






## **PERINATAL FACTORS ASSOCIATED WITH PREMATURITY IN NEONATAL INTENSIVE CARE UNIT**

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### **ABSTRACT**

**Objective:** to identify the perinatal factors associated with prematurity in neonatal intensive care units from prenatal care.

**Method:** a case-control study carried out in the southern region of the country with 186 puerperal women, from July to November 2018. A hierarchical approach strategy and conditional logistic regression were used in data analysis.

**Results:** among the preterm births, 5.9% (n=11) were classified as extremely premature (<31 weeks), 12.9% (n=24) as moderate prematurity (32 to 34 weeks and 6 days) and 31.2% (n=58) as late premature (35 to 36 weeks and 6 days). The factors associated with the occurrence of prematurity were maternal age (30 years old), schooling (<8 years) and income (4 wages). Among the perinatal factors in the final adjustment model, insufficient number of consultations (OR 2.69/95% CI 1.10 - 6.55) and late onset of prenatal care (OR 4.34/95% CI 1.49 - 12.58) were associated with the occurrence of the outcome. On the other hand, absence of complications, premature membrane rupture and infections in the current pregnancy, as well as adequate clinical management and specific referral were protective factors against the occurrence of births before 37 weeks of pregnancy.

**Conclusion:** it is necessary that health professionals are accessible to the most varied social changes, considering their role as educators and health promoters. Qualified and appropriate Nursing assistance in prenatal care for pregnant women reduces the chance of the newborns being admitted to neonatal intensive care units.

**DESCRIPTORS:** Prenatal care. Premature birth. Risk factors. Neonatal intensive care unit. Premature.

**HOW CITED:** Pitilin EB, Rosa GFD, Hanauer MC, Kappes S, Silva DTR, Oliveira PP. Perinatal factors associated with prematurity in neonatal intensive care unit. *Texto Contexto Enferm* [Internet]. 2021 [cited YEAR MONTH DAY]; 30:e20200031. Available from: <https://doi.org/10.1590/1980-265X-TCE-2020-0031>

# FATORES PERINATAIS ASSOCIADOS À PREMATURIDADE EM UNIDADE DE TERAPIA INTENSIVA NEONATAL

## RESUMO

**Objetivo:** identificar os fatores perinatais associados à prematuridade em unidade de terapia intensiva neonatal a partir da assistência pré-natal.

**Método:** estudo caso-controle realizado na Região Sul do país com 186 puérperas, no período de julho a novembro de 2018. Utilizou-se na análise dos dados a estratégia de abordagem hierárquica e regressão logística condicional.

**Resultados:** entre os nascimentos pré-termo, 5,9% (n=11) foram classificados como prematuros extremos (<31 semanas), 12,9% (n=24) prematuridade moderado (32 a 34 semanas e 6 dias) e 31,2% (n=58) como prematuros tardios (35 a 36 semanas e 6 dias). Os fatores associados à ocorrência da prematuridade foram idade materna (30 anos), escolaridade (<8 anos) e a renda (<4 salários). Entre os fatores perinatais no modelo ajustado final o número de consulta insuficiente (OR 2,69/IC 95%1,10 - 6,55) e início do pré-natal tardio (OR 4,34/IC95%1,49 - 12,58) estiveram associados à ocorrência do desfecho. Por outro lado, ausência de intercorrências, ruptura prematura da membrana e infecções na gestação atual, bem como uma conduta clínica adequada e encaminhamento específico foram fatores de proteção para a ocorrência de nascimentos antes de 37 semanas de gestação.

**Conclusão:** torna-se necessário que os profissionais da saúde estejam acessíveis às mais variadas mudanças sociais, considerando o seu papel de educador e promotor da saúde. Uma assistência de Enfermagem no pré-natal qualificada e oportuna para a gestante diminui a chance de internação do recém-nascido em unidades de terapia intensiva neonatal.

**DESCRITORES:** Assistência Pré-natal. Parto prematuro. Fatores de risco. Unidade de terapia intensiva neonatal. Prematuro.

