

UNIVERSITY OF CAPE TOWN

**Prevalence and risk factors associated with alcohol
consumption in pregnant Ugandan women**

By

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PREAMBLE

1. Declaration

I, Phumzile Kimberly Pretty Tshabalala (TSHPHU014), hereby declare that the work on which this dissertation/thesis is based is my original work (except where acknowledgements indicate otherwise) and that neither the whole work nor any part of it has been, is being, or is to be submitted for another degree in this or any other university.

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Signature: PKP Tshabalala

Date: 18 January 2022

2. Dedication

To my mom

Beauty Nthabiseng Tshabalala

and my late grandmother

Jeanette Qoshile Mofokeng (Khumalo).

3. Acknowledgements

We thank the NIHR Global Health Research Unit on Lung Health and TB in Africa at LSTM - "IMPALA" for helping to make this work possible. In relation to IMPALA (grant number 16/136/35) specifically: IMPALA was commissioned by the National Institute of Health Research using Official Development Assistance (ODA) funding. The views expressed in this publication are those of the author(s) and not necessarily those of the National Institute for Health Research or the Department of Health.

I would like to thank my supervisor Associate Professor Maia Lesosky it has been a very challenging two years in a pandemic, the knowledge that you have passed down to me is invaluable. You are truly a great source of inspiration for me. Thank you for always being so understanding and patient with me, your contribution goes beyond this dissertation, your drive and work ethic will be imprinted in me forever.

I would like to thank God because I could not have been able to finish this thesis without God's mercies, I would also like to acknowledge my ancestors who helped me through this tough journey.

To my parents thank you, mom, thank you for all the support you showed me throughout this MPH. It has been a very challenging couple of years but with your love and encouragement I am able to finally close this chapter.

To my sister Zanele, my friends Lerato, Phindulo, Nkanyezi, Zamokuhle, Balekane, Siyanda, and Amanda; I would not have made it this far without your words of encouragement and support.

4. Thesis abstract

Introduction: Foetal alcohol syndrome disorder (FASD) is caused by alcohol consumption during pregnancy. Foetal alcohol syndrome (FAS) is a lifelong condition that results in reduced quality of life. We examined the prevalence and risk factors associated with alcohol consumption in a population of pregnant Ugandan women.

Methods: This mini dissertation comprises of two sections: a research protocol (Section A) and a manuscript (Section B). We made use of data previously collected (2018) for the "IMPALA" study and focused our research on alcohol consumption during pregnancy. This study consisted of 566 eligible study participants between the ages of 15-46. Univariable and multivariable logistic regression methods were used to identify risk factors associated with alcohol consumption among study participants.

Results: Our study population consisted mainly of married women who work as farmers, living in rural areas. We found that 14% of the study participants consumed alcohol while pregnant. Both the univariable and multivariable regression found that age, residential area, married polygamously and married monogamously were significantly ($p\text{-value} < 0.05$) associated with alcohol consumption amongst study participants. Number of children and being a farmer were significantly associated in the univariable regression model only, the pattern of association was similar in the multivariable regression model.

Conclusion: The prevalence of alcohol consumption in pregnancy was found to be 14% with age, residential area, number of children and working as a farmer being identified as the risk factors for alcohol consumption. Our conclusion is that alcohol consumption in this population was similar to that reported in other studies.

5. List of abbreviations

HDSS:	Health and Demographic Surveillance Sites
FASDs:	Foetal alcohol spectrum disorders
FAS:	Foetal alcohol syndrome
IMPALA:	Maternal and socioeconomic determinants of lung function among young infants in Uganda
LMIC:	Low middle income countries
LSTM:	Liverpool School of Tropical Medicine

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A. PROTOCOL

Introduction

Background

Uganda is an East African country with an estimated population of 42.72 million people as recorded by the World Bank in 2018. In 2015 it was estimated that 48.1 percent of the population consisted of children below the age of 15. Between 2010 and 2015 Uganda recorded an estimated 1.57 million live births with infant mortality rate recorded at 61 per 1000 births (Kuberuka et al, 2017). In 2019, this number reduced to 33 per 1000 births compared to 32 per 1000 births in Botswana and 28 per 1000 births in South Africa. Total fertility rate was recorded at 6.38, which is the lowest it has ever been (The World Bank, 2020).

Alcohol consumption during pregnancy is harmful to the baby as it passes through the mother's blood and reaches the baby through the umbilical cord (Foetal Alcohol Syndrome, 2002). Alcohol consumption during pregnancy is associated with poor birth outcomes including stillbirth and miscarriage along with other developmental issues that may follow the child throughout their life. Disabilities caused by the consumption of alcohol during pregnancy are known as foetal alcohol spectrum disorders (FASDs). There is no known quantity of alcohol that is safe for drinking during pregnancy (Albertsen et al, 2004).

There is no cure for FASDs, however, starting treatment early can improve the child's developmental delays (FAS, 2002). Early intervention is from birth till the age of 3, where the child can be taught some important skills, these include speech therapy, assisting the child to walk as well as interpersonal skills where the child will be taught how to interact with other people especially children.

Uganda has one of the highest alcohol consumption levels in Sub-Saharan Africa along with heavy binge drinking (Ssebunnya et al., 2020). The preferred form of alcohol is waragi, which is a traditional beer and moonshine, the prevalence of beer, wine and spirits are on the rise however still relatively low.

