**REVIEW ARTICLE**

# MATERNAL FOOD DIVERSITY AND SEASONALITY AS CONDITIONS FOR CHILDREN'S NUTRITIONAL STATUS: AN INTEGRATIVE REVIEW

Bianca Araujo Milbratz[1]; Ana Clara da Cruz Della Torre[2]
Maysa Helena de Aguiar Toloni[3]; Daniela Braga Lima[4]

**Highlights:**

1. Adequate maternal nutrition reflects better health outcomes in childhood.
2. Seasonality affects food diversity in rural mother-child pairs.
3. Quality maternal nutrition lowers risk of child nutritional disorders.

PRE-PROOF

(as accepted)

This is a preliminary, unedited version of a manuscript accepted for publication in Revista Contexto & Saúde. As a service to our readers, we are making this initial version of the manuscript available as accepted. The article will still undergo revision, formatting, and author approval before being published in its final form.

http://dx.doi.org/10.21527/2176-7114.2025.50.13797

How to cite:

Milbratz BA, Della Torre AC da C, Toloni MH de A, Lima DB. Maternal food diversity and seasonality as conditions for children's nutritional status: an integrative review. Rev. Contexto & Saúde. 2025;25(50):e13797

[1] Universidade Federal de Lavras – UFLA. Lavras/MG, Brazil. https://orcid.org/0000-0002-9266-4650

[2] Universidade Federal de Lavras – UFLA. Lavras/MG, Brazil. https://orcid.org/0000-0001-6212-8729

[3] Universidade Federal de Lavras – UFLA. Lavras/MG, Brazil. https://orcid.org/0000-0002-0297-0786

[4] Universidade Federal de Lavras – UFLA. Lavras/MG, Brazil. https://orcid.org/0000-0002-6755-9744

**MATERNAL FOOD DIVERSITY AND SEASONALITY AS CONDITIONS FOR CHILDREN'S NUTRITIONAL STATUS: AN INTEGRATIVE REVIEW**


## ABSTRACT

Nutritional status is a determining factor in achieving good health. The aim of the study was to evaluate whether maternal dietary patterns can influence nutritional disorders in children under two years of age. An integrative review was carried out, with data collected from the following databases: EMBASE, PubMed, LILACS and SciELO. A total of 273 studies were identified, 11 of which answered the guiding question, and only four met all the inclusion criteria. The findings showed that maternal nutrition decreased the risk of nutritional disorders in children. Maternal dietary diversity was a protective factor for stunting in children and a predictor of children's food variety, consequently influencing their food consumption. Maternal abstinence from food is among the common factors related to child malnutrition. It can be concluded that maternal nutrition is a protective factor for the development of nutritional disorders in children between zero and 24 months of age, since mothers are usually responsible for feeding the family, especially in traditional societies.


**Keywords:** maternal nutrition; eating behaviour; infant nutritional disorders.

**A DIVERSIDADE ALIMENTAR MATERNA E A SAZONALIDADE COMO CONDICIONANTES DO ESTADO NUTRICIONAL INFANTIL: UMA REVISÃO INTEGRATIVA**


## RESUMO

O estado nutricional constitui um fator determinante para a obtenção de uma boa condição de saúde. O objetivo do estudo foi identificar evidências do quanto o padrão alimentar da mãe pode influenciar nos distúrbios nutricionais de crianças menores de dois anos de idade. Foi realizada uma revisão integrativa, com dados levantados nas bases de dados: EMBASE, PubMed, LILACS e SciELO. Foram identificados 273 estudos, sendo que 11 respondiam à questão norteadora e apenas quatro atendiam a todos os critérios de inclusão. Os achados apontaram que a nutrição materna diminuiu o risco de distúrbios nutricionais nos seus filhos. A diversidade alimentar materna foi um dos fatores de proteção para o déficit de estatura infantil e preditor da variedade alimentar de seus filhos, influenciando, consequentemente, no consumo

alimentar das crianças. A abstenção da alimentação materna está entre os fatores comuns da desnutrição infantil. Pode-se concluir que a alimentação materna é um fator protetor para o desenvolvimento de distúrbios nutricionais de crianças entre zero e 24 meses, uma vez que as mães possuem responsabilidade pela alimentação da família, especialmente, nas sociedades tradicionais.

**Palavras-chave:** nutrição materna; comportamento alimentar; transtornos nutricionais do lactente.

## INTRODUCTION

Nutritional status is a determining factor in achieving good health[1]. In childhood, low or excess weight is a risk factor that is associated with adverse lifelong consequences, such as the onset of infectious diseases and the early onset of chronic noncommunicable diseases (NCDs), such as obesity and type 2 diabetes mellitus[2].

The formation of eating habits occurs in childhood, and a child's family is their first social influence, transmitting beliefs, cultures, attitudes and practices related to food that can influence future eating patterns[3]. The family niche provides food environments and experiences with food, so children's behaviours and lifestyles are modelled on those of their parents; the mother has a fundamental and primordial role within the family, since she has the power to decide when, how and what kind of food is offered to the child[4].

