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Prevalence of Food Insecurity during Pregnancy in Latin American and the Caribbean Countries: A Systematic Review

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A B S T R A C T

In Latin American and Caribbean (LAC) countries, women are particularly affected by food insecurity (FI). This gender gap can be amplified at certain key periods in life, particularly during pregnancy, with negative consequences on maternal and infant health. In the current geopolitical and health context, it is essential to take stock of the prevalence of FI among pregnant women in this region and the associated economic and psychosocial determinants. From 168 publications identified on Pubmed and Scopus, this systematic review selected 13 publications in 7 LAC countries. Although the published data only described the situation before the COVID-19 pandemic (2009–2019), the prevalence of FI in this population was already worrying, ranging from 28.2% to 64.9%. Only 4 of 13 studies investigated socioeconomic and psychosocial determinants among mothers in this region. Thus, the factors most frequently reported concerned mothers' demographic characteristics (advanced age and ethnic minority), household socioeconomic characteristics (low income, poorest wealth quartile, precarious housing, and welfare recipients), the absence of a stable partner, and a low education level. High prevalences of FI have also been associated with mental distress during pregnancy. In conclusion, few recent studies (notably none since the COVID-19 pandemic) have been published in this region on the issue of FI among women during pregnancy. Yet, this knowledge is essential to the development of a logical framework for the implementation and evaluation of public health programs aimed at women and children. By reducing the FI of mothers in the LAC region, we will contribute to reducing the social inequalities in health that often manifest themselves very early in life.

This study was registered at PROSPERO as CRD42024513321 (https://www.crd.york.ac.uk/prospero/display_record.php?RecordID=513321).

Keywords: food insecurity, pregnancy, Latin America, Caribbean, systematic review

Introduction

According to the FAO, food security is achieved "when all people, at all times, have physical, social, and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life." This definition was adopted at the 1996 World Summit [1]. It underlined the complex, multidimensional nature of food security, bringing together 4 key concepts: access to food, its availability, its use, and its stability [2].

Against the backdrop of the COVID-19 pandemic and the war in Ukraine, the problem of food insecurity (FI) has affected every state in the world to varying degrees of concern [3]. According to the latest FAO report, the number of people experiencing severe food insecurity (SFI) reached 900 million in 2022, almost 180 million more than in 2019 before the pandemic [4]. According to this report, Latin American and Caribbean (LAC) countries were the second most food-insecure region in the world, after Africa, with prevalences of 37.5% and 60.9%, respectively.

In LAC countries, the prevalence of moderate food insecurity (MFI) to SFI was higher than the global average (29.6% worldwide in 2022) [4]. A study of 13 LAC countries, using World Bank data, estimated that around 4 of 10 households surveyed had experienced FI during the COVID-19 pandemic [5].

Abbreviations: aPR, adjusted prevalence ratio; FI, food insecurity; LAC, Latin American and Caribbean; MFI, moderate food insecurity; SFI, severe food insecurity.

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Caribbean countries (60.6%) were more affected than Central America (34.5%) and South America (36.4%) in 2022 [4,6]. Over the 2020–2023 period, Haiti was the country with the highest prevalence (82.6%) in the region, followed by Jamaica (54.4%) and the Dominican Republic (52.1%). In Mesoamerica, Guatemala and Honduras had the highest prevalences of FI (59.8% and 56.1% respectively), while Mexico (27.6%) and Costa Rica (16.2%) had the lowest. In South America, the prevalence of FI was highest in Argentina (36.9%) and Brazil (32.8%).

Overall, women were more affected than men by FI, with the gender gap widening between 2020 and 2021 [4]. In the LAC region, the gender gap in FI prevalence (41.8% in women compared with 32.7% in men) was greater than the global average (9.1 compared with 2.3 percentage points worldwide). Furthermore, the magnitude of these salient inequalities between genders are amplified at certain key periods in women's lives. Indeed, because of their specific nutritional needs, women are particularly vulnerable to qualitative and/or quantitative food shortages during pregnancy [7]. FI has been shown to have negative effects on pregnancy and child health, particularly mental health (stress, anxiety, and depression), quality of life, micronutrient deficiencies (especially anemia), inadequate gestational weight gain and dietary diversity, and ultimately neonatal morbidity and mortality (prematurity, low birth weight, and hearing impairments) [2,8,9].

