

Prevalence and associated factors of alcohol consumption among pregnant women attending antenatal care in a Rural District in Tete, Mozambique

Sancho Pedro Xavier (✉ s.xavier@unilurio.ac.mz)

Universidade Zambeze

Jorge Manuel José

Universidade Zambeze

Nelson Domingos Cote

Universidade Zambeze

Ramim Xavi

Universidade Zambeze

Audêncio Victor

Universidade de São Paulo

Research Article

Keywords: Alcohol consumption, antenatal care, pregnancy

Posted Date: November 7th, 2022

DOI: <https://doi.org/10.21203/rs.3.rs-2232864/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Abstract

Background: Alcohol consumption during pregnancy is a significant public health and pregnancy-related problem, such as spontaneous abortion, stillbirth or low birth weight. According to the WHO, there is no safe amount of alcohol consumption during pregnancy. Studies show high rates of alcohol consumption during pregnancy in sub-Saharan African countries with a prevalence range (2.2-87%). This research aimed to determine the prevalence and associated factors of alcohol consumption among pregnant women attending antenatal care in a rural district of Tete, Mozambique.

Methods: A cross sectional survey was conducted between May and June 2022. The non-probability convenience method was applied for sample selection. Prevalence was determined using a 95% CI. binary logistic Regression was used to determine the factors associated with alcohol consumption. Data were analysed using statistical SPSS v26 and Stata.

Results: The prevalence of alcohol consumption during pregnancy was 85.9% (152/177; 95% CI: 80.7-91.0), which was associated with increasing age (OR= 8.86; 95% CI: 2.646-29.687; p-value = 0.000 and OR= 9.81; 95% CI: 2.262-42.576; p-value = 0.002) respectively. In addition, another associated factor was following some religion (OR= 0.07; 95% CI: 0.020-0.246; p-value = 0.000).

Conclusion: The survey significantly reveals a high prevalence of alcohol consumption among pregnant women attended in a antenatal care in Chitima. Maternal age and religion were the variables that have some significant association with alcohol consumption during pregnancy. Therefore, interventions for behavioural change to reduce alcohol consumption during pregnancy are needed, especially in all age groups.

Background

Alcohol is a psychoactive drug that can cause acute as well as chronic changes, and has been largely used by many populations worldwide, although its effects, in particular causing dependence (1). Consumption of alcohol during pregnancy is a worrying public health problem because it is a substance known to cause teratogenic effects (2), bringing harmful effects to the health of both the mother and the developing foetus (3,4). Alcohol has the ability to rapidly cross the placenta, immediately affecting the foetus within two hours (5). Alcohol exposure during antenatal period is recognised as a risk factor for several harmful pregnancy outcomes, including spontaneous abortion, stillbirth, preterm birth, reduced fetal development and low birth weight, cognitive, behavioural and neurodevelopmental deficiencies for the child over the life course(6), in addition to a variety of disorders known collectively as Fetal Alcohol Spectrum Disorder (FASD) (7-9). Globally, about 630,000 children are born with FASD each year, and in 2017, the prevalence of FASD was 8 per 1000 children and young people(10). The World Health Organization (WHO) recommends that pregnant women to abstain completely from alcohol, as no amount of alcohol at this stage is considered safe(11), not only is it safe for pregnant women not to consume alcohol, but also women who are planning a pregnancy (6,12,13). Further, despite these

recommendations, alcohol consumption among women is not uncommon, and worldwide it is estimated at 10% (14). In sub-Saharan African countries, surveys estimate the prevalence of lifetime alcohol exposure among women to be between 2.2 and 59.28%, reaching 87% (15–17), which suggests that in this region, alcohol consumption during pregnancy is a growing problem among pregnant women (18). In this region, having an unplanned pregnancy (19,20), unawareness about the risks of alcohol consumption (20), having partners and friends who consume alcohol (20,21), health-related problems such as depression and unemployment (20,21) are the main factors for alcohol consumption during pregnancy. In Mozambique, there is a lack of research that aims to explore the prevalence and predictors for alcohol consumption during pregnancy. Therefore, this research was undertaken to determine the prevalence and associated factors of alcohol consumption among pregnant women attending a primary health care unit in Chitima, Cahora Bassa district, Tete province.

