# Substance Use And Associated Factors Among Women Who Delivered Low Birth Weight Newborns In Gandhi Memorial And Kadisko General Hospitals

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# Substance Use And Associated Factors Among Women Who Delivered Low Birth Weight Newborns In Gandhi Memorial And Kadisko General Hospitals

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This certifies that the Master's Thesis
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# ABBREVIATION AND ACRONYMS

| | |
|---|---|
| CDC | Communicable Disease Control |
| EDHS | Ethiopian Demographic and Health Survey |
| FMOH | Federal Ministry of Health |
| GATS | Global Adult Tobacco Survey |
| LBW | Low Birth Weight |
| LMP | Last Menstrual Period |
| MOH | Ministry of Health |
| MRN | Medical Record Number |
| NICU | Neonatal Intensive Care unit |
| OR | Odds Ratio |
| SHS | Second-Hand Smoke |
| VLBW | Very Low Birth Weight |
| WHO | World Health Organization |

# Abstract

## Substance Use And Associated Factors Among Women Who Delivered Low Birth Weight Newborns In Gandhi Memorial And Kadisko General Hospitals

**Background**

Alcohol, cigarettes, and "Khat" during pregnancy can have negative health consequences for the fetus. The use of substances such as alcohol, tobacco, and "Khat" during pregnancy can result in various complications and the death of newly born infants. In developing countries such as Ethiopia, low birth weight is a significant public health issue. Low birth weight is linked to an increased risk of early neonatal mortality and morbidity worldwide. The most common causes of low birth weight are associated with maternal risk factors. Maternal malnutrition, anemia, substance abuse, and hypertensive disorders of pregnancy, for example, are all linked to low birth weight.

**Objective**

The objective of this study is to investigate the association between substance use and associated factors among low birth weighted women in Gandhi memorial public Hospital and Kadisco general private Hospital in Addis Ababa, Ethiopia in 2021, as well as the effect of excessive caffeine consumption of more than 300 mg per day on the duration of pregnancy and the condition of the newborn *(Jarosz, Wierzejska, & Siuba, 2012),*

**Methods**

A facility-based cross-sectional study was conducted from June to August 2021 among 204 women who gave birth at Kadisco Private Hospital and Gandhi Memorial Public Hospital in Addis Ababa, Ethiopia. The study participants were chosen using a systematic random

sampling technique. Pretested structured questionnaires were used to collect data. The data was entered into Jamovi version 2.2.5, and descriptive statistics were performed using frequency and percentage; the association of substance use compared with women who delivered LBW babies were calculated by Pearson's Chi-square analysis or Fisher's Exact test,and, the factors associated with substance use and socio-demographic characteristics of the women who delivered LBW babies were examined using binomial logistic regressions with 95% confidence intervals (95% CI) and the level of significance were identified by p-value.

**Results**

In this study, the variables that showed a significant relation with substance use were age, gestational hypertension, education status, religion, and weight gained during pregnancy. Cigarette smoking was significantly associated with educational status and the incidence of smoking was high among those with higher levels of education compared to those unable to read or write (OR:32.9 95% CI=4.05-262.2) with *p*=0.001; furthermore the odds of khat chewing were six times higher among mothers with no weight gain during pregnancy compared to mothers who gained weight. (OR=6.73; 95% CI:2.105-21.51, *p*=0.001) Regarding religion, Muslim mothers with LBW infants were exposed to khat chewing as high as 6.5 times ( OR=6.55; 95%CI:1.21-33.45, *p*=0.024) X than those following other religions. Mothers belonging to the 25–30 age group had a 2.5 times higher chance of khat chewing and had LBW infants (OR=2.531 95% CI=1.371-4.670, *P*=0.003). Mothers with gestational hypertension had a 3.1 times higher chance of chewing khat resulting in low birth weight infant (OR= 3.11 (95% CI=1.440-6.730, *P*= 0.004.

**Conclusion**

Substance use during pregnancy is still a significant public health issue worldwide because it can lead to various adverse neonatal outcomes (Fetene et al., 2021). According to the finding of this study, 42.4% of women used substance (cigarette, khat, alcohol, or shisha) on an occasional, weekly, monthly, or daily basis.

Finally, mothers in the young age group with low education, gestational hypertension, and marital status had a higher chance of having LBW infants due to khat chewing practices during pregnancy. Thus, it is necessary to provide information on the importance of not using khat or other substances during pregnancy to reduce the prevalence of LBW infants.

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**Keywords**: Substance use; Pregnancy women; Smoking, Khat, Low birth weight, Passive Smoking, Alcohol drinking; Complications

# I. Introduction

## 1.1 Background

Low birth weight (LBW) is still a significant public health issue worldwide. The WHO defined low birth weight as less than 2500 g (before 1976, the WHO definition was less than or equal to 2500 g) because birth-weight-specific infant mortality begins to rise rapidly below this value (Kramer, 1987). It is a multifaceted problem that includes preterm neonates (babies born before 37 weeks of gestation), term neonates who are small for their gestational age, and the overlap between these two conditions (Risnes et al., 2011).

LBW is a persistent global public health issue, particularly in Sub-Saharan Africa and Asia. More than 20 million babies are born with low birth weight worldwide, with 95.6% coming from developing countries (Abdurke Kure, Abdo Komicha, & Egata, 2021).

Low birth weight is most common in low and middle-income countries, particularly among the most vulnerable populations, accounting for 28% in south Asia,13% in sub-Saharan Africa, and 9% in Latine America (Kim & Saada, 2013). Among children born with a reported birth weight in Ethiopia,13% were LBW babies (Csa, 2016).

The etiology of LBW is multifactorial, with maternal, fetal, placental, and environmental risk factors, ANC status, and the mother's socioeconomic status all playing a role (Idris, Gupta, Mohan, Srivastava, & Das, 2000).

Substance use is any substance that alters the way the body functions, whether mentally, physically, or emotionally, and includes substances such as alcohol, tobacco, caffeine, illegal drugs, prescription drugs, inhalants, and solvents. The type of substance used, the extent of use, and the point of exposure all impact the effects of drug use during pregnancy.

Tobacco is the most commonly used substance in pregnancy worldwide, followed by alcohol, cannabis, and other illicit substances (Behnke et al., 2013).

Caffeine is a stimulant substance found in coffee, tea, cocoa (chocolate), Kola nuts (cola), soft drinks, energy drinks, and over-the-counter medications. Coffee is one of the world's most popular beverages and the most common source of high caffeine (Chen et al., 2014) (6). A cohort study, with 102,347 pregnant women, that was included in the meta-analysis shows the pooled relative risk (RR) for LBW was 1.33 (95% CI: 1.12, 1.57) for mothers with the highest level compared with the lowest level of caffeine intake during pregnancy, with significant heterogeneity across studies ($I2 = 49.3\%$, $P = 0.032$). The pooled RR was 1.07 (95% CI: 1.02, 1.11) for each 100 mg/day increase in caffeine intake (Jin & Qiao, 2021). Another systematic review and meta-analysis shows a significant positive association between maternal caffeine intake and the risk of LBW (Soltani et al., 2021).

Despite its teratogenic potential, alcohol is a commonly used substance during pregnancy. It can disrupt fetal development, particularly the central nervous system, with potentially serious long-term consequences. When a pregnant woman smokes a cigarette, her fetus is exposed to potentially harmful chemicals. Nicotine is just one of 4000 toxic chemicals a pregnant woman can pass on to her fetus. Nicotine causes blood vessels to constrict, allowing less oxygen and nutrients to reach the fetus (Tesso, Woldesemayat, & Kebede, 2017).

Tobacco is one of the most commonly used substances by pregnant women. Tobacco use among pregnant women in Jimma, Ethiopia, revealed that the prevalence of substance use among pregnant women was 37.9, with 2.7% being active tobacco smokers (Tesso et al., 2017). Furthermore, another study in Butajira, south-central Ethiopia, found a prevalence of 60.1% of substance use during pregnancy, with 23.2% of these users being passive smokers but none being active tobacco smokers (Alamneh, Endris, & Gebreyesus, 2020).

According to the WHO Global progress report on the implementation of the WHO Framework on Tobacco Control 2018, around the world, 40% of children and 35% of female nonsmokers were exposed to environmental tobacco smoke (WHO, 2018).

Within the local context, according to the recent Ethiopian Demographic and health survey (EDHS 2016) report, in Ethiopia, female smokers are rare. Still, they are vulnerable to the harmful effects of tobacco smoke, with Addis Ababa accounting for 5.4% of active smokers (Csa, 2016), where, as per WHO estimates, Ethiopia's tobacco use in both sexes was 4% of the total population (Erku & Tesfaye, 2019). Even though smoking bans in public places are mandated by law, the most recent review of Ethiopia's tobacco legislative history revealed that there are gaps in the legislation, such as allowing smoking in designated rooms and areas in some baned public or workplaces, and that these gaps should be filled to prevent the tobacco industry from exploiting them to interface with national tobacco control policies.

## 1.2 Statement of the problem

According to a report on the prevalence and associated factors of alcohol use during pregnancy among Bahir-Dar residents in Northwest Ethiopia, 9.8% of pregnant women consume alcohol. The majority of alcohol consumption during pregnancy in the eastern African WHO region ranged from 3.4% in Seychelles to 20.5% in Uganda. The prevalence of alcohol consumption during Pregnancy in Ethiopia ranged from 7.9% to 34%. (Anteab, Demtsu, & Megra, 2014).

LBW is a significant public health problem in developing countries such as Ethiopia; according to reports from various regions, the prevalence of LBW in Ethiopia is as high as 10%. According to a study from the Tigray region of northern Ethiopia, 10.5% of live births were underweight babies (Mengesha, Wuneh, Weldearegawi, & Selvakumar, 2017). A study conducted at Gonder University Hospital in northern Ethiopia found that 11.2% of

deliveries performed there included LBW babies (Adane, Ayele, Ararsa, Bitew, & Zeleke, 2014). In another hospital based study, the prevalence of low birth was 14.6% in the Tigray region of northern Ethiopia (Gebremedhin, Ambaw, Admassu, & Berhane, 2015). In a recent meta-analysis, the estimated national pooled prevalence of LBW in Ethiopia was as high as 17.7% (Endalamaw, Engeda, Ekubagewargies, Belay, & Tefera, 2018).

Maternal smoking during pregnancy has been linked to fetal growth problems, low birth weight, preterm labor, and increased infant and neonatal mortality (Jaddoe et al., 2008). In Ethiopia, according to the 2016 Global Adult Tobacco Survey (GATS) fact sheet, 26% of adult women are exposed to tobacco smoke at work, and 12.5% are exposed to it at least monthly at home (" Global Adult Tobacco Survey," 2016) (18). This figure could rise as high as 33% concrning daily indoor secondhand smoke (SHS) in Kersa, Eastern Ethiopia (Reda, Kotz, & Biadgilign, 2013). Adverse effects are avoidable. Improving public health through ongoing efforts to reduce the burden associated with tobacco-related death and exposure to tobacco smoke remains a national and international priority for governments and other stakeholders. However, it remains a significant cause of premature mortality and morbidity, with evidence indicating no safe level of tobacco smoke exposure.

