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FACTORS ASSOCIATED WITH NON-ATTENDANCE AT PRENATAL CARE IN THE FIRST AND SECOND TRIMESTERS OF PREGNANCY IN A TERTIARY-LEVEL HOSPITAL IN LIMA, PERU, 2023

FACTORES ASOCIADOS A LA INASISTENCIA AL CONTROL PRENATAL EN EL PRIMER Y SEGUNDO TRIMESTRE EL EMBARAZO EN UN HOSPITAL DE TERCER NIVEL DE LIMA, PERÚ, 2023

Claudia Veralucia Saldaña-Díaz [1,a], Andrés Campaña Acuña [1,b], Rosemary Isabel López Vidal [2,a], Victoria Naveros Serda [3,a], Gabina Mamani Conto [3,c], Jonathan Franco Rodas Valladares [4,d], Luis Alfonso Meza Santibañez [5,e]

ORIGINAL ARTICLE

ABSTRACT

Introduction: Inadequate attendance at prenatal care (PNC) is a public health issue that affects maternal and perinatal outcomes. **Objective:** To identify and compare the factors associated with inadequate PNC attendance during the first and second trimesters of pregnancy in women receiving care at the Instituto Nacional Materno Perinatal (INMP) in Lima, Peru. **Methods:** An analytical cross-sectional study was conducted on 256 pregnant women with more than 26 weeks and 6 days of gestation who received care at the INMP. Adequate PNC was defined, according to the World Health Organization (WHO), as at least one visit before 13 weeks for the first trimester, and at least two visits between 13 and 26 weeks and 6 days for the second trimester. Structured surveys and a review of PNC records were conducted. Adjusted Poisson regression was applied to estimate prevalence ratios (PR) and 95% confidence intervals (95% CI), considering a p-value < 0.05 as statistically significant. **Results:** In the first trimester, being single (aPR=1.55; p=0.004), having a lower educational level (aPR=1.77; p=0.019), and receiving care from midwives (aPR=2.00; p<0.001) were associated with higher prevalence of inadequate attendance, while having a high-risk pregnancy was associated with lower prevalence (aPR=0.55; p<0.001). In the second trimester, higher prevalence persisted among single women (aPR=1.95; p=0.059) and those with lower education (aPR=2.19; p=0.026), as well as among women with three or more children (aPR=2.69; p=0.001). **Conclusion:** Factors associated with inadequate PNC attendance vary between trimesters, highlighting the need for targeted strategies to improve PNC coverage and adherence.

Keywords: First trimester of pregnancy; Second trimester of pregnancy; Prenatal care; Pregnancy. (Source: MESH-NLM)

RESUMEN

Introducción: La asistencia inadecuada al control prenatal (CPN) es un problema de salud pública que afecta la atención materno-perinatal. **Objetivos:** Identificar y comparar los factores asociados a la asistencia inadecuada al CPN en el primer y segundo trimestre de gestación en gestantes atendidas en el Instituto Nacional Materno Perinatal (INMP) de Lima, Perú. **Métodos:** Se realizó un estudio transversal analítico en 256 gestantes con más de 26 semanas con 6 días de gestación atendidas en el INMP. Se definió CPN adecuado en el primer trimestre como al menos una consulta antes de las 13 semanas y en el segundo trimestre como al menos dos consultas entre las semanas 13 y 26 con 6 días, según la Organización Mundial de la Salud (OMS). Se realizaron encuestas estructuradas y revisión de cartillas de CPN. Se aplicó regresión de Poisson ajustada para estimar razones de prevalencia (RP) e intervalos de confianza al 95% (IC95%), considerando significativo un valor de p<0,05. **Resultados:** En el primer trimestre, ser soltera (RPa=1,55; p=0,004), tener menor nivel educativo (RPa=1,77; p=0,019) y acudir a matronas (RPa=2,00; p<0,001) aumentaron la prevalencia de asistencia inadecuada, mientras que el embarazo riesgoso la redujo (RPa=0,55; p<0,001). En el segundo trimestre, persistió mayor en solteras (RPa=1,95; p=0,059) y mujeres con menor educación (RPa=2,19; p=0,026), además de tener tres o más hijos (RPa=2,69; p=0,001). **Conclusión:** Los factores asociados a la asistencia inadecuada al CPN varían entre los trimestres, lo que resalta la necesidad de estrategias diferenciadas para mejorar la cobertura y adherencia al CPN.