Also during pregnancy, the mother already plays a very important role in the health outcomes of her child throughout her life. Thus, both maternal under- and overnutrition trigger effects on the nutritional status of the fetus, which lead to metabolic responses until adulthood. Poor gestational weight gain can lead to low birth weight, increasing the risk of cardiovascular disease in adulthood. Excessive weight gain increases the risk of having macrosomic babies, associated with obesity in adulthood[5]. Therefore, the risk of overweight and obesity in children increases up to two times when their mothers are obese pregnant women[6].

The diet of children under 24 months of age changes over time; initially, exclusive breastfeeding is recommended for up to six months, with the subsequent adequate introduction of other foods[7]. However, for a healthy complementary diet, it is necessary to pay attention to

what foods are offered, prioritizing fresh and minimally processed foods and a diet that is free from ultra-processed foods (UPFs)[8].

Food diversity is understood as the number of different food groups or foods eaten in a given period. In addition to promoting a healthy weight, improving nutritional status and ensuring food security, food diversity is the best form of nutritional adequacy and an indicator of healthy eating[9]. In addition, food diversity can be affected by seasonality in food availability, especially in rural areas. Thus, in periods of scarcity, there is a change in consumption patterns, which causes inadequate and/or insufficient nutritional intake, worsening nutritional status and food security[10].

Current evidence points to the existence of a relationship between maternal malnutrition and the development of nutritional inadequacies in children[11,12]. However, there is a gap in the literature regarding maternal nutrition as a protective factor against nutritional disorders in the first two years of a child's life. Given the above, the objective of the study was to evaluate whether identify evidence of how much maternal dietary patterns influence nutritional disorders (malnutrition and obesity) in children under two years of age.

## MATERIALS AND METHODS

This was an integrative review conducted according to the methodology proposed by Mendes *et al.*[13], which involves six steps: 1) the identification of the theme and guiding question; 2) the establishment of criteria for the inclusion and exclusion of studies; 3) the definition of the information to be extracted from the selected materials; 4) the evaluation of studies; 5) the interpretation of results; and 6) the presentation of the review/synthesis of knowledge. The review was based on the PICO search strategy[14] (Chart 1) to answer the following guiding question: Is there evidence that maternal nutritional status influences nutritional disorders in infants?

**Table 1 -** Description of the PICO search strategy.

| Initials | Description | Analysis |
|---|---|---|
| P | Patient or problem | Childhood |
| I | Intervention or indicator | Maternal nutrition |
| C | Comparison or control | - |
| O | Outcomes | Infant nutritional disorders (malnutrition and obesity) |

Source: prepared by the author, 2022.

The search was performed using the EMBASE, PubMed, Latin American and Caribbean Literature on Health Sciences (LILACS) and Scientific Electronic Library Online (SciELO) databases. The Health Sciences Descriptors (DeCS) used were Feeding Behaviour, Maternal Nutrition and Infant Nutritional Disorders, and their respective corresponding terms in English and Spanish, combined as shown in Table 2.

**Table 2 -** Search strategies in the databases.

| Base | Busca |
|---|---|
| Embase | "feeding behaviour" AND "maternal nutrition" AND "infant nutrition disorders" |
| Scielo | "comportamento alimentar" OR "*conducta alimentaria*" AND "nutrição materna" OR "*nutrición materna*" AND "transtornos nutricionais do lactente" OR "*trastornos de la nutrición del lactante*" |
| PubMed | "feeding behaviour" AND "maternal nutrition" AND "*infant nutrition disorders*" |
| LILACS | "*conducta alimentaria*" AND "*nutrición materna*" |
| | "*nutrición materna*" AND "*trastornos de la nutrición del lactante*" |

Source: prepared by the author, 2022.

The inclusion criteria were as follows: original full-text articles available online; articles with different methodological approaches; articles published in Portuguese, English and Spanish; articles including children under the age of two; articles answering the guiding question; and articles published from 2016 to 2022. The period was chosen due to the very important milestone that was the institution of the National Policy for Integral Attention to Children's Health (PNAISC) at the end of 2015[15]. The exclusion criteria adopted were review articles, course conclusion works, dissertations, theses, response letters, editorials, reviews, books, official publications, chapters and duplicate publications.

The database searches were conducted between April and May 2022, and the extraction of data from the selected studies was performed according to the proposal of Ursi *et al.*[16], using the variables of interest, including the article title, authors, year of publication, country of study, study design and main results, followed by the assessment of the level of evidence defined by Melnyk *et al.*[17], according to the type of study: level I for a systematic review or meta-analysis; level II for a randomized controlled trial; level III for a randomized controlled trial; level IV for a case–control study or cohort study; level V for a systematic review of qualitative or descriptive studies; level VI for a qualitative or descriptive study; and level VII for an opinion or a consensus.

The studies were independently reviewed by three researchers, and in cases of disagreement among them, the study with the most votes prevailed. The analysis and synthesis of the data were carried out in a descriptive way.