# FACTORES PERINATALES ASOCIADOS A NACIMIENTOS PREMATUROS EN UNIDADES NEONATALES DE CUIDADOS INTENSIVOS

## RESUMEN

**Objetivo:** identificar los factores perinatales asociados a nacimientos prematuros en unidades neonatales de cuidados intensivos a partir de la atención prenatal.

**Método:** estudio de caso-control realizado en la Región Sur del país con 186 puérperas, entre julio y noviembre de 2018. En el análisis de los datos se utilizó la estrategia de enfoque jerárquico y regresión logística condicional.

**Resultados:** entre los nacimientos prematuros, 5,9% (n=11) se clasificaron como prematuros extremos (<31 semanas), 12,9% (n=24) como prematuros moderados (32 a 34 semanas y 6 días) y 31,2% (n=58) como prematuros tardíos (35 a 36 semanas y 6 días). Los factores asociados a la incidencia de nacimientos prematuros fueron los siguientes: edad materna (30 años), escolaridad (<8 años) e ingresos (<4 salarios). Entre los factores perinatales en el modelo ajustado final, la cantidad insuficiente de consultas (OR 2,69/IC 95%1,10 - 6,55) y el inicio tardío de la atención prenatal (OR 4,34/IC 95%1,49 - 12,58) presentaron asociación con la incidencia del resultado. Por otro lado, la ausencia de complicaciones, ruptura prematura de la membrana e infecciones en el embarazo actual, al igual que una conducta clínica adecuada y derivación específica fueron factores de protección contra la incidencia de nacimientos antes de las 37 semanas de embarazo.

**Conclusión:** es necesario que los profesionales de la salud sean permeables a los múltiples cambios sociales, considerando su rol de educadores y promotores de la salud. La atención de Enfermería calificada y oportuna en el período prenatal a la mujer embarazada reduce las probabilidades de internación del recién nacido en unidades neonatales de cuidados intensivos.

**DESCRIPTORES:** Atención prenatal. Parto prematuro. Factores de riesgo. Unidad neonatal de cuidados intensivos. Prematuro.



## INTRODUCTION

One of the main factors of mortality and morbidity in the perinatal period is the premature birth that occurs when the newborn (NB) is born with less than 37 weeks. Its prevalence has increased mainly in developing countries, given the complexity of its etiology, which involves numerous factors.<sup>1</sup>

Nearly 14.9 million babies are premature, which corresponds to 11.1% of all live births worldwide, ranging from nearly 5% in European countries to 18% in some African countries. For Latin America, a 9% increase in preterm births per year is estimated.<sup>2</sup> In Brazil, nearly 11.1% of the births are premature, occupying the 10<sup>th</sup> position among the countries with the highest birth rate before 37 weeks of gestation.<sup>3</sup>

Among those who survive, 10% will develop complications during the neonatal period such as sepsis, congenital infections, enterocolitis, hemorrhage, and high risk of chronic diseases in adult life such as cardiovascular disease, type II diabetes, obesity, asthma, allergic rhinitis, etc.<sup>4</sup> One of the ways to reduce problems and sequelae related to prematurity is by adapting to gestational care during prenatal care, which, when effective, allows situations and interventions to be identified and performed early in detecting risks and preventing health problems.<sup>5</sup>

Some research studies have already highlighted the possible factors related to premature birth such as maternal age, socioeconomic status, genetic factors, previous cesarean section, and infections, among others.<sup>6-7</sup> However, the search for factors related to prematurity from the prenatal care process indirectly assessing the quality of care provided to pregnant women is still incipient.