Palabras clave: Primer trimestre del embarazo; Segundo trimestre del embarazo; Atención prenatal; Embarazo (Fuente: DeCS- BIREME)

[1] Instituto Nacional Materno Perinatal, Lima, Peru.
[2] Universidad Científica del Sur, Lima, Peru.
[3] Hospital de Emergencias José Casimiro Ulloa, Lima, Peru.
[4] Universidad Nacional del Callao, Lima, Peru.
[5] Universidad Nacional Mayor de San Marcos, Lima, Peru.
[a] MD
[b] Bio-statistician economist.
[c] Registered nurse.
[d] Statistician.
[e] Obstetrician-gynecologist.

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INTRODUCTION

Prenatal care is a fundamental intervention to improve maternal and neonatal health outcomes [1]. Numerous studies have demonstrated its association with a reduced incidence of adverse birth outcomes. Adequate prenatal care has been shown to significantly decrease the risks of preterm birth and low birth weight [2,3], as well as reduce the risk of neonatal mortality by 55%[4]. Likewise, low utilization of prenatal care—either due to late initiation or an insufficient number of visits—has been associated with an increased risk of adverse maternal health behaviors and conditions, such as inadequate gestational weight gain, smoking during pregnancy, and absence of breastfeeding after delivery [5]. In resource-limited settings, restricted availability and low use of maternal health services contribute significantly to high maternal mortality, as reported in a study conducted in Ghana[6].

Various factors are associated with inadequate prenatal care (PNC), including geographical and socioeconomic barriers. Women who depend on public transportation and require long travel times have been identified as more likely to receive inadequate prenatal care, which is associated with worse perinatal outcomes[7]. In low- and middle-income countries, access to and adherence to prenatal care are influenced by factors such as socioeconomic status, education, and regional poverty [8]. Other factors, such as low educational attainment, reduced household income, and smoking during pregnancy, have also been linked to inadequate use of prenatal care [6]. The COVID-19 pandemic exacerbated many of these barriers, negatively impacting prenatal care and maternal and neonatal health outcomes. It has been reported that reduced prenatal visits, along with the implementation of potentially harmful care policies during the pandemic, contributed to an increase in maternal mental health issues and domestic violence, as well as negatively affected birth outcomes [9]. It is essential to develop strategies that promote adherence to prenatal and postnatal care regimens[10]. While group prenatal care has shown significant benefits in reducing prematurity and low birth weight, there is still insufficient evidence to support the widespread implementation of other strategies [11]. Therefore, it is necessary to expand the study of factors that limit prenatal care utilization among pregnant women, considering their needs according to gestational stage and socioeconomic context [12]. This will enable the design of more precise and effective interventions to improve maternal and fetal health from the earliest stages of pregnancy. For this reason, the objective of this study is to compare the factors associated with inadequate PNC during the first and second trimesters of pregnancy in women treated at the outpatient clinic of the Instituto Nacional Materno Perinatal (INMP), a referral hospital in Lima, Peru.

METHODOLOGY

Study design and setting

A retrospective, analytical, cross-sectional study was conducted among pregnant women seen at the outpatient clinics of the INMP in Lima, Peru. The INMP is a high-complexity public health institution specialized in maternal-perinatal medical-surgical care, with an annual record of approximately 22,000 births. The outcome variable was inadequate PNC. PNC was considered adequate in the first trimester when the pregnant woman had at least one visit before 13 weeks of gestation, and adequate in the second trimester when she had at least two PNC visits between weeks 13 and 26 + 6 days, according to the recommendations of the World Health Organization (WHO) [13] and the Peruvian Ministry of Health[14].

Population and sample

A total of 256 pregnant women with a completed second trimester (more than 26 weeks + 6 days of gestation) seen at the INMP outpatient clinics were included. Women were excluded if they did not have their PNC booklet at the time of the interview, had physical or mental limitations preventing them from answering the questionnaire, or refused to sign the informed consent. To determine the sample size, Fleiss' formula with continuity correction for comparison of proportions was used.

A reference value of 28% for positive unexposed and an expected prevalence ratio of 1.7 was considered based on previous literature [6]. A 95% confidence level and 80% statistical power were assumed. The initial calculation determined a sample size of 210 subjects, which was increased to account for a possible 20% refusal rate.

Variables and instruments

There was no primary exposure variable; rather, a thorough exploration of various factors potentially associated with inadequate PNC was conducted. A structured questionnaire was designed, including demographic questions (age, marital status, education level, and place of origin), gynecological-obstetric history (number of children, history of abortion, high-risk pregnancy, and planning of the current pregnancy), sociocultural factors (care by midwives in the community, type of transportation used to attend PNC, and travel time in hours), and perception of care received (waiting time for appointment assignment, waiting time on the day of the visit, and adequacy of information provided by health personnel).