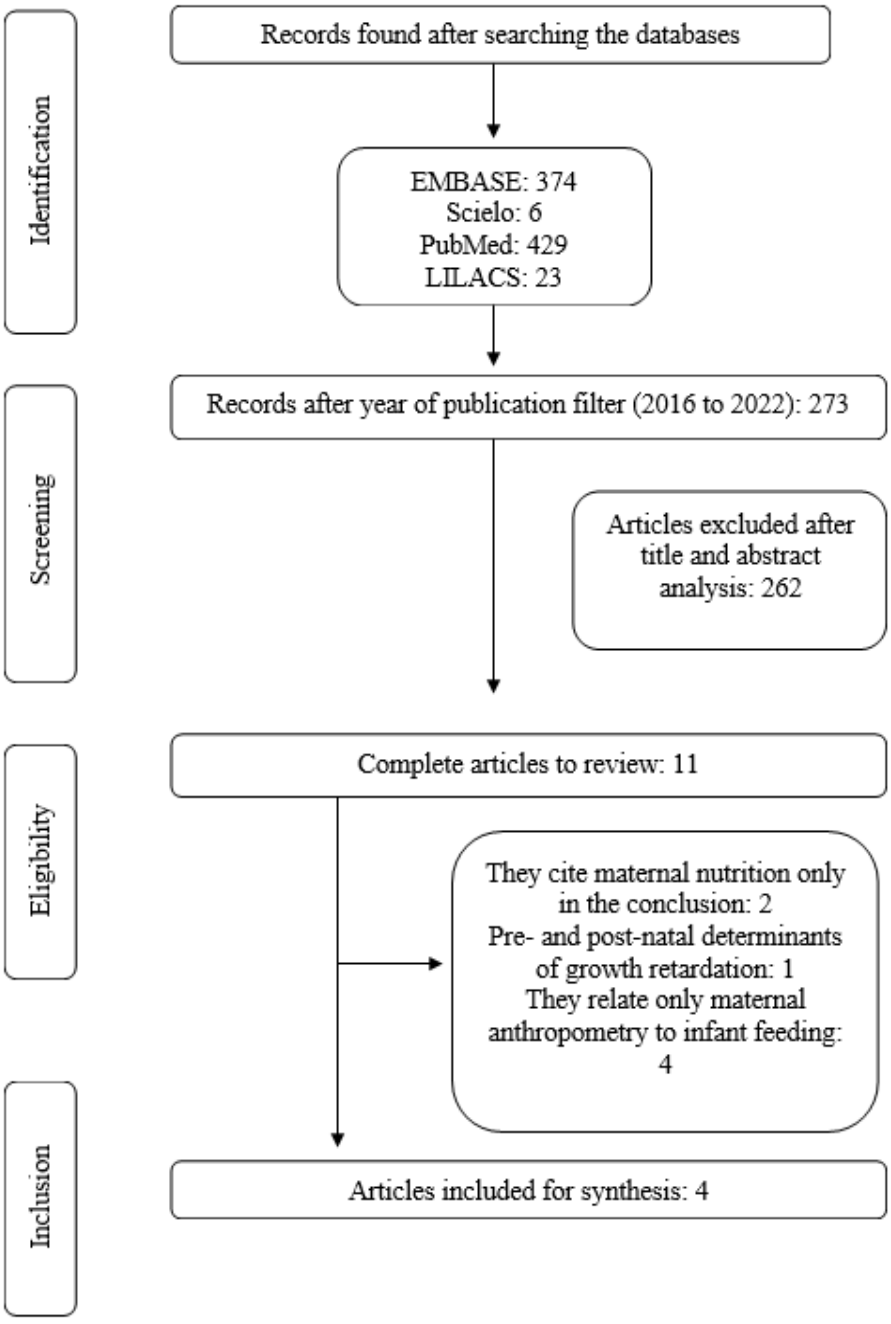
The ethical aspects of this review were preserved so that the information and data were presented in a reliable manner and in accordance with Copyright Law no. 9.610/9810. Furthermore, the authors analysed and cited were properly referenced.

## RESULTS

In the article selection process, 832 articles were retrieved and selected through the descriptors. Then, the temporality filter was applied, which resulted in the retrieval of 273 articles. After the initial reading, with respect to the inclusion criteria, 11 articles were obtained and identified for full reading. From this universe, another seven articles were excluded because

they did not present data related to maternal nutrition and the nutritional status of children in their results. Ultimately, four articles were included for synthesis and analysis in this review (Figure 1).

**Figure 1 -** Data search flowchart.




Source: prepared by the author, 2022.

Table 3 presents the synthesis of the articles selected in this review, including the objectives, the instruments used to carry out the research and the main results found, highlighting the relationship between maternal nutrition and nutritional disorders in infants.

The samples were composed of mother-child dyads, and 50% (n = 2) of the studies were carried out with children aged between 6 and 23 months. Regarding study design, half of the studies were longitudinal studies, and the other half were cross-sectional studies; thus, they presented levels of evidence of IV and VI, respectively, as classified by Melnyk *et al.*[17].

