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Sociodemographic factors associated with immediate puerperal control: A cross-sectional study based on the Peruvian demographic and health survey, 2019

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ABSTRACT

Introduction: Peru is the fifth country in Latin America with the highest maternal mortality. In Peru, immediate puerperal control (IPC) was established in 2013 as a measure to improve postnatal control, with a view in reducing maternal mortality. This study aimed to evaluate the frequency and sociodemographic factors associated with compliance with IPC in Peru, 2019.

Methods: We conducted an analytical cross-sectional study based on the Demographic and Family Health Survey (ENDES, for its acronym in Spanish) of Peru, 2019. The dependent variable was compliance with IPC (control in the first 2 h) in women aged 15–49 years who had delivered within the last five years preceding the survey. To evaluate the associated factors, Poisson family generalized linear models were used to calculate crude (cPR) and adjusted (aPR) prevalence ratios, with their respective 95% confidence intervals (95%CI).

Results: Data from 11,854 women were analyzed. The frequency of IPC was 59.6% (95%CI: 58.3–60.9). We found a lower proportion of IPC in urban areas (58.8%) and in the highlands (57%) and jungle (57.2%) of Peru. Residing in rural areas (aPR:1.13; 95%CI:1.08–1.19), having undergone appropriate antenatal care (ANC) (aPR:1.05; 95%CI:1.01–1.10) and having delivered a low-birth-weight newborn (aPR:1.20; 95%CI:1.12–1.29) were associated with a higher frequency of IPC, while living in the highlands (aPR:0.86; 95%CI:0.80–0.92) or jungle (aPR:0.86; 95%CI:0.80–0.92) was associated with a lower frequency of IPC.

Conclusions: Approximately four out of ten women did not have IPC. There was a lower proportion of IPC in urban areas and in the highland and jungle regions.

Introduction

Between 1990 and 2015, at least 10.7 million women died worldwide from causes related to pregnancy or childbirth [1]. Approximately 73% of all maternal deaths between 2003 and 2009 were due to direct obstetric causes, the leading cause being hemorrhage with 27% (19.9%−36.2%), followed by hypertensive disorders with 14% (11.1%−17.4%) and sepsis with 11% (5.9%−18.6%) [2]. In view of this, efforts to reduce maternal mortality have increased, albeit with limited impact, since, the number of maternal deaths continues to be high, with data for 2017 indicating 211 maternal deaths per 100,000 live births worldwide [3]. In relation to maternal mortality, factors such as biology, economics, culture, demographics, and the distribution and effectiveness of health services may participate in the causal pathway of maternal deaths [4], and thus, these factors should be taken into account in the design of prevention frameworks.

Maternal deaths could be reduced by health policies, through factors such as access to family planning, appropriate antenatal care (ANC), information concerning and immediate and timely puerperal control, and timely identification and management of obstetric complications [4,

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5]. Currently, puerperal care and monitoring services represent an excellent strategy for the prevention of maternal deaths [6,7]. The World Health Organization (WHO) recommends that the woman and the newborn should be examined immediately after delivery [8]. It also recommends counseling on danger signs and symptoms, as well as appropriate measures against life-threatening conditions [8]. Likewise, different clinical practice guidelines recommend monitoring during the first hours in order to identify immediate complications, mainly hemorrhage [9,10].

In Latin America, maternal mortality has decreased in recent years [11], although Peru remains the country with the fifth highest maternal mortality [11]. In 2013, the technical health standard for comprehensive maternal health care provided by the Peruvian Ministry of Health (MINSA, its acronym in Spanish) established measures to improve postnatal control. The first recommendation was to give immediate puerperal control (IPC) during the puerperium (evaluation within the first two hours after delivery) [12], as an important point to reduce maternal mortality, which could explain the reduction in maternal mortality in Peru in recent years [11]. Evaluation of postpartum follow-up coverage through population-based studies has been explored in Uganda, Nepal and Ethiopia, using a cut-off point of two days after delivery [13–15], given the low coverage of this follow-up (<60%). This low coverage likely contributes to the higher maternal mortality in these countries [11]. In Peru, a frequency of puerperal control of 96.9% within the first 24 h was reported in 2019 [16]. However, the frequency of IPC and its associated factors have not been evaluated in the literature. Therefore, the present study aimed to estimate the prevalence of IPC and its associated factors in Peruvian women of childbearing age. The findings of this study could favor the implementation and empowerment of strategies for IPC, and thereby reduce maternal mortality.

