ORIGINAL ARTICLE

Difference of Socioeconomic Factors among Mothers of Preterm and Full-Term Infant

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Abstract

Objective: To analyze the difference of socioeconomic factors among mothers of preterm and full-term infants. **Material and Methods:** A cross-sectional retrospective study was developed with 250 mothers of children aged three to five years. The sample was divided into two groups: 125 mothers of preterm infants from the referral center of a public hospital in the city of Belo Horizonte, Brazil and 125 mothers of children born full-term at a daycare center within the same city. A pre-tested questionnaire was used to collect socioeconomic data and type of breastfeeding. To verify if there was association between the dependent variable gestational age at birth and the independent variables, the chi-square test was used. A final model with multiple Poisson regression estimated prevalence ratio values for each independent variable was developed. **Results:** The final multiple regression model showed that mothers that have a low monthly income of up to USD 450.28 (PR = 1.979, 95% CI = 1.082–3.620), used drugs, cigarettes, or alcohol during their pregnancy (PR = 4.095, 95% CI = 2.422–6.921), and did not breastfeed (PR = 2.294, 95% CI = 1.205–4.369) were more likely to give birth to preterm infants. **Conclusion:** Low monthly family income, use of drugs, alcohol, or smoking during pregnancy and absence of breastfeeding were more frequent on mothers of preterm infants.

Keywords: Breast Feeding; Infant; Premature Birth; Term Birth; Socioeconomic Factors.

Introduction

Approximately 15 million children are born prematurely annually around the world, accounting for 11.1% of all births [1]. Newborns with a gestational age of less than 37 weeks are considered premature [1]. Preterm birth is the leading cause of death in the neonatal period and the second leading cause of death in children under five years of age [2,3]. More than one million babies die each year from complications of preterm birth, and survivors may face several life-long sequelae, including motor deficits, learning disabilities, visual and hearing problems, and increased risk of chronic diseases in adulthood. The fragility of the general health of the preterm infant implies public policy expenditures [2].

In Brazil, from the 1980's, advances in maternal and child health care were observed, although there was an increase in preterm births [4]. Approximately 12% of births in Brazil are premature [5], and this number is higher than observed in developed countries. For instance, in European countries, the prevalence of preterm birth is 5% [1,2]. Notably, Brazil is among the 10 countries with the highest number of preterm births [1,2].

Several factors are associated with preterm birth, including mother's age, pregnancy in adolescence or above 35 years, gestation of twins, chronic diseases and infections, socioeconomic and nutritional factors, race, short interval between pregnancies, and maternal anemia in the first semester of pregnancy. Other factors associated with the fetus, such as genetic diseases, are also associated with premature birth [1,6,7]. Indeed, most of the factors related to the etiology of prematurity are potentially preventable [8-10].

The understanding of the profile of mothers of preterm children can support management decisions, prevention, clinical decisions, and public policies aimed at reducing preterm birth rates. Thus, the objective of the study was to analyze the difference of sociodemographic factors among mothers of preterm and full-term infants.

Material and Methods

Study Design and Sample

A comparative epidemiological cross-sectional study with a convenience sample was developed with 250 mothers of children from three to five years of age. The sample was divided in two groups: G1 consisted of 125 mothers of preterm infants from the preterm infants care referral center at a public hospital in the city of Belo Horizonte, Brazil; G2 consisted of 125 mothers of full-term infants from a public daycare center within the same city. The daycare center was selected for convenience and according to the city's Department of Education.

Data Collection

The preterm mothers were contacted through the medical records of a university hospital referral center. Full-term mothers were contacted at a public day care center. The mothers were interviewed by the researcher with the use of questionnaires developed by the team of researchers. The same questionnaire was used for both groups to obtain information on gestational age, sociodemographic aspects (mother's age, mother's profession, family income, child's sex, and child's age), and infant development (diseases, medication use, hospitalizations, and weight). This questionnaire was previously tested during a pilot study with 20 mothers to evaluate the methodology proposed for this study. No change in methodology was required. Participants in the pilot study were not included in the main study.

Monthly family income was defined according to the Brazilian minimum wage, which corresponded to 450.00 USD at the time of the study, and was established as the average monthly income of all economically active members of the family. For statistical analysis, household income was categorized as follows: parents/caregivers of children whose families have a monthly income ≤ 2 BMW or > 2 BMW.

