

Prevalence and Correlates of Alcohol Consumption During Pregnancy in Georgia: Evidence from a National Survey

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Abstract

Background: While alcohol consumption is pervasive in the country of Georgia, the extent of alcohol consumption among pregnant women is yet to be examined. The goal of this study is to examine prevalence and correlates of alcohol consumption during pregnancy in Georgia.

Methods: Using data from the World Health Organization's Stepwise approach to noncommunicable disease risk factor surveillance in Georgia, this study examined prevalence and sociodemographic correlates of alcohol use among pregnant women in Georgia. The study sample of reproductive age (18-45) women was drawn from the STEPS, which is a large and nationally representative survey of adults with a 95% participation rate. Frequencies, multivariate analyses and related statistics were computed to describe and study associations among the target population and the odds of alcohol consumption during pregnancy.

Results: Only 66 individuals in the sample were pregnant. About 13% of pregnant women consumed alcohol in the past 30 days and nearly 70% of them engaged in binge drinking on at least one occasion. Pregnant women who were young, married, homemakers, living in two-member households and in the lowest bracket of monthly income had the highest likelihood of consuming alcohol and binge drinking. The study results were statistically significant ($p < .05$).

Conclusions: This study reveals the magnitude of alcohol consumption and binge drinking among reproductive age women in Georgia. This study also shows prevalence and correlates of alcohol consumption during pregnancy in Georgia. The results identify characteristics of women who are most likely to use alcohol during pregnancy. Given that, alcohol use is a modifiable behavioral risk factor, the findings in this study provide the foundation for evidence-based prevention strategies that target pregnant and reproductive age women.

Keywords: alcohol consumption; pregnancy; women; risk factors; Georgia.

Introduction

Alcohol consumption during pregnancy has been widely proclaimed as a significant public health problem in many countries (Bhuvaneshwar et al., 2007). However, despite its recognition as the oldest wine country in the world, there is scant evidence on alcohol consumption during pregnancy in the country of Georgia (Mokhtari et al, 2016). In other words, alcohol use by pregnant women in Georgia is yet to be characterized and/or assessed in a systematic study. Thus, there is no evidence-based analysis that may inform policy makers targeting alcohol use by pregnant women in Georgia. Nonetheless, recent evidence on adults aged 18-65 indicates an escalation in prevalence of drinking from 11% in 2003 to 30% in 2010 (Mokhtari et al., 2016). Using 2010 data from the World Health Organization's (WHO's) Stepwise approach to noncommunicable disease

risk factor surveillance in Georgia (STEPS, 2010), this study aims to investigate prevalence and correlates of alcohol consumption during pregnancy in Georgia.

Alcohol use in pregnancy may lead to miscarriage, stillbirth and fetal alcohol spectrum (FAS) disorders in children manifested by lifelong physical, behavioral and intellectual disabilities (Naimi et al., 2003; Patra et al., 2011). In addition to pre- and postnatal adverse health effects, alcohol intake in pregnancy significantly contributes to a rising rate of the noncommunicable diseases worldwide and high economic costs (Bouchery et al., 2011; CDC, 2014; Flak et al., 2014; Green et al., 2016; Lim et al., 2012; Rehm et al., 2010; Tan et al., 2015; USDHHS, 2005; WHO, 2014). Fetal *in utero* exposure to maternal alcohol increases risk of developing a congenital disorder known as fetal alcohol syndrome marked with facial anomalies, poor growth and cognitive and behavioral problems in children, which is the most debilitating form of fetal alcohol spectrum disorders (Balachova et al., 2012; Flak et al., 2014; Green et al., 2016). While there are no estimates for Georgia, evidence shows that prevalence of FAS and Fetal Alcohol Spectrum Disorders (FASD) in the United States is 6 to 9 cases and 24 to 48 cases per 1000 children, respectively (May et al., 2014).

Binge drinking, particularly in early pregnancy, is found to be associated with hyperactivity and attention disorders in children (Sayal et al., 2014). Research has not reached consensus on a minimal harmful dose of maternal alcohol on developing fetus in a dose-response relationship. Abstinence from all types of alcohol, including wine and beer, is currently deemed essential in pregnancy. In 2014, the Centers for Disease Control and Prevention (CDC) and the National Center on Birth Defects and Developmental Disabilities reaffirmed that there is no safe time to drink and no safe amount of alcohol intake during pregnancy (CDC, 2014). Alcohol use and binge drinking in pre-pregnancy is a strong predictor of continued drinking during pregnancy

(Skagerstrom et al., 2011), and preconception counselling has been recommended for all childbearing age women in the United States (Floyd et al., 1999). Unfortunately, no data on the women use of alcohol prevention or treatment services exist for Georgia at this point. This provides further impetus for the goal of this study, which is providing baseline evidence on prevalence and correlates of alcohol consumption during pregnancy in Georgia.

Alcohol consumption in Georgia exceeds global per capita intake by 24%. Georgia's alcohol consumption is 45% higher than that of Armenia and 335% higher than that of Azerbaijan, its two neighboring countries (WHO, 2014). In Georgia, wine is a preferred alcoholic beverage by both males and females. About 5% of Georgian women believe that alcohol is advantageous for health (Pomerleau et al., 2008). While cultural factors have always played a significant role in Georgia, the complexity of contextual social factors and political and economic turmoil linked to the post-soviet era transformation may contribute to the overall sustained psychological stress and changing drinking habits among women (Hinote et al., 2009; Jukkala et al., 2008; Peele & Brodsky, 1996). One could argue that demands of women, related to the traditional gender role as housewives and guardians of children, have been changing and drinking and binge drinking is used as means of gaining identity and stress reduction. Overtime, society's drinking culture may be becoming more tolerant to women who drink. It is hypothesized that increasing prevalence of drinking and binge drinking among women in Georgia will predict a similar pattern of drinking during pregnancy that will include homemakers and married women.

