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Food insecurity during the gestational period and factors associated with maternal and child health

Abstract

Food security consists in granting everyone's right to regular and permanent access to safe, nutritious and sufficient food to meet their dietary needs and food preferences in order to lead to an active and healthy life. Studies that analyze aspects associated with food insecurity are important for the planning of programs and public policies in a preventive way and health promotion. The objective of this study is to review the factors associated with food insecurity during pregnancy. The prevalence of food insecurity in women during the gestational period ranged from 9.0% to 87.9%, with the lowest prevalence found in developed countries and the highest prevalence in underdeveloped or developing countries.

Keywords: food security, food and nutrition security, pregnancy, women's health, prenatal care

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Introduction

Food security consists in granting everyone's right to regular and permanent access to safe, nutritious and sufficient food to meet their dietary needs and food preferences in order to lead to an active and healthy life.[1]

The main international measure to achieve food security is based on the first United Nations Millennium Development Goals (eradicate hunger and poverty),[2] concurrent with the human right to proper food. It is estimated that one billion people in the world do not have access to sufficient food to meet basic nutritional needs or that they live in a situation of continuous hunger, a situation that indicates a severe food insecurity.[3] Food security / insecurity can be measured through individual dietary intake, anthropometry, food availability, among others. In international surveys the most used instrument to measure this insecurity is the "Household Food Security Survey Module".

According to the UN Food and Agriculture Organization report,[4] the prevalence of food insecurity in the world has improved, from 18.6% between 1990 and 1992 to 12.5% between 2010 and 2012. Food insecurity is determined mainly by poverty and social inequalities. Studies that analyze aspects associated with food insecurity are important for the planning of programs and public policies in a preventive way and health promotion.[4,5] The objective of this study is to review the factors associated with food insecurity during pregnancy.

Food insecurity during the gestational period

The effects of food insecurity can be seen mainly among the most vulnerable groups. Infant mortality, the damage of physical and mental development, low birth weight, maternal mortality, increased school dropouts, and decreased school performance are events related to the lack of healthy and quality food as a consequence of precarious access to income, goods and services.[6] Several international studies point to a direct relationship between food insecurity and losses in the children nutritional status.[7–11]

Laraia et al.,[12] have proposed three potential reasons why food insecurity may be of particular importance in pregnancy: nutritional needs are increased due to physiological changes in the pregnant woman's organism (elevation of basal metabolic rate as a consequence of accelerated synthesis of fetal, placental, uterine, mammary and maternal reserve tissue; the increase in mass of metabolically active tissue and cardiorespiratory process), the effort required to prepare food may be more difficult and pregnant women are forced to leave work, especially at the end of pregnancy, which leads to financial squeezing. These reasons may influence nutrition, health conditions and nutritional maternal status and may have unsatisfactory pregnancy outcomes.[12]

In this review the prevalence of food insecurity in women during the gestational period ranged from 9.0% to 87.9% (Table 1), with the lowest prevalence found in developed countries and the highest prevalence in underdeveloped or developing countries.[12–28]

Although there are some studies on food insecurity during the gestational period, there is still little knowledge about the effects of this insecurity on maternal and child health. Food insecurity in the gestational period is associated with anemia, pre-gestational and gestational anthropometric nutritional status, birth defects, maternal depression/anxiety disorders in pregnancy, gestational complications (diabetes, hypertension and obesity), gestational weight gain, food intake, low birth weight and postpartum depression and suicide. The key determinants of food insecurity were the non-empowerment of women, the presence of women and children at home, polygamous family arrangements, maternal depression disorder, lower education level, depressive disorder symptoms, paternal absence, low income, black race, and maternal age.[10,12,14,18,20,21,24,28–38]

More studies are needed to understand the impact of gestational food insecurity on maternal and child health in order to contribute to the development of health policies that can guarantee the food and nutritional security of the binomial mother and child.

Table 1 Summary of studies that estimated the prevalence and factors associated with food insecurity during pregnancy

