (Harerimana, Nyirazinyoye, Thomson, & Ntaganira, 2016; Manzi et al., 2014; Rwabufigiri, Mukamurigo, Thomson, Hedt-Gautier, & Semasaka, 2016), this analysis involved a two-step process of bivariate analysis to identify explanatory variables followed by backward stepwise regression

to eliminate variables that were not statistically significant when controlling for other variables.

Frequency tests were used to identify variables related to binary outcomes (drinking, risky drinking, dependence, and binge drinking). First, bivariate analysis was conducted via chi-square to identify associations between each predictor variable and the outcome. The chi-square test of independence is a non-parametric test of frequencies or counts (McHugh, 2013). In this study, it was used to test the assumption that a participant's likelihood of being in a particular category of one variable (e.g., under 25) was unrelated to their likelihood of being in one category of another (e.g., risky drinking). Those variables found significantly associated with changes in the outcome variable were then entered into logistic regression to produce a general explanatory model (Thomson, 2014). Logistic regression is a test of probability that calculates the effect of change in one variable on the likelihood of a specific outcome in another (called an odds ratio). In addition, logistic regression can be used to calculate odds ratios when other variables are theoretically held constant, theoretically isolating the effect of single variables (Peng, Lee, & Ingersoll, 2002). To avoid exclusion of useful variables from the logistic regression model, significance for bivariate analysis was set generously at $p = .1$ (Thomson, Bah, Rubanzana, & Mutesa, 2015). Significance for regression analysis was set more conservatively at $p = .05$.

Means tests were used to identify factors related to differences in continuous variables (ie. AUDIT and AUDIT-C scores) following a similar process of bivariate analysis and regression described above. Student's T-test is a statistical test of the likelihood that the difference between two mean scores in an observed sample represent an actual difference between the two groups in the population from which the sample was drawn (Livingston, 2004). Student's T-tests were used to test relationships between nominal and ordinal variables and AUDIT-C scores at $p = .1$. Those variables found related to differences in

AUDIT-C scores were entered into linear regression models to identify variables independently associated with differences in drinking pattern at $p = .05$.

3.8 Conclusion

This chapter has described the process of gathering and analysing the data used in this study. The methods described are borrowed mostly from previously published research on drinking in South Africa, and especially among women attending public antenatal care facilities. Specifically, the measure of alcohol use patterns used in this study, the AUDIT, was used in much of the existing literature on the topic and so its use here is intended to produce results that complement existing literature. The length of the questionnaire used in this study limits the variables that may be investigated but allows for less disruptive administration in a public health setting. While the methods of statistical analysis used here are standard, the extra step of conducting identical analysis on a subsample of the data may prove useful in extracting more interpretable results from data. The results are presented in the next chapter.

CHAPTER FOUR
Results

4.1 Introduction

This chapter presents the results of the analysis. As the demographic characteristics of the sample are described in the previous chapter, this chapter begins with the observed distribution of outcome variables in the sample. The first section describes the patterns of drinking, defined by the frequency and volume of consumption, most prevalent in the sample as well as the portions of the sample meeting criteria for risky and hazardous/harmful drinking.

The second section then describes the results of each step of the stepwise regression: predictor variables identified in bivariate analysis are listed, followed by the results of multivariate analysis conducted with those variables identified in the previous step. The results are presented here as succinctly as possible, and the tables in this chapter may serve as a reference when the interpretation of these results is discussed in the next chapter.

4.2 Descriptive Statistics

More than a third of the sample reported some alcohol use (n=396, 36.36%). In most cases, alcohol use was infrequent: 64% of drinkers drank less than monthly, a further 29% drank less than weekly. However, heavy alcohol use is apparent in the data. Although 71% of those who reported drinking reported usually having 4 or fewer drinks per session, 63% reported occasionally having more than six drinks. Among drinkers, 59.63% met criteria for risky drinking[6], 52% met criteria for hazardous/harmful drinking, and 55% endorsed items concerning dependence. The mean AUDIT-C score among drinkers was 3.5 (SD = 2.16) and the mean AUDIT score was 7.81 (SD = 5.38). Thus, on these measures, the mean scores for

[6] Score of 3 or more on the AUDIT-C

those reporting alcohol use in this sample lie beyond cut-off points for risky drinking and hazardous/harmful drinking[7] respectively, with high variance.

Table 2

Frequency of Outcome Variables

Variable	*n*	*% of sample*	*% of drinkers*
Never drank	693	63.64	-
Drank monthly/less	254	23.32	64.14
Drank 2-4 times per month	114	10.47	28.79
Drank 2-3 times per week	14	1.29	3.54
Drank >4 times per week	14	1.29	3.54
1-2 Drinks per occasion	327	29.75	35.71
3-4 Drinks per occasion	133	12.10	32.76
5-6 Drinks per occasion	76	6.92	18.47
7-8 Drinks per occasion	8	0.73	1.97
10+ Drinks per occasion	29	2.64	4.19
Binge Drinking	246	22.8	62.69
Risky Drinking	226	21.08	59.63
Hazardous/Harmful	180	22.17	52.02

[7] Total AUDIT score of 7 or more.

Drinking				

*: $p < .05$; **: $p < .01$

4.3 Inferential Statistics

4.3.1 Likelihood of alcohol use

Chi-square tests of independence showed significant relationships between the likelihood of alcohol use during the last twelve months and the following variables: age, race, married/cohabit, intimate partner violence during current pregnancy, and living with a regular drinker. Logistic regression analysis found four of these variables independently and significantly associated with the likelihood of self-reported alcohol use. Risk factors were living with a regular drinker, intimate partner violence during current pregnancy, and identifying as Coloured. Being married/cohabiting was identified as a protective factor. Odds ratios reported in Table 3 indicate that those who reported drinking were 2.74 times more likely to identify as Coloured than to identify to as African, 1.98 times more likely to live with a regular drinker, and .71 times as likely as those who did not drink to be married/cohabiting. The full model was statistically significant at $p < .01$.

Table 3

Covariates of Drinking in the General Sample

Variable	*n(%)*	X^2	Odds Ratio	95% CI
18-25 years old	163 (37.30)	7.32	1	-
26-35 years old	197 (38.33)		1.09	.82 – 1.45
36-45 years old	35 (26.12)		.71	.44 – 1.12

>45 years old	1 (25.00)		.75	.06 – 9.17
African	368 (35.42)	9.06	1	-
Coloured	23 (56.10)		2.74**	1.40- 5.36
Not married/cohabiting	267 (38.98)	2.79	1	-
Married/cohabiting	120 (33.71)		.71**	.53 - .95
No partner violence during pregnancy	351 (35.60)	12.47	1	-
Partner violence during pregnancy	34 (58.62)		2.42**	1.38 – 4.27
Regular drinker in the home	193 (45.73)	22.90	1.98**	1.51 – 2.58
No other drinker in the home	188 (31.07)			

*: $p < .05$; **: $p < .01$

4.3.2 Risky drinking

In the general sample, bivariate analysis showed significant relationships between risky drinking and the following variables: race, intimate partner violence during current pregnancy, and living with a regular drinker (see Table 4 below). Logistic regression found living with a regular drinker and race significantly, independently, and positively associated

with risky drinking. Intimate partner violence during current pregnancy failed to be significant when controlling for race and living with a regular drinker, $p > .05$. Odds ratios indicate that risky drinkers were 1.96 times more likely to identify as Coloured, 2.02 times more likely to live with a regular drinker, and 1.78 times more likely to have experienced intimate partner violence during the current pregnancy, although this last effect was only marginally significant. The full model was statistically significant at $p < .01$.

Among drinkers, only living with a regular drinker was significantly associated with self-reported risky drinking in bivariate analysis, X^2 (1, n = 371) = 2.69, p = .10. However, this relationship failed to be significant in logistic regression (OR: 1.42, 95% CI: .93, 2.15, p=.1). Thus, none of the categorical variables tested were significantly related to risky drinking among those who reported alcohol use.

Table 4

Covariates of Risky Drinking in the General Sample

Variable	***n(%)***	***X²***	**Odds Ratio**	**95% CI**
African	209 (20.45)	4.73	1	-
Coloured	14 (34.15)		1.96*	1.01- 3.81
No partner violence during pregnancy	203 (20.80)	6.50	1	-
Partner violence during pregnancy	20 (35.09)		1.78	1.00 - .319

No other drinker in the home	99 (16.61)	21.81	1	
Regular drinker in the home	121 (28.88)	21.81	2.03**	1.49 – 2.76

* : $p < .05$; ** : $p < .01$

4.3.3 Hazardous and harmful drinking

In the general sample, bivariate analysis found significant relationships between hazardous/harmful drinking as measured by AUDIT scores of 7 or above and the following variables: parity, education, intimate partner violence during current pregnancy, and living with a regular drinker (see Table 5 below). Logistic regression found all four these variables significantly and independently related to hazardous/harmful drinking, such that women who had previously given birth, experienced intimate partner violence during their current pregnancy, and lived with a regular drinker were more likely to score 7 or above on the AUDIT, and women who had obtained a Matric certificate were less likely.