For the most part, in spite of an existing problem, alcohol use by pregnant women in Georgia has not been adequately assessed in systematic studies. Unlike in developed countries where health monitoring and national health surveys are routinely conducted, the paucity of statistical data in Georgia hinders investigation of critical effects of excessive alcohol use in different groups of

population. The recent World Health Organization project called WHO STEPwise Approach (STEPS) has offered assistance and opportunity to raise database and develop national health surveillance system in countries like Georgia to be used for international comparisons of noncommunicable disease risk factors (STEPS, 2012; STEPS Manual, 2015; Ustun et al., 2003). The large WHO STEPS Georgia Survey was piloted in 2010 and has initiated a nationwide collection of data on essential sociodemographic, economic information and health indicators such as frequency and quantities of alcohol use in adult population (STEPS, 2012). The objective of this study is to investigate prevalence and correlates of alcohol consumption during pregnancy in Georgia.

Methods

Study Data

The source of a sample used in this study was the World Health Organization's Stepwise (WHO STEPS) approach to noncommunicable disease risk factor surveillance in Georgia. The WHO STEPS provides the framework, instruments, and guidelines for collecting comparable health related data in various countries. By focusing on the noncommunicable disease (NCD) risk factors, the WHO STEPS' Instrument covers three different levels or 'steps' of risk factor assessment and several optional modules: Step 1 (questionnaire), Step 2 (physical measurements) and Step 3 (biochemical measurements) are the basic components of the WHO STEPS' approach in this respect. There are also optional modules that cover: mental health/suicide, oral health, sexual health, tobacco policy, and violence and injury. The questionnaire in each case includes guidelines and background information on the intent of each question and/or measures to be collected by implementing the instrument. This allows interviewers to supply relevant information and/or response to the participant's requests for clarification about any particular issue.

The WHO STEPS Georgia Survey (STEPS, 2010) focused on survey of chronic disease risk factors in Georgia was carried out from August to December 2010. The WHO STEPS Georgia survey consists of a multi-stage, clustered sample design that yielded representative data for adults aged 18-64 in Georgia. A total of 6,497 adults participated in the Georgia STEPS survey. Georgian data is comparable to other survey data that are collected according to international best practice.

With a participation rate of 95%, the WHO STEPS Georgia Survey or sample represents a total of more than two million (2,166,687) adults aged 18-65 years old, including 1,090,231 males and 1,076,456 females. Among females, there were 693,910 (64.46%) observations on childbearing age women (18-45 years old) and 29,862 (4.30%) pregnant women respondents. A series of questions related to alcohol use captured the main observations on the variables of interest in this study. For example, the instrument included the following standard questions about alcohol use by the adults who participated in survey:

Have you ever consumed alcohol?

Consumed alcohol in the past 12 months?

Frequency of one standard during the past 12 months?

Have you consumed any alcohol within the past 30 days?

During the past 30 days, on how many occasions did you have at least one standard alcoholic drink?

A multistage clustered STEPS 2010 Georgia Survey methodology ensured that observations within the same cluster of population were correlated and valid (STEPS, 2012; STEPS Manual, 2015). Detailed information related to the primary survey sampling, face-to-face interviews and data collection can be found elsewhere (STEPS, 2012; STEPS Manual, 2015). Our study sample comprised data on 2,971 reproductive age women and 66 pregnant women. The range of sociodemographic variables and covariates on quantities (standard drinks) of alcohol consumed during lifetime, in the past 12 months and the past 30 days, as well as the number of binge drinking episodes in the past 30 days were available. In our analysis we included sociodemographic variables found in previous studies shown to be associated with drinking and drinking-related outcomes in women (CDC, 2014; Mokhtari et al., 2016; Pomerleau et al., 2008; Skagerstrom et al., 2011).

Measures

A standard drink is defined by the National Institute on Alcohol Abuse and Alcoholism (NIAAA) as an equivalent to 14 grams of pure alcohol found in 12 ounces of regular beer, 5 ounces of wine, and in 1.5 ounces of distilled spirits (NIAAA, 2004). Binge drinking in women refers to an intake of four or more standard drinks on one occasion or within a two-hour period, and may bring blood alcohol concentration (BAC) level up to 0.08 grams percent or above (NIAAA, 2004).

Statistical Analysis

Data analyses were carried out using specialized survey command (Surveyfreq Procedure) in the SAS software version 9.4 (SAS Institute Inc. Cary, NC). The cross-sectional survey analysis was chosen as a preferred method in the study. The sample was broken down by age, ethnicity, household size, education, marital status, employment, and monthly household income. The weighted estimators of alcohol consumption and accompanied weighted standard deviation (SD)

were used for unbiased assessments of covariates. Sociodemographic correlates were examined with logistic regression in the total sample (to predict prevalence) and in subsamples of non-pregnant and pregnant respondents with lifetime, 12-months and 30-days prevalence of drinking. Binge drinking was assessed by one, two or four episodes. For inference, we used standard errors, chi-square and the p-values (<.05) for each of the estimated coefficients, which were confirmed to be statistically significant for gestational alcohol consumption during the past 30 days among Georgian women.