A systematic review of 11 studies, conducted mainly in low-income and middle-income countries, concluded that there were few robust evaluation of interventions involving dietary supplements, counseling and nutritional education for women during pregnancy and the postpartum period [10]. Thus, the lack of solid evidence could limit the large-scale implementation of programs aiming to combat FI in this population. A better understanding of FI (eg, magnitude, psychosocial determinants, and profile of affected populations) could improve the development and evaluation of effective evidence-based programs. Thus, the first step toward achieving the Sustainable Development Goal of eliminating hunger among women by 2030 could be to take stock of the situation of FI during the pivotal period of pregnancy in terms of prevalence and socioeconomic and psychosocial risk factors [11].

Although women are particularly affected by FI in the LAC region, few studies on the prevalence of FI during pregnancy have been published. Most studies and systematic reviews have focused on the United States and African populations [8]. In the current geopolitical and health context (eg, COVID-19 epidemic, economic crises, and conflicts), the scale of the problem of food shortages in this region may have stimulated the publication of recent data. We therefore carried out a systematic review of the prevalence and economic and psychosocial factors associated with FI among pregnant women in the LAC region.

Methods

Literature search

Before implementing this work, a preliminary check was performed in PubMed, Prospero, and the Cochrane Library to ensure that no systematic reviews had previously been conducted on this specific field in LAC countries.

A literature search was performed using PubMed and Scopus to cover all publications up to 12 February 2024. The search terms were defined by 2 researchers (CB, MD) and included the following keywords in the title and/or the abstract: (nutrition OR hunger OR food) AND (security OR insecurity OR access OR poverty OR supplement OR sufficiency OR desert OR assistance OR shortage) AND (pregnancy OR gestation OR maternal OR antenatal OR postnatal OR postpartum OR childbirth OR prenatal OR delivery OR mother) AND (south America OR Latin America OR Caribbean). The search included studies in the French, Spanish, Portuguese, or English language (languages spoken by some team members) and studies on human subjects and excluded the following publication types: reviews, correspondence, editorials, case reports, and case series. This systematic review was based on the PRISMA guidelines. This study was registered with PROSPERO (number CRD42024513321), available at https://www.crd.york.ac.uk/prospero/display_record.php?RecordID=513321.

Study selection

Study eligibility criteria were defined a priori. Studies were eligible if they reported data on "FI" households comprising pregnant women or women who had given birth in the last 72 h, and households living in LAC countries. The outcome was the prevalence of FI defined as MFI or SFI or FI with moderate or severe hunger.

The Covidence systematic review platform (Veritas Health Innovation, Melbourne, Australia), available at www.covidence.org, was used to perform study selection. After elimination of duplicates, the 2 researchers (CB, MD) made a blind check of titles and abstracts of all articles. When there was divergence about whether or not to include an article, they deliberated the case until consensus was reached.

Data extraction

Data extraction was realized independently by the 2 researchers, using the same extraction form. The following data were extracted: year of publication, country, sample size, age (mean or median and their statistical dispersion parameters, where available), sample characteristics (level of education, occupation, marital status, ethnicity, and income), data collection method (time, recall period, and FI assessment instrument), estimated prevalence of FI and socioeconomic and psychosocial factors associated with FI. When different published studies were conducted on the same data set, only 1 of them was included in the systematic review. However, where appropriate, missing information in the retained study could be supplemented by additional data present in the studies that were excluded.

Quality assessment

The Newcastle–Ottawa Scale was used to assess the quality of included studies [12]. This scale is composed of 3 quality criteria: selection (4 points for cohort or case–control studies and 5 points for cross-sectional studies), comparability (2 points), and outcome assessment (3 points). This gives a total of between 0 and 9 (or 10) points. Scores of 7 or more are considered high-quality studies, scores of 5–6 as moderate quality, and scores below 5 as low quality.

Results

Selection procedure and general characteristics of selected articles

In all, 168 publications were identified with Pubmed and Scopus, as of 12 February, 2024, and 6 through manual check in the references of selected articles (Figure 1). Of these, 45 were duplicates. After an initial selection based on title and abstract, 38 publications were selected for full-text review. Of these 38 publications, 13 were excluded owing to an erroneous outcome (no measurement of FI), 9 owing to an erroneous population (measurement outside pregnancy), and 3 owing to overlapping data. In all, 13 articles were eligible for data extraction and quality assessment.

