



## Research paper

## Maternal depression symptoms and use of child health-care services at The Pelotas 2004 Birth Cohort



Gabriela Callo-Quinte<sup>a,\*</sup>, Bianca Del-Ponte<sup>a</sup>, Ana Carolina Oliveira Ruivo<sup>a</sup>,  
Laísa Rodrigues Moreira<sup>a</sup>, Bruno Iorio Könsgen<sup>a</sup>, Fernando C. Wehrmeister<sup>a</sup>, Alicia Matijasevich<sup>b</sup>,  
Fernando Barros<sup>a</sup>, Iná S. dos Santos<sup>a</sup>

<sup>a</sup> Postgraduate Program in Epidemiology, Federal University of Pelotas, Marechal Deodoro, 1160 Bairro Centro, Pelotas, RS 96020-220, Brazil

<sup>b</sup> Preventive Medicine Department, Faculty of Medicine FMUSP, São Paulo University, SP, Brazil

## ARTICLE INFO

## Keywords:

Maternal depression  
Child health services  
Hospitalization  
Preventive care

## ABSTRACT

**Objective:** To investigate the influence of maternal depression on child health-care services utilization.

**Methodology:** Data from The Pelotas 2004 Birth Cohort collected at birth and at 12- and 24-month follow-ups were used. Four outcomes occurring in the second year of life were investigated: number of well-baby visits, number of medical appointments, number of visits to emergency rooms, and number of hospitalizations. The main exposure was maternal depression symptoms at 12-month post-partum as assessed by the Edinburgh Postpartum Depression Scale (EPDS). Adjusted prevalence ratios (PR) with 95% confidence intervals (95% CI) were calculated by Poisson regression.

**Results:** The prevalence of mothers with depressive symptoms was 27.6% (95% CI: 26.2–29.0%). These mothers showed a 10% lower probability of taking their children to well-baby visits (0.90; 0.85–0.95;  $p = 0.001$ ); 16% higher probability to seek medical consultations (1.16; 1.09–1.25,  $p = 0.001$ ); and they sought emergency services for their children more often (1.30; 1.17–1.45,  $p < 0.001$ ) as compared to mothers who did not present depressive symptoms. Although the PR for hospitalizations was 26% higher for children from mothers with depressive symptoms, the association did not achieve statistical significance (1.26; 0.98–1.63;  $p = 0.072$ ).

**Conclusion:** Children from mothers with depressive symptoms attend fewer number of preventive consultations. In contrast, they are taken to medical and emergency care more often, suggesting that these children are given healthcare when they are at more advanced stages of their illnesses.

## 1. Introduction

Pregnancy and the postpartum are periods of greatest vulnerability to the occurrence of mood problems, such as anxiety and depression, due to physical, emotional and hormonal changes that occur at these stages (Hartmann et al., 2017; Abrams et al., 2009; Dennis, 2004). Low family income, low schooling, teenage gestation and lack of social support are well-known risk factors for depression during pregnancy and the postpartum period (Pereira and Lovisi, 2008). Studies point to a roughly 20% maternal depression prevalence during pregnancy and in the postpartum period (Hartmann et al., 2017; Abrams et al., 2009; Dennis, 2004; Pereira and Lovisi, 2008; Siqueira Barcelos et al., 2018).

Maternal postpartum depression is associated with serious family function adverse effects, impairing the marital relationship and increasing conflict between partners (Burke, 2003). Thus, maternal depressive symptoms directly affect the familiar environment, especially

the child's development (Mandl et al., 1999). Studies show that depressed mothers talk less with their children, express fewer positive emotions and are more prone to employ corporal punishment to correct or control children's behaviors than non-depressed mothers (Chung et al., 2004; Knuth et al., 2011; MdLSe et al., 2013).