Statistical Analysis

Statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS Inc, version 23.0, New Armonc, USA). A descriptive analysis of the data was performed. Bivariate analyzes using the chi-square test were performed to evaluate the association between the independent variables and the dependent variable "gestational age". The dependent variable "gestational age" was dichotomized as mothers of preterm infants and mothers of full-term infants. Independent variables with a p value of <0.20 were incorporated into the Poisson regression model [11].

Ethical Aspects

This study was approved by the Human Research Ethics Committee (Protocol # 49803115.4.0000.5149). Inclusion criteria consisted of mothers with children aged three to five years with good general health status. Illiterate mothers were excluded from the study.

Results

A total of 250 mothers participated in this study, with children of both sexes, of whom 113 boys (45.2%) and 137 girls (54.8%). The mean age of the mothers was 35.33 years (± 7.45). Of the total sample, 120 mothers gave birth to infants less than 34 weeks of gestation and 5 gave birth to infants between 35 and 37 weeks gestation. The majority of mothers belonged to families with incomes up to 450.28 USD (n = 129; 51.6%). A large percentage of mothers reported they did not use drugs during pregnancy (n = 226; 94.16%), and more than half had a planned pregnancy (n = 136; 54.4%). A large proportion of the mothers gave birth by cesarean section (n = 164; 65.6%) and breastfed after hospital discharge (n = 202; 80.2%). Most of the mothers offered bottle-feeding (n = 198; 79.2%) and breastfed (n = 201; 80.4%) (Table 1).

Sample power was calculated using the prevalence of families with incomes up to 450.28 USD in the present study (35.1% for both mothers of preterm infants and full-term infants) and the number of participants of 250. The calculation was performed through the PS (Power and Sample Size calculation, version 3.0, Nashville, TN, USA) program. A 95% confidence interval and a 5% error were considered acceptable. A sample power of approximately 95% was obtained.

In the bivariate analysis, gestational age had a statistically significant association with child's gender (p=0.008), child's age (p=0.015), mother's age (p<0.001), mother's profession (p<0.001), family income (p<0.001), drug use during pregnancy (p<0.001), and breastfeeding (p<0.001) (Table 1).

The multivariate Poisson regression model showed that family income, drug use during in pregnancy, and breastfeeding remained associated with the gestational age variable. The likelihood of remaining in the mothers of preterm infant group was higher for families that have a monthly income up to 450.28 USD (PR = 1.979, 95% CI = 1.082–3.620), mothers who used drugs, alcohol, or cigarettes during their pregnancy (PR = 4.095, 95% CI = 2.422–6.921), and mothers who did not breastfeed (PR = 2.294, 95% CI = 1.205–4.369) (Table 2).

Table 1. Bivariate poisson regression model for independent variables in relation to gestational age.

Variables	Preterm Births		Normal Term		PR (95%CI)	p-value
	N	%	N	%		
Child's Gender						
Male	46	40.7	67	59.3	0.706 (0.542-0.920)	0.008
Female	79	57.7	58	42.3	1	
Child's Age						
3 Years	39	61.9	24	38.1	1	
4 Years	35	50.0	35	50.0	0.808 (0.596-1.095)	0.168
5 Years	51	43.6	66	56.4	0.704 (0.531-0.934)	0.015
Mother's Age						
< 20 Years	11	15.1	2	1.6	2.525 (1.855- 3.436)	<0.001
>20 Years	62	84.9	123	98.4	1	
Mother's Profession						
Not Work Outside	33	42.3	21	17.1	1.996 (1.445- 2.758)	<0.001
Work Outside the Home	45	57.7	102	82.9	1	
Family Income						
Up to USD 450.28	84	65.1	45	34.8	2.455 (1.749-3.448)	<0.001
Greater than USD 450.28	32	26.4	89	73.6	1	
Unplanned Pregnancy						
Yes	60	44.1	76	55.9	0.788 (0.613-1.014)	0.064
No	61	56.0	48	44.0	1	
Drugs During Pregnancy						
No	108	90.8	118	97.5	1	<0.001
Drugs, Cigarette, Alcohol	11	9.2	3	2.5	2.437 (1.948-2.991)	
Birth						
Normal	42	50.6	41	49.4	1.025 (0.788-1.333)	0.857
Cesarean	81	49.4	83	50.6	1	
Feeding a Patient Discharge						
Breastfeeding	88	43.6	114	56.4	0.778 (0.531-1.139)	0.197
Bottle-Feeding	14	56.0	11	44.0	1	
Breastfeeding						
No	39	84.8	7	15.2	1.982 (1.620-2.424)	<0.001
Yes	86	42.8	115	57.2	1	
Bottle-Feeding						
Not Used	24	47.1	27	52.9	0.932 (0.675-1.286)	0.661
Used	100	50.5	98	49.5	1	

Table 2. Multivariate Poisson regression model for independent variables in relation to mothers of preterm birth.

