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ASSOCIATION BETWEEN PRENATAL CARE AND PERIPARTUM AND POSTPARTUM MATERNAL OBSTETRIC COMPLICATIONS. ENDES 2017 TO 2019

ASOCIACIÓN ENTRE EL CONTROL PRENATAL Y LAS COMPLICACIONES OBSTÉTRICAS MATERNAS PERIPARTO Y POSTPARTO. ENDES 2017 AL 2019

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ABSTRACT

Introduction: Obstetric complications are an important cause of maternal morbidity and mortality, with prenatal control (PNC) being a strategy for their adequate prevention and treatment. **Objectives:** To determine the association between adequate CPN and peripartum and postpartum maternal obstetric complications. **Methods:** Quantitative, observational, retrospective, cross-sectional and analytical study, based on information from the ENDES 2017-2019. **Results:** A sample of 41,803 mothers was analyzed, 21,0% and 28,7% had peripartum and postpartum complications respectively, furthermore, it was found that not having a quality NPC (PR = 1.20; 95% CI = 1.14-1.27), residing in metropolitan Lima (PR = 1,38; 95% CI = 1,27-1,49) or in the mountains (PR = 1,25; 95% CI = 1,18-1,33), belong to wealth quintile two (PR = 1,13; 95% CI = 1,04-1,22) or three (PR = 1,11; 95% CI = 1,03-1,20), having been attended only by qualified personnel (PR = 1,81; 95% CI = 1,33-2,48) and only in the public sector (PR = 1,48; 95% CI = 1,31-1,68) were associated with a greater possibility of peripartum complications. Not having a quality NPC (PR = 1,28; 95% CI = 1,22-1,33), residing in metropolitan Lima (PR = 1,12; 95% CI = 1,05-1,20) or in the mountains (PR = 1,06; 95% CI = 1,01-1,12), belong to wealth quintile two (PR = 1,13; 95% CI = 1,05-1,20) or three (PR = 1,12; 95% CI = 1,05-1,19) and having received NPC only in the public sector (PR = 1,28; 95% CI = 1,17-1,41) were associated with a greater possibility of postpartum complications. **Conclusions:** Within the adequate NPC, an association was found between the quality NPC and the peripartum and postpartum maternal obstetric complications.

Key words: Prenatal care; Complications of pregnancy; Complications of labor; Female urogenital diseases; Complications of pregnancy; Postpartum disorders, Maternal health (source: MeSH NLM).

RESUMEN

Introducción: Las complicaciones obstétricas son causa importante de morbimortalidad materna, siendo el control prenatal (CPN) una estrategia para su adecuada prevención y tratamiento. **Ojetivos:** Determinar la asociación entre el CPN adecuado y las complicaciones obstétricas maternas periparto y postparto. **Métodos:** Estudio cuantitativo, observacional, transversal y analítico, basado en información de la ENDES 2017-2019. **Resultados:** Se analizó una muestra de 41 803 madres, el 21,0% y el 28,7% tuvieron complicaciones periparto y postparto respectivamente, además, se encontró que el no tener un CPN de calidad (RP=1,20; IC95%=1,14-1,27), residir en Lima metropolitana (RP=1,38; IC95%=1,27-1,49) o en la Sierra (RP=1,25; IC95%=1,18-1,33), pertenecer al quintil de riqueza dos (RP=1,13; IC95%=1,04-1,22) o tres (RP=1,11; IC95%=1,03-1,20), haber sido controlada solo por personal calificado (RP=1,81; IC95%=1,33-2,48) y solo en el sector público (RP=1,48; IC95%=1,31-1,68) se asociaron con mayor posibilidad de complicaciones periparto. Además, el no tener un CPN de calidad (RP=1,28; IC95%=1,22-1,33), residir en Lima metropolitana (RP=1,12; IC95%=1,05-1,20) o en la Sierra (RP=1,06; IC95%=1,01-1,12), pertenecer al quintil de riqueza dos (RP=1,13; IC95%=1,05-1,20) o tres (RP=1,12; IC95%=1,05-1,19) y haber sido controlada solo en el sector público (RP=1,28; IC95%=1,17–1,41) se asociaron con mayor posibilidad de complicaciones postparto. **Conclusión:** Dentro del CPN adecuado, se encontró asociación entre el CPN de calidad y las complicaciones obstétricas maternas periparto y postparto.

Palabras clave: Atención prenatal; Complicaciones del embarazo; Complicaciones del trabajo de parto; Enfermedades urogenitales femeninas; Complicaciones del embarazo; Trastornos puerperales; Salud materna (fuente: DeCS BIREME).

