Drug use Pattern and Antenatal Care Utilization Among Pregnant Women in Ethiopia

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Abstract

Background: Taking medications during pregnancy can harm both the mother and fetus. However, avoiding drug utilization is a difficult due chance to occur maternal complications. The irrational use of medicine remains to worsen in developing countries. The main objective of this study was to evaluate the medication use pattern and its determinants among pregnant women in Ethiopia.

Methods: This study used the national representative secondary data obtained from the 2016 Ethiopian Demographic health survey (DHSprogram.com/Data). Simple descriptive statistics were used to present the socio-economic characteristics of the respondents. Bivariate and multivariate regression models were performed consecutively to examine the significant statistical association between medication use and independent variables. Variables $p < 0.25$ during bivariate analysis were further analyzed with a multivariate regression model. A significant statistical association was detected if $p < 0.05$ at 95% confidence interval (CI). The 95% CIs and Odds ratios (OR) were also calculated for significant variables in bivariate regression. Stata/SE 14.2 statistical software was used to analyze the data.

Results: About 10,29 (91.8%) of surveyed pregnant had taken at least one prescription drug. Thus, supplementary drugs were dominant (34% of iron folate). The prevalence of non supplementary drugs such as anthelmintic (15.3%), antibiotics (6%) followed by antimalarial (1.7%) drugs. Less than half 380 (34%) pregnant had received antenatal care (ANC) during their pregnancy. Thus, the majority of 364 (96%) of them received the ANC service at public health sectors. Most pregnant were in the second trimester when they started ANC. Pregnant aged from 35-49 years used drugs less likely by 65% (OR = 0.35, 95% CI = 0.069-1.772) compared to younger pregnant. Poorer mothers were more likely to take medications by 53% (OR=0.47, 95% CI = 0.218-1.628) than middle income. The majority of pregnant were used medication during the second trimester (39.3%) followed by the third trimester (38.5%).

Conclusion: The utilization of ANC was lower among pregnant women. Hence, increasing the coverage and utilization of ANC services is needed to improve the consumption of supplements and other preventive chemotherapy. Likewise, to expand the ANC service channel is important to monitor the irrational drug use of pregnant.

Introduction

Drug utilization during pregnancy imposes a challenge in providing healthcare services for pregnant women [1–2]. Taking medications during this period is related to adverse effects for both the mother and fetus [3]. The concern for drug utilization for pregnant women has been given after the teratogenic incidence of thalidomide and diethylstilbestrol in the 1960s and 1971 respectively [4]. The presence of the undesired effects of drugs is a result of the wide range of changes in physiological, pharmacokinetic, and physiological functions of pregnant women [5–7]. Enough information for the danger of all available medicines during pregnancy is not available yet. Even though, several reports from studied drugs are recommended not to take medications during periods of pregnancy, while using some medicines with

caution is allowed. Reports from both developed and undeveloped countries revealed 1.5 to 4.5% of pregnant women had used harmful drugs [8]. Furthermore, about 20% of women purchase at least one contraindicated drug during their pregnancy period [9]. Likewise, minimum of one prescription drug had utilized by around 86% of pregnant [10].

Limited studies in Ethiopia had been also illustrated significant findings regarding the utilization of medications in pregnancy. Thus, studies in Addis Ababa (71%), Bahr Dar (88%), Nekemte (96%), Adigrat (88%), and Harar (85%) of pregnant women had reported a history of medicine use [11–15]. A study in Adama revealed an average of 1.7 ± 6 drugs per encounter [16]. Irrational use of drugs in pregnancy can be worsened in developing countries including Ethiopia. The lack of information, lower educational level, poor health-seeking behavior, and late or not initiation of antenatal care (ANC) are factors from the mother's side [13]. Moreover, lack of updated drug information among healthcare professionals, lack of standard of prescribing guidelines in the country are also additional challenges from the government perspective [13]. ANC during pregnancy could minimize the irrational use of the drug among pregnant women in the context of our country. WHO recommends at least four ANC follow up during pregnancy periods [17], [18]. Health care follows up during pregnancy is key for the mother and child's wellbeing. Ethiopian Government has given attention to antenatal (ANC) of pregnant women. The maternal and child care priorities have been highlighted in the 2015/16 Health Sector Transformation Plan (HSTP) document [17].

