

Pregnant Women and Medication Use: A Cross-Sectional Study of Knowledge, Perceptions, and Concerns in North Kerala

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ABSTRACT

Background: Physiological changes occurring during pregnancy may influence drug metabolism and thus safe medication use is essential for both mother and child. But awareness and practices of medication use during pregnancy are still variable.

Objective: To evaluate knowledge, attitudes, and practices (KAP) of medication use among pregnant women in North Kerala and determine factors associated with unsafe practices.

Methods: A January-March 2025 cross-sectional survey of 415 pregnant women who received antenatal clinic and community pharmacy visits. Data were obtained by a validated KAP questionnaire and analyzed with SPSS Version 22.0 to examine demographic and clinical variables for associations."

Results: Whereas 46.99% of them were aware of the drugs they took and 69.40% knew the significance of some drugs in pregnancy, just 12.53% knew the hazards of the misuse of drugs. The most used drugs were Antiemetics (75.12%), paracetamol (26.99%), and Antimalarials (26.26%). The shocking fact is that only 29.64% met a healthcare provider prior to use of drugs. Conclusion: There is an urgent need for focused education and increased healthcare participation to decrease risky drug use by pregnant women in rural and lower-educated groups in North Kerala, ultimately enhancing fetal and maternal health outcomes.

Keywords: - Antenatal care, Drug safety, KAP Study, Medication awareness, Maternal health, Pregnancy medication use, Public health awareness.

How to cite this article: Sai Keerthana PC, Nair S, Jabeen L, John F, Hiba F, Aravindhan A, Shery H, Najiya N, Shahla P, Rana P. Pregnant women and medication use: a cross-sectional study of knowledge, perceptions, and concerns in North Kerala. *Int J Drug Deliv Technol.* 2026;16(75s): 488-501. DOI: 10.25258/ijddt.16.75s.56

Source of support: Nil

Conflict of interest: None

1. INTRODUCTION

Pregnancy entails ongoing physiological alterations in the body of a woman to sustain the growing fetus.[1] These alterations have the ability to modify the process of drug absorption, distribution, and transfer across the placenta, thus posing risks to the fetus. Hence, there is a need to evaluate thoroughly the benefits and potential risks of taking medication during pregnancy for both the mother and the fetus.[2]

Recent evidence has shown an appreciable global over the counter and prescription drugs in pregnant women. Drug consumption in pregnancy is frequently unavoidable as a result of illnesses such as diabetes, hypertension, asthma and epilepsy that demand continuous or sporadic management.[3] Drugs are

required for treating pregnancy conditions such as anemia, pre-eclampsia, gestational diabetes, and nausea. Although drug use during pregnancy is frequent and frequently unavoidable, data relating to safety are lacking because pregnant women are excluded from clinical trials.[4] As a result, irrational medication use during pregnancy has the potential to cause harm to the mother as well as the fetus. Therefore, rational use of medication during pregnancy is extremely important from a public health point of view.[5]

Research has indicated that teratogenic medications account for 1% of all congenital birth abnormalities.[6] Though comparatively small in number, fetal safety concerns can prompt pregnant women to abstain from taking drugs, potentially exacerbating maternal and fetal

conditions. On the other hand, inadequate information triggers self-medication and inappropriate use, resulting in negative consequences. The FDA categorizes drug safety during pregnancy from safest (A) to not recommended (X).[7]

A number of studies in various countries—such as Nigeria, Eritrea, Italy, Tanzania, Malaysia, the United States, Serbia, Norway, Saudi Arabia, and India—have evaluated pregnant women's knowledge, attitudes, beliefs, and practices regarding the use of medicines during pregnancy.[8] [9] [10]. Medication safety awareness and practice depend on geography, culture, education level, and access to healthcare. Myths, fear, and dependence on self-medication or traditional remedies, despite increased risk awareness, continue to exist globally. This emphasizes the importance of specific education and improved communication between healthcare professionals and pregnant women. In developing nations, unsafe use of medication is influenced by unsound health-seeking behavior, late antenatal care, low maternal education levels, lack of access to information, poor healthcare infrastructure, and insufficient provider training.[11] A Ugandan study showed that 44% of pregnant women had used at least one unsafe medication, with antibiotics being prescribed more and analgesics being sold as OTC drugs.[12]