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INTRODUCTION

Worldwide obstetric complications are an important cause of morbimortality among women, while it is true that according to estimates by the World Health Organization (WHO), the number of maternal mortality have decreased by 43% from 1990 to 2015[1], in many places the goals have not been met to improve maternal health[1–3]. In Peru, the situation is not much different, the majority of maternal deaths between 2014 and 2019 were a consequence of obstetric complications during pregnancy, labor or postpartum and of pre-existing diseases or those that appeared during pregnancy and were not adequately controlled[4], in this regard, finding ways to prevent them and give them timely treatment is of great importance[5]. Prenatal care or PNC, according to WHO, is the service provide by trained health professionals to pregnant women and teenagers, with the purpose of guaranteeing the best health conditions for the mother and the baby during pregnancy, as well as decrease maternal and perinatal morbidity and mortality[5], The recommended PNC number may vary according to country , with a minimum of six in Peru according to the Norma Técnica de Salud para la Atención Integral de la Salud Materna of 2013, where it was also recommended that it should begin before 14 weeks gestation and the basic PNC care outline is detailed[6].

The specialized care before, during, and after labor is important for pregnant women and newborns[7], however, the proportion of women that received prenatal care at least once during their pregnancy was around 83% between 2006 and 2014 according to WHO figures[2,5]. In Peru, according to the report on Salud Materna from ENDES 2018, the adequate PNC access and implementation has increased. PNC carried out by qualified health personnel went from 95.9% in 2013 to 98.1% in 2018, 89.5% of pregnant women received six or more PNC, and 81.5% had their first PNC in the first three months of pregnancy[8], however, in the study by Hernández-Vásquez et al regarding factors associated to the quality of prenatal care in Peru and based on ENDES 2017 found that only 56.1% of women received quality PNC in the last 5 years, factors such as education level, wealth quintile, and first control during the first trimester of pregnancy were associated to a bad quality PNC[9]. This data reflects that in our country there still exist gaps regarding access to health services and therefore an adequate PNC, where diverse social, economic, demographic and cultural factors are also involved[10].

A high quality care in pregnancy and during and after labor, contribute in preventing and/or providing opportune treatment to diverse complications that continue to be a public health problem in several countries, especially developing countries[3,11,12]. The study by Linard et al, found that an inadequate PNC was associated to severe maternal and perinatal morbidity[13], in this same manner, diverse studies carried out in our country and in the region have found an association between PNC and diverse obstetric complications during and after labor, such as hypertensive disorders of pregnancy, postpartum hemorrhage, premature rupture of membranes, urinary tract infection, perineal tears, mastitis, among others, and that affect the mother as well as the newborn[14–16].

This study has an objective to determine the association between adequate PNC and the maternal peripartum and postpartum obstetric complications according to ENDES from 2017 to 2019, assessing one of the most nationally used strategies for the decrease in maternal perinatal morbimortality, one of the Prioridades Nacionales de Investigación en Salud en el Perú hasta el año 2023[17].

METHODS

Type and design

A quantitative, observational, cross-sectional, and analytical study, based on secondary source data, ENDES 2017 to 2019.

Population and Sample

The population is made up of all women of fertile age residents of Peru, that at least had one child and provided information related to PNC of the latest one, according to ENDES 2017, 2018 and 2019, excluding from the research those women under 15 years of age, those who did not receive PNC, or did not find data on PNC, of peripartum or postpartum obstetric complications, or of any remaining study variables. Regarding the mentioned criteria, we obtained a sample for the three years 41 803 women of fertile age. It was a two-stage, probabilistic, balanced type, stratified and independent, department level, at urban and rural areas, according to the sample design from ENDES 2017, 2018 and 2019.

Variables and instruments

The study variables were created from the data present in ENDES. We included the following peripartum

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complications: prolonged labor, excessive bleeding after labor, high fever with vaginal bleeding with bad odor, convulsions not caused by fever and other complications. We included the following postpartum complications: intense vaginal bleeding, fainting or loss of consciousness, high fever or chills, breast infection, pain or burning with urination, vaginal flow or liquids, and involuntary urine leakage. The adequate PNC is made up of variables that are formed from the number of PNC, time of first PNC, and intervention actions and promotional prevention that make up a quality variable of PNC (weight, blood pressure, urine exam, blood work, listened to baby's heartbeat, syphilis test, HIV test, pregnancy nutrition information, pregnant woman's rights information, education regarding how to prepare breasts for breastfeeding, information regarding maternal breastfeeding, information about pregnancy complications, information on where to go in case of complications, did she receive iron and antitetanic protection (greater or equal to one vaccine), according to the recommendations by the Ministerio de Salud regarding refocused prenatal care[6] and the technical norms about the national schedule on vaccination in Peru in the year 2018[18]. For the sociodemographic variables, we considered age, region, place of residence, educational level and wealth index. Finally, we took into account the following for the variables referred to PNC: medical care by qualified personnel (doctor, nurse, and OBGYN nurse) and service only in the public sector (MINSA hospital, center or health post, ESSALUD hospital, policlinic, center or health post, FF.AA. and PNP hospitals, and municipality hospital or other). Finally, we took into account the variables referred to the sample design, the V005 variable for the sample weights were divided into a million in order to obtain the final sample weights that were incorporated in order to obtain results, and the V002 stratification variables and the variable that identifies the V001 clusters were taken into account.