Results

Descriptive Analysis

The WHO STEPS Survey of Georgians includes 4,610 women aged 18-65 whose characteristics are provided in Table 1a. The data sample, however, consisted of 2,971 reproductive age women (aged 18-45), out of which 66 self-identified as being pregnant (Table 1b). Given a 95% participation rate in the survey and taking the sampling design into account, this implied that sixty six pregnant women (n = 66) between ages 18 – 45 represented almost thirty thousand (N = 29,862) pregnant women in Georgia.

Sociodemographic Correlates

Alcohol Consumption

Table 1b and Figure 1 show that the highest weighted relative frequency distribution in the sample was among 20-year-old pregnant women (17%), 99% constituted pregnant women 38 years old or younger, and 43% of pregnant women were 18-23 years old.

Table 2 illustrates that 67.51% of non-pregnant and 64.76% of pregnant women of childbearing age (< 46 years old) consumed alcohol (beer, wine, and spirits) during their lifetime. Also, half of

the non-pregnant women (51.89%) used alcohol in the past 12 months, and just over a one-fourth (27.41%) used it in the previous 30 days. In contrast, more than half (56.85%) of pregnant women used alcohol in the past 12 months, and over one-third (34.76%) used alcohol in the prior 30 days. This indicates that almost 10% of non-pregnant women ($9.60\% = 67.51\% \times 56.85\% \times 27.41\%$) and 13% of pregnant women ($12.79\% = 64.76\% \times 51.89\% \times 34.76\%$) used alcohol in the past 30 days. In Table 3 we can see that in Georgia nearly 25% of women (24.45%) also engaged in binge drinking as defined above. This implies that 70% of pregnant women ($70\% = 24.45\% / 34.76\%$) engaged in binge drinking during the past 30 days, half of them (51.51%) had at least four episodes, 14.51% had two episodes and 4.31% had one episode of binge drinking.

Ethnicity, Household Size, and Age

In the sample, the majority of pregnant women self-identified themselves as Georgian (89.09%), and remaining were Azerbaijanis, Russians, Ossetians and Abkhazians women (Table 3). About one third of Georgian pregnant women (34.76%) reported drinking alcohol in the past 30 days. More than half of pregnant women (45.88%) lived in two-member households, 25.13% lived in a three-member, and or 22.83% in a four-member households. The rate of drinking was the highest (16.54%) among pregnant women who lived in two-member households followed by four-member households (13.38%). The rates of pregnancy (62.42%) and alcohol use (25.47%) were the highest among 18-25 years old women. Among 26-35 years old women the pregnancy prevalence was 28.14% and alcohol use was 6.62% and a much lower among women 36-45 years old women.

Marital Status and Education

Pregnant women (92.46%) in the study who were married or cohabitating had a higher rate of alcohol use (27.23%) than never married or divorced. More than half (57.72%) of pregnant women completed high school, about 25% (26.30%) completed college, and a smaller fraction (15.99%)

had completed secondary school or less. Pregnant women who completed high school or college had similar rates of alcohol use (15.38% vs.14.34%) compared to women with secondary school education (5.05%).

Occupation and Income

The majority of pregnant women were homemakers (66.28%), followed by self-employed (13.06%) and government employees (10.92%). The rate of alcohol use among pregnant homemakers during the past 30 days was 20.43% and twice as high as among self-employed women (9.10%) and four times higher than among non-government employees (5.24%). Pregnant women in other occupations (government, student and unemployed) abstained from drinking during the previous 30 days. The highest rate of pregnancy (55.70%) and alcohol use in the past 30 days (33.5%) was among women in the lowest reported household income bracket of less than 200 GEL/month (equal to \$110 in October, 2010). It appears that a higher income was not associated with drinking during pregnancy as women in a higher income bracket of 200-400 GEL/month (8.98%) had lower pregnancy rate and very low rate of alcohol use (1.27%), and reported no alcohol consumption during the past 30 days.

Logistic Regression Analysis

Table 4a and Table 4b present the results from the multivariate logistic regression analysis with correlates on alcohol consumption among women aged 18-65 and pregnant women (aged 18-45) during the past 30 days. First, all of the available covariates were included in the regression model (Table 4a); thus, avoiding a stepwise approach that would have opened the analysis to potential spurious correlation or inference. However, limited number of observations on pregnant women (n = 66) did not allow for the full inclusion of all potential covariates (Table 4b). Based on the literature, the sociodemographic variables were controlled to avoid confounding. Given a rather

modest number of pregnant women in the sample ($n = 66$) and highly collinear sociodemographic characteristics, only a limited number of potential regressors were allowed in the final logit model to make inference about a large population (Table 4b). The proposed model fit (Table 4b) was overall fairly good, as reflected in the concordant of 75.40%, tied 9.2%, and discordant of 15.4%. The variations in the likelihood (odds) of drinking and binge in the past 30 days in a sample were well explained by the sociodemographic characteristics of pregnant women. The measures of standard error, chi-square tests, and p-values confirmed that a small household size (one- or two-member), occupation (self-employed) and income (<200 GEL/month) were all statistically significant ($p < .05$) for alcohol consumption during the past 30 days among pregnant Georgian women.

Pregnant women who lived alone (5.68, SD 1.64) were more likely to drink than those who lived in larger households (two-, three-, four- or five- or more-member). Likewise, pregnant women who lived in the two-member households (2.17, SD 0.86) were more likely to have consumed alcohol in the past month than those living in larger households. Self-employed pregnant women (5.11, SD 1.75) and women in low monthly income category (5.06, SD 2.15) had a substantially higher likelihood of drinking alcohol during the past 30 days. Table 4b shows that the results of adjusted odds ratios, after controlling for other factors. This provides certain (albeit limited) insight into the likelihood of drinking during pregnancy in Georgia.