Methods

Design and period of the study

A cross-sectional study with a quantitative approach was conducted between May and June 2022.

Study area

The study was conducted in a primary care unit of a primary health center located in Chitima, Cahora-Bassa district, Tete province, northwestern Mozambique. Chitima is a rural community of 20,135 inhabitants according to 2017 census data (22), with an extension of 1,370.00 km², latitude -15.73957° or 15° 44' 22" south and longitude 32.76925° or 32° 46' 9" west, R601.

Population, sample size and sampling techniques

About 300 pregnant women who visited the prenatal care during the survey were considered universe of the study. This universe, corresponds to the monthly average of pregnant women attending the antenatal service of the health facility. To determine the sample size a mathematical calculation for finite population was used, where the expected population was 50%, value of the normal distribution for a given confidence level (95%) =1.96, and margin of error of 0.05. 169 was the size found and 5% was added to total 177 (n=177). The non-probabilistic technique by convenience was used for sample selection.

Data collection procedures

A structured instrument adapted from literature reviews was used to collect data on (i) socio-demographic, (ii) obstetric and (iii) behavioural variables on alcohol use.

Study variables

Alcohol consumption during pregnancy was considered the dependent variable. This variable was dichotomised into 1 = "consumed alcohol during pregnancy" and 0 = "did not consume alcohol during pregnancy". The independent variables included: sociodemographic factors (age, education, religion, current occupation, family income and marital status); obstetric factors (number of pregnancies, gestation period, type of previous delivery); and behavioural factors (knowledge of the risks of consuming alcohol during pregnancy) on alcohol use.

Data treatment and analysis

Descriptive statistics were performed for sociodemographic, obstetric and behavioural data on alcohol consumption. The multivariate logistic model was applied to identify predictors of alcohol consumption during pregnancy. The Odds Ratio (OR) was applied to determine the probability of occurrence of the main outcome, considering the 95% confidence interval (CI) and p-value < 0.05 for statistically significant differences. Bivariate analysis was performed to determine associations between the sociodemographic variables. All analysis was performed using Stata and SPSS v. 26.

Results

Sociodemographic characteristics of pregnant women

A total of 177 pregnant women were included in the study. The mean age of the participants was 27.9 (SD \pm 4.84), with a range of 18 to 39 years old. Most (56%) of the participants were between 25-31 years of age. 58.8% were enrolled in Primary education. More than half (84.7%) of the participants had no formal occupation till the time of the study. The majority (83.8%) were married and without religion (58.4%) as shown in table 1.

Table 1. Sociodemographic characteristics of pregnant women attending a health center in Chitima, between May and June 2022.

Variables	<i>n</i>	<i>%</i>	<i>p-value</i>
Age			
18- 24	39	22,0	
25- 31	99	55,9	0,007*
> 31	39	22,9	
Education			
Primary	104	58,8	
Secondary	70	39,5	0,614
None	3	1,7	
Current occupation			
Yes	27	15,3	0,771
No	149	84,7	
Household income			
>3000	6	3,4	
<3000	24	13,6	0,90
None	147	83,0	
Marital Status			
Married	134	75,7	
Single	23	13,0	0,68
Divorced	3	1,7	
No mention	17	9,6	
Religion			
Yes	72	41,6	0,000*
No	101	58,4	

Obstetric characteristics of pregnant women

As shown in Table 2, among the pregnant women who participated in the study, 39.0% had two gestations. Most pregnant women were between 12 and 24 weeks of gestation (54.1%), and 65.5% were in the second trimester of gestation. 5.9% of pregnant women reported some previous abortion history.

Table 2. Obstetric characteristics of pregnant women attending a health center in Chitima, between May and June 2022.