Procedures

For data collection, we accessed the INEI official web page, in the option "Microdatos" http://iinei.inei.gob.pe/microdatos/, we accessed the section "Consulta por encuesta" where Encuesta demográfica y de salud familiar 2017, 2018 y 2019, were later selected and the corresponding data bases that contained the variables used for the analysis implementation were downloaded, the lost variables of each base were eliminated, leaving the variables of interest for the statistical analysis, in addition to the variables for the declaration of the sample design. The eliminated data bases were put together and a new data base was created, which contained all the necessary variables for the implementation of the study.

Statistical Analysis

The statistical software SPSS version 25.0 was used for the elaboration and procession of the database, with the individual identifier within homes (CASEID) and the home identifiers (HHIID) as the key variable. The csplan archive, which contains the survey sample design, was created and used for the data analysis. The complex samples module was used for the univariate and bivariate analysis, for the first the frequencies and percentages were calculated together with the variation coefficients (Table 1), for the second we calculated percentages for the qualitative variables and the corrected F statistical test for complex samples was used as association measure (Table 2). For the calculation of prevalence reasons, a version 16 STATA statistical software was used through the Poisson regression model with a robust variance for the binary response, for which the weighted sample weights were incorporated (Table 3). Lastly, the adequate PNC variables and those that resulted associated in the multivariate analysis (Table 3) were entered into a final model to identify the factors associated to the maternal peripartum and postpartum obstetric complications (Table 4).

Ethical Aspects

This study is based on the analysis of information extracted from the ENDES database from 2017 to 2019, which has public access through the INEI web portal. This database does not allow knowing the identity or any type of personal information of those surveyed, therefore, the survey participants' privacy is protected. Furthermore, the research project has been evaluated and approved by the Comité de Ética of the Universidad Ricardo Palma, allowing the continuation of the study.

RESULTS

A total survey of 41,803 mothers was analyzed, 21.0% had peripartum complications and 28.7% postpartum complications, from the first group we found that 8.6% had less than six PNC, 16.7% did not have PNC in the first trimester of pregnancy, while among the mothers who had postpartum complications, we found that 19.6% had less than six PNC and did not begin their control in the first trimester, and 50.8% did not have a quality PNC. Likewise, the greater percentage of mothers were

between 20 and 34 years of age (64.1%), were in metropolitan Lima (28.6%), in an urban area (74.6%), had high school level of education (45.3%), and, in short, belonged to sectors 1 and 2 of the wealth index (23.1% and 25.0%, respectively). Furthermore, 98.9% of mothers received PNC care only by qualified personnel and 88.9% only in the public sector (Table 1).

Among the mothers with peripartum complications, 18.2% did not begin PNC in the first trimester (p=0,004), 21.2% did not have more than six PNC nor did they begin control in the first trimester (p=0,003) and 55.4% did not have a quality PNC (p < 0,001), also, the majority were in metropolitan Lima (32.2%) or the mountains (31.2%) (p < 0,001), and 22.4% and 26.3% belongs to the quintile 1 and 2, respectively (p=0,005), furthermore, 99.5% received PNC care only by qualified personnel (p < 0,001) and 91.7% only in the public sector (p < 0,001). Among the mothers with postpartum complications, we observed that 56.3% did not have a quality PNC (p < 0,001), the majority were between 20 and 34 years of age (66,9%; p < 0,001), were in metropolitan Lima (29,8%; p=0,005), and had a high school level of education (46,1%; p < 0,001), 21,8% and 26,3% belonged to quintile 1 and 2, respectively (p < 0,001), and 99,1% received PNC care only by qualified personnel (p=0,024), finally 90,5% only in the public sector (p < 0,001) (Table 2).

We observed that the mothers without quality PNC had greater possibility of presenting peripartum complications (PR=1,20; CI95%=1,14-1,27); as far as sociodemographic factors those women in metropolitan Lima (PR =1,38; CI95%=1,27-1,49) or the mountains (PR =1,25; CI95%=1,18-1,33) and those belonging to quintile 2 (PR =1,13; CI95%=1,04-1,22) or 3 (PR =1,11; CI95%= 1,03 - 1,20) from the wealth index had greater possibility of having peripartum complications, while the mothers in the jungle had less possibility of said complications (PR =0,90; CI 95%=0,83-0,97); with respect to the factors referring to PNC care we found that mothers who received PNC care only by qualified personnel (PR =1,81; CI 95%=1,33-2,48) and only in the public sector (PR =1,48; CI 95%=1,31-1,68) had greater possibility of presenting peripartum complications (Table 4).

