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Determinants of non-institutional childbirth: Evidence from the Peruvian demographic and health survey

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ABSTRACT

Objective: We aimed to evaluate the determinants of non-institutional delivery among women of childbearing age in Peru.

Methods: We conducted a secondary analysis of data from the Peru 2019 Demographic and Family Health Survey (ENDES). This multi-stage survey sampling is representative at the urban-rural, regional, and national levels. The outcome variable was place of delivery, collected by self-reporting. Binary logistic regression models were used to assess the factors associated with non-institutionalized delivery. Thus, we estimated crude and adjusted odd ratios (aOR). For the multivariable model, the manual forward selection method and the Wald test were used to obtain a final parsimonious model.

Results: The final sample included 14,061 women of reproductive age between the ages of 15 and 49. The prevalence of non-institutional delivery was 7.8 %. Multivariate regression analysis found that having a secondary education (aOR:0.48; 95 % confidence interval [CI]:0.39–0.58) or higher (aOR:0.57; 95 %CI:0.42–0.78); belonging to the second (aOR:0.26; 95 %CI:0.20–0.33), third (aOR:0.28; 95 %CI:0.21–0.38), fourth (aOR:0.21; 95 %CI:0.13–0.33), or fifth wealth quintile (aOR:0.15; 95 %CI:0.09–0.27); and suffering intimate partner violence (aOR:0.76; 95 %CI:0.64–0.91) were associated with lower odds of non-institutional delivery, while not having some type of health insurance (aOR:3.12; 95 %CI:2.47–3.95), living in a rural area (aOR:1.93; 95 % CI:1.54–2.42), and having had three or more deliveries (aOR:1.36; 95 %CI:1.07–1.72), were associated with higher odds of non-institutional delivery.

Conclusions: We found that not having health insurance, residing in a rural area, and having had three or more deliveries were factors associated with non-institutional delivery in women of childbearing age. We propose that should focus public health strategies towards providing education to women about maternal health, and likewise, facilitating access to specialized health centers for rural populations.

Introduction

Maternal mortality is defined as death during pregnancy or within 42 days after delivery and poses a public health concern worldwide [1]. Therefore, the World Health Organization (WHO) has declared that all pregnant women should have access to care provided by qualified personnel, adequate control during pregnancy, management of complications, and immediate and timely care for the newborn. All of this

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should be done with the aim of preventing an increase in maternal, neonatal and fetal mortality rates [2].

The global maternal mortality rate (MMR) has decreased by 30.48 % (an annual decrease of 1.5 %) from 281.5 per 100,000 live births in 1990 to 195.7 per 100,000 live births in 2015, thus reducing MMRs [3]. This has been promoted by one of the Millennium Development Goals aimed at reducing the MMR in United Nations member countries [4]. In Peru, maternal deaths have decreased from 265 to 93 deaths per 100,000 live births from 1990–1996 to 2004–2010. However, we are still far from achieving the goal of less than 70 deaths per 100,000 live births [5].

Likewise, neonatal mortality, defined as death occurring during the first 28 days of birth [6], also presents worrisome figures. Globally, the neonatal mortality rate has been estimated to have fallen by 42 % from 2000 to 2018 (from 31 to 18 deaths per 1,000 live births) [7]. In Peru in 2017, the rate was 10/1000 per live births; that is, the rate had increased compared to the around 9/1000 per live births in 2010–2013, with most of these neonatal deaths being potentially preventable [8].

Non-institutional deliveries, understood as deliveries that occur outside health care institutions and not attended to by any health personnel [9], are considered one of the main causes of maternal and neonatal deaths, both globally and [10,11] nationwide [12]. In Peru in 2019, the institutional delivery ratio was 92.4 %, with lower percentages of 84.3 % and 90.7 %, in the jungle and the highland regions, respectively, which might be attributable to the prevalence of non-institutional delivery in these natural regions. The prevalence of non-institutional delivery is estimated to have decreased from 2009 to 2017, currently being under approximately 10 %. However, the gaps between rural and urban areas are still marked. Thus, in rural areas, non-institutional deliveries account for approximately 21 % of births [13].

