



(RESEARCH ARTICLE)



Analysis of factors related to medicine consumption pattern in pregnant women (Field study at Jagir Public Health Center, Surabaya in 2023)

Siti Ma'rufah ^{1,*}, Linda Dewanti ² and Muhammad Ardian Cahya Laksana ³

¹ Midwifery Study Program, Faculty of Medicine, Airlangga University, Surabaya, Indonesia.

² Department of Public Health Sciences - Preventive Medicine, Faculty of Medicine, Airlangga University, Surabaya, Indonesia.

³ Department of Obstetrics and Gynecology, Faculty of Medicine, Airlangga University, Surabaya, Indonesia.

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Abstract

Medications can have unintended effects on the fetus during pregnancy. During pregnancy, a woman may experience various complaints or health problems that require medication. Improper use of medication during pregnancy and inadequate nutrient intake can cause structural and functional abnormalities. Congenital anomalies occur in 3–4% of pregnancies, and in addition, improper medication use has been estimated to be the cause of abnormalities in 10% of births [1]. This study aimed to analyze the factors associated with medication use patterns in pregnant women in the Jagir Public Health Centre Surabaya, in relation to the history of health problems experienced by the mother before pregnancy, complaints experienced by the mother during pregnancy, the status of consultation by pregnant women to health workers, and the status of recommendation of close people of pregnant women regarding the use of certain medications during pregnancy. The research method used was observational with a cross-sectional research design. Data collection was carried out in June–September 2023, using purposive sampling, with the research subjects being pregnant women in the working area of the Jagir Public Health Centre Surabaya. The instrument used in this study was a questionnaire for the use of medication in pregnant women that has been tested for validity and reliability. Statistical data analysis used Chi-Square test with a significance level of 5% and the help of SPSS 25.0 software. The results of the study showed that of the total respondents of 122 pregnant women, 17.2% had a history of health problems before pregnancy, 49.2% had complaints experienced during pregnancy, but 91.8% of respondents had consulted with health workers and 56.6% had received recommendations from close people regarding the use of certain medications. Pregnant women who received and consumed prescription drugs were 16.4%, had consumed over-the-counter drugs 23%, consumed herbal 24.6%, and consumed supplements 97.5%. The results of the Chi-Square test showed that there was a significant effect on the relationship between the mother's medical history and the pattern of prescription drug consumption ($p = 0.000$), the complaints experienced by the mother during pregnancy with the pattern of prescription drug and over-the-counter drug consumption ($p = 0.042$; 0.000), the status of recommendation of close people of pregnant women with the pattern of over-the-counter drug and herbal consumption ($p = 0.000$; 0.001). From this study showed that the factors that influence the medication use patterns of pregnant women included the mother's history of health problems before pregnancy, the complaints experienced by the mother during pregnancy, and the status of recommendation from the close people of pregnant women.

Keywords: Medicine; Pregnancy; Medical history; Recommendation; Consumption patterns

* Corresponding author: Siti Ma'rufah

1. Introduction

Pregnancy is a special condition that requires more attention in terms of health. Irresponsible use of drugs and lack of nutritional needs can lead to structural and functional abnormalities. A healthy and complaint-free pregnancy is highly desired by pregnant women, it is not a coincidence but needs to be worked on [2]. Antenatal care in the form of medical treatment, observation and counseling for pregnant women aims to ensure that pregnant women can undergo a healthy pregnancy and prepare for childbirth properly [3].

Health care providers should be aware of appropriate pharmacological therapy for various conditions and the potential impact on the pregnant woman and her fetus. Regarding the use of safe drugs during pregnancy, the US Food and Drug Administration (FDA) classifies drugs into five main categories: A, B, C, D, and X, with categories D and X showing evidence of risk in pregnancy. Drugs used in pregnant women deserve attention, because they can affect the fetus and affect brain development in the fetus [4]. Most pregnant women self-medicate with modern or traditional herbal medicines. Education and provision of appropriate health insights should be provided to identify the factors that determine the practice of medication in the community, as pregnant women are one of the population groups most vulnerable to the side effects of drugs on the fetus and on themselves. This is because the pharmacokinetic profile of drugs can contribute to physiological changes in the mother during pregnancy. In addition, drugs can cross the placenta and harm the fetus [5]. Self-medication during pregnancy is generally a type of conventional and herbal treatment. The dominant factors in the use of self-medication with modern medicine are more on accessibility and time saving. The two most popular reasons for using herbal medicines among pregnant women are because of the perceived lower side effects and higher efficacy [6]. Self-medication is mainly influenced by relatives or friends who recommend the use of herbal/allopathic medicine [7].