There is no enough information on-trend of drug use pattern among pregnant who utilizes ANC service in Ethiopia. This is important to inform policymaker in improving the effectiveness of maternal health care. Hence, to know the protectiveness of ANC for irrational drug use in pregnancy needed to be assessed at a national level.

Methods

Data source

The data analyzed by a recent study was obtained from the 2016 EDHS ([DHSprogram.com/Data](https://dhsprogram.com/Data)) conducted by the Ethiopian Central Statistical Agency (ECSA). EDHS 2016 is a nationally representative survey to provide updated information on demographic and health characteristics of households in the country [19]. The standard questionnaire has consisted of five main streams illustrated as households, women's health, men's health, biomarkers, and health facilities. The sampling design of the survey has two levels of strata (urban and rural areas), and samples were selected in two stages. In total, 15,683 women were interviewed. Further detailed information concerning maternal health and household characteristics was described in the 2016 EDHS report [19]. The dataset was obtained after permission from ICF international's DHS program office in Rockville, USA.

Study variables

Dependent variable

The main objective of this study was to evaluate the medication use pattern and associated factors among pregnant women in Ethiopia. According to the current study context, a drug utilization pattern is defined as taking medications and vaccines for any medical condition or the prevention of any disease during the pregnancy period. The national DHS 2016 survey has asked pregnant women about the category of drug used during pregnancy, the source, and the reason to use. The source of medication is also defined as the area of the health facility where the drug was obtained or purchased.

Independent variables

Socio-economic characteristics such as age, marital status, educational level, employment status, wealth level, area of residence was identified as independent variables. Moreover, pregnancy status such as gravidity, last birth, plan of pregnancy were also independent variables in this study. The DHS 2016 survey category was used for each variable. Likewise, utilizing ANC was added as an additional independent variable since receiving antenatal care services can influence the medication use by pregnant women [13]. Other variables were associated with delivering ANC (health facility, frequency of visits, provider educational status, and pregnancy month of starting ANC) were also considered. ANC providers were classified as “skilled providers” when the service is delivered with doctors, nurse/midwives, health officers, and health extension workers [19].

Statistical analysis

Pregnant women who took medicines during pregnancy were categorized by pharmacological classifications. Socio-economic characteristics of participants were summarized by simple descriptive statistics such as frequency, average, and percentages are presented by tables and figures. Inferential statistics were also used to examine the significant association between medication use and independent variables including antenatal care. First, a bivariate regression analysis model was performed, and then those variables < 0.25 p-value were further analyzed with multivariate analysis. A significant statistical association was stated when the p-value is < 0.05 at a 95% confidence interval (CI). 95% confidence intervals and odds ratios (OR) were also estimated for some selected variables. The obtained data were analyzed using Stata/SE 14.2 statistical software.

Results

Socio-economic characteristics

Around 1,122 pregnant women were pregnant during the EDHS 2016 survey, thus 91% of them were aged from 20 to 49 years (Table 1). The majority (96.6%) of pregnant were married and currently living with their husband. More than half (53.2%) of pregnant were illiterates and 55.2% of them were unemployed. Only 12% had completed secondary and above school. Moreover, nearly 85.8% of pregnant women have resided in a rural area and 65% had middle to poorest income.

Table 1
Selected background characteristics of pregnant
women age 15–49, EDHS 2016

Respondent characteristics	n	(%)
Total sample	1,122	(100)
Age (years)		
15–19	100	(8.9)
20–34	845	(75.3)
35–49	177	(15.8)
Marital status		
Never married	10	(0.9)
Married or living together	1084	(96.6)
Divorced/Separated/Widowed	28	(2.5)
Education level		
No education	597	(53.2)
Primary education	393	(35.0)
Secondary education	93	(8.3)
More than secondary education	39	(3.5)
Employment status		
Unemployed	619	(55.2)
Employed	503	(44.9)
Residence		
Urban	159	(14.2)
Rural	963	(85.8)
Wealth status		
Poorest	254	(22.7)
Poorer	262	(23.3)
Middle	211	(18.8)
Richer	196	(17.5)
Richest	199	(17.8)

Pregnancy status of respondents

The majority of women had conceived as they planned, while nearly 10% of them never accepted the current pregnancy yet (Table 2). Around 67% of pregnant women were in their second and third trimesters. Concerning the history of giving birth, 95% of them had not birthed in the year before the survey. Likewise, about 68% had more than one birth in the last five years.