For this systematic review, publication dates cover the last 12 y (2010–2022) on 7 countries in the LAC region. The FI assessment dates cover the period between 2009 [13] and 2019 [14,15], with 6 studies in 2015–2016 [16–20]. The majority of articles (53.8%) focused on the Brazilian population: Brazil [14,15,17–21], Colombia [13,16,22], Mexico [23], Haiti [24], Costa Rica, Honduras, and the Dominican Republic [25]. Brazilian publications focused on states in the Northeast [17,20,21], Southeast [15], South [14,19], and Amazon region [18]. In terms of study design, 10 studies were cross-sectional, and 3 studies were cohorts [15,23,24]. The median size of study populations was 407 (IQR: 316–1089), with a minimum of 150 participants [13] and a maximum of 1393 [16].

Characteristics of the study population in the selected articles

Table 1 [13–25] summarizes the characteristics of the study population in the selected articles. In the studied populations, the mean age was between 24 and 26 y in 9 of 13 publications [14,16–23]. In the remaining 4 studies, the population was, on average, either younger (1 adolescent study) [13] or older [15,24,25]. Six publications included populations living mainly in urban areas [14,16,18,20–22], while 2 articles focused on rural populations [24,25]. The majority of women lived with a partner (over 70% of study populations) [14,15,18–20,22,23,25].

Method for measuring FI during pregnancy

Table 2 [13–27] summarizes the methods used to measure FI, the FI prevalence, and the main factors related to FI. Data were collected through face-to-face interviews, with the exception of 1 study where interviews were conducted by telephone [20]. Interviews took place during antenatal care in health facilities: in hospitals [15,17,18,23,24], in municipal/primary health units [14,19–22], and in unspecified health facilities [13]. For 2 studies, interviews were conducted face-to-face, without specifying the location [16,25].

The exact time of data collection during pregnancy was specified in 12 of 13 articles: at birth [17,18], during the postnatal period [17,25], or during the prenatal period [14,15,20–24]. Prenatal assessment was carried out either: mainly in the third trimester [14], mainly in the first trimester [15], equally

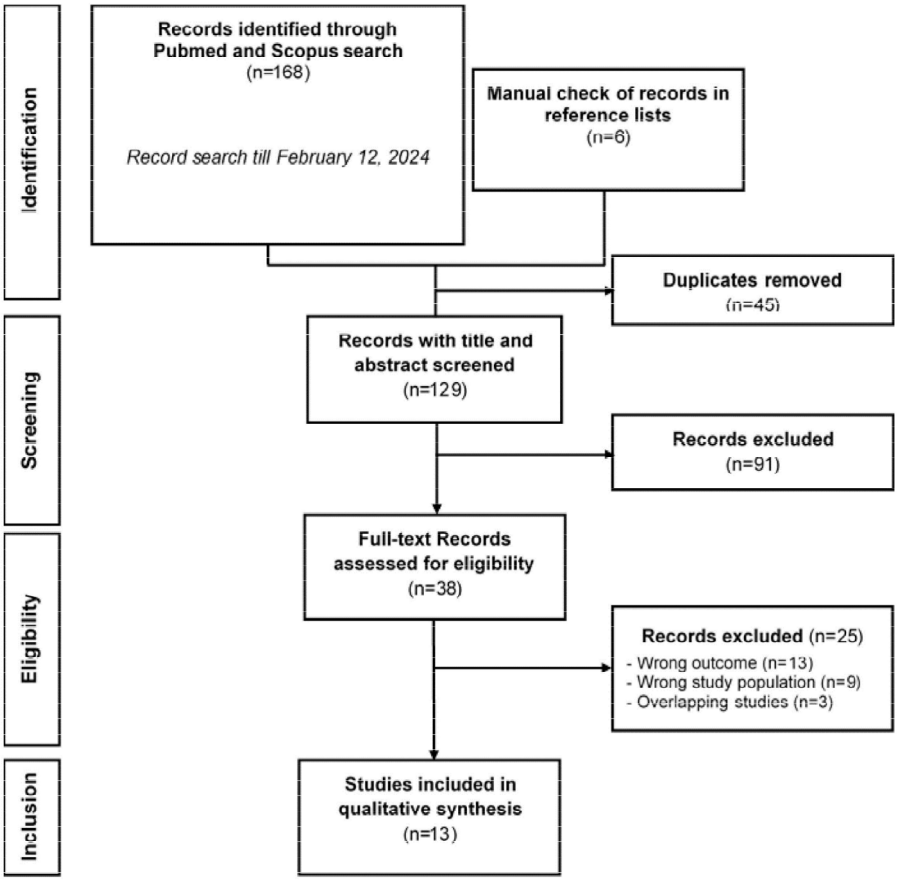

FIGURE 1. PRISMA flow diagram.