Different studies have reported varying figures on the preference for home delivery (non-institutional or non-supervised by health professionals), with higher values observed among women from rural areas [14–18]. It is also of note that it is not uncommon to see reports of home birth even among women who initially wanted an institutional birth. Nonetheless, while the approach is important in both cases, greater emphasis should be placed on the latter because when a woman changes her mind at the end of her pregnancy and chooses home delivery there is an increase not only in the number of non-institutional births but also the maternal and neonatal mortality rate.

In Peru, the National Sexual and Reproductive Health Strategy places special emphasis on the promotion and adoption of strategies aimed at reducing the number of non-institutional births [19]. Then, in 2016, the Technical Standard for Vertical Delivery Assistance was approved, with the aim of reducing perinatal maternal morbidity and mortality through the institutionalization of vertical delivery. This initiative considers a national-level intercultural approach and consequently contributes to a decrease in the number of home births [20]. However, as mentioned above, in spite of the increase in the rate of institutional deliveries in recent years [21], the use of maternal and perinatal services by Peruvian mothers should continue to be promoted. Pregnant women who receive prenatal care and deliver at a health care institution are at a 4.54 times lower risk of mortality compared to those who are not adequately monitored or deliver in their own home [22].

For the reasons mentioned above, this study was conducted to evaluate the determinants of non-institutional delivery among women of childbearing age in Peru.

Methods

Study design

A secondary analysis of data from the Peru 2019 Demographic and Family Health Survey (ENDES) was conducted. The National Institute of Statistics and Informatics (INEI) conducts the ENDES on an annual basis and it consists of three questionnaires: the "Household Questionnaire", the "Individual Women's Questionnaire", and the "Health Questionnaire." For the present study, only information from the Individual Women's Questionnaire (IWQ) was used.

The ENDES is representative at the urban-rural, regional, and national levels as it is a multi-stage survey with a probability sampling design by conglomerates and is stratified at the department level, as well as at urban and rural areas. The primary sampling unit is comprised of the conglomerates selected, and the secondary sampling unit includes the selected dwellings. Additional information on the ENDES methodology is available in its technical report [23].

Population, sample, and sampling

The IWQ of the 2019 ENDES collected information from a total of 33,289 women of reproductive age (15–49 years). This study considered women of reproductive age who answered the questions that make up the variable of interest (place of delivery), and in whom full data were available on the remaining variables of interest. The effective sample for our study consisted of 14,061 respondents (Fig. 1).

Variables

The dependent variable of the study was place of delivery, collected by self-reporting in the IWQ of the variable M15. Based on that, the place of delivery was categorized as institutional if the woman reported any of the following responses: 1) Ministry of Health (MINSA) Hospital, 2) Health Social Security (ESSALUD) Hospital, 3) Armed Forces and Peru National Police Hospital, 4) MINSA Health Center, 5) MINSA Health Dispensary, 6) ESSALUD Health Center/Dispensary, 7) Hospital/other health center of the municipality, 8) Private clinic, and 9) Clinic/Non-governmental Organization Dispensary. For the purposes of this research, non-institutional delivery was defined considering the following responses: 1) Own domicile, 2) Midwife's home, 3) Hospital/Other church center, 4) Private medical office, and 5) Any other place reported. We considered these options because they do not guarantee a delivery under the supervision of trained healthcare personnel and with suitable equipment.

The following covariates of interest were selected as described in the literature [3–5]: sociodemographic characteristics, such as the mother's age (15–26 years, 27–33 years, 34–49 years), marital status (married or life partner, not married or no life partner), educational level (primary or preschool, secondary, higher), active employment status (yes, no), health insurance (yes, no), geographic region (metropolitan Lima, rest of the coast, highlands, jungle), area of residence (urban, rural), level of wealth (first quintile, second quintile, third quintile, fourth quintile, fifth quintile), ethnicity (mestizo, Quechua, negro, moreno, zambo, or others), and obstetric history, which includes parity (first child, second child, third child, or more). According to the recommendations of the WHO [2] and the methodology of previous studies [9,11,12,24], the variable prenatal care (PNC) was constructed using the responses on the number of prenatal check-ups, having the first prenatal check-up during the first trimester, compliance with the components of PNC, and being seen by trained health personnel and was considered affirmative when the respondent affirmatively complied with all the components of PNC. The variable of intimate partner violence (IPV) was constructed from questions related to psychological violence (D101A, D101B, D101C, D101D, D101E, D101F, D103A, D103B, D103C, and D103D), physical violence (D105A, D105B, D105C, D105D, D105E, D105F, and D105G), and sexual violence (D105I and D105H); and a positive response to any of these three components was considered to define IPV.

