Alcohol Use During Pregnancy and Associated Factors Among Pregnant Women in Sub-Saharan Africa: Further Analysis of the Recent Demographic and Health Survey Data

Bezawit Mulat (mulatbezawit@gmail.com)  
University of Gondar

Wallelign Alemnew  
University of Gondar

Kegnie Shitu  
University of Gondar

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Abstract

Background

Alcohol drinking during pregnancy is towering in spite of the well-established prove on its unfavorable pregnancy results and destitute child improvement. Despite such enormous consequences, there are limited data that explore about the extent of alcohol drinking and its associated factors among mothers during pregnancy in sub-Saharan Africa.

Objective

This study aimed to assess the prevalence and associated factors of alcohol consumption during pregnancy among pregnant mothers in sub-Saharan Africa.

Method

A community based cross-sectional demographic and health survey was conducted from 2013 to 2017 among four Sub-Sahara African countries: Burundi, Ethiopia, Liberia and Zimbabwe. A two-stage stratified sampling technique was employed to select the participants. Multivariable Logistic regression analysis was used to identify factors associated with alcohol consumption during pregnancy. A p-value less than 0.05 and 95% confidence interval were used to declare statistical significance.

Result

A total of 3,953 weighed sample of pregnant mothers were included in the study. The mean age of the participants was 27.3 (± 6.8) years with an age range of 15-49 years. The overall prevalence of alcohol use during pregnancy was 22.8% with (95% CI (21.5, 24)) and it was significantly associated with increased age (AOR=1.02, 95% CI (1.01, 1.04)), Muslim religion follower (AOR=0.07, 95% (0.05,0.11), husband/partner's educational status of primary (AOR=0.7 ,95% CI (0.55,0.84), secondary (AOR=0.53, 95% CI (0.41,0.7)) and higher (AOR=0.49 , 95% CI(0.31,0.8), being currently working (AOR=1.5,95% CI ( 1.09,1.55) , having ANC visit ( AOR=0.82, 95% C I(0.68,0.98) and increased gravidity ( AOR=0.93,95% CI( 0.86,0.99).

Conclusion

Alcohol drinking during pregnancy was high among pregnant in sub-Saharan African countries. Maternal age, religion, husband educational status, current working status of the mother, presence of ANC visit and gravidity of the mother were factors which have significant association with alcohol drinking during pregnancy. This calls a tailored behavior change intervention to reduce alcohol use during pregnancy. More emphasis should also be given for pregnant women with no ANC visit, lower gravidity, and an illiterate husband, currently working and Christianity followers.

Background

Alcohol is a psychotropic agent that can have acute and chronic impacts on brain functions (1). Alcohol consumption during pregnancy is a significant public health problem. It has a number of negative effects on maternal and fetal health (2). To begin with, alcohol crosses the placenta quickly, with fetal blood alcohol levels surpassing maternal levels within 2 hours of maternal admission, affecting fetal development immediately (3). Second, alcohol consumption during pregnancy may have an indirect effect on fetal development by altering the mother-fetus hormonal connections (4). According to a World Health Organization research on alcohol use, there is no safe level of alcohol consumption during pregnancy. Furthermore, it states that alcohol is the most prevalent teratogen and dangerous chemical, and that there is no safe period or amount of alcohol to consume during pregnancy (5). On the report of the World Health Organization (WHO), sub-Saharan Africa (SSA) has one of the highest per capita rates of alcohol consumption in the world, implying a high prevalence of Fetal Alcohol Spectrum Disorder (FASD) in the region (5, 6). Drinking alcohol is known to cause preventable cognitive impairment in both the child and the mother (7, 8). One of the few preventable and modifiable risk factors for poor pregnancy and birth outcomes is alcohol consumption during pregnancy (9). Miscarriage, stillbirth, early birth, congenital abnormalities, intrauterine growth retardation, and low birth weight are all possible side effects. FASD is the most serious condition caused by excessive alcohol drinking during pregnancy (10). FASD is a catch-all name for a variety of negative consequences on the developing baby caused by alcohol consumption during pregnancy (11). It includes atypical facial features known as the philtrum, a small head circumference, lower than usual height, low body weight, poor coordination, and Attention Deficit Hyperactivity Disorder (ADHD) (12).

As stated by a paper published in the Lancet Global Health, the global prevalence of alcohol consumption during pregnancy and the occurrence of fetal alcohol spectrum disease is 9.8% and 14.6 cases per 10,000 people, respectively (13).

