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Factors associated with lack of prenatal care in a large municipality

Fatores associados à não realização de pré-natal em município de grande porte

ABSTRACT

OBJECTIVE: To analyze the factors associated with a lack of prenatal care in a large municipality in southern Brazil.

METHODS: In this case-control age-matched study, 716 women were evaluated; of these, 179 did not receive prenatal care and 537 received prenatal care (controls). These women were identified using the Sistema Nacional de Informação sobre Nascidos Vivos (Live Birth Information System) of Pelotas, RS, Southern Brazil, between 2009 and 2010. Multivariate analysis was performed using conditional logistic regression to estimate the odds ratios (OR).

RESULTS: In the final model, the variables associated with a lack of prenatal care were the level of education, particularly when it was lesser than four years [OR 4.46; 95% confidence interval (CI) 1.92;10.36], being single (OR 3.61; 95%CI 1.85;7.04), and multiparity (OR 2.89; 95%CI 1.72;4.85). The prevalence of a lack of prenatal care among administrative regions varied between 0.7% and 3.9%.

CONCLUSIONS: The risk factors identified must be considered when planning actions for the inclusion of women in prenatal care by both the central management and healthcare teams. These indicated the municipal areas with greater deficits in prenatal care. The reorganization of the actions to identify women with risk factors in the community can be considered to be a starting point of this process. In addition, the integration of the activities of local programs that target the mother and child is essential to constantly identify pregnant women without prenatal care.

DESCRIPTORS: Prenatal Care, utilization. Risk Factors. Socioeconomic Factors. Health Services Accessibility. Maternal-Child Health Services. Equity in Health. Case-Control Studies.

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RESUMO

OBJETIVO: Analisar os fatores associados à ausência de realização de pré-natal em município de grande porte.

MÉTODOS: Estudo caso-controle, pareado por idade, com 716 mulheres, das quais 179 não realizaram o pré-natal e 537 o realizaram (controles), identificadas por meio do Sistema Nacional de Informação sobre Nascidos Vivos, do município de Pelotas, RS, entre 2009 e 2010. Realizou-se análise múltipla por regressão logística condicional para estimar as *odds ratios* (OR).

RESULTADOS: No modelo final, as variáveis que mostraram associação com a não realização de pré-natal foram: ter menor escolaridade, especialmente menos de quatro anos de estudo (OR 4,46; IC95% 1,92;10,36), ser solteira (OR 3,61; IC95% 1,85;7,04) e ser multípara (OR 2,89; IC95% 1,72;4,85). A prevalência de não realização de pré-natal por região administrativa variou de 3,9% a 0,7%.

CONCLUSÕES: Os fatores de risco encontrados devem ser considerados no planejamento de ações para a inclusão das mulheres no pré-natal, tanto pela gestão central quanto pelas equipes de saúde, e indicaram as regiões do município com maiores déficits na captação de pré-natal. A reorganização das ações para identificar as mulheres com esses fatores de risco na comunidade pode ser considerada o ponto inicial desse processo. É necessário ainda integrar as atividades entre programas locais que atuam sobre o grupo materno-infantil para a busca constante das gestantes sem atendimento.

DESCRITORES: Cuidado Pré-Natal, utilização. Fatores de Risco. Fatores Socioeconômicos. Acesso aos Serviços de Saúde. Serviços de Saúde Materno-Infantil. Equidade em Saúde. Estudos de Casos e Controles.

INTRODUCTION

Prenatal care aims to promote maternal and fetal health, monitor risk factors, and treat complications as early as possible. Prenatal care improves clinical and psychological outcomes in pregnancy and postpartum and decreases maternal and child morbidity and mortality.[11,13,a]

Many initiatives have been adopted worldwide to provide universal access to adequate reproductive healthcare.[12,15,16] In industrialized countries, more than 95.0% of pregnant women undergo at least one prenatal consultation. In emerging countries such as Colombia and South Africa, this indicator is at 62.0% and 69.0%, respectively.[3,11,14,15]

In Brazil, the prenatal coverage significantly increased after the adoption of the *Programa Nacional de Humanização do Pré-Natal e Nascimento* (National

Program for Humanization of Prenatal Care and Birth) in 2000, and its main strategy is to provide improved access, coverage, and adequate healthcare to the mother and child at the prenatal, delivery, and postpartum stages.[19] The National Demographic and Health Survey published in 2009 showed a decrease in the percentage of mothers without prenatal care (14.0% in 2000 to 2.7% in 2006). The proportion of live births to mothers having ≥ 7 prenatal visits increased from 43.7% in 2000 to 54.5% in 2006.[b] In 2010, the prenatal care coverage was 98.0% in Brazil.[c]