Statistical analysis

The 2019 ENDES databases were downloaded and imported into the R statistical program and were merged following the methodology described by Hernández-Vásquez et al. [22]. Subsequently, a single

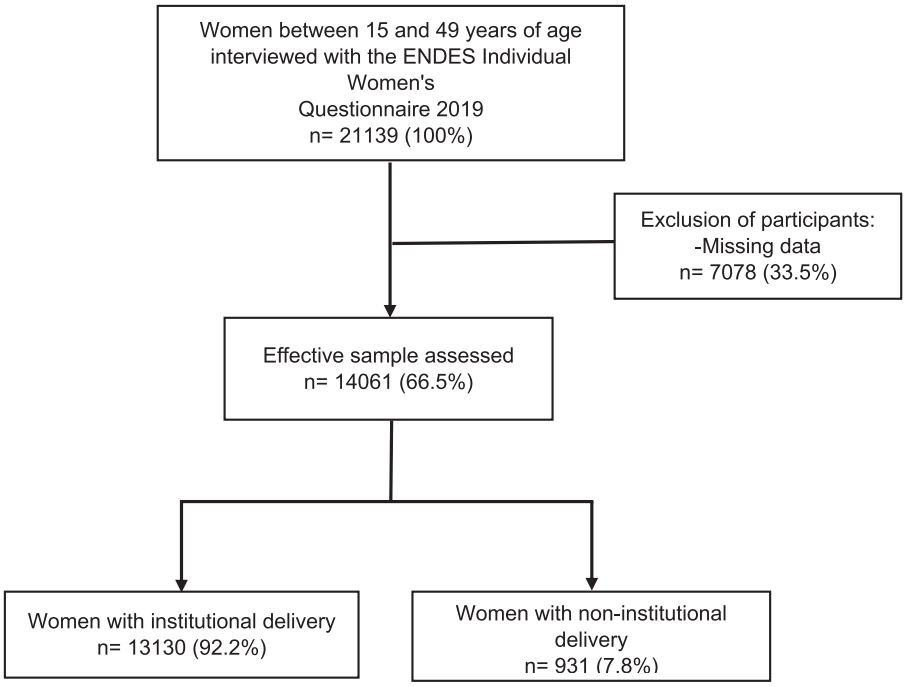


Fig. 1. Flowchart for sample selection.

database that included all the variables was exported to the Stata® v.16.0 program (Stata Corporation, College Station, Texas, USA) to perform all the analyses according to the complex design of the survey and the ENDES weighting factors. The *svy* Stata module for complex samples was used for all analyses.

Given that all the variables are categorical, the absolute frequencies and weighted proportions were calculated for the descriptive analysis. For the bivariate analysis, the Chi-square test with Rao–Scott correction was used to compare the proportions of the covariables of interest with the place of birth.

Binary logistic regression models were used to assess the factors associated with non-institutionalized delivery. Thus, the crude odds ratios (OR) and the adjusted odd ratios (aOR) were estimated. For the multivariable model, the manual forward selection method and the Wald test were used to select the variables that allowed obtaining a final parsimonious model. The analyses were submitted along with their respective 95 % confidence intervals (CI), and p-values < 0.05 were considered statistically significant.

Ethical aspects

This study did not require the endorsement of an ethics committee as it was a secondary analysis of a database that is freely available on the INEI website (http://iinei.inei.gob.pe/microdatos/). We did not consider information that allows the identification of the subjects surveyed and, therefore, confidentiality was always maintained. The primary data collection was carried out by the INEI team [25], which previously required the consent of the respondents to participate in the study.

Results

Out of a total of 21,139 women of reproductive age between the ages of 15 and 49 who responded to the IWQ in ENDES 2019, 7,078 women were excluded for not having complete data on the variables of interest, thus yielding a final sample of 14,061 women (Fig. 1).