Pregnant women are increasingly using over-the-counter (OTC) drugs for the main reasons of cost, time saving, and lack of access to doctors. The use of OTC drugs has been linked to past experience and their main knowledge is friends and/or pharmacists, although most OTC drugs are safe during pregnancy, others have not been tested and can harm the developing fetus [4]. Some drugs can pose a risk to the health of the mother, and can also have an effect on the fetus. During the first trimester, drugs can cause birth defects (teratogenesis), and the greatest risk is pregnancy 3-8 weeks. During the second and third trimesters, drugs can affect the growth and development of the fetus functionally or can poison the placenta. If possible, counseling should be done for someone before planning a pregnancy, including discussing the risks associated with specific drugs, traditional medicines, and the harmful effects of chemicals such as cigarettes and alcohol. Supplements such as folic acid should be given during pregnancy management because folic acid use reduces neural tube defects. Drugs should only be prescribed during pregnancy if the expected benefit to the pregnant woman outweighs the risk to the fetus. All drugs should be avoided if possible, during the first trimester. Physiological changes during pregnancy can affect the drug kinetics in pregnant women, which may affect the pregnant woman's response to the drugs she takes. Thus, it is necessary to have a good understanding of which drugs are relatively unsafe and should be avoided during pregnancy so as not to harm the mother and the fetus she is carrying [7].

According to the World Health Organization (WHO), the factor of drug consumption refers to patient behavior related to adherence to drug use, diet, and lifestyle, individual and disease factors, treatment regimen, and interaction with health care providers. While individual factors include age, education, employment status, economic level, and others [8]. The many factors that influence drug use in pregnant women encourage researchers to feel the need to conduct studies on the factors that influence drug use in pregnant women, with the hope of being able to intervene with education so that pregnant women can consume drugs appropriately and minimize the risk to the mother and fetus.

2. Material and methods

The type of research used was observational using a cross-sectional design and purposive sampling technique. The population in this study was all pregnant women who visited maternal services at the Jagir Health Center in Surabaya from June to September 2023. Pregnant women as respondents were given questions that were developed to explore the influence between internal factors of the mother, namely the history of health problems experienced by the mother since before pregnancy and complaints experienced by the mother during pregnancy, external factors of the mother, namely the status of consultation with health workers such as doctors or midwives and the status of recommendations from the mother's closest person regarding the consumption of certain drugs. This is then complemented by factors of the mother's demographic characteristics such as age, education, occupation, family income, family members living in the same house, parity, and gestational age in the trimester. In addition to these factors, the pattern of drug consumption by the mother during pregnancy is also explored, which includes the consumption of prescription drugs, over-the-counter drugs, herbal preparations, and the consumption of supplements/vitamins.

The measurement of independent and dependent variables in this study used a research instrument in the form of a questionnaire. To test the validity level of the instrument, the Pearson Product-Moment correlation analysis technique was used with a significance level of $\alpha = 5\%$, while the Alpha-Cronbach technique was used for the reliability test of the research instrument with the provision that the Alpha value obtained was > 0.6 , then the instrument is considered reliable and produces consistent answers. The validity and reliability tests were carried out using the SPSS 25.0 program. The data obtained were analyzed using univariate analysis which aims to determine the picture of the frequency distribution of each variable and bivariate analysis to find the relationship between the independent and dependent variables using the Chi-Square statistical test that is appropriate for the available data using the SPSS 25.0 program.

3. Results and discussion

The Jagir Public Health Center is a first-level health facility with the number of outpatient visits in 2019 reaching 13,623 patients in total, 5,728 male patients and 7,895 female patients, and 1,243 inpatients. The health center also serves 847 pregnant women, with an estimated 169 of them experiencing obstetric complications, and an estimated 116 neonatal complications [9].

3.1. Overview of pregnant women demographic characteristics

Table 1 Distribution of respondent characteristics by demographics at Jagir Public Health Center within June – September 2023

Variable	Category	Counts	Percentage
Age	< 20 y.o	3	2.5%
	21 – 35 y.o	102	83.6%
	< 36 y.o	17	13.9%
Education level	First-mid level school	23	18.9%
	Senior high school	74	60.7%
	University graduates	25	20.5%
Occupation	Blue collar worker	1	0.8%
	Entrepreneur	7	5.7%
	Housewives	82	67.2%
	State/private company employee	32	26.2%
Household income	Below city minimum wage	70	57.4%
	Around city minimum wage	24	19.7%
	Above city minimum wage	28	23.0%
Living with family members within the house	2 persons	22	18.0%
	3 – 4 persons	58	47.5%
	5 persons or more	42	34.4%
Number of times women has given birth	1 child	37	30.3%
	2 children	41	33.6%
	3 children	31	25.4%
	4 children or more	13	10.7%
Phase of pregnancy	1 st trimester (0-12 weeks)	26	21.3%
	2 nd trimester (13-28 weeks)	42	34.4%
	3 rd trimester (29-40 weeks)	54	44.3%

The pregnant women as research respondents in the Jagir Health Center work area during the period of June - September 2023 were mostly early adults aged between 21 - 35 years (83.6%), with the last education background of senior high school/equivalent (60.7%), having the status of housewives (67.2%), with family income below the regional

minimum wage (57.4%), living in a house with 3-4 family members (47.5%), having a history of 2 children before the current pregnancy (33.6%), and at the time of the study the pregnancy was in the late phase of pregnancy Trimester III or 29 – 40 weeks (44.3%).