Despite the increased coverage and nearly universal prenatal care, a percentage of the target population does not receive this assistance, depending on the level of

regional development, access to healthcare services, and organization of the healthcare system.[12,13,20,21] Failure to perform prenatal care has been associated with adverse outcomes during pregnancy and childbirth. Moreover, complications such as congenital syphilis, neonatal death, and preterm birth are strongly correlated with a lack of prenatal care.[4,8,16,18]

Most studies suggest that a lack of prenatal care is mainly a result of socioeconomic factors (low family income and education), access to medical consultations (large distance from the place of residence to the healthcare unit and transportation costs), quality of healthcare, and social support.[13,20,21] Other potentially related factors include maternal age (adolescence and older age), not living with a partner, use of alcohol or other drugs during pregnancy, multiparity, nonacceptance of pregnancy, lack of family support, adverse social context, negative experience of care, and perceptions of disapproval of prenatal care.[8-10,15,17]

Considering the relevance of this issue for the development of public policies directed at maternal care during pregnancy, this study aimed to evaluate the factors associated with a lack of prenatal care in a large municipality.

METHODS

This case-control, retrospective, and age-matched study used secondary data available from *Sistema Nacional de Informação sobre Nascidos Vivos* (SINASC – Live Birth Information System) regarding the city of Pelotas, RS, Southern Brazil.

The eligibility criteria included women who resided in Pelotas without prenatal care and with live births between 2009 and 2010. The control group consisted of women who resided in Pelotas and without prenatal care and with live births during the same period.

During the study period, the municipal SINASC had full access to birth registries, which corresponded to 4,057 births in 2009 and 3,909 births in 2010. This database contained data extracted from *Declaração de Nascido Vivo* (DNV – Live Birth Certificate) forms applied in the municipality since 1999. DNV were issued in triplicate shortly after childbirth in the healthcare unit where delivery occurred. The first form was collected by the Municipal Department of Health, following which it was revised and registered. In addition to DNV, the study used the Hospital Admission Authorization database from the municipality as a source of information.

Three controls were selected for each case to increase the study power. All controls were matched for maternal age, with a difference of approximately three years, and were selected according to the place of residence (administrative region) where each case occurred: Areal, Três Vendas, Center, Fragata, Praias, Porto,

and rural districts 1 to 9. For the selection of controls, cases and controls were arranged in ascending order of age and were randomly selected. The study included 179 cases (74 in 2009 and 105 in 2010) and 537 controls (222 in 2009 and 315 in 2010). This sample size enabled the calculation of odds ratios (OR ≥ 1.65) assuming a variable prevalence between 20.0% and 70.0%, a confidence interval of 95%, and statistical power of 80.0%.

The following mother-related variables were selected: age (continuous), self-reported marital status (married, divorced, single, or widow), level of education in years (< 4, 4-7, 8-11, ≥ 12), occupation of the mother, absolute number of live births and fetal deaths, duration of pregnancy in weeks (< 22, 22-27, 28-31, 32-36, 37-41, ≥ 42), and place of residence (administrative region). Some independent variables were regrouped or transformed: marital status (single, married), employment (yes, no), parity considering the number of live and dead births in previous pregnancies (primiparous, first childbirth; multiparous, other situations), and preterm birth (gestational age < 37 weeks) (yes, no).

After variable selection for this study, the percentage of unknown data on age and place of residence was evaluated. In case of the lack of such information, a search was conducted in the Hospital Admission Authorization database after the approval by the Data Processing Center of the Municipal Department of Health. The distance traveled on foot from the place of residence (for the cases and controls) to the nearest prenatal service of the primary healthcare (PHC) unit (m) was calculated using Google Earth™ software and Google Maps™ service. To perform the calculation, the addresses of the participants and PHC units in each district of residence were input into the software. To identify the nearest PCH unit, a list provided by the Municipal Department of Health and the type of healthcare model (traditional or Family Health Strategy – FHS) were considered.

Data analysis was performed using Stata software version 11.0 (Stata Corporation, College Station, USA) and included the frequencies of all variables for cases and controls. Bivariate analyses were performed during crude analysis by crossing each variable for the cases and controls. Multiple analyses were performed by keeping the variables with p < 0.20 in the model to control for confounding factors. Crude and adjusted OR, respective 95%CI, and significance were calculated using conditional logistic regression. The variables were included in the adjusted model using two hierarchical levels: in the first level, distance between the place of residence and the nearest PHC unit, assistance model and occupation, level of education, and marital status; in the second level, parity and gestational age.

The study was approved by the Research Ethics Committee of the *Faculdade de Enfermagem de Pelotas* (Process CAAE 12396813.6.0000.5316).

RESULTS

The percentage of unknown data for the variables selected from the SINASC database was ≤ 8.0%, as follows: maternal age (1.0%), parity (2.0%), place of residence (4.0%), preterm birth (5.0%), marital status (6.0%), employment of the mother (6.0%), and years of education of the mother (8.0%). After cases and controls were selected, the Hospital Admission Authorization database was consulted to identify the addresses of 3.9% of the cases and 8.6% of the controls.