Variables	<i>n</i>	%
Number of gestation		
Premi	19	10,7
II	69	39,0
III	59	33,3
IV and more	30	16,9
Gestation period (in weeks)		
< 12 weeks	9	5,3
12- 24 weeks	93	54,1
24- 36 weeks	64	37,6
36 or more	5	2,9
Gestation period (trimester)		
First trimester	25	14,6
Second trimester	112	65,5
Third trimester	34	19,9
Type of previous delivery		
Normal	137	90,1
Caesarean section	6	3,9
Abortion	9	5,9

Prevalence of alcohol consumption during pregnancy

The prevalence of alcohol consumption in any quantity among pregnant women was 85.9% (152/177; 95% CI: 80.7-91.0). Of these, 97.4% (148/152) consumed alcohol before pregnancy. Only 11.5% of pregnant women stopped consuming alcohol after knowing about their pregnancy status. Most of the pregnant women consumed alcohol one week before the day of the study (71.1%). Of the pregnant women who consumed alcohol during pregnancy, most consumed it between 12 and 24 weeks (53.7%), and the second trimester was the most frequent (65.1%). Regarding the frequency of alcohol consumption, 71.7% consumed alcohol 1-3 times a week, while 17.8% consumed alcohol monthly.

Traditional alcoholic beverage (76.5%) and beer (18.3%) were the most consumed among pregnant women, as shown in Table 3.

Table 3. Distribution and pattern of alcohol consumption among pregnant women attending a health center in Chitima, between May and June 2022.

Variables	<i>n</i>	%
Alcohol consumption during pregnancy		
Yes	152	85,9
No	25	14,1
Pregnancy period (in weeks)		
< 12 weeks	7	4,7
12- 24 weeks	80	53,7
24- 36 weeks	57	38,3
36 or more	5	3,4
Gestation period (trimester)		
First	21	14,1
Second	97	65,1
Third	32	20,8
Last time you consumed alcohol (before the study)		
< 1 week	3	2,0
1 week	108	71,1
1 week	32	21,1
2 weeks	2	1,3
Unknown	7	4,6
Frequency of alcohol consumption		
Daily	3	2,0
1-3 times weekly	109	71,7
Monthly	27	17,8
Occasional	13	8,6
Types of alcoholic drinks		
Beer	28	18,3
Traditional	117	76,5
Wine	8	5,2

Knowledge of pregnant women about the risks and the reasons for consuming alcohol during pregnancy

According to Table 4, of the women who consumed alcohol during pregnancy, 94.1% were unaware on the risks of consuming alcohol during pregnancy. Of those who knew (5.9%), abortion (33.3%), hypertension (44.4%) were the most mentioned risks. Entertainment (79.2%), having a family member who drinks alcohol (10.7%), and absence of occupation (5.4%) were the main reasons indicated for alcohol consumption during pregnancy.

Table 4. Knowledge of pregnant women about the risks and the reasons for consuming alcohol during pregnancy attending a health center in Chitima, between May and June 2022.

Variables	<i>n</i>	%
Pregnant women's knowledge of the risks		
Does not know	143	94,1
Knows	9	5,9
Risks mentioned		
Abortion	3	33,3
LBW	1	11,1
HT	4	44.4
Others	1	11,1
Reasons for alcohol consumption during pregnancy		
Stress	7	4,7
Enjoyment	118	79,2
Lack of occupation	8	5,4
Having a family that consumes alcohol	16	10,7

*Note: LBW: Low birth weight; HT: Hypertension.

Determination of associated factors of alcohol consumption during pregnancy

Based on binary logistic regression analysis, increasing maternal age (OR= 8.86; 95% CI: 2.646-29.687; p-value = 0.000 and OR= 9.81; 95% CI: 2.262-42.576; p-value = 0.002) respectively and religion (OR= 0.07; 95% CI: 0.020-0.246; p-value = 0.000) were significantly associated with alcohol consumption during pregnancy. The chance of consuming alcohol in pregnancy was 881.5% times more increased in pregnant women with an age above 31 years than the age between 25 and 31 with 786% chance. The chance of consuming alcohol in pregnancy was 93% times reduced than women with no religion as shown in table 5.