The children of depressed mothers are subject to greater environmental vulnerability (Minkovitz et al., 2005), both because they have less favorable social conditions (lower socioeconomic status of their families and less maternal formal education) and due to the quality of the care provided by the mother. Studies have found greater routine medical visit non-attendance risk and lower vaccination coverage among children of depressed mothers (Minkovitz et al., 2005; Adair et al., 2013; Lyngsoe et al., 2018). In addition, depressed mothers tend to report the child's poor health and to seek emergency medical care for their children more frequently than non-depressed mothers (Minkovitz et al., 2005).

\* Corresponding author.

E-mail address: [gavizon7@hotmail.com](mailto:gavizon7@hotmail.com) (G. Callo-Quinte).

<https://doi.org/10.1016/j.jad.2019.04.102>

Received 22 March 2019; Received in revised form 25 April 2019; Accepted 30 April 2019

Available online 30 April 2019

0165-0327/ © 2019 Elsevier B.V. All rights reserved.

In a cohort study, children of mothers with depression symptoms at twelve months post-partum were at increased risk of injuries such as falls, cuts and burns between two and four years of age (Siqueira Barcelos et al., 2018). Therefore, this study aims to investigate the association between maternal depression and health care seeking behavior for the child among participants of The Pelotas 2004 Birth Cohort.

## 2. Methods

Pelotas is a city in southern Brazil with a population of 328,275 inhabitants and a human development index of 0.739 (Municipal IBdGeEsIndDH, 2010). In 2004, all live births to mothers living in the urban area of Pelotas were included in the 2004 Birth Cohort. Children were evaluated at 3, 12, 24, and 48 months and at 6 and 11 years of age. The questionnaires applied at each follow-up contained questions about demographic, socioeconomic, behavioral and biological characteristics of both mothers and children. Further details of the cohort are available in other publications (Santos et al., 2011, 2014).

This study used information collected at birth and at 12- and 24-month follow-ups. Of the 4231 children born alive and included in the cohort, the percentage which was followed at 12 and 24 months was 94.3% and 93.5%, respectively. In the current study, 3869 children for whom the outcome data were available were analyzed. Considering that morbidity is more prevalent in offspring from multiple pregnancies (Santana et al., 2018) and to satisfy the assumptions of independence between the observations to run the analyses, we excluded 86 twin children from the analytical sample.

### 2.1. Outcomes

The utilization of four types of Pediatrics health-care services were investigated: number of well-baby visits, number of medical appointments, number of visits to emergency rooms, and number of hospitalizations. All outcomes were measured at the 24-month follow-up and were referred to the second year of life (between 12 and 24 months of age).

The number of well-baby visits was measured by asking to the mother: "After one year old, has <CHILD'S NAME> ever been at the doctor's, health clinic or hospital just for immunization or growth monitoring?" And "How many times after one year of age?". The number of medical appointments was obtained through the question: "After one year old, has <CHILD'S NAME> ever been taken to the doctor's, health center or hospital to consult for being ill?" And "How many times?". To evaluate the number of times the child was taken to be seen at emergency rooms, the following questions were asked: "After one year old, have you taken <CHILD'S NAME> to consult in the County Emergency Hospital Room or in any emergency care unit?" And if so, "How many times?". The number of hospitalizations was calculated by asking the questions: "After one year old, has <CHILD'S NAME> ever been admitted to hospital?" And "How many times?" When mothers answered "no" to the first question for each outcome, the corresponding number of times was computed as zero.

### 2.2. Exposure assessment

The presence of maternal depressive symptoms was investigated at the cohort 12-month follow-up, using the Edinburgh Postpartum Depression Scale (EPDS), validated in Brazil (Santos et al., 2007). A  $\geq 10$  cutoff point was used (82.6% and 65.4% sensitivity and specificity, respectively) (Santos et al., 2007), indicating the presence of depressive symptoms.