To collect data, a targeted survey was administered focusing on factors related to non-attendance to PNC. The number of PNC visits was recorded by the principal investigator using a data collection form, which included the dates of PNC visits in the first and second trimesters, according to the documentation in the PNC booklet. PNC visits during the first trimester were those conducted between weeks 1 and 12 + 6 days, and second-trimester visits were those between weeks 13 and 26 + 6 days.

Procedures

Pregnant women were contacted during their appointments at the INMP outpatient clinics. After explaining the study objectives and obtaining informed consent, the structured survey was applied individually in a private setting. Subsequently, the principal investigator reviewed each participant's PNC booklet to record the number of visits made during the first and second trimesters.

Statistical analysis

In the descriptive analysis, frequencies and percentages were used for qualitative variables, while measures of central tendency (mean) and dispersion (standard deviation) were calculated for quantitative variables. For hypothesis testing of qualitative variables, the chi-square test was used, considering a p-value <0.05 as statistically significant.

The strength of association was estimated using a Poisson regression model, adjusted to control for confounding variables through multiple regression analysis. Results were reported in terms of prevalence ratios (PR) and 95% confidence intervals (CI), with statistical significance set at p<0.05.

Ethical considerations

The study was approved by the Institutional Research Ethics Committee of the INMP under letter No. 091-2023-CIEI/INMP. Informed consent was obtained from all participants prior to administering the survey, and confidentiality of data and adherence to ethical principles of research involving human subjects were ensured.

RESULTS

A total of 256 pregnant women with more than 26 weeks + 6 days of gestation were surveyed. Of these, 114 had adequate PNC and 142 did not in the first trimester, while in the second trimester, 211 had adequate PNC and 45 did not.

Demographic and gynecological-obstetric characteristics

Significant differences in inadequate PNC during the first trimester were found in relation to marital status (p=0.043), education level (p<0.001), place of birth (p=0.005), and age range (p=0.002). In the second trimester, significant differences were observed regarding place of birth (p=0.027), number of children (p=0.007), and history of abortion (p=0.043) (Table 1).

Table 1. Distribution of demographic and gynecological characteristics of pregnant women according to adequate attendance to prenatal check-ups during the first and second trimesters of pregnancy at INMP, 2023.

		1st Trimester Inadequate Attendance			2nd Trimester Inadequate Attendance			Total
		No	Yes	*p*-value	No	Yes	*p*-value	
		N=139	N=117		N=211	N=45		N=256
Marital status	Married / Cohabiting	126 (90.6%)	96 (82.1%)	0.043	187 (88.6%)	35 (77.8%)	0.052	222 (86.7%)
	Single				24 (11.4%)	10 (22.2%)		34 (13.3%)
Education level	Higher (complete/incomplete)	62 (44.6%)	17 (14.5%)	<0.001	70 (33.2%)	9 (20.0%)	0.082	79 (30.9%)
	Elementary / Middle / High	77 (55.4%)	100 (85.5%)		141 (66.8%)	36 (80.0%)		177 (69.1%)
Place of birth	Lima	88 (63.3%)	64 (54.7%)	0.005	118 (55.9%)	34 (75.6%)	0.027	152 (59.4%)
	Province	39 (28.1%)	51 (43.6%)		82 (38.9%)	8 (17.8%)		90 (35.2%)
	Foreign country	12 (86%)	2 (1.7%)		11 (5.2%)	3 (6.7%)		14 (5.5%)
Number of pregnancies	2 or fewer	95 (68.3%)	89 (76.1%)	0.170	159 (75.4%)	25 (55.6%)	0.007	184 (71.9%)
	3 or more	44 (31.7%)	28 (23.9%)		52 (24.6%)	20 (44.4%)		72 (28.1%)
Age range	Under 30 years	78 (56.1%)	87 (74.4%)	0.002	132 (62.6%)	33 (73.3%)	0.170	165 (64.5%)
	30-35 years	61 (43.9%)	30 (25.6%)		79 (37.4%)	12 (26.7%)		91 (35.5%)
History of miscarriage	No	100 (71.9%)	90 (76.9%)	0.360	162 (76.8%)	28 (62.2%)	0.043	190 (74.2%)
	Yes	39 (28.1%)	27 (23.1%)		49 (23.2%)	17 (37.8%)		66 (25.8%)

Social and institutional characteristics

In the first trimester, inadequate PNC attendance showed significant differences with the following factors: high-risk pregnancy (p<0.001), planned pregnancy (p<0.001), usual prenatal consultation with midwives (p<0.001), type of transportation (p=0.002), and waiting time for appointment assignment (p<0.001). In the second trimester, significant differences were found regarding high-risk pregnancy (p=0.019), waiting time for appointment assignment (p<0.001), waiting time on the day of the visit (p<0.001), and adequacy of information provided by health personnel (p<0.001) (Table 2).