Pregnant women with comorbidities and polypharmacy were more likely to take unsafe drugs, which emphasizes the necessity to enhance their KAP on medication safety. In a similar line, 20% of pregnant women consumed herbal drugs were reported by a study in Gulu, Uganda. [13] The study emphasizes raising awareness of safe use of herbs during pregnancy among pregnant women and identifies a deficiency of studies on Uganda's pregnant women's KAP. It evaluates their attitudes, knowledge, practices, and factors that influence them. Appropriate counseling and having positive attitudes will help avoid self-medication and misuse, while physician-monitored drug use avoids birth defects and complications. Results can inform efforts for educating and counseling pregnant women on safe medication. [14] [15]

2. METHODS

2.1 Study Design and Setting

A cross-sectional survey was implemented among pregnant women in northern Kerala for three months, between January and March 2025. The data collection involved both structured interviews and internet-based responses through Google Forms. Participants were pregnant women visiting hospital antenatal clinics as well as those accessing medicines from community pharmacies. The research applied STROBE guidelines to promote methodological transparency and uphold the integrity of the reporting process.

2.2 Participants in the Study

Pregnant women who attended routine check-ups in the antenatal care in north kerala unit within the study period were all included, subject to the fact that they provided both oral and written informed consent. Pregnant women below 18 years of age, labor pain, with life-threatening illnesses, unconscious, or could not respond to oral instructions were not included in the study.

2.3 Ethical Considerations

The protocol of the study, survey questionnaire, and informed consent processes were approved by the Institutional Ethics Committee (IEC) as per letter no: KAS:ADM: IEC:06H:24. Participants were clearly explained the purpose and procedures of the study. Participants gave voluntary oral and written consent. Participants were explained their right to withdraw at any stage during the study. Steps were taken to provide anonymity, confidentiality, and to reduce any possible harm. The study was done in accordance with the Declaration of Helsinki (1975) ethical standards for human subject research.

2.4 Sample Size Estimation and Sampling Method

The sample size was determined with a single population proportion formula, estimating 50% safe medication use awareness during pregnancy, at a 5% margin of error, 80% power, and 1% design effect, yielding 384 participants. Allowing for a 5% non-response rate, the total sample size was 404. Convenience sampling was employed to draw eligible participants. Although this non-random technique can create bias and restrict generalizability, it allowed timely recruitment and attainment of the desired sample size within resource-constrained contexts.

2.5 Survey Tool Development and Validation

A systematic review of literature regarding medication use in pregnancy was carried out through PubMed, Medline, and Google Scholar. Ten main studies informed the survey question preparation, mainly based on general hospital recommendations. The first draft of the questionnaire was tested by a panel of faculty, clinical pharmacists, and hospital physicians including pediatricians, obstetricians, and gynecologists. The final instrument consisted of 8 knowledge, 10 attitude, and 6 practice questions. Expert judgment provided satisfactory content validity indexes (CVI) of 0.95, 0.83, and 0.89 for knowledge, attitude, and practice, respectively. Pilot testing among 30 pregnant women was highly reliable with Cronbach's alpha of 0.88, 0.91, and 0.89, establishing the tool's reliability.

2.6 Survey Tool

The instrument of the survey was composed of four sections:

- (1) demographic, obstetric, and medical profiles;

- (2) knowledge about medication use during pregnancy;
- (3) attitude about the use of medication during pregnancy; and
- (4) practice of medication use during pregnancy.

2.7 Demographics, Obstetrics, and Medical Profile

The demographic section collected data on age, education, residence, occupation, and contact details, whereas obstetric data comprised gestational age, gravida, ANC visits, and pregnancy risk category. Medical data comprised prior conditions, medication use in previous pregnancies, and current prescribed and OTC medications. ANC visits were categorized as regular if they complied with WHO recommendations, and pregnancy risk levels were identified on the basis of medical records.

2.8. Awareness of Medication Use During Pregnancy

Eight yes/no items evaluated knowledge of safe medication use during pregnancy regarding drug names, indications, safety, periods of fetal risk, effects of illicit drugs, and management of chronic conditions. All correct answers received 1 and wrong 0, and the total scores ranged 0–8. Those with scores >4 ($>50\%$) were categorized as having adequate knowledge and ≤ 4 ($\leq 50\%$) as inadequate.

2.9 Attitude Towards Drug Use During Pregnancy

The attitude scale assessed pregnant women's perceptions of medication use with 10 items using a 3-point Likert scale (Disagree=3, Uncertain=2, Agree=1). Four items were reverse-scored to minimize bias. The total scores were from 10 to 30, and ≥ 15 was defined as a positive attitude and <15 as a negative attitude toward safe medication use in pregnancy.