3.2. Overview of pregnant women internal and external factor

Table 2 Distribution of respondent based on history of health problems experienced by the mother since before pregnancy at Jagir Public Health Center within June – September 2023

Variable	Category	Counts	Percentage
History of health problems experienced by the mother since before pregnancy	Doesn't have history of illness	101	82.8%
	Having history of illness	21	17.2%
	Total	122	100.0%
Types of health problems experienced by the mother since before pregnancy	Hemorrhoid	1	0.8%
	Gastritis	7	5.8%
	Asthma	2	1.6%
	High-blood pressure	1	0.8%
	Endometriosis	1	0.8%
	Spotting or bleeding in previous pregnancies	1	0.8%
	Thyroid cancer	1	0.8%
	Shortness of breath in the morning	1	0.8%
	Glandular tuberculosis	1	0.8%
	Tuberculosis	3	2.6%
	Typhus	1	0.8%
	Appendicitis	1	0.8%
Total	21	17.2%	

Out of the total 122 pregnant women respondents who were interviewed, 21 people (17.2%) had a medical history since before pregnancy, while 101 people (82.8%) did not have a specific medical history since before pregnancy. Regarding the types of medical history experienced by pregnant women respondents, 7 people had gastritis (5.7%), followed by 2 people with asthma (1.6%), 3 people with TB/tuberculosis (2.5%), and several other diseases such as hemorrhoids, high blood pressure, endometriosis, thyroid cancer, etc. Table 3 shows that 60 pregnant women respondents (50.8%) had complaints during pregnancy, with the most common complaint being nausea and vomiting, also known as hyperemesis gravidarum, in 20 people (16.4%). This was followed by dizziness in 13 people (10.7%), and abdominal pain to back pain. Meanwhile, 62 people (49.2%) reported no significant complaints during pregnancy.

Table 3 Distribution of respondent based on complaints experienced by the mother during pregnancy at Jagir Public Health Center within June – September 2023

Variable	Category	Counts	Percentage
Complaints experienced by the mother during pregnancy	Doesn't have complaints	62	50.8%
	Having complaints	60	49.2%
	Total	122	100.0%
Types of complaints experienced by the mother during pregnancy	Hemorrhoid	1	0.8%
	Cough	4	3.3%
	Bleeding	3	2.5%
	Tingling	1	0.8%
	Cramps	5	4.1%

	Nausea and vomiting	20	16.4%
	Loss of appetite	1	0.8%
	Abdominal pain	6	4.9%
	Back pain	5	4.1%
	Runny nose	1	0.8%
	Dizziness	13	10.7%
	Total	60	49.2%

Table 4 Distribution of respondent based on consultation with health workers such as doctors or midwives at Jagir Public Health Center within June – September 2023

Variable	Category	Counts	Percentage
Consultation with health workers such as doctors or midwives	Never consult	10	8.2%
	Have consult	112	91.8%
	Total	122	100%
Reasons why pregnant women did not consume medication during pregnancy	Worried about the effects on the fetus	27	22.1%
	Did not feel any complaints	36	29.5%
	Not advised by health workers	19	15.6%
	Not answer	30	24.6%
	Total	112	91.8%

Table 4 shows that the majority of pregnant women respondents (n=112, 91.8%) had consulted with health workers, such as midwives or doctors at all levels of health facilities, regarding the consumption of medication during pregnancy. A small minority of respondents (n=10, 8.2%) admitted to never having consulted with a health worker. When asked about the reasons why pregnant women did not consume medication during pregnancy, the majority (n=30, 24.6%) did not answer, 27 people (22.1%) were worried about the effects on the fetus, 36 people (29.5%) did not feel any complaints, and 19 people (15.6%) answered that they did not consume because they were not advised by health workers.

Table 5 Distribution of respondent based on recommendations from the mother's closest person regarding the consumption of certain drugs at Jagir Public Health Center within June – September 2023

Variable	Category	Counts	Percentage
Recommendations from the mother's closest person regarding the consumption of certain drugs	Never got recommendation	53	43.4%
	Have got recommendation	69	56.6%
	Total	122	100%
Source of these recommendations	Partners or close family members	27	22.1%
	Friends	30	24.6%
	Neighbors	12	9.8%
	Total	69	56.6%

Table 5 shows that 69 pregnant women respondents (56.6%) received recommendations from close acquaintances regarding the consumption of certain medications during pregnancy, while 53 people (43.4%) never received such recommendations. When asked further about the source of these recommendations, 30 people (24.6%) received

recommendations from friends, 27 people (22.1%) from partners or close family members of the pregnant women, and only 12 people (9.8%) received recommendations from their surroundings.