Authors / Year of Publication	Place of Study	Study Period	Population (Source of Information)	Study Design	Sample Size	Measurement Instrument (Scale)*	Prevalence of Food Insecurity	Statistical Analysis	Associated Factors
Araujo et al. [13]	Recife - PE, Brazil	Nov 2012 to Jan 2013	Pregnant women attended by three Family Health Units (USF) located in districts II and III	Cross sectional	88	EBIA, 15 items	71.59% (mild: 54.55%, moderate: 13.64%, severe: 3.41%)	Simple logistic regression	association with no own income: OR = 3.33
Dewing et al. [14]	South Africa		Women 3 months after childbirth residents in a peri-urban settlement near Cape Town, South Africa.	Cross sectional	249	HFIAS, 9 items	Severe insecurity: 59.8%	Multiple Poisson regression	Each additional point on the food insecurity scale was associated with increased risks of probable depression (adjusted risk ratio [ARR], 1.05; 95% CI, 1.02–1.07), hazardous drinking (ARR, 1.04; 95% CI, 1.00–1.09), and suicidality (ARR, 1.12; 95% CI, 1.02–1.23). Evaluated at the means of the covariates, these estimated associations were large in magnitude.
Gamba et al. [15]	United States of America	1999 to 2008	Pregnant women participating in NHANES	Cross sectional	1158	US HFSSM, 18 items	21,00%	Multiple logistic regression	Household food security status may not be associated with overall diet quality.
Hromi-Fiedler et al. [16]	Hartford - Connecticut, USA	Sept 2005 to May 2007	Pregnant Latinas of Low Income Residents in Hartford	Cross sectional	135	Adapted version for pregnant Latinas: 15 items from US HFSSM	36,80%	Multiple logistic regression	Association with high levels of depressive symptoms (OR = 2.59, 95% CI: 1.03-5.52)
Jebena et al. [17]	Ethiopia	2013	Pregnant women from Jimma Zone, Southwest Ethiopia	Cross sectional	642	HFIAS, 9 items	9,00%	Multiple logistic regression	Association with mental distress (OR = 4.15, 95% CI: 1.67-10.32).

Table continued...

Authors / Year of Publication	Place of Study	Study Period	Population (Source of Information)	Study Design	Sample Size	Measurement Instrument (Scale)*	Prevalence of Food Insecurity	Statistical Analysis	Associated Factors
Laraia et al. [12]	North Carolina, United States	2000 to 2004	Pregnant women with less than 20 gestational weeks attended at University of North Carolina Hospitals and private obstetrics clinics	Retrospective cohort	606	US HFSSM, 18 items	25%	Multiple logistic regression	Association with: poorer social class (OR = 4.84; 95% CI: 2.37- 8.75); black skin color (OR = 1.65, 95% CI: 1.05 - 2.61); increase in the perceived stress score (OR = 1.80; 95% CI: 1.43 - 2.25); increase in anxiety score (OR = 1.74, 95% CI: 1.38 - 2.19); increase in the score of symptoms of depression (OR = 1.59, 95% CI: 1.27 - 2.00)
Laraia et al. [18]	North Carolina, United States	Jan 2001 to May 2005	Pregnant women with income ≤ 400% of the income / poverty index served at University of North Carolina Hospitals and private obstetrics clinics	Retrospective cohort	810	US HFSSM, 18 items	24%	Multiple logistic regression	Association with severe pre-gestational obesity (OR = 2.97; 95% CI: 1.44-6.14); gestational diabetes (OR = 2.76, 95% CI: 1.01-7.66)
Lobo [19]	João Pessoa - PB, Brazil	Jun to Aug 2013	Parturients from 19 to 35 years of age in two public	Cross sectional	222	EBIA, 14 items	59% (mild: 43.2%, moderate: 9.0%, severe: 6.8%)	Simple logistic regression	Inverse association: regular consumption of raw salad: OR = 0.79 (95% CI: 0.68-0.93); Cooked veggies: OR = 0.87 (95% CI: 0.76 -0.99); fresh fruit or fruit salad: OR = 0.64 (95% CI: 0.48-0.84).
López-Salame et al. [20]	Cartagena, Colombia	2011	Pregnant women in the urban area served in Cartagena	Cross sectional	413	Adapted and validated Alvarez scale of CCHIP	29.8% (mild: 23%, moderate: 6.3%, severe: 0.5%)	Simple logistic regression	-

Table continued...