TABLE 1
Main characteristics of the sample of 13 studies included in the systematic review.

Author, year	Sample size	Study design	Country (state)	Age (y)	Sample recruitment	Main characteristics of the sample
Harmel and Höfelmann, 2022 [14]	513	Cross-sectional	Brazil (Paraná)	26.2 (95% CI: 25.7, 26.7)	Patients in Colombo's primary health care units	Urban area (100%) Education: ≥8 y (82.6%) Paid work (41.1%) Marital status: with partner (81.3%) Ethnicity: Black/Brown (45%)
Martínez-Torres et al., 2022 [16]	1393	Cross-sectional	Colombia	25.6 (±6.6)	Multistage stratified probability sampling design, based on the country's population and housing census	Urban area (72.9%) Education: ND Paid work: ND Marital status: ND Ethnicity: Black/mixed-race/Afro-descendant (10.3%); indigenous (12.8%)
de Abreu Rodrigues et al., 2021 [15]	169	Cohort	Brazil (Rio de Janeiro)	30.2 (±ND)	Patients with confirmed gestational risk referred to a public university hospital (≥18 y, a single pregnancy)	Urban area: ND Education: ≥9 y (83.4%) Paid work: ND Marital status: married/stable union (71.6%) Ethnicity: Black/mixed-race (67.5%)
Nery et al., 2021 [17]	469	Cross-sectional	Brazil (Salvador)	25 (IQR: 20–31)	Women who gave birth at a referral maternity hospital	Urban area: ND Education: <9 y (70.0%) Paid work: (47%) Marital status: ND Ethnicity: non-White (96.1%)
Cardona Cordero et al., 2021 [25]	1199	Cross-sectional	Costa Rica (Heredia), Dominican Republic (Olancho), Honduras (Santiago)	27 (±ND)	Door-to-door approach and snowball sampling method with recruitment of women aged 18 y and older who have had a pregnancy within 5 y	Urban area: 0% (rural communities) Education: ≤High school (89.9%) Paid work: ND Marital status: with partner (75.3%) Ethnicity: ND
Ramalho et al., 2020 [18]	1194	Cross-sectional	Brazil (Acre)	25.1 (±6.7)	Among in-hospital deliveries of parturients in Rio Branco (excluding twin pregnancies)	Urban area (100%) Education: from high school (74.0%) Paid work (35.8%) Marital status: with partner (84.0%) Ethnicity: non-white (27.6%)
Richterman et al., 2020 [24]	1089	Cohort	Haiti	27 (IQR: 23–32)	Among women aged 16 y and older consulting for routine prenatal care at the Hôpital Universitaire de Mirebalais	Urban area: (rural Haiti) Education: ND Paid work: ND Marital status: ND Ethnicity: ND
Arredondo et al., 2018 [23]	402	Cohort	Mexico (Morelos)	25 (±5.9)	Prenatal care at Temixco General Hospital, no alcohol or tobacco consumption, 18 y and older, no relocation within the next 3 y	Urban area: ND Education: completed high school (19.7%) Paid work (15%) Marital status: with partner (89.3%) Ethnicity: ND
Fernandes et al., 2018 [19]	316	Cross-sectional	Brazil (Paraná)	26.2 (±6.0)	Proportional stratified sampling across the 17 Family Health Units in the city of Colombo	Urban area: ND Education: ≥8 y (76.6%) Paid work (43.7%) Marital status: with partner (83.5%) Ethnicity: Black or indigenous (50.5%)

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TABLE 1 (*continued*)