Catha edulis is the scientific name for “Khat,” which indicates that the plant’s leaf is edible. Ethiopia is home to this plant. Cathinone is the essential chemical in “Khat” and is thought to have the same effect as amphetamine, a central nervous system stimulant (Mega & Dabe, 2017).

Despite the significant effect of substance use on congenital disabilities and developmental disabilities, Ethiopia’s current prevalence of substance use during pregnancy has not been fully addressed. As a result, this study aimed to estimate the prevalence of substance use during pregnancy and investigate the association between substance use and women who gave birth to babies with LBW.

Excessive caffeine consumption, as well as the use of alcohol, cigarettes, and "khat" during pregnancy, can have negative health consequences for the fetus. In developing countries such as Ethiopia, low birth weight is a significant public health issue. Excessive caffeine consumption of more than 300 mg per day during pregnancy affects the duration of pregnancy and the condition of the newborn (Jarosz et al., 2012).

## 1.3 Significance of the study

According to the latest WHO data published in 2020, low birth weight deaths in Ethiopia reached 28,020 or 4.97% of total deaths, and the age-adjusted death rate is 9.52 per 100,000 population. Ethiopia ranks 37th in the world.

There have been few studies on the extent and associated factors of substance use among Ethiopian women who gave birth to low birth weight babies. From the standpoint of environmental risk factors such as substance use, the study's findings can be the first step in combating infant mortality due to LBW. The study identifies stakeholders such as regulatory authorities and strengthens tobacco control policies.
The study is also essential for raising awareness about the dangers of substance use during pregnancy among healthcare providers and pregnant women. It also serves as a starting point for additional research and evidence-based planning of health intervention or promotion programs to improve infant, maternal, and general population health.

This study's finding also helps mobilize stakeholders and donor organizations to work collaboratively to create awareness among people exposed to substance use and helps mobilize resources to combat substance use.

## 1.4 Research questions

What factors have been associated with substance use among women who gave birth to babies with LBW in Gandhi Memorial Public Hospital and Kadisco General Private Hospital in Addis Ababa, Ethiopia?

## 1.5 General objectives

The objective of this study was to investigate the association between substance use and women with LBW infants in Gandhi Memorial Public Hospital and Kadisco General Private Hospital in Addis Ababa, Ethiopia, 2021

## 1.6 Specific objectives

I. To identify factors associated with substance use among mothers who birthed low birth weight babies in Gandhi Memorial Hospital & Kadisco General Private Hospital in Addis Ababa,

II. To provide evidence for policymakers regarding the prevention of substance use.

## 1.7 Operational definitions

### 1.7.1 Alcohol use during the current pregnancy

It is defined as any use of drinks with industrially prepared alcoholic content (ethanol or ethyl) or locally prepared alcoholic content, such as Teji, Areki, and Tela, during pregnancy, regardless of dose or frequency (yes/No) (*Fetene et al., 2021)*.

### 1.7.2 Passive smoke exposure

Being exposed to someone else's cigarette smoke for more than 15 minutes at least once a week at home, at work, or in public places (restaurants, bars, or cafeterias) during pregnancy.

### 1.7.3 Substance use during the current pregnancy

It is defined as a self-report of exposure to at least one of the three substances (alcohol, "khat" or tobacco) before the interview, regardless of doses or frequency (Yes/No )(Fetene et al., 2021).

### 1.7.4 Tobacco use during the current pregnancy

It is defined as every use of tobacco products during the current pregnancy (Yes/No) (Fetene et al., 2021).

### 1.7. 5 Khat's use during the current pregnancy

It is defined as every chewing of "Khat" during the current pregnancy, irrespective of its dose and frequency (Yes/No).

# II. Literature review

A literature review is a systematic and logical arrangement of information carefully selected from scientific writings. The ultimate purpose of a good literature review is to find the best available evidence from various updated sources and to organize them scientifically within the framework of the current research project. The review of relevant literature provides statistical support for research. It is similar to an annotated bibliography; it purely describes the facts and may add comments to highlight common themes. It is also critically analyzes the attributes present study in the previous research.

The literature review helps identify the strengths, weaknesses, and research gaps of the previous research topic. It accounts for what has already been published (or) established by researchers.

The related literature for the present study has been organized under the following subheadings.

2.1 Factors related to smoking.
2.2 Factors related to khat.
2.3 Factors related to alcohol.
2.4 Factors related to obstetric condition & general characteristics.

## 2.1 Factors related to smoking

Smoking during pregnancy has been linked to several adverse health outcomes for both the fetus and the mother. According to the Lancet 2018 report, the global prevalence of smoking during pregnancy is 1.7%, with regional disparities ranging from the highest in the European region, with a majority of 8.1%(95% CI 4.0-12.2) to the lowest in the African region with a prevalence of 0.8% (0.0-202) (*Lange, Probst, Rehm, & Popova, 2018)*.

Secondhand smoke kills approximately 900,000 people annually, but one-quarter of the world's population is still exposed, putting nonsmokers and those in lower socioeconomic strata at greater risk of exposure and placing an associated burden on them (Jeffrey Drope, 2016).

According to the WHO 2019 report on age-standardized prevalence estimate for daily *tobacco* use among people aged 15 and over, Africa has the top three highest shares of tobacco users, with Lesotho having the highest tobacco epidemic on the continent, with an estimate of 22.6% (95% CI 16.9-28.8).

According to WHO's recent report, passive smoke exposure causes more than 1.2 million premature deaths each year, and 65,000 children die annually from illnesses related to passive smoke exposure.

A population-based study and meta-analysis of cross-sectional data on domestic secondhand tobacco smoke and risk of under-five mortality in 23 Sub-Saharan African countries found that exposure to domestic secondhand tobacco smoke had a significant positive impact on the risk of under-five mortality in sub-Saharan Africa, with Ethiopia's hazard ratio of 1.16 (95% CI:1.02-1.31), including a risk of death (Owili, Muga, Pan, & Kuo, 2017).

According to Petersen et al., in an exploratory cross-sectional study of women in Aleta Wondo, southern Ethiopia, the prevalence of living with tobacco users was 7.6%, but 14.4% of the overall and 22% of the urban participants had daily exposure at home. After controlling for other covariates, place of residence, allowing smoking in the house, living with a tobacco user, and exposure to point-of-sale advertising within the last 30 days were

discovered to be strong predictors of reporting daily SHS prevalence at home (Petersen, Thompson, Dadi, Tolcha, & Cataldo, 2016).

In a systematic review and meta-analysis conducted in Ethiopia, a total of 5,343 mother-neonate pairs were included in 15 studies that showed that cigarette smokers (95% CI: AOR=4.36 (1.75, 6.98) were four times more likely to have low birth weight neonates compared to their counterparts (Bayih et al., 2021).

## 2.2 Factors related to 'khat.'

In a study conducted in the eastern part of Ethiopia, the overall magnitude of substance use among pregnant women was 26.5% of the total sample of expectant mothers, with 19.6% chewing "khat." During pregnancy, 9.4% drank alcohol, and 2.4% smoked cigarettes. Furthermore, pre-pregnancy substance use, partner substance use, family substance use, and average monthly household income were statistically significant factors associated with substance use during pregnancy (Fetene et al., 2021).

In a systematic review and meta-analysis conducted in Ethiopia, 5,343 mother-neonate pairs were included from 15 studies that showed that Khat users were 2.4 times (95%CI: AOR=2.4; 1.11, 5.19) more likely to have congenitally defected neonates (Bayih et al., 2021).

The overall prevalence of substance use during pregnancy is defined in a cross-sectional study done in Butajira, the central south part of Ethiopia, as exposure to at least one of the four substances, that is, caffeine more than or equal to 300mg, alcohol intake of, or "khat" chewing, or tobacco smoke during the current pregnancy. Based on this, the general substance use during the current pregnancy was 60.1 % (95%CI: 54.8%, 65.2%). In total, 122 pregnant women (35.8%; 95%CI: 30.8, 41.0%) chewed "khat" during their current

pregnancy. None of the pregnant women smoked tobacco. However, 9.7% (95%: CI 8.2%-15%) of the pregnant women drank alcohol in the three months preceding their current pregnancy, and 10% (95% CI: 7.2%, 13.7%) drank alcohol during their current pregnancy ***(Alamneh et al., 2020)***.

## 2.3 Factors related to alcohol

A facility-based prospective cohort study in Ethiopia showed that women who reported a hazardous pattern of alcohol intake during pregnancy were 2.34 times (ARR=2.34; 95% CI: 1.66, 3.30) likely to give birth to babies with LBW when compared to women who abstained entirely throughout their pregnancy. Similarly, the risk of LBW was 50% (ARR=1.50; 95% CI: 1.31, 1.98) higher for pregnant women who were non-hazardous alcohol drinkers compared to women who did not consume alcohol (Addila, Azale, Gete, & Yitayal, 2021).

## 2.4 Factors related to obstetric and general characteristics

A hospital-based cross-sectional study conducted among 337 mothers who give birth in the public hospital of North Wello, Ethiopia, shows that obstetrical factors influence a child's birth weight. For women with no abortion history, multiple pregnancies become statistically significant. Compared to mothers with abortion history, the birth weight of a child delivered by women with no abortion history increased by 325 grams (β= 325.3, 95% CI=177.6, 473.0); multigravida mothers have a child who is gaining weight. A child born to a multigravida woman weighs nearly 107 grams more than a child born to a primipara woman (β=107.2, 95% CI=10.4, 204.0).(***Wubetu, Amare, Haile, & Degu, 2021)***.

A facility-based cross-sectional study conducted in the public hospital of Harari regional state, Eastern Ethiopia, shows that compared to their counterparts, mothers who had an unplanned pregnancy had four times the odds of having babies with LBW (AOR=4.7,95%CI) ***(Abdurke Kure et al., 2021).***

A hospital-based cross-sectional study conducted in the North wollo zone of the Amhara region's public hospital revealed that merchant mothers had a significantly higher risk of giving birth to babies with LBW than employed mothers (AOR (CI)=2.90, (1.03-8.22) (***Wubetu et al., 2021)***.

## 2.5 Conceptual Framework

The significant exposure, associate and outcome variables are described in the conceptual framework of this study. The study's dependent (outcome) variable is substance use among pregnant women who had babies with LBW. LBW and substance use are influenced by confounding variables such as socio-demographic factors, maternal and obstetric factors (which we later controlled for their effect with a multivariable model). Substance use during pregnancy is defined by exposure to at least one of the four substances (alcohol intake, "khat" chewing, tobacco smoke, and others like shisha).