Discussion

Using data from the World Health Organization's Stepwise approach to noncommunicable disease risk factor surveillance in Georgia (STEPS, 2010), this study examined prevalence and sociodemographic correlates of alcohol use among pregnant women in Georgia. The study sample of reproductive age (18-45) women was drawn from the STEPS, which is a large and nationally

representative survey of adults with a 95% participation rate. Frequencies, multivariate analyses and related statistics were computed to describe and study associations among the target population and the odds of alcohol consumption during pregnancy. In particular, we examined sociodemographic correlates in association with alcohol consumption among non-pregnant and pregnant women in Georgia. Comparisons are made across age groups, ethnicity, marital and employment status, household size and monthly income to capture alcohol use to determine the prevalence of lifetime, 12-months and 30-days drinking and binge drinking episodes.

In Georgia, about 67.51% of non-pregnant and 64.76% of pregnant women aged less than 46 years old consumed alcohol (beer, wine, and spirits) during their lifetime. The pregnancy rates in association with alcohol use were the highest among 18-25-year-old women. Almost 13% of pregnant women used alcohol in the past 30 days. This is 5.4 percentage points higher than that of 7.6% found in the United States ($5.4\% = 13\% - 7.6\%$) (Marchetta et al., 2012.), but it is within the range of 20% to 80% that has been reported in Ireland, Australia, New Zealand and the United Kingdom (O’Keeffe et al., 2015).

Recent research suggests that drinking patterns with heavy drinking in binges may indicate a stronger independent risk factor for adverse alcohol-related health outcomes (Rehm et al., 2001; Tan et al., 2015). Among those women who drank during their pregnancy in Georgia, nearly 70% drank alcohol in binges during the past 30 days, on more than one occasion. This pattern of drinking among pregnant women in Georgia may be a serious risk factor to their health and the health of offspring. Analysis of the data supports the hypothesis that pregnant women who were married, homemakers, from small household size (two-member), and with the lowest monthly income have a higher likelihood of alcohol use and binge drinking than others. In contrast,

unmarried, older (35–44 years old) and employed women living in the US were more likely alcohol drinkers while pregnant (Marchetta et al., 2012).

Alcohol use in pregnancy may vary across studies depending on the methods of data collection (interviewer-administered vs self-report questionnaires) (Rogers et al., 1998). Nonetheless, abstinence and alcohol cessation are the best ways to achieve a healthy pregnancy. Despite the limitations imposed by the cross-sectional nature of the data, this study offers evidence that inform policies and initiatives that are designed to reduce harmful impact of alcohol use during pregnancy in Georgia. The findings in this study strengthen public health preventive strategies on abstinence that target reproductive age and pregnant women in the country of Georgia.

Contributions to Understanding Alcohol Use and Policy

As the oldest producer of wine in the world, Georgian culture has evolved to define alcohol consumption as an essential element for interpersonal relationships and behavioral norms and expectations. This cultural view hinders an understanding that alcohol use, in general, endangers public health and, in particular, the health of pregnant women. Thus, by quantifying the extent of the problem of alcohol use during pregnancy in Georgia this study challenges the existing cultural norms and informs policy makers of an existing problem that deserves their attention. Moreover, by reporting on the correlates of alcohol use during pregnancy, this study provides Georgian policy makers with evidence for targeting sub-groups that may be more susceptible to alcohol abuse during pregnancy than others.

Our quantitative assessment of the extent of alcohol use during pregnancy in Georgia contributes to those policies and initiatives that aim at reducing alcohol use among pregnant women. First, our study provides a base-line for assessing the evolution of alcohol use among pregnant women.

Second, our quantitative analysis informs policy makers in their efforts to target particular sub-groups among pregnant women who consume alcohol. Third, by providing an evidence-informed perspective, our study can be used as an initial model for monitoring and evaluation, where policy makers can measure and demonstrate whether interventions have positive effects in reducing alcohol use among pregnant women. By quantifying the problem of alcohol consumption during pregnancy and related sub-groups, our study improves policy makers understanding of these critical issues and provides a better quantitative target for initiatives and action, as well as a foundation for gauging future activities that may aim at prevention, reduction and abstinence from alcohol use by women.

Strengths and Limitations

The main strength of this study is availability of a national survey-based sample representative of the population in Georgia, where cultural and social environment approves of alcohol consumption in women. The resources provided by WHO STEPS project offered opportunity to begin health data gathering and to initiate national health surveillance system in Georgia (STEPS, 2012; STEPS Manual, 2015; Ustun et al., 2003). A second strength of this study is a high local interest and cooperation in survey with a 95% respondent participation rate. The survey includes data on alcohol drinking habits and binge drinking episodes among pregnant women during their lifetime, in the past 12 months and the past 30 days.

This study also has some limitations and weaknesses. The cross-sectional nature of the survey prevents us from ascribing causality between the variables of interest. Not having access to a longitudinal dataset is an important limitation in any study of alcohol use. The cross-sectional nature of the data used in this study limits ability to infer causal associations. Validity of measures, self-reports, recall bias and underreporting is a problem in most surveys of alcohol consumption

and are considered a limitation (Embree & Whitehead, 1998; Stockwell et al., 2004). There may also be a substantial underreporting of alcohol use by women before and during pregnancy that have heavily drinking partners (Balachova et al., 2012). No data were collected on drinking habits among underage youth as the national survey was restricted to adults aged 18-65 years old. Measure of the longer-term drinking pattern, quitting and resuming of drinking in subsequent pregnancies could complement research data. Therefore, systematic observations and regular alcohol screening in women and their partners can enrich data available to research that focuses on reproductive age women, particularly in the preconception period and during pregnancy.