Variables	Mothers of Preterm Birth		
	PR Adjusted	95%CI	p-value
Child's Gender			
Male	0.949	0.568-1.587	0.842
Female	1		
Child's Age			
3 Years	1		
4 Years	0.352	0.352-1.557	0.246
5 Years	0.904	0.510-1.307	0.730
Mother's Age			
< 20 Years	1.182	0.365-3.826	0.780
>21 Years	1		

Mother's Profession			
Not Work Outside	1.444	0.872-2.391	0.154
Work Outside the Home	1		
Family Income			
Up to USD 450.28	1.979	1.082-3.620	0.027
Greater than USD 450.28	1		
Unplanned Pregnancy			
Yes	0.629	0.361-1.095	0.101
No	1		
Drugs During Pregnancy			
No	1		<0.001
Drugs, Cigarette, Alcohol	4.095	2.422-6.921	
Feeding a Patient Discharge			
Breastfeeding	0.650	0.263-1.609	0.351
Bottle-Feeding	1		
Breastfeeding			
No	2.294	1.205-4.369	0.011
Yes	1		

PR = Prevalence Ratio; CI = Confidence Interval.

Discussion

This study aimed to evaluate the socioeconomic aspects that influence the mothers who gave birth to preterm infants and full-term infants. The low income was more prevalent in mothers of preterm infants. Preterm birth rates are highest on average for low-income countries (11.8%), followed by low-middle income countries (11.3%), and the lowest for middle- high and high income (9.4% and 9.3%) [1]. A study developed in the U.S. conducted a multilevel logistic regression analysis to estimate the effect of poverty on the risk of preterm birth in 634,994 nested births in 115 counties in the state of Missouri. Results indicated that women residing in socioeconomically deprived areas are at increased risk of preterm birth, above other underlying risk factors [12]. Access to educational and employment opportunities and medical care in low-income individuals is limited [13]. Factors related to socioeconomic deprivation, such as medical comorbidities, lack of prenatal care, and behavioral factors (smoking and alcohol consumption), are risk factors for premature birth [14]. The difficulty of access to health and behavioral factors related to the low family income of the mothers of the present study may have influenced the premature birth.

Studies have shown that the use of drugs, cigarettes, or alcohol during pregnancy is also associated with teenage pregnancy [15,16]. The use of illegal drugs in adolescent pregnancy is associated with an increased incidence of concurrent use of cigarettes and alcohol, social morbidity, and low income [6,15,17]. In the present study, the majority of mothers who were less than 20 years of age were mothers of premature children and had low family incomes. The age and low income of these mothers may have influenced the use of drugs, tobacco, or alcohol during pregnancy. In addition, several studies support that drug, cigarette, or alcohol use during pregnancy are risk factors for preterm delivery [18-20]. The use of these drugs is associated with spontaneous preterm delivery, premature rupture of membranes, and prepartum bleeding [18-20].

The absence of breastfeeding was higher among mothers of preterm infants. Preterm infants may present difficulties in initiating breastfeeding due to the immaturity of coordinating sucking, swallowing, and breathing functions [21,22]. Breastfeeding a premature infant can be challenging for the mother, as she needs to pump milk regularly until her child has acquired the ability to suck the breast during neonatal hospitalization [23]. Accordingly, breastfeeding rates for very premature infants are lower than for full term

infants [24-26]. Moreover, the use of cigarettes by mothers of preterm infants may have influenced breastfeeding initiation, as maternal smoking and exposure to smoke have been shown to affect the initiation and duration of breastfeeding [27-29].

Prematurity is not restricted only to biological factors, as behavioral and social factors also influence premature birth. This study highlights the importance of the pregnant woman's vision in its entirety by health professionals. Social support and educational campaigns on risk orientation of preterm birth should be encouraged.