**Table 3 -** Main outcomes found in the studies included in the integrative review.

| N | Author/ Year | Level of Evidence | Objective | Type of study/Sample/ Country | Measurement of the factors studied | Results |
|---|---|---|---|---|---|---|
| 1 | Desalegn et al., 2019[18] | Level IV | To evaluate and compare the feeding practices and nutritional status of children aged 6 to 23 months with fasting and nonfasting. lactating mothers during the fasting and nonfasting periods of Ethiopian Orthodox Lent.** | Longitudinal study with 505 mother-child dyads with children of both sexes aged 6 to 23 months from Ethiopia. | Anthropometry: Weight and length of children; Feeding: 24-hour recall (R24h) at two timepoints: fasting and nonfasting. Minimum Diet Diversity (MDD), Minimum Meal Frequency (MMF) and Minimum Acceptable Diet (MAD) scores were recorded for children. | The children of mothers who practised fasting had significantly lower weight for height and height for age when compared to the children of mothers who did not fast. The median weight for age and diet diversity score were higher in nonfasting periods. Maternal abstinence from food was shown to be one of the common factors in children with malnutrition, low weight and extreme loss of muscle and fat mass. |
| 2 | Mahmudion et al., 2017[19] | Level VI | To determine the relationship between dietary diversity and childhood stunting. | Cross-sectional study with 736 families in Indonesia. | R24h reported by the mother; Checklist of 12 food groups proposed by the Food and Agriculture Organization (FAO). | High levels of maternal dietary diversity were associated with a lower chance of childhood stunting. |
| 3 | Roba et al., 2016[20] | Level IV | To report seasonal variations in infant and young child underfeeding practices and malnutrition among children aged 6-23 months with lactating mothers in different agroecological zones. | Longitudinal study with 216 mother/child pairs with children aged 6-23 months during postharvest and 206 pairs at the preharvest stage in Ethiopia. | R24h | The differences between the two periods, pre- and postharvest, were the decrease in the height-for-age scores and maternal dietary diversity. In the preharvest period, there was an increase in infant food diversity and in the prevalence of short stature and low weight. In both seasons, the predictors for wasting and infant dietary diversity were, infant feeding practices and maternal |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | dietary diversity, respectively. |
| 4 | Reyes-López et al., 2021[21] | Level VI | To evaluate the association between the quality of the maternal diet during the 2nd half of pregnancy and newborn nutritional status in a group of Mexican pregnant women. | Cross-sectional study with 226 mother-newborn pairs in Mexico. | R24h was applied three times during the 2nd half of pregnancy, applying a new adaptation of the Alternated Healthy Easting Index 2010 (AHEI-2010). | High dietary quality during pregnancy was associated with increased weight and length of the newborns, and a reduced risk of low birth weight (LBW) and small for gestational age (SGA). |

[i] The longitudinal community-based research was conducted in the Lenten fasting (15 February to 15 April 2017) and non-fasting (1 to 30 May 2017) periods in rural Genta Afeshum woreda (the third-level administrative division in Ethiopia), in rural Tigray, Ethiopia.

Source: prepared by the author, 2022.

## DISCUSSION

The articles pointed out that quality of maternal nutrition influenced the risk of nutritional disorders in children[18–21]. The method used to assess the food consumption of mother-child dyads was the 24-hour recall (R24h), associated with other instruments, such as a checklist of 12 groups from the Food and Agriculture Organization (FAO) and the AHEI-2010, adapted for pregnant women[19,21].

The use of the R24h as the most frequent instrument in the assessment of food consumption corroborates the findings of Fernandes *et al.*[22]; additionally, R24h can be used on one or three nonconsecutive days, depending on the objective. Although some studies evaluated the dietary pattern according to the availability of nutrients, the World Health Organization (WHO) has established that this evaluation can be based on questionnaires that address food consumption[8].

In the first three articles, the diversity of the maternal diet was evaluated as an explanatory variable for the food consumption and nutritional status of children, with or without nutritional disorders, regarding the excess or deficit of anthropometric variables. In all articles, despite the use of different methodologies for this measurement, it was found that maternal food diversity was a protective factor for childhood stunting and a predictor of the food variety of children, consequently influencing their food consumption[18–20].

In this context, it is known that diet can be influenced by several factors, such as ethnicity, culture, religion, economic status, geographic region and place of residence[22,23]. In addition, seasonality is an important factor that also interferes with the availability and access to food; in rural families, mainly in developing countries, this can lead to a change in the food pattern, not only in the number of meals but also in the quantity and quality of food[10]. These factors were considered in Studies 1 and 3, where the quality of the diet was evaluated in two different periods, namely, in periods of fasting for mothers of the Orthodox religion[18] and at pre- and postharvest times in rural communities, respectively[20].

In the article by Desalegn *et al.*[18], the findings showed that the children of mothers who fasted during pregnancy and lactation were 2.1 and 2.6 times more likely to be underweight, respectively, and 1.8 times more likely to be smaller (height for age) than the children of

mothers who did not fast during these periods[18]. This can be explained by maternal malnutrition during pregnancy, leading to insufficient weight gain for the mother, which is a risk factor for the birth of babies who are very small for gestational age[24].

In a study carried out in northeastern Ethiopia, it was found that 54.8% of pregnant women had inadequate and/or insufficient dietary practices, the explanatory factor of which was religious practice[24]; religious practices can constitute dietary conditions by establishing rules for food intake, differentiating pure and impure foods and even determining periods of fasting[25]. This practice of fasting by orthodox mothers resulted in lower minimum diet diversity (MDD), minimum meal frequency (MMF) and minimum acceptable diet (MAD) scores for their children, in addition to lower weight-for-age and height indices age in children compared to mothers who did not practice fasting[18].