We also showed that those mothers without a quality PNC had greater possibility of presenting postpartum complications (PR =1,28; CI 95%=1,22-1,33); in reference to the sociodemographic factors, we found that those mothers who were in metropolitan Lima (PR =1,12; CI 95%=1,05-1,20) or the mountains (PR =1,06; CI 95%=1,01-1,12) and those belonging to quintile 2 (PR =1,13; CI 95%=1,05-1,20) or 3 (PR =1,12; CI 95%=1,05-1,19) in the wealth index had greater possibility of presenting postpartum complications, on the other hand, the mothers 35 years of age and above (PR =0,88; CI 95%=0,84-0,92), those without education or elementary education (PR = 0,85; CI 95%= 0,79 - 0,91) and those who reached high school education (PR =0,94; CI 95%=0,89-0,99) had less possibility of postpartum complications. According to the factors referring to PNC care, we found that mothers receiving PNC care only in the public sector (PR =1,29; CI 95%=1,17–1,41) had greater possibility of postpartum complications (Table 4).

Table 1. Variables involved in the research. ENDES 2017 to 2019: Univariate analysis.

Variables	n	%	CI95%	Coefficient of variation (%)
Peripartum maternal obstetric complications				
With complications	9009	21,0	20,4 - 21,6	1,4
Without complications	32794	79,0	78,4 - 79,6	0,4
Postpartum maternal obstetric complications				
With complications	11863	28,7	28,1 - 29,3	1,1
Without complications	29940	71,3	70,7 - 71,9	0,4
Adequate Prenatal Control				
Number of PNC ≥ 6				
No	3605	8,3	8,0 - 8,7	2,3
Yes	38198	91,7	91,3 - 92,0	0,2
Start of PNC in first trimester				
No	7504	16,7	16,2 - 17,2	1,5
Yes	34299	83,3	82,8 - 83,8	0,3
Number of PNC ≥ 6 and start in first trimester				
No	8672	19,6	19,1 - 20,1	1,4
Yes	33131	80,4	79,9 - 80,9	0,3
Quality PNC				
No	20849	50,8	50,0 - 51,5	0,7
Yes	20954	49,2	48,5 - 50,0	0,8
Sociodemographic Factors				
Age (years)				
Upto 19	1391	3,2	3,0 - 3,4	3,5
Between 20 and 34	27095	64,1	63,4 - 64,7	0,5
35 and above	13317	32,7	32,1 - 33,4	1,1
Region				
Metropolitan Lima	4820	28,6	27,5 - 29,8	2,0
Remainder of the coast	12575	26,2	25,3 - 27,2	1,8
Mountains	13621	27,3	26,3 - 28,4	1,9
Jungle	10787	17,8	17,0 - 18,7	2,4
Place of residence				
Rural	11923	25,4	24,7 - 26,1	1,4
Urban	29880	74,6	73,9 - 75,3	0,5
Education Level				
Without educación/Elementary	8810	20,1	19,5 - 20,7	1,5
High School	19236	45,3	44,5 - 46,0	0,8
Advanced	13757	34,7	33,9 - 35,5	1,1
Wealth index				
Quintile 1	11130	23,1	22,4 - 23,8	1,5
Quintile 2	11762	25,0	24,3 - 25,8	1,5
Quintile 3	8524	20,4	19,8 - 21,1	1,5
Quintiles 4 or 5	10387	31,4	30,5 - 32,3	1,4
Factors referring to PNC care				
Care only by qualified personnel				
Yes	41306	98,9	98,6 - 99,1	0,1
No	497	1,1	0,9 - 1,4	11,3
Care only in public sector				
Yes	38949	88,9	88,3 - 89,5	0,3
No	2854	11,1	10,5 - 11,7	2,7

Source: Own compilation, data obtained from INEI. Survey: ENDES 2017-2018-2019.

Table 2. Adequate PNC, sociodemographic factors and factors referring to PNC care associated to peripartum and postpartum complications. ENDES 2017 to 2019.