In 2006 a survey including 610 women attending antenatal care in Kampala, Uganda, found that 30% of the participants reported consuming alcohol at least one month before learning of their pregnancy (Namagembe et al, 2010). In the study population 25% of the women continued drinking alcohol even after finding out about their pregnancy, this translates to 151 women. Of the 151 (24.8%) women who continued to drink, 123 (20%) decreased their consumption of alcohol, 8 (1.3%) reported no change and 20 (3.3%) reported an increase in alcohol consumption. Older women were more likely to stop drinking alcohol after learning of their pregnancy compared to younger women aged between 17 and 25 years (Namagembe et al, 2010).

A study conducted in 2016 by Kabwama in Uganda with a study population of 3987 concluded that 9.8% of the adult population in their study had an alcohol-use-related disorder. In the study there were differences in alcohol consumption quantity between urban and rural residents. Certain regions such as north and east had different consumption levels. Findings show a 26.8% prevalence of alcohol use among adults, other African countries with similar studies are Tanzania 29.3%, Zimbabwe and Ethiopia with 58% and 45.7% respectively. Botswana was on the lower end with 18.7% and Zambia recording 20.8%. The study found a link between the country's socioeconomic status and alcohol consumption among both men and women (Kabawama, 2016).

These studies did not however look at the determinants of alcohol consumption during pregnancy, besides educational levels nothing else was highlighted about what drives women to consume alcohol, even after finding out about their pregnancies. Many studies in Africa also do not speak of the role of the male partners in reducing risk as it is unlikely for a pregnant woman to consume alcohol when the male partner does not. This work will investigate factors that may be associated with pregnant women consuming alcohol in rural Uganda.

Study aims and objectives

The overall aim of this study is to:

Evaluate the social determinants of alcohol consumption during pregnancy in a cohort of pregnant Ugandan women.

The specific objectives are:

Objective 1: Identify prevalence of alcohol consumption in this study population

Objective 2: Describe demographic factors and alcohol consumption during pregnancy in a cohort of pregnant Ugandan women

Objective 3: Describe socioeconomic factors that may be associated with alcohol use during pregnancy

Study design

Overview

This project is a secondary analysis of data already collected. The parent study conducted a prospective cohort study design which used quantitative data collection methods. The study was conducted in Kalungu District in South-Western Uganda and covered by local ethics approval (Appendix). The South African team was responsible for data management along with developing database tools.

Women who met the inclusion criteria were recruited at routine antenatal care visits in one of four local clinics in the Health and Demographic Surveillance Sites (HDSS) based in Kalungu district. A total of 566 consenting pregnant women were recruited.

The study participants were asked to be available for two home visits. The visits were split between the two stages of pregnancy, one during the antenatal period and the other visit took place after delivery. In total the study participants were required to participate in a total of four measurement visits, additional to the antenatal period visit and the post-delivery visit, participants also had the enrolment visit as well as another visit four weeks after delivery.

Setting

The parent study was implemented in the General Population Cohort (GPC), a Health and Demographic Surveillance Site (HDSS) in Kyamulibwa sub-county, Kalungu District, South-Western Uganda. The UK Medical Research Council (MRC) established the GPC in 1989 for the purpose of studying HIV epidemiology in rural Uganda, this was a collaboration between MRC and the Uganda Virus Research Institute. In recent years epidemiology and genetics of communicable and non-communicable diseases have been added. There are 25 rural villages, and a small township in the HDSS. The residents in these communities are given unique identity numbers for the purpose of the studies which they will have throughout their lives.

The main economic activity in the HDSS is farming, residents farm bananas, vegetables as well as coffee. They also raise livestock in the form of cattle, goats, and pigs. A small number of residents sell their goods although at a small scale.

The communities are serviced by five health facilities that provide basic medical care, three of these facilities offer medical services (deliveries and postnatal care). Women who have consented to being in the study were followed until after birth so the birth outcomes may be documented. There were an estimated 600 births per year and about 40% of those occurred at home. A general outpatient clinic that also provided free HIV care established by the MRC, medical emergencies were referred to a nearby hospital.

Data collection

The data collection happened in four stages, 1) at enrolment during antenatal care; 2) during the first home visit; 3) after delivery at the postnatal clinic and 4) at the second home visit 6 weeks after giving birth.

At enrolment, a structured questionnaire was administered by trained study staff in the native language of Luganda. Demographic characteristics including age, number of children born, income, highest educational level attained, and employment status were collected. Additionally, information on alcohol consumption and clinical data were collected.

Table 1. Variable list with data collection timeframe

Variable	Data collection			
	At enrolment	First home visit	After delivery	6 weeks
Age (years)	X			
Marital status	X			
Education	X			
Occupation	X			
Religion	X			
Tobacco	X	X	X	X
Alcohol	X	X	X	X

Further details of the data collection are provided in the parent study.

Study Population

Inclusion criteria

Age 18 or older

Pregnant

Consent to home visits and willing to return for second visit

Providing informed consent for research

Exclusion Criteria

Planning to relocate out of the study areas during the course study

Analytic considerations

Sampling strategy (parent study)

Pregnant women were identified and recruited at the antenatal clinics. As they waited for their appointment, potential participants were given information sheets written in the local language. Due to the education levels in the area, it was sometimes necessary for the study staff to read and explain the information sheet to the potential participant. Confirming participation in the study only took place after the clinic consultation, this was the point where informed consent was obtained. The study staff also explained to participants about their rights to withdraw from the study at any point and explained how their decision would not affect their access to healthcare for themselves and their infant.