Table 2. Distribution of social and institutional characteristics of pregnant women according to adequate attendance to prenatal check-ups during the first and second trimesters of pregnancy at INMP, 2023.

		1st Trimester Inadequate Attendance			2nd Trimester Inadequate Attendance			Total
		No N=114	Yes N=142	*p*-value	No N=211	Yes N=45	*p*-value	N=256
High-risk pregnancy	No	68 (59.6%)	96 (67.6%)	<0.001	142 (67.3%)	22 (48.9%)	0.019	164 (64.1%)
	Yes	46 (40.4%)	46 (32.4%)		69 (32.7%)	23 (51.1%)		92 (35.9%)
Planned pregnancy	No	74 (53.2%)	90 (76.9%)	<0.001	140 (66.4%)	36 (80.0%)	0.073	176 (68.8%)
	Yes	65 (46.8%)	27 (23.1%)		71 (33.6%)	9 (20.0%)		80 (31.3%)
Usual midwife care in the community	No	76 (54.7%)	100 (85.5%)	<0.001	162 (76.8%)	37 (82.2%)	0.430	199 (77.7%)
	Yes	63 (45.3%)	17 (14.5%)		49 (23.2%)	8 (17.8%)		57 (22.3%)
Type of transportation	Private	131 (94.2%)	68 (58.1%)	0.002	23 (10.9%)	2 (4.4%)	0.140	25 (9.8%)
	Public	8 (5.8%)	49 (41.9%)		148 (70.1%)	38 (84.4%)		186 (72.7%)
	Taxi	20 (14.4%)	5 (4.3%)		40 (19.0%)	5 (11.1%)		45 (17.6%)
Distance to hospital	Less than 1 hour	89 (64.0%)	97 (82.9%)	0.580	139 (65.9%)	27 (60.0%)	0.450	166 (64.8%)
	1 hour or more	30 (21.6%)	15 (12.8%)		72 (34.1%)	18 (40.0%)		90 (35.2%)
Long wait for appointment scheduling	No	88 (63.3%)	78 (66.7%)	<0.001	168 (79.6%)	21 (46.7%)	<0.001	189 (73.8%)
	Yes	51 (36.7%)	39 (33.3%)		43 (20.4%)	24 (53.3%)		67 (26.2%)
Long wait on day of appointment	No	116 (83.5%)	73 (62.4%)	0.860	160 (75.8%)	18 (40.0%)	<0.001	178 (69.5%)
	Yes	23 (16.5%)	44 (37.6%)		51 (24.2%)	27 (60.0%)		78 (30.5%)
Sufficient information provided	No	96 (69.1%)	82 (70.1%)	0.530	186 (88.2%)	26 (57.8%)	<0.001	212 (82.8%)
	Yes	43 (30.9%)	35 (29.9%)		25 (11 8%)	19 (42 2%)		44 (17 2%)

Table 3. Crude and adjusted prevalence ratios of sociodemographic and personal characteristics of pregnant women according to adequate prenatal care attendance during the first and second trimesters at INMP, 2023.