Table 2
Pregnancy status characteristics of respondent women age 15–49, EDHS 2016

Pregnancy status	n	(%)
Plan of pregnancy		
Needed	789	(70.3)
Accepted later	227	(20.3)
Never accepted	105	(9.4)
Trimester		
First trimester	241	(21.5)
Second trimester	441	(39.3)
Third trimester	441	(39.3)
Births in the past year		
No births	1,085	(95.6)
1	50	(4.4)
2	31	(0.08)
Births in the last five years		
No births	366	(32)
1	501	(44)
2	234	(21)
3	32	(2.8)
4	2	(0.2)

Obstetric utilization characteristics

Of 1,122 pregnant women, less than half 380 (34%) had received antenatal care during their pregnancy period. The majority 364 (95.8%) of them gained their antenatal care at the government health sector, the professional health caregiver had provided for 216 (27.7%) of them (Table 3). Thus, nearly half 199 (48%) of pregnant women were in their third trimester when they first started antenatal care service. However, there was a decrease in the number of pregnant visiting healthcare sectors for antenatal care during third trimester. Concerning the frequency of visits for the antenatal checks, a remarkable number of 350 (85%) of them visited less than six times during their pregnancy period.

Table 3
Antenatal care utilization among pregnant women age 15–49,
Ethiopia DHS 2016

	n	(%)
Receive antenatal care for current pregnancy	380	(34)
Source of antenatal care service		
Government medical sector		
Hospital	21	(1.9)
Health center/station	255	(22.8)
Health post	86	(24.7)
Other public health areas	2	(0.22)
Private medical sector		
Hospital	10	(0.9)
Clinic	13	(1.2)
NGO medical sector	6	(0.5)
Other places	1	(0.05)
Antenatal care provider		
Doctor	37	(4.7)
Health officer	14	(1.8)
Midwife	64	(8.2)
Health extension worker	101	(13)
Traditional attendant	2	(0.3)
Pregnancy trimester ANC		
First	162	(39.4)
Second	199	(48.1)
Third	51	(12.3)
Not remember/don't know	1	(0.3)
Number of antenatal visits		
1–5	350	(85)
NGO: Non-governmental organization; ANC: Antenatal Care		

	n	(%)
6–10	57	(13.8)
11–15	1	(0.2)
Not remember/don't know	4	(1)
NGO: Non-governmental organization; ANC: Antenatal Care		

Drug use during pregnancy

As described in Table 4, about 10,29 (91.8%) of surveyed pregnant reported they had taken at least one prescription drug. Among those pregnant women, 263 (34%) consumed iron folate. More than seven types of pharmacological classes of drugs were prescribed to pregnant women (Fig. 1). Concerning the non-supplementary drugs anthelmintic, antibiotics, and antimalarial drugs were taken by 15.3, 6%, and 1.7% of pregnant women, respectively. Aspirin 0.31% was the only analgesics reported drug by participants. About 362 (46.5%) of pregnant had taken tetanus vaccination, thus nearly 339 (43.5%) of them were taken less than four times. The majority reason to take was fever during pregnancy pregnant.

Table 4
Drug utilization pattern among pregnant women age 15–49, Ethiopia DHS 2016

Drug category	Name	N	%
Antimalarial drugs	IPTp-SP	3	(0.26)
	Chloroquine	1	(0.01)
	Quinine	5	(0.42)
	Combination with artemisinin	6	(0.5)
	Artesunate	2	(0.18)
	Other anti-malarial	3	(0.28)
Antibiotic drugs	Pill/syrup	15	(1)
		48	(4)
	Injection	51	(1)
Analgesics/antiplatelet	Aspirin	4	(0.31)
Antiemetics	Antimotility	1	(0.01)
Supplementary	Iron, zinc	263	(34)
Anthelmintic	N/A	171	(15.3)
Other drugs	Other taken	2	(0.19)
	Other injection (non-antibiotic)	1	(0.04)
Number of tetanus injection	Never received	397	(51)
	1	73	(9.4)
	2	134	(17.3)
	3	131	(16.9)
	4	15	(1.9)
	5	9	(1.1)
	6	1	(0.1)
	Don't know	20	(2.6)
IPTp-SP: Sulfadoxine-Pyrimethamine; N/V: Nausea/vomiting; N/A: Not available/specified			