The following conceptual framework is adapted from maternal determinants of low birth weight among Indian children: Evidence from the National Family Health Survey-4, 2015–16 (***Zaveri, Paul, Saha, Barman, & Chouhan, 2020***)

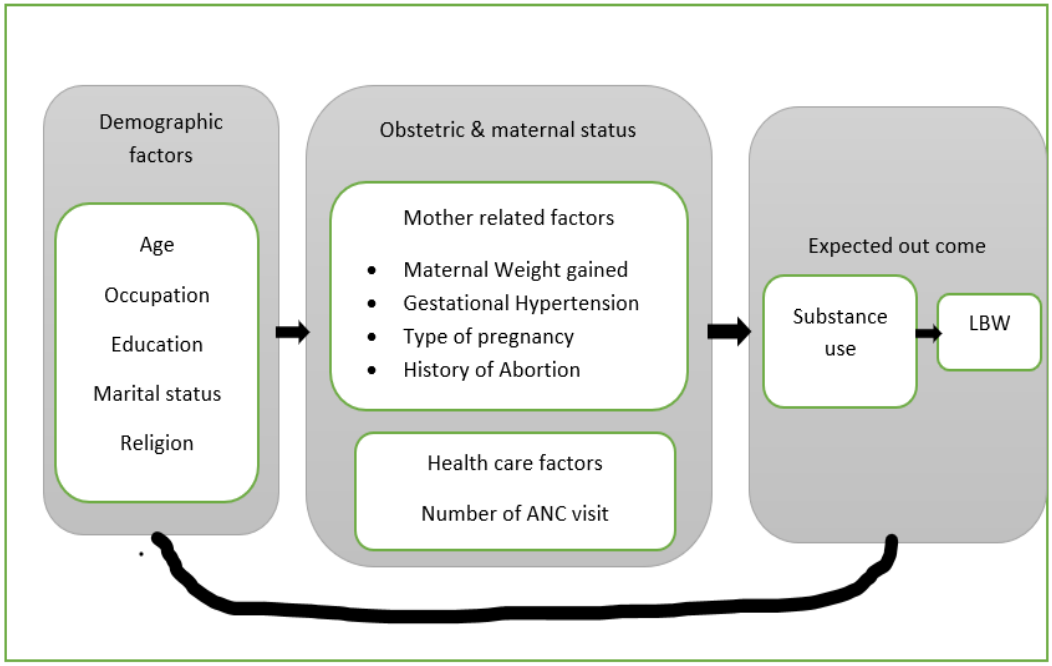


**Figure 1 . Conceptual framework of substance uses prevalence and associated factors among low birth weighted mothers (Zaveri et al., 2020)**

# III. Methods

This chapter deals with the methods adopted for the study, and it includes the description of the research design, setting of the study, variables, population, sample size, sampling technique, criteria for sample selection, description of the tools, method of data collection,

and plan for data analysis.

## 3.1 Study design

A facility-based cross-sectional study was conducted to investigate the association between substance use and associated factors among women who had LBW babies from June to August 2021.

## 3.2 Study setting

The study was carried out in two hospitals in Addis Ababa, Ethiopia's capital. Addis Ababa has an area of 549 square kilometers, of which 18.2 square kilometers encompass rural areas. Administratively, there are 11 sub-cities and 126 woredas. The city has twelve public hospitals. Twenty-five private hospitals, 107 public health centers, and 744 types of private clinics. It has a total population of 5,228,000 and an entire household population of around 1,066,939. Gandhi Memorial Hospital is one of the well-known government maternity hospitals administered by the city. Compared to other hospitals, the hospital has a high volume of deliveries. Daily, 30–40 pregnant women give birth. According to the hospitals' annual report in the year 2019/2020, a total of 12,661 women had given birth; among those, around 1,200 (9.48%) babies had a LBW of <2500g.

Kadisco General Hospital is the sister company of one of the leading paint manufacturing companies, Kadisco Chemical Industries. The hospital opened its maternity wing on May 1, 2007. It is a well-known private hospital with more than 200 health care workers. In the last year, more than 450 mothers had a delivery with 57 registered babies with LBWs (12.67%) <2500g.

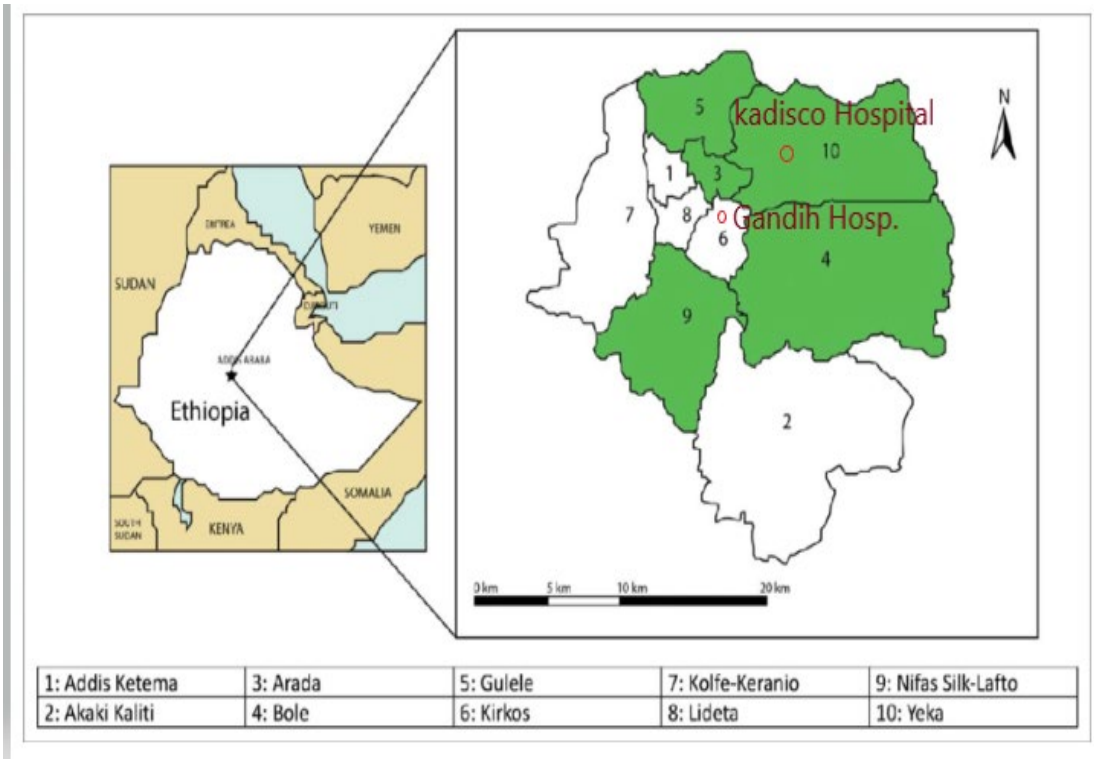


**Figure 2. Map of Addis Ababa city administration**

## 3.3 Participant

The source population of this study was pregnant women who had delivered between July 2019 to June 2020 at both hospitals; the participants were from the 204 women who gave birth to LBW babies at Kadisco Private Hospital (n=37) and Gandhi Memorial Public Hospital (n=167) in Addis Ababa, Ethiopia. The study participants were chosen using a systematic random sampling technique. Pretested structured questionnaires were used to collect data.

## 3.4 Inclusion & Exclusion criteria

The eligible subject for this study were mothers who delivered live singleton infants with a birth weight of < 2500 grams at term. The exclusion criteria of this study were mothers who delivered live singleton infants with a birth weight of > 2500 grams at term.

## 3.5 Sampling

The sample size was determined using a single proportion formula based on the prevalence of substance use: 26.5% (at 95% CI: 22.7, 30.6) used substances during their current pregnancy in an Eastern Ethiopia study ***(Fetene et al., 2021)***. The sample size was calculated using the following assumption: 95% confidence interval and 5% margin of error; estimate sample size using the following hypothesis: $n= (Z\ \alpha/2)^2 * P* (1-P)/d^2$.

The formula used for the calculation:

$$n= \frac{(Z\ \alpha/2)^2 * P\ (1-p)}{d^2}$$

Where

P= prevalence of substance use

Z α/2= critical value at 95% confident level of certainty (1.96)

d=the margin of error between the sample and population

n=is the required sample size of 3.8416

Thus, the sample size was $n= \frac{(1.96)2 *0.265*(1-0.265)}{(0.05)^2} = \frac{3.842*0.265*0.735}{0.0025}$

N1=300,

By considering P= 26.5%, the sample size was 300. Since the total population was found to be less than 10,000, the following formula was used:

nf=ni/ (1+ni/N)

Where

nf=final/corrected sample size

ni=uncorrected sample size, and

N=total number of women in the source population (entire women from both hospitals who delivered LBW infants and had a delivery in the year 2020).

Therefore (300/(1+300/1237)=241, so the sample size was 241, a total of two hundred forty-one women who gave birth to LBW babies were included in this study from the actual data collection time, 204 mothers with LBW babies and their medical history cards were accessed.

## 3.6 Sampling technique

The hospitals were chosen using a purposive sampling technique because of their higher skilled deliveries; in 2012 Ec(2019/20Gc), the two facilities, Mahatma Gandhi Memorial and Kadisco Hospital, had a skilled delivery of 12,661 and 450 deliveries and LBW of 1200 and 57 respectively.

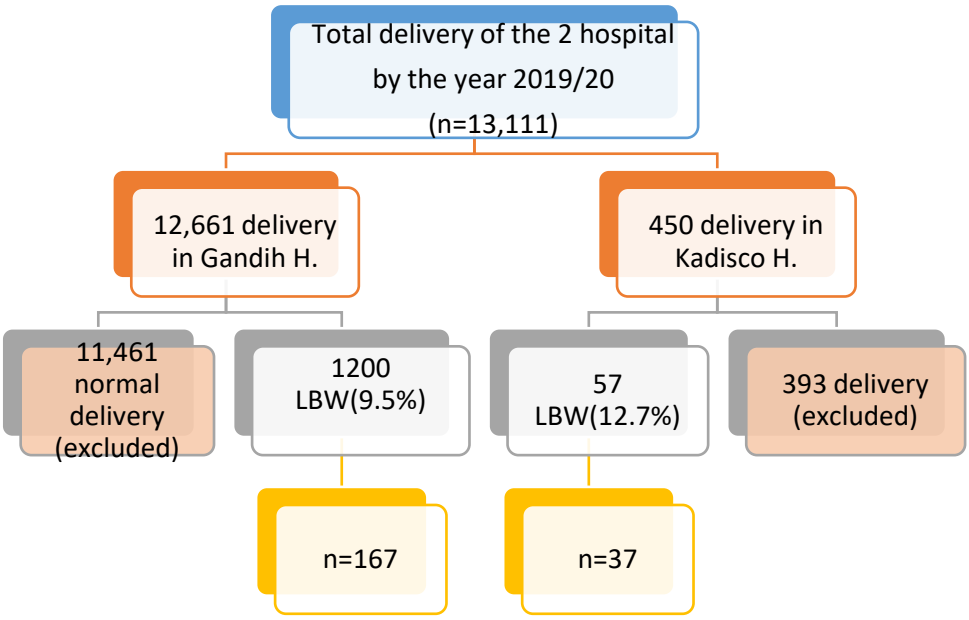


**Figure 3. Flow chart for population selection and sampling**

A simple random sampling technique was used to select from each hospital's list of low birth weight deliveries. A sample size of 241 was chosen. In the previous year, mothers who received a proper allocation from each hospital had low births. Actual participants' medical record numbers (MRN) were selected using a computer random generation method, and the first participants were chosen using a lottery method.