2.10 Medication use practice during pregnancy

The practice component evaluated safe medication use using six questions related to consulting doctors, reading medicine leaflets, attending regular follow-ups, asking about medication safety, and using evidence-based information. One point for every correct answer (0–6 total). Individuals scoring 6 were categorized under practicing rational use of medications and those under 6 represented irrational use.

2.11 Data Collection

Eligible pregnant women were made aware of the study's purpose, design, and anticipated outcomes prior to consent. Out of 453 approached at the ANC outpatient department, 20 declined and 18 were not available, yielding 415 face-to-face interviews for 15–20 minutes each. Data were gathered using a validated KAP survey via interviews, review of medical records, and Google Forms. Quality checks for data accuracy occurred daily on-site, and incomplete records were not analyzed.

2.12 Data Analysis

Respondent data were cleaned and organized in Excel then processed using IBM SPSS version 22.0. Descriptive statistics provided socio-demographic, obstetric, clinical, medication use, and KAP profiles. Binary and multiple logistic regression examined associations between independent (socio-demographic, obstetric, clinical, medication use) and dependent variables (KAP). Variables with $p < 0.20$ in binary were used in multiple regression to determine significant predictors.[17] Less than 0.05 p-value in the two-way analysis was employed as statistically significant.

3. RESULTS

415 pregnant women with an age range of 27.51 ± 5.15 years participated in the study. The majority (66.99%) were between 26 and 35 years old, followed by ≤ 25 years (14.46%) and >35 years (18.55%). The levels of education were 39.52% undergraduates, 33.73% postgraduates, 25.06% higher secondary, and 1.68% no formal education.

The majority of participants resided in villages (62.17%) compared to urban areas (37.83%). Homemakers accounted for 68.17%, non-medical professionals 26.02%, and medical workers 5.78%.

Obstetrically, 48.91% were second trimester, 32.29% first, and 18.79% third. Average gravida was 1.84 ± 0.66 , where 53.97% were in their second pregnancy. Only 24.82% received regular antenatal visits, whereas 75.18% received irregular care. 13.97% were high-risk pregnancies, and 10.84% had a history of miscarriage or stillbirth. On recent history of health, 6.26% experienced health conditions, and 5.54% experienced a medical condition within the last year. Also, 15.42% went to a general practitioner. During the last pregnancy, 68.91% took medication, but 31.08% did not. In the current pregnancy, 28.43% were ill that needed treatment. Participants consumed 1.85 ± 1.32 drugs on average; 32.77% consumed three or more drugs, 32.01% consumed two, 11.32% consumed one, and 23.85% consumed none. OTC drugs were consumed by 28.43%, whereas 71.57% did not consume OTC drugs. (Table 1)

The most prevalent medical condition was urinary tract infection (71.57%), followed by asthma (14.69%), limb paralysis (6.75%), hypertension (2.17%), anemia (1.20%), and others such as dermatomycosis, pharyngitis, and epistaxis. Less common were diabetes, tuberculosis, and typhoid. Remarkably, 1.34% had no illness during pregnancy. Antiemetics were most prescribed medication (75.12%), followed by paracetamol (26.99%), antimalarials (26.26%), bronchodilators (22.17%), antibiotics (11.56%), iron and folic acid (23.85%), antitubercular drugs (10.36%), and NSAIDs (1.44%). Only 3.37% received no medication. (Table 2)

In the area of knowledge, 46.99% were aware of their drug names and 67.71% knew their indications. Approximately 46.5% were aware some drugs are not safe during pregnancy, while 69.4% were aware some drugs are significant. Less than half (47%) were familiar with critical times in which drugs impact fetal development. Only 12.53% were aware of the danger of unwanted drugs, 56.4% knew treatments for chronic conditions must be adjusted, and 28.2% was accurate in identifying contraindicated drugs in spite of condition. (Table 3)

29.64% consulted a doctor or pharmacist before using medication, and 79.04% routinely read drug leaflets. A majority (84.58%) had regular pregnancy check-ups, with more than 90% inquiring about medication purpose and safety when prescribing and dispensing. A further 69.16% sought out medication information themselves.