General characteristics of the study population

The most frequent age group was that of 27–33 years (34.9 %), with a higher proportion of married women or women with a life partner (89.9 %), women with a secondary education (45.2 %), and women who were working at the time of the survey (65.9 %). Most participants belonged to the highland region of Peru (28.1 %), urban areas (73.6 %), and were in the second wealth quintile (25.5 %). Having had adequate PNC (19.1 %) and suffering IPV (53.4 %) were two of the most important variables. The prevalence of non-institutional delivery was 7.8 % (Table 1).

Characteristics of the study population according to the place of delivery

The prevalence of non-institutional delivery was significantly higher among married women or women with a life partner (8.9 %; $p = 0.004$), among women who only had primary education or less (20.0 %; $p < 0.001$), among those who lived in the highlands or the jungle region of Peru (9.4 % and 14.3 % respectively, $p < 0.001$), or in a rural area (18.7 %, $p < 0.001$), among women who belonged to the first wealth quintile (21.0 %; $p < 0.001$), among those who had less than six PNC check-ups (13.7 %; $p < 0.001$), or had inadequate PNC (8.1 %; $p = 0.038$), among women who were not current smokers (42.0 %; $p = 0.025$), and among those who did not suffer IPV (8.7 %; $p = 0.007$) (Table 2).

Factors associated with non-institutional deliveries

The multivariate regression analysis found that having a secondary education (aOR: 0.48; 95 % CI: 0.39–0.58) or higher (aOR: 0.57; 95 % CI:0.42–0.78); belonging to the second (aOR: 0.26; 95 % CI: 0.20–0.33), third (aOR: 0.28; 95 % CI:0.21–0.38), fourth (aOR: 0.21; 95 % CI:0.13–0.33), or fifth wealth quintile (aOR: 0.15; 95 % CI:0.09–0.27); and suffering IPV (aOR: 0.76; 95 % CI:0.64–0.91) were associated with lower odds of non-institutional delivery, while not having some type of health insurance (aOR: 3.12; 95 % CI:2.47–3.95), living in a rural area (aOR: 1.93; 95 % CI:1.54–2.42), and having had three or more deliveries (aOR: 1.36; 95 % CI:1.07–1.72), were associated with higher odds of non-institutional delivery (Table 3).

Table 1
Characteristics of the study population (n = 14,061).

Characteristics	n	%*	95 % CI*
Age			
15–26 years of age	4349	30.3	29.3–31.3
27–33 years of age	4945	34.9	33.9–35.9
34–49 years of age	4767	34.8	33.8–35.8
Current marital status			
Life partner	12,582	89.9	89.2–90.5
Non-married/nor in a couple	1479	10.1	9.5–10.8
Woman's educational level			
Primary school or preschool	2741	19.3	18.4–20.1
Secondary school	6522	45.2	44.1–46.4
Tertiary	4798	35.5	34.4–36.6
Employment status			
Yes	9413	65.9	64.8–67.1
No	4648	34.1	32.9–35.2
Health insurance			
Yes	11,733	81.9	81.0–82.8
No	2328	18.1	17.2–19.0
Geographic region			
Lima Metropolitan Area	1636	27.9	26.9–29.0
Rest of the coast	4239	26.2	25.1–27.3
Highlands	4630	28.1	26.8–29.4
Jungle	3556	17.8	16.8–18.9
Area of residence			
Urban	10,019	73.6	72.6–74.5
Rural	4042	26.4	25.5–27.4
Wealth index			
First quintile	3761	24.2	23.2–25.1
Second quintile	3992	25.5	24.5–26.6
Third quintile	2813	19.7	18.8–20.7
Fourth quintile	2058	16.6	15.7–17.6
Fifth quintile	1437	14.0	13.1–14.9
Ethnic origin			
Mixed race	5936	45.7	44.6–46.9
Quechua	3965	23.9	23.0–24.9
Negro/moreno/zambo	1504	11.9	11.2–12.7
Other	2656	18.4	17.5–19.4
Pregnancies			
First child	4073	29.7	28.7–30.7
Second child	4768	34.2	33.2–35.3
Third child or more	5220	36.1	35.0–37.2
Number of PNC check-ups			
> =6 PNC	12,877	91.5	90.9–92.1
< 6 PNC	1184	8.5	7.9–9.1
First PNC check-up during the first trimester			
No	2538	17.2	16.4–18.0
Yes	11,523	82.8	82.0–83.6
PNC Content			
Inappropriate	5467	39.8	38.7–41.0
Adequate.	8594	60.2	59.0–61.3
PNC provided by qualified health care professionals			
Not competent	6	0.0	0.0–0.1
Competent	14,055	100.0	99.9–100.0
Suitable PNC			
No	11,402	80.9	80.0–81.8
Yes	2659	19.1	18.2–20.0
Psychological violence			
No	7250	51.5	50.4–52.6
Yes	6811	48.5	47.4–49.6
Physical violence			
No	10,355	74.8	73.9–75.7
Yes	3706	25.2	24.3–26.1
Sexual violence			
No	13,371	95.2	94.7–95.6
Yes	690	4.8	4.4–5.3
Intimate partner violence			
No	6539	46.6	45.5–47.7
Yes	7522	53.4	52.3–54.5
Type of delivery			
Non-institutional	931	7.8	7.1–8.6
Institutional	13,130	92.2	91.4–92.9