	Peripartum Complications					Postpartum Complications				
	With Complications		Without Complications		p value	With Complications		Without Complications		p value
	n	%	n	%		n	%	n	%	
Adequate Prenatal Control										
Number of PNC ≥ 6										
No	792	8,8	2813	8,2	0,209	1047	8,5	2558	8,3	0,570
Yes	8217	91,2	29981	91,8		10816	91,5	27382	91,7	
Start of PNC in first trimester										
No	1687	18,2	5817	16,3	0,004	2116	16,5	5388	16,7	0,716
Yes	7322	81,8	26977	83,7		9747	83,5	24552	83,3	
Number of PNC ≥ 6 and start in first trimester										
No	1950	21,2	6722	19,1	0,003	2465	19,6	6207	19,6	0,899
Yes	7059	78,8	26072	80,9		9398	80,4	23733	80,4	
CPN de calidad										
No	4827	55,4	16022	49,5	0,000	6499	56,3	14350	48,5	0,000
Yes	4182	44,6	16772	50,5		5364	43,7	15590	51,5	
Sociodemographic Factors										
Age (years)										
Upto 19	319	3,2	1072	3,2		418	3,3	973	3,1	
35 and above	2759	31,7	10558	33,0	0,238	3401	29,7	9916	34,0	0,000
Between 20 and 34	5931	65,1	21164	63,8		8044	66,9	19051	62,9	
Region										
Metropolitan Lima	1165	32,2	3655	27,7		1455	29,8	3365	28,2	
Mountains	3406	31,2	10215	26,3	0,000	4064	28,1	9557	27,0	0,005
Jungle	1976	13,8	8811	18,9		3018	17,0	7769	18,1	
Remainder coast	2462	22,8	10113	27,1		3326	25,0	9249	27,0	
Place of residence										
Rural	2690	25,2	9233	25,5	0,661	3336	24,6	8587	25,7	0,088
Urban	6319	74,8	23561	74,5		8527	75,4	21353	74,3	
Education Level										
Without educación /Elementary	1892	19,3	6918	20,3	0,168	2334	17,9	6476	20,9	0,000
High School	4226	46,4	15010	44,9		5516	46,1	13720	44,9	
Advanced	2891	34,3	10866	34,8		4013	35,9	9744	34,2	
Wealth index										
Quintile 1	2465	22,4	8665	23,3		3026	21,8	8104	23,7	
Quintile 2	2636	26,3	9126	24,7	0,005	3552	26,3	8210	24,5	0,000
Quintile 3	1875	21,6	6649	20,1		2490	21,8	6034	19,9	
Quintiles 4 or 5	2033	29,7	8354	31,8		2795	30,2	7592	31,9	
Factors referring to PNC care										
Care only by qualified personnel										
Yes	8946	99,5	32360	98,7	0,000	11748	99,1	29558	98,8	0,024
No	63	0,5	434	1,3		115	0,9	382	1,2	
Care only in public sector										
Yes	8587	91,7	30362	88,2	0,000	11187	90,5	27762	88,3	0,000
No	422	8,3	2432	11,8		676	9,5	2178	11,7	

P value of corrected F statistical test
Source: Own compilation, data obtained from INEI. Survey: ENDES 2017-2018-2019

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Table 3. Reasons for crude and adjusted prevalence for adequate prenatal control, sociodemographic factors, and factors referring to prenatal control care with peripartum and postpartum complications. ENDES 2017 al 2019.