Table 5. Factors associated with alcohol consumption during pregnancy

Variables	Categorization	OR (CI 95%)	<i>p-value</i>
Maternal age	18- 24	1	
	25- 31	8,86 (2,646-29,687)	0,000
	> 31	9,815 (2,262-42,576)	0,002
Religion	Não	1	
	Sim	0,07 (0,020-0,246)	0,000

Discussion

Although the negative effects of alcohol consumption during pregnancy are well known, many pregnant women in sub-Saharan Africa have been drinking alcohol (20). Since alcohol intake is a behavioural pattern, it has harmful consequences, such as spontaneous abortion, stillbirth, pre-term delivery, low birth weight, cognitive, behavioural and neurological deficiencies in children throughout their lives (6). In Chitima, a rural region of Tete Province there is a high trend of alcohol consumption, especially of traditional alcoholic beverage and in January 2015, there was a report of intoxication due to consumption of traditionally (pombe) produced alcohol, which led to deaths (23). In this present survey, the prevalence of alcohol consumption among pregnant women was 85.9% (152/177; 95% CI: 80.7-91.0). This result is within the prevalence range of sub-Saharan African countries (2.2 and 59.28% to 87%) (15–17). In contrast, the prevalence of alcohol consumption in this survey was excessively higher than surveys conducted in Ethiopia (21,24–27), Burkina Faso (28,29), Republic of Congo (30,31), Uganda (32–36), South Africa (37), Nigeria (12,7%) (17,38–40), Ghana (48%) (41) e Tanzania (42). This variation in prevalence may be due to sociocultural and contextual differences, as it is a rural setting and the tendency of alcohol consumption is higher in these areas. Research shows that alcohol consumption has some influence from society, dealing with adverse life and personal experiences, and intuitive decisions, in addition to cultural-traditional issues (43). Also, the disparity in results is high due to differences in study design and population. However, these results highlight that many pregnant women do not follow the guidelines on alcohol consumption in pregnancy, which recommends total abstinence from alcohol during this gestational period (44,45).

In this study, 71.7% of pregnant women consumed alcohol 1 to 3 times weekly and 17.8% monthly. These results were not consistent with the findings of research done in Ethiopia, where, 4.09% consumed alcohol 4 or more times a week and 14.71% 2 to 4 times a month (25). The reason for the divergence of these results is due to differences in socio-demographics, knowledge and perception of the effects of alcohol on a fetus. In the same country, results were found to be similarly divergent to those found in this study, in which 5% consumed alcohol 2 to 3 times a week, and 10% 2 to 4 times a month (27). In this present study, traditional alcoholic beverage (76.5%) and beer (18.3%) were the most consumed. Similarly, a study done in Ethiopia, found traditional drink and beer as the most consumed (25,27). In

contrast, a survey done in the same region found that after beer (43.8%), traditional alcoholic beverage was the most consumed (26.7%) The latter results are similar for possible reasons such as weak regulation of alcohol production. Traditional alcoholic beverages are culturally and socially acceptable and easily accessible with low cost (46,47). This study showed that 94.1% of pregnant women were unaware of the dangers of consuming alcohol during pregnancy. Conversely, 66.5% of pregnant women knew about the dangers of consuming alcohol during pregnancy, of these, 28.28% had consumed alcohol. The disparity observed may be due to sociocultural and contextual differences, and level of education, despite certain studies showing that the level of education has a statistically significant association between high education and alcohol consumption (48).

Socio-demographic factors have been strongly associated with alcohol consumption during pregnancy in both developing and developed countries. Studies in developing countries have found that women who drink alcohol are generally younger, less educated and unmarried (39,41). Other studies in the same region have found that older, well-educated women consume more alcohol during pregnancy (49). In this present study, there was statistically significant association between alcohol consumption with increasing age (OR= 8.86; 95% CI: 2.646-29.687; *p-value* = 0.000 and OR= 9.81; 95% CI: 2.262-42.576; *p-value* = 0.002) respectively, and with some religion (OR= 0.07; 95% CI: 0.020-0.246; *p-value* = 0.000). There was concordance with previous studies done in sub-Saharan Africa (40), Nigeria (39), Tanzania (50) e Burkina Faso (51). In this study, belonging to either Muslim or Christian faiths was a protective factor for alcohol use during pregnancy. A study in sub-Saharan Africa found that Muslim religion was protective of alcohol consumption compared to Christianity.(40). The association of age with alcohol intake in pregnancy remains unclear and is not well discussed in the literature, but young adults are found to be most at risk (52). However, these results should be carefully observed keeping in mind the study design. In relation to religion, these results suggest that women whose religions prohibit alcohol consumption have a reduced likelihood of consuming alcohol and consequently minimise the idea of alcohol consumption during pregnancy.