Associated factors with medication use among pregnant women

Table 5 shows the multivariate logistic regression estimation of factors associated with drug use during pregnancy. Variables such as age, economic status, plan of pregnancy, former childbirth before a year and five years, and the month of pregnancy when first antenatal care was received.

Table 5

Associated factors with medication use among Ethiopian pregnant women aged 15–19 years, EDHS 2016

Respondent characteristics	Drug use during pregnancy		Adjusted OR (95% CI)	p-value
	n	(%)		
Age (years)				
15–19	96	(9.3)	1.00	
20–34	781	(75.9)	0.649 (0.147–2.861)	0.568
35–49	153	(14.8)	0.35 (0.069–1.772)	0.038
Wealth status				
Poorest	234	(23)	1.00	
Poorer	232	(22)	0.63 (0.308–0.941)	0.113
Middle	177	(17)	0.47 (0.218–1.628)	0.003
Richer	190	(18)	2.69 (1.803–1.472)	0.065
Richest	197	(19)	3.75 (5.335–0.928)	0.123
Plan of pregnancy				
Needed	738	(71.7)	1.00	
Accepted later	192	(18.7)	0.458 (0.21-1)	0.001
Never accepted	99	(9.6)	1.257 (0.324–4.876)	0.616
Trimester				
First trimester	229	(22.2)	1.00	
Second trimester	405	(39.3)	0.778 (0.269–2.248)	0.67
Third trimester	396	(38.5)	0.507 (0.172–1.493)	0.069
Births in the past year				
No births	981	(95.3)	1.00	
1	48	(4.7)	6.197 (1.25-30.724)	0.018
2	0	(0)	1.000	0.968
Births in the last five years				
No births	362	(35.1)	1.00	
1	429	(41.6)	0.46 (10.054–3.901)	< 0.000

Respondent characteristics	Drug use during pregnancy		Adjusted OR (95% CI)	p-value
	n	(%)		
2	207	(20.1)	0.612 (0.065–5.786)	< 0.000
3	30	(2.9)	1.000	0.211
4	2	(0.2)	1.000	0.635
Government medical sector				
Hospital	21	(5.7)	1.000	
Health center/station	257	(70.3)	5.345 (0.252-113.548)	0.641
Health post	85	(23.3)	0.269 (0.0145.299)	0.338
Other public health area	3	(0.7)	1.000	0.949
Antenatal care provider				
skilled provider	394	(99.4)	1.000	0.179
Unskilled provider	2	(0.6)		
Trimester of first ANC				
First	153	(39.4)	1.000	
Second	184	(47.3)	0.066 (0.005–0.892)	0.015
Third	51	(13.1)	1.000	0.663
Not remember/don't know	1	(0.3)		
Number of antenatal visits				
1–5	328	(84.0)	1.000	
6–10	57	(14.7)	3.244 (0.189–55.566)	0.543
11–15	1	(0.1)	1.000	0.834
Not remember/don't know	4	(1.1)	1.000	0.658

Pregnant with age group of 35–49 years old used drugs less likely by 65% when compared to 15 to 19 years old (OR = 0.35 and 95% CI = 0.069–1.772). The lowest income pregnant women were more likely to use drugs during their pregnancy period by 53% than middle income pregnant (OR = 0.47 and 95% CI = 0.218–1.628). Concerning the readiness of pregnancy, during the occurrence of unintended pregnancy; women utilize drug less likely by 54% than the planned pregnancy (OR = 0.458 and 95% CI = 0.21-1.000). Even though a significant association was not observed in the trimester of pregnancy, a remarkable number 405 (39.3%) and 396 (38.5%) of mothers has been taken medications during the second and

third trimester, respectively. Most (70.3%) of drugs were prescribed from the health center in which almost all (99.6%) of medications were prescribed by skilled providers.