Table 5

Covariates of Hazardous/Harmful Drinking in the General Sample

Variable	***n(%)***	***X^2***	**Odds Ratio**	**95% CI**
No Matric	88 (26.27)	5.09	1	-
Matric Education	90 (19.52)		.66*	.46 - .96
Nulliparous	29 (17.06)	3.75	1	-
Multiparous	127 (24.19)		1.66*	1.04 – 2.65

No partner violence during pregnancy	160 (21.11)	7.59	1	-
Partner violence during pregnancy	18 (38.30)		2.62**	1.32 – 5.22
No other drinker in the home	79 (17.32)	14.74	1	
Regular drinker in the home	97 (28.78)		2.0**	1.41 – 2.99

Among drinkers, parity, age, education, and living with a regular drinker were significantly associated with hazardous/harmful drinking in bivariate analysis (see table 6). Logistic regression found primary school education and living with a regular drinker independently, significantly and positively associated with hazardous/harmful drinking among drinkers, such that drinkers who lived with another drinker were 1.7 times as likely, and drinkers who had obtained no more than primary school education were 4.2 times as likely to score above 7 on the AUDIT, indicating high risk of future or current physical, emotional or social harm associated with alcohol use.

Table 6

Covariates of Hazardous/Harmful Drinking Among Drinkers

Variable	***n(%)***	X^2	**Odds Ratio**	**95% CI**
18-25 years old	63 (44.06)	7.05	1	-
26-35 years old	98 (57.99)		1.40	.81 – 2.42
36-45 years old	18 (54.55)		1.00	.39 – 2.54

>45 years old	1 (100)		-	-
No Formal Education	3 (100)	10.36	1	-
Some Primary School	14 (77.78)		4.22*	1.16 – 15.38
Some High School	71 (54.62)		1.77	.88 – 3.56
Matric Education	67 (48.91)		1.41	.70 – 2.81
Higher Education	23 (42.59)		-	-
Nulliparous	29 (41.43)	3.82	1	-
Multiparous	127 (54.74)		1.52	.81 – 2.84
No other drinker in the home	79 (46.47)		1	-
Regular drinker in the home	97 (57.06)	3.82	1.71*	1.06 – 2.76

4.3.4 Binge drinking

Intimate partner violence during current pregnancy, X^2 (1, 1040) = 6.12, p = .01 and living with a regular drinker X^2 (1, 1022) = 31.06, p < .01 were significantly associated with binge drinking in the general sample. When controlling for living with a regular drinker, intimate partner violence during current pregnancy failed to be significant, p = .07. In the resulting logistic regression model, those living with a regular drinker were more than twice as likely to binge drink as those who did not (95% CI: 1.64, 2.97, p < .01).

Table 7

Covariates of Binge Drinking in the General Sample

Variable	*n(%)*	X^2	Odds Ratio	95% CI
No partner violence during pregnancy	222 (22.58)	6.12	1	-
Partner violence during pregnancy	21 (36.84)		1.71	.97 – 3.04
No other drinker in the home	104 (17.36)	31.06	1	-
Regular drinker in the home	137 (32.39)		2.21**	1.64 – 2.97

*: $p < .05$; **: $p < .01$

Among drinkers, bivariate analysis found living with a drinker and race significantly related to binge drinking. When both variables were entered into a logistic regression model, race failed to be significant. Drinkers who lived with a regular drinker were 1.69 times as likely to binge drink as those who did not.

Table 8

Covariates of Binge Drinking Among Drinkers

Variable	*n(%)*	X^2	Odds Ratio	95% CI
African	229 (63.97)	3.88	1	-
Coloured	10 (43.48)		.46	.20 – 1.09
No other drinker in	103 (56.59)	6.28	1	-

the home				
Regular drinker in the home	134 (69.07)		1.69	1.10 – 2.59

**: p < .05; **: p < .01*

4.3.5 Reported dependence

In bivariate analysis in the general sample, the likelihood of reporting any of the symptoms related to dependence on the AUDIT was related to intimate partner violence during current pregnancy, married/cohabiting, and education. Results of logistic regression indicated that all three variables were independently associated with participants' responses to items concerning dependence. Women who had completed matric were about half as likely as those who did not, women who were married/cohabiting were .68 times as likely as those who were not, and women who had experienced intimate partner violence were more than twice as likely as those who did not to endorse items related to dependence on the AUDIT.

Table 9

Covariates of Reported Dependence in the General Sample

Variable	***n(%)***	X^2	**Odds Ratio**	**95% CI**
No Matric	106 (46.29)	10.46	1	-
Matric	101 (32.58)		.55**	.39 - .79
No intimate partner violence during current pregnancy	187 (36.67)	7.59	1	-

Intimate partner violence during current pregnancy	22 (59.46)		2.37*	1.18 – 4.75
Not married/Cohabiting	151 (41.14)	3.92	1	-
Married/Cohabiting	59 (32.42)		.68*	.46 – 1.00

*: $p < .05$; **: $p < .01$

Among drinkers, education was significantly associated with endorsing items of dependence, X^2 (1, n = 364) = 8.25, $p < .01$ as was race X^2 (2, n = 367) = 6.40, p = .04. Multiple logistic regression indicated that women who identified as Coloured were .26 times as likely as those who identified as African (95% CI: .10, .65, $p < .01$) to endorse items related to dependence, while women who had obtained matric certificates were .47 times as likely as those who had not (95% CI: .31, .73, $p < .01$). Logistic regression analysis was then repeated, adding AUDIT-C scores to the model, which is described in Table 10 below. AUDIT-C scores were significant in the second model, indicating that every point increase in AUDIT-C scores increased odds of reporting dependence among drinkers by about 30%. However, calculated odds ratios were virtually identical for race and education between the two models, indicating that these effects were independent of reported consumption.

Table 10

Covariates of Reported Dependence Among Drinkers

Variable	***n(%)***	***X²***	**Odds Ratio**	**95% CI**
No Matric	104 (51.49)	8.25	1	-

Matric	98 (48.51)		.47**	.30 - .75
African	195 (56.69)	5.17	1	-
Coloured	7 (31.82)		.24**	.09 - .63
AUDIT-C	-	-	1.3	1.16 – 1.47

*: $p < .05$; **: $p < .01$

4.3.6 Audit-C

In the general sample, two-tailed t-tests indicated significant differences in mean scores by living with a regular drinker, $t(1013)=5.08$, $p<.01$, intimate partner violence during current pregnancy $t(1033)=3.01$, $p<.01$, married/cohabiting, $t(1028)=1.79$, $p=.07$, education, $t(1048)=1.77$, $p=.08$, and race, $t(1063)=2.25$, $p=.02$. Education failed to be significant in multiple linear regression analysis, $p = .09$. Living with a regular drinker, experiencing intimate partner violence during current pregnancy, being unmarried/not cohabiting, and identifying as Coloured were all independently associated with higher alcohol consumption as measured by the AUDIT-C, $F(5, 968) = 9.62$, $p<.01$, $R^2=.05$, $R^2_{adjusted}=.04$.

Among drinkers, two-tailed t-tests indicated significant differences in mean scores by living with a regular drinker, $t(367)=1.74$, $p=.08$. However, the effect failed to meet significance in a simple linear regression, $p=.08$. Thus, none of the continuous variables tested were significantly associated with higher consumption as measured by the AUDIT-C among drinkers.

4.3.7 AUDIT

In the general sample, two-tailed t-tests indicated significant differences in mean AUDIT scores by Matric Education, intimate partner violence during current pregnancy, and living

with a regular drinker. Logistic regression found all three mentioned variables independently and significantly associated with higher likelihood of alcohol-related harm as measured by the AUDIT.

Among drinkers, those without a matric education (m=8.74, sd=5.73) scored significantly higher on the AUDIT than those who reported completing matric (m=7.13, sd=5.02), $t(340)=2.77$, $p<.01$. This effect remained significant in linear regression, $F(1, 340) = 7.65$, $p<.01$, $R^2=.02$, $R^2_{adjusted}=.02$. The coefficient (B=-1.61) indicated that matric education corresponded, on average, to a score 1.61 points lower on the AUDIT among drinkers.

4.4 Conclusion

The results presented in this chapter present the detailed outcomes of individual statistical procedures. In the next chapter, significant results and noteworthy non-significant results are discussed and interpreted with reference to existing literature.

CHAPTER FIVE
Discussion

5.1 Introduction

This chapter interprets the main findings of the study with reference to existing literature. The first section focuses on the patterns of alcohol use observed in this sample in comparison to those observed in previous South African studies. The factors found related to the participants' likelihood of reporting drinking, binge drinking, or meeting criteria for hazardous/harmful use on the AUDIT are then discussed with the intention of guiding intervention.