Despite the pertinent results of this study, some limitations may be observed. Because it is a cross-sectional study, it is difficult to assign causality. Data collection biases may occur in determining the prevalence of alcohol consumption. The estimation on quantity was difficult due to lack of understanding about the units of alcohol consumed and the cup size. However, the results confirm the need for increased efforts to develop and implement evidence-based interventions to prevent and reduce alcohol consumption during pregnancy. One weakness was the use of a small sample size corresponding to a short period, although some percentage was added in the sample. The results of the Confidence Intervals are greater indicating possible imprecision. The potential for deviations from the population, however, diminishes as the sample gets closer to the actual population. Another weakness is that there were some non-responses.

Conclusion

The results of the study reveal high alcohol consumption in pregnant women. The associated factors are maternal age and religion. However, religion proved to be a protective factor, whereas age was a risk factor for the outcome. Health interventions are needed to reduce alcohol consumption during pregnancy and intervention research to arrive at an accurate strategy is required.

List Of Abbreviations

FASD: Fetal Alcohol Spectrum Disorder; HT: Hypertension; LBW: Low birth weight; WHO: World Health Organization.

Declarations

Ethics approval and consent to participate

This study was approved by the Scientific Committee of Universidade Zambeze, Faculty of Health Sciences, and Health Center where the data was collected. Approval and authorization was obtained prior to conducting the research under code TFCLN - VNo110/22CCAP. The study was conducted under the Helsinki principles appropriate for the research. All pregnant women involved in the study consented to participate. The confidentiality of the participants was maintained.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that there are no competing interests.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or nonprofit sectors.

Authors' contributions

All authors were involved in the conceptualisation of the study, others in the revision and submission of the manuscript. SX and JMJ were involved in data collection, database creation and data entry; NDC e RX the review and correction of the original Portuguese manuscript; and SPX and AV in data analysis and interpretation. All authors read and approved the final manuscript.

Acknowledgements

The authors acknowledge the Scientific Committee of the Universidade Zambeze, Faculty of Health Sciences for approving this research project. They also thank the scientific direction of the Health Center through which the data of the research were collected.

References

1. World Health Organization. Global status report on alcohol and health 2018. World Health Organization; 2019.
2. Streissguth AP, Landesman-Dwyer S, Martin JC, Smith DW. Teratogenic effects of alcohol in humans and laboratory animals. *Science*. 1980 Jul;209(4454):353–61.
3. Patra J, Bakker R, Irving H, Jaddoe VW V, Malini S, Rehm J. Dose-response relationship between alcohol consumption before and during pregnancy and the risks of low birthweight, preterm birth and small for gestational age (SGA)-a systematic review and meta-analyses. *BJOG*. 2011 Nov;118(12):1411–21.
4. Bhuvanewar CG, Chang G, Epstein LA, Stern TA. Alcohol use during pregnancy: prevalence and impact. *Prim Care Companion J Clin Psychiatry*. 2007;9(6):455.
5. Gynecologists AC of O and. At-risk drinking and alcohol dependence: obstetric and gynecologic implications. Committee Opinion No. 496. *Obs Gynecol*. 2011;118:383–8.
6. National Health and Medical Research Council (NHMRC). Australian guidelines to reduce health risks from drinking alcohol. NHMRC Canberra. 2009;
7. Cook JL, Green CR, Lilley CM, Anderson SM, Baldwin ME, Chudley AE, et al. Fetal alcohol spectrum disorder: a guideline for diagnosis across the lifespan. *Cmaj*. 2016;188(3):191–7.
8. Chudley AE, Conry J, Cook JL, Looock C, Rosales T, LeBlanc N. Fetal alcohol spectrum disorder: Canadian guidelines for diagnosis. *Cmaj*. 2005;172(5 suppl):S1–21.
9. Hoyme HE, Kalberg WO, Elliott AJ, Blankenship J, Buckley D, Marais A-S, et al. Updated clinical guidelines for diagnosing fetal alcohol spectrum disorders. *Pediatrics*. 2016;138(2).
10. Lange S, Probst C, Gmel G, Rehm J, Burd L, Popova S. Global Prevalence of Fetal Alcohol Spectrum Disorder Among Children and Youth: A Systematic Review and Meta-analysis. *JAMA Pediatr*. 2017 Oct;171(10):948–56.
11. World Health Organization (WHO). WHO recommendations on interventions to improve preterm birth outcomes. 2014; Available from: <https://apps.who.int/iris/handle/10665/148114>
12. Butt P, Beirness D, Gliksman L, Paradis C, Stockwell T. Alcohol and health in Canada: a summary of evidence and guidelines for low-risk drinking. Ottawa, Can Cent Subst Abus. 2011;
13. Danish National Board of Health. Healthy habits—before, during and after pregnancy. 1st English edition (translated from the 2nd Danish edition). The Danish National Board of Health and The Danish Committee for Health ...; 2010.