### 2.3. Potential confounders

The variables used as potential confounding factors were collected in the perinatal study (at the hospital, right after birth) and included maternal and newborn characteristics. From the mother, the following variables were used: family monthly income (in quintiles); maternal formal education (0, 1–4, 5–8 and  $\geq 9$  years of schooling); mother's age (<20, 21–30 and  $\geq 31$  years); mother living with a partner (yes, no); self-referred mother skin color (later classified as white and brown / black / other); parity (1, 2 and  $\geq 3$ ); planned pregnancy (yes, no); smoking during pregnancy - at least one cigarette per day, every day, during any trimester of pregnancy (yes, no); alcohol use during pregnancy - regular use at least once a week, regardless of intake amount (yes, no); number of prenatal visits (0–5,  $\geq 6$ ); and maternal morbidity in pregnancy - presence of arterial hypertension and/or diabetes mellitus during pregnancy (yes, no). From the newborn, the variables employed were preterm birth (gestational age at birth < 37 weeks), low birth weight (< 2500 g), sex (male, female), and neonatal intensive care unit (neonatal ICU) need (yes, no). Information about hospitalizations in the first year of life (yes, no) and number of consultations were collected at the 12-month follow-up.

The analyses were performed by using the Stata 14.0 software (StataCorp LP, College Station, United States). We used the means (Standard Deviation) of well-baby visits, medical consultations, visits to emergency rooms and hospitalizations according to the presence of depressive symptoms to describe our population. These outcome variables were considered as a count (number of visits or consultations by the child between 12 and 24 months). The association between maternal depression and outcomes was tested using Poisson regression with robust variance. Crude and adjusted prevalence ratios (OR) with 95% confidence intervals (95% CI) were obtained. We kept the confounding variables in the model associated with the exposition and outcome at a  $p$  level < 0.20.

The study was approved by the Ethics and Research Committee of the Faculty of Medicine of the Federal University of Pelotas (Project number 4.06.01.113). Mothers or legal guardians of the children were informed about the study before signing an Informed Consent Form.

## 3. Results

The prevalence of mothers showing depressive symptoms at the 12-month follow-up was 27.6% (26.2–29.0%). In their second year of life, 93.4% (92.6–94.1%), 85.6% (84.5–86.7%) and 59.0% (57.4–60.5%) of the children had attended well-baby clinic visits, medical consultations and emergency rooms visit, respectively, and 9.9% (9.0–10.9%) had been hospitalized.

Table 1 shows the sample distribution and the mean (Standard Deviation) number of each outcome according to maternal and child characteristics at the cohort inception. Of the total number of mothers, 15.1% had up to four years of schooling. Most of the mothers lived with a partner (84.4%) and reported having white skin color (62.2%). As for the number of children, 34.2% of them reported having three or more. About two thirds (65%) of them had not planned pregnancy, and 26.9% smoked during the pregnancy period.

Table 2 shows that in comparison to children from non-depressed mothers, those from mothers with depressive symptoms had fewer mean number of well-baby visits (4.8 versus 4.3;  $p < 0.001$ ) and, conversely, a higher number of medical appointments (3.0 versus 3.5;  $p < 0.001$ ) and emergency-care consultations (1.3 versus 1.8;  $p < 0.001$ ), in addition to having been hospitalized in average twice as more (0.1 versus 0.2;  $p < 0.001$ ).

In adjusted analyses (Table 3) mothers with depressive symptoms presented a 10% lower probability of taking their children to well-baby visits than non-depressed mothers (PR: 0.90; 0.85–0.95;  $p = 0.001$ ). Prevalence ratios for medical appointments and emergency room consultations were, respectively, 16% (1.16; 1.09–1.25;  $p = 0.001$ ) and

**Table 1**  
Characteristics of mothers and babies participating in Pelotas 2004 Birth Cohort. Pelotas 2004 Birth Cohort ( $n = 3838$ ).