Author, year	Sample size	Study design	Country (state)	Age (y)	Sample recruitment	Main characteristics of the sample
Demétrio et al., 2017 [20]	245	Cross-sectional	Brazil (Bahia)	25.8 (±5.9)	Random sample among pregnant women with anemia, diabetes, and hypertension receiving prenatal care at the Santo Antônio de Jesus family health unit	Urban zone (100%) Education: ≥8 y (38.4%) Paid work (42.4%) Marital status: with partner (80.0%) Ethnicity: Black (87.8%)
De Oliveira et al., 2017 [21]	363	Cross-sectional	Brazil (Alagoas)	24.1 (±6)	Proportional stratified sampling across the 60 Health Units of Maceio	Urban zone (100%) Education: ≥4 years (94.8%) Paid work (Housewife 72.2%) Marital status: with stable partner (20.7%) Ethnicity: no Black (84.0%)
López-Sáleme et al., 2012 [22]	413	Cross-sectional	Colombia (Cartagena)	24.3 (±ND)	Proportional sample, stratified by health units of Cartagena, affiliation plan and pregnancy trimester	Urban area: 80.9% Education: completed high school (33.4%) Paid work (housewife, 55.7%) Marital status: with partner (72.2%) Ethnicity: ND
Muñoz-Astudillo et al., 2010 [13]	150	Cross-sectional	Colombia (Risaralda)	17 (±ND)	Teenagers in the Pereira city birth register	Urban area: ND Education: not completed high school (59.0%) Paid work ND Marital status: ND Ethnicity: ND

Abbreviations: ND, not determined.

between the 3 trimesters [22], at the end of pregnancy [20], or on average between 23 and 25 wk of gestation [21,23,24]. In the study including 3 countries (Costa Rica, Honduras, and the Dominican Republic), data were collected on average 27 mo after delivery [25].

To measure FI, the Brazilian FI Scale (Escala Brasileira de Insegurança Alimentar) was mainly used [14,15,18,19,21]. The most widely used version of this scale comprised 14 items; only 1 study used a short 6-item version [19]. The Latin American and Caribbean Food Security Scale (Escala Latinoamericana y Caribeña de Seguridad Alimentaria) was used in 3 studies [13,16,23]. The United States Household Food Security Survey Module was also used, in its short 6-question version [20]. One study measured risk of FI using a validated 2-point screening method [17,26]. One study measured FI by asking a single question, with no details on its validation [25]. Finally, 1 study measured FI using a 12-point household FI scale validated in Colombia [22,27].

The recall period for measuring FI was mainly within the last 3 mo. However, some studies have also measured FI over the last 30 d [13,16,24] or 12 mo [20], or throughout pregnancy [17,18,25].

In all included studies, FI was expressed either as a categorical (in 2 classes: food security or FI) or ordinal variable (no insecurity, mild, moderate, or severe insecurity). One study measured FI using the household hunger scale, and results were given for no/moderate hunger compared with severe hunger [24].

Prevalence of FI during pregnancy

The prevalence of FI during pregnancy was reported in all 13 included studies. The prevalence of FI ranged from 28.2% in the Bahia region of Brazil [20] in 2014–2015 to 64.9% in Haiti in 2017 [24]. The prevalence of FI exceeded 50% in 38.5% of publications ($n = 5/13$) [13,15–17,24].

Association between socioeconomic and psychosocial factors and FI during pregnancy

The sociodemographic factors examined in the studies that were positively associated with FI during pregnancy were first demographic characteristics: mothers' age [adjusted prevalence ratio (aPR): 1.66 for those aged 30 y and older] [19] and their declared ethnic origin—aPR: 1.22 for the Afro-descendant community [16], and aPR: 1.39 for the Black or aboriginal community [19]. The second type of associated factors was economic characteristics: households with the lowest income with an aPR of 2.07 [19]; the lowest household economic class with an aPR of 1.99 [18], households living in the lowest wealth quartile with an aPR of 2.23 [16], and households receiving social assistance during pregnancy with an aPR of 1.65 [18]. Finally, the other factors were social: mothers' low level of education—aPR: 1.58 [19] and aPR= 1/0.66 [18]; not having a partner—adjusted odds ratio: 1/0.56 [18]; and precarious living conditions—households with open sewers adjusted odds ratio: 1.64 [18] and living in the Atlantic region of Colombia, aPR: 1.34 [16].

TABLE 2
Description of the methods used, food insecurity prevalence, and main factors related to food insecurity.