Regarding attitudes, 46.51% believed all drugs harm mother and fetus, 34.46% disagreed, and 19.04% were neutral. About 26.75% thought stopping medication benefits fetal health, 38.31% disagreed, and 34.94% were unsure. Notably, 64.10% felt pregnant women tolerate medications better, and 46.99% agreed untreated illnesses harm fetal development.

On safety beliefs, 74.22% perceived natural remedies as safe, 59.04% believed in vitamins and supplements, 17.59% perceived topical preparations to be safe, and 56.38% did not know. Also, 66.99% were in favor of avoiding unnecessary OTC medication, and 46.51% thought pregnant women should inform doctors about medication use. (table 4 and 5)

4. DISCUSSION

The research documented a mixed educational background, where 39.52% were undergraduates and 33.73% postgraduates, while another study documented 49.9% university-educated and 46.8% secondary-educated. While 62.17% of the subjects in this study were from rural backgrounds and 68.17% were homemakers, the second study noted 93.1% urban and 68.2% working, which could suggest variations in access to healthcare and health literacy (2). A majority of the women (53.97%) were in their second pregnancy with a mean gravida of 1.84 (SD $\pm$ 0.66). A mere 24.82% had routine antenatal visits, reflecting gaps in regular follow-ups. Also, 13.97% of them had high-risk pregnancy, highlighting the importance of focused interventions.

The main clinical conditions identified in the study included urinary tract infections (71.57%), asthma (14.69%), and paralysis of limbs (6.75%), and antiemetics (75.12%) as the most prescribed medication, followed by paracetamol (26.99%) and antimalarials (26.26%). In British Columbia, amoxicillin and doxylamine-pyridoxine were the most commonly dispensed drugs

during pregnancy, primarily for UTIs and nausea. Although the present study reported a decrease in drug use following the first trimester, other studies revealed variable trimester-specific trends that mirrored local prescribing patterns and differential responses to pregnancy-related ailments. Self-medication during pregnancy is a risk factor of high concern in many countries with prevalence rates of 74.1% in Ghana, 31.0% in Nigeria, 11.7% in Indonesia, and 33.92% in Ethiopia.[7] [18] [19] Though endangering maternal and fetal well-being, 29.6% of women saw health professionals prior to drug use, indicating unsafe behaviors. In Indonesia, awareness about OTC drugs promoted self-medication (aOR=2.15), while awareness of risks lowered it among educated women (aOR=0.17). Though 46.5% were aware of medication risks, 28.4% also used OTC medications. The usual risk factors are low educational status, never married, first-trimester pregnancy, current illness, and history of self-medication. [20] These observations emphasize the necessity for tighter OTC control, focused education, and available antenatal care to encourage safer use of medicines by pregnant women.

Use of drugs during pregnancy is frequently restricted by safety factors, and some agents are teratogenic. In Riyadh, medications were taken by 44.7% of pregnant women, but 58% did not have guidance by a physician and 65.7% did not have guidance by a pharmacist. Although the majority were aware of the reason for medication, only 46.99% were aware of the specific drugs and 46.5% were aware of the risks involved. Likewise, this study revealed that 67.7% were aware of the reason, but fewer knew about the specific drugs and their risks. These results reflect the necessity of better education and consistent information provided by healthcare workers.[21]

A study conducted in Dhaka, Bangladesh, revealed that 70% of pregnant women used herbal preparations, mostly for the common cold and nausea, and 8.8% experienced side effects. [22] In this research, it was discovered that although 91.8% of pregnant women inquired about the safety of drugs, only 29.6% sought advice from healthcare practitioners prior to usage, thus indicating a wide knowledge-practice gap. This suggests that special education targeting misconceptions regarding the safety of herbal products is imperative. Attitudes also reflect mixed views. Most women (64.1%) think that pregnant women can tolerate medicines to a greater extent than non-pregnant women, but at the same time, there is a general feeling that natural medicines are safer (74.22%). Nevertheless, 46.51% of the respondents believe all medicines are dangerous for the fetus, which can be a cause for not consulting professional people about medication during pregnancy.

The studies reveal that residence in an urban area and higher educational levels, especially postgraduate education, are associated with better medication knowledge, albeit this is not always expressed as safer practice. Female physicians had greater awareness, indicating an impact of medical education. Likewise, the Indian research found gaps in medication knowledge across younger, lower-educated, jobless, and rural women to be a cause for targeted education.[16]

Premature use of medication in pregnancy is reduced by regular antenatal visits, yet the Saudi study reveals that most women trust medication leaflets more than healthcare professionals, underlining a gap in education. The two studies emphasize the need for targeted education among less educated, rural women and those without routine antenatal care. Health professionals must fill knowledge gaps, promote pre-consultation before medication is taken, and allay myths about natural remedies. More research is necessary to aid safer medication use in pregnancy.