Thus, this study assumes that qualified and appropriate prenatal care for pregnant women reduces the incidence of premature births as well as the risk of hospitalization for newborns in the neonatal intensive care unit (NICU). Even if indirect, the evaluation of the health programs aimed at pregnant women is necessary since there are questions about the quality and effectiveness of the assistance provided to these women, as well as the impact of the health outcome indicators.<sup>8</sup> Therefore, strategies to increase the effectiveness of prenatal care, such as guidelines on breastfeeding, supplementary feeding and immunization may reduce the number of births before the 37<sup>th</sup> week.<sup>9</sup>

In this perspective, the current scenario brings the need to consider that, despite the improvement of access and the proportion of coverage of prenatal care in the country, a small percentage of women receive adequate assistance during pregnancy contributing to the occurrence of preventable diseases and unnecessary hospitalizations potentially avoidable.<sup>10</sup>

By identifying the factors that can be improved in this area, it is intended to help professionals, especially nurses, to introduce new behaviors and routines in the care of this specific population. The search for the correspondence of the health services and actions during prenatal care by nurses is an element of a socially relevant work and can provide subsidies for the reorganization of the services aimed at pregnant women in the context of primary health care. Given the above, the study aimed to identify the perinatal factors associated with prematurity in a neonatal intensive care unit from prenatal care.

## METHOD

This is a case-control study carried out with 186 puerperal women in the South of the country, from July to November 2018, who had their babies admitted to the NICU in a municipality that is a reference for the high complexity care of premature neonates within the scope of Unified Health System (*Sistema Único de Saúde*, SUS). The puerperal women were invited to participate in the research during the newborn's hospitalization period. The mean time for filling in the questionnaire was 18.7 minutes.

The selection of participants was made according to the following inclusion criteria: for the cases, mothers with premature newborns (less than 36 weeks and 6 days) and/or with low birth weight (less than 2,500 kg), users of the SUS and assisted at the referral obstetric service for premature births. For the definition of the controls, mothers with the same characteristics of the cases were considered, but with full-term newborns (gestational age equal to or greater than 37 weeks) and with adequate weight ( $\geq 2,500$  kg). Adolescent puerperal women (young women aged 10 to 19 years old) and those who had twin births in the current pregnancy were excluded. There was no refusal by the subjects to participate in the study.

The controls were matched to the cases by age and maternal parity to minimize or eliminate the confusion effect. To obtain the NB's gestational age and the weight, the values in the medical record were adopted. Only the main diagnosis recorded in the Hospitalization Authorization (HA) was considered.

To determine the sample size, a maximum type I (alpha) error of 5% was considered, with a minimum statistical power of 80% and a case/control ratio of 1:1. Taking into account an exposure between controls of 5% and detection of estimated Odds Ratio (OR) of 3.0 or more, increased by 10% to allow for the adjustment of the confusing factors and potential interaction in models in the logistic regression analysis, the final sample resulted in 186 mothers (93 cases and 93 controls). These parameters were used according to previous studies.<sup>11</sup> The objective was to ensure the necessary sample of cases in view of the possibility of eliminating births that presented different gestational age measures in the different sources of registration of this variable.

The independent variables investigated regarding the prenatal care process were the following: a) number of prenatal consultations (obtained by counting the records of the dates of the consultations and adjusted according to the gestational age); b) gestational age (GA) in weeks; c) initiation of prenatal care in the first trimester (up to the 13<sup>th</sup> week); d) obstetric clinical conduct (considered adequate when Blood Pressure (BP), weight, Height of the Uterine Fundus (HUF) and Fetal Cardiac Beatings (FCB) rate were measured in all consultations); e) complete vaccination schedule (considering the presence of records of vaccines against tetanus, hepatitis B and influenza); f) routine laboratory tests (considered adequate when the results of basic tests such as blood typing, toxoplasmosis, HIV/AIDS, syphilis, hepatitis B, blood count, partial urine, urine culture and fasting glucose were recorded).

The NICU was visited from Monday to Friday. On the day of the visit, all eligible puerperal women were invited to participate in the study and, at each new visit, those who had already participated were excluded, leaving only the new cases. For data collection, a semi-structured questionnaire prepared by the researchers, an electronic medical record of the NB and a prenatal card for the pregnant woman were used. A pilot study was carried out with 10 puerperal women to test the applicability of the studied variables that were later included in the study analysis.