Factors		1st Trimester Inadequate Attendance				2nd Trimester Inadequate Attendance			
		cRP IC95%	*p*-value	aPR 95% CI	*p*-value	cRP IC95%	*p*-value	aPR 95% CI	*p*-value
Marital status	Married / Cohabiting	Ref.				Ref.			
	Single	1.43 (1.05 - 1.94)	0.022	1.55 (1.15 - 2.10)	0.004	1.87 (1.02 - 3.41)	0.043	1.95 (0.98 - 3.90)	0.059
Education level	Higher (complete/incomplete)	Ref.				Ref.			
	Elementary / Middle / High	2.63 (1.69 - 4.08)	<0.001	1.77 (1.10 - 2.85)	0.019	1.79 (0.90 - 3.53)	0.096	2.19 (1.10 - 4.36)	0.026
Place of birth	Lima	Ref.				Ref.			
	Province	1.35 (1.04 - 1.75)	0.025	0.77 (0.57 - 1.06)	0.107	0.40 (0.19 - 0.82)	0.013	0.34 (0.15 - 0.78)	0.011
	Foreign country	0.34 (0.093 - 1.24)	0.103	0.45 (0.13 - 1.55)	0.208	0.96 (0.34 - 2.73)	0.936	0.98 (0.33 - 2.89)	0.971
Number of pregnancies	2 or fewer	Ref.				Ref.			
	3 or more	0.80 (0.58 - 1.11)	0.190	1.29 (0.94 - 1.77)	0.114	2.04 (1.21 - 3.45)	0.007	2.69 (1.48 - 4.92)	0.001
Age range	Under 30 years	Ref.				Ref.			
	30-35 years	0.63 (0.45 - 0.87)	0.004	0.92 (0.67 - 1.27)	0.626	0.66 (0.36 - 1.21)	0.181	0.56 (0.29 - 1.09)	0.089
High-risk pregnancy	No	Ref.				Ref.			
	Yes	0.54 (0.38 - 0.76)	<0.001	0.55 (0.39 - 0.78)	<0.001	1.86 (1.10 - 3.16)	0.021	1.40 (0.81 - 2.43)	0.235
Planned pregnancy	No	Ref.				Ref.			
	Yes	0.37 (0.24 - 0.58)	<0.001	0.56 (0.35 - 0.91)	0.017	0.55 (0.28 - 1.09)	0.086	0.64 (0.29 – 1.40)	0.258
Usual midwife care	No	Ref.				Ref.			
	Yes	2.52 (2.02 – 3.14)	<0.001	2.00 (1.49 – 2.68)	<0.001	0.76 (0.37 – 1.53)	0.435	0.96 (0.45 – 2.06)	0.913
Type of transportation	Private	Ref.				Ref.			
	Public	2.60 (1.18 – 5.79)	0.018	1.77 (0.77 – 4.08)	0.178	2.55 (0.65 – 9.97)	0.177	1.96 (0.43 – 8.91)	0.383
	Taxi	1.67 (0.69 - 4.05)	0.260	1.26 (0.52 - 3.05)	0.606	1.39 (0.29 - 6.67)	0.681	1.11 (0.24 - 5.20)	0.899
Distance to hospital	< 1 hour	Ref.				Ref.			
	≥ 1 hour	0.92 (0.69 - 1.23)	0.580	1.45 (1.04 - 2.01)	0.027	1.23 (0.72 - 2.11)	0.453	1.07 (0.60 - 1.93)	0.821
Long wait for appointment assignment	No	Ref.				Ref.			
	Yes	1.70 (1.32 - 2.18)	<0.001			3.22 (1.92 - 5.40)	<0.001		
Long wait on appointment day	No	Ref.				Ref.			
	Yes	0.97 (0.73 - 1.31)	0.861			3.42 (2.01 - 5.84)	<0.001		
Sufficient information provided	No	Ref.				Ref.			
	Yes	1.12 (0.80 - 1.56)	0.517			3.52 (2.15 - 5.78)	<0.001		

Multivariate regression analysis

In the multivariate regression model for inadequate PNC attendance during the first and second trimesters, the following variables were included: marital status, education level, place of birth, gestational age, age range, high-risk pregnancy, planned pregnancy, usual PNC with midwives, type of transportation, and distance from residence to the hospital. In the first trimester, single women had a higher risk of inadequate attendance (aPR = 1.55; p = 0.004), as did those with primary or secondary education (aPR = 1.77; p = 0.019).

Pregnant women with high-risk pregnancies showed a lower risk of inadequate attendance (aPR = 0.55; p < 0.001). In addition, usual prenatal consultation with midwives was associated with a higher risk (aPR = 2.00; p < 0.001), as was living one hour or more away from the hospital (aPR = 1.45; p = 0.027) (Table 3).

In the second trimester, single women also had a higher risk of inadequate attendance (aPR = 1.95; p = 0.059), while those with primary or secondary education presented a significantly higher risk (aPR = 2.19; p = 0.026). Women born in provinces showed a lower risk of inadequate attendance (aPR = 0.34; p = 0.011), whereas those with three or more children had a higher risk (aPR = 2.69; p = 0.001) (Table 3).

DISCUSSION

This study identified that, in the first trimester, single women and those with a primary or secondary education level had a higher prevalence of inadequate attendance to prenatal care (PNC). Additionally, it was observed that women with high-risk pregnancies had a lower frequency of inadequate attendance, while habitual prenatal consultations with midwives and living an hour or more from the hospital were associated with a higher risk of inadequate attendance. In the second trimester, the pattern of higher prevalence of inadequate attendance persisted among single women and those with primary or secondary education.

However, other specific factors emerged, such as a lower proportion of inadequate attendance in women born in provinces and a higher risk in those with three or more children. These findings highlight the variability of determinants influencing PNC attendance according to the gestational stage.

Access to and utilization of prenatal care has been extensively studied due to its impact on maternal and neonatal health. Different studies have identified multiple barriers, with significant differences according to sociodemographic, economic, and cultural factors. The 2023 Demographic and Family Health Survey (ENDES, by its Spanish acronym) in Peru reported that the main reasons for not attending PNC were economic difficulties in covering transportation or consultations (35%), distance to health centers (25%), and lack of time due to work or family responsibilities (20%). Additionally, 15% of women mentioned previous negative experiences or distrust of health personnel, while 10% indicated not understanding the importance of PNC [15].