PNC: prenatal care; CI: confidence interval.
* Weighted percentages according to the complex sampling of the survey.

Discussion

Main results

A secondary analysis was conducted using data from the 2019 ENDES in Peru with the aim of describing the determinants of non-institutional delivery among women of childbearing age. We found that the factors that increased the odds of non-institutional delivery were not having health insurance, residing in a rural area, and a history of three or more deliveries. On the other hand, the factors that decreased these odds included having a secondary level or higher education, belonging to the second or fifth wealth quintiles, and having a history of IPV.

Comparison with other studies and interpretation of outcomes

Women residing in rural areas were twice as likely to have a non-institutional delivery. This finding is consistent with what was described by Siddiquee et al. [26] Yaya et al. [27] and Palamuneli et al. [10] who reported that pregnant women living in rural areas were less likely to use institutional delivery services compared to women residing in urban areas. Likewise, during the last decade, studies carried out in Africa and Asia have revealed that the highest proportion of pregnant women who had a non-institutional delivery were from rural areas [26–34]. This phenomenon could be explained by the presence of access barriers, such as the absence of health centers [29,32,35] or the greater distance to these from rural areas [29,31,32,36,37], roads in poor condition and difficult to access, and unavailability of transport services, such as ambulances [29,31,35,37–40]. It may also be due to traditional customs, which are common in rural areas of Peru, such as being attended by midwives [41,42], and sociocultural factors, such as low adherence to health programs among rural populations [43].

The odds of having a non-institutional delivery were higher among mothers who had three or more deliveries. Similar results have been found among African women. For instance, Yibeltal et al. [44] reported that women with up to two live children were less likely to have a non-institutional birth compared to those with three to six live children, and Ngozi et al. [34] reported that mothers who had three to four deliveries or five or more were less likely to have an institutional delivery compared to those who had one to two deliveries. Additionally, previous studies have reported that primiparous pregnant women were more likely to use institutional services to give birth compared to multiparous and grand multiparous women [33,45,46]. Likewise, a meta-analysis showed that as the order of birth increased, the preference for the use of institutional services to give birth decreased [26]. This could be due to the knowledge pregnant women have about the greater complications that may occur in primiparous women compared to multiparous women, such as fetal distress, oligohydramnios, and uteroplacental insufficiency [47]. Therefore, primiparous woman would tend to look for specialized personnel at a health care institution in order to manage any emergency, unlike multiparous women who have more experience and feel more confident and familiar with childbirth. It is also plausible that the first experience of childbirth in a health care institution was not completely satisfactory and as a result, the pregnant woman prefers non-institutional deliveries for her following pregnancies [33,44]. In addition, we hypothesize another reason may be a family with three or more children could have fewer financial resources available to pay for institutional delivery care.

In our study, we found that women without health insurance were more likely to have a non-institutional delivery. Similarly, Lawrence et al. [48] described that mothers subscribed to health insurance were more likely to have an obstetric delivery at a health institution. This finding can be explained by the access to PNC and maternal health training that these types of health insurances provide. Low or no PNC has been shown to be associated with non-institutional deliveries [33,49], and women who have health information about the benefits of

Table 2
Prevalence of non-institutional delivery according to the characteristics of the study population (n = 14,061).