Sociodemographic and economic characteristics related to the use of the health services, perception of the quality of the outpatient care received and the evaluation of the prenatal care process were defined as independent variables in relation to the outcome of the study (occurrence of prematurity). The latter based on the protocols adopted by the Ministry of Health (*Ministério da Saúde*, MS).<sup>12</sup>

A hierarchical approach strategy and conditional logistic regression were used, whose regression coefficients represent the logarithms of the odds ratios. Three hierarchical levels represented by the determinants at the distal, intermediate and proximal levels that can influence the occurrence of prematurity were considered for analysis. This approach allows quantifying the contribution of each hierarchical level and minimizing the underestimation of the effects of risk determination.

At the distal level, demographic and socioeconomic variables such as race/skin color, schooling, marital status, income and maternal occupation were included. At the intermediate level, the variables were reproductive history, obstetric risk, lifestyle, parity, type of delivery, smoking, abortion, complications, previous cesarean section, urinary tract infection and bleeding. At the proximal level, the variables related to the prenatal care process were included, such as number of consultations, initiation of care, referrals, clinical conduct, laboratory routine and vaccination schedule.

The reported obstetric complications corresponded to the onset or diagnosis of Gestational Hypertensive Syndromes (GHS), such as Pre-Eclampsia (PE), Gestational Hypertension (GH), Chronic Arterial Hypertension (CAH) and Chronic Arterial Hypertension superimposed on Pre-eclampsia (CAHP); Hemorrhagic Syndromes (HS), such as threat of abortion, Placental Abruption (PA), Previous Placenta (PP), rupture of the previous vasa or any other common hemorrhagic syndrome of the second trimester and Gestational Diabetes (GD).

All aspects were assessed in a dichotomous way (for example, yes or no, adequate or inadequate, complete or incomplete). The smoking variable was categorized into two groups: smokers and non-smokers, regardless of the number of cigarettes smoked per day. Those who quit smoking at least six months before pregnancy were considered non-smokers.

The Amniotic Fluid Index (AFI) was measured by ultrasound recording of the amniotic fluid pockets, estimating the ideal amount of fluid for the gestational age as part of the fetal evaluation.

The data were stored and analyzed in the Statistical Package for the Social Sciences (SPSS) software, version 20.0, by one of the researchers with expertise in statistics. First, descriptive statistics (frequency, percentage, mean and standard deviation) and the chi-square association test and T test were performed.

The multivariate regression analysis was conducted according to the plan proposed in the hierarchical approach. Forward logistic regression was employed for each block of variables. The set of variables at one level was analyzed independently from those at the other levels. The adjustments of the variables of the subsequent levels were integrated when statistically significant following the same order adopted for the other levels. The variables were maintained in the final model when the adjustments were adequate. The modeling process was composed of the selected variables.

The variables that showed to be statistically significant at a level of 20% ( $p < 0.20$ ) in the univariate analysis were selected for the final logistic model. In the hierarchical approach, the variables of the most distal levels were maintained in the model to adjust the most proximal variables, controlling their effect on the occurrence of the outcome. Gross odds ratios were presented and adjusted with respective 95% confidence intervals.

For the inferential statistical tests, a significance level of  $p < 0.05$  was used. The quality of fit was assessed by the Hosmer-Lemeshow test. The multicollinearity assumption test was performed by the Variance Inflation Factor (VIF) and calculated by multiple linear regression, adopting a  $VIF \geq 4$  as cutoff point. The test showed no evidence of the presence of multicollinearity among the independent variables studied for multiple logistic regression.

Data collection was performed in a reserved place at the institution after signing the Free and Informed Consent Form (FICF). To maintain the anonymity of the interviewees, they were successively identified and coded by acronyms (P1, P2, P3, P4...).