5. STRENGTH AND LIMITATIONS

The strengths of this study are extensive data collection through interviews and Google Forms, survey tools validated by experts, ethical and STROBE guidelines compliance, correct sample size calculation, and sound statistical analysis. The limitations are the possible convenience sampling bias, usage of self-reported data with the risk of recall and social desirability bias, inability to infer causality given its cross-sectional nature, geographical limitation to the northern part of Kerala, hence non-generalizability, and absence of long-term follow-up.

6. CONCLUSION

This research uncovers widespread gaps in knowledge regarding the use of medications during pregnancy among women from northern Kerala. Even with the common use of prescriptions and OTC medicines, women are not aware of the names of medications, their purposes, or dangers. The evidence necessitates focused education among rural, poorly educated women and those with irregular antenatal care. Enhanced availability of healthcare, promoting consultation with health providers, and dispelling myths regarding natural medicines are essential for safer drug use. The research highlights the critical role of healthcare providers and calls for additional research to be done on long-term medication safety interventions during pregnancy.

7. ACKNOWLEDGEMENT

We appreciate the Hospital Administration in making participant recruitment possible and express our appreciation to the pregnant women for their willingness to share their experience of using medication. There is no specific funding for this study.

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Table 1

List of Abbreviations

Abbreviations	Full forms
KAP	Knowledge, attitude and practice
FDA	Food and Drug Administration
ANC	Antenatal care
STROBE	Strengthening the Reporting of Observational Studies in Epidemiology

IEC	Institutional ethics committee
CVI	Content validity index
OTC	Over-the-counter
NSAID	Non steroidal anti inflammatory drugs

Clinical, demographics, obstetrics, and medication use characteristics of the study participants ($n = 415$)

Variable	Frequency (%)
Age in years (mean $\pm$ SD)	26.51 $\pm$ 5.15
≤ 25	60 (14.46)
26–35	278 (66.99)
> 35	77 (18.55)
Education level	
No formal education	7 (1.68)
HSC	104 (25.06)
Under graduate	164 (39.52)
Post graduate	140 (33.73)
Residence	
Village	258 (62.17)
Metropolitan	157 (37.83)
Occupation	
Home maker	283 (68.17)
Medical field	24 (5.78)
Others	108 (26.02)
Current trimester	
- 3 months	134 (32.29)
4 – 6 months	203 (48.91)
6- 9 months	78 (18.79)
Gravida (mean $\pm$ SD)	1.84 $\pm$ 0.66
1	129 (31.08)
2	224 (53.97)
≥ 3	62 (14.94)

ANC visits regularity	
Yes	103 (24.82)
No	312 (75.18)
Risky pregnancy	
Yes	58 (13.97)
No	357 (86.02)
Miscarriage/Stillbirth	
Yes	45 (10.84)
No	370 (89.16)
Any health problems in recent years	
Yes	26 (6.26)
No	389 (93.73)
Any medical condition in recent years	
Yes	23 (5.54)
No	392 (94.45)
Medication usage in previous pregnancy	
Yes	286 (68.91)
No	129 (31.08)
Current medical illness	
Yes	118 (28.43)
No	297 (71.56)
Any GP visit in recent years	
Yes	64 (15.42)
No	351 (84.58)
Medicines used	1.85 ± 1.32
0	99 (23.85)
1	47 (11.32)
2	133 (32.01)
≥ 3	136 (32.77)
Usage of OTC medicines	

Yes	118 (28.43)
No	297 (71.57)

TABLE 2**Distribution of medical illness and medicines used during pregnancy.(n= 415)**