Authors, year	Collection date	Data collection method	Time of evaluation	Tool used to FI	Recall period	Prevalence of FI	Socioeconomic and psychosocial factors related to FI
Harmel and Höfelmann, 2022 [14]	March 2018–September 2019	Face-to-face interviews	T1 (16.8%) T2 (33.9%) T3 (49.3%)	EBIA	In the last 3 mo	FS: 55.4% LFI: 38.2% MFI/SFI: 6.4%	Higher mental distress with women experiencing: LFI/PR: 1.34 (1.12–1.61) MFI/SFI: 1.71 (1.33–2.19)
Martínez-Torres et al., 2022 [16]	2015–2016	Face-to-face interview with interviewer and nutritionist	T1 (13.7%) T2 (35.7%) T3 (41.5%) NS (9.1%)	ELCSA	In the last 30 d	FS: 36.6% LFI: 34.4% MFI: 16.1% SFI: 12.8%	Higher FI among women: from the Afro-descendant community—aPR: 1.22 (1.01–1.47) living in the most disadvantaged wealth quartile—aPR: 2.23 (1.41–3.68) living in the Atlantic region—aPR: 1.34 (1.08–1.67)
de Abreu Rodrigues et al., 2021 [15]	August 2017–October 2019	Face-to-face interview	T1 (77.3%) T2/T3 (22.7%)	EBIA	In the last 3 mo	FS: 43.5% LFI: 44.2% MFI/SFI: 12.3%	—
Nery et al., 2021 [17]	October 2015–January 2016	Face-to-face interview	At birth or 2 y later	2-point screening method [26]	Within the pregnancy	At risk FI: 60.4% (n = 409)	—
Cardona Cordero et al., 2021 [25]	Spring–Summer 2017	Face-to-face interview	At 27 mo postpartum on average	One question "worries about enough food during pregnancy"	During the pregnancy	FS: 54.1% FI: 45.9%	—
Ramalho et al., 2020 [18]	April–July 2015	Face-to-face interviews	At birth	EBIA	Between the period of the pregnancy discovery and the last gestational weeks	FS: 65.2% LFI: 24.6% MFI: 4.8% SFI: 5.4%	Higher FI in households: with open sewers in the peridomestic environment—aOR: 1.64 (1.21–2.22) in lower economic class households—aOR: 1.99 (1.35–2.94) in those benefiting from the government family assistance program—aOR: 1.65 (1.18–2.30) Lower FI among women: having a partner—aOR: 0.56(0.39-0.79) with ≥8 y education—aOR: 0.66 (0.49–0.90)
Richterman et al., 2020 [24]	May–December 2017	Face-to-face interview	Median: 24 wk (IQR: 17–30 wk)	HHS	In the last 30 d	NH: 35% MH: 30% SH: 35%	—
Arredondo et al., 2018 [23]	2017	Face-to-face interview	At 24 wk	ELCSA	In the last 3 mo	FS: 67.9% LFI: 22.4% MFI: 5.7% SFI: 3.9%	—
Fernandes et al., 2018 [19]	April–November 2016	Face-to-face interview with nutritionists and nutrition students	NS	EBIA (short version)	In the last 3 mo	FS: 54.9% FI: 45.1%	Higher FI among women: aged 30 y and older—aPR: 1.66 (1.02–2.69) Black or indigenous—aPR: 1.39 (1.08–1.79) with ≤7 y of education—aPR: 1.58 (1.14–2.19) with the lowest per capita income—aPR: 2.07 (1.36–3.14)

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TABLE 2 (*continued*)

Authors, year	Collection date	Data collection method	Time of evaluation	Tool used to FI	Recall period	Prevalence of FI	Socioeconomic and psychosocial factors related to FI
Demétrio et al., 2017 [20]	December 2014–February 2015	Telephone interview	At the end of pregnancy	US-HFSSM (short version)	Over the past 12 mo	FS: 71.8% FI: 28.2%	—
De Oliveira et al., 2017 [21]	2014	Face-to-face interview	Average weeks of gestation: 23.4 ± 9.3	EBIA	In the last 3 mo	FS: 57.3% LFI: 24.8% MFI: 9.9% SFI: 8.0%	—
López-Sáleme et al., 2012 [22]	2011	Face-to-face interview	T1 (33.4%) T2 (33.4%) T3 (33.2%)	Colombian scale [27]	NS	FS: 70.2% LFI: 23.0% MFI: 6.3% SFI: 0.5%	—
Muñoz-Astudillo et al., 2010 [13]	April–June 2009	Face-to-face interview	Median weeks of gestation: 25	ELCSA	In the last 30 d	FS: 36.7% LFI: 23.3% MFI: 17.3% SFI: 22.7%	—

Abbreviations: aOR, adjusted odds ratio; EBIA, Brazilian Food Insecurity Scale; ELCSA, Latin American and Caribbean Food Security Scale; FI, food insecurity; FS, food security; HHS, household hunger scale; LFI, light food insecurity; MFI, moderate food insecurity; MH, moderate hunger; NH, no hunger; NS, not specified; PR, prevalence ratio; SFI, severe food insecurity; SH, severe hunger; T1, first trimester of pregnancy; T2, second trimester of pregnancy; T3, third trimester of pregnancy; US-HFSSM, United States household food security survey module.