Variables	N (%)
Income (quintiles)	
Poorest	752 (19.6)
2nd	760 (19.8)
3rd	764 (19.9)
4th	806 (21.0)
Richest	756 (19.7)
Maternal schooling (years)	
0	33 (0.9)
1–4	542 (14.3)
5–8	1555 (40.9)
9 or more	1670 (44.0)
Mother's age (years)	
≤ 20	920 (24.0)
21–30	1855 (48.4)
≥ 31	1061 (27.7)
Mother living with a partner	
No	602 (15.7)
Yes	3236 (84.3)
Mother skin color	
White	2358 (62.2)
Brown / black / other	1435 (37.8)
Parity (number of children)	
1	1524 (39.7)
2	1002 (26.1)
≥ 3	1311 (34.2)
Planned pregnancy	
Yes	1331(34.7)
No	2506(65.3)
Smoking during pregnancy	
No	2815(73.4)
Yes	1023(26.7)
Alcohol use during pregnancy	
No	3716(96.8)
Yes	122(3.2)
Number of prenatal visits	
0–5	616(17.3)
≥ 6	2943(82.7)
Maternal morbidity in pregnancy (arterial hypertension, diabetes mellitus)	
No	2762 (74.6)
Yes	942 (25.4)
<b>Child</b>	
Gestational age at birth (weeks)	
≤ 36	503(13.1)
≥ 37	3331(86.9)
Sex	
Male	1988 (51.8)
Female	1850 (48.2)
Birth weight (grams)	
≥ 2500	3521 (91.8)
< 2500	316 (8.2)
Number of medical consultations 0–12 months of age	
None	591(15.6)
1–7	2872(75.9)
8–15	285(7.5)
16 or more	36(1)
Hospitalization in the first year of life	
No	3118(81.2)
Yes	

30% (1.30; 1.17–1.45  $p < 0.001$ ) higher among children from mothers with depression symptoms than among those from non-depressed mothers. Prevalence ratio for hospitalizations was higher for children from depressed mothers although without statistical significance at adjusted analysis (1.26; 0.98–1.63;  $p = 0.072$ ).

#### 4. Discussion

Our study found association between the presence of maternal depression symptoms at 12 months postpartum and the use of health care services by children in the second year of life. When compared to

**Table 2**

Estimated visits means (Standard Deviation) to child health care service utilization between 12 and 24 months, according to the presence or absence of maternal depressive symptoms. Pelotas 2004 Birth Cohort.

Type of child health care service	Maternal depressive symptoms			P value*
	Total mean (SD)	No mean (SD)	Yes mean (SD)	
Well-baby visits	4.7(0.05)	4.8 (0.06)	4.3(0.10)	<0.001
Medical consultations	3.1(0.05)	3.0(0.06)	3.5 (0.10)	<0.001
Emergency room visits	1.5 (0.03)	1.3 (0.04)	1.8 (0.08)	<0.001
Hospitalizations	0.1 (0.01)	0.1 (0.01)	0.2 (0.02)	<0.001

\* Mann–Whitney Test.

mothers without depressive symptoms, mothers with depressive symptoms made use of fewer health preventive measures (child immunizations and growth monitoring consultations) and a higher number of medical consultations and emergency room visits. The probability of hospitalization of children whose mothers presented depressive symptoms was also higher, but lost significance after the adjusted analysis.

These findings agree with results from a birth cohort study in the United States, which showed that children whose mothers presented depressive symptoms between two and four months postpartum had a 19% lower probability of performing preventive visits to the pediatrician, as compared to children of mothers without depressive symptoms (PR: 0.81; 0.69–0.95) (Minkovitz et al., 2005). In contrast, other studies have reported that maternal depressive symptoms are associated with an increase in the number of visits to the pediatrician, though they have not discriminated whether the demand for the service was due to preventive measures or illness (Eilat-Tsanani et al., 2006; Webster et al., 2001; Sills et al., 2007). Some studies have not found association between maternal depression and use of consultations for immunizations and growth monitoring (Mandl et al., 1999; Watson and Kemper, 1995).