Methods

Study design

An analytical cross-sectional study was conducted based on data from the 2019 Peruvian Demographic and Family Health Survey (ENDES, for its acronym in Spanish). This survey is carried out annually through the National Institute of Statistics and Informatics (INEI, for its acronym in Spanish) [17] and collects information on sociodemographic and health indicators of the population. The ENDES sampling has a complex design, being probabilistic proportional to the size of the sampling unit for the selection of clusters (primary sampling unit), and probabilistic balanced for the selection of households (secondary sampling unit), making it a survey with national, regional and urban-rural representativeness. The method used to collect the information was by means of direct interview carried out by trained personnel during a visit to the selected households. Additional information on the ENDES survey methodology is available in its technical report [17].

Population, sample and sampling

A total of 21,139 women between 15 and 49 years of age were surveyed in the ENDES 2019. The present study included information on Peruvian women of childbearing age between 15 and 49 years of age who had a birth within the five years prior to the date of the survey. Information from women who had had a last non-institutional delivery or who presented a complication during delivery that required continuous care, such as prolonged labor, sacrum, fever, convulsions, among others was excluded. Finally, only data from women with complete data on the variables of interest were evaluated. Thus, the final sample used in the study was 11,854 women (Fig. 1).

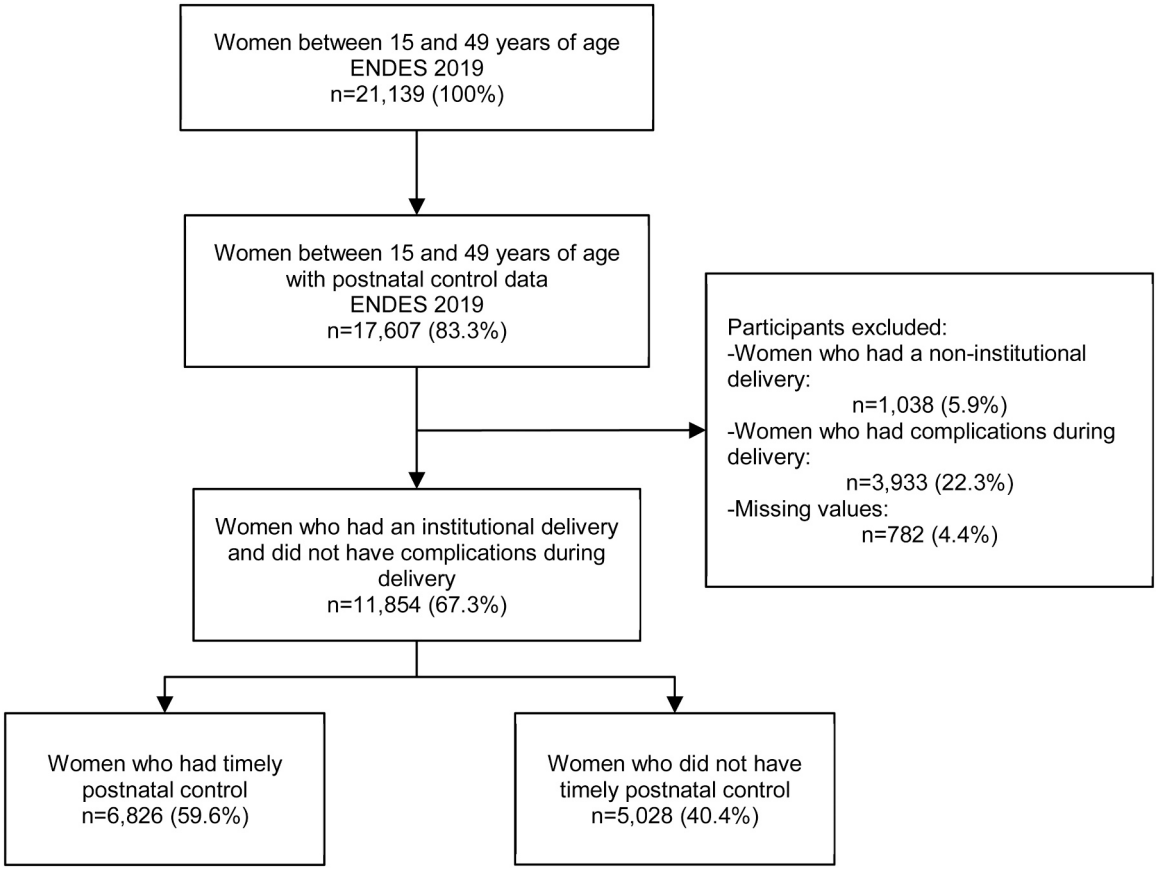

Fig. 1. Flowchart of sample selection.