14. Popova S, Lange S, Probst C, Gmel G, Rehm J. Estimation of national, regional, and global prevalence of alcohol use during pregnancy and fetal alcohol syndrome: a systematic review and meta-analysis. *Lancet Glob Heal*. 2017 Mar;5(3):e290–9.
15. Abasiubong F, Bassey EA, Udobang JA, Akinbami OS, Udoh SB, Idung AU. Self-Medication: potential risks and hazards among pregnant women in Uyo, Nigeria. *Pan Afr Med J*. 2012;13(1).
16. Ordinioha B, Brisibe S. Alcohol consumption among pregnant women attending the ante. Natal clinic of a tertiary hospital in south. South Nigeria. *Niger J Clin Pract*. 2015;18(1):13–7.
17. Popova S, Lange S, Probst C, Shield K, Kraicer-Melamed H, Ferreira-Borges C, et al. Actual and predicted prevalence of alcohol consumption during pregnancy in the WHO African Region. *Trop Med Int Health*. 2016 Oct;21(10):1209–39.
18. Gareri J, Lynn H, Handley M, Rao C, Koren G. Prevalence of fetal ethanol exposure in a regional population-based sample by meconium analysis of fatty acid ethyl esters. *Ther Drug Monit*. 2008 Apr;30(2):239–45.
19. Tesso FY, Woldesemayat LA, Kebede DB. Magnitude of substance use and associated factors among pregnant women attending jimma town public health facilities, Jimma Zone, Oromia Regional State Southwest Ethiopia. *Clin Mother Child Heal*. 2017;14(275):2.
20. Addila AE, Bisetegn TA, Gete YK, Mengistu MY, Beyene GM. Alcohol consumption and its associated factors among pregnant women in Sub-Saharan Africa: a systematic review and meta-analysis' as given in the submission system. *Subst Abuse Treat Prev Policy*. 2020;15(1):1–14.
21. Anteab K, Demtsu B, Megra M. Assessment of prevalence and associated factors of alcohol use during pregnancy among the dwellers of Bahir-Dar City, Northwest Ethiopia, 2014. *Int J Pharma Sci Res*. 2014;5:939–46.
22. Garcia RA. The effect of lipids on bongkreic (Bongkrek) acid toxin production by *Burkholderia cocovenenans* in coconut media. *Food Addit Contam*. 1999;16(2):63–9.
23. Gudo ES, Cook K, Kasper AM, Vergara A, Salomão C, Oliveira F, et al. Description of a Mass Poisoning in a Rural District in Mozambique: The First Documented Bongkreic Acid Poisoning in Africa. *Clin Infect Dis an Off Publ Infect Dis Soc Am*. 2018 Apr;66(9):1400–6.
24. Mekuriaw B, Belayneh Z, Shemelise T, Hussen R. Alcohol use and associated factors among women attending antenatal care in Southern Ethiopia: a facility based cross sectional study. *BMC Res Notes [Internet]*. 2019 Oct 24;12(1):690. Available from: <https://pubmed.ncbi.nlm.nih.gov/31651365>
25. Bitew MS, Zewde MF, Wubetu M, Alemu AA. Consumption of alcohol and binge drinking among pregnant women in Addis Ababa, Ethiopia: Prevalence and determinant factors. *PLoS One*. 2020;15(12):e0243784.
26. Tesfaye G, Demlew D, G/tsadik M, Habte F, Molla G, Kifle Y, et al. The prevalence and associated factors of alcohol use among pregnant women attending antenatal care at public hospitals Addis Ababa, Ethiopia, 2019. *BMC Psychiatry [Internet]*. 2020;20(1):337. Available from: <https://doi.org/10.1186/s12888-020-02747-1>