The prevalence of mental distress was significantly higher among food-insecure pregnant women with or without adjustment for socioeconomic factors [14]. This prevalence was higher when FI was moderate to severe (aPR: 1.34 for light FI; aPR: 1.71 for MFI/SFI).

Quality of selected articles

The quality of the articles included using Newcastle–Ottawa Scale is presented in Table 3. All articles were classified as high quality, with the exception of 1 article that was classified as moderate quality [13].

Discussion

This systematic review showed an alarming prevalence of FI during pregnancy in Latin American and Caribbean countries. The situation was presumably probably much worse during the COVID-19 pandemic but no study has been published study since 2019 describing the magnitude of its impact on FI, which is unfortunate because pregnant women were probably severely affected during COVID-19 [28]. Although the review included 12 (of 13) high-quality publications, only 3 reported socioeconomic factors associated with FI. When reported, the main risk factors associated with FI were older maternal age, belonging to disadvantaged ethnic communities, low household socioeconomic level, low educational level, and lack of stable partner. In addition, a high prevalence of FI was also associated with psychological distress during pregnancy.

Several strengths of this systematic review should be highlighted. First, it was carried out in accordance with the standardized PRISMA guidelines. Study selection, data extraction, and quality assessment were rigorously carried out by 2 independent reviewers. Second, the search was conducted in 4 languages (English, French, Spanish, and Portuguese), unlike most systematic reviews. Third, the research was conducted until February 2024, which includes the COVID pandemic period.

In the articles retained in our review, the prevalence of FI in the household of pregnant women was higher than the national average, suggesting a high vulnerability during this life stage. For example, in the state of Acre in Brazil, the prevalence of FI in the households of pregnant women was estimated at 34.8%, compared with 21.5% in the Brazilian urban population (2015–2017) and 31.2% in the state of Acre as a whole [18]. Similarly, in Colombia [16], this prevalence during pregnancy was 6 percentage points higher than the national average (60.2% compared with 54.2%, respectively). In addition, the Brazilian data in this review showed that prevalences vary considerably from state to state (range: 60–28), which may reflect different economic and demographic contexts [15]. Geopolitical factors, such as conflicts, food prices, inflation, and political crises, could also influence the estimation of FI at the individual on household level. Our bibliographic search went as far as 2024 but found no publications on FI in pregnant women during or after the COVID-19 pandemic. Yet, the prevalence of FI in pregnancy before 2020 was already alarming, and both the postpandemic situation and the Russian–Ukrainian war are likely to have further exacerbated the problem [28]. The FAO figures for the LAC region as a whole confirm this hypothesis [4] because the prevalence of MFI to SFI measured by the Food Insecurity

TABLE 3
Quality assessment of the studies included in the systematic review using the Newcastle–Ottawa Scale (NOS).

Auteur, year	Study design	Selection	Comparability	Outcome	Total score	Quality rating
Harmel and Höfelmann, 2022 [14]	Cross-sectional	****	**	***	9	High
Martínez-Torres et al., 2022 [16]	Cross-sectional	***	**	**	7	High
de Abreu Rodrigues et al., 2021 [15]	Cohort	****	**	***	9	High
Nery et al., 2021 [17]	Cross-sectional	**	**	***	7	High
Cardona Cordero et al., 2021 [25]	Cross-sectional	*****	**	**	9	High
Ramalho et al., 2020 [18]	Cross-sectional	****	**	**	8	High
Richterman et al., 2020 [24]	Cohort	****	**	***	9	High
Arredondo et al., 2018 [23]	Cohort	****	**	***	9	High
Fernandes et al., 2018 [19]	Cross-sectional	****	**	**	8	High
Demétrio et al., 2017 [20]	Cross-sectional	*****	**	**	9	High
de Oliveira et al., 2017 [21]	Cross-sectional	***	**	***	8	High
López-Sáleme et al., 2012 [22]	Cross-sectional	***	**	***	8	High
Muñoz-Astudillo et al., 2010 [13]	Cross-sectional	****	—	**	6	Moderate

NOS scores of ≥7 were considered as high quality, 5–6 as moderate quality, and <5 as low quality.