Conclusion

Based on a national survey data, this study has identified a number of sociodemographic characteristics which are associated with high prevalence of alcohol use and binge drinking among pregnant women in the country of Georgia. Maternal use of alcohol during early pregnancy exposes the fetus to a range of adverse outcomes. Abstention and alcohol cessation ensure improved pregnancy outcomes and fetal growth and development. Evidence on the alcohol use by pregnant women in Georgia informs public health preventive strategies that target both reproductive age and pregnant women in the country of Georgia. For preventing alcohol-exposed pregnancies research must focus on studying and devising interventions that are effective at earlier ages. Future research based on continued systematic screening and surveillance at early age might shed light on women who remain at the highest risk for alcohol exposure before pregnancy is recognized.

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Contributors

M. Mokhtari designed and coordinated the study and undertook the statistical analysis. All authors contributed to drafting of the manuscript. All authors approved the final manuscript.

References

1. Balachova T, Bonner B, Chaffin M, et al. (2012). Women's alcohol consumption and risk for alcohol-exposed pregnancies in Russia. *Addiction*. 107(1):109–117.
2. Bhuvaneshwar, C. G., Chang, G., Epstein, L. A., & Stern, T. A. (2007). Alcohol Use During Pregnancy: Prevalence and Impact. *Primary Care Companion to The Journal of Clinical Psychiatry*, 9(6), 455–460.
3. Bouchery EE, Harwood HJ, Sacks JJ, Simon CJ, Brewer RD. (2011). Economic costs of excessive alcohol consumption in the U.S., 2006. *Am J Prev Med*. 41(5):516–24.
4. CDC. (2014). Centers for Disease Control and Prevention. Fact Sheet-Binge Drinking. Atlanta, GA. Retrieved from: www.cdc.gov/alcohol/fact-sheets/binge-drinking.htm.
5. Embree B G, Whitehead P C. (1998) Validity and reliability of self-reported drinking behaviour: dealing with the problem of reporting bias, *Journal of Studies on Alcohol*, 54, 334- 344.
6. Flak AL, Su S, Bertrand J, Denny CH, Kesmodel US, Cogswell ME. (2014). The Association of Mild, Moderate, and Binge Prenatal Alcohol Exposure and Child Neuropsychological Outcomes: A Meta-Analysis. *Alc Clin Exp Res*. 38(1):214–26.
7. Floyd RL, Ebrahim SH, Boyle CA. (1999). Observations from the CDC. Preventing alcohol-exposed pregnancies among women of childbearing age: the necessity of a preconceptional approach. *Journal of Women's Health & Gender-Based Medicine* 8:733–736.
8. Green PP, McKnight-Eily LR, Tan CH, Mejia R, Denny CH. (2016). Vital Signs: Alcohol-Exposed Pregnancies - United States, 2011–2013. *Morb Mortal Wkly Rep* 65:91–97.
9. Hinote BP, Cockerham WC, Abbott P. (2009). The specter of post-communism: women and alcohol in eight post-Soviet states. *Soc Sci Med* 68:1254–1262.
10. Javakhishvili DJ, Sturua L, Otiashvili D, Kirtadze I, Zabransky T. (2011). Overview of the drug situation in Georgia. *Adictologie*. 11(1): 42–51.

11. Jukkala T, Mäkinen IH, Kislitsyna O et al. (2008). Economic strain, social relations, gender, and binge drinking in Moscow. *Soc Sci Med* 66:663–674.
12. Marchetta CM, Denny CH, Floyd RL, Cheal NE, Sniezek JE. (2012). Alcohol use and binge drinking among women of childbearing age-United States, 2006–2010. *Morb Mortal Wkly Rep* 61(28):534-538.
13. May PA, Baete A, Russo J, et al. (2014). Prevalence and characteristics of fetal alcohol spectrum disorders. *Pediatrics* 134(5):855–866.
14. Mokhtari M, Kondracki A, Wallen J, Kavtaradze L, Ashtari M, Topuridze M, Sturua L, Piralishvili G, Todadze K, Kiladze L, Gachechiladze N. (2016). Binge Drinking in the Oldest Wine Country: Evidence from the Noncommunicable Disease Risk Factor Surveillance. *Journal of Global Drug Policy and Practice*, 10 (3).
15. Naimi TS, Lipscomb LE, Brewer RD, Gilbert BC. (2003). Binge drinking in the preconception period and the risk of unintended pregnancy: implications for women and their children. *Pediatrics*.111:1136–41.
16. O’Keeffe LM, Kearney PM, McCarthy FP, et al. (2015). Prevalence and predictors of alcohol use during pregnancy: findings from international multicentre cohort studies. *BMJ* 5: e006323.
17. Oxford Companion to Wine, 4th edition. (2015). Robinson J and Harding J Editors. Oxford University Press. Oxford, UK.
18. Patra J, Bakker R, Irving H, Jaddoe VWV, Malini S, Rehm J. (2011). 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*. 118:1411–1421.
19. Peele S, Brodsky A. (1996). Alcohol and Society. How Culture Influences the Way People Drink. Pamphlet prepared for The Wine Institute, San Francisco: CA. Retrieved from: <http://www.peele.net/lib/sociocul.html>.
20. Pomerleau J, McKee M, Rose R, Haerpfer CW, Rotman D, Tumanov S.(2008). Hazardous alcohol drinking in the former Soviet Union: a cross-sectional study of eight countries. *Alcohol and Alcoholism*. 43 (3): 351–359.
21. Rehm J, Gmel G, Room R, Frick U. (2001). Average volume of alcohol consumption, drinking patterns and related burden of mortality in young people in established market economies of Europe. *Eur Addict Res* 7:148-151.
22. Rogers SM, Miller HG, Turner CF. (1998). Effects of interview mode on bias in survey measurements of drug use: Do respondent characteristics make a difference? *Subst Use Misuse* 33:2179–2200.