27. Addila AE, Azale T, Gete YK, Yitayal M. Individual and community-level predictors of maternal alcohol consumption during pregnancy in Gondar town, Northwest Ethiopia: a multilevel logistic regression analysis. *BMC Pregnancy Childbirth* [Internet]. 2021;21(1):419. Available from: <https://doi.org/10.1186/s12884-021-03885-4>
28. Sanou AS, Diallo AH, Holding P, Nankabirwa V, Engebretsen IMS, Ndeezi G, et al. Maternal alcohol consumption during pregnancy and child's cognitive performance at 6-8 years of age in rural Burkina Faso: an observational study. *PeerJ*. 2017;5:e3507.
29. Moise IK. Alcohol use, pregnancy and associated risk factors: a pilot cross-sectional study of pregnant women attending prenatal care in an urban city. *BMC Pregnancy Childbirth* [Internet]. 2019;19(1):472. Available from: <https://doi.org/10.1186/s12884-019-2652-5>
30. Williams AD, Nkombo Y, Nkodia G, Leonardson G, Burd L. Prenatal alcohol exposure in the Republic of the Congo: prevalence and screening strategies. *Birth Defects Res A Clin Mol Teratol*. 2013 Jul;97(7):489–96.
31. Greenmyer JR, Klug MG, Nkodia G, Popova S, Hart B, Burd L. High prevalence of prenatal alcohol exposure detected by breathalyzer in the Republic of the Congo, Africa. *Neurotoxicol Teratol*. 2020;80:106892.
32. English L, Mugenyi GR, Ngonzi J, Kiwanuka G, Nightingale I, Koren G, et al. Prevalence of Ethanol Use Among Pregnant Women in Southwestern Uganda. *J Obstet Gynaecol Canada JOGC = J d'obstetrique Gynecol du Canada JOGC*. 2015 Oct;37(10):901–2.
33. English LL, Mugenyi G, Nightingale I, Kiwanuka G, Ngonzi J, Grunau BE, et al. Prevalence of Ethanol Use Among Pregnant Women in Southwestern Uganda. *Matern Child Health J*. 2016 Oct;20(10):2209–15.
34. Raggio GA, Psaros C, Fatch R, Goodman G, Matthews LT, Magidson JF, et al. High Rates of Biomarker-Confirmed Alcohol Use Among Pregnant Women Living With HIV in South Africa and Uganda. *J Acquir Immune Defic Syndr*. 2019 Dec;82(5):443–51.
35. Wagman JA, Nabukalu D, Miller AP, Wawer MJ, Ssekubugu R, Nakowooya H, et al. Prevalence and correlates of men's and women's alcohol use in agrarian, trading and fishing communities in Rakai, Uganda. *PLoS One*. 2020;15(10):e0240796.
36. Wynn A, Nabukalu D, Lutalo T, Wawer M, Chang LW, Kiene SM, et al. Alcohol use during pregnancy in Rakai, Uganda. *PLoS One* [Internet]. 2021 Aug 26;16(8):e0256434–e0256434. Available from: <https://pubmed.ncbi.nlm.nih.gov/34437616>
37. Peltzer K, Pengpid S. Maternal alcohol use during pregnancy in a general national population in South Africa. *South African J Psychiatry*. 2019;25.
38. Onwuka CI, Ugwu EO, Dim CC, Menuba IE, Iloghalu EI, Onwuka CI. Prevalence and Predictors of Alcohol Consumption during Pregnancy in South-Eastern Nigeria. *J Clin Diagn Res* [Internet]. 2016/09/01. 2016 Sep;10(9):QC10–3. Available from: <https://pubmed.ncbi.nlm.nih.gov/27790525>
39. Adeoye IA. Alcohol consumption and tobacco exposure among pregnant women in Ibadan, Nigeria. *BMC Psychiatry*. 2022;22(1):1–13.