5.2 Main Findings

5.2.1 Patterns of Alcohol Use

In this sample, the portion of participants reporting alcohol use (36%) was much higher than the 17% of female participants observed in a national representative sample in 2008 (Peltzer et al., 2011), and the 6.6% of antenatal care users in Mpumalanga (Louw et al., 2011). Some of the difference may be explained by methodological differences: the previous studies enquired alcohol use over the past month, and the current study over the past 12 months. The prevalence of reported alcohol use in this study was also higher than that observed in the UK (28.5%), Russia (26.5%), Switzerland (20.9%), Norway (4.1%), Sweden (7.2%), and Poland (9.7%) by Mardby, Lupattelli, Hensing, and Nordeng (2017). In the latter study, 58.7% of those reporting antenatal alcohol use drank less than 3 units of alcohol over the course of the pregnancy.

Among those reporting alcohol use in this study, most drank on a less than monthly basis, normally consuming four or fewer drinks, but occasionally having six or more. This is reflected on the domains of the AUDIT: almost 60% of participants who reported drinking met criteria for risky drinking on the AUDIT-C. On the full AUDIT, more than half of participants reporting drinking met criteria for hazardous/harmful drinking, indicating that

their reported pattern of alcohol consumption was likely to cause them physical or social harm if it had not already. This pattern of heavy occasional consumption is consistent with previous South African research (Vellios & Van Walbeek, 2018), confirming that problematic patterns of alcohol consumption are common among pregnant women reporting alcohol consumption in this area of the Eastern Cape.

5.2.2 Factors Associated with Alcohol Use

5.2.2.1 Living with a Drinker

In this study, participants who reported sharing a home with someone who drinks regularly were more likely to report alcohol use themselves. This finding is consistent with research in the Western Cape that found the home environment to be a significant determinant of drinking behaviour (Lesch & Adams, 2016; May et al, 2005). In addition, drinkers in this study who lived with a drinker were more likely to binge drink, and more likely to meet criteria for hazardous/harmful drinking than those who did not live with a drinker. Thus, these results show that the presence of a regular drinker in the home was associated with higher likelihood and severity of alcohol use among women attending antenatal clinics in the study area.

This study enquired about the presence of any regular drinker in the home, not specifically the drinking habits of a romantic partner, as in previous research (Petersen-Williams et al., 2018). Given the relationship between alcohol and intimate partner violence, which is discussed later in this chapter, the drinking habits of intimate partners are of special interest to this research. However, living with a drinker was defined in this study by the presence of any regular drinker in the home, and controlling for whether participants were married/cohabiting did not explain the effect of another drinker in the home on self-reported alcohol use.

Regardless of the other drinker's relationship to the participant, these findings indicate a strong influence of the home context on women's drinking behaviour. This is of vital importance to the development of interventions to decrease antenatal alcohol use and the incidence of FASD. To date, routinely recommended interventions have focused heavily on individual counselling and creating awareness of FASD (Floyd, Weber, Denny, & O'Connor, 2009), despite a lack of evidence to support the efficacy of knowledge-based approaches (Lachausse, 2008; Fletcher et al., 2018). The evidence presented here implies that a complete understanding of alcohol use during pregnancy must include consideration of environmental factors. Individual or neurocognitive models of decision-making (e.g., Goudriaan, Grekin, & Sher, 2011), when viewed in isolation, are unable to explain the variation in behaviour according to home circumstances observed in these results.

5.2.2.2 Married/cohabiting

In this study, participants who reported being married or living with a partner were less likely to report alcohol use. Participants in the general sample were also less likely to endorse any of the items related to dependence on the AUDIT if they reported being married or living with a partner. No relationship was found between being married/cohabiting and patterns of alcohol use as measured by the AUDIT.

Previous studies have indicated a relationship between relationship status and women's alcohol use, but defined variables in a manner slightly different to the current study. Louw et al.'s study of women attending antenatal care in Mpumalanga found alcohol consumption to be more likely among women who had reported having more than one sexual partner in the last 12 months (2011). In a national sample of the general population, female participants who reported living with a partner or being single were more likely to binge drink than females who were married (Vellios & Van Walbeek, 2018). Research from the United States has reported similar findings (Denny, Acero, Naimi, & Kim, 2019; Shmulewitz & Hasin,

2019). The current study thus replicates previous findings of a relationship between alcohol use and romantic and/or sexual relationships and suggests that this relationship persists during pregnancy.

It is possible that the described findings reflect some protective function by the presence of a partner on participants' drinking. Social support is taken to explain the well-observed relationship between marriage and psychological wellbeing (Soulsby & Bennett, 2015), and women who drank during pregnancy in the current area of study described a lack of partner support as contributing to their alcohol use (Macleod, Matebese, & Tsetse, 2020). The lower likelihood of drinking among married or cohabiting participants in this study may thus represent a lowered need to use alcohol when adequate support is received from partners.

However, this study did not measure the quality of marital/cohabiting relationships, and it should not be assumed that all participants in such relationships received adequate support from their partners. Therefore, the inverse relationship between marriage/cohabiting and likelihood of self-reported alcohol use may result from less supportive partner practices, such as restricting participants' access to alcohol. A third explanation is that the observed relationship merely represents a lower likelihood of establishing and maintaining cohabiting/marital relationships among those reporting alcohol use.

It is noteworthy that likelihood of self-reported alcohol use was the only outcome variable found related to marital/cohabiting status. In other words, although married/cohabiting participants were less likely to report using alcohol, these data provide no evidence that they were less likely to drink riskily, hazardously, or binge drink. More research is needed to understand the interactions between intimate relationships and alcohol use.

5.2.2.3 Race

Participants identifying as Coloured were more likely to report some alcohol use in this study. This is consistent with large-scale studies of the general population (Peltzer and

Ramlagan, 2009) and focused surveys of women attending antenatal health facilities (Petersen-Williams et al., 2018). This analysis cannot offer any explanation for this observation, and as race is regarded here as a socially constructed concept, any notion of inherent tendencies is explicitly rejected.

London (1999) argues that a culture of drinking was established among so-called Coloured farm workers in the Western Cape by the practice of distributing alcohol in lieu of wages. It is impossible to determine whether and to what extent this practice influences the drinking behaviours in the rest of the country, but London's argument shows how the relationship of race to alcohol use can be understood by considering historic, economic, and cultural factors.

Among participants who reported drinking in this study, participants who identified as Coloured were less likely to endorse items of dependence, even when controlling for drinking patterns. It should be noted that the items dedicated to dependence on the AUDIT only concern three of the 11 symptoms of Alcohol Use Disorder in the Diagnostic and Statistics Manual of Mental Disorders and should thus not be used as a diagnostic tool (American Psychiatric Association, 2013). However, meeting criteria for hazardous/harmful drinking on the full AUDIT have been found to predict Alcohol Use Disorder, and no relationship was found between race and hazardous/harmful drinking in this study. Thus, the difference in endorsement of items on the dependence domain of the AUDIT do not indicate a difference in prevalence of Alcohol Use Disorder. Nonetheless, it is noteworthy that women who scored identically on the AUDIT-C were less likely to endorse items on the dependence domain of the AUDIT if they identified as Coloured. These items concern failure to fulfil a social or work role due to alcohol use, consuming alcohol in larger volume or over longer duration than intended, and taking alcohol to ease withdrawal.

5.2.2.4 Education

Drinkers in this study did not significantly differ from non-drinkers in educational attainment. Nor was any difference observed by level of education in likelihood of binge drinking or meeting criteria for risky drinking as measured by the AUDIT-C. However, among drinkers and in the general sample, education was associated with lower likelihood of hazardous/harmful drinking. In other words, women who had completed more years of schooling were less likely to be judged as at risk of alcohol-related harm on the AUDIT, even if they had reported alcohol use. Furthermore, women who reported completing matric education were less likely to endorse any of the items on the dependence subscale of the AUDIT.

In this study, then, education was related to fewer reported negative outcomes related to alcohol, even though education did not predict different patterns of consumption. The items that measure these negative outcomes are the three items of the dependence domain discussed above as well as items seven to ten on the AUDIT (see Appendix C) that enquire about guilt or remorse after drinking, amnesia the day after drinking, injuries related to drinking, and concern of others regarding the participant's drinking, respectively. These data would suggest that participants with more years of education are somehow less susceptible to these outcomes at a given level of consumption.

It could be expected that formal education would assist participants in consuming public health information regarding harmful alcohol use. At the very least, users of public health services require literacy to engage with information that is not offered verbally by healthcare or social workers. Thus, formal education would allow participants access to additional information, or at least offer an additional medium through which information may be received. However, it is not clear that access to information affects the drinking patterns of pregnant women. Multiple studies in other parts of the world have indicated that consumption

prior to pregnancy more accurately predicts consumption during pregnancy than does knowledge of adverse effects to the foetus (Chang, McNamara, Orav, & Wilkins-Haug, 2006; Kim & Park, 2011). In the current study, participants who had completed more formal education were no less likely to drink or to drink at risky levels, despite assumed greater ability to consume information about the harmful effects.