There are some limitations that deserve comment. The study population was limited to a convenience sample, which does not guarantee its reproduction in other socioeconomic and cultural realities. There is the possibility of memory bias, although the information collected has happened during or shortly after exposure. It is important that future studies in this area be conducted with a variety of designs, both quantitative and qualitative.

Conclusion

In this study, low monthly family income, use of drugs, alcohol, or tobacco during pregnancy, and the absence of breastfeeding were more frequent on mothers of preterm infants. Educational campaigns that guide mothers of all social classes should be encouraged to promote the health of children. Public policies should be encouraged to promote health in low-income communities.

Authors' Contributions

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All authors declare that they contributed to critical review of intellectual content and approval of the final version to be published.

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Conflict of Interest

The authors declare no conflicts of interest.

References

[1] Blencowe H, Cousens S, Chou D, Oestergaard M, Say L, Moller AB, et al. Born too soon: the global epidemiology of 15 million preterm births. Reprod Health 2013; 10(Suppl 1):S2. https://doi.org/10.1186/1742-4755-10-S1-S2

[2] Blencowe H, Cousens S, Oestergaard M, Chou D, Moller AB, Narwal R, et al. National, regional and worldwide estimates of preterm birth rates in the year 2010 with time trends for selected countries since 1990: a systematic analysis. Lancet 2012; 379(9832):2162-72. https://doi.org/10.1016/S0140-6736(12)60820-4

[3] Liu L, Johnson HL, Cousens MA, Perin J, Scott S, Lawn JE, et al. Global, regional, and national causes of child mortality in 2000-2010: an updated systematic analysis. Lancet 2012; 379(9832):2151-61. https://doi.org/10.1016/S0140-6736(12)60560-1

[4] Victora CG, Aquino EM, Leal MC, Monteiro CA, Barros FC, Szwarcwald CL. Maternal and child health in Brazil: progress and challenges. Lancet 2011; 377(9780):1863-76. https://doi.org/10.1016/S0140-6736(11)60138-4

[5] Matijasevich A, Silveira MF, Matos ACG, Rabello Neto D, Fernandes RM, Maranhão AG, et al. Corrected estimates of the prevalence of preterm births in Brazil, 2000 to 2011. Epidemiol Serv Saude 2013; 22(4):557-64. https://doi.org/10.5123/S1679-49742013000400002

[6] Amjad S, MacDonald I, Chambers T, Osornio-Vargas A, Chandra S, Voaklander D, et al. Social determinants of health and adverse maternal and birth outcomes in adolescent pregnancies: a systematic review and meta-analysis. Paediatr Perinat Epidemiol 2019; 33(1):88-99. https://doi.org/10.1111/ppe.12529

[7] Oliveira KA, Araújo EM, Oliveira KA, Casotti CA, Silva CALD, Santos DBD. Association between race/skin color and premature birth: a systematic review with meta-analysis. Rev Saude Publica 2018; 52:26. https://doi.org/10.11606/S1518-8787.2018052000406

[8] Silveira MF, Santos IS, Barros AJ, Matijasevich A, Barros FC, Victora CG. Increase in preterm births in Brazil: review of population-based studies. Rev Saude Publica 2008; 42(5):957-64. https://doi.org/10.1590/S0034-89102008000500023

[9] Santos IS, Matijasevich A, Gorgot LR, Valle NC, Menezes AM. Avoidable infant deaths in the 1993 and 2004 Pelotas birth cohorts, Rio Grande do Sul State, Brazil. Cad Saude Publica 2014; 30(11):2331-43. https://doi.org/10.1590/0102-311X00129413

[10] Harrison MS, Goldenberg RL. Global burden of prematurity. Semin Fetal Neonatal Med 2016; 21(2):74-9. https://doi.org/10.1016/j.siny.2015.12.007

[11] Mickey J, Greenland S. A study of the impact of confounder-selection criteria on effect estimation. Am J Epidemiol 1989; 129(1):125-37. https://doi.org/10.1093/oxfordjournals.aje.a115101

[12] DeFranco EA, Lian M, Muglia LA, Schootman M. Area-level poverty and preterm birth risk: a population-based multilevel analysis. BMC Public Health 2008; 8:316. https://doi.org/10.1186/1471-2458-8-316

[13] Lynch JW, Smith GD, Kaplan GA, House JS. Income inequality and mortality: importance to health of individual income, psychosocial environment, or material conditions. BMJ 2000; 320(7243):1200-4. https://doi.org/10.1136/bmj.320.7243.1200