40. Mulat B, Alemnew W, Shitu K. Alcohol use during pregnancy and associated factors among pregnant women in Sub-Saharan Africa: further analysis of the recent demographic and health survey data. *BMC Pregnancy Childbirth* [Internet]. 2022;22(1):361. Available from: <https://doi.org/10.1186/s12884-022-04694-z>
41. Da Pilma Leketey J, Dako-Gyeke P, Agyemang SA, Aikins M. Alcohol consumption among pregnant women in James Town Community, Accra, Ghana. *Reprod Health*. 2017 Sep;14(1):120.
42. Mpelo M, Kibusi SM, Moshi F, Nyundo A, Ntwenya JE, Mpondo BCT. Prevalence and Factors Influencing Alcohol Use in Pregnancy among Women Attending Antenatal Care in Dodoma Region, Tanzania: A Cross-Sectional Study. Marozio L, editor. *J Pregnancy* [Internet]. 2018;2018:8580318. Available from: <https://doi.org/10.1155/2018/8580318>
43. Popova S, Dozet D, Akhand Laboni S, Brower K, Temple V. Why do women consume alcohol during pregnancy or while breastfeeding? *Drug Alcohol Rev*. 2022;41(4):759–77.
44. Ferreira-Borges C, Esser MB, Dias S, Babor T, Parry CDH. Alcohol Control Policies in 46 African Countries: Opportunities for Improvement. *Alcohol Alcohol*. 2015 Jul;50(4):470–6.
45. Powers JR, Loxton DJ, Burns LA, Shakeshaft A, Elliott EJ, Dunlop AJ. Assessing pregnant women's compliance with different alcohol guidelines: an 11-year prospective study. *Med J Aust*. 2010 Jun;192(12):690–3.
46. Lee M, Regu M, Seleshe S. Uniqueness of Ethiopian traditional alcoholic beverage of plant origin, tella. *J Ethn Foods* [Internet]. 2015;2(3):110–4. Available from: <https://www.sciencedirect.com/science/article/pii/S2352618115000426>
47. Board BMA. How much alcohol is too much during pregnancy? 2016.
48. Murakami K, Obara T, Ishikuro M, Ueno F, Noda A, Kuriyama S. Associations of education and work status with alcohol use and cessation among pregnant women in Japan: the Tohoku Medical Megabank Project Birth and Three-Generation Cohort Study. *BMC Public Health*. 2021 Jul;21(1):1400.
49. Lanting CI, van Dommelen P, van der Pal-de Bruin K, Bennebroek Gravenhorst J, van Wouwe JP. Prevalence and pattern of alcohol consumption during pregnancy in the Netherlands. *BMC Public Health*. 2015;15(1):1–5.
50. Isaksen AB, Østbye T, Mmbaga BT, Daltveit AK. Alcohol consumption among pregnant women in Northern Tanzania 2000–2010: a registry-based study. *BMC Pregnancy Childbirth* [Internet]. 2015;15(1):205. Available from: <https://doi.org/10.1186/s12884-015-0630-0>
51. Bonnechère B, Samadoulougou S, Cisse K, Tassebedo S, Kouanda S, Kirakoya-Samadoulougou F. Alcohol consumption and associated risk factors in Burkina Faso: results of a population-based cross-sectional survey. *BMJ Open* [Internet]. 2022 Feb 1;12(2):e058005. Available from: <http://bmjopen.bmj.com/content/12/2/e058005.abstract>
52. Kuntsche E, Kuntsche S, Thrul J, Gmel G. Binge drinking: Health impact, prevalence, correlates and interventions. *Psychol Health*. 2017 Aug;32(8):976–1017.