Since we used a secondary database, which was not collected to answer our research question, we calculated the statistical power for the association of interest. We chose area of residence (urban, rural) as one of the most important associated factors for puerperal control [15]. Thus, power was calculated based on the study by Ndugga et al. [15], in which the proportion of adequate puerperal control was 62.7% in urban areas and 46.3% in rural areas. Thus, considering a sample of 11,854 women who met the eligibility criteria of this study, a statistical power of greater than 99.9% was obtained.

Variables

The dependent variable of the study was IPC assessed by the following question: "How many hours, days or weeks after the birth of (child's name) did you have your first checkup or medical checkup?". Any response greater than two hours was considered as no IPC. The cut-off point of two hours was chosen considering the MINSA technical health norm for comprehensive maternal health care [12].

The independent variables were analyzed in previous studies [13–15], and were considered to have an important relationship with the performance of puerperal control. For the present study, we included the mother's age (adolescent 15–19 years, youth 20–34 years, adult 35–49 years) [18,19], current marital status (married/cohabiting partner, not married/cohabiting partner), education level (primary or preschool, secondary, higher), employment condition (no, yes), geographical region of residence (Lima metropolitan area, rest of coastline, highlands, jungle), residence area (urban, rural), wealth index (first quintile, second quintile, third quintile, fourth quintile, fifth quintile), ethnicity (mestizo, Quechua, black or brown or zambo, other), parity (first children, second children, third children or more), adequate ANC (yes, no) and infant birth weight (adequate, low weight, high weight). Adequate ANC was constructed using responses on four components: first, number or ANC visits (with a cut-off point of six controls); second, first ANC visit during the first trimester; third, appropriate content of ANC (care and content that should be guaranteed during gestation); and fourth, whether the mother was attended by trained health personnel. This construct was based on WHO recommendations [20], and the methodology of previous studies [21,22]. ANC was considered adequate when the respondent affirmatively complied with all the components of adequate ANC.

Statistical analysis

All analyses were performed with the statistical program Stata® v.17.0 (Stata Corporation, College Station, Texas, USA), considering the characteristics of the complex survey design and the Demographic and Health Surveys weighting factors using the "svy" module.

For the descriptive analysis, given that all the variables were categorical, absolute frequencies and weighted proportions were calculated. For bivariate analysis, the chi-square test with Rao-Scott correction was used. To evaluate the factors associated with IPC, we used Poisson family generalized linear models to obtain crude (cPR) and adjusted (aPR) prevalence ratios. For the adjusted model, we used the forward manual selection method and the Wald test to select the variables that would allow obtaining a final parsimonic model. Thus, the variables region, area of residence, appropriate content of ANC and birth weight were included in the final model. The analyses were reported with their respective 95% confidence intervals (95%CI). Values of $p < 0.05$ were considered statistically significant. To evaluate the collinearity of the independent variables included in the adjusted model, the variance inflation factor was used, where a value > 10 determined multicollinearity among the variables; however, all the values obtained were less than 10.

Results

A total of 11,854 women aged 15–49 years were included in the analysis (Fig. 1). Regarding sociodemographic characteristics, 64.5% were between 20 and 34 years old, 83.6% were married or cohabitating with a partner, 46.4% had attained a secondary school education, 57.5% resided on the coast (including Metropolitan Lima), and 25.5% belonged to the second wealth quintile. Regarding gynecological-obstetric characteristics, 34.2% reported having three or more children, 80.9% did not have adequate ANC, and 86.8% had a child with adequate birth weight (Table 1).