Factors associated with prenatal care attendance have also been documented in other contexts. A study in a rural district of Ghana identified that low availability and underutilization of health services contributed to high maternal and neonatal mortality rates in resource-limited settings [6]. In Argentina, an analysis of PNC adherence highlighted that the physician-patient interaction influences adherence to prenatal care, emphasizing the importance of effective communication in maternal care [16]. Similarly, a narrative review on prenatal care in developing countries pointed out that cultural barriers constitute a significant obstacle to attending check-ups[17].

In Uganda, adherence to prenatal care has been described as being affected by lack of economic resources, lack of shared understanding of the value of PNC, and gender-based power dynamics within households [12]. In China, a follow-up study concluded that attending PNC had an independent effect in reducing the risk of preterm birth and low birth weight [2]. In the United States, barriers reported to attending prenatal visits included lack of health insurance and partner violence, factors that affect not only the mother

but also the well-being of the newborn [18]. In 32 low-income countries, key determinants of prenatal care utilization were identified, suggesting the need to integrate safe maternity programs with social development strategies [8]. In Brazil, a study in the northeast of the country found high levels of prenatal care attendance, although one-third of pregnant women showed inadequate utilization due to socioeconomic and demographic factors, such as maternal age, education level, and lack of a partner [19]. In Ethiopia, socioeconomic inequality at the start of prenatal care was associated with wealth, education level, and region of residence, highlighting the need for targeted interventions[20].

A survival analysis conducted in 57 low- and middle-income countries demonstrated that prenatal care attendance is associated with lower neonatal mortality, underscoring the importance of promoting more prenatal visits[4]. Furthermore, the validation of a model of adherence to prenatal recommendations in the United States emphasized the relevance of shared decision-making and cultural competence to improve adherence to prenatal check-ups[21].

The impact of the COVID-19 pandemic on maternal and perinatal health highlighted the lack of planning for continuity of prenatal care, reflected in a concerning reduction in prenatal visits and an increase in maternal mental health issues. These findings underscore the need to implement adaptive strategies and allocate additional resources to ensure the continuity of prenatal care during crisis situations[9]. In this context, a systematic review of interventions to improve prenatal care adherence in sub-Saharan Africa concluded that current strategies have limited effectiveness, which highlights the need for innovative approaches [10]. Similarly, a study in the United Kingdom found that ethnic and socioeconomic inequalities affect the timely initiation of prenatal care, emphasizing the importance of addressing these disparities to improve maternal outcomes[22].

Prenatal care attendance remains a challenge influenced by various sociodemographic, economic, and cultural factors. The evidence shows that the lack of economic resources, distance to health centers, and lack of time continue to be significant barriers to adequate attendance to prenatal check-ups [23]. Additionally, the impact of factors such as maternal education and social stability has been widely documented [24], highlighting the need to strengthen educational programs and access to medical services from a comprehensive perspective. Interventions targeted at at-risk populations, such as the implementation of behavioral incentives and patient navigation, have shown promise in increasing adherence to prenatal care [25]. Furthermore, the development of innovative prenatal care models, such as group care and the use of technology for remote consultations, may help reduce access gaps[26].

Since access to prenatal care directly impacts the reduction of maternal and neonatal complications[27], it is recommended to implement public policies that ensure equity in access to these services. Moreover, integrating a biopsychosocial approach in perinatal care would allow for more effective addressing of the individual needs of pregnant women, promoting better maternal and neonatal health outcomes[28]. Finally, to reduce disparities in prenatal care attendance, collaboration between governments, communities, and healthcare professionals is essential to develop sustainable and culturally sensitive strategies that encourage greater adherence to prenatal check-ups[29].

This study presents some limitations. As a retrospective analytical cross-sectional design, it does not allow for establishing causal relationships between the analyzed variables. Furthermore, the information obtained through surveys may be subject to recall or response biases, which could affect the accuracy of some data. Another limitation is that the study was conducted at a single reference center, which may limit the generalizability of the findings to other contexts with

different socioeconomic characteristics and access to healthcare.

CONCLUSION

This study demonstrates that factors associated with inadequate PNC attendance vary between the first and second trimesters of pregnancy. While being single and having a lower education level were risk factors in both trimesters, other variables, such as high-risk pregnancy, habitual consultations with midwives, and distance from the hospital, primarily influenced the first trimester, while the number of children and place of birth had an impact in the second trimester. These findings underscore the importance of designing differentiated strategies according to the gestational stage, considering sociodemographic, cultural, and healthcare access factors to improve PNC coverage and adherence. Implementing policies that reduce geographical and economic barriers, as well as strengthening prenatal education, could contribute to greater adherence to check-ups and, consequently, improve maternal and neonatal outcomes.