## 3.7 Variables

### 3.7.1 Dependent variables

- Substance use (smoking, alcohol, khat chewing, and others like shisha) .

### 3.7.2 Independent variables

- Socio-demographic variables (age, education, marital status, occupation, and religion).
- Maternal & obstetric characteristics- gravidity (Number of pregnancies), weight gain (Current Pregnancy), history of abortion, ANC visit, type of facility, gestational hypertension, and type of pregnancy
- Newborn characteristics- sex.

**Table 1. Description of variables**

| Variables | Characteristics | Classifications | | Definition/remark |
|---|---|---|---|---|
| Dependent | **Substance use**<br>➢ Alcohol use<br>➢ Smoking<br>➢ Khat<br>➢ Others** | Not at all =1<br>Occasionally=2;<br>Monthly =3<br>weekly=4<br>Daily =5 | No =1<br><br><br><br>Yes =2 | Substance use during current pregnancy is defined as a self-report of exposure to at least one of the three substances (Alcohol, "khat" or tobacco) before the interview, regardless of doses or frequency (Yes/No) (Fetene et al., 2021)<br>* Occasionally means about once or twice a month; monthly means once a month; weekly means once or twice a week |
| Independent | **Demographic characteristics** | | | |
| | Age | 15–24 years =1;<br>25-30 years=2<br>>30=3 | | Age of the mother who delivered the LBW infant |
| | Education | No education=1<br>Primary=2<br>Secondary level (middle)=3<br>Higher or over education=4 | | The mother's highest level of education that has already been completed |

| Variables | Characteristics | Classifications | Definition/remark |
|---|---|---|---|
| Dependent | **Substance use**<br>➢ Alcohol use<br>➢ Smoking<br>➢ Khat<br>➢ Others** | Not at all =1 No =1<br>Occasionally=2;<br>Monthly =3<br>weekly=4<br>Daily =5 Yes =2 | Substance use during current pregnancy is defined as a self-report of exposure to at least one of the three substances (Alcohol, "khat" or tobacco) before the interview, regardless of doses or frequency (Yes/No) (Fetene et al., 2021)<br>* Occasionally means about once or twice a month; monthly means once a month; weekly means once or twice a week |
| | Maternal Status | Single=1 ; Married=2<br>Divorced=3 ; Widowed=4 | The marital status of the women who delivered LBW infant |
| | Occupation | Government employee=1<br>Merchant=2; House wife=3 | Occupation of the women who delivered LBW infant |
| | Religion | Orthodox=1; Muslim=2<br>Protestant=3; others=4 | The religion of the women |
| | **Maternal & obstetric characteristics**<br>Weight Gained during the current Pregnancy | <10 kg=1; >10Kg=2 | The amount of weight in Kg. the mother gained during the current pregnancy |
| | ANC visit | One visit=1; Two visits=2<br>Three visits =; Four visit=4 | Number of ANC visits for the current pregnancy |

| Variables | Characteristics | Classifications | | Definition/remark |
|---|---|---|---|---|
| Dependent | **Substance use**<br>➢ Alcohol use<br>➢ Smoking<br>➢ Khat<br>➢ Others** | Not at all =1<br>Occasionally=2;<br>Monthly =3<br>weekly=4<br>Daily =5 | No =1<br><br><br><br>Yes =2 | Substance use during current pregnancy is defined as a self-report of exposure to at least one of the three substances (Alcohol, "khat" or tobacco) before the interview, regardless of doses or frequency (Yes/No) (Fetene et al., 2021)<br>* Occasionally means about once or twice a month; monthly means once a month; weekly means once or twice a week |
| | Type of facility | Public Hospital=1<br>Private hospital =2 | | The health facility of the mother delivered |
| | History of abortion | Yes=1; No=2 | | Termination of a pregnancy |
| | Type of Pregnancy | Planed=1<br>Unplanned=2 | | Does the pregnancy want or unwanted |
| | number of pregnancy | Prim gravida<br>Multi gravida | | Total number of pregnancies, including the current |
| | Gestational hypertension | Yes=1; No=2 | | Gestational Hypertension history of the women |
| | Sex of Infant | Male<br>Female | | Sex of newborn infant |

** Others=tobacco, shisha

## 3.8 Data collection tools and procedures

Data was gathered through interviews and the review of medical records. During the postnatal period, structured questionnaires administered by an interviewer were used to collect data from the mothers. A structured questionnaire was used to collect basic information, and the instrument was based on previously published literature. The questionnaire was written in English to collect the necessary data. The questionnaire was divided into four sections: socio-demographic information, maternal substance use characteristics during pregnancy, newborn information, and the pregnant women's obstetric history. The data was entered into Jamovi version 2.2.5, and descriptive statistics were performed using frequency tables, proportions, and summary measures. After controlling for potential confounders, a multivariable analysis was used to determine the effect of predictor variables on the outcome variable. At a p-value of 0.05, statistical significance was declared (*Fetene et al., 2021)*.

## 3.9 Data quality management

The questionnaire was appropriately designed and modified and was structured to collect data from the mothers and the mothers' delivery chart data collectors and supervisors who received training. Before data collection at the study site, a pretest was conducted at another nearby hospital. Based on the pretest results, the questionnaire was received and adapted to the actual context. The supervisor checked the data for completeness during and immediately after collection.

## 3.10 Data analysis

Each questionnaire was checked for completeness, missed values, and unlikely responses while collecting data from the mother's folder. The coded data were entered into Jamovi version 2.2.5. and descriptive statistics were performed using frequency and percentage. Association of substance use compared with women who delivered babies with LBW was calculated by Pearson's Chi-square analysis or Fisher's Exact test, and, the factors

associated with substance use and socio-demographic characteristics of the women who delivered babies with LBW was examined by binomial logistic regressions with 95% confidence intervals (95% CI) and the level of significance by p-value was identified.

# IV. Result

## 4.1 Characteristics of the Study Population

### *4.1.1* General characteristics of the mothers

This study includes 204 LBW-delivered mothers, with an 85% response rate. The vast majority of the 190 participants (93%) were married. About 92 (45%) of the respondents were over the age of 30, 90 (44%) were between the ages 25 and 30, and only 22 (11%) were aged between15 and 24. The mean age of the respondent was 31.6 years, 5.7 SD. Among the women who delivered babies with LBW, 50% (103) had above higher educational level, while 44 (22%), 41 (20%), and 16 (8%) had secondary and primary academic levels of education and were unable to read & write. Conversely, regarding the women's occupational status, 72 (35%) were housewives, 88 (43%) were government-employed, and 44 (21%) were merchants (Table1).

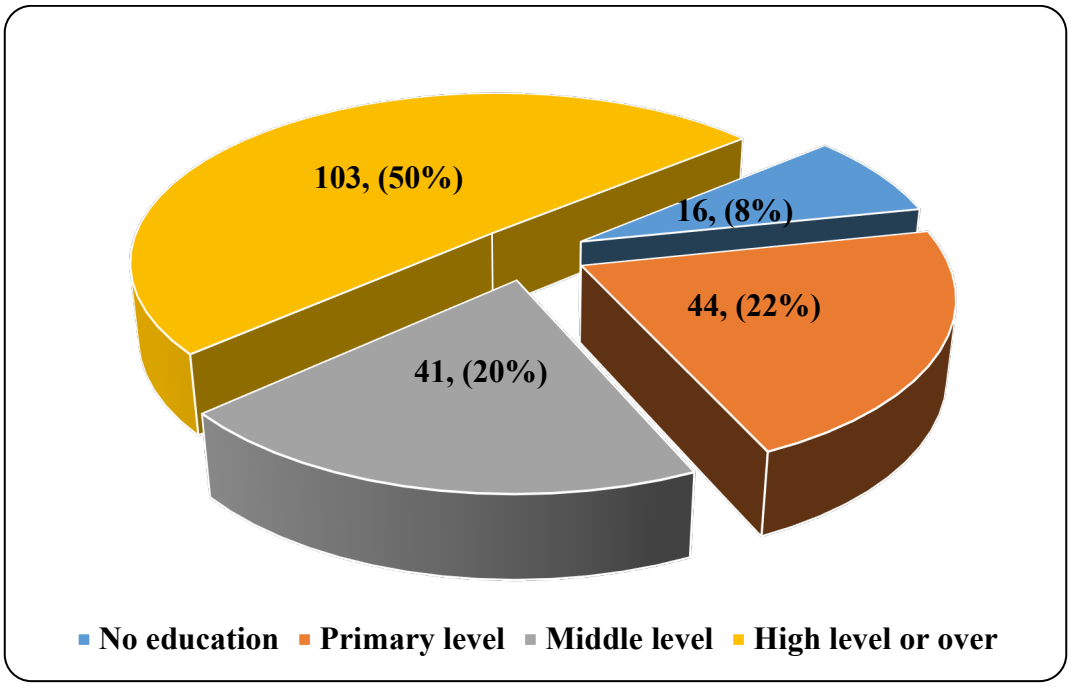


**Figure 4. Frequency (%) distribution of mothers' educational status**

### 4.1.2 Obstetric and health-related characteristics of the mothers

Regarding obstetric conditions, 127 (62%) study participants gained less than 10kg during pregnancy. About100 (49%) of the respondents were prime gravida, and the other 41% were multigravida. Regarding ANC visits, 45.6 % of the mothers came to the hospital for their first ANC visit, and 19.6% attended their third and fourth ANC visits (figure 5).

Furthermore, 27(13%) of the women had a history of abortion, while 44(22%) had a history of gestational hypertension. More than half of the participants, that is, the majority of the mothers 179 (88%) planned their pregnancies. About 126(62%) of the infant were female (Table 2).