Sampling size (parent study)

A food frequency questionnaire was used to estimate the sample size along with the association with infant lung function. The minimum sample size needed to give researchers 80% power to estimate effect size of an OR = 1.5 or larger (discrete outcomes) is 358. The study enrolled 566 women to account for loss to follow up as well as congenital abnormalities that will only be known at delivery.

Data Management

Data was collected by trained study personal using the RedCAP app on digital devices. The data that was captured on the RedCAP app was uploaded into the UCT hosted RedCAP database (HREC: R042-2018). The database was password protected and managed by the senior data manager at UCT who was also responsible for developing the data dictionary, direct queries and carry out data quality assurance activities. To ensure anonymity all study records were stored under participant identification numbers which were provided to them at enrolment, participants names were not recorded.

Data analysis

The data was summarised using measures of association specifically odds ratio was used to summarise the data along with 95% confidence interval and p-value. Age categories were stratified into age bands for analysis as well as marital status, which combined never married/widowed/divorced into a single band for easier analysis. Descriptive characteristics were summarized as percentages.

Alcohol consumption was measured based on starting age, frequency of use [never, once or twice, monthly, weekly and daily or almost daily], as well as age at stopping. Other types of substances such as inhalants, tobacco products, and cannabis were also measured in a similar way.

The outcome of interest, socioeconomic determinants, was examined as: 1) level of education, 2) residential area, 3) source of income, 4) number of children, 5) dwelling type, and 6) marital status. There is no known amount of alcohol that is safe during pregnancy so for the purpose of this study the operating definition of alcohol use was any reported alcohol consumption of any amount during pregnancy, while hazardous alcohol was defined as alcohol consumption after learning of pregnancy.

We examined the association between alcohol consumption and education levels, residential area, marital status, age, number of pregnancies and dwelling type using logistic regression models. This approach yields the odds ratio which we used to approximate the odds of experiencing the outcome.

Ethical Considerations

Ethical review

The parent study protocol has gone through ethical review from the Liverpool School of Tropical Medicine Research Ethics Committee (LSTM REC) and also went through approval in Uganda UVRI. This protocol was submitted to the Human Subjects Research Ethics Committee of the Faculty of Health Science at the University of Cape Town. Ethical approval was also awarded for the hosting of database at the University of Cape Town.

Informed consent

The informed consent was delivered to study participants by the trained study staff, which detailed the purpose of the study, along with the risks and benefits that the study might pose to the expectant mothers and their infants at the time of enrolment. The informed consent document also highlighted to participants about their rights to withdraw from the study at any time they feel they no longer wanted to participate, along with the voluntary nature of their participation.

Risks

This study utilised existing data and therefore did not pose any direct risk to individuals. The parent study represented minimal risk as it was an observational study which had no intervention and had been carried out under local and institutional ethical approval.

Study staff members were trained to recognise psychosocial distress in participants during interview sessions as there were some risks for participants to experience psychosocial distress.

Potential indirect risks such as lack of confidentiality were mitigated by retaining only study ID numbers, limiting data access to only appropriate study staff, and maintaining records on password protected computers.

Benefits

Direct benefit

This proposal made use of data that was already collected, stored, and digitised and so there was no direct benefit to the proposed study population. The parent study may have provided direct benefits to the mothers and their infants regarding lung health which is a service that is generally unavailable in Uganda.

Indirect benefits

Alcohol consumption during pregnancy is dangerous to the baby and risks health issues along with developmental delays that can follow the infant throughout their life. Learning more about the drivers of alcohol consumption during pregnancy will be important for the development of future interventions.

Compensation

The parent study had specified the compensation that was given to the study participants, because this study uses secondary data no compensation was provided.

Privacy and confidentiality

This protocol used existing data collected for the parent study, certain processes were undertaken to provide privacy and confidentiality to the study participants. User controls were implemented on the database to only allow specified people access.

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B. Manuscript

Title: Prevalence and risk factors associated with alcohol consumption in pregnant Ugandan women. A prospective cohort study.

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Per SPHFM guidelines for this component of the thesis the student author is the only named author, however other contributing authors would be included in any publication including researchers responsible for data collection.

Abstract

Introduction: Alcohol use by pregnant women negatively impacts the foetus and in turn the infant. Uganda rates as one of the largest alcohol consumers in the African continent. Using a standardized survey assessment tool, we estimate the prevalence and risk factors associated with alcohol use during pregnancy in Uganda.

Methods: Pregnant women were identified in the waiting rooms of antenatal clinics; after consent and enrolment, a survey was administered by trained study staff who explained it in the native languages in order to make sure there was no misinformation. Multivariable regression analyses methods were used to identify factors associated with alcohol use or misuse among pregnant women.

Results: Of the 566 study participants, n=77 (14%) reported any alcohol use and two reported continuous alcohol use. Alcohol misuse, as measured by consumption of alcohol after finding out about pregnancy, was more likely among unmarried women who are 30 years and older with primary education as their highest level of education. In the multivariable model, age (aOR: 1.095; 95% CI: 1.02, 1.17) and residential (urban and township) areas (aOR: 7.74; 95% CI: 3.02, 20.60) were associated with alcohol use during pregnancy. The majority of women who consumed alcohol reported only drinking it once or twice during pregnancy, while a small proportion of 0.34% reported daily consumption even after finding out about their pregnancy. In the univariable regression model the number of children and being a business owner were significantly associated.