Author contributions:
SDCV: Conceptualization, methodology, investigation, formal analysis, writing – original draft, writing – review & editing. ACA: Conceptualization, methodology, investigation, formal analysis, writing – original draft, writing - review & editing. RILV: Conceptualization, investigation, data curation, formal analysis, writing – original draft, writing – review & editing. NSV: Conceptualization, data curation, formal analysis, writing – original draft, writing – review & editing. GMC: Conceptualization, investigation, writing – original draft, writing – review & editing. JFRV: Conceptualization, investigation, writing – original draft, writing – review & editing.

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Correspondence: Claudia Veralucia Saldaña Díaz.
Email: cvsaldi.med@gmail.com

REFERENCES

1. Peahl AF, Howell JD. The evolution of prenatal care delivery guidelines in the United States. Am J Obstet Gynecol. 2021;224(4):339-47. doi:10.1016/j.ajog.2020.12.016.

2. Huang A, Wu K, Zhao W, Hu H, Yang Q, Chen D. Attendance at prenatal care and adverse birth outcomes in China: A follow-up study based on Maternal and Newborn's Health Monitoring System. Midwifery. 2018;57:26–31. doi:10.1016/j.midw.2017.10.018

3. Handler A, Rankin K, Rosenberg D, Sinha K. Extent of documented adherence to recommended prenatal care content: provider site differences and effect on outcomes among low-income women. Matern Child Health J. 2012;16(2):393–405. doi:10.1007/s10995-011-0763-3

4. Doku DT, Neupane S. Survival analysis of the association between antenatal care attendance and neonatal mortality in 57 low- and middle-income countries. Int J Epidemiol. 2017;46(5):1668–77. doi:10.1093/ije/dyx125

5. Yan J. The Effects of Prenatal Care Utilization on Maternal Health and Health Behaviors. Health Econ. 2017;26(8):1001–18. doi:10.1002/hec.3380

6. Nuamah GB, Agyei-Baffour P, Mensah KA, Boateng D, Quansah DY, Dobin D, et al. Access and utilization of maternal healthcare in a rural district in the forest belt of Ghana. BMC Pregnancy Childbirth. 2019;19(1):6. doi:10.1186/s12884-018-2159-5

7. Holcomb DS, Pengetnze Y, Steele A, Karam A, Spong C, Nelson DB. Geographic barriers to prenatal care access and their consequences. Am J Obstet Gynecol MFM. 2021;3(5):100442. doi:10.1016/j.ajogmf.2021.100442

8. Guliani H, Sepehri A, Serieux J. Determinants of prenatal care use: evidence from 32 low-income countries across Asia, Sub-Saharan Africa and Latin America. Health Policy Plan. 2014;29(5):589–602. doi:10.1093/heapol/czt045

9. Kotlar B, Gerson E, Petrillo S, Langer A, Tiemeier H. The impact of the COVID-19 pandemic on maternal and perinatal health: a scoping review. Reprod Health. 2021;18(1):10. doi:10.1186/s12978-021-01070-6

10. Esopo K, Derby L, Haushofer J. Interventions to improve adherence to antenatal and postnatal care regimens among pregnant women in sub-Saharan Africa: a systematic review. BMC Pregnancy Childbirth. 2020;20(1):316. doi:10.1186/s12884-020-02992-y

11. Groskaufmanis L, Brunner Huber LR, Vick T. Group Prenatal Visits: Maternal and Neonatal Health Outcomes. J Midwifery Womens Health. 2018;63(5):505-638. doi:10.1111/jmwh.12764

12. Wilson M, Patterson K, Nkalubo J, Lwasa S, Namanya D, Twesigomwe S, et al. Assessing the determinants of antenatal care adherence for Indigenous and non-Indigenous women in southwestern Uganda. Midwifery. 2019;78:16–24. doi:10.1016/j.midw.2019.07.005

13. World Health Organization. WHO recommendations on antenatal care for a positive pregnancy experience [Internet]. Publications; 2016 [citado el 14 de junio de 2024]. Disponible en: https://www.who.int/publications/i/item/9789241549912.

14. Ministerio de Salud del Perú. Recomendaciones para una maternidad saludable [Internet]. Gobierno del Perú; 2024 [citado el 4 de julio de 2024]. Disponible en: https://www.gob.pe/33919-recomendaciones-para-una-maternidad-saludable.