Roba *et al.*[20] revealed an increase in the prevalence of stunting and low weight in children from 39.8% and 26.9% at postharvest to 46% and 31.8% at preharvest, respectively, which they defined as seasonal variation in malnutrition. Furthermore, it was notable that food diversity increased in the preharvest period for mothers and their children. At first, the data seem to be contradictory; however, despite food diversity having increased in the preharvest period, there were differences between regions, with localities where the food diversity among children decreased, reaching only 2.9%, and another place where this percentage increased, reaching a prevalence of 44.5%, depending on what was grown and the mother's presence in the field, absent from home care.

In other studies, in the postharvest period, a general tendency to increase food diversity was observed[10,26]. The seasonal variation can be explained by the fact that agricultural products are seasonal and perishable. The precariousness of the storage locations makes it difficult to maintain a diverse diet in the off-season; in addition, shortly after harvest, transactions of the marketable surplus occur as a way of not losing the food, which reduces the food variety and, consequently, causes changes in nutritional status[26].

According to Roba *et al.*[20], the dietary diversity of the maternal diet was a predictor for diversified infant food consumption in both seasons and was also associated with a lower chance of the occurrence of childhood stunting (OR=0.89; 95% CI=0.80–0.98), revealing it as a protective factor[19]. Thus, mothers who consume diversified and nutritious diets create

protective environments for their children, given that their children's food consumption is adequate[27].

Infant feeding is revealed to be one of the most important functions of maternal care, and even though both parents play a prominent role in their child's eating behaviour, the mother is primarily responsible for the nutrition of the family, especially in traditional societies. Mothers exert a strong influence in feeding their children, deciding, in most cases, what and how their children eat[28–30].

In the fourth revised article[21], the decrease in the risk of low birth weight (LBW) and small for gestational age (SGA) can be highlighted, as the maternal diet quality index (AHEI 10P) score increased by five units. This increase in the 2010 AHEI score provided greater birth weight and length, as well as an increase in the weight-for-age index in their children[21]. That is, a good quality maternal diet proved to be a determining factor for the health of children. These data can be explained by the fact that an adequate diet involves greater availability of macro- and micronutrients, which leads to adequate growth and development of a foetus[31].

Maternal nutritional adequacy, including food intake in the preconception and conception period, is an important factor for embryonic and placental growth and development, and health outcomes throughout the baby's life[32]. Extremes in maternal nutritional status are harmful to the fetus. Children of malnourished mothers may have reduced growth, pancreatic development and insulin secretion, associated with increased glucose uptake in peripheral tissues, among other metabolic deviations, which, when accompanied by high energy intake in adult life, can lead to the emergence of obesity, insulin resistance and diabetes[33].

Meanwhile, children of women with obesity are more susceptible to the high supply of glucose and lipids that can contribute to the birth of macrosomic babies, in addition to having a greater chance of accumulating fat mass, contributing to obesity in adult life[33]. Pre-gestational BMI is, therefore, not only an indicator of healthy pregnancy, but also an indicator of maternal health and adverse pregnancy outcomes[34].

Given the reduced number of articles for synthesis, the results of this review must be interpreted while considering some limitations inherent to the research. This factor can be explained by the lack of health descriptors that answer the guiding question, such as the lack of a controlled concept of maternal nutritional status and a more specific concept for nutritional

disorders in children under two years of age.

Another observation was the lack of studies conducted in Brazil, since it was demonstrated how much the geographic region can interfere with the food consumption of mother-child dyads. Thus, new national studies are justified to assess factors that would facilitate the implementation of strategies and actions aimed at adequate nutrition and the prevention of nutritional disorders in infants.

On the other hand, this study is relevant in highlighting evidence that points to a protective factor of maternal nutrition in the nutritional status of children. The importance of attention to the diet and nutrition of the mother-child dyad is highlighted, from conception to the first two years of life, which a critical period for the formation of eating habits and in which intense growth and development occurs. The findings of this study also point to the need for further prospective studies that aim to assess maternal nutritional status as a protective factor in the development of nutritional disorders in children under two years of age, providing evidence subsidies for the formulation of new public policies for the public, guaranteeing adequate and healthy food, growth and development.



## CONCLUSION

Maternal nutrition is a protective factor for the development of nutritional disorders in infants, since mothers are responsible for feeding their families, especially in traditional societies, and define the type and frequency of meals for their children.

This study showed that the better the quantity and quality of the maternal diet, the greater the positive impact on infant food consumption and the adequacy of the nutritional status of children under two years of age. Another result of this important integrative review concerns the influence of seasonality on the availability and intake of food in rural societies, which is related to the nutritional status and dietary diversity of mother-child dyads.

The results of this study revealed that the quality of maternal nutrition influenced the risk of nutritional disorders in children, contributing to the deepening of knowledge about the protective factors of maternal nutrition in nutritional disorders in the first years of life. In this

way, more studies and interventions can be supported to improve the health conditions of maternal and child populations.