On the other hand, positive associations between maternal depression and medical consultations (due to the presence of disease complaints) and emergency-care units are consistently evidenced in literature (Mandl et al., 1999; Minkovitz et al., 2005; Eilat-Tsanani et al., 2006; Webster et al., 2001; Roberts et al., 2001). Mandl et al., in a population-based cohort study, reported that children of women with depressive symptoms showed a higher frequency of medical consultations (OR: 2.0; 95% CI:1.5–3.0) and emergency room visits (OR: 3.2; CI:95%: 1.5–6.9) as compared to those whose mothers had no symptoms. In a study by Eilat-Tsanani et al., in which maternal depression was positively associated with pediatric care demand, the reason why mothers sought medical care was also investigated. "Non-specific" baby-related complaints such as feeding problems, irritability, excessive crying, and insufficient weight gain prevailed, thus suggesting maternal insecurity or a kind of somatization attributed to the child. In Philadelphia, Pennsylvania, Chung et al., in a study with low-income women, found that children whose mothers had depressive symptoms had a higher chance of being hospitalized (OR: 2.9; 1.61–5.0) (Chung et al., 2004).

The mechanism linking maternal depression and use of health-services to the child is complex and involves diverse factors, such as good social supports, adequate income and environments free of stress and conflict (Lyngsoe et al., 2018; Sills et al., 2007; Bentley et al., 2014). Maternal depression may undermine preventive care due to reduced maternal energy and poor motivation (Bentley et al., 2014). Maternal depression, especially when marked, may lead to fatigue, impaired concentration, psychomotor slowing and feelings of hopelessness and worthlessness. Such symptoms may lead to functional prejudice resulting in breastfeeding problems, early breastfeeding cessation, incomplete child immunization, and impairment of other feeding and

**Table 3**

Prevalence ratios (PR) for use of child health care services between 12 and 24 months of age, according to maternal depressive symptoms at 12 months. Pelotas 2004 Birth Cohort, Brazil.

Type of child health care service	Crude PR (CI95%)	p	Adjusted PR (CI95%)	p*
Well-baby visits	0.89 (0.85–0.94)	<0.001	0.90 (0.85–0.95)	<0.001
Medical consultations	1.19 (1.11–1.27)	<0.001	1.16 (1.09–1.25)	<0.001
Emergency room visits	1.34 (1.21–1.48)	<0.001	1.30 (1.17–1.45)	<0.001
Hospitalization	1.66 (1.32–2.08)	<0.001	1.26 (0.98–1.63)	0.072

\* Adjusted for family monthly income, maternal schooling, maternal age, mother's self-reported skin color, parity, planned pregnancy, smoking during pregnancy, alcohol drinking during pregnancy, number of antenatal care consultations, morbidity during pregnancy, gestational age, birth weight, sex, neonatal ICU need, hospitalization and number of consultations during the first year of life.

hygiene-related activities, thus increasing the child risk of falling ill. Additionally, a mother with depressive symptoms may not realize the initial and subtle changes in a child's illness process (Mandl et al., 1999), leading to a worsening of the child's condition, eventually requiring emergency care or hospitalization. Conversely, some depressed women may find looking for their children's care less stigmatizing than searching for their own needs, thus increasing the demand for childcare services (Flynn et al., 2004).

Our study has strengths and limitations. One of the strengths is the measure of frequency and type of pediatric health services used by children within a period of time that goes beyond immediate gestation or postpartum. This contributes to the expansion and complementation of the scientific scope related to the topic. Moreover, highlights the discussion about necessary care about maternal mental health and its implications on children's health. Other strengths of this study include the longitudinal design preserving temporality between the exposure and the outcomes, the high follow-up rates and the availability of information on covariables that allows for potential confounder adjustments. Another strong point is the exposure assessment, which was performed based on an instrument adapted and validated for the Brazilian population widely used to evaluate maternal depression and its symptoms, allowing greater comparability between studies.