Despite similar patterns of drinking, negative outcomes related to alcohol use were reported at a lower rate among more educated participants. It is possible that education helped drinkers in this sample to practice behaviours that mitigate their risk of alcohol-related harm at a given level of consumption. For such behaviour to be attributed to education, drinkers with more education would have to practice such behaviours as the result of knowledge gained through their education. As these data do not indicate a difference in likelihood or pattern of drinking, any behaviours that explain observed differences in alcohol-related outcomes by education must mitigate the harmful effects of alcohol without reducing the volume or frequency of consumption. Examples of such behaviours may be drinking where it is safe to do so, for example at home rather than in public, or drinking when it is less likely to cause disruptions in other aspects of the participant's life. These examples require that the drinker has control over where and when alcohol is available, which does not automatically follow from formal education. Furthermore, it should not be assumed that drinkers who are formally educated have greater insight into the consequences of their drinking behaviours. Given a lack of evidence for greater adaptive drinking behaviour among more educated participants, it is likely that the observed effect of education on alcohol-related harm represents a different protective factor that is disproportionately distributed among those with different levels of education.

It is possible that participants with more formal education were more likely to be familiar with the concept of Alcohol Use Disorder and thus better able to present themselves in a

positive light by denying certain outcomes associated with problematic alcohol use. If this were the case, these participants would be expected to underreport their alcohol consumption in addition to the related outcomes. Given that no significant difference exists in drinking patterns by education in this sample, systematic underreporting of consumption by participants with more formal education would imply that these participants actually consumed more alcohol than those with less education. However, as there is no evidence of systematic underreporting by one demographic in the sample, it is assumed that the observed effects are valid, and that education indirectly protects against some of the undesirable outcomes related to alcohol consumption.

It is important to note that the risk of alcohol-related harm, as measured by the participant's score on the full AUDIT, applies to the individual drinker. The AUDIT-score indicates a person's risk of future mental or physical harm resulting from alcohol use (Allen, Litten, Fertig, & Babor, 1997). During the short term of pregnancy, however, harm to the developing foetus is estimated only by pattern of alcohol consumption, which is measured by the AUDIT-C. On this measure, no difference was found by education in this study. Thus, while these results indicate that formal education is associated with lower risk of personal harm from alcohol use in the long term, no evidence was found to suggest a protective function of education on the risk of Foetal Alcohol Spectrum Disorders.

5.2.2.5 Employment

No effect was found for employment on likelihood or pattern of alcohol use. The pattern of infrequent drinking common among drinkers in this study may be compatible with full-time employment. As 92% of drinkers in this study drank once a week or less frequently, drinking behaviours could plausibly be timed so as not to interfere with occupational roles. Those who reported more frequent alcohol use in this sample were few (n = 28), limiting the power of this analysis to detect effects within this group. Therefore, these results are not necessarily

inconsistent with previous research that found unemployment related to antenatal alcohol use in South Africa (Peltzer & Pengpid, 2019).

5.2.2.6 Intimate Partner Violence

In this sample, 5.5% of women reported intimate partner violence. This figure is much lower than the 29.3% observed in a nationally representative sample of women (Gass, Stein, Williams, & Seedat, 2011) and lower than the 8.7% of pregnant women reporting physical intimate partner violence in a Durban study (Groves, Moodley, McNaughton-Reyes, Martin, Foshee, & Maman, 2015). This discrepancy may be explained by differences in methodology. The first study surveyed experienced intimate partner violence over participants' lives, while the latter included acts of violence perpetrated during pregnancy and up to nine months postpartum: a total period of 72 weeks. Louw, Peltzer, and Matseke observed that 8.5% of women included in the Mpumalanga study of antenatal care users reported physical partner violence over the previous 6 months (2011). This study only enquired participants' experience of physical partner violence during the current pregnancy; mean gestational age in this sample was 21 weeks.

Despite the difference in observed rates of intimate partner violence, these results replicate previous observations of a relationship between intimate partner violence and alcohol use (Davis, Rotheram-Borus, Weichle, Rezai, & Tomlinson, 2017; Choi et al., 2014; Louw et al., 2011; Petersen-Williams et al., 2018). In this study, this effect was independent of other variables in logistic regression analyses. In other words, women who experienced intimate partner violence during their current pregnancy were more likely to drink, regardless of the other variables related to drinking in this study: living with another drinker, identifying as Coloured, and being unmarried and not cohabiting. Intimate partner violence was also associated with endorsing items on the dependence domain of the AUDIT, indicating that these participants were more likely to suffer from specific alcohol-related problems.

The relationship between alcohol consumption and intimate partner violence is complex, and a causative role of either is debated (Foran & O'Leary, 2008). However, no doubt exists that the likelihood and severity of intimate partner violence is positively related to alcohol use (Wilson, Graham, & Taft, 2014). Although these data cannot imply causality, the findings of the current study are consistent with the view that the high rates of risky drinking and intimate partner violence faced by South African women of childbearing age should be understood as contributing to one another (Russell, Eaton, & Petersen-Williams, 2013). In the area of the current study, women who drank during pregnancy described alcohol use as an important means of dealing with stressors (Macleod et al., 2020). Given that symptoms of depression predict antenatal alcohol use among vulnerable pregnant women (Davis et al., 2017; Vythilingum, Steyn, Roos, Faure, & Geerts, 2012), threats to wellbeing, such as intimate partner violence, need to be considered by interventions aimed at drinking reduction.

5.3 Conclusion

This chapter has discussed the main findings of this study and attempted to draw meaning from these observations through comparison with previous research and some speculation. The final chapter considers the scope and contribution of this paper before suggesting directions for future research.

CHAPTER SIX
Conclusion

6.1 Introduction

It is well established that patterns of alcohol consumption pervasive in South Africa, such as binge drinking, lead to adverse outcomes in health and personal functioning (Peltzer et al., 2009; WHO, 2018). Previous research had shown that problematic alcohol use was prevalent among pregnant women in some parts of South Africa, causing neurodevelopmental impairment in offspring in addition to the personal outcomes associated with heavy alcohol use (Louw et al., 2011; May et al, 2005). This study expands the empirical literature on antenatal alcohol use in South Africa by describing results from a peri-urban setting in a previously understudied area of the country.

This chapter aims to summarise the most salient aspects of the study. The main findings of the study are reviewed before methodological considerations are reviewed. Finally, limitations of this study are used to suggest areas for future research.

6.2 Summarised Findings

This study confirms problematic alcohol use among pregnant women in the Eastern Cape. More than a third of participants in this sample reported alcohol use. This portion exceeds those observed in previous studies in South Africa (Louw et al., 2011) and Europe (Mardby et al., 2017). Among those reporting alcohol use in this study, the majority acknowledged binge drinking and met criteria for risky drinking as well as hazardous/harmful drinking. Thus, the alcohol use represented by these data is not only widespread, but also dangerous.

The findings of this study indicate that drinking behaviour was related to participants' domestic contexts. Alcohol use by others in the home was found to be a major predictor of participants' alcohol use, such that drinking was significantly more prevalent among those who reported living with a regular drinker. Even among drinkers, living with a regular drinker was associated with binge drinking and high scores on a measure of alcohol-related

harm. Among the variables investigated, living with a regular drinker was unique in its relationship to both the likelihood and patterns of participants' self-reported drinking.

Protective effects were noted for marriage/cohabiting and education. Participants who were married or living with a partner were less likely to report alcohol use, indicating lower risk of alcohol-related health problems to these participants and their offspring. Participants with Matric education were less likely to meet criteria for hazardous/harmful drinking, despite no observed difference in rates or patterns of drinking between participants of different levels of education.

Those who reported physical violence from intimate partners during their current pregnancy were more likely to report drinking and to acknowledge items related to dependence. Relationships between intimate partner violence and other aspects of drinking were also noted, but these failed to be significant when the effects of other variables were included.

6.3 Methodological Considerations

6.3.1 Contributions

This study involved repeated bivariate and logistic regression analysis of each outcome variable. The process was conducted once using all data in the sample (N = 1099) and again using only data from those participants who reported alcohol use (n = 396). Analysis using all data identified factors related to any participant's likelihood of reporting alcohol use, binge drinking, drinking riskily, or hazardous/harmful alcohol use. By repeating the analysis after excluding participants reporting no alcohol use, this study was able to investigate factors that differed between light drinkers and those meeting criteria for hazardous/harmful alcohol use. This meant that this analysis was able to distinguish a relationship with drinking behaviour independent of any relationship to the likelihood of drinking.

5.3.2 Limitations

Despite the relatively large sample obtained, the power of this study to identify relationships was limited by the small size of some subsets. These underpopulated subsets include participants who reported intimate partner violence, which may have been underreported, and participants who drink very frequently, who may be expected to form a small part of the population. Both of these groups are of interest to research on antenatal drinking, the first because of the relationship between intimate partner violence observed in this and previous studies, and the second because of the elevated risk of adverse outcomes associated with frequent alcohol consumption. Future research may choose to purposefully sample participants in these groups.