## REFERENCES

1. Soares MM, Juvanhol LL, Ribeiro AQ, Pereira PF, Franceschini SCC, Araújo RMA. Maternal overweight and its relation with child's anthropometric indices. Rev Bras Saude Mater Infant [Internet]. 2021 [cited 2022 jun 2];21:379–388. Available from: https://www.scielo.br/j/rbsmi/a/HB6zM8gvHYMq79n6FyXRhfF DOI: https://doi.org/10.1590/1806-93042021000200003

2. Abarca-Gómez L, Abdeen ZA, Hamid ZA, Abu-Rmeileh NM, Acosta-Cazares B, Acuin C, et al. Worldwide trends in body-mass index, underweight, overweight, and obesity from 1975 to 2016: a pooled analysis of 2416 population-based measurement studies in 128·9 million children, adolescents, and adults. Lancet [Internet]. 2017 [cited 2022 jun 2];390:2627–2642. Available from: https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(17)32129-3/fulltext DOI: http://dx.doi.org/10.1016/

3. Jaime PC, Prado RR do, Malta DC. Family influence on the consumption of sugary drinks by children under two years old. Rev Saúde Pública [Internet]. 2017 [cited 2022 jun 26];51:1s-10s. Available from: https://www.scielo.br/j/rsp/a/CcC7Pr5qWB8ZbLZwbsGLLxr/?lang=en DOI: https://doi.org/10.1590/S1518-8787.2017051000038

4. Scaglioni S, De Cosmi V, Ciappolino V, Parazzini F, Brambilla P, Agostoni C. Factors Influencing Children's Eating Behaviours. Nutrients [Internet]. 2018 [cited 2022 jun 15];10:706. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6024598/ DOI: 10.3390/nu10060706

5. Ayoama T, Li D, Bay JL. Weight gain and nutrition during Pregnancy: An Analysus of Clinical Practice Guidelines in the Asia-Pacific Region. Nutrients [Internet]. 2022 [cited 2024 mar 22]; 14(6):1288. Available from: Weight Gain and Nutrition during Pregnancy: An Analysis of Clinical Practice Guidelines in the Asia-Pacific Region - PMC (nih.gov). DOI 10.3390/nu14061288.

6. Baran J, Weres A, Czenczek-Lewandowska E, Leszczak J, Kalandyk-Osinko K, Luszczki E, Sobek G et al. Excessive Gestational Weight Gain: Long-Term Consequences for the Child. J Clin Med [Internet]. 2020 [cited 2024 22 mar]; 9(12): 3795. Available from: Excessive Gestational Weight Gain: Long-Term Consequences for the Child - PMC (nih.gov). DOI 10.3390/jcm9123795.

7. Ministério da Saúde, Secretaria de Atenção à Saúde, Departamento de Atenção Básica. Guia alimentar para crianças brasileiras menores de 2 anos [Internet]. Brasília: Ministério da Saúde; 2019 [cited 2022 jun 1]. 265 p. Available from:

https://www.gov.br/saude/pt-br/assuntos/saude-brasil/eu-quero-me-alimentar-melhor/Documentos/pdf/guia-alimentar-para-criancas-brasileiras-menores-de-2-anos.pdf/view

8. Flores TR, Neves RG, Wendt A, Costa C dos S, Bertoldi AD, Nunes BP. Padrões de consumo alimentar em crianças menores de dois anos no Brasil: Pesquisa Nacional de Saúde, 2013. Ciênc saúde coletiva [Internet]. 2021 [cited 2022 jun 20];26:625–36. Available from: https://www.scielo.br/j/csc/a/yncgKG9tqmNXbtR3xDT5pQq/?lang=pt DOI: https://doi.org/10.1590/1413-81232021262.13152020

9. Weerasekara PC, Withanachchi CR, Ginigaddara G a. S, Ploeger A. Understanding Dietary Diversity, Dietary Practices and Changes in Food Patterns in Marginalised Societies in Sri Lanka. Foods [Internet]. 2020 [cited 2022 jun 9];9:1659. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7696452/ DOI: 10.3390/foods9111659

10. Waswa LM, Jordan I, Krawinkel MB, Keding GB. Seasonal Variations in Dietary Diversity and Nutrient Intakes of Women and Their Children (6–23 Months) in Western Kenya. Frontiers in Nutrition [Internet]. 2021 [cited 2022 jun 8];8. Available from: https://www.frontiersin.org/articles/10.3389/fnut.2021.636872/full DOI: https://doi.org/10.3389/fnut.2021.636872

11. Brzozowska A, Podlecka D, Jankowska A, Król A, Kaleta D, Trafalska E, et al. Maternal diet during pregnancy and risk of allergic diseases in children up to 7–9 years old from Polish Mother and Child Cohort study. Environ Res [Internet]. 2022 [cited 2022 jun 13];208:112682. Available from: https://www.sciencedirect.com/science/article/abs/pii/S0013935122000093?via%3Dihub DOI: https://doi.org/10.1016/j.envres.2022.112682

12. Marshall NE, Abrams B, Barbour LA, Catalano P, Christian P, Friedman JE, et al. The importance of nutrition in pregnancy and lactation: lifelong consequences. Am J of Obstet Gynecol [Internet]. 2022 [cited 2022 jun 15];226:607–632. Available from: https://www.ajog.org/article/S0002-9378(21)02728-9/fulltext DOI: https://doi.org/10.1016/j.ajog.2021.12.035

13. Mendes KDS, Silveira RC de CP, Galvão CM. Revisão integrativa: método de pesquisa para a incorporação de evidências na saúde e na enfermagem. Texto & contexto enferm [Internet]. 2008 [cited 2022 jun 17];17:758–64. Available from: https://www.scielo.br/j/tce/a/XzFkq6tjWs4wHNqNjKJLkXQ/abstract/?lang=pt DOI: https://doi.org/10.1590/S0104-07072008000400018