	Peripartum Complications				Postpartum Complications			
	Crude PR	IC95%	Adjusted PR	IC95%	Crude PR	IC95%	Adjusted PR	IC95%
Adequate Prenatal Control								
Number of PNC ≥ 6								
No	1,06	0,97 - 1,15	0,94	0,83 - 1,06	1.02	0,95 - 1.10	0,98	0,89 - 1,09
Yes	1,00		1,00		1,00		1,00	
Start of PNC in first trimester								
No	1,11	1,04 - 1.19	0,99	0,84 - 1,19	0,99	0,93 - 1.05	0,92	0,80 - 1,07
Yes	1,00		1,00		1,00		1,00	
Number of PNC ≥ 6 and start in first trimester								
No	1,11	1,04 - 1,18	1,13	0,93 - 1,37	1,00	0,95 - 1,06	1,06	0,91 - 1,25
Yes	1,00		1,00		1,00		1,00	
Quality PNC								
No	1,20	1,14 - 1,27	1,20	1,14 - 1,26	1,25	1,20 - 1,31	1,25	1,20 - 1,31
Yes	1,00		1,00		1,00		1,00	
Sociodemographic Factors								
Age (years)								
Upto 19	0,99	0,87 - 1,13	1,00	0,88 - 1,15	1,00	0,90 - 1,12	1,02	0,92 - 1,13
35 and above	0,95	0,90 - 1,01	0,96	0,91 - 1,02	0,87	0,83 - 0,91	0,88	0,84 - 0,93
Between 20 and 34	1,00		1,00		1,00		1,00	
Region								
Metropolitan Lima	1,29	1,19 - 1,39	1,34	1,24 - 1,45	1,09	1,02 - 1,16	1,11	1,04 - 1,18
Mountains	1,31	1,24 - 1,39	1,29	1,22 - 1,38	1,08	1,03 - 1,13	1,09	1,04 - 1,15
Jungle	0,89	0, 83 - 0,95	0,87	0,81 - 0,93	1,00	0,95 - 1,05	1,01	0,96 - 1,07
Remainder coast	1,00		1,00		1,00		1,00	
Place of residence								
Rural	0,99	0,94 - 1,04	1,00	0,93 - 1,08	0,96	0,92 - 1,00	1,01	0,95 - 1,07
Urban	1,00		1,00		1,00		1,00	
Educational level								
Without education/Elementary	0,98	0,91 - 1,05	0,96	0,88 - 1,05	0,86	0,82 - 0,91	0,85	0,79 - 0,91
High School	1,04	0,98 - 1,10	0,99	0,93 - 1,07	0,98	0,94 - 1,03	0,94	0,89 - 0,99
Advanced	1,00		1,00		1,00		1,00	
Wealth index								
Quintile 1	1,02	0,96 - 1,10	1,14	1,02 - 1,27	0,98	0,92 - 1,04	1,06	0,97 - 1,16
Quintile 2	1,11	1,03 - 1,19	1,20	1,10 - 1,32	1,09	1,03 - 1,16	1,14	1,07 - 1,23
Quintile 3	1,12	1,03 - 1,20	1,17	1,08 - 1,27	1,11	1,04 - 1,18	1,14	1,07 - 1,21
Quintiles 4 or 5	1,00		1,00		1,00		1,00	
Factors Referring to Prenatal Control Care								
Care only by qualified personnel								
Yes	2,12	1,55 - 2,89	2,17	1,59 - 2,97	1,29	1,06 - 1,57	1,31	1,08 - 1,60
No	1,00		1,00		1,00		1,00	
Care only in public sector								
Yes	1,37	1,22 - 1,54	1,38	1,22 - 1,55	1,19	1,09 - 1,30	1,19	1,09 - 1,31
No	1,00		1,00		1,00		1,00	

Source: Own compilation, data obtained from INEI. Survey: ENDES 2017-2018-2019.

Table 4. Factors associated to peripartum and postpartum complications. ENDES 2017 to 2019.

	Peripartum Complications		Postpartum Complications	
	Adjusted PR	CI95%	Adjusted PR	CI95%
Number of PNC ≥ 6				
No	0,95	0,84 - 1,08	0,99	0,90 - 1,10
Yes	1,00		1,00	
Start of PNC in first trimester				
No	0,96	0,81 - 1,14	0,90	0,78 - 1.04
Yes	1,00		1,00	
Start of PNC in first trimester				
No	1,13	0,93 - 1,37	1,07	0,92 - 1,26
Yes	1,00		1,00	
Start of PNC in first trimester				
No	1,20	1,14 - 1,27	1,28	1,22 - 1,33
Yes	1,00		1,00	
Start of PNC in first trimester				
Upto 19	-	-	1,01	0,91 – 1,13
35 and above	-	-	0,88	0,84 - 0,92
Between 20 and 34	-		1,00	
Region				
Metropolitan Lima	1,38	1,27 - 1,49	1,12	1,05 - 1,20
Mountains	1,25	1,18 - 1,33	1,06	1,01 - 1,12
Jungle	0,90	0,83 - 0,97	1,03	0,98 - 1,09
Remainder coast	1,00		1,00	
Education Level				
Without educación /Elementary	-	-	0,85	0,79 - 0,91
High School	-	-	0,94	0,89 - 0,99
Advanced	-		1,00	
Wealth index				
Quintile 1	1,06	0,98 - 1,15	1,04	0,96 - 1,12
Quintile 2	1,13	1,04 - 1,22	1,13	1,05 - 1,20
Quintile 3	1,11	1,03 - 1,20	1,12	1,05 - 1,19
Quintiles 4 or 5	1,00		1,00	
Care only by qualified personnel				
Yes	1,81	1,33 - 2,48	-	-
No	1,00		-	
Care only in public sector				
Yes	1,48	1,31 - 1,68	1,29	1,17 - 1,41
No	1,00		1,00	

Source: Own compilation, data obtained from INEI. Survey: ENDES 2017-2018-2019.

DISCUSSION

We found an association between PNC and the peripartum maternal obstetric complications, those mothers without quality PNC had greater possibility of complications (PR=1,20; CI 95%=1,14-1,27) compared to those who had quality PNC, diverse studies found an association in their results regarding PNC and obstetric complications, as reported in a study by Solórzano et al for inadequate PNC associated to severe maternal morbidity (OR=3,467; p=0,001; CI 95%=1,657-7,254)[16]; Chambi et al, found that a number of PNC between 1 and 5 was associated to obstetric complications in pregnant adolescents seen in a hospital of Juliaca-Peru (OR=4,85; CI 95%=1,04-22,48; p=0,02)[15]; and McCall et al, who found that an inadequate use of PNC is associated with maternal mortality in women of 35 years of age and older (OR=23,62; CI 95%=8,79–63,45; p= <0,001)[19].