## RESULTS

Among the preterm births, 5.9% (n=11) were classified as extremely premature (<31 weeks), 12.9% (n=24) as moderate prematurity (32 to 34 weeks and 6 days) and 31.2% (n=58) as late premature (35 to 36 weeks and 6 days). Among the controls, 32.3% (n=60) were classified as full term and 3.2% (n=6) as late term (41 weeks and 6 days). The birth conditions associated with prematurity were the following: skin-to-skin contact, breastfeeding in the first hour of life, exclusive breastfeeding, cardiopulmonary resuscitation, length of hospitalization (days) and birth weight (Table 1).

**Table 1** – Characteristics of the newborns according to the birth conditions between the cases and controls. Chapecó, SC, Brazil. 2018. (n=186)

	Case (n=93)	Control (n=93)	p-value
Gestational age			
Extreme prematurity	11 (5.9)		
Moderate prematurity	24 (12.9)		
Late prematurity	58 (31.2)		
Preterm		27 (14.5)	
Full term		60 (32.3)	
Late term		6 (6.5)	
Cried at birth			0.128*
Yes	79 (42.5)	85 (45.7)	
No	14 (7.5)	8 (4.3)	
Skin to skin contact			0.000*
Yes	19 (10.2)	60 (32.3)	
No	74 (38.8)	33 (17.7)	
Breastfeeding 1 <sup>st</sup> hour of life			0.000*
Yes	7 (3.8)	71 (38.4)	
No	86 (46.5)	21 (11.4)	
Breastfeeding type			0.000*
Exclusive maternal	25 (13.4)	78 (41.9)	
Mixed	68 (36.6)	15 (8.1)	
Cardiopulmonary resuscitation			0.002*
Yes	11 (5.9)	1 (0.5)	
No	82 (44.1)	92 (49.5)	
Hospitalization time (days)	7.8 (SD 9.9)	1.5 (SD 0.5)	0.000†
Apgar 1 <sup>st</sup> minute	8.3 (SD 0.8)	9.0 (SD 13.5)	0.619†
Apgar 5 <sup>th</sup> minute	9.0 (SD 0.6)	10.2 (SD 13.2)	0.319†
Birth weight	1,842.54 (SD 700.1)	3,292.12 (SD 400.5)	0.000†

\*Chi-square (with Yates correction); †T test for independent samples.

The socioeconomic and demographic characteristics of the puerperal women associated with prematurity and/or low birth weight according to the analysis of the variables of the distal hierarchical level are shown in Table 2. Maternal age greater than 30 years old, low schooling (<8 years) and low income (<4 wages) were associated with the occurrence of the outcome in this block.

**Table 2** – Socioeconomic and demographic characteristics of the puerperal women associated with prematurity and/or low birth weight according to the results of the univariate analysis of the distal hierarchical level. Chapecó, SC, Brazil. 2018. (n=?)

	Case n(%)	Control n(%)	Total	Gross OR*	p-value
Maternal age					0.018
20 to 29 years old	48 (25.8)	63 (33.9)	111 (59.7)	1	
30 years old or more	45 (24.2)	30 (16.1)	75 (40.3)	2.80	
Maternal schooling					0.014
< 08 years	35 (18.8)	49 (26.3)	84 (45.2)	1.84	
≥ 08 years	58 (31.2)	44 (23.7)	102 (54.8)	1	
Marital status					0.222
Has a partner	86 (46.2)	82 (44.1)	168 (90.3)	1.64	
No partner	7 (3.8)	11 (5.9)	18 (9.7)	1	
Maternal occupation					0.489
Employed	52 (28.0)	47 (25.3)	99 (53.2)	1	
Unemployed	41 (22.0)	46 (24.7)	87 (46.8)	0.80	
Income					0.011
≥ 4 wages	35 (18.8)	21 (11.3)	56 (30.1)	1	
< 4 wages	58 (31.2)	72 (38.7)	130 (69.9)	2.06	

\*OR = Odds Ratio

Table 3 shows the univariate analyses of the variables at the intermediate hierarchical level. The results showed that cesarean section, obstetric complications, alteration of the AFI, premature membrane rupture and urinary infection were associated with the occurrence of prematurity and/or low birth weight.