In the study population, a prevalence of 59.6% (95%CI: 58.3–60.9) of IPC was found. This IPC was more frequent in women aged 15–19

Table 1
Characteristics of the study population (n = 11,854).

y	n	%*	95%CI*
Age			
15–19 years old	594	4.7	4.3–5.3
20–34 years old	7738	64.5	63.3–65.7
35–49 years old	3522	30.7	29.6–31.9
Current marital status			
Married/cohabiting partner	9885	83.6	82.7–84.4
Not married/cohabiting partner	1969	16.4	15.6–17.3
Womens education level			
Primary or preschool	1937	16.0	15.1–16.8
Secondary	5616	46.4	45.3–47.6
Higher	4301	37.6	36.4–38.8
Employment status			
Yes	7960	66.5	65.3–67.8
No	3894	33.5	32.2–34.7
Geographical region			
Lima metropolitan area	1421	28.8	27.5–30.0
Rest of coastline	3815	28.7	27.5–29.9
Highlands	3610	25.0	23.8–26.3
Jungle	3008	17.5	16.5–18.6
Residence area			
Urban	8932	77.8	76.7–78.8
Rural	2922	22.2	21.2–23.3
Wealth index			
First quintile	2710	19.8	18.9–20.8
Second quintile	3371	25.5	24.4–26.6
Third quintile	2480	20.4	19.4–21.4
Fourth quintile	1896	18.3	17.2–19.4
Fifth quintile	1397	16.0	15.1–17.0
Ethnicity			
Mestizo	5453	49.2	47.9–50.5
Quechua	3181	22.9	21.9–23.9
Negro/moreno/zambo	1197	11.2	10.5–12.0
Others	2023	16.7	15.7–17.7
Parity			
First child	3827	33.1	32.0–34.1
Second child	3845	32.7	31.6–33.9
Third child or more	4182	34.2	33.1–35.3
Number of ANC visits			
≥ 6 ANC	10,851	91.5	90.9–92.2
< 6 ANC	1003	8.5	7.8–9.1
First ANC visit during the first trimester			
No	2154	17.1	16.2–18.0
Yes	9700	82.9	82.0–83.8
Appropriate content of ANC			
Inadequate	4250	36.8	35.6–38.0
Adequate	7604	63.2	62.0–64.4
ANC adequate			
No	9596	80.9	79.9–81.8
Yes	2258	19.1	18.2–20.1
Weight at birth			
Adequate	10,311	86.8	85.9–87.6
Low weight	610	5.3	4.8–5.9
High weight	933	7.9	7.2–8.6
Immediate puerperal control			
No (≥2 h)	5028	40.4	39.1–41.7
Yes (<2 h)	6826	59.6	58.3–60.9

ANC: antenatal care; CI: confidence interval.
* Weighted percentages according to survey complex sampling.

years (63.3%; p = 0.280), in those with a primary or preschool education (62.4%; p = 0.052), women living in the Lima metropolitan area (62.6%; p = 0.005), those living in rural areas (62.4%; p = 0.011), women of black, brown or zambo ethnicity and in ethnicities other than mestizo and Quechua (61.8% for both categories; p = 0.026), in women who received adequate appropriate content of ANC (60.6%; p = 0.032) and in women who had a child with a low-birth-weight (70.9%; p < 0.001) (Table 2).

In the adjusted regression analysis, being from a rural area (aPR: 1.13; 95%CI: 1.08–1.19), having received ANC with content adequate (aPR: 1.05; 95%CI: 1.01–1.10) and having a child with a low-birth-weight (aPR: 1.20; 95%CI: 1.12–1.29) were associated with a higher prevalence of IPC, whereas being from the highlands (aPR: 0.86; 95%CI: 0.80–0.92) and jungle (aPR: 0.86; 95%CI: 0.80 −0.92) was associated with a lower prevalence of IPC (Table 3).

Table 2
Prevalence of immediate puerperal control according to the characteristics of the study population (n = 11,854).