Women in Chad, Namibia, Uganda, and Ethiopia are the world's biggest alcohol drinkers, consuming 17.7 to 24.5 liters of pure alcohol per capita per year (14). The prevalence of alcohol drinking during pregnancy varies from 2.5% (15) to 59.28% (15), according to researchers conducted in Sub-Saharan African nations. Self-reported alcohol use during pregnancy was found to be 18.5 percent in a study done in Burkina Faso (16). Unplanned pregnancy (17), a lack of awareness about the effects of alcohol consumption (18), having partners and friends consume alcohol (19), health-related problems such as depression (20) and unemployment (17) are the main factors for alcohol consumption during pregnancy in Sub-Saharan Africa.
Despite the fact that alcohol drinking during pregnancy has been shown to be harmful to both the child and the mother's health, there is a scarcity of evidence in Sub-Saharan Africa. As a result, the goal of this study is to determine the overall prevalence of alcohol intake among pregnant women in Sub-Saharan Africa, as well as its associated characteristics. In addition, the current study is thought to provide crucial evidence for policymakers and program implementers in SSA to avoid alcohol use during pregnancy. Can be utilized as an input to strengthen stakeholder and clinical practitioners' efforts to raise awareness among pregnant women about their health outcomes in both the short and long term.

**Methods**

**Data source**

This study was based on the most recent Demographic Health Survey (DHS) data from four sub-Saharan African countries: Burundi in 2016-2017, Ethiopia, in 2016, Liberia in 2013 and Zimbabwe in 2015. A total of 33 Demographic and Health Surveys (DHSs) was conducted in SSA from 2010 to 2018. Of these only nine countries were measured alcohol use during pregnancy. However, only four of the nine countries measure alcohol intake during pregnancy in the same way: alcohol intake in the past one month. Therefore, only these four countries were included in the final analysis of the present study, while five of the countries were excluded since they had measured the outcome of interest with no clear/different time frame. Each country's DHS follows the same execution procedure. A two-stage stratified sampling procedure was used to select study participants in the DHS survey. Initially, Enumerations Areas (EAs) were selected based on the sampling frame of each respective country. In the second stage, a sample of households was selected from each EAs. The detailed sampling procedure used by DHS has been documented elsewhere (21)(22) (22). Individual records data set (IR file) were used for this study amongst the five DHS datasets. This data set (IR file) is consist of information collected from all eligible women aged 15-49 years. However, this study was limited to women who were pregnant during the survey. Given this, a total weighted sample of 3,953 current pregnant women aged 15–49 years were included in the study form four sub-Sahara African countries (Figure 1).

**Study variables**

**Dependent variable**

The outcome variable of this study was alcohol drinking during pregnancy among pregnant mothers in sub-Saharan Africa. The variable was dichotomized into 1 = "drink alcohol during pregnancy" and 0 = "didn't drink alcohol during pregnancy".

**Independent variables**

In this study the independent variables included: sociodemographic factors (Age, religion, residence, marital status, educational status of the mother, educational status of husband/partner, and current working (employment) status, and obstetric factors: complications during previous pregnancies (terminated pregnancy), pregnancy plan, and gravidity (number of pregnancy).

**Operational definitions**

**Alcohol drinking during pregnancy:** This was defined as consumption of any alcohol containing drink during pregnancy. It was assessed by asking pregnant mothers whether they took alcohol in the past one month.

**Household wealth quintile:** The wealth index was divided into quintiles: poorest, poor, middle, rich, and richest. Principal component analysis were used to arrive at these results (PCA). By combining the lower two (poorest and poor) quantiles with the top two (richest and rich) quantiles, this variable was further divided into three categories (Poor, Medium, and rich) (23).

**Media Exposure:** This variable was computed from the frequency of exposure to the two commonest mass media routes (radio and television). In this study exposure to magazines/newspapers was excluded because little (<5%) women were exposed to this channel. The variable was categorized into two parts: no exposure to media and had exposure to media.

**Data processing and Analysis**

Individual records (IR) files were used to extract data, which was then coded and transformed using STATA version 14 statistical software. To account for differential chance of selection and non-response in the original survey, weighted samples were employed for analysis. The presence of statistical significance was determined using a multivariable logistic regression analysis. It was fitted after the model's fitness was evaluated using the Hosmer and Lemeshow goodness of fit test. The variance inflation factor (VIF) was also used to analyze multicollinearity across the explanatory components, and it was found to be within acceptable limits. A p-value less than 0.05 is used to evaluate the presence of a meaningful effect or relationship of independent factors with the outcome variable.