Characteristics	Type of delivery						
	Non-institutional			Institutional			*p***
	n	%*	95 % CI*	n	%*	95 % CI*	
Age							
15–26 years of age	321	8.9	7.8–10.2	4028	91.1	89.8–92.2	0.057
27–33 years of age	305	7.3	6.4–8.4	4640	92.7	91.6–93.6	
34–49 years of age	305	7.4	6.4–8.6	4462	92.6	91.4–93.6	
Current marital status							
Life partner	860	8.1	7.3–8.9	11,722	91.9	91.1–92.7	**0.004**
Non-married/nor in a couple	71	5.4	4.1–7.1	1408	94.6	92.9–95.9	
Woman's educational level							
Primary school or preschool	481	20.0	17.7–22.5	2260	80.0	77.5–82.3	**< 0.001**
Secondary school	324	5.8	5.1–6.7	6198	94.2	93.3–94.9	
Tertiary	126	3.7	2.9–4.7	4672	96.3	95.3–97.1	
Employment status							
Yes	583	7.2	6.5–8.2	8830	92.8	91.8–93.5	**0.049**
No	348	10.5	7.6–10.1	4300	89.5	89.9–92.4	
Health insurance							
Yes	736	7.2	6.5–8.0	10,997	92.8	92.0–93.5	**< 0.001**
No	195	10.5	8.8–12.5	2133	89.5	87.5–91.2	
Geographic region							
Lima Metropolitan Area	65	4.4	3.4–5.8	1571	95.6	94.2–96.6	**< 0.001**
Rest of the coast	177	5.3	4.4–6.5	4062	94.7	93.5–95.6	
Mountain range	329	9.4	8.0–11.1	4301	90.6	88.9–92.0	
Jungle	360	14.3	12.1–16.7	3196	85.7	83.3–87.9	
Area of residence							
Urban	304	3.9	3.4–4.5	9715	96.1	95.5–96.6	**< 0.001**
Rural	627	18.7	16.5–21.1	3415	81.3	78.9–83.5	
Wealth index							
First quintile	639	21.0	18.8–23.4	3122	79.0	76.6–81.2	**< 0.001**
Second quintile	124	4.3	3.4–5.3	3868	95.7	94.7–96.6	
Third quintile	94	4.3	3.3–5.6	2719	95.7	94.4–96.7	
Fourth quintile	45	3.0	2.0–4.5	2013	97.0	95.5–98.0	
Fifth quintile	29	2.2	1.4–3.4	1408	97.8	96.6–98.6	
Ethnic origin							
Mixed race	271	5.3	4.5–6.0	5665	94.8	94.0–95.5	**< 0.001**
Quechua	146	3.9	3.0–5.0	3819	96.1	95.0–97.0	
Negro/moreno/zambo	155	12.5	10.4–15.0	1349	87.5	85.0–89.6	
Other	359	16.4	14.1–19.0	2297	83.6	81.0–85.9	
Pregnancies							
First child	174	5.6	4.7–6.8	3899	94.4	93.2–95.3	**< 0.001**
Second child	239	6.0	5.1–7.0	4529	94.0	93.0–94.9	
Third child or more	518	11.3	10.1–12.7	4702	88.7	87.3–89.9	
Number of PNC check-ups							
> =6 PNC	777	7.3	6.6–8.0	12,100	92.7	92.0–93.4	**< 0.001**
< 6 PNC	154	13.7	11.4–16.3	1030	86.3	83.7–88.6	
First PNC check-up during the first trimester							
No	247	11.8	10.2–13.6	2291	88.2	86.4–89.8	**< 0.001**
Yes	684	7.0	6.3–7.8	10,839	93.0	92.2–93.7	
PNC Content							
Inappropriate	471	9.9	8.7–11.2	4996	90.1	88.8–91.3	**< 0.001**
Adequate	460	6.5	5.7–7.3	8134	93.5	92.7–94.3	
PNC provided by qualified health care professionals							
Not competent	2	22.3	4.6–63.0	4	77.7	37.0–95.4	**0.151**
Competent	929	7.8	7.1–8.6	13,126	92.2	91.4–92.9	
Suitable PNC							
No	795	8.1	7.4–9.0	10,607	91.9	91.0–92.6	**0.038**
Yes	136	6.5	5.3–8.0	2523	93.5	92.0–94.7	
Psychological violence							
No	517	8.6	7.6–9.7	6733	91.4	90.3–92.4	**0.009**
Yes	414	7.0	6.2–7.9	6397	93.0	92.1–93.8	
Physical violence							
No	716	8.2	7.4–9.1	9639	91.8	90.9–92.6	**0.017**
Yes	215	6.7	5.7–7.8	3491	93.3	92.2–94.3	
Sexual violence							
No	822	7.8	7.1–8.6	12,489	92.2	91.4–92.9	0.988
Yes	49	7.8	5.7–10.5	641	92.2	89.5–94.3	
Intimate partner violence							
No	472	8.7	7.7–9.8	6067	91.3	90.2–92.3	**0.007**
Yes	459	7.0	6.2–7.9	7063	93.0	92.1–93.8	