**Table 2.** Socio-demographic characteristics, obstetric conditions, and substance use behavior of women who gave LBW birth at Mahatma Gandhi Hospital & Kadisco Hospital in Addis Ababa, Ethiopia, 2021 (n=204)

| Characteristics | Variables | Categories | Frequency (n) | % |
|---|---|---|---|---|
| Socio economic status | Age (Years) | 15–24 | 22 | 10.8 |
| | | 25–30 | 90 | 44.1 |
| | | >30 | 92 | 45.1 |
| | Educational status | No education | 16 | 7.8 |
| | | Primary level | 44 | 21.6 |
| | | Middle level | 41 | 20.1 |
| | | High-level or over | 103 | 50.5 |
| | Marital status | Married | 190 | 93.1 |
| | | Others (single, Widowed/separated/Co-habitant) | 9 | 6.9 |
| | Occupation | Government employee | 88 | 43.1 |
| | | Merchant | 44 | 21.6 |
| | | Housewife | 72 | 35.3 |
| | Religion | Orthodox | 92 | 45.1 |
| | | Muslim | 57 | 27.9 |
| | | Protestant | 40 | 19.6 |
| | | Other religion | 15 | 7.4 |

| Characteristics | Variables | Categories | Frequency (n) | % |
|---|---|---|---|---|
| Obstetric Status of Mothers | Weight gained during the current pregnancy | <10 kg | 127 | 62.3 |
| | | >10kg | 77 | 37.7 |
| | History of abortion | Yes | 27 | 13.2 |
| | | No | 177 | 86.8 |
| | ANC Visit | One visit | 93 | 45.6 |
| | | Two visit | 71 | 34.8 |
| | | Three visit | 27 | 13.2 |
| | | Four visit | 13 | 6.4 |
| | Type of health facility | Public | 167 | 81.9 |
| | | Privet | 37 | 18.1 |
| | Type of pregnancy | Planed | 179 | 87.7 |
| | | Unplanned | 25 | 12.3 |
| | Number of pregnancy | Prim gravida | 89 | 43.6 |
| | | Multi gravida | 115 | 56.4 |
| | Gestational hypertension | Yes | 44 | 21.6 |
| | | No | 160 | 78.4 |
| | Sex of infant | Male | 78 | 38.2 |
| | | Female | 126 | 61.8 |

| Characteristics | Variables | Categories | Frequency (n) | % |
|---|---|---|---|---|
| **Substance use behavior of low birth-weighted women** | Mother's habit of smoking cigarettes | No | 189 | 92.6 |
| | | Yes | 15 | 7.4 |
| | Mother's habit of khat chewing | No | 168 | 82.4 |
| | | Yes | 36 | 17.6 |
| | Mother's habit of taking alcohol | No | 162 | 79.4 |
| | | Yes | 42 | 20.6 |
| | Other substance | No | 181 | 88.7 |
| | | Yes | 23 | 11.3 |
| | All types of substance use | No | 117 | 57.6 |
| | | Yes | 86 | 42.4 |

ANC=Antenatal Care visit ** Shisha

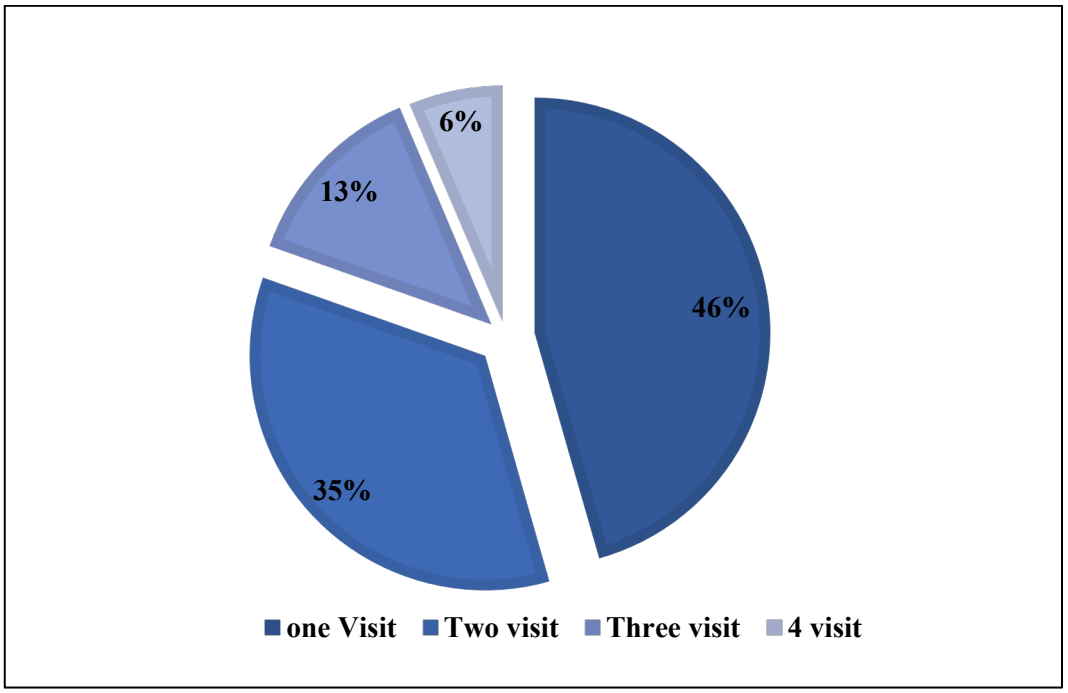


**Figure 5. Frequency distribution of mother's ANC visit for current pregnancy**

### 4.1.3 Substance use characteristics of the respondent

Among the study participants, fifteen (7.4%) mothers that delivered babies with low birth weight smoked cigarettes. Thirty-six (17.6%) mothers chewed "Khat" during their current pregnancy, and forty-two (20.6%) of them consumed alcoholic beverages (beer, whisky, "Tela," "Areki," "Tej"). Although 23 (11.3%) of mothers with infants with low birth weight were found to use shisha, over 42.4% of the mothers used different substances during the current pregnancy (see Fig-6).

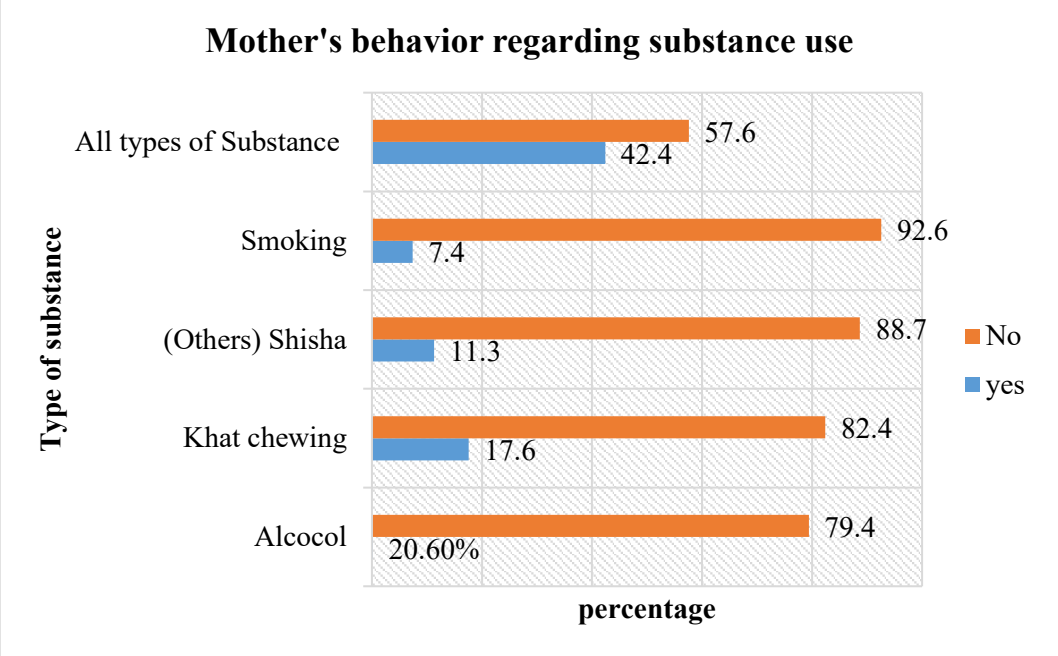


**Figure 6. Frequency distribution of Mother's substance use behavior**

## *5.2 Association between General characteristics and substance use*

Table 3 shows the relationship between general characteristics and substance use among women who gave birth at Gandhi Memorial Public Hospital and Kadisco General Private Hospital in Addis Abeba, Ethiopia. The general characteristics include educational status, religion, weight gain during the current pregnancy, Pearson's Chi-square analysis was conducted to examine the association between general characteristics and substance use.

Based on the analysis, the history of abortion, the number of pregnancies, gestational hypertension of the mother, and the sex of infants all showed a significant association with cigarette smoking ($p<0.05$). There is also a significant association among marital status,

religion, weight gained during the current pregnancy, type of pregnancy (planned or unplanned), maternal gestational hypertension, and khat chewing ($p<0.05$).

**Table 3 Association of general characteristics and substance use (Smoking and Khat chewing) behavior of women who gave LBW birth at Mahatma Gandhi Hospital & Kadisco Hospital in Addis Ababa, Ethiopia, 2021 (n=204)**

| Variables | Smoking | | | | Khat chewing | | | |
|---|---|---|---|---|---|---|---|---|
| | No | Yes | $x^2$ | P | No | Yes | $x^2$ | P |
| | N (%) | N (%) | | | N (%) | N (%) | | |
| **Age (Years)** | | | | | | | | |
| 15–24 | 21(10.3) | 1(0.5) | 3.04 | 0.218 | 16(7.8) | 6(2.9) | 2.79 | 0.248 |
| 25–30 | 86(42.2) | 4(2) | | | 78(38.3) | 12(5.9) | | |
| >30 | 82(40.2) | 10(4.8) | | | 74(36.3) | 18(8.8) | | |
| **Educational Status** | | | | | | | | |
| No education | 15(7.3) | 1(0.5) | | | 15(7.4) | 1(0.5) | | |
| Primary level | 41(20.1) | 3(1.5) | 23.7 | **<0.001** | 34(16.7 | 10(4.9) | 5.76 | 0.124 |
| Middle level | 31(15.2) | 10(4.9) | | | 30(14.7 | 11(5.4) | | |
| High-level or over | 102(50) | 1(0.5) | | | 89(43.5) | 14(6.9) | | |
| **Marital Status** | | | | | | | | |
| Married | 175(85.6) | 15(7.4) | 1.19 | 0.755 | 160(78.4) | 30(14.6) | 13.7 | **0.003** |
| Others (single, Widowed/separated/ Co-habitant) | 14(7) | 0(0) | | | 8(4) | 6(3) | | |