It is important to note that relationships between variables not observed in this study may exist in the population. The level of significance used in this study ($\alpha = .05$) means that any relationships deemed non-significant are more likely than 5 in 100 to occur in the sample by chance (Stangor, 2014, p. 149). That is not to say that such effects do not exist, merely that these data do not provide sufficient evidence that such effects *do exist*. Non-significance can then not be taken as evidence against any relationship; at most *p*-values above .05 indicate absence of evidence at a given level of certainty. Thus, relationships may exist between variables in the population, even though insufficient evidence exists in this sample. This is especially likely in subsets of these data that contain fewer participants. Because an effect of a given size is more likely (and will thus produce a larger *p*-value) in a smaller sample, it is possible that effects remained undetected because of the low number of participants in certain subsets of the sample.

The minimal disruption caused to health service delivery at data collection points is certainly a benefit of this study, as is the protection of participants' identities by not recording them. However, the lack of a sampling frame and of refusal rates undermine the generalisability of

these results, as it is impossible to ascertain whether unintended sampling bias exists. For this reason, conclusions about the prevalence of alcohol consumption in the study area should not be drawn from this research.

The cross-sectional design of this study meant that data were only collected from each participant at one point in time. Thus, this study did not investigate factors associated with changes in drinking patterns over time. Future research may seek to identify factors associated with the reduction of alcohol intake after recognition of pregnancy, especially those that may be expected to respond to intervention. Despite these limitations, this study provides valuable data from an area of the country which has received little previous attention.

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APPENDIX A: Department of Health Letter

Eastern Cape Department of Health

Enquirles: Madoda Xokwe

Date: 05 July 2016

e-mail address: madoda.xokwe@echealth.gov.za

Dear Prof. McLeod

Tel No: 040 608 0830

Fax No: 043 642 1409

Re: Alcohol use during pregnancy in the Eastern Cape: Research in support of FASfacts intervention (EC_2016RP18_330)

The Department of Health would like to inform you that your application for conducting a research on the abovementioned topic has been approved based on the following conditions:

1. During your study, you will follow the submitted protocol with ethical approval and can only deviate from it after having a written approval from the Department of Health in writing.
2. You are advised to ensure, observe and respect the rights and culture of your research participants and maintain confidentiality of their identities and

shall remove or not collect any information which can be used to link the participants.

3, The Department of Health expects you to provide a progress on your study every 3 months (from date you received this letter) in writing.

4. At the end of your study, you will be expected to send a full written report with your findings and implementable recommendations to the Epidemiological Research & Surveillance Management. You may be invited to the department to come and present your research findings with your implementable recommendations.

5. Your results on the Eastern Cape will not be presented anywhere unless you have shared them with the Department of Health as indicated above.

Your compliance in this regard will be highly appreciated.

SECRETARIAT: EASTERN CAPE HEALTH RESEARCH COMMITTEE

APPENDIX B: Information & Consent

CRITICAL STUDIES IN SEXUALITIES AND REPRODUCTION RESEARCH PROGRAMME □□Tel: (046) 603 7329 □ e-mail: cssradmin@ru.ac.za

Dear service user

I (Health Service Provider) form part of a research team interested in exploring the prevalence of alcohol use during pregnancy in support with the FASfacts intervention, in Eastern Cape, South Africa. This study is important in terms of helping us understand the features of drinking amongst antenatal clinic users. Permission to conduct this research has been obtained from the Eastern Cape Liquor Board and the Eastern Cape Department of Health. Ethical approval was granted by the Rhodes University Ethical Standards committee.

I invite you to participate in this study. If you agree to participate in the study your participation will involve the following:

1. During your consultation with your nurse or health service provider, you will be asked questions about your drinking. This will take approximately 5 mins. He/she will provide you with the consent forms to consent if you would like to take part in the study or not.
2. If at any stage of the consultation you wish to withdraw from the study you can simply tell the health service provider that you are no longer continuing with the interview.

   If you are unhappy with a question, you are free not to answer it.

Please understand that your participation in this study is completely voluntary and you are not being forced to take part, although we would really value your participation. If you choose to, or choose not to, participate in this study, the services you receive will not be affected in any way whatsoever.

All the information will be confidential and your name will not appear on the questionnaire.
Only the researchers will have access to the data. If any of the questions raised personal concerns for you, please speak to the health service provider who will assist you and refer you for additional help, if necessary.

If you have any questions about this study, please feel free to ask me. In addition, if there are questions that you feel I have not answered, or if you have concerns about the research, you may contact Prof Charles Young (046-603-8541), or Prof Catriona Macleod, the principal researcher, at Rhodes University by calling her on 046-603-7329.

If you have a complaint about any aspect of this study, you may also contact the Rhodes University Ethical Standards Committee by calling 046-603-8055 or e-mailing ethics-committee@ru.ac.za

(THE ABOVE SECTION IS TO BE KEPT BY THE PARITICPANT)

ALCOHOL USE DURING PREGNANCY IN THE EASTERN CAPE: RESEARCH IN SUPPORT OF FASfacts INTERVENETION PROJECT

WOMAN PARTICIPANT CONSENT FORM:

I hereby agree to participate in this research project that seeks to explore the prevalence of alcohol use during pregnancy in various wards of Buffalo City Municipality (Eastern Cape), in support of FASfacts intervention. Please tick to indicate your response in the below box.

I agree to the following:	Yes	No
1.1. The interview using alcohol use measuring instruments, during consultation session that I will have with the health service provider.		

I understand that I am participating freely and without being forced in any way to do so. I understand that at any point if I wish not to continue I can withdraw from participating in the study without any negative consequences.

The purpose of this study has been explained to me, and I understand what is expected of my participation. I have kept a copy of the written explanation given to me.

I have received the telephone number of a person to contact should I need to speak about any issues that may arise due to participating in this study. I understand that no personally identifying information will be released in any form. I understand that the answer sheets will be kept securely in a locked environment. I understand that if I do not want any of the conversations I have with health service providers in the private consultation room form part of the research I will communicate this to the researcher.

_____ _____

Signature of participant Date

_____ _____

Signature of the Nurse (HSP) Date

CRITICAL STUDIES IN SEXUALITIES AND REPRODUCTION RESEARCH PROGRAMME Tel: (046) 603 7329 e-mail: cssradmin@ru.ac.za

Msebenzisi weenkonzo obekekileyo

Mna (Mnikezeli weeNkonzo zeMpilo) ndiyinxalenye yeqela labaphandi abanomdla wokuphonononga ukuxhaphaka kokusetyenziswa kotywala ngexesha umntu akhulelweyo ukuxhasa ungenelelo lweFASfacts, eMpuma Koloni, eMzantsi Afrika. Olu phando lubalulekile ekusincedeni ukuba siqonde iimpawu zokusela utywala kubasebenzisi beekliniki zabantu abazithweleyo. Imvume yokwenza olu phando ifunyenwe kwi-Eastern Cape Liquor Board neSebe lezeMpilo laseMpuma Koloni. Imvume yemikhwa esesikweni siyinikwe yikomiti, iRhodes University Ethical Standards.

Ndiyakumema ukuba uthathe inxaxheba kolu phando. Ukuba uyavuma ukuthatha inxaxheba kolu phando, indima yakho iza kuquka oku kulandelayo:

1. Ngexesha lakho lokubonana nonesi okanye umnikezeli weenkonzo zempilo, uza kubuzwa imibuzo emalunga nokusela kwakho utywala. Oku kuza kuthatha into engangemizuzu emi-5. Uza kukunika iifomu zemvume ukuze uphawule ukuba ungathanda kusini na ukuthatha inxaxheba kolu phando okanye hayi.
2. Ukuba nangaliphi na inqanaba lengxoxo uziva unqwenela ukuphuma kolu phando ungasuka uxelele umnikezeli weenkonzo zempilo ukuba akusayi kuqhubeka nodliwano-ndlebe. Ukuba akuwuthandi umbuzo othile, uvumelekile ukuba ungawuphenduli.

Nceda wazi ukuba ukuthatha inxaxheba kwakho kolu phando kungokuvolontiya kwakho ngokugqibeleleyo yaye akunyanzeliswa ukuba uthathe inxaxheba, nangona singayibulela kakhulu inxaxheba yakho. Ukuba ukhetha ukuyithatha, okanye ungayithathi, inxaxheba kolu phando, iinkonzo ozifumanayo azizi kuchaphazeleka tu kwaphela.

Lonke ulwazi luza kubayimfihlo yaye igama lakho alizi kuvela kwiphepha lemibuzo. Ngabaphandi kuphela abaza kufikelela kwiinkcukacha. Ukuba kukho nawuphi na umbuzo okuchaphazelayo wena buqu kule mibuzo ibuziweyo, nceda uthethe nomnikezeli weenkonzo zempilo noza kukunceda akuthumele ukuze ufumane uncedo olongezelelweyo, ukuba kukho isidingo.

Ukuba kukho imibuzo onayo malunga nolu phando, nceda ubuze kum ngokukhululekileyo. Phezu koko, ukuba kukho imibuzo obona ngathi andiyiphendulanga, okanye ukuba unenkxalabo ngolu phando unganxulumana noNjingalwazi uCharles Young (046-603-8541), okanye uNjingalwazi uCatriona Macleod, umphandi oyintloko, kwiYunivesithi iRhodes ngokumtsalela ku-046-603-7329.