**Result**

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A total of 3,953 pregnant mothers were included in the study. The mean age of the participants was 27.3 (± 6.8) years with an age range of 15-49 years. The majority (67.9%) of the mothers were Christians and more than half of them (71%) were married and 2,938 (75%) were from a rural area. Concerning the reproductive history, about 90.2% (3565) had wanted pregnancy and (55.7%) of pregnant mothers have ANC visits. (Table 1)

| Variable                  | Category     | Frequency | Percent |
|---------------------------|--------------|-----------|---------|
| Age (in years)            | 15-24        | 1445      | 36.6    |
|                           | 25-34        | 1861      | 47.0    |
|                           | 35-49        | 647       | 16.4    |
| Marital status            | Single       | 1145      | 29.0    |
|                           | Married      | 2808      | 71.0    |
| Residence                 | Rural        | 3039      | 77.0    |
|                           | Urban        | 914       | 23.0    |
| Educational status of respondents | No formal education | 1509 | 38.2 |
|                           | Primary      | 1487      | 37.6    |
|                           | Secondary    | 850       | 21.5    |
|                           | Higher       | 107       | 2.7     |
| Educational status of the husband/partner | No formal education | 1097 | 28.0 |
|                           | Primary      | 1349      | 34.0    |
|                           | Secondary    | 964       | 24.3    |
|                           | Higher       | 179       | 4.5     |
|                           | Don't know   | 364       | 9.2     |
| Wealth index              | Poor         | 1706      | 43.0    |
|                           | Medium       | 785       | 20.0    |
|                           | Rich         | 1462      | 37.0    |
| Current working status    | Currently working | 2099 | 53.1 |
|                           | Currently not working | 1854 | 46.9 |
| Mass media exposure       | Have exposure | 1251      | 31.7    |
|                           | Haven't exposure | 2702     | 68.3    |
| Current pregnancy wanted  | Wanted       | 3565      | 90.2    |
|                           | Unwanted     | 388       | 9.8     |
| Gravidity                 | 3 (2-5)±     |
| Have ANC visit            | Yes          | 2201      | 55.7    |
|                           | No           | 1752      | 44.3    |
| Ever had terminated pregnancy | Yes      | 625       | 15.8    |
|                           | No           | 3328      | 84.2    |

Key: ± (median with interquartile range)

In this study the overall prevalence of alcohol drinking during pregnancy was 22.8% with (95% CI (21.5, 24)). Without taking into account population weighting, the prevalence of alcohol drinking during pregnancy for all four countries was 21.7%. The prevalence of alcohol consumption among pregnant mothers was high in Brundi (32.4%) and low in Zimbabwe (3 %). (Figure 2).
The proportion of alcohol drinking was higher among mothers who are residents of rural area that is 24% as compared to urban resident mothers (18%). Moreover, the proportion of mothers who drink alcohol during pregnancy is higher among older age groups (35-49) years. Additionally, the proportion of alcohol drinking is higher (27.4 %) among mothers who hadn't formal educational attainment as compared to mothers who were taking part in formal education. In addition to the aforementioned factors, the proportion of pregnant mothers who drank alcohol was higher among single mothers as compared to married once.

**Factors associated with alcohol drinking during pregnancy**

Based on the output of multivariable binary logistic regression analysis the following explanatory variables had a statistically significant association with alcohol drinking during pregnancy: increased age (AOR=1.02, 95% CI (1.01, 1.04)), being Muslim religion follower (AOR=0.07, 95% CI (0.05, 0.11)), Husband education (husbands who attended primary educational level (AOR=0.7 ,95% CI (0.55, 0.84), have secondary level educational status (AOR= 0.53, 95% CI (0.41, 0.7)), husbands who attended higher educational levels (AOR= 0.49, 95% CI (0.31, 0.8). Plus to the above factors being currently working (AOR= 1.3, 95% CI (1.08, 1.55)), gravidity (AOR=0.92, 95% CI (0.87, 0.99), and having ANC visit (AOR= 0.52, 95% CI (0.68, 0.98) were significantly associated with mothers alcohol drinking during pregnancy.