| Variables | Smoking | | | | Khat chewing | | | |
|---|---|---|---|---|---|---|---|---|
| | No | Yes | $x^2$ | P | No | Yes | $x^2$ | P |
| | N (%) | N (%) | | | N (%) | N (%) | | |
| **Occupation** | | | | | | | | |
| Government employee | 83(40.6) | 5(2.5) | 2.36 | 0.307 | 68(33.4) | 20(9.8) | 2.75 | 0.253 |
| Merchant | 42(20.6) | 2(1) | | | 38(18.6) | 6(2.9) | | |
| Housewife | 64(31.4) | 8(3.9) | | | 62(30.4) | 10(4.9) | | |
| **Religion** | | | | | | | | |
| Orthodox | 84(41.2) | 8(3.9) | | | 82(40.2) | 10(4.9) | | |
| Muslim | 54(26.4) | 3(1.5) | 12 | **0.007** | 35(17.2) | 22(10.8) | 29.5 | **<0.001** |
| Protestant | **40(19.6)** | **0(0)** | | | **40(19.5)** | **0** | | |
| Other religion | 11(5.4) | 4(2) | | | 11(5.4) | 4(2) | | |
| **Weight gained during the current pregnancy** | | | | | | | | |
| <10 kg | 113(55.7) | 13(6.4) | | | 94(46.3) | 32(15.7) | | |
| >10Kg | 75(36.9) | 2(1) | 4.16 | **0.041** | 73(36) | 4(2) | 13.4 | **<0.001** |
| **History of abortion** | | | 5.69 | **0.017** | | | 0.915 | 0.339 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Yes | 22(10.8) | 5(2.5) | | 24(11.8) | 3(1.5) | |
| No | 167(81.8) | 10(4.9) | | 144(70.6) | 33(16.1) | |

| Variables | Smoking | | $x^2$ | P | Khat chewing | | $x^2$ | P |
|---|---|---|---|---|---|---|---|---|
| | No | Yes | | | No | Yes | | |
| | N (%) | N (%) | | | N (%) | N (%) | | |
| **ANC visit** | | | | | | | | |
| One visit | 87(42.6) | 6(2.9) | 1.83 | 0.609 | 69(33.8) | 24(11.8) | 16.9 | **<0.001** |
| Two visits | 65(31.9) | 6(2.9) | | | 69(33.8) | 2(1) | | |
| Three visits | 24(11.7) | 39(1.6) | | | 21(10.3) | 6(2.9) | | |
| Four visits | 13(6.4) | 0 | | | 9(4.4) | 4(2) | | |
| **Type of health facility** | 153(75) | 14(6.9) | 1.43 | 0.231 | 137(67.2) | 30(14.7) | 0.063 | 0.801 |
| Public | | | | | | | | |
| Private | 36(17.6) | 1(0.5) | | | 31(15.2) | 6(2.9) | | |
| **Type of pregnancy** | | | | | | | | |
| Planned | 167(81.9) | 12(5.9) | 0.903 | 0.342 | 157(77) | 22(10.8) | 28.8 | **<0.001** |
| Unplanned | 22(10.7) | 3(1.5) | | | 11(5.4) | 14(6.8) | | |
| **Number of pregnancy** | | | 6.04 | **0.014** | | | 1.49 | 0.222 |
| Prim gravida | 87(42.6) | 2(1) | | | 70(34.3) | 19(9.3) | | |
| Multi gravida | 102(50) | 13(6.4) | | | 98(48.1) | 17(8.3) | | |

| Variables | Smoking | | $x^2$ | P | Khat chewing | | $x^2$ | P |
|---|---|---|---|---|---|---|---|---|
| | No | Yes | | | No | Yes | | |
| | N (%) | N (%) | | | N (%) | N (%) | | |
| **Gestational hypertension** | | | | | | | | |
| Yes | 44(21.5) | 0 | 4.45 | **0.035** | 44(21.6) | 0 | 12 | **<0.001** |
| No | 145(71.1) | 15(7.4) | | | 124(60.8) | 36(17.6) | | |
| **Sex of infant** | | | | | | | | |
| Male | 65(31.9) | 13(6.4) | 16.1 | **<0.001** | 51(25) | 27(13.2) | 25 | **<0.001** |
| Female | 124(60.7) | 2(1) | | | 117(57.4) | 9(4.4) | | |

With a $P<0.05$, the association between general characteristics of women and alcohol such as beer, whisky, teji, areki, and tela use are significantly associated with age, weight gain during the current pregnancy, religion, history of abortion, number of ANC visits, type of pregnancy (planned or unplanned), the mother's number of pregnancies, and the sex of the infant. However, other substances, such as shisha are significantly associated with the mother's marital status, occupation, religion, weight gain during the current pregnancy, history of abortion, and number of pregnancies ($p<0.05$) (Table 4).

**Table 4Association between general characteristics and substance use (Alcohol and others) behavior of women who gave LBW birth at Mahatma Gandhi Hospital & Kadisco Hospital in Addis Ababa, Ethiopia, 2021 (n=204)**

| Variables | Categories | Alcohol | | | | Others | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | No | Yes | $x^2$ | *P* | No | Yes | $x^2$ | *p* |
| | | N (%) | N (%) | | | N (%) | N (%) | | |
| Age (Years) | 15-24 | 15(7.4) | 7(3.4) | 9.08 | **0.011** | 19(9.3) | 3(1.5) | 0.923 | 0.63 |
| | 25-30 | 80(39.2) | 10(4.9 | | | 82(40.2) | 8(3.9) | | |
| | >30 | 67(32.8) | 25(12.3) | | | 80(39.3) | 12(5.8) | | |
| Educational Status | No education | 16(7.8) | 0(0) | 4.89 | 0.180 | 16(7.8) | 0(0) | 4.79 | 0.188 |
| | Primary level | 33(16.2) | 11(5.4) | | | 36(17.6) | 8(3.9) | | |
| | Middle level | 33(16.2) | 8(3.9) | | | 38(18.6) | 3(1.5) | | |
| | High-level or over | 80(39.2) | 23(11.3) | | | 91(44.6) | 12(6.0) | | |
| Marital status | Married | 150(73.4) | 40(19.6) | 3.51 | 0.319 | 173(84.7) | 17(8.3) | 37.3 | **<0.001** |
| | Others (single, Widowed/separated /Co-habitant) | 12(6) | 2(1) | | | 8(4) | 6(3) | | |
| Occupation | Government employee | 69(33.8) | 19(9.3) | 0.46 | 0.795 | 83(40.7) | 5(2.5) | 42.7 | **<0.001** |
| | Merchant | 34(16.7) | 10(4.9) | | | 27(13.2) | 17(8.3) | | |

| Variables | Categories | Alcohol | | | | Others | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | No | Yes | $x^2$ | *P* | No | Yes | $x^2$ | *p* |
| | | N (%) | N (%) | | | N (%) | N (%) | | |
| | Housewife | 59(28.9) | 13(6.4) | | | 71(34.8) | 1(0.5) | | |
| Religion | Orthodox | 54(26.5) | 38(18.6) | 49.6 | **<0.001** | 91(44.6) | 1(0.5) | 20.4 | **<0.001** |
| | Muslim | 57(27.9) | 0 | | | 45(22.1) | 12(6.0) | | |
| | Protestant | 40(19.6) | 0 | | | 31(15.2) | 9(4.5) | | |
| | Other religion | 11(5.4) | 4(2) | | | 14(6.9) | 1(0.5) | | |
| Weight gained during the current pregnancy | <10 kg | 107(52.7) | 19(9.4) | 6.37 | **0.012** | 103(50.7) | 23(11.3) | 15.9 | **<0.001** |
| | >10Kg | 54(26.6) | 23(11.3) | | | 77(38) | 0 | | |
| History of abortion | Yes | 15(7.3) | 12(5.9) | 10.8 | **<0.001** | 27(13.2) | 0 | 3.95 | **0.047** |
| | No | 147(72.1) | 30(14.7) | | | 154(75.5) | 23(11.3) | | |
| ANC visit | one Visit | 74(36.3) | 19(9.3) | 8.07 | **0.045** | 79(38.7) | 14(6.9) | 6.55 | 0.088 |
| | Two visits | 58(28.4) | 13(6.4) | | | 62(30.4) | 9(4.4) | | |
| | Three visits | 17(8.3) | 10(4.9) | | | 27(13.2) | 0 | | |
| | Four visits | 13(6.4) | 0 | | | 13(6.4) | 0 | | |
| Type of health facility | Public | 132(64.7) | 35(17.2) | 0.077 | 0.781 | 150(73.5) | 17(8.4) | 1.1 | 0.294 |
| | Privet | 30(14.7) | 7(3.4) | | | 31(15.2) | 6(2.9) | | |

| Variables | Categories | Alcohol | | | | Others | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | No | Yes | $x^2$ | *P* | No | Yes | $x^2$ | *p* |
| | | N (%) | N (%) | | | N (%) | N (%) | | |
| Type of pregnancy | planed | 137(67.1) | 42(20.6) | 7.39 | **0.007** | 159(77.9) | 20(9.8) | 0.015 | 0.903 |
| | Unplanned | 25(12.3) | 0 | | | 22(10.8) | 3(1.5) | | |
| Number of pregnancy | Prim gravida | 88(43.1) | 1(0.5) | 36.6 | **<0.001** | 69(33.8) | 20(9.8) | 19.8 | **<0.001** |
| | Multi gravida | 74(36.3) | 41(20.1) | | | 112(54.9) | 3(1.5) | | |
| Gestational hypertension | Yes | 34(16.7) | 10(4.9) | 0.157 | 0.692 | 44(21.6) | 0 | 7.13 | 0.008 |
| | No | 128(62.7) | 32(15.7) | | | 137(67.1) | 23(11.3) | | |
| Sex of infant | Male | 70(34.3) | 8(3.9) | 8.25 | **0.004** | 72(35.3) | 6(2.9) | 1.62 | 0.203 |
| | Female | 92(45.1) | 34(16.7) | | | 109(53.4) | 17(8.4) | | |