Ukuba unezikhalazo ngawo nawuphi na umba wolu phando, ungaphinda unxulumane neRhodes University Ethical Standards Committee ngokutsalela umnxeba ku-046-603-8055 okanye uthumele i-imeyile ku ethics-committee@ru.ac.za

(ELI CANDELO LINGENTLA MALIGCINWE NGUMTHATHI-NXAXHEBA)

UKUSETYENZISWA KOTYWALA NGEXESHA UMNTU AKHULELWEYO EMPUMA KOLONI: UPHANDO OLUXHASA IPROJEKTI YONGELELO YE-FASfacts

IFOMU YEMVUME YOMTHATHI-NXAXHEBA OLIBHINQA:

Ngoko ke ndiyavuma ukuthatha inxaxheba kule projekti yophando ezama ukuphononongа ukuxhaphaka kokusetyenzswa kotywala ngexesha umntu akhulelweyo kumacandelo ohlukeneyo kaMasipala weBuffalo City (eMpuma Koloni), kuxhaswa ungenelelo lweFASfacts. Nceda uphawule impendulo yakho kule bhokisi ilandelayo.

Ndiyavumelana noku kulandelayo:	Ewe	Hayi
1.1. Udliwano-ndlebe kusetyenziswa izixhobo zokulinganisa ukusetyenziswa kotywala, ngexesha lokudibana nomnikezeli weenkonzo zempilo.		

Ndiyaqonda ukuba ndithatha inxaxheba ngokuzithandela yaye andinyanzelekanga ukuba ndenze njalo. Ndiyaqonda ukuba ndingayeka ukuqhubeka ndithatha inxaxheba kolu phando nanini na ndinqwenela ukwenza njalo yaye loo nto ayizi kubanaziphumo zibi.

Ndiyicaciselwe injongo yolu phando, yaye ndiyaqonda ukuba kulindeleke ntoni kum njengomthathi-nxaxheba. Ndiyigcinile ikopi yengcaciso ebhaliweyo endiyinikiweyo.

Ndiyifumene inombolo yomnxeba yomntu endinokunxulumana naye xa ndifuna ukuthetha ngawo nawuphi na umba onokuthi uvele ngenxa yokuthatha-inxaxheba kwam kolu phando. Ndiyaqonda ukuba akukho lwazi olungam oluza kupapashwa nangaluphi na uhlobo. Ndiyaqonda ukuba amaphepha eempendulo aza kugcinwa ekhuselekile endaweni etshixiweyo. Ndiyaqonda ukuba xa ndingafuni ukuba iincoko endibanazo kwindlu yokudibanela ebucala nabanikezeli beenkonzo zempilo zisetyenziswe kolu phando, ndiza kuchazela umphandi oku.

_____	_____
Isiginitsha yomthathi-nxaxheba	Usuku
_____	_____
Isiginistsha Mnikezeli weeNkonzo zeMpilo	Usuku

CRITICAL STUDIES IN SEXUALITIES AND REPRODUCTION RESEARCH PROGRAMME □□Tel: (046) 603 7329 □ e-mail: cssradmin@ru.ac.za

Geagte Diensverbruiker

Ek (Gesondheidsdiensverskaffer) vorm deel van 'n navrosingspan wat belangstel daarin om die voorkoms van alkoholverbruik gedurende swangerskap te ondersoek met die ondersteuning van die FASfeite intervensie in die Oos-Kaap, Suid-Afrika. Hierdie studie is belangrik om ons te help om die kenmerke van die alkoholverbruik te verstaan onder voorgeboorte kliniekverbruikers. Toestemming om hierdie navorsing te doen is verkry van die Oos-Kaapse Drankraad en die Oos-Kaapse Departement vir Gesondheid. Etiese goedkeuring is toegestaan deur die Universiteit Rhodes se Etiese Standaardekomitee.

Ek nooi u uit om deel te neem aan hierdie studie. Indien u instem, sal u deelname die volgende behels:

1. Gedurende u konsultasie met u verpleegster of gesondheidsdiensverskaffer, sal u vrae gevra word rondom u alkoholverbruik. Dit sal ongeveer 5-minute neem. Hy/sy sal vir u 'n toestemmingsvorm gee om toestemming te gee of u deel wil wees van die studie of nie.
2. As u op enige stadium van die konsultasie wil onttrek van die studie kan u eenvoudig die gesondheidsdiensverskaffer sê dat u nie met die onderhoud gaan voortgaan nie.
3. Indien u nie gemaklik is met 'n vraag nie, hoef u dit nie te beantwoord nie.

Dit is belangrik om te verstaan dat u deelname aan hierdie studie geheel en al vrywillig is en u word glad nie forseer om deel te neem nie, alhoewel ons werklik u deelname hoog op prys sal stel. Indien u besluit om deel te neem al dan nie, sal dit geensins die diens wat u ontvang beïnvloed nie.

Al die inligting is vertroulik en u naam sal nie op die vraelys verskyn nie. Slegs die navorsers sal toegang hê tot die data. Indien enige van die vrae persoonlike kwessies vir u geoppper het, praat asseblief met die gesondheidsdiensverskaffer wat u sal help en u verwys na iemand vir addisionele hulp, indien nodig.

Indien u enige vrae het oor die studie, voel asseblief vry om my te vra. Daarmee saam, indien u voel dat daar vrae is wat ek nie beantwoord het nie, is u welkom om Prof. Charles Young (046-603-8541), of Prof. Catriona Macleod, die hoofnavorser by die Universiteit Rhodes, te kontak. Prof. Macleod kan geskakel word op 046-603-7329.

Indien u 'n klagte het oor enige aspek van die studie, kan u ook die Universiteit Rhodes se Etiese Standaarde Komitee kontak. Hulle kan geskakel word op 046-603-8055 of e-pos ethics-committee@ru.ac.za.

(DIE BOSTAANDE DEEL WORD DEUR DIE DEELNEMER GEHOU)

ALKOHOLVERBRUIK GEDURENDE SWAGERSKAP IN DIE OOS-KAAP: NAVORSING TER ONDERSTEUNING VAN DIE FASfeite INTERVENSIE PROJEK

VROULIKE DEELNEMER TOESTEMMINGSVORM:

Hiermee stem ek in om deel te neem aan hierdie navorsingsprojek wat poog om die voorkoms van alkoholverbruik gedurende swangerskap te ondersoek in die verskeie wyke van die Buffalo-stad Munisipaliteit (Oos-Kaap), ter ondersteuning van die FASfeite intervensie. Merk asseblief die blokkie hieronder om u antwoord aan te dui.

Ek stem in tot die volgende:	Ja	Nee
’n Onderhoud, wat alkoholverbruik-meetinstrumente gebruik, gedurende konsultasiesessies wat ek met die gesondheidsdiensverskaffer sal hê.		

Ek verstaan dat ek vrywillig deelneem sonder dat ek enigsins forseer is om deel te neem. Ek verstaan dat ek op enige punt kan onttrek indien ek nie meer wil aangaan nie, sonder dat daar enige negatiewe gevolge sal wees.

Die doel van hierdie studie is aan my verduidelik en ek verstaan wat van my deelname verwag word. Ek behou ’n kopie van die geskrewe verduideliking wat aan my gegee is.

Ek het die telefoonnommer van ’n kontakpersoon ontvang indien ek met iemand moet praat oor enige van die kwessies wat opkom as gevolg van my deelname in hierdie studie. Ek verstaan dat geen persoonlike inligting wat my kan identifiseer op enige manier bekend gemaak sal word nie. Ek verstaan dat die antwoordstel veilig bewaar sal word in ’n geslote omgewing. Ek verstaan dat as ek nie wil hê enige van die gesprekke wat ek met die gesondheidsdiensverskaffers in die private konsultasiekamer het moet deel vorm van die navrosing nie, ek dit aan die navorser sal kommunikeer.

_____ _____

Handtekening van deelnemer Datum

_____ _____

Handtekening van verpleër (GDV) Datum

APPENDIX C: Questionnaire

ALCOHOL USE DURING PREGNANCY IN THE EASTERN CAPE

Today's date:			
Site:			
For the following items, please read questions as they are written. Record answers carefully.			
1	In what YEAR and MONTH were you born?	Year:	Month:
2	What is your AGE?		
3	How many weeks pregnant are you	Weeks:	
4	What is the ESTIMATED DATE of DELIVERY?	Month:	Day:
5	What is your RACE:	☐ African ☐ Coloured	☐ White ☐ Indian
6	What is the highest level of EDUCATION that you have obtained?	☐ No formal schooling completed ☐ Primary School ☐ High School ☐ Matric ☐ Higher Education	
7	Are you employed (including maternity leave)?	☐ Yes	☐ No
8	In total how many pregnancies have you had?	Number:	

ALCOHOL USE DISORDERS IDENTIFICATION TEST

Begin the AUDIT by saying "Now I am going to ask you some questions about your use of alcoholic beverages during this past year."