3.3. Overview of pregnant women medicine consumption

Table 6 Distribution of respondent based on consumption of prescription medications related to their medical history during pregnancy at Jagir Public Health Center within June – September 2023

Variable	Category	Counts	Percentage
Consumption of prescription medications related to the medical history during pregnancy	Never prescribed and consumed	102	83.6%
	Have got prescription and consume	20	16.4%
	Total	122	100%
Type of prescription medications consumed	Amlodipine	1	0.8%
	Antasida	2	1.6%
	Inhaler	1	0.8%
	Lupa	4	3.3%
	Metoclopramide	2	1.6%
	Obat ambeien	1	0.8%
	Obat TB	4	3.3%
	Omeprazole	3	2.5%
	Paracetamol	2	1.6%
Total		20	16.4%

Table 6 shows that 20 pregnant women respondents (16.4%) purchased and consumed prescription medications related to their medical history during pregnancy, while 102 people (83.6%) did not consume prescription medications. The types of prescription medications purchased and consumed by pregnant women included tuberculosis (TB) medication (4 people, 3.3%), *Omeprazole* (3 people, 2.5%), *Paracetamol* (2 people, 1.6%), antacids, *Amlodipine*, and *Metoclopramide*. There were 4 people (3.3%) who claimed to have forgotten the type of medication they purchased and consumed related to their medical history during pregnancy. Table 7 shows that 94 pregnant women respondents (79.0%) never consumed over-the-counter medications sold in pharmacies or online, while 28 people (23.0%) had consumed over-the-counter medications. The most commonly consumed over-the-counter medications were *Paracetamol* (13 people, 10.7%), *Demacolin* (3 people, 2.5%), *Oskadon*, and several other brands. The results of the study, as presented in Table 6, indicate that 20 respondents (16.4%) consumed prescription medications related to their pre-existing health conditions, both before and during pregnancy. Additionally, 28 respondents (23.0%) purchased and consumed over-the-counter (OTC) medications without a doctor's prescription. This was primarily associated with the symptoms experienced by the respondents, which were generally related to the physiological changes that occur during pregnancy. The consumption of herbal remedies and supplements was 24.6% and 97.5%, respectively. The low rates of prescription, OTC, and herbal medication use, and the high rate of supplement use, broadly suggest that today's society especially pregnant mothers have begun to understand the importance of being selective and extra cautious when consuming any medication during pregnancy. A further analysis of the data revealed that the most commonly used prescription medications among the respondents were tuberculosis (TB) drugs (3.3%), followed by *Omeprazole* (2.5%), antacids, *Paracetamol*, and *Metoclopramide* (1.6% each). Other medications, such as *Amlodipine*, inhalers, and hemorrhoid medications, were consumed by a smaller proportion of respondents (0.8%).

Table 8 shows that the majority of pregnant women respondents (97.5%, n=119) had purchased and consumed supplements or additional nutrients during pregnancy. The most commonly consumed supplements were *Laduni* and calcium, with various other brands such as *Blackmores*, *Folamil Genio*, *Folafit*, *Mom Ung*, and others. Some respondents knew about and consumed *Laduni* as an all-in-supplement due to recommendations from the health centers where they consulted during pregnancy.

Table 7 Distribution of respondent based on consumption of over-the-counter drugs during pregnancy at Jagir Public Health Center within June – September 2023

Variable	Category	Counts	Percentage
Consumption of over-the-counter drugs during pregnancy	Never consumed	94	77.0%
	Have consumed	28	23.0%
	Total	122	100%
Type of over-the-counter drugs during pregnancy consumed	Antalgin	1	0.8%
	Bodrex	1	0.8%
	Demacolin	3	2.5%
	Duphaston	1	0.8%
	Kaditic	4	3.3%
	Oskadon	2	1.6%
	Paracetamol	13	10.7%
	Sangobion	1	0.8%
	Silex	1	0.8%
	Tuzalos	1	0.8%
	Total	28	23.0%

Table 8 Distribution of respondent based on consumption of supplements during pregnancy at Jagir Public Health Center within June – September 2023

Variable	Category	Counts	Percentage
Consumption of supplements during pregnancy	Never consumed	3	2.5%
	Have consumed	119	97.5%
	Total	122	100%
Type of supplements during pregnancy consumed	Asam folat	1	0.8%
	Blackmores	5	4.1%
	Folamil genio	5	4.1%
	Kapsul zat besi	9	7.4%
	Laduni	46	37.7%
	Laduni, kalsium	50	41.0%
	Laduni, Omega 3	1	0.8%
	Lupa	1	0.8%
	Promavit	1	0.8%
	Total	119	97.5%

Table 9 shows that 92 pregnant women respondents (75.4%) never consumed herbal medicine during pregnancy, while only 23 people did. The most common type of herbal medicine consumed was *sinom*, with 15 people consuming it (12.3%). It was also combined with *beras kencur* by 6 people (4.9%) and turmeric by 7 people (5.7%).