**Table 5. Association between general characteristics and any substance use (smoking, khat chewing, Alcohol, or others like shisha) behavior of women who gave LBW birth at Mahatma Gandhi Hospital & Kadisco Hospital in Addis Ababa Ethiopia, 2021 (n=204)**

| Variables | Categories | One or more kinds of substance use(smoking, khat chewing, alcohol, or shisha) | | $x^2$ | *p* |
|---|---|---|---|---|---|
| | | No | Yes | | |
| | | N (%) | N (%) | | |
| Age (Years) | 15-24 | 9(4.4) | 13(6.4) | 11.7 | **0.003** |
| | 25-30 | 63(31.0) | 26(12.8) | | |
| | >30 | 45(22.2) | 47(23.2) | | |
| Educational status | No education | 15(7.4) | 1(0.5) | 14.8 | **0.002** |
| | Primary level | 19(9.4) | 25(12.3) | | |
| | Middle level | 28(13.8) | 13(6.4) | | |
| | High-level or over | 55(27.1) | 47(23.2) | | |
| Marital status | Married | 115(56.7) | 75(36.9) | 10.2 | **0.001** |
| | Others (single, Widowed/separated/ Co-habitant) | 2(1.0) | 11(5.4) | | |
| Occupation | Government employee | 52(25.6) | 35(17.2) | 14.3 | **<0.001** |
| | Merchant | 15(7.4) | 29(14.3) | | |
| | Housewife | 50(24.6) | 22(10.8) | | |
| Religion | Orthodox | 46(22.7) | 46(22.7) | 11 | **0.012** |
| | Muslim | 29(14.3) | 27(13.3) | | |
| | Protestant | 31(15.3) | 9(4.4) | | |
| | Other religions | 11(5.4) | 4(2.0) | | |

| Variables | Categories | One or more kinds of substance use (smoking, Khat chewing, Alcohol, or shisha) | | $x^2$ | *p* |
|---|---|---|---|---|---|
| | | No | Yes | | |
| | | N (%) | N (%) | | |
| Weight gained during the current pregnancy | <10 kg | 68(33.7) | 58(28.7) | 1.64 | **0.201** |
| | >10Kg | 48(23.8) | 28(13.9) | | |
| History of abortion | Yes | 12(5.9) | 15(7.4) | 2.22 | **0.136** |
| | No | 105(51.7) | 71(35.0) | | |
| ANC visit | one Visit | 52(25.6) | 41(20.2) | 5.71 | 0.127 |
| | Two visits | 45(22.2) | 26(12.8) | | |
| | Three visits | 11(5.4) | 16(7.9) | | |
| | Four visits | 9(4.4) | 3(1.5) | | |
| Type of health facility | Public | 95(46.8) | 71(35.0) | 0.0617 | 0.804 |
| | Privet | 22(10.8) | 15(7.4) | | |
| Type of pregnancy | planed | 107(52.7) | 71(35.0) | 3.63 | 0.057 |
| | Unplanned | 10(4.9)0 | 15(7.4) | | |
| Number of pregnancies | Prim gravida | 54(26.6) | 34(16.7) | 0.884 | 0.347 |
| | Multi gravida | 63(31.0) | 52(25.6) | | |
| Gestational hypertension | Yes | 34(16.7) | 10(4.9) | 8.87 | **0.003** |
| | No | 83(40.9) | 76(37.4) | | |

A binomial logistic regression analysis was performed to identify significant variables associated with substance use and low birth weight. The binary logistic regression result revealed that those with higher socio-demographic variables such as high academic levels (OR:32.2, 95%CI=4.01-262.230 p=0.001) are more likely to smoke cigarettes than the uneducated. Regarding the religion of low birth weight mothers (OR:6.55,95%CI=1.21-33.45,p=0.024), Muslims are more likely associated with cigarette smoking than other religions. Obstetric variables such as the history of abortion are also more likely associated with cigarette smoking (OR:3.8,95% CI=1.16-12.10,p=0.024). The type of pregnancy ( planned or unplanned), number of pregnancies, and sex of infant were significantly associated with smoking cigarettes. However, other variables have no association with the dependent variable. Table 6 shows the associated factors of LBW (Table 5). The other substance, khat chewing, also has a significant association with marital status, religion, weight gain during the current pregnancy, and the number of ANC visits more likely associated with khat chewing (OR:10.157,95%CI=2.275-45.34, *p*=0.002) below two ANC visits are more likely associated than three and above ANC visits, and the sex of the infant. Still, other independent variables are insignificant with LBW (Table 5).

**Table 6 Binomial logistic regression analysis results between general characteristics and substance use (Smoking and 'Khat' chewing) behavior of women who gave LBW birth at Mahatma Gandhi Hospital & Kadisco Hospital in Addis Ababa, Ethiopia, 2021 (n=204)**

| Variables | Categories | Smoking (Yes) | | | | Khat chewing (Yes) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | OR | 95% CI | | *P* | OR | 95% CI | | *P* |
| Age (Years) | 15-24 | 2.56 | 0.31 | 21.14 | 0.383 | 0.649 | 0.222 | 1.89 | 0.428 |
| | 25-30 | 2.62 | 0.791 | 8.69 | 0.115 | 1.581 | 0.713 | 3.51 | 0.26 |
| | >30 | **1** | | | | **1** | | | |
| Educational status | Primary level | **1** | | | | **1** | | | |
| | No education | 4.84 | 0.566 | 41.38 | 0.15 | 0.227 | 0.027 | 1.93 | 0.175 |
| | Middle level | 4.41 | 1.118 | 17.38 | **0.034** | 0.182 | 0.021 | 1.54 | 0.182 |
| | High-level or over | 32.9 | 4.051 | 267.23 | **0.001** | 0.424 | 0.052 | 3.47 | 0.424 |
| Marital status | married | 9.91 | 0.421 | 5.341 | 0.993 | 3.825 | 1.21 | 12.08 | **0.022** |
| | Others (single, Widowed/separated/co-habitant) | **1** | | | | **1** | | | |
| Occupation | Government employee | 2.07 | 0.648 | 6.65 | 0.219 | 0.606 | 0.26 | 1.42 | 0.248 |
| | Merchant | 2.62 | 0.531 | 12.65 | 0.236 | 1.157 | 0.38 | 3.52 | 0.798 |

| | | | |
|---|---|---|---|
| | Housewife | **1** | **1** |

| Variables | Categories | Smoking (Yes) | | | | Khat chewing (Yes) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | **OR** | **95% CI** | | ***P*** | **OR** | **95% CI** | | ***P*** |
| Religion | Orthodox | 3.82 | 0.985 | 14.8 | **0.053** | **1** | | | |
| | Muslim | 6.55 | 1.21 | 33.45 | **0.024** | 0.194 | 0.083 | 0.452 | **<0.001** |
| | Protestant | 1.14 | 0.347 | 11.61 | 0.991 | 1.41 | 0.017 | 0.618 | 0.987 |
| | Other religion | **1** | | | | 0.335 | 0.089 | 1.255 | 0.105 |
| Weight gained during the current pregnancy | <10 kg | 1 | | | | **1** | | | |
| | >10kg | 4.31 | 0.946 | 19.7 | 0.059 | **6.21** | **2.10** | 18.36 | **<0.001** |
| History of Abortion | Yes | **1** | | | | **1** | | | |
| | No | 3.8 | 1.16 | 12.1 | **0.024** | 0.562 | 0.141 | 2.23 | 0.413 |
| ANC Visit | One visit | **1** | | | | **1** | | | |
| | Two visits | 0.447 | 0.124 | 1.907 | 0.218 | 10.157 | 2.275 | 45.34 | **0.002** |
| | Three visits | 1.313 | 0.255 | 6.751 | 0.745 | 1.014 | 0.347 | 2.96 | 0.979 |
| | Four visits | 4.37 | 0.091 | 0.861 | 0.993 | 0.402 | 0.095 | 1.71 | 0.217 |

| Variables | Categories | Smoking (Yes) | | | | Khat chewing (Yes) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | OR | 95% CI | | *P* | OR | 95% CI | | *P* |
| Type of health facility | Public | **1** | | | | **1** | | | |
| | Private | 3.786 | 0.451 | 31.821 | 0.22 | 1.369 | 0.465 | 4.03 | 0.569 |
| Type of pregnancy | Unplanned | **1** | | | | **1** | | | |
| | planed | 7.724 | 1.265 | 47.161 | **0.027** | 4.366 | 1.593 | 11.97 | **0.004** |
| Number of pregnancy | Prim gravida | **1** | | | | **1** | | | |
| | Multi gravida | 0.088 | 0.015 | 0.536 | **0.008** | 1.23 | 0.586 | 2.59 | 0.583 |
| Gestational hypertension | Yes | **1** | | | | **1** | | | |
| | No | 3.07 | 1.14 | 32.15 | 0.991 | 3.13 | 0.76 | 3.27 | 0.986 |
| Sex of infant | Male | **1** | | | | **1** | | | |
| | Female | 12.4 | 2.72 | 56.6 | **0.001** | 4.197 | 1.691 | 10.42 | **0.002** |

Taking Alcohol during pregnancy is significantly associated with age, occupation, weight gained during the current pregnancy, the mother's history of abortion, and the number of pregnancy. Conversely, other substances like shisha are significantly associated with general characteristics of the mother, such as occupation, religion, and marital status, and obstetric conditions like the number of pregnancies are more likely related to low birth weight. Still, the remaining independent variables are not significantly associated with LBW. In general, substances like smoking, khat chewing, alcohol, and shisha used during pregnancy have a significant association with age, educational status, marital status, occupation, ANC visit, and gestational hypertension. (see table 6-8

**Table 7 Binomial logistic regression analysis results between general characteristics and substance use (Alcohol and others) behavior of women who gave LBW birth at Mahatma Gandhi Hospital & Kadisco Hospital in Addis Ababa, Ethiopia, 2021 (n=204)**

| Variables | categories | Alcohol (Yes) | | | | Others (Yes) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | OR | 95% CI | | *P* | OR | 95% CI | | *P* |
| Age (Years) | 15-24 | 0.851 | 0.3 | 2.41 | 0.761 | 0.868 | 0.092 | 8.163 | 0.902 |
| | 25-30 | 3.414 | 1.507 | 7.74 | **0.003** | 1.726 | 0.443 | 6.727 | 0.432 |
| | >30 | **1** | | | | **1** | | | |
| Educational status | Primary level | **1** | | | | **1** | | | |
| | No education | 1.22 | 0.191 | 2.614 | 0.986 | 4.5 | 0.003 | 1.35 | 0.995 |
| | Middle level | 0.775 | 0.267 | 2.25 | 0.639 | 0.474 | 0.11 | 2.03 | 0.315 |
| | High-level or over | 0.752 | 0.295 | 2.95 | 0.55 | 0.592 | 0.15 | 2.34 | 0.455 |
| Marital status | Married | 0.625 | 0.134 | 2.91 | 0.549 | 7.63 | 2.369 | 24.59 | **<0.001** |
| | Others (single, Widowed/separated/Co-habitant) | **1** | | | | **1** | | | |
| Occupation | Government employee | **1** | | | | **1** | | | |
| | Merchant | 1.313 | 0.449 | 3.84 | 0.618 | 0.026 | 0.005 | 0.122 | **<0.001** |
| | Housewife | 2.592 | 1.048 | 6.41 | **0.039** | 3.51 | 0.339 | 36.249 | 0.292 |