A1	How often do you have a drink containing alcohol?	☐ Never [Skip to A9-A10] (0) ☐ Monthly or less (1)

		☐ 2 to 4 times a month (2) ☐ 2 to 3 times a week (3) ☐ 4 or more times a week (4)
A2	How many drinks containing alcohol do you have on a typical day when you are drinking?	☐ 1 or 2 (0) ☐ 3 or 4 (1) ☐ 5 or 6 (2) ☐ 7, 8, or 9 (3) ☐ 10 or more (4)
A3	How often do you have six or more drinks on one occasion	☐ Never (0) ☐ Less than monthly (1) ☐ Monthly (2) ☐ Weekly (3) ☐ Daily or almost daily (4)

AUDIT QUESTIONS CONTINUE ON NEXT PAGE

A4	How often during the last year have you found that you were not able to stop drinking once you had started?	☐ Never (0) ☐ Less than monthly (1) ☐ Monthly (2) ☐ Weekly (3) ☐ Daily or almost daily (4)

A5	How often during the last year have you failed to do what was normally expected from you because of drinking?	☐ Never (0) ☐ Less than monthly (1) ☐ Monthly (2) ☐ Weekly (3) ☐ Daily or almost daily (4)
A6	How often during the last year have you needed a first drink in the morning to get yourself going after a heavy drinking session?	☐ Never (0) ☐ Less than monthly (1) ☐ Monthly (2) ☐ Weekly (3) ☐ Daily or almost daily (4)
A7	How often during the last year have you had a feeling of guilt or remorse after drinking?	☐ Never (0) ☐ Less than monthly (1) ☐ Monthly (2) ☐ Weekly (3) ☐ Daily or almost daily (4)
A8	How often during the last year have you been unable to remember what happened the night before because you had been drinking?	☐ Never (0) ☐ Less than monthly (1) ☐ Monthly (2) ☐ Weekly (3) ☐ Daily or almost daily (4)
A9	Have you or someone else been injured as a result of your drinking?	☐ No (0)

		☐ Yes, but not in the last year (2) ☐ Yes, during the last year (4)
A10	Has a relative or friend or a doctor or another health worker been concerned about your drinking or suggested you cut down?	☐ No (0) ☐ Yes, but not in the last year (2) ☐ Yes, during the last year (4)

FINAL QUESTIONS

9	Are you married or currently living with a partner?	☐ Yes	☐ No
10	At any time during your current pregnancy, did your husband/partner push, hit, slap, kick, choke or physically hurt you in any other way?	☐ Yes	☐ No
11	Does your partner or anybody else regularly drink at your home?	☐ Yes	☐ No

Please check that you have completed the entire questionnaire, and thank the participant

Appendix D: Data Analysis Code for STATA 13

```
* change directory to your directory

        clear all
        cd "C:\Users\Pieter Bredenkamp\Documents\M1\FAS\Data"
        use "alldataxxx.dta"
        set more off
        *ssc install outreg2

        *------------------------------------------------------------------------

                                                                *1: Cleaning data

        * remove minors from dataset
        drop if age < 18
        drop if age==.

                * 1.1 Create Variables of interest

                * Create Continuous variable for AUDIT-C that returns only if no responses
                * are missing
        gen audit_c = (a1 + a2 + a3) if (a1 !=. & a2 !=. & a3 !=.)

                                                replace audit_c = 0 if a1==0
        tab audit_c

                        * Do the same for the complete AUDIT Questionnaire

                gen audit =                 (a1+a2+a3+a4+a5+a6+a7+a8+a9+a10) ///
```

```
        if                      (a1!=. & a2!=. & a3 !=. & a4!=. & a5!=. & a6!=. ///
                                & a7!=. & a8!=. & a9!=. & a10!=.)

        * Ignoring questions 2-8 for non-drinkers

replace audit =  a9 + a10       ///
        if                      a1 == 0


        *Create variables for specific subtests
gen consume = (a2 + a3) if (a2 !=. & a3 !=.)
gen consume_risk =.
replace consume_risk = 0 if consume==0
replace consume_risk = 1 if consume > 0 & consume !=.


gen depend  = (a4 + a5 + a6) if (a4 !=. & a5 !=. & a6!=.)
gen depend_risk =.
replace depend_risk = 0 if depend==0
replace depend_risk = 1 if depend > 0 & depend !=.

gen harm        = (a7 + a8 + a9 + a10) if a7 !=. & a8 !=. & a9 !=. & a10 !=.
gen harm_risk =.
replace harm_risk = 0 if harm==0
replace harm_risk = 1 if harm > 0 & harm !=.

        * Create binary variable for drinkers/non drinkers

gen drank =1            if      a1 > 0 & a1 !=. ///

replace drank = 0       if      a1 == 0
```

```
*Create Binary variable for risky drinking
gen risk=.
replace risk=0 if audit_c<=2
replace risk=1 if audit_c>=3 & audit_c!=.

*Create Binary variable for binge drinking
gen binge=.
replace binge=0 if a1==0
replace binge=0 if a3==0
replace binge=1 if a3>0 & a3!=.

*Create Binary variable for harmful drinking
gen hazard=.
replace hazard=0 if audit <7
replace hazard=1 if audit >=7 & audit !=.

*1.2 Label Variables

label define binary_label 0 "No" 1 "Yes"
label values harm_risk depend_risk consume_risk hazard binary_label

label define education_label 1 "No formal" 2 "Primary" 3 "High School" ///
4 "Matric" 5 "Higher Education"
label values education education_label

recode employed (2=0)
label values employed binary_label
```

```
rename a1 frequency
label define frequency_label      0 "Never" 1 "Monthly/less" 2 "2-4/month" ///
                                                                  3 "2-3/week" 4
"4+/week"
label values frequency frequency_label

rename a2 occasion_dose
label define occasion_dose_label          0 "1/2" 1 "3/4" 2 "5/6" ///
                                                                  3 "7/8" 4
"10+"
label values occasion_dose occasion_dose_label

rename a3 binge_frequency
label define binge_frequency_label        0 "Never" 1 "Less than monthly" ///
                                                                  2 "Monthly"
3 "Weekly" 4 "Daily/almost"
label values binge_frequency binge_frequency_label

rename a4 cantstop
label define cantstop_label                    0 "Never" 1 "Less monthly" ///
                                                                  2 "Monthly"
3 "Weekly" 4 "Daily/almost"
label values cantstop cantstop_label

rename a5 rolefailure
label define rolefailure_label            0 "Never" 1 "Less monthly" ///
                                                                  2 "Monthly"
3 "Weekly" 4 "Daily/almost"
label values rolefailure rolefailure_label

rename a6 morning
label define morning_label                     0 "Never" 1 "Less monthly" ///
```

```
                                                                    2 "Monthly"
3 "Weekly" 4 "Daily/almost"
                label values morning morning_label

                rename a7 guilt
                label define guilt_label            0 "Never" 1 "Less monthly" ///
                                                                    2 "Monthly"
3 "Weekly" 4 "Daily/almost"
                label values guilt guilt_label

                rename a8 amnesia
                label define amnesia_label              0 "Never" 1 "Less monthly" ///
                                                                    2 "Monthly"
3 "Weekly" 4 "Daily/almost"
                label values amnesia amnesia_label

                rename a9 injury
                label define injury_label           0 "No" 2 "Not in last year" ///
                                                                    4 "In last
year"
                label values injury injury_label

                rename a10 cutdown
                label define cutdown_label              0 "No" 2 "Yes, not in last year" ///
                                                                    4 "Yes, in
last year"
                label values cutdown cutdown_label

                rename v9relationshipstatus married_cohabit
                recode married_cohabit (2=0)
                label values married_cohabit binary_label

                rename v10 IPV_current
```

```
recode IPV_current (2=0)
label values IPV_current binary_label

rename v11 home_drinker
recode home_drinker (2=0)
label values home_drinker binary_label

label define race_label 1 "African" 2 "Coloured" 3 "White" 4 "Indian"
label values race race_label

*Create categorical age variableS

recode age (18/25 = 1)(26/35 = 2)(36/45 = 3) (45/60 = 4), gen(agecat)

*label agecat values
label define agecat_label 1 "18-25" 2 "26-35" 3 "36-45" 4 "46+"
label values agecat agecat_label

recode age (18/35 = 1)(35/49 = 2), gen(agebinary)

*Create binary age variable: Below or above mean
gen older=.
replace older=1 if age >=28 & age!=.
replace older=0 if age <28
label values older binary_label
```

```
                                        *Create binary education variable

recode education (1/3 = 0) (4/5 = 1), gen(edubinary)
        *label values
        label define edubinary_label 0 "No Matric" 1 "Matric or more"
        label values edubinary edubinary_label

        tab edubinary

                                        *Create categorical gravidity variable

recode ofbirths (1/10 =1), gen(gravidity)
replace gravidity=0 if ofbirths==0


                                        *create Trimester Variable
gen weekspregnant_n = real(weekspregnant)


recode weekspregnant_n          (1/12=1) ///
                                        (13/24=2) ///
                                        (25/42=3), gen(trimester)
                                        label variable trimester "trimester"

*------------------------------------------------------------------------------

                                        *2: DESCRIPTIVE STATISTICS

        * Count sample size
sum ques
```