Table 9 Distribution of respondent based on consumption of herbals during pregnancy at Jagir Public Health Center within June – September 2023

Variable	Category	Counts	Percentage
Consumption of herbal during pregnancy	Never consumed	92	75.4%
	Have consumed	30	24.6%
	Total	122	100%
Type of herbal during pregnancy consumed	Jahe	1	0.8%
	Minyak kelapa	1	0.8%
	Sinom	15	12.3%
	Sinom beras kencur	6	4.9%
	Sinom kunir	7	5.7%
	Total	30	24.6%

Table 10 Distribution of respondent based on history of side effects from the medication taken during pregnancy at Jagir Public Health Center within June – September 2023

Variable	Category	Counts	Percentage
Experiencing side effects from the medication taken during pregnancy	Never experience side effect	121	99.2%
	Have experience side effect	1	0.8%
	Total	122	100%
Kind of side effects from the medication taken during pregnancy	Drowsiness/sleepy	1	0.8%
	Total	1	0.8%

Table 10 shows that 121 pregnant women respondents (99.2%) did not experience any side effects from the medication taken during pregnancy, while only 1 person (0.8%) experienced them. The side effect experienced by the pregnant women respondent was drowsiness in 1 person (0.8%).

3.4. Relationship between contributing factors to medicine consumption

The results of this study indicate that mothers' pre-pregnancy health history has a significant influence on their prescription medication and supplement use patterns during pregnancy. Table 11 shows that one of the internal factors of pregnant women which is history of health disorders experienced by pregnant women since before pregnancy only had a significant effect on the pattern of prescription drug and supplement consumption, as indicated by *P-values* of 0.000 and 0.022, respectively, below the 95% confidence level $\alpha=0.05$. The analysis showed that mothers with certain health conditions or illnesses that they have had for a long time or before pregnancy are more likely to use prescription medications. However, they are less likely to readily purchase and use over-the-counter (OTC) medications that can be easily obtained from pharmacies without a prescription, or to use herbal remedies. In addition to showing a relationship with prescription medication use, pregnant women with certain health histories also showed a significant relationship with supplement use. This is related to the motivation and knowledge of pregnant women to maintain their own physical condition and the condition of the fetus they are carrying. The results of the study showed that mothers' pre-pregnancy health history is an important factor to consider in understanding medication use patterns during pregnancy. Pregnant women with certain health histories need to receive special attention and education regarding the safe and effective use of medications during pregnancy.

Every pregnant woman may experience different complaints during her pregnancy. Some may feel nauseous or vomit immediately after smelling perfume or food, while others may not experience nausea at all ^[10].

Table 11 Influence analysis history of health problems experienced by the mother since before pregnancy to drug consumption during pregnancy at Jagir Public Health Center within June – September 2023

History of health problems experienced by the mother since before pregnancy				
		Yes	No	<i>P-value</i>
Consumption of prescription medications	Yes	20(95.2%)	0(0.0%)	0.000
	No	1(4.8%)	101(100%)	
Consumption of over-the-counter drugs	Yes	5(23.8%)	23(22.8%)	0.918
	No	16(76.2%)	78(77.2%)	
Consumption of herbal medicine	Yes	4(19.0%)	26(25.7%)	0.517
	No	17(81.0%)	75(74.3%)	
Consumption of supplements	Yes	19(90.5%)	100(99.0%)	0.022
	No	2(9.5%)	1(1.0%)	

Table 12 Influence analysis complaints experienced by the mother during pregnancy to drug consumption during pregnancy at Jagir Public Health Center within June – September 2023

Complaints experienced by the mother during pregnancy				
		Yes	No	<i>P-value</i>
Consumption of prescription medications	Yes	14(23.3%)	6(9.7%)	0.042
	No	46(76.7%)	56(90.3%)	
Consumption of over-the-counter drugs	Yes	26(43.3%)	2(3.2%)	0.000
	No	34(56.7%)	60(96.8%)	
Consumption of herbal medicine	Yes	17(28.3%)	13(21.0%)	0.345
	No	43(71.7%)	49(79.0%)	
Consumption of supplements	Yes	58(96.7%)	61(98.4%)	0.540
	No	2(3.3%)	1(1.6%)	