Conclusion: We found that alcohol use among pregnant women was common and the main risk factors were age and urban and/or township living. There was increased prevalence of alcohol consumption among pregnant women aged 30 and older, compared to younger women, as well as those who were unmarried compared to married women.

Keywords: Alcohol consumption, Pregnant women, Uganda

Key Questions

What is already known?

- Alcohol moves from the mother's blood and passes to the baby through the umbilical cord which can cause miscarriage, stillbirth, and a range of other lifelong disabilities
- Lifelong disabilities associated with alcohol consumption during pregnancy are known as foetal alcohol spectrum disorders, which present as abnormal facial features, low body weight, small head size, and speech delays
- There is no safe time to drink alcohol during pregnancy
- There is no known safe amount of alcohol to drink while pregnant

What are the new findings?

- Alcohol consumption in this study population was high at 14%
- Earliest self-reported age of starting alcohol consumption was 3 years old and most women who consumed alcohol while pregnant had primary education as their highest level of education
- Women who lived in urban and township areas were more likely to consume alcohol while pregnant compared to women who lived in rural areas
- Women with more access (urban, cash business) are more likely to consume alcohol compared to other groups
- Very few women continued to consume alcohol after learning about pregnancy

What do the new findings imply?

- Public health interventions aimed at educating pregnant women about the risks of alcohol consumption during pregnancy are still needed especially for women who reported primary as their highest level of education
- Interventions should also involve partners of pregnant women as odds of consuming alcohol in single pregnant women were 5 times those of married women.
- The role of traditional beer in alcohol consumption is understudied along with its effects during pregnancy

Introduction

Alcohol consumption during pregnancy is a recognised cause of foetal alcohol spectrum disorder (FASD) with heavy and binge drinking being associated with foetal alcohol syndrome (FAS). The Lancet Global Health reported a global prevalence of foetal alcohol syndrome (FAS) to be at 14.6 cases per 10 000 population in 2017, resulting in 119 000 children born with FAS ⁽¹⁾. Prevalence of alcohol consumption during pregnancy was estimated at 9.8% globally. FAS and FASD lead to intellectual disability, developmental delays along with birth defects. FAS is a lifelong condition which can result in mental illness, substance misuse, and other secondary disabilities and it is completely preventable ⁽²⁾. There is considerable regional variation in prevalence of alcohol use during pregnancy. For example, in South Africa, the prevalence of alcohol use among pregnant women differs between provinces but ranges from 3.2% - 42.8% ⁽³⁾. In Ghana, alcohol consumption during pregnancy was reported at 20.4% in Bosomtwe district ⁽⁴⁾, Dodoma in Tanzania reported 15.1% ⁽⁵⁾.

Alcohol is considered an integral part of many cultural, religious, and social practices; it has formed part of customs of many communities around Africa such as weddings, funerals, and ancestral ceremonies ⁽⁶⁾. Traditionally, drinking alcohol was restricted to elders of the families and usually to only men, however with the evolution of cultural customs, women are now also permitted to consume it during these gatherings. There is a rise in alcohol consumption in low- and middle-income countries (LMIC) with an estimated 43% of the world population who are 15 years and older consuming alcoholic beverages ⁽⁷⁾. In many African countries homemade alcohol is commonly consumed as it is cheap and easy to produce and usually of lower alcohol content. This can result in under reporting of alcohol use as it is not accounted for in official statistics ⁽⁸⁾. Homemade alcohol is associated with increased risk of harm due to the presence of toxic compounds, which could lead to unknown and likely dangerous effects associated with its consumption, especially for pregnant women. In addition to the known harmful effects of alcohol itself ⁽⁹⁾. Alcohol consumption is one of the world's largest risk factor for disease and disability ⁽¹⁰⁾.

The prevalence of alcohol consumption in Uganda is rated as one of the highest in the world at number seven, with disparities among men and women attributed to culture and gender roles ⁽¹¹⁾. In 2004, Uganda recorded the highest annual consumption per capita in its history, however these numbers have since seen a decline ⁽¹²⁾. Understanding the local prevalence and risk factors associated with alcohol consumption during pregnancy, will ensure appropriate interventions designed to reduce alcohol consumption during pregnancy are implemented.

Published studies on alcohol consumption during pregnancy in African countries are limited and do not use standardized alcohol assessment tools ⁽²⁾. In order to address these limitations, we will use data collected from a larger study that recruited participants across different Ugandan districts. This study will estimate the prevalence of alcohol use during pregnancy as well as look at associated risk factors linked with alcohol consumption during pregnancy.

Methods

Prospective cohort study design, setting and population

This study is part of a prospective cohort study of pregnant women, their infants, and families from Kalungu District in south-western Uganda, it has an estimated population of 177,200 people as recorded in 2012.

Pregnant women were recruited during their routine antenatal care visits at two local clinics. The estimated number of births recorded per year in the regional area is approximately 600, with an estimated 40% of the births occurring at home. Study participants needed to be 18 years or older, pregnant, and consenting to all four visits which included two home visits along with providing consent for research.

Data collection

Study participants were recruited at their local antenatal clinics during their routine visits. Data was collected in four stages, the first data collection stage took place at enrolment, the consent form highlighted the three other stages of data collection which included two home visits (during pregnancy and the second visit after delivery), with the final visit taking place 6 weeks after giving birth. Study visits collected data using structured questionnaires with trained study staff. Measures in this analysis included demographic characteristics such as age, residential area, number of children born, highest educational level attained, employment status, dwelling type and marital status, as well as information regarding alcohol consumption during the antenatal period.