Variable	Frequency (%)
Medical illnesses	
Allergy	2 (0.49)
Arthritis	3 (0.72)
Anemia	5 (1.20)
Asthma	61 (14.69)
Cataract	2 (0.48)
Cough	1 (0.24)
Dermatomycosis	8 (1.93)
Diabetes	2 (0.48)
Diarrhea	4 (0.96)
Emesis	5 (1.20)
Epistaxis	4 (0.96)
Gastritis	1 (0.24)
Headache	6 (1.44)
Hypertension	9 (2.17)
Insomnia	4 (0.96)
Joint pain	2 (0.48)
Limb paralysis	28 (6.75)
Malaria	1 (0.24)
Multiple sclerosis	2 (0.48)
Pharyngitis	7 (1.69)
Pneumonia	5 (1.20)
Peptic ulcer disease	3 (0.72)
Sinusitis	1 (0.24)
Snake bite (nonvenomous)	1 (0.24)
Tuberculosis	2 (0.48)

Typhoid	3 (0.72)
Urinary tract infections	297 (71.57)
Nil	18 (1.34)
Medications used	
Antihistamines	8 (1.93)
Antihypertensives	3 (0.72)
Antidiabetics	6 (1.44)
Paracetamol	112 (26.99)
Antibiotics	48 (11.56)
Antimalarials (prophylactic and therapeutic)	109 (26.26)
Bronchodilators	92 (22.17)
Steroidal hormones	8 (1.93)
NSAIDs	6 (1.44)
Cough suppressants	3 (0.72)
Antitubercular agents	43 (10.36)
Antacids	2 (0.48)
Antiemetics	312 (75.12)
Iron and folic acid	99 (23.85)
Nil	14 (3.37)

TABLE 3**Knowledge and practice questions for safe medication use during pregnancy (n = 415).**

S. No	Knowledge based questions	Answered yes
1	Do you know the name of the medicine(s) that you are taking at present?	195 (46.99)
2	Do you know the use(s) of all the medicine(s) that you are taking at present?	281 (67.71)
3	Do you know that some medicines are not safe to take during pregnancy?	193 (46.50)
4	Do you know that some medicines are essential to take during pregnancy?	288 (69.40)
5	Do you know the crucial period during pregnancy when medicines tend to have effect on fetus?	195 (47.00)
6	Taking unwanted drugs during pregnancy may have implications for both the mother and the health of the child?	52 (12.53)
7	Medication treatment should be adjusted during pregnancy if you have a	234 (56.40)

	chronic condition.	
8	Certain medications must never be employed in pregnancy no matter what the condition	117 (28.20)

S. No	Practice based questions	Answered yes
1	Do you only take drugs after consulting a doctor or pharmacist?	123 (29.64)
2	Do you usually check the content of the accompanying leaflet of the drug?	328 (79.04)
3	Do you regularly see your doctor throughout pregnancy?	351 (84.58)
4	At prescribing time, do you inquire the aim of prescribed medicine(s) safety during pregnancy?	381 (91.81)
5	At dispensing time, do you inquire from the pharmacist how to take dispensed medicine(s) and its safety during pregnancy?	376 (90.60)
6	What is your source of information about medicines?	287 (69.16)

S. No	Attitude based questions	Supports	Disapproves	Neutral
1	All the medicines are toxic to the fetus and pregnant women.	193 (46.51)	143 (34.46)	79 (19.04)
2	It is safer for the fetus when women refrain from taking medicines during pregnancy.	111 (26.75)	159 (38.31)	145 (34.94)
3	Pregnant women have an increased tolerance in taking medicines compared to normal.	266 (64.10)	38 (9.16)	111 (26.75)
4	Untreated sickness in pregnancy can impact the fetal growth.	195 (46.99)	145 (34.46)	75 (18.07)
5	Natural medicines are taken as safe to use in pregnancy.	308 (74.22)	48 (11.57)	59 (14.22)
6	Pregnant women should inform their physician or pharmacist of their issue and medication use during pregnancy.	193 (46.51)	143 (34.46)	79 (19.04)
7	Prescription drugs are safe to use during pregnancy.	266 (64.10)	38 (9.16)	111 (26.75)
8	Women need to discontinue using unnecessary OTC drugs during pregnancy.	278 (66.99)	46 (11.08)	91 (21.93)
9	Supplements and vitamins are safe during pregnancy.	245 (59.04)	108 (26.02)	62 (14.69)
10	Topical drugs/preparations are safe during pregnancy.	73 (17.59)	108 (26.02)	234 (56.38)