Considering the distribution of 179 cases per administrative region in the municipality according to the place of residence, a higher number of cases in the regions of Areal and Três Vendas and a lower number of cases in the regions of Praias and Distritos were observed. However, when analyzing the number of cases in relation to the total live births in each region, the prevalence of women without prenatal care increased in the regions of Areal, Porto, Center, and Praias (Table 1).

The average age for the cases and controls varied between 14 and 44 years, with a mean age of 25 years (SD = 6.2). With regard to age, 20.0% of the women were aged < 20 years and 8.4% were aged ≥ 35 years.

With regard to the distribution of the independent variables for cases and controls, the most frequent cases involved being single, lower level of education (< 7 years), and multiparity. With regard to the distance between the place of residence and the nearest PHC unit, the highest prevalence of a lack of prenatal care was observed in the category 500 to 1,000 m for the cases and controls. With regard to the assistance model of the healthcare unit, the nearest unit had a traditional healthcare model in more than 50.0% of the cases and controls (Table 2).

Table 3 shows the crude and adjusted OR values for the independent variables. After model adjustment, being single had a significant and positive correlation with a lack of prenatal care. Lower educational levels (4-7 years

and < 4 years) were associated with a lack of prenatal care, and the risk of not receiving prenatal care increased as the level of education decreased (p for linear trend < 0.001). With regard to parity, multiparity was positively correlated with a lack of prenatal care (p < 0.001). However, no significant correlation was found between a lack of prenatal care and distance between the place of residence and the nearest healthcare unit, assistance model, employment, and duration of gestation.

DISCUSSION

The benefits of performing prenatal care have been extensively discussed in the scientific literature, and the most important factors are decreased maternal and infant mortality.[2,7,18] The deprivation of prenatal care can lead to premature pregnancy, intrauterine growth retardation, low weight at birth, and maternal and child mortality as a result of infections in the perinatal

Table 1. Distribution of cases of women without prenatal care and its distribution in relation to total live births by administrative region in Pelotas, RS, Southern Brazil, 2009-2010.

Administrative Region	Cases	Live births	% of cases
	n	n	
Areal	41	1,354	3.9
Três Vendas	41	2,191	1.9
Fragata	32	1,889	1.7
Porto	28	757	3.7
Center	27	1,075	2.5
Praias	7	287	2.4
Rural districts	3	413	0.7

Table 2. Distribution of variables related to women without prenatal care and the respective controls in Pelotas, Rio Grande do Sul, RS, Southern Brazil, 2009-2010.

Variable	Case (N = 179)		Control (N = 537)	
	n	%	n	%
Distance between place of residence and PHC unit (m)				
≤ 500	52	31.7	169	34.6
501 to 1,000	82	50.0	212	43.4
> 1,000	30	18.3	108	22.0
Assistance model				
Family Health Strategy	79	44.1	227	42.5
Traditional	100	55.9	307	57.5
Marital status				
Married	12	6.8	110	20.6
Single	164	93.2	423	79.4
Education (years)				
> 11	14	8.0	81	15.2
8 to 11	42	24.0	208	39.1
4 to 7	97	55.4	215	40.4
< 4	22	12.6	28	5.3
Employment status				
Yes	47	26.5	176	32.9
No	130	73.5	359	67.1
Parity				
Primiparous	32	18.0	213	39.7
Multiparous	146	82.0	323	60.3
Preterm birth				
No	129	80.1	426	79.8
Yes	32	19.9	108	20.2

PHC: primary healthcare

Table 3. Raw and adjusted odds ratios between cases and controls in Pelotas, RS, Southern Brazil, 2009-2010.

Variable (hierarchical level)	OR$_{raw}$	95%CI	p	OR$_{adjusted}$	95%CI	p
Distance between place of residence and PHC unit (1)			0.800^T			–
≤ 500	1	–		–	–	
501 to 1,001	1.26	0.84;1.90				
> 1,000	0.87	0.51;1.47				
Assistance model (1)			0.707	–	–	–
Family Health Strategy	1	–				
Traditional	0.93	0.67;1.33				
Single (1)			< 0.001			< 0.001
No	1	–		1	–	
Yes	4.02	2.11;7.67		3.61	1.85;7.04	
Education in years (1)			< 0.001^T			< 0.001^T
> 11	1	–		1	–	
8 to 11	1.17	0.60;2.84		1.05	0.53;2.05	
4 to 7	2.73	1.46;5.11		2.29	1.21;4.33	
< 4	4.93	2.16;11.24		4.46	1.92;10.36	
Employed (1)			0.111			0.912
Yes	1	–		1	–	
No	1.34	0.93;2.03		1.02	0.67;1.56	
Parity (2)						
Primiparous	1	–	< 0.001	1	–	< 0.001
Multiparous	4.18	2.54;6.89		2.89	1.72;4.85	
Preterm birth (2)						
No	1	–	0.967	–	–	–
Yes	0.99	0.72;1.37				

PHC: primary healthcare
^{T} Linear trend

and postnatal periods.[4,8,16,18] This scenario justifies the performance of studies that will contribute to the understanding of the effects of a lack of prenatal care.