Data management and analysis

Data collection was done by trained data capturers using handheld tablets directly onto a secure RedCAP database ⁽¹³⁾. To ensure confidentiality and protect sensitive information, study participants were provided with unique study numbers.

Data was cleaned and exported to R studio where coding and analysis was completed. Data on alcohol consumption was measured according to age of starting alcohol, frequency [never, once or twice, monthly, weekly and daily or almost daily], along with age of stopping. Prevalence of alcohol consumption in this study population group was analysed. Any amount of alcohol

consumed during pregnancy was reported as alcohol use; hazardous alcohol use was defined as alcohol consumption after finding out about pregnancy.

Measures of association specifically odds ratios were used to summarise the data along with 95% confidence interval and p-value. Age categories were stratified into age bands for easier analysis along with marital status which combined never married/widowed/divorced into a single band for easier analysis. Variables were all summarized as percentages.

Level of education, marital status, residential area, dwelling type and employment were examined as outcomes of interest in the association of alcohol consumption during pregnancy. We examined the characteristics of the women, followed by the frequency of the alcohol consumption and risk factors and lastly the association between alcohol consumption and age, residence, number of children, education, employment, marital status, and dwelling type using unadjusted and adjusted logistic regression models. We then interpreted these results as factors associated with alcohol use.

Results

The number of women who answered the different characteristic questions differed with the overall number of participants being 566, however only 556 (98%) women answered the age component and only 562 (99%) answered the marital status question, 559 (98.7%) answered the level of education section, 551 (97%) women answered the occupation question, 451 (79.7%) answered when asked about the number of children they had, 541 (95.6%) reported on dwelling type and 560 (98.9%) answered on which residential area they lived in, which presented a bit of a problem when calculating proportion as it had to be calculated individually and not based on the overall number of participants. Majority of the women had between 1-7 children and 1 woman who consumed alcohol while pregnant reported having over 10 children, these numbers coincided with the gravida of women who consumed alcohol while pregnant. 2 women reported cigarette smoking during pregnancy, and none reported the use of other illicit substances such as heroine, marijuana, and inhalants.

Characteristics of Study participants

A total of 566 consenting pregnant women were recruited for the parent study, two home visits which were divided into two, one in the antenatal period of the pregnancy and the second visit after the woman had given birth were arranged for the study participants, along with the enrolment visit and one other visit six weeks after delivery with a total of four visits. The average age of the study participants is 26 years (range: 15-46). Descriptive characteristics (Table 1) level of education, marital status, dwelling type and residential area, Table 1 shows 316 women reported primary education being the highest level completed, 195 (34.5%) reported secondary

education as their highest level, 2 reported having a diploma, 2 had tertiary education and 20 had a certificate. Majority of the participants 447 (80%) were married monogamously, 103 (18%) were married polygamously and 9 had never been married. 93% of the participants reside in rural areas while only 35 (6.2%) lived in urban/townships.

Majority of the women are farmers 400 (72.8%) followed by housewives 46 (8.3%), women in business 30 (5.4%), 25 (4.5%) are teachers, hairdressers 20 (4%), and other occupations accounting for 28 (5.1%). Of the 566 women 354 (78.5%) of the women reported having between 1-4 children, 88 (19.5%) women reported 5-8 children and 9 (2%) women reported between 9-19 children. Independent houses were the most reported dwelling type among the participants with 418 (77.3%), 100 (18.5%) women lived in tenement, 15 (2.8%) women reported living in boy's quarters, 4 (0.7%) were sharing either a house or flat and 1 (0.2%) lived in an independent flat.

Table 1. Socio-demographic characteristics of pregnant women

Characteristics	Overall (%)	Alcohol use during during pregnancy (%) N=77	Non-alcohol use during pregnancy (%)
Age (years) n=556			
<19	89 (16.0)	6 (7.8)	83 (17.3)
20-24	179 (32.2)	18 (23.4)	161 (33.6)
25-29	134 (24.1)	19 (24.7)	115 (24.0)
30-35	100 (18.0)	20 (26)	80 (16.7)
>35	54 (9.7)	14 (18.2)	40 (8.4)
Marital status n=562			
Divorced/separated/ never married/widowed	12 (2.14)	5 (6.6)	7 (1.44)
Married monogamously	447 (80.0)	52 (68.4)	395 (81.3)
Married polygamously	103 (18.3)	19 (25.0)	84 (17.3)
Education n=559			
Primary	316 (56.5)	38 (49.4)	278 (57.7)
Secondary	195 (34.7)	29 (37.7)	166 (34.4)
Post-secondary	24 (4.3)	4 (1.3)	20 (4.1)
None	24 (4.3)	6 (7.8)	18 (3.7)
Occupation n=551			
Farmer	400 (72.6)	48 (64.8)	347 (73.5)
Housewife	46 (8.3)	8 (10.8)	38 (8.1)
Business	30 (5.4)	9 (12.2)	21 (4.4)
Teacher	25 (4.5)	4 (5.4)	21 (4.4)
Hairdresser	22 (4.0)	2 (2.7)	20 (4.2)
Other	28 (5.1)	3 (4.1)	25 (5.3)
Number of children n=451			
1- 4	354 (78.5)	45 (69.2)	309 (80.3)
5- 8	88 (19.5)	19 (29.2)	69 (18)
9-10	9 (2.0)	1 (1.5)	7 (1.8)