Characteristics	Timely postnatal care						
	No			Yes			*p* * *
	n	%*	95%CI*	n	%*	95%CI*	
Age							
15–19 years old	225	36.7	31.9–41.7	369	63.3	58.3–68.1	0.280
20–34 years old	3323	40.8	39.4–42.4	4415	59.2	57.6–60.6	
35–49 years old	1480	40.1	37.9–42.3	2042	59.9	57.7–62.1	
Current marital status							
Married/cohabiting partner	4189	40.3	39.0–41.7	5696	59.7	58.3–61.0	0.720
Not married/ cohabiting partner	839	40.9	38.0–43.8	1130	59.1	56.2–62.0	
Womens education level							
Primary or preschool	719	37.6	35.0–40.3	1218	62.4	59.7–65.0	0.052
Secondary	2376	40.3	38.5–42.0	3240	59.7	58.0–61.5	
Higher	1933	41.8	39.7–43.8	2368	58.2	56.2–60.3	
Employment status							
Yes	3408	40.7	39.2–42.2	4552	59.3	57.8–60.8	0.509
No	1620	39.9	37.7–42.0	2274	60.1	58.0–62.3	
Geographical region							
Lima metropolitan area	557	37.4	34.3–40.5	864	62.6	59.5–65.7	**0.005**
Rest of coastline	1531	39.7	37.6–41.8	2284	60.3	58.2–62.4	
Highlands	1613	43.0	40.9–45.2	1997	57.0	54.8–59.1	
Jungle	1327	42.9	40.4–45.3	1681	57.2	54.7–59.6	
Residence area							
Urban	3876	41.2	39.7–42.7	5056	58.8	57.3–60.3	**0.011**
Rural	1152	37.6	35.4–39.9	1770	62.4	60.1–64.6	
Wealth index							
First quintile	1100	39.5	37.1–42.0	1610	60.5	58.0–62.9	0.053
Second quintile	1458	42.4	40.1–44.7	1913	57.6	55.3–59.9	
Third quintile	1091	42.4	39.7–45.1	1389	57.6	54.9–60.3	
Fourth quintile	804	38.8	35.8–41.9	1092	61.2	58.1–64.2	
Fifth quintile	575	37.7	34.4–41.0	822	62.3	59.0–65.6	
Ethnicity							
Mestizo	2324	40.3	38.4–42.1	3129	59.7	57.9–61.6	**0.026**
Quechua	1435	43.4	41.1–45.7	1746	56.6	54.3–58.9	
Negro/moreno/zambo	438	38.2	34.6–41.9	759	61.8	58.1–65.4	
Others	831	38.2	35.4–41.2	1192	61.8	58.8–64.6	
Parity							
First child	1672	40.8	38.7–42.9	2155	59.2	57.1–61.3	0.567
Second child	1673	40.9	38.8–43.1	2172	59.1	56.9–61.2	
Third child or more	1683	39.5	37.6–41.5	2499	60.5	58.5–62.4	
Number of ANC visits							
≥ 6 ANC	4639	40.6	39.3–41.9	6212	59.4	58.1–60.7	0.288
< 6 ANC	389	38.3	34.3–42.5	614	61.7	57.5–65.7	
First ANC visit during the first trimester							
No	875	38.9	36.2–41.7	1279	61.1	58.3–63.8	0.221
Yes	4153	40.7	39.4–42.1	5547	59.3	57.9–60.6	
Appropriate content of ANC							
Inadequate	1904	42.1	40.1–44.1	2346	57.9	55.9–59.9	**0.032**
Adequate	3124	39.4	37.9–41.0	4480	60.6	59.0–62.1	
ANC adequate							
No	4123	40.7	39.3–42.1	5473	59.3	57.9–60.7	0.269
Yes	905	39.1	36.5–41.8	1353	60.9	58.2–63.5	
Delivery provided by skilled health care professionals							
Not skilled	23	45.5	28.1–64.1	23	54.5	35.9–71.9	0.586
Skilled	5005	40.4	39.1–41.7	6803	59.6	58.3–60.9	
Weight at birth							
Adequate	4436	41.0	39.6–42.3	5875	59.0	57.7–60.4	**< 0.001**
Low weight	188	29.1	24.7–33.9	422	70.9	66.1–75.3	
High weight	404	42.0	37.8–46.3	529	58.0	53.7–62.2	

* *Calculated by Chi2 test of independence with Rao Scott correction for complex sampling. p-values < 0.05 are in bold.
ANC: antenatal care; CI: confidence interval.
* Weighted percentages according to survey complex sampling.

Table 3
Factors associated with immediate puerperal control, ENDES 2019.