Experience Scale (experience-based scale) rose from 27.3% in 2015 to 37.5% in 2022, with a peak of 40.3% in 2021, in the LAC region. In addition, FI prevalence among pregnant women and mothers after the onset of the COVID crisis was estimated at 51.0% in a recent meta-analysis of 6 countries worldwide [29].

Regarding the methods used to estimate the prevalence of FI during pregnancy, the majority of articles in this review did not include samples representative of the source population. In fact, only 4 articles stand out for their stratified and proportional sampling to improve the representativeness of the sample [16,19,21,22]. Studies conducted in referral hospitals rather than primary care centers [15,17,18,23,24] may also have over-represented pregnancies at risk of complications and/or certain sociodemographic profiles. All articles included in this review used direct measures of FI, based on lived experience at the household or individual level [30]. Assuming that individuals experience FI in a similar way worldwide, these scales seemed robust and relevant enough to be applicable in different cultural contexts (using adapted language) [31]. Indeed, this type of questioning has the advantage of taking into account the physical and psychosocial experience of FI [32,33]. By contrast, some of the tools used (household hunger scale or short household food security survey module scale) tended to overestimate the FI on the basis of studies carried out in other populations [24,34,35].

Only 3 of the 13 included publications investigated the associations between socioeconomic and demographic factors and FI during pregnancy. The influencing factors of FI varied across studies, but all 3 studies pinpointed a low socioeconomic level as a major risk factor, in contexts of political crises (presidential impeachment in Brazil and diplomatic crisis between Colombia and Venezuela) [16,18,19,36]. The protective role of schooling in preventing FI was only reported in 2 Brazilian publications but not elsewhere [18,19]. This may underline the importance of Brazil's Bolsa Familia program, which encourages vulnerable families to send their children to school. Belonging to a Black/Afro-descendant or indigenous community as a risk factor for FI has also been reported in this review and in the literature [16,19,37], with these factors interacting to create a vicious circle of vulnerability and insecurity [38].

Finally, the association between FI and depressive symptoms [14] could be hypothesized to reflect FI causing stress meeting basic needs for oneself and one's child [39–42]. In fact, the relationship is likely to be bidirectional, with unhappiness and mental disorders also limiting the ability to adapt to food or money shortages. This association between FI and depressive symptoms may be attenuated by supportive social environment [39,43]. In this review, 1 Brazilian publication in this review mentioned living with a partner as a protective factor against FI [18]. The use of social resources (eg, sharing of food, exchange of experiences, psychological support, and understanding) could be effective in coping with food shortages and reducing risk of depression [39].This social coping strategy should be the subject of further studies.

In conclusion, this systematic review, focusing on pregnant women in South American and Caribbean countries, provides us with 3 interesting insights: *1*) first, it highlights the worrying situation of food security during pregnancy and the vulnerability of women during this pivotal period of life; *2*) although COVID-19 has often revealed the problem of FI in different populations, our review also highlights the lack of recent studies on the impact of the COVID-19 pandemic on FI in pregnant women in the region; and *3*) it also reveals the lack of data on the determinants at play in FI during pregnancy, and on the severity of FI; indeed, for more effective prevention policies, it seems necessary to provide data on the continuum of FI severity in this population. The inclusion of pregnant women in future studies should thus be encouraged in order to classify and monitor the severity of FI during pregnancy on a macroterritorial and microterritorial scale [44]. Pregnant women and children are not the most vocal advocacy group, therefore providing such knowledge is essential if we are to act more effectively during the first 1000 days of life and influence their health outcomes.

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Author contributions

The authors' responsibilities were as follows—CB, MD: designed and conducted the research; CB, MS, MN, MD: carried

out data extraction and bias assessment; CB, MS, MSG, CG, MN, LO, MD: wrote and revised drafts of the manuscript; all authors: made intellectual contributions and read and approved the final manuscript.

Conflict of interest

The authors report no conflict of interest.

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Data availability

The data described in the manuscript, the code book, and the analytical code will be made available on reasonable request at the following address: celia.basurko@gmail.com.

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