Dwelling type n=541

Boy's quarters	15 (2.8)	1 (1.4)	14 (3)
Independent flat	1 (0.2)	0	1 (0.2)
Independent house	418 (77.3)	57 (78.1)	361 (77.1)
Sharing house/flat/apartment	4 (0.7)	1 (1.4)	3 (0.6)
Tenement	100 (18.5)	13 (17.8)	87 (18.6)
Other	3 (0.6)	1 (1.4)	2 (0.4)

Residence n=560

Rural	525 (93.8)	61 (79.2)	464 (94.89)
Urban/townships	35 (6.3)	16 (20.8)	19 (3.89)

¹ Two women reported cigarette smoking during their pregnancy

² No woman reported the use of heroine, marijuana, inhalants, and drugs in the questionnaire

Alcohol consumption among pregnant women

The prevalence of alcohol consumption during pregnancy was 14%, the minimum age of starting alcohol was 3 while the average age of women who consumed alcohol during pregnancy was 20 years. Out of the 77 (14%) women who reported alcohol consumption 3 (0.53%) said they consumed alcohol daily or almost daily, 5 (0.88%) said monthly, 8 (1.41%) said weekly, 38 (6.71%) said once or twice and 23 (4.06%) said they never consumed alcohol in the past three months of the study period. Two women said they smoked daily or almost daily in the past three months. Majority of the participants reported no smoking.

The estimated prevalence of alcohol use in this study was 0.136 (or 14%), with a margin of error being plus or minus 0.028 (rounded to 0.03 or 3%). The lower end of the interval is 0.136 - 0.03=0.106 or 10.6%; the upper end is 0.166 or 16.6%) with 95% confidence the percentage of times pregnant women consumed alcohol while pregnant was somewhere between 11% and 16% based on our sample.

Women who consumed alcohol during pregnancy were business owners 9 (30%), women who have had between 5 - 8 children 19 (22%) and live in other dwelling types 1 (33%) as compared to women who are hairdressers 22 (9%), farmers 48 (12%) and teachers 4 (16%) as well as those who had 1-4 pregnancies 45 (13%), more than 9 pregnancies 1 (11%) and lived in independent flats 0. 23 (30%) out of the 77 women who consumed alcohol discontinued consumption as the pregnancy progressed.

Frequency of Alcohol consumption during study period

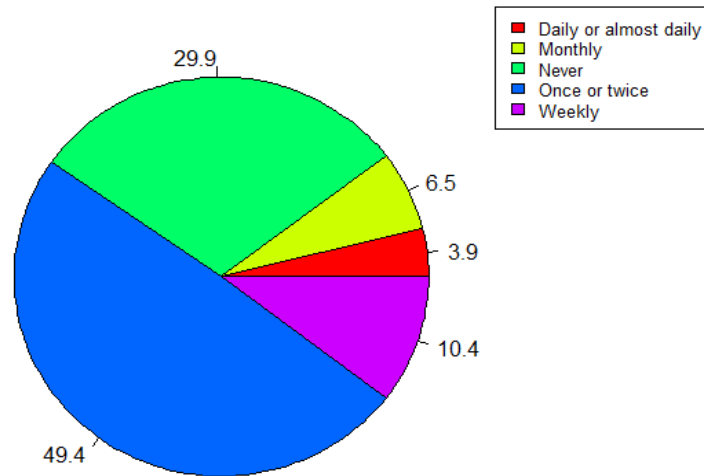


Figure 1. Pie chart of frequency of alcohol consumption during study period

Risk factors associated with alcohol consumption during pregnancy

Results from the univariable and multivariable models of factors associated with alcohol consumption among pregnant Ugandan women are shown in (Table 2).

In the univariable models age, residence, number of children, married polygamously, married monogamously and being a farmer (Table 2) were significantly ($p < 0.05$) associated with increased odds of alcohol consumption during pregnancy. The odds ratio in (Table 2) indicate that women who recorded primary schooling as their highest level of education were more likely to consume alcohol during pregnancy compared to women who had secondary and post-secondary education. We also observed a decreased occurrence of association of alcohol consumption during pregnancy in women who were either housewives or teachers compared to farmers, hairdressers, and any other jobs. Women who lived in independent houses/flats were least likely to be associated with alcohol consumption during pregnancy compared to those who lived in boy's quarters.

Table 2: Unadjusted and adjusted logistic regression models of correlates of alcohol use during pregnancy among participants.