23. Sayal K, Heron J, Draper E, Alati R, Lewis SJ, Fraser R, Barrow M, Golding J, Emond A, Davey Smith G, Gray R. (2014). Prenatal exposure to binge pattern of alcohol consumption: mental health and learning outcomes at age 11. *Eur Child Adolesc Psychiatry* 23(10):891-9.
24. Skagerstrom J, Chang G, Nilsen P. (2011). Predictors of drinking during pregnancy: a systematic review. *J Women's Health*. 20(6):901–13.
25. STEPS Manual. (2015). World Health Organization, Geneva, Switzerland. Retrieved from: <http://www.who.int/chp/steps/manual/en/index7.html>.
26. STEPS. (2012). Georgia STEPS Survey 2010. World Health Organization, Geneva, Switzerland. Retrieved from: http://www.who.int/chp/steps/2012_GeorgiaSTEPS_Report.pdf?ua=1.
27. Stockwell T, Donath S, Cooper-Stanbury M, Chikritzhs T, Catalano P, Mateo C. (2004). Under-reporting of alcohol consumption in household surveys: a comparison of quantity-frequency, graduated-frequency and recent recall. *Addiction* 99:1024–33.
28. Tan CH, Denny CH, Cheal NE, Sniezek JE, Kanny D. (2015). Alcohol Use and Binge Drinking Among Women of Childbearing Age -United States, 2011–2013. *Morb Mortal Wkly Rep* 64(37):1042-1046.
29. USDHHS. (2005). US Department of Health and Human Services. US Surgeon General releases advisory on alcohol use in pregnancy. Washington, DC: US Department of Health and Human Services. Retrieved from: <http://www.surgeongeneral.gov/pressreleases/sg02222005.htm>.
30. Ustun TB, Chatterji S, Mechbal A, Murray, CJL. (2003). World Health Surveys. In: Murray CJL, Evans DB. 2003. Health systems performance assessment: debates, methods and empiricism. Retrieved from: www.who.int/healthinfo/survey/hspa58.pdf.
31. Whitmore SK, Kann L, Prejean J, Koenig LJ et al. (2012). Vital Signs: HIV Infection, Testing, and Risk Behaviors Among Youths - United States. *Morb Mortal Wkly Rep* 61(47): 971-976.
32. WHO. (2014). World Health Organization. Global status report on alcohol and health, 2014. Geneva, Switzerland, p.44. Retrieved from: [//apps.who.int/iris/bitstream/10665/112736/1/9789240692763_eng.pdf](http://apps.who.int/iris/bitstream/10665/112736/1/9789240692763_eng.pdf).

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Conflict of Interest

All authors declare no conflict of interest. All authors declare that they have no proprietary, financial, professional or other personal interest of any nature or kind in any product, service and/or company that could be construed as influencing the position presented in, or the review of, the manuscript entitled *Prevalence and Correlates of Alcohol Consumption During Pregnancy in Georgia: Evidence from a National Survey*.

Table 1a. Sociodemographic Characteristics of Georgian Women Aged 18 – 65

Female (n = 4610)				
	Raw Freq	%	SD	Chi-Square
Ethnicity				
Georgian	4,049	87.80	1.81	188.01
Ossetian	43	0.71	0.21	1,247.21
Azerbaijani	164	6.01	1.71	161.61
Armenian	259	4.41	0.91	399.61
Russian	54	0.81	0.21	3,722.91
Household Size				
One	858	7.41	0.50	1,908.90
Two	1,473	25.71	1.00	432.20
Three	1,177	29.81	1.00	340.30
Four	670	20.31	1.00	629.70
Five or more	391	16.50	1.10	478.40
Age				
18 – 25	550	21.20	1.20	397.00
26 – 35	674	22.50	0.90	641.90
36 – 45	827	20.80	0.80	855.10
46 – 55	1,221	23.10	0.80	812.10
56 – 65	1,342	12.40	0.60	1,924.00
Marital Status				
Never married	614	18.90	1.00	609.20
Separated	136	1.50	0.20	4,794.20

Divorced	187	3.20	0.30	2,820.30
Widowed	725	7.80	0.40	2,687.20
Married	2,907	68.20	1.00	262.70
Maternal Status				
Pregnant	66	2.80	0.40	1,643.70
Smoker				
Smoker	201	4.80	0.50	1,298.60
Education				
Secondary school	372	9.11	1.21	1,363.61
High School	2,711	57.81	1.41	413.21
College	1,486	32.80	1.20	185.70
Occupation				
Government	1,859	15.70	0.90	823.60
Non-government	823	5.50	0.60	1,332.20
Self-employed	207	6.70	0.50	1,619.70
Non-paid	314	0.30	0.10	2,168.20
Student	10	6.80	0.70	1,116.40
Homemaker	140	42.50	1.30	35.20
Retired	567	5.30	0.40	2,805.90
Unemployed	588	15.80	0.90	738.10
Unable to work	61	0.10	0.20	1,815.10
Monthly Income (GEL)				
=< 200	2,766	53.40	1.80	3.90
> 200 to <=400	1,013	23.50	1.10	460.00

> 400 to <=800	615	16.50	1.10	510.70
> 800 to <=1600	193	5.70	0.60	1,110.50
More than 1600	27	0.80	0.20	2,099.40

Data: WHO's STEPwise Approach to Noncommunicable Disease Risk Factor Surveillance

SD: Standard Deviation; Chi-square: Rao-Scott Chi-Squared statistics.