**Calculated using the Chi-square independence test with Rao–Scott correction for complex sampling. p-values < 0.05 are in bold font.
PNC: prenatal care; CI: confidence interval.
* Weighted percentages according to the complex sampling of the survey.

Table 3
Factors associated with non-institutional delivery, ENDES 2019.

Characteristics	Crude model			Parsimonious adjusted model		
	cOR	95 % CI	p	aOR	95 % CI	p
Woman's educational level						
Primary school or preschool	Ref.			Ref.		
Secondary school	0.25	0.20–0.30	**< 0.001**	0.48	0.39–0.58	**< 0.001**
Tertiary	0.15	0.12–0.21	**< 0.001**	0.57	0.42–0.78	**< 0.001**
Health insurance						
Yes	Ref.			Ref.		
No	1.51	1.22–1.87	**< 0.001**	3.12	2.47–3.95	**< 0.001**
Residence area						
Urban	Ref.			Ref.		
Rural	5.63	4.54–6.99	**< 0.001**	1.93	1.54–2.42	**< 0.001**
Wealth index						
First quintile	Ref.			Ref.		
Second quintile	0.17	0.13–0.22	**< 0.001**	0.26	0.20–0.33	**< 0.001**
Third quintile	0.17	0.12–0.23	**< 0.001**	0.28	0.21–0.38	**< 0.001**
Fourth quintile	0.12	0.08–0.18	**< 0.001**	0.21	0.13–0.33	**< 0.001**
Fifth quintile	0.08	0.05–0.13	**< 0.001**	0.15	0.09–0.27	**< 0.001**
Pregnancies						
First child	Ref.			Ref.		
Second child	1.07	0.84–1.36	0.572	1.09	0.84–1.41	0.509
Third child or more	2.14	1.71–2.66	**< 0.001**	1.36	1.07–1.72	**0.01**
Intimate partner violence						
No	Ref.			Ref.		
Yes	0.79	0.67–0.98	**0.007**	0.76	0.64–0.91	**0.003**

cOR: Crude Odds Ratio; aOR: Adjusted Odds Ratio; CI: confidence interval.
Odds ratios and confidence intervals were calculated considering the complex sampling of the survey. p-values < 0.05 are in bold.

having an institutional birth are more likely to choose it compared to women who have not received this information [37]. Likewise, not being affiliated to some type of health insurance can imply that the cost of the institutional delivery service would be high and therefore, unaffordable. Therefore, people who cannot pay for this service would choose a non-institutional delivery.

We also identified determinants associated with lower odds of non-institutional delivery. The odds of having a non-institutional delivery were lower among women who had a secondary or higher education. This finding is consistent with the results of other studies carried out at a global level [30,31,37,38,45,50,51] and supports the idea that women with some type of formal education are less likely to have a non-institutional delivery [10,27,29,31,44]. This could be explained by the influence of education on the comprehension of health promotion messages - having a higher educational level could favor a greater assimilation of these messages [38]. Likewise, educated women have better access to information, and therefore, are more aware of PNC, warning signs during pregnancy, risks involved during childbirth, and the quality service provided by health institutions during childbirth that can prevent these risks [31,45,49]. However, this variable may be influenced by the degree of autonomy a woman has with regard to decision-making within her family and sociocultural context [45].