	Univariable model		Multivariable model	
	OR (95% CI)	P-value	OR (95% CI)	P-value
Age	1.08 (1.04, 1.12)	<0.001	1.095 (1.02, 1.17)	0.009
Residential area				
Rural	Ref			
Urban/township	6.34 (3.1, 13)	<0.001	7.74 (3.02, 20.60)	<0.0001
Children				
Numb. of children	1.14 (1.02, 1.28)	<0.001	0.93 (0.76, 1.14)	0.504
Education				
None	Ref			
Primary	0.41 (0.15, 1.09)	0.075	0.42 (0.16, 1.31)	0.111
Secondary	0.54 (0.2, 1.48)	0.23	0.48 (0.16, 1.61)	0.214
Post-secondary	0.63 (0.15, 2.61)	0.526	0.57 (0.07, 4.61)	0.598
Marital status				
Divorced/separated/ never married/widowed	Ref			
Married polygamously	0.22 (0.06, 0.83)	0.025	0.09 (0.01, 0.53)	0.011
Married monogamously	0.14 (0.04, 0.48)	0.002	0.05 (0.01, 0.28)	0.001
Employment				
Business	Ref			
farmer	0.32 (0.14, 0.75)	0.008	0.67 (0.23, 2.08)	0.463
hairdresser	0.23 (0.04, 1.21)	0.084	0.44 (0.05, 2.74)	0.416
housewife	0.49 (0.16, 1.46)	0.202	1.56 (0.39, 6.31)	0.525
teacher	0.44 (0.12, 1.67)	0.23	0.59 (0.07, 3.98)	0.596
Other	0.28 (0.07, 1.17)	0.081	0.39 (0.07, 1.86)	0.258
Dwelling type				
Tenement	Ref			
Boy's quarters	0.48 (0.06, 3.95)	0.493	1.07 (0.05, 7.58)	0.952
Independent house/flat	1.05 (0.55, 2.01)	0.874	1.37 (0.06, 3.35)	0.461
sharing house, flat/apt	2.23 (0.22, 23.09)	0.501	4.35 (0.18, 55.28)	0.267
Other	2.23 (0.22, 23.09)	0.501	2.68 (0.09, 35.06)	0.498

In the multivariable model (Table 2), women with primary education as their highest level of education had increased odds of alcohol consumption compared to those with post-secondary education. As indicated in (Table 2) there was no significant statistical difference in the odds of alcohol misuse between people who recorded primary and secondary school as their highest level of education. Women employed as teachers had lower odds compared to women who listed 'other' as their form employment. Women who lived in a shared space such as house/flat had increased odds of alcohol consumption compared to women who lived in boy's quarters.

The multivariable model shows there was increased occurrence based on age (aOR: 1.095; 95% CI: 1.02, 1.17), and the women who lived in urban or township areas consumed alcohol 7.7 times more than women who lived in rural areas (aOR: 7.74; 95% CI: 3.02, 20.60). There was decreased occurrence of alcohol consumption in women who are married polygamously (aOR; 0.09; 95% CI: 0.01, 0.53), or monogamously (aOR: 0.05; 95% CI: 0.01, 0.28) as they consumed 0.09 and 0.05 times less alcohol than women who were in the never married/widowed/separated/divorced group of participants. Number of children and being a farmer were no longer associated with alcohol use during pregnancy after adjusting for covariates. The strength of association was highest with those residing in either urban/township areas on both the univariable and multivariable models.

Discussion

In this prospective cohort study of 566 women seeking antenatal care in selected facilities in Kalungu District in south-western Uganda, we report prevalence and risk factors of alcohol consumption during pregnancy. In spite of guidance to avoid alcohol use during pregnancy, we found that a large number of the participants (14%) consumed alcohol during pregnancy. This is in line with a similar study that reported a 33% prevalence of alcohol consumption among pregnant Ugandan women ⁽¹⁴⁾.

The relatively high (14%) proportion of maternal alcohol consumption reported in this study might be due to the availability of alcohol that is served at various traditional ceremonies. Uganda is a post conflict country which has now seen a rise in alcohol marketing in recent years due to international companies who could not previously trade in the country now being able to expand their clientele ⁽¹⁵⁾.

This study consisted mainly of monogamously and polygamously married women who work as subsistence farmers in their late 20s to mid-30s with secondary education being their highest level of education. Majority of the study participants live in rural areas in independent houses and have between 1- 4 children. Unmarried women were more likely to consume alcohol during pregnancy as compared to married women. Owning a business and living in urban/township

areas resulted in increased occurrence of association compared to those who were teachers. This is in line with a study conducted in Ghana where most alcoholic drinkers were young, unmarried less educated women⁽¹⁶⁾. The women who reported consuming alcohol in the last three months did reduce their consumption as the pregnancy progressed, which is in line with a similar study conducted in Australia on Nonindigenous West Australian women by Colvin ⁽¹⁷⁾.

A study conducted by Wandera ⁽¹⁴⁾ found that women who drank alcohol while pregnant were in romantic relationships with men who binge drank and supplied the women with alcohol which contradicts the results in our study as majority of our study participants are married women and only accounted for (13%) of women who consumed alcohol compared to 42% of unmarried women who consumed alcohol while pregnant. A study conducted in South-Eastern Nigeria found that 35.5% of women in their study were aware that alcohol is harmful to the foetus however there were still knowledge gaps about the harmful effects ⁽¹⁸⁾.

A small number of the study participants did not answer questions based on alcohol consumption likely due to them knowing that consumption of alcohol during pregnancy is harmful to the foetus. Current (during study period) alcohol consumers drank alcohol once or twice in the past three months while a small number reported drinking weekly, at the time of the study the women were already in their second or third trimester. A number of studies including one by Ethen⁽¹⁹⁾, reported that pre-pregnancy binge drinking is a predictor of drinking during pregnancy (adjusted OR = 8.52, 95% CI = 6.67-10.88). It should be highlighted that the findings in this study are vastly different to the reports that Uganda has the highest alcohol consumption levels in Sub-Saharan Africa.