The odds of drinking alcohol during pregnancy was increased by 2% as the age of the mother increased by a year. The odds of drinking alcohol during pregnancy were 97% lower among Muslim pregnant mothers as compared to Christian pregnant mothers. Moreover, having a husband with primary, secondary and higher education level decreased the odds of drinking alcohol during pregnancy by 30%, 47% and 51% respectively, when compared to pregnant mothers having an illiterate husband. (Table 2)
### Table 2
Factors associated with alcohol use during pregnancy among pregnant mothers in sub-Saharan African countries, (n=3,953).

| Variable                        | Alcohol drinking during pregnancy | AOR                  |
|---------------------------------|-----------------------------------|----------------------|
|                                 | Yes (n=901)                       | No(n=3,052)          |
|                                 | Frequency (%)                     | Frequency (%)        |
| Age\(^c\)                       | 28(23-33)µ                       | 26(22-32)µ           | 1.02(1.05,1.04)* |
| Marital status                  |                                   |                      |
| Single                          | 294(25.7%)                        | 851(74.3%)           | 1                   |
| Married                         | 606(21.6%)                        | 2201(78.4%)          | 1.08(0.9,1.3)       |
| Residence                       |                                   |                      |
| Urban                           | 167(18.3%)                        | 747(81.7%)           | 1                   |
| Rural                           | 734(24%)                          | 2305(76%)            | 1.17(0.92,1.5)      |
| Religion                        |                                   |                      |
| Christian                       | 848(30.5%)                        | 1935(69.5%)          | 1                   |
| Muslim                          | 22(3%)                            | 694997%              | 0.07(0.05,0.11)*    |
| Other                           | 31(6.8%)                          | 423(93.2%)           | 0.24(0.16,0.35)*    |
| Mothers educational level       |                                   |                      |
| No formal education             | 414(27%)                          | 1,095(73%)           | 1                   |
| Primary                         | 354(23.8%)                        | 1,133(76.2%)         | 1.07(0.9,1.3)       |
| Secondary                       | 116(13.7%)                        | 733(86.3%)           | 0.92(0.69,1.24)     |
| Higher                          | 17(15.8%)                         | 90(84.2%)            | 1.03(0.57,1.9)      |
| Current working status          |                                   |                      |
| Currently working               | 581(28%)                          | 1519(72%)            | 1.3(1.09,1.55)*     |
| Currently not working           | 320(17.3%)                        | 1533(82.7%)          | 1                   |
| Husband education               |                                   |                      |
| No formal education             | 336(30.6%)                        | 761(69.4%)           | 1                   |
| Primary education               | 305(22.6%)                        | 1,044(77.4%)         | 0.7(0.55,0.84)*     |
| Secondary education             | 136(14%)                          | 828(86%)             | 0.53(0.41,0.69)*    |
| Higher                          | 31(17%)                           | 149(83%)             | 0.5(0.3,0.82)*      |
| Don't know                      | 93(25.6%)                         | 271(74.4%)           | 0.68(0.47,0.97)*    |
| Wealth index                    |                                   |                      |
| Poor                            | 403(23.6%)                        | 1302(76.4%)          | 1                   |
| Medium                          | 191(24.3%)                        | 595(75.7%)           | 1.1(0.9,1.4)        |
| Rich                            | 307(21%)                          | 1155(79%)            | 1.06(0.85,1.3)      |
| Media exposure                  |                                   |                      |
| Exposed                         | 666(24.7%)                        | 2036(75.3%)          | 0.98(0.8,1.2)       |
| Non exposed                     | 235(19%)                          | 1016(81%)            | 1                   |
| Current pregnancy               |                                   |                      |
| Wanted                          | 804(22.6)%                        | 2761(77.5%)          | 0.95(0.7,1.3)       |
| Unwanted                        | 97(25%)                           | 291(75%)             | 1                   |
| Have ANC visits                 |                                   |                      |

Key: \(^c\) (continuous),\(^\mu\) (mean with standard deviation),\(\ne\) (Median with interquartile range),* (statistically significant (p value <0.05))
Discussion