Variable	Knowlegde	Attitude	Practice	
	COR (95% CI), p value	AOR (95% CI), p value	COR (95% CI), p value	AOR (95% CI), p value
Age in years (mean $\pm$ SD)				
≤ 25	0.50 (0.24–1.03) *	0.12 (0.09–0.26) *	0.23 (0.10–0.51) ***	0.55 (0.12–2.55)
26–35	0.63 (0.37–1.05)	0.53 (0.28–0.98) *	0.88 (0.53–1.45)	1.05 (0.42–2.64)
> 35	1.00	1.00	1.00	1.00
Education level				
No formal education	0.09 (0.01–0.84) *	0.12 (0.01–0.26)	0.00 (0.00–0.00)	0.00 (0.00–0.00)
HSC	0.09 (0.05–0.18) ***	0.12 (0.05–0.33)	0.02 (0.01–0.04) ***	0.03 (0.01–0.13) ***
Under graduate	0.19 (0.11–0.31) ***	0.23 (0.11–0.50)	0.08 (0.05–0.15) ***	0.15 (0.01–0.38) ***
Post graduate	1.00	1.00	1.00	1.00
Residence				
Village	1.00	1.00	1.00	1.00
Metropolitan	3.53 (2.31–5.40) ***	0.92 (0.48–1.76)	6.67 (4.29–10.37) ***	1.54 (2.68–4.49) *
Occupation				
Home maker	0.23 (0.15–0.37)	0.79 (0.37–1.71)	0.11 (0.07–0.18) ***	0.73 (0.27–1.92)
Medical field	3.04 (1.06–8.74) *	2.56 (1.86–7.59) *	3.49 (0.77–15.84)	1.94 (2.36–10.59) *
Others	1.00	1.00	1.00	1.00
Current trimester				
- 3 months	1.00		1.00	1.00
4 – 6 months	0.93 (0.59–1.48)		1.14 (0.73–1.77)	1.350E9 (0.00–€)
6- 9 months	1.04 (0.58–1.86)		1.66 (0.94–2.92)	0.29 (0.00–€)
Gravida (mean $\pm$ SD)				

1	1.00		1.00	1.00
2	0.99 (0.63–1.57)		1.57 (1.01–2.44) *	a (0.00–€)
≥3	0.89 (0.47–1.69)		1.10 (0.59–2.06)	4.89 (0.00–€)
ANC visits regularity				
Yes	2.48 (1.57–3.91) ***	1.79 (1.05–3.74) *	7.19 (4.29–12.04) ***	1.22 (1.06–3.48) *
No	1.00	1.00	1.00	1.00
Risky pregnancy				
Yes	1.53 (0.87–2.69)	0.72 (0.29–1.79)	2.12 (1.21–3.73) **	0.00 (0.00–€)
No	1.00	1.00	1.00	1.00
Miscarriage/Stillbirth				
Yes	0.94 (0.49–1.82)		1.20 (0.64–2.23)	
No	1.00		1.00	
Any health problems in recent years				
Yes	1.20 (0.53–2.72)		1.62 (0.73–3.59)	
No	1.00		1.00	
Any medical condition in recent years				
Yes	1.24 (0.52–2.93)		2.18 (0.92–5.17)	1.36 (0.28–6.71)
No	1.00		1.00	1.00
Medication usage in previous pregnancy				
Yes	0.97 (0.63–1.51)		1.45 (0.95–2.23)	1.43 (0.34–7.46)
No	1.00		1.00	1.00
Current medical illness				
Yes	1.02 (0.65–1.59)		0.89 (0.58–1.38)	

No	1.00		1.00	
Any General Practitioner visit in recent years				
Yes	2.33 (1.36– 4.00) **	1.73 (1.02– 3.25) *	4.29 (2.39– 7.71) ***	2.54 (1.09– 5.91) *
No	1.00	1.00	1.00	1.00
Medicines used				
0	1.00	1.00	1.00	1.00
1	2.84 (1.37– 5.89) **	1.51 (0.65– 3.47)	8.19 (3.65– 18.40) ***	9.00 (2.68– 30.30) ***
2	1.32 (0.74– 2.36)	0.94 (0.48– 1.83)	4.84 (2.50– 9.37) ***	5.86 (2.15– 15.98) **
≥ 3	1.95 (1.10– 3.44) *	1.20 (0.63– 2.30)	7.92 (4.09– 15.32) ***	9.88 (3.50– 27.87) ***

Note: Others: women working in any private or government organization; a = 744821564.081, b = 2429578102.222598, $\epsilon = 0.9999999$.

Abbreviations: ANC, antenatal care; AOR, adjusted odds ratio; COR, crude odds ratio; GP, general practitioner.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.