**Table 3** – Reproductive history, current pregnancy and smoking of the puerperal women associated with prematurity and/or low birth weight according to the results of the univariate analysis of the intermediate hierarchical level. Chapecó, SC, Brazil. 2018. (n=186)

	Case n (%)	Control n (%)	Total	Gross OR*	p-value
Smoking					0.274
Yes	8 (4.3)	10 (5.4)	18 (9.7)	1	
No	85 (45.7)	83 (44.6)	168 (90.3)	0.78	
Parity					0.331
Primiparous	43 (23.1)	32 (17.2)	75 (40.3)	0.61	
Multiparous	50 (26.9)	61 (32.8)	111 (59.7)	1	
Type of delivery					0.002
Vaginal	26 (14)	45 (24.2)	71 (38.2)	1	
Cesarean	67 (36)	48 (25.8)	115 (61.8)	2.41	
Complications					0.000
Yes	47 (25.3)	9 (4.8)	56 (30.1)	9.53	
No	46 (24.7)	84 (45.2)	130 (69.9)	1	
Alteration of the AFI					0.029
Yes	20 (32.8)	7 (11.7)	27 (22.3)	3.89	
No	41 (67.2)	53 (88.3)	94 (77.7)	1	

**Table 3 – Cont.**

	Case n (%)	Control n (%)	Total	Gross OR*	p-value
Premature membrane rupture					0.000
Yes	37 (19.9)	11 (5.9)	48 (25.8)	4.92	
No	56 (30.1)	82 (44.1)	138 (74.2)	1	
Urinary infection					0.001
Yes	59 (31.7)	37 (19.9)	96 (51.6)	2.62	
No	34 (18.3)	56 (30.1)	90 (48.4)	1	

\*OR = Odds Ratio

The univariate analyses of the variables at the proximal hierarchical level are shown in Table 4. The sufficient number of consultations, the early initiation of prenatal care, the appropriate obstetric clinical conduct, the routine of laboratory tests and the vaccination schedule were protective factors against the occurrence of prematurity and/or low birth weight. On the other hand, the lack of adequate referral of the pregnant woman to the reference service increased the chances of occurrence of the outcome (Table 4).

**Table 4 – Univariate analysis of the factors related to the prenatal care process at the proximal hierarchical level associated with prematurity and/or low birth weight. Chapecó, SC, Brazil. 2018. (n=186)**

	Case n (%)	Control n (%)	Total	Gross OR*	p-value
Number of consultations <sup>†</sup>					0.002
Sufficient	42 (22.6)	62 (33.3)	104 (55.9)	0.41	
Insufficient	51 (27.4)	31 (16.7)	82 (44.1)	1	
Early initiation of prenatal care					0.000
Yes	56 (30.1)	78 (41.9)	134 (72)	0.29	
No	37 (19.9)	15 (8.1)	52 (28)	1	
Referral <sup>‡</sup>					0.000
Yes	45 (24.2)	12 (6.5)	57 (30.6)	6.32	
No	48 (25.8)	81 (43.5)	129 (69.4)	1	
Obstetric clinical conduct					0.015
Adequate	72 (38.7)	83 (44.6)	155 (83.3)	0.41	
Inadequate	21 (11.3)	10 (5.4)	31 (16.7)	1	
Routine laboratory tests					0.000
Adequate	62 (33.3)	82 (44.1)	144 (77.4)	0.26	
Inadequate	31 (16.7)	11 (5.9)	42 (22.6)	1	
Vaccine schedule					0.000
Adequate	66 (35.5)	86 (46.2)	152 (81.7)	0.19	
Inadequate	27 (14.5)	7 (3.8)	34 (18.3)	1	

\*OR = Odds Ratio; <sup>†</sup>Adjusted according to gestational age; <sup>‡</sup>To the tertiary health reference service (hospital level).

The final result of the hierarchical multivariate analysis is shown in Table 5. After adjusting the final model, income, absence of complications and infections, premature membrane rupture and changes in the AFI were protective factors against prematurity. On the other hand, the insufficient number of consultations presented a 2.69 times greater chance of the outcome occurring, when



adjusted for the variables of the same level and of the intermediate and distal levels. Late initiation of prenatal care was 4.34 times more likely to occur in the group of premature NBs when compared with NBs at term.