Table 12 shows that the complaints experienced during pregnancy, as another internal factor of pregnant women, had a significant effect on the pattern of prescription and over-the-counter drug consumption, as indicated by *P-values* of 0.042 and 0.000, respectively, below $\alpha=0.05$. Most pregnancy complaints are normal and natural, indicating that the body's hormones are adapting to the fetus in the womb. However, these complaints can cause discomfort and inconvenience for pregnant women. Table 3 shows the distribution of respondents based on the complaints they experienced during pregnancy. A total of 60 respondents (49.2%) experienced complaints during pregnancy, with the most common types of complaints being nausea and vomiting (16.4%), dizziness (10.7%), and back pain (4.1%). Nausea and vomiting are the main complaints experienced by almost 75% of pregnant women worldwide ^[10]. The exact cause of nausea and vomiting is not fully understood, but it is thought to be due to low blood sugar, fluctuating levels of human chorionic gonadotropin (HCG) or estrogen ^[11]. Dizziness or headache is another common complaint experienced by pregnant women due to hormonal surges and increased blood volume ^[12]. Pregnant women who experience complaints during pregnancy are six times more likely to self-medicate than those who do not experience complaints, for reasons such as saving time or other related factors ^[13].

The use of medication during pregnancy should be under the supervision of a doctor, midwife, or pharmacist. This is because the use of medication during this period can endanger the safety of the fetus, so safety is the top priority. Table 13 shows that consultation with health workers during pregnancy, as an external factor of pregnant women, did not have a significant effect on the pattern of prescription drug, over-the-counter drug, herbal, or supplement consumption,

as indicated by P-values of 0.569, 0.309, 0.059, and 0.600, respectively, above the $\alpha=0.05$ value. This study found that pregnant women's consultation with health care providers did not have a significant effect on their patterns of prescription, over-the-counter, herbal, or supplement use. The analysis showed that the *p-value* for the variable of health care provider consultation on the pattern of prescription, over-the-counter, herbal, or supplement consumption was higher than the value of $\alpha=0.05$. This could be less accurate because in general, it seems that pregnant women's knowledge about medication use during pregnancy is already high. Pregnant women are already aware that medication use patterns must be maintained related to the condition of their fetus. However, related to economic factors, recommendations from close friends and family, and the pregnant woman's own experience who feels safe enough with the knowledge and experience she has, so the factor of consultation with health care providers does not appear to be a factor that influences the decision to use medication during pregnancy.

Table 13 Influence analysis consultation with health workers during pregnancy to drug consumption during pregnancy at Jagir Public Health Center within June – September 2023

Consultation with health workers during pregnancy				
		Yes	No	<i>P-value</i>
Consumption of prescription medications	Yes	19(17.0%)	1(10.0%)	0.569
	No	93(83.0%)	9(90.0%)	
Consumption of over-the-counter drugs	Yes	27(24.1%)	1(10.0%)	0.309
	No	85(75.9%)	9(90.0%)	
Consumption of herbal medicine	Yes	30(26.8%)	0(0.0%)	0.059
	No	82(73.2%)	10(100.0%)	
Consumption of supplements	Yes	109(97.3%)	100(100%)	0.600
	No	3(2.7%)	0(0.0%)	

An interesting finding was when respondents were asked about the reasons for not taking certain medications during pregnancy. 27 respondents (22.1%) stated that they were worried about the effect on their fetus, 36 respondents (29.5%) stated that they did not take medication because they had no complaints, while 19 respondents (15.6%) answered that they did not dare to take medication because it was not recommended by a health care provider. This shows that the education has indeed reached its target.

Pregnancy check-ups are a health effort given to women during pregnancy with the aim of preventing risks that can occur to the mother and fetus [14]. Pregnancy check-ups and education provided by health care providers that are carried out regularly during pregnancy can monitor the mother's health and the growth and development of the fetus from early pregnancy to the childbirth process according to the safe and healthy condition of the pregnant woman [15].

In addition to medications obtained from doctor's prescriptions, respondents also acquired medications through self-medication or by purchasing them directly from pharmacies and convenience stores. Table 5 shows that 56.6% of respondents, or more than half of the total participants in the study, received recommendations from close family and friends regarding the use of specific medications during pregnancy. Further investigation revealed that 22.1% of these recommendations came from partners/close family members, 24.6% from friends, and 9.8% from the surrounding community or neighbors. This result indicates that recommendations from friends ranked highest.

Furthermore, self-medication during pregnancy is motivated by several factors, including: 1) Ease of access to medication [16]; 2) Past treatment experience [17]; 3) Time-saving benefits [18]; 4) Medical history [19]. Analysis of the relationship between recommendations from close family and friends and pregnant women's patterns of medication use revealed a significant association. This is indicated by *p-values* of 0.000 and 0.001, both below $\alpha=0.05$. These findings align with research conducted by Abeje et al. [19], which found that 25.1% of pregnant women engaged in self-medication. Over-the-counter (OTC) medications are the most frequently used category of drugs in self-medication. This is due to their easy accessibility, being available without a doctor's prescription and readily purchased at nearby pharmacies [16]. However, medication use with OTC drugs is considered potentially harmful to pregnant women. This is because only a small fraction of OTC medications is categorized by the FDA as falling within categories A/B (no risk to the fetus) compared to categories C (potential benefits outweigh risks), D, and X (proven to cause malformations in the

fetus) [15]. Valid sources of information regarding medication should be obtained from experts, in this case, healthcare professionals, especially when intended for use by pregnant women.