Regarding regions, Metropolitan Lima (PR=1,38; CI 95%=1,27-1,49) and the mountains (PR=1,25; CI95%=1,18-1,33), were the regions where the mothers had greater possibility of presenting peripartum complications, unlike the mothers in the jungle (PR=0,90; CI95%=0,83-0,97), the latter can be explained due to the lower birth rate found in this region, as was reported in the study carried out by Espinola et al[20] where it was evidenced that the jungle is the region with less quantity of pregnant women on a national level with 34.27% of the total of pregnancies (p< 0,001); a lower number of mothers to see in this region may explain a lower number of complications, in addition, it will allow more personalized PNC adapted to each pregnant woman. With respect to wealth, we found that mothers belonging to quintiles 2 (PR=1,13; CI 95%=1,04–1,22) and 3 (PR=1,11; CI 95%=1,03–1,20) had greater possibility of presenting peripartum complications compared to those belonging to quintiles 4 and 5, which coincides with the bivariate analysis from the study by Chávez et al[21], in which it was found that pregnant adolescents with a low socioeconomic level had greater possibility of presenting obstetric complications (OR=2,35; CI 95%=1,08-5,11; p=0.027), compared to those that belonged to a middle level (the high level was not evaluated since no pregnant woman of their population complied with said condition), regarding the economic topic, UNICEF signaled that, although there has been great advancements in the world to improve the access of women to maternal services, the reality is still rough on women who live in the greater poverty situation, since access to quality maternal health care is more jeopardized[22].

Regarding factors referring to PNC care, we found that mothers who received PNC care only by qualified personnel had greater possibility of having peripartum complications (PR=1,48; CI 95%=1,31–1,68), probably because qualified personnel can identify and report greater subtle complications than a non-qualified personnel, it is also possible that during labor care by professionals, there may be some interventions that lead to these outcomes. We also found that mothers who received PNC only in the public sector had greater possibility of presenting peripartum complications (PR=1,48; CI 95%=1,31–1,68), while in the study by Cueto et al, the mothers with a private pregnancy control were who had greater likelihood of having hemorrhagic disorders (OR=1,69, CI 95%=1,21–2,36)[23], this study was carried out in Spain, where there is greater possibility that their public services have the necessary tools for a PNC that contributes in decreasing the peripartum complications, different from Peru, where there still exist deficiencies in supply, storage and maintenance of material resources in public establishments, obstructing the prevention and early diagnosis of complications that may be present during labor, prompting mothers to complement their pregnancy evaluations with service in other sectors, such as private. For this reason, it is also important that government keeps a constants supervision in services offered and carry out these sectors with the goal that this intersectoral work contributes in preserving maternal health.

We found an association between PNC and the postpartum obstetric maternal complications, finding that women who did not have a quality PNC had greater possibility of postpartum complications (PR=1,28; CI 95%=1,22-1,33) compared to those with quality PNC, similar to those reported by Heaman, who found that not having received adequate gestational control predisposed to a greater possibility of presenting maternal complications such as maternal depression and anxiety (aOR=1,14; CI 95%=1,05-1,23) and a short birth interval (OR=1,33; CI 95%=1,25-1,43)[24]; likewise, Montenegro found an association between the presence of postpartum complications and an inadequate PNC number (OR=4,517; CI 95%=2,13-9,219; p=0,00)[14].

According to age, we found that mothers 35 years of age and older had les possibility of having postpartum

complications (PR=0,88; CI 95%=0,84–0,92), it is possible that mothers o folder age, due to finding themselves in an obstetric vulnerable situation and due to the maturity that age brings, they be more careful with their pregnancy and seek care when facing any alarm signs, preventing the development of complications, however, these results differ from those found by Tipiani Rodriguez[25] and by the study from Heras Pérez[26]; our findings and those of other authors[25,26] reflect the importance of greater studies regarding the role of age groups in obstetric complications. With respect to region, we found that Metropolitan Lima (PR=1,12; CI 95%=1,05-1,20) and the mountain region (PR=1,06; CI 95%=1,01-1,12) were the regions where mothers presented greater possibility of postpartum complications, this could be due to the conditions in which mothers are seen in these regions such as that exposed in the study by Huamán Ayala et al regarding the factors that influence the decision on seeking prenatal care in the Andes of Peru, where we found that waiting on criticism about having more children, long wait time for care and inconvenient hours of surgery, and masculine gender of healthcare workers negatively influence the prenatal care[27], for this reason, it is still important to work in the promotion of an adequate and opportune PNC assistance in the population of this region, and this way avoid the development of complications during and after labor.