15. Instituto Nacional de Estadística e Informática. Perú: Encuesta Demográfica y de Salud Familiar, Endes 2023 [Internet]. Gobierno del Perú; 2024 [citado el 4 de julio de 2024]. Disponible en: https://www.gob.pe/institucion/inei/informes-publicaciones/5601739-peru-encuesta-demografica-y-de-salud-familiar-endes-2023.

16. González-Cowes VL, Landini FP. Adherence to prenatal care in the north of Argentina from a social interface perspective. Cienc Saude Coletiva. 2018;23(8):2741–50. doi:10.1590/1413-81232018238.12932016

17. Dioses Fernández DL, Corzo Sosa CA, Zarate García JJ, Vizcarra Gonzales VA, Zapata Maza NG, Arredondo-Nontol M, et al. Adherence to prenatal care in the sociocultural context of developing countries: a narrative review. Horiz Méd Lima. 2023;23(4). doi:10.24265/horizmed.2023.v23n4.12

18. Wolf ER, Donahue E, Sabo RT, Nelson BB, Krist AH. Barriers to Attendance of Prenatal and Well-Child Visits. Acad Pediatr. 2021;21(6):955–60. doi:10.1016/j.acap.2020.11.025

19. Ribeiro ERO, Guimarães AMDN, Bettiol H, Lima DDF, Almeida MLD, de Souza L, et al. Risk factors for inadequate prenatal care use in the metropolitan area of Aracaju, Northeast Brazil. BMC Pregnancy Childbirth. 2009;9:31. doi:10.1186/1471-2393-9-31

20. Kidie AA, Asmamaw DB, Belachew TB, Fetene SM, Baykeda TA, Endawkie A, et al. Socioeconomic inequality in timing of ANC visit among pregnant women in Ethiopia, 2019. Front Public Health. 2024;12. doi:10.3389/fpubh.2024.1243433

21.Evans NM, Sheu J-J. Validating a path model of adherence to prenatal care recommendations among pregnant women. Patient Educ Couns. 2019;102(7):1350–6. doi:10.1016/j.pec.2019.02.028

22. Puthussery S, Tseng P-C, Sharma E, Harden A, Griffiths M, Bamfo J, et al. Disparities in the timing of antenatal care initiation and associated factors in an ethnically dense maternal cohort with high levels of area deprivation. BMC Pregnancy Childbirth. 2022;22(1):713. doi:10.1186/s12884-022-04984-6

23.Zielenbach M, Ekpe E, Oot A, Yeh C, Yee LM. Association of Antenatal Housing Instability with Perinatal Care Utilization and Outcomes. J Womens Health (Larchmt). 2024;33(1):90-97. doi:10.1089/jwh.2023.0002

24. Lee Y-C, Liang F-W, Chen G-D, Lu T-H, Chiang T-L. Social determinants of late initiation of prenatal care in Taiwan: A nationwide study. Res Sq. 2023. Disponible en: https://www.researchsquare.com/article/rs-3161743/v1.

25.Svikis DS, Kelpins SS, Keyser-Marcus L, Bishop DL, Parlier-Ahmad AB, Jones H, et al. Increasing Prenatal Care Compliance in At-Risk Black Women: Findings from a RCT of Patient Navigation and Behavioral Incentives. J Racial Ethn Health Disparities. 2022;9(2):630-640. doi:10.1007/s40615-021-00995-9

26.Darling EK, Kjell C, Tubman-Broeren M, Marquez O. The Effect of Prenatal Care Delivery Models Targeting Populations with Low Rates of PNC Attendance: A Systematic Review. J Health Care Poor Underserved. 2021;32(1):119-136. doi:10.1353/hpu.2021.0012

27.Heberlein EC, Smith JC, LaBoy A, Britt J, Crockett A. Birth Outcomes for Medically High-Risk Pregnancies: Comparing Group to Individual Prenatal Care. Am J Perinatol. 2024;41(4):414-421. doi:10.1055/a-1682-2704

28.Duberstein ZT, Brunner J, Panisch LS, Bandyopadhyay S, Irvine C, Macri JA, et al. The Biopsychosocial Model and Perinatal Health Care: Determinants of Perinatal Care in a Community Sample. Front Psychiatry. 2021;12:746803. doi:10.3389/fpsyt.2021.746803

29.Pennathur H, Ghrayeb L, Debnath D, Ganzi S, Cohn A, Peahl AF. Cumulative Effect of Medical and Social Risk Factors on Routine Prenatal Care Screening [A231]. Obstet Gynecol. 2022;139:67S. doi:10.1097/01.AOG.0000826200.21918.f0