The main limitation of our study is the evaluation of the outcomes, based on mothers' report being then subjected to misclassification error and to recall bias. Unfortunately, we do not have available computerized medical records to validate the mother's reports. Moreover, our health system does not register private health services (hospitalizations, emergency consultations, etc.) and they are not easy to access to get such kind of information. To avoid possible recall bias (Althubaiti, 2016) in the study, we adjusted the analyses for maternal and age education that are socio-demographic characteristics known to be associated with quality of the information in epidemiologic studies. Additionally, we have no information about the reason for seeking healthcare and whether the demand for medical consultations or emergency care visits were really necessary or not.

In addition, hospitalizations during infancy may be affected by Berkson's bias, which could explain the loss of the association between maternal depressive symptoms and hospitalizations after maternal socioeconomic characteristics adjustments.

## 5. Conclusion

The high prevalence of depression symptoms among women makes the associations between maternal mental health and childcare particularly important. In our study, children from depressed mothers had fewer preventive consultations, which are of paramount importance for the monitoring and protection of the baby's health. In contrast, they pursued more medical consultations due to illness and more emergency care, showing that these children were likely to be given medical assistance when they were at a more advanced stage of the natural history of their illnesses. These findings highlight the importance of detection and treatment of maternal depression that could rebound in less costly

healthcare use patterns for children of depressed mothers.

## Funding

There was no financing.

## Acknowledgments

This article is based on data from the study "Pelotas Birth Cohort, 2004" conducted by Postgraduate Program in Epidemiology at Universidade Federal de Pelotas, with the collaboration of the Brazilian Public Health Association (ABRASCO). From 2009 to 2013, the Wellcome Trust supported the 2004 birth cohort study. The World Health Organization, National Support Program for Centers of Excellence (PRONEX), Brazilian National Research Council (CNPq), Brazilian Ministry of Health, and Children's Pastorate supported previous phases of the study.

## References

- Abrams, L.S., Dornig, K., Curran, L., 2009. Barriers to service use for postpartum depression symptoms among low-income ethnic minority mothers in the United States. *Qual. Health Res.* 19 (4), 535–551.
- Adair, L.S., Fall, C.H.D., Osmond, C., Stein, A.D., Martorell, R., Ramirez-Zea, M., et al., 2013. Associations of linear growth and relative weight gain during early life with adult health and human capital in countries of low and middle income: findings from five birth cohort studies. *Lancet* 382 (9891), 525–534.
- Althubaiti, A., 2016. Information bias in health research: definition, pitfalls, and adjustment methods. *J. Multidiscip. Healthc.* 9, 211–217.
- Bentley, S.M., Pagalilauan, G.L., Simpson, S.A., 2014. Major depression. *Med. Clin. N. Am.* 98 (5), 981–1005.
- Burke, L., 2003. The impact of maternal depression on familial relationships. *Int. Rev. Psychiatry* 15 (3), 243–255.
- Chung, E.K., McCollum, K.F., Elo, I.T., Lee, H.J., Culhane, J.F., 2004. Maternal depressive symptoms and infant health practices among low-income women. *Pediatrics* 113 (6), e523–e529.
- Dennis, C.L., 2004. Influence of depressive symptomatology on maternal health service utilization and general health. *Arch. Women's Ment. Health* 7 (3), 183–191.
- Eilat-Tsanani, S., Merom, A., Romano, S., Reshef, A., Lavi, I., Tabenkin, H., 2006. The effect of postpartum depression on women's consultations with physicians. *Isr. Med. Assoc. J.* 8 (6), 406–410.
- Flynn, H.A., Davis, M., Marcus, S.M., Cunningham, R., Blow, F.C., 2004. Rates of maternal depression in pediatric emergency department and relationship to child service utilization. *Gen. Hosp. Psychiatry* 26 (4), 316–322.
- Hartmann, J.M., Mendoza-Sassi, R.A., Cesar, J.A., 2017. Depressão entre puérperas: prevalência e fatores associados. *Cadernos de Saúde Pública* 33.
- Knuth, A.G., Malta, D.C., Dumith, S.C., Pereira, C.A., Morais Neto, O.L., Temporão, J.G., et al., 2011. Prática de atividade física e sedentarismo em brasileiros: resultados da Pesquisa Nacional por Amostra de Domicílios (PNAD) 2008. *Ciênc. Saúde Colet.* 16, 3697–3705.
- Lyngsoe, B.K., Vestergaard, C.H., Rytter, D., Vestergaard, M., Munk-Olsen, T., Bech, B.H., 2018. Attendance of routine childcare visits in primary care for children of mothers with depression: a nationwide population-based cohort study. *Br. J. Gen. Pract.* 68 (667), e97–e104.
- Mandl, K.D., Tronick, E.Z., Brennan, T.A., Alpert, H.R., Homer, C.J., 1999. Infant health care use and maternal depression. *Arch. Pediatr. Adolesc. Med.* 153 (8), 808–813.
- MdLSe, Morais, Lucci, T.K., Otta, E., 2013. Postpartum depression and child development in first year of life. *Estud. Psicol.* 30, 7–17.
- Minkovitz, C.S., Strobino, D., Scharfstein, D., Hou, W., Miller, T., Mistry, K.B., et al., 2005. Maternal depressive symptoms and children's receipt of health care in the first 3 years of life. *Pediatrics* 115 (2), 306–314.
- Municipal IbdGeEsIndDH. Censo Demográfico IBGE. 2010.