The municipality of Pelotas has offered an extensive network of primary care units since the 1980s, amounting to 42 units in urban areas and 11 units in rural areas. Despite the adequate supply and high prenatal coverage, 1.8% of the pregnant women in 2009 and 2.7% in 2010 were excluded from this service, which indicates a significant increase in the number of cases in this period, reaching approximately 50.0%. In Brazil, during these years, the prevalence was 1.9% and 1.8%, respectively.[c]

Single women had a threefold higher risk of not receiving prenatal care than married women. One hypothesis for this finding may be related to the results of other studies, wherein spousal support during pregnancy favored the adherence to prenatal care. In contrast, the lack of spousal support, along with low education of the mother, contributed to the lack of seeking prenatal care and the decreased number of consultations during pregnancy.[12,17]

A lack of prenatal care was strongly correlated with the education level, which was considered one of the main factors associated with a lack of healthcare assistance in general. Increased education, in turn, contributed to the achievement of prenatal care even among those belonging to lower socioeconomic classes.[1,9,13,19,20] Hence, the educational level influences the use of both basic healthcare and prenatal care services by the less-favored population.[5,19]

The risk of not receiving prenatal care was twofold higher in multiparous women than in primiparous women. Previous studies have shown that nonprimiparous women and women without prior obstetric complications have a tendency of not receiving prenatal care, particularly those with a lack of family support, adverse social context, negative experience of healthcare, and perceptions of disapproval of prenatal care.[1,8,10,17,21]

The duration of pregnancy was not associated with a lack of prenatal care. The data obtained from DNV classified by gestational age may have been a limiting factor in the accurate assessment of the relationship between preterm birth and a lack of prenatal care. Nonetheless, previous studies have shown that a lack of prenatal care

can lead to preterm birth.[2,8,18,20] In addition, a study by Kilsztajn et al[16] showed that the increase in the number of prenatal visits from 0-3 to ≥ 7 significantly decreased the prevalence of low weight at birth and/or preterm birth from 14.0% to 4.0%.

In this study, the assistance model of the nearest PHC unit was considered a substitute to the healthcare organization/ management in relation to the provision of priority actions at this level of care. The traditional assistance model showed no positive correlation with a lack of prenatal care. This result may be related to the low coverage of FHS in the municipality, at the time of the study, and to the free choice of the basic healthcare unit by the pregnant women. No correlation was observed between a lack of prenatal care and the distance between the place of residence and the nearest healthcare unit, which is in agreement with results of previous studies.[1,6,13,20] The selection of controls by administrative region and the high number of PHC units, particularly in urban areas of the municipality, may have contributed to this result.

Even considering the wide coverage of the PHC network in Pelotas, the inclusion of pregnant women without prenatal care should not lead to work overload for the healthcare teams. A reorganization of the activities that prioritize women with risk factors can be a starting point in this process. The integration of local program activities that target the mother and child, such as "Primeira Infância Melhor", "Prá-nenê", and "Bolsa Família", could improve the identification of pregnant women without prenatal care, promote health education on family planning, early initiation of prenatal care, and inclusion of children in childcare. Furthermore, the support provided to families to avoid school evasion due to pregnancy is an important action to be taken by healthcare professionals.

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HIGHLIGHTS

The present study analyzes the factors associated with the lack of prenatal care in Pelotas, a large municipality in the Southern Region of Brazil. Despite the improvement in health care and prenatal care coverage, part of the target population does not receive such care. Previous studies indicate that the lack of prenatal care is mainly due to socioeconomic factors, limited access to medical consultations, and the quality of health care and social support services. The adequate prenatal care follow-up is essential for maternal and fetal health and allows the monitoring of risk factors and the early treatment of complications. In addition, this care improves clinical and psychological outcomes during pregnancy and postpartum, reducing infant and maternal morbidity-mortality.

The variables associated with the lack of prenatal care were: lower education levels, especially < 4 years of education, being single, and being multiparous. The prevalence of the lack of prenatal care by administrative region varied between 0.7% and 3.9%.

Health care services should be organized so as to identify pregnant women without prenatal care in their coverage area. The integration of local program activities that target the mother and child can improve strategies aimed at the inclusion of pregnant women without care, health education on family planning, need for early initiation of prenatal care, and the inclusion of children in childcare.

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