Authors / Year of Publication	Place of Study	Study Period	Population (Source of Information)	Study Design	Sample Size	Measurement Instrument (Scale)*	Prevalence of Food Insecurity	Statistical Analysis	Associated Factors
Marano et al. [21]	Queimados e Petrópolis - RJ, Brazil	Dec 2007 to Nov 2008	Women in the first trimester of pregnancy attended by the public health system	Cross sectional	1535	EBIA, 15 items	37.8% (mild: 22.9%, moderate and severe: 14.9%)	Simple logistic regression	Mild insecurity associated with obesity (OR = 1.49, 95% CI: 1.01 - 2.20)
Na et al. [22]	Gaibandha District, Bangladesh	2007 to 2011	Rural women, followed by the 5 gestational week at 6 months postpartum	Prospective cohort	14600	FAST, 9 items	49.65% (mild: 20.12%, moderate: 15.33%, severe: 14.20%)	Generalized estimation equations (GEE)	Compared with women fromfood-secure households, women of mild, moderate, and severe HFI were less likely, in a dose-response fashion, to have consumed dairy products [adjusted ORs (95% CIs): 0.73 (0.69, 0.78), 0.62 (0.58, 0.66), and 0.52 (0.48, 0.55), respectively], eggs [0.81 (0.76, 0.85), 0.73 (0.68, 0.77), and 0.61 (0.57, 0.65)], meat [0.83 (0.79, 0.88), 0.73 (0.69, 0.78), and 0.60 (0.56, 0.64)], fish [0.87 (0.80, 0.94), 0.76 (0.70, 0.83), and 0.59 (0.54, 0.65)], legumes and nuts [0.88 (0.83, 0.93), 0.81 (0.76, 0.87), and 0.79 (0.74, 0.85)], and yellow and orange fruit and vegetables [0.85 (0.80, 0.91), 0.78 (0.73, 0.84), and 0.72 (0.67, 0.78)]. Neither intakes of dark-green leafy vegetables nor of vegetable oil were associated with HFI status.
Oliveira et al. [23]	Maceió - AL, Brazil	2014	Pregnant women from Maceió who performed prenatal care in the municipal public health system	Cross sectional	363	EBIA, 14 items	42.7% (mild: 24.8%, moderate: 9.99%, severe: 8.0%)	Multiple Poisson regression	Association with hyperglycaemia: PR: 1.45 (95% CI: 1.01 - 2.12); high blood pressure: RP: 1.64 (95% CI: 1.04 - 2.56);

Table continued...

Authors / Year of Publication	Place of Study	Study Period	Population (Source of Information)	Study Design	Sample Size	Measurement Instrument (Scale)*	Prevalence of Food Insecurity	Statistical Analysis	Associated Factors
Park et al. [24]	United States of America	1999 to 2006	Pregnant women participating in NHANES	Cross sectional	1045	US HFSSM, 18 items	15,69%	Multiple logistic regression	Association with iron deficiency classified by ferritin (OR = 2.90, 95% CI: 1.29 - 6.51) adjusted for age, race, gestational trimester, parity, schooling, year of research, poverty index, smoking, health insurance coverage, and protein level C-reactive
Santos [25]	Santo Antônio de Jesus, BA, Brazil	Feb 2014 to Feb 2015	Pregnant women from 14 to 49 residents in the urban area and attended at the Family Health Units of the municipality	Cross sectional	245	USDA Short Food Security Scale - 6 items	28,16%	Multiple logistic regression	Association with anemia (OR = 3.46, 95% CI: 1.78 - 6.75), adjusted for marital status, paid work, number of residents at home and level of schooling
Stevens et al. [26]	Pirganj, Bangladesh	Feb 2013 to Feb 2015	Pregnant women from twelve villages in Pirganj sub-district, Rangpur district, in northern Bangladesh.	Cross sectional	288	HFIAS, 9 items	87.9% (mild: 20.6%, moderate: 59.6%, severe: 7.7%)	Chi-square	Food security was associated with seasonality (p = 0.039). Food diversity was significantly lower in the summer (p = 0.029) and spring (p = 0.038). Food security decreased significantly in the spring (p = 0.006) and at the end of autumn (p = 0.009).
Tabares et al. [27]	Pereira - Risaralda, Colombia	2009	Pregnant adolescents who had prenatal care in the three institutions providing health services belonging to "ESE Salud Pereira"	Cross sectional	150	ELCSA, 17 items	63.3% (mild: 23.3%, moderate: 17.3%, severe: 22.7%)	Chi-square	Association with lower socioeconomic status (p = 0.016)

Table continued...

Authors / Year of Publication	Place of Study	Study Period	Population (Source of Information)	Study Design	Sample Size	Measurement Instrument (Scale)*	Prevalence of Food Insecurity	Statistical Analysis	Associated Factors
Zapata-López et al. [28]	Medellín, Colombia	Aug 2011 to Mar 2012	Pregnant women in the third trimester of pregnancy who underwent prenatal care in the Mendellin public health service	Cross sectional	294	ELCSA, 17 items	65.4% (mild: 42.2%, moderate: 14.5%, severe: 8.7%)	Multiple logistic regression	-

*CCHIP, community childhood hunger identification project; EBIA, Brazilian food insecurity scale; ELCSA, Latin american and Caribbean food security scale; HFIAS, household food insecurity access scale; US HFSSM, us household food security survey module

Conclusion

The prevalence of food insecurity in women during the gestational period ranged from 9.0% to 87.9%, with the lowest prevalence found in developed countries and the highest prevalence in underdeveloped or developing countries, and this prevalence is associated with anemia, pre-gestational and gestational anthropometric nutritional status, birth defects, maternal depression/anxiety disorders in pregnancy, gestational complications (diabetes, hypertension, obesity), gestational weight gain, food intake, low birth weight and postpartum depression and suicide.

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Conflict of interest

The author declares no conflict of interest.

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