Raw Freq: Raw Frequencies

Software: SAS (Surveyfreq Procedure)

Table 1b. Pregnancy Distributions by Age, Georgia 2010

Age	Raw Frequency	Weighted Relative Frequency (%)	Weighted SD (%)
19	1	0.77	0.77
20	9	16.52	5.57
21	1	1.91	1.93
22	6	11.27	4.41
23	7	12.26	4.45
24	5	6.20	2.93
25	5	5.08	2.41
26	3	5.79	1.55
27	1	0.55	0.55
28	4	5.65	3.32
29	3	5.25	3.13
30	3	4.30	2.53
31	1	0.66	0.67
32	4	7.39	4.11
33	1	2.28	2.26

34	3	6.56	3.28
35	2	1.27	0.92
36	1	1.02	1.03
37	2	1.63	1.20
38	3	2.45	1.44
45	1	1.19	1.19

SD: Standard Deviation

Figure 1. Pregnancy Distributions by Age in the Country of Georgia, 2010

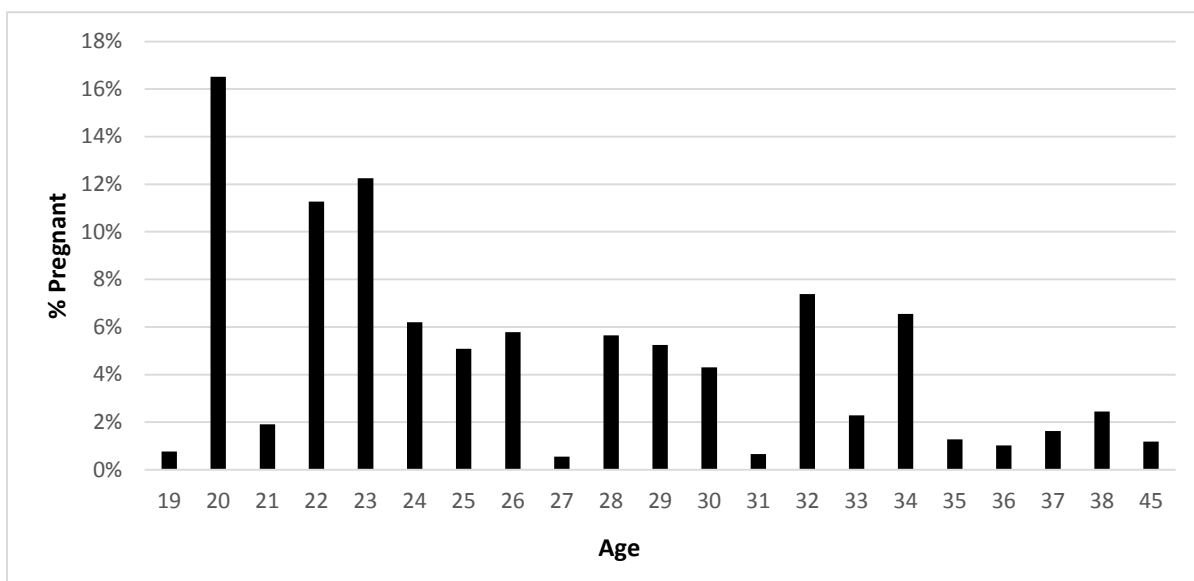


Table 2. Prevalence of Drinking among Non-Pregnant and Pregnant Women, Georgia 2010

	Raw Frequency	Weighted Relative Frequency (%)	Weighted SD (%)
Alcohol Consumption by Non-Pregnant Women (Age < 46)			
Ever Consumed Alcohol (X = % of non-pregnant women)	1,245	67.51	2.36
Consume Alcohol in past 12 Months (Y = % of X)	952	51.89	2.34
Consumed Alcohol in past 30 Days (Z = % of Y)	500	27.41	1.78
Alcohol Consumption by Pregnant Women (Age < 46)			
Ever Consumed Alcohol (X = % Of pregnant women)	46	64.76	7.06
Consume Alcohol in past 12 Months (Y = % of X)	31	56.85	7.13
Consumed Alcohol in past 30 Days (Z = % of Y)	9	34.76	8.80
Binge drinking by Pregnant Women in the Past 30 Days (Z = A1 + A2)			
Binged on Alcohol (A1= Z – A2)	5	24.45	8.07
Consumed Alcohol without Binging (A2 = Z – A1)	4	10.31	5.53
<i>Frequency of Drinking Alcohol in the Past 30 Days</i>			
(100% = B1 + B2 + B3 + B4)			
Drank Alcohol without Binging (B1 = % of Z)	4	29.65	13.18
Binge Drinking Once (B2 = % of Z)	1	4.31	0.70
Binge Drinking Twice (B3 = % of Z)	1	14.51	14.24
Binge Drinking More Than Four Times (B4 = % of Z)	3	51.51	7.88

SD: Standard Deviation

Table 3. Prevalence of Drinking Patterns among Pregnant Women in Georgia, 2010.