Likewise, economic status between the second and fifth wealth quintiles was associated with lower odds of non-institutional delivery. Similar findings have been reported in other studies, in which middle class, rich, and very rich women, belonging to the second and fifth wealth quintiles, more frequently had an institutional delivery compared to those with a poor socioeconomic status who were more likely to give birth at home [44,49]. This may be the result of the limited economic budget available to pregnant women from lower socioeconomic strata when they have to pay various fees, such as those for transfer to the hospital and the delivery care service itself at an institution [49]. Consequently, they tend to hire traditional non-professionally trained midwives [52]. Likewise, poverty can limit the education of pregnant women, which in turn, limits access to quality health information [53], and thereby leads to ignorance about the problems related to maternal health mentioned above [54].

We also found that suffering IPV was associated with lower odds of non-institutional delivery. This is an important finding because at least four out of ten Peruvian women are victims of IPV and this occurs more frequently between the ages of 25 and 35 [55], a population similar to that included in our study. However, our finding contrasts with that of Yaya et al. [56], who described that women who experienced emotional violence were less likely to use institutional delivery services. This public health problem could restrict the autonomy of the pregnant woman to decide upon the place of delivery, prioritizing the wishes of the aggressor or family. Physically abused pregnant women may suffer threatened miscarriage, and consequently, deliver at an institution in order to manage obstetric emergencies similar to what we found in the present study. Another possible hypothesis may entail a heightened prevalence of women experiencing IPV originating from rural regions with limited healthcare accessibility.

Implications for public health

Non-institutional deliveries are one of the main causes for maternal death nationwide [12]. In general, the findings of our study suggest the need for greater intervention by Ministry of Health (MINSA) and other related institutions for the creation of hospitals with trained personnel for delivery care in rural areas and for the improvement of roads and availability of vehicles, specifically in rural areas with difficult access. Likewise, three globally accepted strategies are proposed that can be used as references. The first is the implementation of obstetric emergency departments and cesarean section services at health centers of the first level of care in rural areas to reduce maternal and neonatal mortality [57]. The second strategy involves interventions in the community targeted towards midwives and aimed at providing them with a higher education to complement their knowledge, and thus, enable them to seek care at institutionalized health centers [58]. Therefore, developing a model for midwife-assisted planned home births could be a relevant strategy to enhance the safety of home births [59]. The third is based on strategies involving the promotion of education, as well as the financing of higher education. In this way, the percentage of people with an education will increase, and in turn, their access to information will improve. Likewise, better education for women will advance their job opportunities, thereby improving their socioeconomic level, and

consequently, providing better opportunities to access quality health services and health insurance.

Limitations and strengths

Some limitations should be highlighted. First, the cross-sectional design of the study does not allow for the establishment of causality between the associated factors described and non-institutional delivery in our sample. Second, being an analysis of a secondary database, it was not possible to analyze other variables of interest, such as the time needed to reach the nearest health center, history of problems during pregnancy, and the woman's occupation, among others. Third, since the ENDES questions were collected by self-reporting, memory bias and social desirability constitute a possible limitation. Fourth, the limited information on birth outcomes prevents us from determining whether the births with more adverse events occurred in non-institutional care. However, ENDES is a national and regional reference database for the development of research. In addition, it follows methodological control processes that increase the reliability of its data. Likewise, previous understand studies in other countries use demographic and health surveys similar to ENDES [33,34,56]. Fourth, our results cannot be fully extrapolated to other countries due to intercultural differences. However, this study could represent an important approach to the reality of developing countries like ours and at the level of Latin America.

Conclusion

We found that not having health insurance, residing in a rural area, and having had three or more deliveries are factors associated with non-institutional delivery in women of childbearing age. We propose that public health strategies focus towards providing education to women about maternal health, and likewise, facilitating access to specialized health centers for rural populations. Promoting and financing higher education could enhance women's education, expand their employment opportunities, raise their socioeconomic status, and consequently, provide better access to quality health services and health insurance.

Contribution to authorship

PKRG, BCC, DFG, DUP and CJTH designed the study. BCC, DFG, DUP and CJTH performed the analysis. DUP, RAS and CJTH interpreted the results. PKRG, BCC, DFG, DUP, RAS and AZVC wrote the manuscript. CJTH critically reviewed the manuscript. All authors contributed to and approved the final version.

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Declaration of Competing Interest

The authors have declared that no competing interests exist.

Data Availability

The database used is in the public domain (http://iinei.inei.gob.pe/microdatos/). No registration is needed to download the ENDES database.

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