This study assessed the prevalence and associated factors of alcohol drinking during pregnancy among pregnant women in sub-Saharan Africa by analyzing the recent DHS data of the eligible 4 countries in the region. The overall prevalence of alcohol drinking during pregnancy is 22.8 with 95% CI (21.5, 24). The result is in line with the study conducted in Northern Uganda (23.6%) (24). The possible explanation for this alignment might be the presence of similar socio-demographic characteristic of the respondents. However, the result of the present study is lower than a study conducted in UK (28.5%), Russia (26.5%) (25) and in Nigeria(59.29%) (15). The discrepancy might be elucidated by difference in the economic status of mothers residing in Europe and African continent. The possible justification for the divergence would be women from the westerns life style, stresses management ways, individualism and greater chance to access alcoholic beverages may be the factors which create this discrepancies. Due to this the prevalence of alcohol drinking among women in in sub-Saharan Africa is lower than European once. On the other hand the result of current study is higher than contemporary meta-analysis in sub-Saharan Africa (20.8% ) (26), the World Health Organization Africa region (18.5% (14), Korea (16.4%) (27)and Burkina Faso (18.5%) (16). The disparity might be due to differences in study design and variations in population characteristics.

Alcohol drinking during pregnancy can be affected by different socio-demographic and obstetric characteristics of the mother. In the current study, alcohol drinking during pregnancy was significantly associated with increased age, which is supported by a study conducted in Sweden (28), Uganda (19) and Tanzania (29). According to the findings of the present study the prevalence of alcohol drinking during pregnancy increased among Christians and being Muslim is a protective from consuming alcohol this result is in harmony with the study conducted in Tanzania (29). This implied that Women whose religion explicitly prohibited alcohol consumption have a decreased probability of consuming alcohol consumption and concomitantly minimize the chance of alcohol drinking when they became pregnant. Moreover, current working status of a mother is also significantly associated with alcohol drinking during pregnancy which is supported by a study conducted in Uganda (19) and Zambia (30). This implied that as the mother is involved in work (employed) she can able to generate income and the probability of buying and drinking alcoholic beverages is concomitantly increased. The educational status of husband was also another factor which is significantly associated with alcohol drinking during pregnancy, which is supported by a study conducted in Gondar town, Ethiopia (31). The feasible reason for this association might be husbands’ educational status plays awesome part in decision-making power and had an indeed more noteworthy impact than did wives’ education level on maternal health service decisions in developing countries (32, 33). Consequently, husbands with high educational status might have sufficient knowledge on adverse effects of alcohol use during pregnancy on maternal and fetal health. The result of the present study also revealed that pregnant mothers who had of anti-natal care (ANC) have decreased risk for consuming alcohol during pregnancy than their counter parts. And this finding is held up by the study done in Zambia (30). Finally, the present study also declared the presence of statistically significant association between alcohol drinking during pregnancy and women’s number of pregnancy (gravidity). This may explained as number of pregnancies increased the chance of the mother to visit health institutions might be increased so the mother had a greater chance to get information about the effect of alcohol drinking on the fetus and in general on pregnancy outcomes.

Conclusion And Recommendations

The present study revealed that the prevalence alcohol consumption during pregnancy is high among women’s’ living in Sub-Saharan Africa. Maternal age, religion, husbands’ level of education, current working status of the mother, presence of ANC visits and increased maternal gravidity are factors significantly associated with mothers’ alcohol drinking during pregnancy. Thus, Health education programs should be designed to minimize the consumption of alcohol during pregnancy in order to overcome the unfavorable outcomes that are caused by alcohol consumption on pregnancy and fetal health.

Abbreviations

ANC: Antenatal care, DHS: Demographic and Health Survey, AOR: Adjusted Odds Ratio, and FASD: Fetal Alcohol Spectrum Disorder

Declarations
Ethics approval and consent to participate

The study was conducted under the Declaration of Helsinki. Since the study was based on a secondary data (DHS data), the investigators were requested and get a permission letter to download and use the data files for the present study.

Consent for publication

Not applicable.

Availability of data and materials

All result-based data are available within the manuscript and anyone can access the data set online from www.measuredhs.com

Competing interests

The authors declare that they have no competing interests

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Authors' contributions

All authors made substantial contributions to conception, acquisition of data, or analysis and interpretation of data; took part in drafting the article or revising it critically for important intellectual content; agreed to submit to the current journal; gave final approval of the version to be published; and agree to be accountable for all aspects of the work.

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Figures

Figure 1

A diagrammatic representation of the sample extracting procedure for the study
Figure 2

Prevalence of alcohol use during pregnancy among pregnant mothers in Sub-Saharan African countries, based on the recent DHS data (n=3,953).