	"Have you consumed any alcohol within the past 30 days?"							
	Full Sample		Consumed		Did Not Consume		Chi-square Test	
	%	SD	%	SD	%	SD	Chi-Square	p-value
Ethnicity								
Georgian	89.09	4.40	34.77	8.81	90.22	6.75	37.12	0.01
Russian	2.35	1.81	.	.	2.73	0.15	19.67	0.01
Ossetian	0.91	0.89	.	.				
Armenian	0.98	0.98	.	.				
Azerbaijani	6.69	3.85	.	.				
Household Size								
One	3.57	3.66	3.57	3.66				
Two	45.88	7.00	16.54	5.65	44.98	3.26	2.46	0.11
Three	25.13	6.61	1.27	0.09	36.57	8.13	2.84	0.09
Four	22.83	8.97	13.38	8.87	14.48	7.51	23.42	0.01
Five or more	2.58	0.19	.	.	3.95	0.21	49,673.02	0.01
Age								
18 - 25	62.42	8.58	25.47	8.51	56.64	9.91	0.47	0.49
26 - 35	28.14	7.89	6.52	0.48	33.14	10.41	2.74	0.09
36 - 45	9.44	5.02	2.78	2.85	10.21	3.85	111.57	0.01
Marital Status								
Never married	5.24	0.39	5.24	0.39
Divorced	2.31	2.32	2.31	2.32
Married/Cohabiting	92.46	2.42	27.23	8.71	.	.		
Education								
Secondary school	15.99	6.39	5.05	4.97	16.77	7.44	20.88	0.01
High school	57.72	9.23	15.38	6.88	18.32	4.98	42.23	0.01
College or Higher	26.31	8.26	14.34	8.28	16.74	3.82	79.16	0.01
Occupation								
Government	10.92	2.61	.	.	16.74	3.82	79.16	0.01
Non-government	5.24	0.39	5.24	0.39	.	.	.	
Self-employed	13.06	9.22	9.11	8.57	6.06	5.88	58.32	0.01
Student	2.09	0.16	.	.	3.21	0.17	78,294.93	0.01
Homemaker	66.28	8.24	20.43	7.64	70.28	5.41	14.76	0.01
Unemployed	2.41	1.69	.	.	3.69	2.61	331.96	0.01
Monthly Income (GEL)								
=< 200	55.71	7.27	33.51	8.84	34.03	2.01	66.62	0.01
> 200 to <=400	8.98	4.21	1.27	0.09	11.81	4.36	80.01	0.01
> 400 to <=800	22.74	5.02	.	.	34.86	6.06	6.51	0.01
> 800 to <=1600	12.58	4.48	.	.	19.27	6.41	24.01	0.01

Chi-square Test: chi-squared test for independence.

Table 4a. Results of Multiple Logistic Regression Analysis with Correlates of Alcohol Consumption during the Past 30 Days among Women Aged 18 – 65 in Georgia

	Female (n = 4610)			
<i>% Concordant</i>	<i>0.66</i>			
Effect	Odds	95% CL		p-values
Ethnicity				
Ossetian	0.49	0.10	2.50	0.39
Azerbaijani	0.08	0.02	0.29	<0.01
Armenian	0.52	0.14	1.91	0.32
Russian	0.92	0.23	3.70	0.90
Household Size				
Two	0.67	0.43	1.03	0.07
Three	0.79	0.51	1.24	0.31
Four	0.93	0.54	1.60	0.80
Five or more	1.00	0.58	1.72	0.99
Age				
26 - 35	0.84	0.48	1.48	0.55
36 - 45	0.79	0.47	1.35	0.40
46 - 55	0.56	0.33	0.96	0.04
56 - 65	0.46	0.25	0.86	0.01
Marital Status				
Never married	1.09	0.67	1.79	0.73
Separated	0.75	0.25	2.24	0.60
Divorced	0.47	0.21	1.04	0.06
Widowed	0.45	0.26	0.78	<0.01
Maternal Status				
Pregnant	0.62	0.23	1.68	0.35
Smoking				
Smoker	3.00	1.84	4.89	<0.01
Education				
Secondary School	2.00	1.09	3.67	0.02
College or higher	1.43	0.99	2.05	0.06
Occupation				
Government	1.05	0.64	1.72	0.84
Non-government	0.83	0.40	1.70	0.61
Self-employed	1.30	0.73	2.30	0.38
Non-paid	1.29	0.12	13.59	0.83
Student	1.31	0.66	2.63	0.44
Retired	0.48	0.25	0.92	0.03
Unemployed	0.61	0.39	0.98	0.04
Unable to work	0.72	0.13	3.86	0.70
Monthly Income (GEL)				
> 200 to <=400	0.49	0.33	0.72	<0.01
> 400 to <=800	0.52	0.33	0.82	0.01
> 800 to <=1600	0.75	0.39	1.45	0.39
More than 1600	1.06	0.29	3.91	0.93

Table 4b. Multivariate Logistic Regression Analysis with Correlates of Alcohol Consumption among Pregnant Women during the Past 30 Days.

Covariates <i>(control groups)</i>	Coefficient Beta Estimate	Standard Error	Chi- Square	p-value	Odds Ratio Estimates	95% CL	
Intercept	-7.85	2.45	10.24	<0.01			
Age (18-35)							
36 – 45	1.22	2.27	0.29	0.59	3.37	0.04	287.52
Household Size (Three or more)							
One	5.68	1.64	12.03	<0.01	293.91	11.85	>999.99
Two	2.17	0.86	6.41	0.01	8.72	1.63	46.65
Marital Status (Married)							
Divorced	1.72	1.08	2.53	0.11	5.58	0.67	46.56
Education (High School or lower)							
College or Higher	-0.13	0.89	0.02	0.89	0.88	0.16	5.00
Occupation (Homemaker, Government, or unemployed)							
Self-employed	5.11	1.75	8.55	<0.01	166.13	5.39	>999.99
Monthly Income (> 200 GEL)							
=< 200	5.06	2.15	5.53	0.02	157.37	2.32	>999.99
% Concordant: 75.4							
% Discordant 15.4							
% Tied: 9.2							