Characteristics	Crude Model			Adjusted Model		
	cPR	95%CI	p	aPR	95%CI	p
Geographical region						
Lima metropolitan area	Ref.			Ref.		
Rest of coastline	0.96	0.91–1.02	0.263	0.94	0.89–1.01	0.057
Highlands	0.91	0.86–0.97	**0.003**	0.86	0.80–0.92	**< 0.001**
Jungle	0.91	0.85–0.97	**0.007**	0.86	0.80–0.92	**< 0.001**
Residence area						
Urban	Ref.			Ref.		
Rural	1.06	1.01–1.11	**0.010**	1.13	1.08–1.19	**< 0.001**
Appropriate content of ANC						
Inadequate	Ref.			Ref.		
Adequate	1.05	1.00–1.09	**0.033**	1.05	1.01–1.10	**0.020**
Weight at birth						
Adequate	Ref.			Ref.		
Low weight	1.20	1.12–1.29	**< 0.001**	1.20	1.12–1.29	**< 0.001**
High weight	0.98	0.91–1.06	0.650	0.97	0.90–1.05	0.446

Prevalence ratios and confidence intervals were calculated considering the survey complex sampling. p-values < 0.05 are in bold.
cPR: crude prevalence ratio; aPR: adjusted prevalence ratio; CI: confidence interval. ANC: antenatal care.

Discussion

Main findings

The main function of puerperal control is to ensure the physical well-being of the mother during the hours following delivery, and it is a measure adopted both in Peru and globally due to its high impact on public health. This study sought to identify the factors related to IPC. As findings, about six out of ten Peruvian mothers had received IPC in their last delivery. Area of residence, newborn weight, natural region of origin and having received ANC with adequate content were associated with IPC.

Prevalence of IPC

Approximately six out of 10 Peruvian women included in the study were found to have received an IPC. In agreement, in 2017 and 2018, 78.1% and 79.8%, respectively of women in Peru had received a puerperal check-up within the first four hours [23,24]. These figures are higher than those described in other low- and middle-income studies, in which 49.5% coverage was reported for Uganda, 19% in Nepal and 57.5% in Ethiopia, but with an assessment time of the first two days postpartum [13–15]. This wide difference in results could contribute to the higher maternal mortality found in these countries, with Uganda, Nepal, and Ethiopia having a maternal mortality rate of more than 100 deaths per 100,000 live births [3]. The vast majority of studies conducted were in African and Asian countries [25]; however, this issue should also be explored in Latin American and Caribbean countries. Despite the higher proportion of IPC in the Peruvian population compared to some of the low- and middle-income countries previously described, these IPC figures should reach 100% coverage, taking into account that the puerperium is a critical time for reducing maternal mortality.

Factors associated with IPC

In terms of geographical area, residing in the highlands or jungle was associated with a lower frequency of receiving IPC compared to living in metropolitan Lima. This could be related to the greater socioeconomic development and access to health services provided in metropolitan Lima compared to that observed in the highlands or jungle regions [16,26]. In addition, it is known that the coverage of ANC and institutional delivery is lower in these regions [16]. Therefore, improvements in the coverage of ANC for pregnant women during childbirth and postpartum require equitable approaches and with greater focus in the regions with the highest maternal mortality, which, in 2019, corresponded to the jungle regions [27].

By area of residence, women living in rural areas were more likely to receive IPC. In this regard, in Uganda, it was found that the majority of women residing in urban areas had an early postpartum checkup (<2 days), compared to 46% of women living in rural areas [15]. This difference in findings could be due to the different socioeconomic characteristics between rural Uganda and Peru. However, this finding is striking, since according to INEI, 38% of women in rural Peru do not have access to health services compared to 28.2% of women living in the urban setting [28]. This is likely due to greater efforts by health personnel in first level health centers in rural areas, since being far from a center of greater complexity where any complication can be resolved, there could be greater surveillance in the postpartum period to avoid maternal death. This could also be due to the fact that the present study excluded non-institutional deliveries, which often do not even have early puerperal control and mainly occur in rural areas [16], thereby limiting the characterization and study of maternal health care in rural areas.