| Variables | categories | Alcohol (Yes) | | | | Others (Yes) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | OR | 95% CI | | *P* | OR | 95% CI | | *P* |
| Religion | Orthodox | 0.56 | 0.157 | 1.99 | 0.37 | **1** | | | |
| | Muslim | 1.44 | 0.062 | 3.816 | 0.989 | 0.015 | 0.001 | 0.156 | **<0.001** |
| | Protestant | 1.53 | 0.143 | 2.537 | 0.991 | 0.025 | 0.002 | 0.269 | **0.002** |
| | other Religion | **1** | | | | 0.007 | 2.91 | 0.198 | **0.003** |
| Weight gained during the current pregnancy | <10 kg | **1** | | | | **1** | | | |
| | >10Kg | 0.378 | 0.183 | 0.777 | **0.008** | 7.68 | 0.493 | 6.107 | 0.988 |
| History of Abortion | Yes | **1** | | | | **1** | | | |
| | No | 4.684 | 1.909 | 11.493 | **<0.001** | 5.49 | 0.391 | 4.805 | 0.989 |
| ANC visit | One visit | **1** | | | | **1** | | | |
| | Two visits | 1.15 | 0.524 | 2.52 | 0.727 | 0.997 | 0.399 | 2.49 | 0.994 |
| | Three visits | 0.439 | 0.173 | 1.11 | 0.083 | 3.12 | 0.261 | 1.026 | 0.993 |
| | Four visits | 1.1 | 0.461 | 2.331 | 0.988 | 5.7 | 0.492 | 2.109 | 0.995 |

| Variables | categories | Alcohol (Yes) | | | | Others (Yes) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | OR | 95% CI | | *P* | OR | 95% CI | | *P* |
| Type of Health facility | Public | **1** | | | | **1** | | | |
| | Privet | 1.128 | 0.45 | 2.83 | 0.797 | 0.645 | 0.229 | 1.82 | 0.407 |
| Type of Pregnancy | planed | 7.6 | 0.749 | 3.75 | 0.988 | 1.08 | 0.2195 | 24.5 | 0.903 |
| | Unplanned | **1** | | | | **1** | | | |
| number of pregnancy | Prim gravida | **1** | | | | **1** | | | |
| | Multi gravida | 0.024 | 0.003 | 0.18 | **<0.001** | 10.82 | 3.1 | 37.77 | **<0.001** |
| Gestational Hypertension | Yes | **1** | | | | **1** | | | |
| | No | 1.055 | 0.464 | 2.4 | 0.899 | 5.15 | 1.517 | 8.385 | 0.986 |
| Sex of infant | Male | **1** | | | | **1** | | | |
| | Female | 0.311 | 0.135 | 0.714 | 0.006 | 0.534 | 0.201 | 1.42 | 0.209 |

*Table 8* ***Binomial logistic regression analysis results between general characteristics and one or more substance use (smoking, Khat chewing, Alcohol or others) behavior of women who gave LBW birth at Mahatma Gandhi Hospital & Kadisco Hospital in Addis Ababa, Ethiopia, 2021 (n=204)***

| Variables | Categories | one or more kinds of substance use(smoking, Khat chewing, Alcohol, or shisha) (Yes) | | | |
|---|---|---|---|---|---|
| | | **OR** | **95% CI** | | ***P*** |
| Age (Years) | 15-24 | 0.723 | 0.282 | 1.86 | 0.5 |
| | 25-30 | 2.531 | 1.371 | 4.67 | **0.003** |
| | >30 | **1** | | | |
| Educational Status | Primary level | **1** | | | |
| | No education | 6.964 | 0.829 | 0.829 | 0.074 |
| | Middle level | 0.353 | 0.145 | 0.145 | **0.021** |
| | High-level or over | 0.543 | 0.253 | 0.253 | 0.118 |
| Marital Status | Married | 8.433 | 1.818 | 39.121 | **0.006** |
| | Others (single, Widowed/separated/ Co-habitant) | **1** | | | |
| Occupation | Government Employee | 0.654 | 0.338 | 1.263 | 0.207 |
| | Merchant | 0.228 | 0.102 | 0.507 | **<0.001** |
| | Housewife | 1 | | | |
| Religion | Orthodox | 0.364 | 0.108 | 1.23 | 0.103 |
| | Muslim | 0.391 | 0.111 | 1.38 | 0.143 |
| | Protestant | 1.253 | 0.32 | 4.9 | 0.746 |
| | Other Religion | **1** | | | |
| weight Gained during the current pregnancy | <10 kg | **1** | | | |
| | >10Kg | 1.46 | 0.816 | 2.62 | 0.202 |

| Variables | Categories | one or more kinds of substance use (smoking, Khat chewing, Alcohol, or shisha) (Yes) | | | |
|---|---|---|---|---|---|
| | | OR | 95% CI | | *P* |
| History of Abortion | Yes | **1** | | | |
| | No | 1.849 | 0.817 | 4.18 | 0.14 |
| ANC Visit | Two visit | **1** | | | |
| | One visit | 0.733 | 0.389 | 1.38 | 0.336 |
| | Three visit | 0.397 | 0.16 | 0.984 | **0.046** |
| | Four visit | 1.733 | 0.43 | 6.98 | 0.439 |
| Type of Health facility | Public | **1** | | | |
| | Privet | 1.1 | 0.531 | 2.26 | 0.804 |
| Type of Pregnancy | Unplanned | **1** | | | |
| | Planed | 2.261 | 0.962 | 5.31 | 0.061 |
| number of pregnancy | Prim gravida | **1** | | | |
| | Multi gravida | 0.763 | 0.434 | 1.34 | 0.347 |
| Gestational Hypertension | Yes | 3.11 | 1.44 | 6.73 | **0.004** |
| | No | **1** | | | |
| Sex of infant | Male | **1** | | | |
| | Female | 0.77 | 0.433 | 1.37 | 0.374 |

# 5. Discussion

According to the finding of this study, the total percentage of substance use among pregnant women in this study was 42.4%; 7.4% of the study participants smoked cigarettes, 17.6% chewed khat, 20.6% consumed alcohol, and 11.3% used shisha.

Age, educational level, marital status, occupation, history of abortion, ANC visits, number of pregnancies, and weight gain during pregnancy were statistically significant factors positively associated with substance use.

This finding is higher than in other studies conducted in the eastern part of Ethiopia, where it was 26.5% (*Fetene et al., 2021)* and in Jimma, where it was 37.9% (*Tesso et al., 2017)*. However, the results of this study was lower than that of the studies conducted in the southern part of Ethiopia in the Butajira area, where 60.1% of the population was exposed to substance use (*Alamneh et al., 2020)*. The difference is that the present study included shisha, Khat, tobacco, and alcohol use, whereas the Butajira study included caffeinated drinks in addition to khat, tobacco, and alcohol use. Furthermore, the difference in sample size, measurement methods, community social and cultural practices, and geographical location of the study subjects have played a role in the variation. These findings highlight the importance of controlling for associated risk factors in analyses of drug use in pregnancy.

This study's estimation of tobacco smoking is 7.4%, consistent with previous Ethiopian studies at Butajira at 9.7% (*Alamneh et al., 2020)*. However, we found a higher percentage than that found in Jimma at 1 % (*Tesso et al., 2017)*. The study conducted in the eastern part of Ethiopia shows 2.4% *(Fetene et al., 2021),* and the Jakarta community in Indonesia is 3.4% *(Phowira, Elvina, Wiguna, Wahyudi, & Medise, 2020).* This inconsistency may be due to differences in the study period, sample size, and socio-demographic characteristics of the study population.

In this study, the prevalence of alcohol consumption in the study area was 20.65, which was lower than the 54.5% found in the exact location in Addis Ababa *(Dendir & Deyessa, 2017).* However, it was higher than the results of a study conducted in Jimma, which was at 11.3% *(Tesso et al., 2017)* and Butajira at 10.0*% (Alamneh et al., 2020).* The variation in prevalence could be explained by the differences in alchohol consumption among the population.

This present study estimated the prevalence of khat at 17.6% in various frequencies. The result is consistent with a survey conducted in the country's eastern region 19.6%, which is lower than a study conducted in Addis Ababa 28.6%, and higher than the study conducted in the Oromia region bale zone 12.4% (*Demelash, Motbainor, Nigatu, Gashaw, & Melese, 2015)*. The difference in methodology and study population could explain this disparity.

According to this study, 11.3% of mothers with low birth weight infants use shisha, and this is less than 17.9% found in other Addis Ababa studies *(Dendir & Deyessa, 2017)*. Conversely, a high prevalence compared to this study which is 23.2% of shisha users was found in the Butajira area study *(Alamneh et al., 2020).*

The prevalence of substance use among low birth weight women in this study was far too high. A study conducted in Addis Ababa found that mothers who used a substance during pregnancy had a 20-fold increased risk of low birth weight when compared to non-substance users (95% CI: AOR 20.1;3.94-103*(Dendir & Deyessa, 2017).*

In this study, the variables that showed a significant relation with substance use were maternal Age, marital status, education status, religion, gestational hypertension, and weight gained during pregnancy. Cigarette smoking was significantly associated with educational status among those with higher education and above level compared to those unable to read or write (OR:32.9 95% CI=4.05-262.2) with $p$=0.001, Furthermore, compared to mothers with no weight gained during pregnancy, the odds of khat chewing are six times higher than getting low birth weight than among mothers who gained weight (OR=6.73; 95% CI:2.105-21.51) with $p$=0.001. Regarding religion, Muslims are 6.5 times

more likely to be exposed to khat chewing ( OR=6.55; 95%CI:1.21-33.45) with *p*=0.024 among LBW infant delivered by mother than in other religions. The maternal age 25–30 OR=2.531 (95% CI=1.371-4.670) with *P*=0.003, and gestational hypertension OR= 3.11 (95% CI=1.440-6.730) *P*= 0.004, for one of the substances included in this research were found to be significantly related to substance use and low birth weight.

# 6. Conclusion and Recommendation

## 6.1 Conclusion

Substance use during pregnancy is still a significant public health issue worldwide because it can lead to various adverse neonatal outcomes (Fetene et al., 2021). This study found a high prevalence of substance use among women with low birth weights at public and private hospitals. According to the finding of this study, 42.4% of women used substances (cigarette, Khat, Alcohol, or shisha) ocassionally and on weekly, monthly, or daily bases. The most used substance during pregnancy is alcohol.

Finally, mothers in the young age group with low education, gestational hypertension, and marital status had a higher chance of having LBW infants due to khat chewing practices during pregnancy. Thus, information should be provided on the importance of not using khat or other substances during pregnancy to reduce the prevalence of LBW infants.

## 6.2 Recommendations

The following recommendations were made based on the study's findings:

- Mothers should protect themselves from any substance exposure (cigarette, alcohol, khat, and others) during pregnancy, primarily to their fetuses, as it is one of the preventable risk factors for LBW.
- During ANC visits, healthcare providers should educate pregnant women or women planning to become pregnant, as well as their partners, about the potential risks of substance exposure to the fetus and the teratogenic effects of substance use during pregnancy.
- To get a clear picture of the entire problem, researchers should use a combination of methods, including qualitative aspects.
- The Ministry of Health and the respective regions should also plan and provide updated training for health personnel to increase their capacity to handle the effect and impact of substance use during pregnancy.

## 6.3 Limitations of the study

Some potential risk factors, such as income, height, nutritional status, arm circumference, iron intake during pregnancy, and the pregnant mother's chronic health condition, could not be obtained because secondary data were used.

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