The number of women who reported cigarette smoking during their pregnancy was two which was far lower than expected as compared to similar studies conducted in the United States ⁽²⁰⁾, other substances such as heroine, marijuana, inhalants, and drugs were asked in the questionnaire with zero reports of these drugs being reported, this is contrary to other similar studies conducted in South Africa ⁽²¹⁾ which found some drug use during pregnancy however of lower prevalence compared to alcohol use. The none reporting of drug use may be associated with social disapproval of these drugs and therefore the women under reported their use of the substances.

Conclusion

In summary, this study found that out of the 77 (14%) women who consumed alcohol 23 (4%) discontinued alcohol consumption as the pregnancy progressed as they reported to have not consumed alcohol in the past three months and this is encouraging. The logistic regression models found that age and living in urban/township areas were significantly associated with alcohol consumption. Monogamously/polygamously marriage saw a reduction in alcohol

consumption as compared to the reference category. There is a need for health promotion programmes which focus on pregnancy and infant health which will help the mothers make informed decisions about abstaining from alcohol consumption during pregnancy and while breast feeding because majority of the women who consumed alcohol had secondary education as their highest level of education. It is also important for maternal educational studies to not only focus on pregnant women but to include all women in reproductive age. The study results presented a high prevalence level of alcohol consumption among pregnant women compared to other similar studies; the number of women who smoked during pregnancy was lower than expected compared to similar European studies.

Strengths and limitations

Our study consisted of self-reporting which may be affected by recall bias or social desirability bias which results in women under-reporting their alcohol consumption during pregnancy. A strength of the study is that it had a small number of pregnant alcohol consumers which is good in terms of public health, the study used validated WHO questionnaire which maximises validity of the findings.

Ethics statement

There was no monetary compensation or incentives provided to subjects for study enrolment. The study was approved by the Health Science review board from the University of Cape Town school of Public Health and Family Medicine.

IMPALA funding statement:

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c. Appendix



UNIVERSITY OF CAPE TOWN
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13 April 2021

HREC REF: 216/2021

A/P M Lesosky

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Dear A/Prof Lesosky

PROJECT TITLE: PREVALENCE AND RISK FACTORS OF ASSOCIATED WITH ALCOHOL CONSUMPTION IN PREGNANT WOMEN FROM UGANDA -MASTER'S CANDIDATE-MISS PHUMZILE TSHABALALA-SUB-STUDY LINKED TO 806/2018

Thank you for submitting your study to the Faculty of Health Sciences Human Research Ethics Committee (HREC) for review.

It is a pleasure to inform you that the HREC has **formally approved** the above-mentioned study.

This approval is subject to strict adherence to the HREC recommendations regarding research involving human participants during COVID -19, dated 17 March 2020 & 06 July 2020.

Approval is granted for one year until the 30 April 2022.

Please submit a progress form, using the standardised Annual Report Form if the study continues beyond the approval period. Please submit a Standard Closure form if the study is completed within the approval period.

(Forms can be found on our website: www.health.uct.ac.za/fhs/research/humanethics/forms)

The HREC acknowledge that the student: Miss Phumzile Tshabalala will also be involved in this study.

Please quote the HREC REF 216/2021 in all your correspondence.

Please note that the ongoing ethical conduct of the study remains the responsibility of the principal investigator.

Please note that for all studies approved by the HREC, the principal investigator **must** obtain appropriate institutional approval, where necessary, before the research may occur.

HREC/REF 216/2021sa

Yours sincerely

PROFESSOR M BLOCKMAN

CHAIRPERSON, FACULTY OF HEALTH SCIENCES HUMAN RESEARCH ETHICS COMMITTEE

Federal Wide Assurance Number: FWA00001637.

Institutional Review Board (IRB) number: IRB00001938

NHREC-registration number: REC-210208-007

Original research

Research papers address specific questions and/or social phenomena in depth, and in such a way that speaks to and connects with the findings of other studies addressing the same question and/or phenomenon. The question and/or phenomenon under inquiry must be clearly articulated, preferably framed in terms of major global health issues or debates, and with analysis (especially of qualitative data) informed by social science theories, in defining the research question, framing the analysis, organising the results and/or reflecting on the findings.

Full papers (including systematic reviews) should follow the basic structure of abstract, introduction, methods, results, discussion, conclusion, references, and tables and figures as appropriate. There is an online data repository for extra information, tables, figures and appendices. However, we would encourage as much methods and data to be contained in the manuscript as possible.

All research on human subjects must have been approved by the appropriate ethics committee and must have conformed to the principles embodied in the Declaration of Helsinki. A statement to this effect must be included in the methods section of the paper.

We encourage the use of the Sex and Gender Equity in Research (SAGER) guidelines for reporting of sex and gender information in study design, data analyses, results and interpretation. This includes the correct use of the terms sex (when reporting biological factors) and gender (when reporting identity, psychosocial, or cultural factors) and separate reporting and interpretation of the data by sex and gender. If sex and/or gender information are not reported, this should be explained. See [SAGER guidelines](#) and [Sex and gender reporting in global health: new editorial policies](#).

Following the lead of The BMJ and its [patient partnership strategy](#), *BMJ Global Health* is encouraging active patient involvement in setting the research agenda. As such, we require authors of Research Articles to add a Patient and Public Involvement statement in the Methods section. Please see more details in the [‘Reporting public involvement in research’](#) section.

Authors should also complete a summary box explaining the significance of their study by providing each of the following key questions:

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Word count: up to 5000

We recognise that some studies may need more space. Requests to exceed this word count should be made to the Editor before submission. Requests will need to be justified, and will be handled on a case by case basis.

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