*View demographic variables

tab education

tab edubinary

tab race

tab employed

sum age

tab older

tab agecat

tab agebinary

sum weekspregnant_n

tab trimester

tab ofbirths

sum ofbirths

tab married_cohabit

tab IPV_current

tab home_drinker

*Test Internal Consistency:

*AUDIT:

alpha frequency occasion_dose binge_frequency cantstop rolefailure morning guilt amnesia injury cutdown, casewise

*AUDIT_C:

alpha frequency occasion_dose binge_frequency, casewise

*Consume

alpha occasion_dose binge_frequency, casewise

```
        *Depend
        alpha cantstop rolefailure morning , casewise

        *Harm
        alpha guilt amnesia injury cutdown, casewise

        *View research variables
tab drank
tab risk if drank
tab audit_c if drank
sum audit_c if drank
tab hazard if drank
tab audit if drank
sum audit if drank
tab depend if drank
tab depend_risk if drank
tab binge if drank
tab frequency if drank

/*
sum audit
sum audit if drank
sum audit_c
sum audit_c if drank
tab risk
tab risk if drank
tab binge if drank
```

```
*/

/*-------------------------------------------------------------------------------*/
        *3. INFERENTIAL STATISTICS

*test for relationship between categorical demographic variables and proportion of drinkers

tab agecat drank, chi2 row
tab older drank, chi2 row
tab race drank, chi2 row
tab education drank, chi2 row
tab edubinary drank, chi2 row
tab employed drank, chi2 row
tab gravidity drank, chi2 row
tab married_cohabit drank, chi2 row
tab IPV_current drank, chi2 row
tab home_drinker drank, chi2 row
tab trimester drank, chi2 row

logistic drank i.race i.married_cohabit i.home_drinker i.IPV_current i.agecat


*test for relationship between categorical demographic variables and risky drinking in general sample
tab risk agecat, chi2 col
tab risk race, chi2 col
tab risk older, chi2 col
tab risk gravidity, chi2 col
tab risk trimester, chi2 col
tab risk education, chi2 col
tab risk edubinary, chi2 col
```

```
tab risk employed, chi2 col
tab risk married_cohabit, chi2 col
tab risk IPV_current, chi2 col
tab risk home_drinker, chi2 col

logistic risk home_drinker IPV_current race


*test for relationship between categorical demographic variables and risky drinking among drinkers
tab risk agecat if drank, chi2 row
tab risk race if drank, chi2 row
tab risk older if drank, chi2 row
tab risk gravidity if drank, chi2 row
tab risk trimester if drank, chi2 row
tab risk education if drank, chi2 row
tab risk edubinary if drank, chi2 row
tab risk employed if drank, chi2 row
tab risk married_cohabit if drank, chi2 row
tab risk IPV_current if drank, chi2 row
tab risk home_drinker if drank, chi2 row

logistic risk home_drinker if drank

tab hazard agecat, chi2 col
tab hazard race, chi2 col
tab hazard older, chi2 col
tab hazard gravidity, chi2 col
tab hazard trimester, chi2 col
tab hazard education, chi2 col
tab hazard edubinary, chi2 col
tab hazard employed, chi2 col
```

```
tab hazard married_cohabit, chi2 col
tab hazard IPV_current, chi2 col
tab hazard home_drinker, chi2 col

logistic hazard gravidity edubinary IPV_current home_drinker
stop
tab hazard agecat if drank, chi2 col
tab hazard race if drank, chi2 col
tab hazard older if drank, chi2 col
tab hazard gravidity if drank, chi2 col
tab hazard trimester if drank, chi2 col
tab hazard education if drank, chi2 col
tab hazard edubinary if drank, chi2 col
tab hazard employed if drank, chi2 col
tab hazard married_cohabit if drank, chi2 col
tab hazard IPV_current if drank, chi2 col
tab hazard home_drinker if drank, chi2 col

logistic hazard home_drinker gravidity i.educat i.agecat if drank

*test for relationship between categorical demographic variables and proportion of binge drinkers among drinkers

tab agecat binge, chi2 row
tab age binge, chi2 row
tab older binge, chi2 row
tab race binge, chi2 row
tab educat binge, chi2 row
tab edubinary binge, chi2 row
tab employed binge, chi2 row
tab gravidity binge, chi2 row
```

```
tab married_cohabit binge, chi2 row
tab IPV_current binge, chi2 row
tab home_drinker binge, chi2 row
tab trimester binge, chi2 row

logistic binge IPV_current home_drinker

tab agecat binge if drank, chi2 row
tab race binge if drank, chi2 row
tab educat binge if drank, chi2 row
tab edubinary binge if drank, chi2 row
tab employed binge if drank, chi2 row
tab gravidity binge if drank, chi2 row
tab married_cohabit binge if drank, chi2 row
tab IPV_current binge if drank, chi2 row
tab home_drinker binge if drank, chi2 row
tab trimester binge if drank, chi2 row

logistic binge i.race home_drinker if drank

*test for relationship between categorical demographic variables and risk of dependence among drinkers
tab depend_risk agecat, chi2 col
tab depend_risk race, chi2 col
tab depend_risk gravidity, chi2 col
tab depend_risk education, chi2 col
tab depend_risk edubinary, chi2 col
tab depend_risk employed, chi2 col
tab depend_risk married_cohabit, chi2 col
tab depend_risk IPV_current, chi2 col
tab depend_risk home_drinker, chi2 col
```

```
tab depend_risk trimester, chi2 col

logistic depend_risk edubinary IPV_current married_cohabit


tab depend_risk agecat if drank, chi2 row
tab depend_risk race if drank, chi2 row
tab depend_risk older if drank, chi2 row
tab depend_risk gravidity if drank, chi2 row
tab depend_risk older if drank, chi2 row
tab depend_risk education if drank, chi2 row
tab depend_risk edubinary if drank, chi2 row
tab depend_risk employed if drank, chi2 row
tab depend_risk married_cohabit if drank, chi2 row
tab depend_risk IPV_current if drank, chi2 row
tab depend_risk home_drinker if drank, chi2 row

logistic depend_risk race edubinary if drank
logistic depend_risk race edubinary audit_c if drank


*test for relationship between categorical demographic variables and risk of dependence among drinkers


*Test for relationship between categorical dempographic variables and
//AUDIT-C scores among & drinkers
ttest audit_c, by(home_drinker)
ttest audit_c, by(IPV_current)
ttest audit_c, by(married_cohabit)
ttest audit_c, by(edubinary)
```

```
ttest audit_c, by (older)

ttest audit_c, by(employed)

ttest audit_c if race <3, by(race)

ttest audit_c, by(gravidity)

regress audit_c home_drinker IPV_current married_cohabit edubinary race

ttest audit_c if drank==1, by(home_drinker)

ttest audit_c if drank==1, by(IPV_current)

ttest audit_c if drank==1, by(married_cohabit)

ttest audit_c if drank==1, by(edubinary)

ttest audit_c if drank==1, by (older)

ttest audit_c if drank==1, by(employed)

ttest audit_c if drank==1 & race <=2, by(race)

ttest audit_c if drank==1, by(gravidity)

regress audit_c home_drinker if drank

*Test for relationship between categorical variables and AUDIT Scores among

// general and drinkers

ttest audit, by(home_drinker)

ttest audit, by(IPV_current)

ttest audit, by(married_cohabit)

ttest audit, by(edubinary)

ttest audit, by (older)

ttest audit, by(employed)

ttest audit, by(gravidity)

ttest audit if race <=2, by(race)
```

```
regress audit home_drinker IPV_current edubinary

ttest audit if drank==1, by(home_drinker)
ttest audit if drank==1, by(IPV_current)
ttest audit if drank==1, by(married_cohabit)
ttest audit if drank==1, by(edubinary)
ttest audit if drank==1, by (older)
ttest audit if drank==1, by(employed)
ttest audit if drank==1, by(gravidity)
ttest audit if drank==1 & race <=2, by(race)

regress audit edubinary if drank

ttest consume if consume_risk==1, by(home_drinker)
ttest consume if consume_risk==1, by(IPV_current)
ttest consume if consume_risk==1, by(married_cohabit)
ttest consume if consume_risk==1, by(edubinary)
ttest consume if consume_risk==1, by (older)
ttest consume if consume_risk==1, by(employed)
ttest consume if drank==1 & race <=2, by(race)
ttest consume if drank==1, by(gravidity)

ttest depend if depend_risk==1, by(home_drinker)
ttest depend if depend_risk==1, by(IPV_current)
ttest depend if depend_risk==1, by(married_cohabit)
ttest depend if depend_risk==1, by(edubinary)
ttest depend if depend_risk==1, by (older)
ttest depend if depend_risk==1, by(employed)
ttest depend if depend_risk==1 & race <=2, by(race)
ttest depend if depend_risk==1 , by(gravidity)
```