Furthermore, women who gave at least one live birth before a year of the survey, most likely used the drug by 6 times (OR = 6.197 and 95% CI = 1.25-30.724) than no births a past year. Likewise, women who had 2 live births took medications less likely by 39% than no births (OR = 0.612 and 95% CI = 0.065–5.786) in the same year. Concerning the first timing of visiting the first ANC trimester, pregnant at the second trimester used medication less likely by 93% (OR = 0.066 and 95% CI = 0.005–0.892) than first-trimester pregnancy.

Discussion

Our study generated results from the Ethiopian demographic and health survey (EDHS) 2016 dataset. Utilizing the medications during pregnancy is critical since the safety of drug is uncertain nowadays. Avoiding, reducing the use of drugs during pregnancy are essential components in improving the health and welfare of the mother and their children [18]. Utilizing antenatal care has a remarkable advantage in the monitoring of drugs utilizing during the periods of pregnancy.

This study observed that the prevalence of using medication during pregnancy was around 91.8%. Other similar studies were done in Ethiopian cities also supports the recent finding. For instance, the prevalence was 88% in Bahr Dar, Adigrat (88%), and Harar (85%). Similarly, higher in Addis Ababa (71%) and lower than Nekemte (96%). Comparing to other countries the percentage was higher than in the Netherlands [20], 65% in the United Kingdom [21], and 56% in Canada [22]. However, it is lower than 96% in France [22] and 93% in Iceland [23].

The recent study revealed supplementary drugs took the largest proportion; thus, iron folate was mainly (34%) prevalent. Among the non-supplementary drugs, anthelmintic was the commonly prescribed drug. The frequent use of these drugs (supplementary and anthelmintic) might be as they are the component of the antenatal care package. Similarly, antibiotics and antimalarial drugs were taken by 6 and 1.7% of pregnant women. All of the classes of drugs found in this study were included in ANC service components which are recommended by WHO as a supplement or preventive interventions [17]. Generally, it is possible to say that medication consumption is lower. However, the prevalence of utilization of supplements, malarial prevention, and anthelmintic is not enough yet in the country. For instance, “WHO recommends that moderate to high-risk areas for transmission of malaria in Africa, antimalarials such as IPEp-SP should be given to all pregnant during each ANC visits [17].

In Ethiopia, areas were categorized into three levels that around 75% of the country are stratified as unstable and endemic areas for transmissions of malaria [24, 25]. Thus, the ministry of health (MoH) policy specified the chemoprophylaxis with antimalaria during pregnancy. But, the weak implementation perceived with the recent study is also supported by Robert et al [26]. Concerning anthelmintic use, WHO recommends all pregnant should take anthelmintic since the second trimester in endemic areas [17, 18]. In Ethiopia, several studies revealed the high prevalence of helminthic transmission among pregnant; 51%

in Tigray [27], 41% in Oromia [28], 31.5% in Addis Ababa [29]. The present study observed only 15% of pregnant women had taken anthelmintic at the national level. This finding is similar to the 2000 to 2017 DHS survey, that covered 48 Soil-transmitted helminthiasis (STH) endemic countries [30]. Results from this survey showed an average of 23% (16 million) pregnant women were dewormed worldwide. This implies the prevention of parasitic infection was anticipated since Ethiopia has been marked as an endemic country. Enhancing the Antenatal care (ANC) utilization might help to increase the coverage. For instance, an African country Congo has dewormed about 86% of pregnant women using ANC channel, in the same survey year [30].

Pregnant aged from 35 to 45 has been taken medicines less likely when compared to younger pregnant women $P = 0.038$, (OR = 0.35 and 95% CI = 0.069–1.772). This might be attributed to the fact that, older mothers may be less likely to take medications due to being afraid of side effects. The poorest mother had taken medications more likely by 53% (OR = 0.47 and 95% CI = 0.218–1.628) than the middle one. The possible reason might be related to their lower socio-economic status [21]. A lower living standard could expose them to various diseases due to reduced nutrient intake, lack of latrine access and utilization, etc. As a result, the probability of medication prescription might be higher [27]. Furthermore, women who wanted to conceive took medications more likely by 54% (OR = 0.458 and 95% CI = 0.21–1.000) than unintended pregnancy. A possible explanation for this may be, a mother who needed the pregnancy could give more care and attention. Consequently, they most likely utilize antenatal care services in which our analysis shows the most prevalent prescribed drugs were components of ANC services.