Adequate obstetric clinical conduct and timely referral to the reference service were protective factors against the occurrence of prematurity.

**Table 5** – Final explanatory hierarchical model of the factors associated with the occurrence of prematurity and/or low birth weight. Chapecó, SC, Brazil. 2018. (n=186)

Model	Gross OR	Adjusted OR	95% CI (Adj. OR)
Distal level			
Monthly income	2.06	0.19	0.07 - 0.53
Intermediate level*			
Obstetric complications	9.53	0.11	0.04 - 0.31
Premature membrane rupture	4.92	0.21	0.07 - 0.61
Alteration of the AFI	3.89	0.14	0.04 - 0.50
Proximal level‡			
Number of consultations	0.41	2.69	1.10 - 6.55
Referrals	6.32	0.30	0.10 - 0.93
Late initiation of prenatal care	0.29	4.34	1.49 - 12.58
Obstetric clinical conduct	0.41	0.34	0.13 - 0.90

\*Adjusted by the variables of the same level and by monthly family income (distal level);

‡Adjusted by the variables at the same level and by the variables at the intermediate and distal levels.

## DISCUSSION

From the results obtained in this study, it was possible to identify that qualified and adequate prenatal care for pregnant women reduces the incidence of premature births, as well as the risk of hospitalization for the NB in the NICU, corroborating the initial hypothesis of the study.

The birth condition among the preterm and/or low birth weight infants admitted to the NICU proved to be similar to that found by other studies regarding skin-to-skin contact, exclusive breastfeeding, breastfeeding in the first hour of life and hospitalization time.<sup>4-7</sup> There was predominance of these care practices recommended for the NB only in births with adequate gestational age and/or weight.

The practice of skin-to-skin contact, for example, can and must be encouraged even with premature NBs with good hemodynamic stability, as it allows assisting in the bond between mother and baby, maintenance of body temperature, immune development by the maternal microbiota, cardiorespiratory stability, pain relief and encouraging maternal breastfeeding.<sup>13</sup>

Breastfeeding in the first hour of life for premature infants ensures that they receive colostrum and its important micronutrients in the mechanism of autoimmune protection and in the reduction of bacterial colonization, avoiding the risk of developing enteric, neurological, cardiac diseases and death.<sup>14</sup>

In the socioeconomic and demographic aspects studied, the mothers of this study aged 30 years old or older, with less than 8 years of study and a monthly income below 4 minimum wages were almost twice as likely to have prematurity and/or underweight at birth, in the light of other studies.<sup>11-15</sup> The family's socioeconomic condition can constitute a group of social support disadvantages resulting in an increase in the clinical-obstetric risks of prematurity, lack of access to the health services, and poor and/or ineffective assistance, among other factors.<sup>16</sup>

On the other hand, the adjusted monthly income in the final explanatory model of this study was configured as a protective factor. In other words, earning more than 4 minimum wages protected the women against the occurrence of prematurity when adjusted by the factors related to reproductive history, current pregnancy and the variables in the prenatal care process.

The absence of obstetric complications, such as hypertensive syndromes, hemorrhagic syndromes, diabetes, infections, oligodramnia and premature membrane rupture, also acted as protective factors against the occurrence of the outcome. Such conditions are well defined as factors associated with the occurrence of prematurity in the academic environment and in the clinical practice.<sup>17</sup> The absence or early detection of these complications favors birth at the appropriate gestational time. The type of delivery was not associated with the occurrence of premature births in this study, despite the fact that the surgical event is related to prematurity.<sup>6</sup>

The analysis of the adequacy of the prenatal care process showed that the insufficient number of consultations resulted in 2.69 times a chance of prematurity, similar to that found in other studies.<sup>18-19</sup> The low coverage expressed by the reduced number of consultations reveals, by itself, a failure in the quality of the assistance provided.