Regarding the content of ANC received, women with adequate content had a higher prevalence of IPC. These findings are consistent with previous studies in Nepal and Uganda, which found that women who received ANC (four or more visits) were more likely to receive a puerperal check-up within the first 24 [29] and 48 h [15]. In addition, in Zambia, women who were informed about pregnancy complications during ANC were found to be more likely to undergo the puerperal checkup (<2 days) than those who were not informed [30]. ANC visits provide adequate counseling about puerperal danger signs and symptoms, thereby increasing the mother's knowledge of possible postpartum complications [31,32], as well as the likelihood of receiving IPC. It is worth mentioning that these studies did not evaluate adequate ANC, but only the number of ANC visits, which is a component of adequate ANC. In Peru, the prevalence of the components of adequate ANC was high (81.5–99.7%) [24], although the prevalence of puerperal control in the first four hours was lower (79.8%) [24]. Therefore, knowledge of the postpartum stage of the mother provided during adequate ANC is necessary but not sufficient to equalize the prevalence of IPC in Peru. This further enforces the need for adequate ANC controls with greater emphasis on the potential risks of not receiving IPC in order to reduce maternal and neonatal morbidity and mortality [29].

Regarding birth weight, newborns with low-birth-weight were more likely to undergo IPC. This probability could be due to comorbidities [33] of pregnant women, such as preeclampsia, which are risk factors for low-birth-weight, [34]. Pregnant women with comorbidities require regular blood pressure and urine monitoring, as well as weekly

assessments to monitor fetal growth [35]. Likewise, women with preeclampsia should receive postpartum follow-up to ensure complete resolution of hypertension [35]. This constant monitoring in women with preeclampsia and low-birth-weight newborns may have mediated this higher probability of IPC in newborns, also taking into account the high prevalence of preeclampsia in Peru [36].

Implications for public health and general recommendations

The importance of the present results for clinical practice lies in the fact that the associated factors found make it possible to propose strategies to improve IPC coverage. Furthermore, governments and ministries of health can generate policies and strategies to improve accessibility to delivery care, ensuring that health personnel provide IPC to all pregnant women. In addition, we recognize that unlike the international literature, our evaluation cut-off point (two hours) could have a lower frequency of coverage, but factors such as region of residence and appropriate compliance with the content of ANC should be taken into account to improve policies for puerperal care. Moreover, our result allows reinforcing this preventive practice in health professionals practicing in urban areas in order to reduce the number of referrals of patients with puerperal complications to health centers with a higher resolution capacity. Lastly, the results obtained can provide the basis for future studies in the field of maternal health, which should include the effects of IPC on maternal mortality.

Limitations and strengths

Regarding the limitations of the study, it should be recognized that since it is a cross-sectional study with an analytical design, we cannot speak of causality. It is also important to mention that some variables that were included in similar studies carried out in other countries [13–15], such as distance to the health center, may have been omitted. On the other hand, since it is based on information from the previous five years, the participants may have memory bias, and some questions may have been misunderstood. However, despite these limitations, the ENDES has protocols to ensure the quality of the data, and is carried out by properly trained personnel, which allows performing population studies with representative results. We do not have information about who the healthcare professional responsible for the ANC orientations was. Furthermore, the survey lacks data on the distribution of primary healthcare coverage in the studied regions. Further research is needed to address these limitations. Furthermore, to our knowledge, this is the first study that evaluates IPC and provides knowledge of some of the factors associated with its performance.

Conclusions

In 2019, about six out of 10 Peruvian women with a last institutional delivery within the five years prior to the survey received IPC. Living in the highlands and jungle were associated with a lower frequency of having an IPC, while women living in rural areas, receiving appropriate ANC content and having a low-birth-weight newborn had a higher frequency of having IPC. The results indicate the importance of recognizing the differences between the subgroups of the Peruvian population of women for the fulfillment of IPC. Finally, it is necessary to develop new health strategies that focus on providing IPC, and thus, reducing maternal mortality.

Ethical approval

The protocol of the present study was evaluated and approved by the Research Ethics Committee of the Universidad Peruana de Ciencias Aplicadas (FCS-CEI/600–07–21).

Author contributions

ADC, JPNM, DUP, and GBQ conceived the research idea. BCC, DFG, DUP and GBQ participated in the statistical analysis and interpretation of data. All authors drafted the manuscript, and all participated in the revision and approval of the final version of the manuscript.

Consent to participate

The primary data collection for this survey, conducted by the INEI team, required prior consent from the respondents to participate.

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Declaration of Competing Interest

The authors have declared that no competing interests exist.

Data Availability

The ENDES 2019 database is in the public domain (http://iinei.inei.gob.pe/microdatos/) and ensures the confidentiality of the participants' data.

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