Table 14 Influence analysis recommendations from the mother's closest person regarding the consumption of certain drugs at Jagir Public Health Center within June – September 2023

Recommendations from the mother's closest person				
		Yes	No	<i>P-value</i>
Consumption of prescription medications	Yes	12(17.4%)	8(15.1%)	0.734
	No	57(82.6%)	45(84.9%)	
Consumption of over-the-counter drugs	Yes	24(34.8%)	4(7.5%)	0.000
	No	45(65.2%)	49(92.5%)	
Consumption of herbal medicine	Yes	25(36.2%)	5(9.4%)	0.001
	No	44(63.8%)	48(90.6%)	
Consumption of supplements	Yes	68(98.6%)	51(96.2%)	0.411
	No	1(1.4%)	2(3.8%)	

In addition to medications obtained from doctor's prescriptions, respondents also acquired medications through self-medication or by purchasing them directly from pharmacies and convenience stores. Table 5 shows that 56.6% of respondents, or more than half of the total participants in the study, received recommendations from close family and friends regarding the use of specific medications during pregnancy. Further investigation revealed that 22.1% of these recommendations came from partners/close family members, 24.6% from friends, and 9.8% from the surrounding community or neighbors. This result indicates that recommendations from friends ranked highest.

Furthermore, self-medication during pregnancy is motivated by several factors, including: 1) Ease of access to medication [16]; 2) Past treatment experience [17]; 3) Time-saving benefits [18]; 4) Medical history [19]. Analysis of the relationship between recommendations from close family and friends and pregnant women's patterns of medication use revealed a significant association. This is indicated by *p-values* of 0.000 and 0.001, both below $\alpha=0.05$. These findings align with research conducted by Abeje et al. [19], which found that 25.1% of pregnant women engaged in self-medication. Over-the-counter (OTC) medications are the most frequently used category of drugs in self-medication. This is due to their easy accessibility, being available without a doctor's prescription and readily purchased at nearby pharmacies [16]. However, medication use with OTC drugs is considered potentially harmful to pregnant women. This is because only a small fraction of OTC medications is categorized by the FDA as falling within categories A/B (no risk to the fetus) compared to categories C (potential benefits outweigh risks), D, and X (proven to cause malformations in the fetus) [15]. Valid sources of information regarding medication should be obtained from experts, in this case, healthcare professionals, especially when intended for use by pregnant women.

Table 9 indicates that 24.6% of pregnant women in the study consumed herbal remedies during their pregnancy. The types of herbal remedies consumed were primarily traditional herbal preparations familiar to the Indonesian population. While herbs and other herbal preparations like *jamu* are generally believed to possess various health benefits, pregnant women are advised against consuming *jamu* during pregnancy. This is because certain types of *jamu* containing mint leaves, sage, rosemary, and *rumpot fatimah* can trigger contractions, potentially leading to miscarriage in the first trimester. Additionally, the production process of homemade or street vendor *jamu* does not always guarantee hygiene and safety, increasing the risk of pregnant women being exposed to infectious pathogens. Table 8 shows that 97.5% of respondents reported consuming supplements during their pregnancy. These supplements contain a variety of ingredients, not simply a single component, usually vitamins, minerals, and each of these components can have its own unique effect on pregnancy. Therefore, supplements cannot be categorically classified, and their use requires caution and should be guided by medical advice and supervision. This is crucial to ensure that the benefits of the supplements outweigh any potential risks to the fetus. An interesting finding is that 78.7% of respondents reported consuming *Laduni*. *Laduni* is a pregnancy-specific supplement recommended by healthcare professionals at Public Health Care clinics, particularly in the city of Surabaya. However, further research on this supplement is still limited. Other supplements consumed by respondents were well-known brands produced by leading pharmaceutical companies in Indonesia, such as *Folamil Genio*, *Blackmores*, and *Promavit*.