Although no significant association was observed with a month of pregnancy, a remarkable number 405 (39.3%) and 396 (38.5%) of pregnant women have been taken at their second and third trimester, respectively. This finding is opposed to other studies done in Ethiopia. Hence, Bedewi et al [15] revealed that almost half of the drugs were prescribed in the first trimester. Likewise, 42% of medication prescribed in the first trimester study done in Adigrat general hospital [11]. Moreover, concerning the first time of visiting the first ANC service, being pregnant in second trimester associated significantly to take medications ($P = 0.015$). This implies the study participants in the present study are less possibly vulnerable to the potential risk of medications. The teratogenic effect of the drug is high in first trimester due to presence of organogenesis in the first three months is expected [31]. The other possible reason for prescription in second trimester is attributed to the WHO recommendation to start preventive chemotherapies such as antimalarial and anthelmintic after the first trimester [17].

Furthermore, the present study revealed women who gave at least one live birth before a year of the survey, were 6 times (OR = 6.197 and 95% CI = 1.25–30.724) more likely to utilize medications than primigravida. This is in agreement with a study in Adigrat [11] and Bahir Dar city [13]. This may be attributed to the high risk of maternal complications since the pregnancy gap is very narrow. Likewise, the current study also observed the women who had 2 live births took medications less likely by 39% than no births (OR = 0.612 and 95% CI = 0.065–5.786) in the same year. Our result illustrates that the utilization of medication during pregnancy is somehow per the WHO ANC service recommendations. However, the antenatal care coverage and utilization policy of Ethiopia needs to be implemented more [32].

Limitation of the study

The study has several limitations. Firstly, the taxological category (US-FDA risk classification) of drugs that specified under the “other types” of the drug is not considered. This is because the data obtained did not list the drug names. Secondly, the overall consumption of medications might be underestimated since the over-the-counter medicines were included not in the survey data. Moreover, the rationale for the prescription of medications for the maternal complications is not considered in our study. This might be a challenge whether the drugs were indicated per needed or not. Lastly, this study measured only the prescription pattern but not the outcome of the chemotherapy. So, the effectiveness of the treatments cannot be estimated in this study.

Conclusion

Supplemental drugs were prescribed commonly to pregnant women. Among non-supplemental drugs, anthelmintic were the majority. These drugs were found to be components of ANC service. Taking medications was significantly associated with respondent characteristics such as age, socio-economic status, plan of pregnancy number of gravidities, and antenatal care utilization. Yet, the prevalence of ANC utilization was lesser among pregnant women. A further detailed investigation is needed to explore the reasons why the utilization is minimal. Furthermore, policymakers should explore further to improve the medication use during pregnancy through the ANC channel.

Abbreviations

ANC: Antenatal Care Service; OR: Odds Ratio; US-FDA: United states Food and Drug Administration; WHO: World Health Organization; DHS: Demographic Health Survey; EDHS: Ethiopian Demographic Health Survey; STH: Soil-Transmitted Helminthiasis; MoH: Ministry of Health, IPEP-SP: Sulfadoxine-Pyrimethamine; NGO: Non-governmental organization; HSTP: Health Sector Transformation Plan, ICF: International Function of function

Declarations

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Authors' contributions

GA, obtained the dataset. GA, WA, and DT did a literature review, and drafted the manuscript. EMA, HG, and DG performed data analysis, reviewed and drafted the manuscript. GA and WA critically drafted and reviewed the manuscript. The manuscript has read and approved by all authors in this study

Competing interests

None

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None

Availability of data and materials

The dataset of the present study is available online in DHS program office site

<https://DHSprogram.com/Data>

Ethics approval and consent to participate

Not Applicable

Consent for publication

Not applicable.

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Figures

Figure 1

Drug category distribution among pregnant women in Ethiopia, EDHS 2016