The reduction in the number of consultations can reflect the late initiation of prenatal care, which in this study presented 4.34 times the chance of premature births. Similar results were found in another study that aimed to evaluate the effectiveness of continuous care for pregnant women.<sup>19</sup> Follow-up before the 13<sup>th</sup> week of pregnancy allows possible risks to be identified early in a timely manner, in addition to enabling the professional to prescribe the necessary care.

An adequate obstetric clinical conduct followed by specific referrals to reference services were protective factors against the occurrence of prematurity in the final explanatory hierarchical model. It is noteworthy that such services offer support for primary care and seek to offer users, with specific clinical conditions, specialized care such as proper clinical management, physical examination, auscultation of fetal heartbeats, and assessment of the nutritional status, among others.<sup>9</sup> Such actions are part of the scope of the nurse's work process proposed for the monitoring and development of pregnancy with the consequent guarantee of a safe and healthy birth.<sup>20</sup>

## CONCLUSION

In the universe researched, it was possible to identify that inequalities still persist in the care process for pregnant women, resulting in premature births and NICU admissions.

Obstetric complications, pre-existing maternal factors and the prenatal care process contributed to the occurrence of premature births. One of the ways to reduce prematurity is by minimizing the occurrence of preterm labor through effective and timely monitoring by nurses during prenatal care, in addition to proper clinical conduct, specific referrals, and early initiation of care, among others.

The insufficient number of consultations and the late initiation of prenatal care assume the absence of compensatory mechanisms to guarantee access to care for these pregnant women.

The birth condition of the premature NB falls short of the international and national guidelines proposed for immediate care in the presence of vigorous NBs, such as skin-to-skin contact and breastfeeding in the first hour of life. The sum of spontaneous premature birth and economically disadvantaged social groups confirms the need to continue prioritizing the reduction of social inequalities and access to the health services, since the health-disease process can be socially determined.

It should be added that the relevant information in the construction of the research was extracted from the records in the patient's electronic medical record and on the pregnant woman's card, which, in practice, this number may show another reality. The hospitalizations analyzed were only those that occurred within the scope of the SUS and can represent a limiting factor for data generalization.

Even with its limitations, this study served to provide an overview of the occurrence of prematurity and/or low birth weight, based on the prenatal care process offered to the pregnant women in the studied scenario. Even if indirect, the evaluation of these services, provided the identification of possible factors for improvement during prenatal care and may provide subsidies for the professionals, especially nurses, to improve their care practices and routines in this context.

The importance of developing new studies in this population is highlighted, based on other indicators of quality of care based on a conceptual framework that establishes which factors are influenced by this health care model, for example.

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## NOTES

### ORIGIN OF THE ARTICLE

Extracted from the Course Conclusion Paper - Perinatal factors associated with prematurity in Neonatal Intensive Care Units in a main municipality of Western Santa Catarina, presented at the Graduate Program in Nursing of the *Universidade Federal da Fronteira Sul*, in 2018

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Data analysis and interpretation: Pitilin EB; Rosa GFD; Hanauer MC; Kappes S; Silva DTR; Oliveira PP.

Discussion of the results: Pitilin EB; Rosa GFD; Hanauer MC; Kappes S; Silva DTR; Oliveira PP.

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Review and final approval of the final version: Pitilin EB; Rosa GFD; Hanauer MC; Kappes S; Silva DTR; Oliveira PP.

### APPROVAL OF ETHICS COMMITTEE IN RESEARCH

Approved by the Research Ethics Committee of the *Universidade Federal da Fronteira Sul*, opinion No.2,157,125, Certificate of Presentation for Ethical Appreciation CAAE No. 69346017.5.0000.5564

### CONFLICT OF INTEREST

There is no conflict of interest.

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Associated Editors: Selma Regina de Andrade, Gisele Cristina Manfrini, Natália Gonçalves, Ana Monica Motta Lino.

Editor-in-chief: Roberta Costa.

### HISTORICAL

Received: March 11, 2020.

Approved: May 21, 2020.

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