- Pereira, P.K., Lovisi, G.M., 2008. Prevalência da depressão gestacional e fatores associados. *Arch. Clin. Psychiatry* 35, 144–153.
- Roberts, J., Sword, W., Watt, S., Gafni, A., Krueger, P., Sheehan, D., et al., 2001. Costs of postpartum care: examining associations from the Ontario mother and infant survey. *Can. J. Nurs. Res.* 33 (1), 19–34.
- Santana, D.S., Surita, F.G., Cecatti, J.G., 2018. Multiple pregnancy: epidemiology and association with maternal and perinatal morbidity. *Rev. Bras. Ginecol. Obstetr.* 40, 554–562.
- Santos, I.S., Barros, A.J.D., Matijasevich, A., Domingues, M.R., Barros, F.C., Victora, C.G., 2011. Cohort Profile: the 2004 Pelotas (Brazil) Birth Cohort Study. *Int. J. Epidemiol.* 40 (6), 1461–1468.
- Santos, I.S., Barros, A.J.D., Matijasevich, A., Zanini, R., Chrestani Cesar, M.A., Camargo-Figuera, F.A., et al., 2014. Cohort Profile Update: 2004 Pelotas (Brazil) Birth Cohort Study. Body composition, mental health and genetic assessment at the 6 years follow-up. *Int. J. Epidemiol.* 43 (5), 1437 -f.
- Santos, I.S., Matijasevich, A., Tavares, B.F., Barros, A.J.D., Botelho, I.P., Lapolli, C., et al., 2007. Validation of the Edinburgh Postnatal Depression Scale (EPDS) in a sample of mothers from the 2004 Pelotas Birth Cohort Study. *Cad. Saúde Pública* 23, 2577–2588.
- Sills, M.R., Shetterly, S., Xu, S., Magid, D., Kempe, A., 2007. Association between parental depression and children's health care use. *Pediatrics* 119 (4), e829–e836.
- Siqueira Barcelos, R., da Silva Dos Santos, I., Matijasevich, A., Anselmi, L., Barros, F.C., 2018. Maternal depression is associated with injuries in children aged 2–4 years: the Pelotas 2004 Birth Cohort. *Injury prevention. J. Int. Soc. Child Adolesc. Injury Prev.*
- Watson, J.M., Kemper, K.J., 1995. Maternal factors and child's health care use. *Soc. Sci. Med.* 40 (5), 623–628.
- Webster, J., Pritchard, M.A., Linnane, J.W., Roberts, J.A., Hinson, J.K., Starrenburg, S.E., 2001. Postnatal depression: use of health services and satisfaction with health-care providers. *J. Qual. Clin. Pract.* 21 (4), 144–148.