This study found that one of the pregnant women's characteristics, age, only had a significant effect on the pattern of supplement/vitamin consumption. This is demonstrated by a *p-value* of 0.002, which is lower than the 95% confidence level ($\alpha=0.05$). On the other hand, the mother's age did not have a significant effect on the consumption of prescription medications, over-the-counter medications, and herbal remedies. Overall, as pregnant women age, their awareness of caring for and maintaining their pregnancy health generally increases. This is done to ensure the proper development of the fetus they are carrying. Several possibilities may explain the association between pregnant women's age and the pattern of supplement/vitamin consumption, older pregnant mother may have more pregnancy experience and knowledge about the importance of supplements/vitamins for fetal health, they also may have better access to health information and financial resources to purchase supplements/vitamins, and they may be more likely to consult with healthcare professionals, who may recommend taking supplements/vitamins [21]. This study suggests that pregnant women's age is a crucial factor to consider in efforts to improve the pattern of supplement/vitamin consumption. Targeted health education and promotion efforts geared towards younger pregnant women could help raise their awareness of the importance of supplements/vitamins for fetal health [22].

The pregnant women's educational background did not significantly affect the pattern of consumption of prescription medications, over-the-counter medications, herbal remedies, or supplements. This was indicated by a *p-value* higher than the 95% confidence level ($\alpha=0.05$). This finding is related to the demographic characteristics of the respondents at the Jagir Public Health Centre, which is largely populated by merchants and informal workers from the surrounding Jagir market and train station area. Similarly, the pregnant women's occupation did not significantly affect the pattern of consumption of prescription medications, over-the-counter medications, herbal remedies, or supplements. This was also indicated by a *p-value* higher than the 95% confidence level ($\alpha=0.05$). This finding is related to the women's position as housewives supporting their husbands, who are the primary breadwinners in the family. As a result, the women's work is not directly related to medication use patterns since the source of income comes from their husbands. The majority of the respondents in this study were housewives (67.2%). This study also found that family income, another characteristic of pregnant women, was not significantly associated with the consumption of prescription drugs, over-the-counter drugs, herbal remedies, or supplements. This was indicated by a *p-value* greater than the 95% confidence level ($\alpha=0.05$). This finding is related to the fact that healthcare is covered by the national insurance program. This means that basic health services such as pregnancy check-ups, maternal and child health services, and childbirth are covered by the insurance. Furthermore, the number of family members living with the pregnant woman did not significantly affect the pattern of consumption of prescription drugs, over-the-counter drugs, herbal remedies, or supplements. This was also indicated by a *p-value* greater than the 95% confidence level ($\alpha=0.05$). This implies that the number of family members living in the same house is not related to the recommendations given for consuming specific medications during pregnancy.

The study results showed a significant relationship between parity and the pattern of herbal consumption, but not with the pattern of prescription drug, over-the-counter drug, or supplement consumption. These findings are consistent with those of Abeje et al. [19], who found a significant relationship between parity and self-medication, with multigravida pregnant women being 2.1 times more likely to self-medicate than primi-gravida women. Women with a higher parity are less concerned about their pregnancy, leading to fewer visits, while women with their first pregnancy may find taking medication during pregnancy to be a new experience, leading to greater caution in its use. It is also worth noting that the gestational age of the pregnant women did not significantly affect the pattern of medication consumption, with a *p-value* greater than the 95% confidence level ($\alpha=0.05$). This suggests that the pregnant women's medication use patterns are not related to their gestational age, although it is generally known that the first trimester is the most vulnerable period of pregnancy, during which pregnant women should avoid consuming over-the-counter medications, herbal remedies, supplements, or even prescription medications without consulting a healthcare professional who can provide comprehensive advice on the benefits and risks involved.

4. Conclusion

This study found out that pregnant women's medication use patterns are influenced by internal factors related to the pregnant woman herself, external factors from her environment, and demographic characteristics. Internal factors that influence medication use include the pregnant woman's health history and complaints during pregnancy. The woman's past medical conditions influence her consumption of prescription medication and supplements and the woman's physical symptoms during pregnancy influence her consumption of prescription and over-the-counter medication. External factors that influence medication use include consultation with healthcare professionals, while consulting doctors or midwives does not directly affect the pregnant woman's medication use patterns, it can provide guidance and influence her decisions.

Other contributing factor is the recommendations from close family and friends: Recommendations from individuals within the woman's social circle can significantly impact her consumption of over-the-counter medication and herbal remedies. Meanwhile as study shows demographic characteristics that influence medication use include the woman's age and parity. The pregnant woman's age only impacts her consumption of supplements, while parity or the number of previous pregnancies only influences the woman's consumption of herbal remedies. Education level, occupation, family income, co-habiting family members, gestational timeframe, all these demographic factors do not generally influence the pregnant woman's overall medication use patterns. In addition, future research could be conducted with a larger sample size and a broader geographical scope. Additional research could also investigate other factors that might influence pregnant women's medication use patterns, such as social and cultural factors.

Compliance with ethical standards

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Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of ethical approval

This study implemented the WMA Declaration of Helsinki – Ethical Principles for Medical Research involving Human Subjects and already received an ethical certificate from Health Research Ethics Committee of Airlangga University, Indonesian Midwives Association of Surabaya Branch has given letter of approval to conduct the study.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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