14. Santos CM da C, Pimenta CA de M, Nobre MRC. The PICO strategy for the research question construction and evidence search. Rev Lat Am Enfermagem [Internet]. 2007 [cited 2022 jun 14];15:508–11. Available from: https://www.scielo.br/j/rlae/a/CfKNnz8mvSqVjZ37Z77pFsy DOI: https://doi.org/10.1590/S0104-11692007000300023

15. Brasil. Portaria no 1.130, de 5 de agosto de 2015 [Internet]. Portaria no 1.130, de 5 de agosto de 2015 [cited 2022 jun 23]. Available from: https://bvsms.saude.gov.br/bvs/saudelegis/gm/2015/prt1130_05_08_2015.html

16. Ursi ES, Gavão CM. Prevenção de lesões de pele no perioperatório: revisão integrativa da literatura. Rev. Latino-Am. Enfermagem [Internet]. 2006 [cited 2022 abr 3];14(1):124-131. Available from: https://www.scielo.br/j/rlae/a/7hS3VgZvTs49LNX9dd85VVb/abstract/?lang=pt DOI: https://doi.org/10.1590/S0104-11692006000100017

17. Melnyk BM, Fineout-Overholt E, Gallagher-Ford L, Stillwell SB. Evidence-Based Practice, Step by Step: Sustaining Evidence-Based Practice Through Organizational Policies and an Innovative Model. Am J Nurs. 2011;111:57–60. Available from: https://pubmed.ncbi.nlm.nih.gov/21865934/ DOI: https://doi.org/10.1097/01.naj.0000405063.97774.0e

18. Desalegn BB, Lambert C, Riedel S, Negese T, Biesalski HK. Feeding Practices and Undernutrition in 6–23-Month-Old Children of Orthodox Christian Mothers in Rural Tigray, Ethiopia: Longitudinal Study. Nutrients [Internet]. 2019 [cited 2022 mai 3];11:138. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6356195/ DOI: https://doi.org/10.3390%2Fnu11010138

19. Mahmudiono T, Sumarmi S, Rosenkranz RR. Household dietary diversity and child stunting in East Java, Indonesia. Asia Pac J Clin Nutr [Internet]. 2017 [cited 2022 abr 15];26:9. Available from: https://pubmed.ncbi.nlm.nih.gov/28244712/ DOI: https://doi.org/10.6133/apjcn.012016.01

20. Roba KT, O'Connor TP, Belachew T, O'Brien NM. Variations between post- and pre-harvest seasons in stunting, wasting, and Infant and Young Child Feeding (IYCF) practices among children 6-23 months of age in lowland and midland agro-ecological zones of rural Ethiopia. Pan Afr Med J [Internet]. 2016 [cited 2022 jun 8];24. Available from: https://pubmed.ncbi.nlm.nih.gov/27795761/ DOI: https://doi.org/10.11604/pamj.2016.24.163.9387

21. Reyes-López MA, González-Leyva CP, Rodríguez-Cano AM, Rodríguez-Hernández C, Colin-Ramírez E, Estrada-Gutierrez G, et al. Diet Quality Is Associated with a High Newborn Size and Reduction in the Risk of Low Birth Weight and Small for Gestational Age in a Group of Mexican Pregnant Women: An Observational Study. Nutrients [Internet]. 2021 [cited 2022 mai 22];13:1853. Available from: https://www.mdpi.com/2072-6643/13/6/1853 DOI: https://doi.org/10.3390/nu13061853

22. Fernandes CSN da N, Marques GF, Ferreira F, Festas C, Silva C. Revisão integrativa sobre instrumentos de avaliação de consumo alimentar em crianças em idade escolar. Cogit Enferm [Internet]. 2017 [cited 2022 jun 8];22. Available from: https://revistas.ufpr.br/cogitare/article/view/49875/pdf DOI: http://dx.doi.org/10.5380/ce.v22i4.49875

23. García-Chávez CG, Rodríguez-Ramírez S, Rivera JA, Monterrubio-Flores E, Tucker KL. Sociodemographic factors are associated with dietary patterns in Mexican schoolchildren. Public Health Nutr [Internet]. 2018 [cited 2022 jun 23];21:702–10. Available from: https://www.cambridge.org/core/journals/public-health-nutrition/article/sociodemographic-factors-are-associated-with-dietary-patterns-in-mexican-schoolchildren/0CEF1E4E153FE5C567F5D1B7F34D0AF7 DOI: https://doi.org/10.1017/S1368980017003299

24. Diddana TZ. Factors associated with dietary practice and nutritional status of pregnant women in Dessie town, northeastern Ethiopia: a community-based cross-sectional study. BMC Pregnancy Childbirth [Internet]. 2019 [cited 2022 jun15];19:517. Available from: https://bmcpregnancychildbirth.biomedcentral.com/articles/10.1186/s12884-019-2649-0 DOI: https://doi.org/10.1186/s12884-019-2649-0

25. Fernández-Gómez E, Luque-Vara T, Moya-Fernández PJ, López-Olivares M, Gallardo-Vigil MÁ, Enrique-Mirón C. Factors Influencing Dietary Patterns during Pregnancy in a Culturally Diverse Society. Nutrients [Internet]. 2020 [cited 2022 mai 30];12:3242. Available from: https://www.mdpi.com/2072-6643/12/11/3242/htm DOI: https://doi.org/10.3390/nu12113242