Regarding the educational level, we found that mothers with high school education (PR=0,93; CI 95%=0,89–0,98) and those without education or elementary education (PR=0,84; CI 95%=0,78–0,90) had les possibility of presenting postpartum complications, it is important to emphasize that mothers with lower levels of education may undervalue the presence of any complication or not properly understand the questions regarding complications made by the surveyor, as opposed to those with higher levels of education and can better understand the complications that they presented and adequately notify them. With respect to this, in the study by Acelas-Granados et al it was found that having completed high school is a protective factors for severe maternal morbidity (SMM) (OR=0,30; CI 95%=0,09-0,93), however, not completing high school is a risk factor for SMM (OR=3,33; CI 95%=1,08-10,97)[28], according to Kobayashi Gamboa, pregnant adolescents with Elementary education had greater probability of accessing health services (OR=1,390; CI 95%=1,070-1,820) compared to those who have high school or higher education, since there is greater concern about the implementation of programs since this population has greater obstetric risk[29], however, it becomes evident the lack of data with respect to other age groups.

As far as the wealth quintiles, it was found that mothers belonging to quintiles 2 (PR=1,13; CI 95%=1,05–1,20) and 3 (PR=1,12; CI 95%=1,05–1,19) have greater possibility of presenting postpartum complications, which coincides with the study by Heaman et al, who found that women belonging to Quintile 2 (aOR=1,42; CI 95%= 1,20 - 1,69) and Quintile 3 (aOR=1,35; CI 95%= 1,13 – 1,61) had greater possibility of maternal hospital readmission after being discharged[24]; we know that, in Peru, pregnancy imposes a considerable economic burden for mothers, which may be very detrimental if they already find themselves in a vulnerable situation, given that many times they have to prioritize the economic needs of their other children (if they have any) or themselves[30], possible affecting a correct evaluation during PNC and predisposing to the development of obstetric complications, in addition, in this study we have seen that care for pregnant women only in the public sector is not enough to reduce the risk of complications, despite the social programs which the mothers can access with lower wealth index, the access to private sector has a prohibitive cost that not all can overcome.

Regarding factors associated to PNC, we found that mothers that had only received control in the public sector had greater possibility of presenting postpartum complications (PR=1,29; CI 95%=1,17–1,41), on the contrary, the study by Cueto in Spain found that women with private pregnancy control had a greater risk of suffering from systemic disorders (OR=2,51, CI 95%=1,44–4,38) and presenting clinical indicators of severity (OR=1,97, CI 95%=1,39–2,80) [23]; in Peru, the population overload of those public health services predispose that, many times, with the purpose of seeing a greater number of possible patients, the necessary time for the proper evaluation of the pregnant woman is not met, furthermore, the lack of material resources or deficits in their maintenance obstruct the proper identification and prevention of diverse obstetric risk factors, which could contribute to the development of postpartum complications.

Within the limitations of this study, we found that, since it is a cross-sectional study, it is not possible to establish causality among the explicative variables and answer variables, the resulting association

would be considered only as a protective or risk factor. With regards to the PNC variable of quality, we could only include the recommendations by the Ministerio de Salud available in ENDES. Furthermore, the information available is subject to the answer of survey questions by those surveyed, that may not be reliable, and the data collection technique used by the surveyor, which it is not possible to corroborate the veracity or accuracy of information obtained, which could induce systemic errors, such as fall into an information bias, unlike those studies with clinical populations, where documents are used such as clinical history, perinatal card, etc. Finally, since it is a general population and not clinical, the associations between health variables involved in this study may be different to those reported by other researchers.

Given the PNC value and the role they play in the development of multiple obstetric complications, it is recommended that future researchers use the clinical population data or databases with verified clinical information and analyze each of the peripartum and postpartum complications individually (eclampsia, postpartum hemorrhage, postpartum endometriosis, etc.). The association among sociodemographic factors and the peripartum and postpartum complications showed their relevance in maternal health, which is why it is recommended that they continue to be included in future research and that other factors may be added that have not been analyzed in this study (occupation, ethnic origin, language, etc.). Likewise, due to the association among the factors referring to PNC and the mentioned complications, it is recommended to Delve into this finding, since limited studies exist on this topic, and in they are descriptive in their majority.

CONCLUSION

In conclusion, among the variables that measure an adequate PNC, we found an association between quality PNC and the peripartum and postpartum obstetric maternal complications. Likewise, we found an association between region, PNC care only by qualified personnel, and only in the public sector and peripartum complications, and association between age, region, educational level, wealth index and PNC care only in the public sector with postpartum complications.

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