[14] Nagahawatte NT, Goldenberg R. Poverty, maternal health and adverse pregnancy outcomes. Ann N Y Acad Sci 2008; 1136:80-5. https://doi.org/10.1196/annals.1425.016

[15] Quinlivan JA, Evans SF. The impact of continuing illegal drug use on teenage pregnancy outcomes - a prospective cohort study. BJOG 2003; 109(10):1148-53. https://doi.org/10.1111/j.1471-0528.2002.01536.x

[16] World Health Organization. Department of Child and Adolescent Health and Development. Adolescent Pregnancy: Issues in Adolescent Health and Development. Geneva: WHO; 2004. 86p.

[17] Delpisheh A, Attia E, Drammond S, Brabin BJ. Adolescent smoking in pregnancy and birth outcomes. Eur J Public Health 2006; 16(2):168-72. https://doi.org/10.1093/eurpub/cki219

[18] Goldenberg RL, Culhane JF, Iams JD, Romero R. Epidemiology and causes of preterm birth. Lancet 2008; 371(9606):75-84. https://doi.org/10.1016/S0140-6736(08)60074-4

[19] Baer RJ, Chambers CD, Ryckman KK, Oltman SP, Rand L, Jelliffe-Pawlowski LL. Risk of preterm and early term birth by maternal drug use. J Perinatol 2019; 39(2):286-94. https://doi.org/10.1038/s41372-018-0299-0

[20] Dos Santos JF, de Melo Bastos Cavalcante C, Barbosa FT, Gitaí DLG, Duzzioni M, Tilelli CQ, et al. Maternal, fetal and neonatal consequences associated with the use of crack cocaine during the gestational period: a systematic review and meta-analysis. Arch Gynecol Obstet 2018; 298(3):487-503. https://doi.org/10.1007/s00404-018-4833-2

[21] Arvedson J, Clark H, Lazarus C, Schooling T, Frymark T. Evidence-based systematic review: effects of oral motor interventions on feeding and swallowing in preterm infants. Am J Speech Lang Pathol 2010; 19(4):321-40. https://doi.org/10.1044/1058-0360(2010/09-0067)

[22] Yildiz A, Arikan D. The effects of giving pacifiers to premature infants and making them listen to lullabies on their transition period for total oral feeding and sucking success. J Clin Nurs 2012; 21(5-6):644-56. https://doi.org/10.1111/j.1365-2702.2010.03634.x

[23] Nye C. Transitioning premature infants from gavage to breast. Neonatal Netw 2008; 27(1):7-13. https://doi.org/10.1891/0730-0832.27.1.7

[24] Flacking R, Ewald U, Wallin L. Positive effect of kangaroo mother care on long-term breastfeeding in very preterm infants. J Obstet Gynecol Neonatal Nurs 2011; 40(2):190-7. https://doi.org/10.1111/j.1552-6909.2011.01226.x

[25] Bonnet C, Blondel B, Piedvache A, Wilson E, Bonamy AE, Gortner L, et al. Low breastfeeding continuation to 6 months for very preterm infants: a European multiregional cohort study. Matern Child Nutr 2018; 15(1):e12657. https://doi.org/10.1111/mcn.12657

[26] Carcavalli L, Martins CC, Rocha IA, Parlato EM, Serra-Negra JM. Preterm birth, pacifier use and breastfeeding: is there a relationship? Braz Dent J 2018; 29(4):388-94. https://doi.org/10.1590/0103-6440201801962

[27] Donath SM, Amir LH, ALSPAC Study Team. The relationship between maternal smoking and breastfeeding duration after adjustment for maternal infant feeding intention. Acta Paediatr 2004; 93(11):1514-8. https://doi.org/10.1111/j.1651-2227.2004.tb02639.x

[28] Joseph HM, Emery RL, Bogen DL, Levine MD. The influence of smoking on breast feeding among women who quit smoking during pregnancy. Nicotine Tob Res 2017; 19(5):652-5. https://doi.org/10.1093/ntr/ntw254

[29] Lok KYW, Wang MP, Chan VHS, Tarrant M. Effect to secundary cigarette smoke from household members on breastfeeding duration: a prospective cohort study. Breastfeed Med 2018; 13(6):412-7. https://doi.org/10.1016/S0140-6736(12)60560-1