26. Ayenew HY, Biadgilign S, Schickramm L, Abate-Kassa G, Sauer J. Production diversification, dietary diversity and consumption seasonality: panel data evidence from Nigeria. BMC Public Health [Internet]. 2018 [cited 2022 mai 23];18:988. Available from: https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-018-5887-6 DOI: https://doi.org/10.1186/s12889-018-5887-6

27. World Health Organization. Healthy diet [Internet]. World Health Organization. [cited 2022 jun 9]. Available from: https://www.who.int/news-room/fact-sheets/detail/healthy-diet

28. Kristo AS, Sikalidis AK, Uzun A. Traditional Societal Practices Can Avert Poor Dietary Habits and Reduce Obesity Risk in Preschool Children of Mothers with Low Socioeconomic Status and Unemployment. Behav Sci (Basel) [Internet]. 2021 [cited 2022 mai 29];11:42. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8063956/ DOI: https://doi.org/10.3390%2Fbs11040042

29. Ramos DC, Coelho TCB. Representação social de mães sobre alimentação e uso de estimulantes do apetite em crianças: satisfação, normalidade e poder. Physis (Rio J.) [Internet]. 2017 [cited 2022 jun 20];27:233–54. Available from: https://www.scielo.br/j/physis/a/whbgNNjdhxy4y4hXsdhZyqp/?format=pdf&lang=pt DOI: http://dx.doi.org/10.1590/S0103-73312017000200004

30. Silva GAP, Costa KAO, Giugliani ERJ. Infant feeding: beyond the nutritional aspects. J Pediatr (Rio J) [Internet]. 2016 [cited 2022 jun 3];92:S2–7. Available from: https://www.scielo.br/j/jped/a/H8MdrRDbRRBRLMnNG85Q99Q/?format=pdf&lang=pt DOI: http://dx.doi.org/10.1016/j.jped.2016.02.006

31. Beluska-Turkan K, Korczak R, Hartell B, Moskal K, Maukonen J, Alexander DE, et al. Nutritional Gaps and Supplementation in the First 1000 Days. Nutrients [Internet]. 2019 [cited 2022 jun 2];11:2891. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6949907/ DOI: https://doi.org/10.3390%2Fnu11122891

32. Salavati N, Bakker MK, Lewis F, Vinke PC, Mubarik F, Erwich JHM, van der Beek EM. Associations between preconception macronutrient intake and birth weight across strata of maternal BMI. Plos One [Internet]. 2020 [cited 2024 mar 23]; 15(12). Available from: Associations between preconception macronutrient intake and birth weight across strata of maternal BMI - PMC (nih.gov). DOI 10.1371/journal.pone.0243200.

33. Marshall NE, Abrams B, Barbour LA, Catalano P, Christian P, Friedman JE, Hay Jr WW et al. The importance of nutrition in pregnancy and lactation: lifelong consequences. Am J Obstet Gynecol [Internet]. 2022 [cited 2024 mar 23]; 226(5):607-632. Available from: The importance of nutrition in pregnancy and lactation: lifelong consequences - PMC (nih.gov). DOI 10.1016/j.ajog.2021.12.035.

34. Aji AS, Lipoeto NI, Yusrawati Y, Malik SG, Kusmayanti NA, Susanto I, Majidah NM et al. Association between pre-pregnancy body mass index and gestational weight gain on pregnancy outcomes: a cohort in Indonesian pregnant women. BMC Pregnancy Childbirth [Internet]. 2022 [cited 2024 mar 24]; 22:492. Available from: Association between pre-pregnancy body mass index and gestational weight gain on pregnancy outcomes: a cohort study in Indonesian pregnant women - PMC (nih.gov). DOI 10.1186/s12884-022-04815-8.

Submitted: December 15, 2022

Accepted: February 21, 2025

Published: July 25, 2025

**MATERNAL FOOD DIVERSITY AND SEASONALITY AS CONDITIONS FOR CHILDREN'S NUTRITIONAL STATUS: AN INTEGRATIVE REVIEW**

| Author Contributions | |
|---|---|
| **Bianca Araujo Milbratz:** | Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Validation; Visualization; Writing – original draft; Writing – review & editing. |
| **Ana Clara da Cruz Della Torre:** | Formal analysis; Investigation; Writing – review & editing. |
| **Maysa Helena de Aguiar Toloni:** | Supervision; Writing – review & editing. |
| **Daniela Braga Lima:** | Project administration; Supervision; Writing – review & editing. |
| **All authors contributed the final version of the text.** | |
| **Funding:** | No Funding |
| **Conflict of interest:** | The authors declare that they have no conflict of interest. |
| **Corresponding author:** | Bianca Araujo Milbratz<br>Universidade Federal de Lavras<br>Campus Universitário, s/n, Aquenta Sol.<br>Lavras/MG, Brazil. Zip Code 37200-000.<br>biancaaraujomilbratz@gmail.com |
| **Editor:** | Giuseppe Potrick Stefani. PhD |
| **Editor-in-Chief:** | Adriane Cristina Bernat Kolankiewicz. PhD |