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Review Article

Ultra processed food consumption and childhood obesity in food-insecure settings: A systematic review

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Abstract

Background: Childhood obesity continues to rise globally among populations with food insecurity. Children's reliance on ultra-processed foods (UPFs) is driven by their high energy density, affordability, and widespread accessibility. This condition contributes to the emerging paradox of the coexistence of food insecurity and childhood obesity associated with UPF consumption.
Objective: This systematic review aims to systematically evaluate the association between ultra-processed food (UPF) consumption and the risk of obesity among children living in food-insecure settings.
Methods: A systematic literature review was conducted using four electronic databases: ScienceDirect, PubMed, Cochrane Library, and Europe PMC, covering publications from 2016 to 2026. It was conducted from 7th April to 10th April. A total of 109 articles were identified through the initial search process, and 10 studies that met the predefined PICO framework and inclusion criteria were included in the final synthesis. Risk of bias was assessed using appraisal tools appropriate to each study design.
Results: The included studies demonstrated that high consumption of ultra-processed foods (UPFs) was associated with an increased risk of overweight and obesity, poorer diet quality, and unhealthy feeding practices among children. Food insecurity was also linked to a greater likelihood of UPF consumption, lower dietary diversity, and reduced intake of fruits and vegetables.
Conclusion: UPF consumption contributes to the increasing prevalence of childhood obesity in food-insecure settings. Food insecurity promotes poor-quality dietary choices and dependence on inexpensive processed foods, highlighting the need for policies aimed at improving access to healthy foods and enhancing education regarding UPF consumption among vulnerable populations.

Background

Epidemiological transition has resulted in a dual burden of malnutrition characterized by the coexistence of undernutrition and overweight within the same populations, households, and even individuals, with prevalence significantly increasing in both high-income and low- and middle-income countries (LMICs) (Popkin et al., 2020). This paradox, in which food insecurity coexists with overweight and obesity, reflects the broader nutrition transition occurring across many populations. Childhood obesity has emerged as one of the most pressing global public health issues of the twenty-first century (WHO, 2023), as excess weight gain in early life is particularly consequential: early adiposity tracking increases the risk of obesity, cardiometabolic disease, and non-communicable disease morbidity in later life (Geserick et al., 2018). The intersection of childhood obesity and food insecurity therefore represents a critical and complex public health challenge that demands integrated evidence synthesis.

Food insecurity, defined as the limited or uncertain availability of, or ability to acquire, nutritionally adequate and safe food in socially acceptable ways, it affects approximately 2.4 billion people globally and disproportionately impacts young children in resource-constrained environments. It is associated with poor diet quality, micronutrient inadequacy, growth faltering, and paradoxically, excessive weight gain (FAO et al., 2023). In food-insecure households, ultra-processed foods (UPFs) are often disproportionately accessible due to their low unit cost, extended shelf life, ready-to-eat convenience, and widespread availability in informal food retail environments, making them a structurally driven dietary risk factor that is particularly relevant in resource-limited settings.

UPFs are characterised by the inclusion of food substances extracted from whole foods (e.g., fats, starches, sugars, proteins) or synthesised

from food constituents (e.g., hydrogenated fats, modified starches), combined with additives such as flavours, colours, emulsifiers, and preservatives (Monteiro et al., 2019). Examples include sugar-sweetened beverages, packaged snacks, instant noodles, reconstituted meat products, and industrially produced bread and confectionery. Multiple biological mechanisms have been proposed through which UPF consumption drives obesity risk in children. First, UPFs are typically energy-dense, nutrient-poor, and deficient in dietary fibre, which impairs satiety signalling and promotes overconsumption through hyperpalatable formulation designed to override physiological hunger regulation (Hall et al., 2019). Second, their high glycaemic load promotes postprandial insulin spikes, lipogenesis, and adiposity through hormonal dysregulation involving insulin, leptin, and ghrelin (Fiolet et al., 2018). Third, additives such as emulsifiers, artificial sweeteners, and preservatives disrupt gut microbiota composition, increase intestinal permeability, and promote low-grade systemic inflammation, all mechanistically linked to metabolic dysfunction and excess weight gain (Lindseth, 2018). Fourth, the displacement of whole and minimally processed foods by UPFs reduces overall dietary quality, contributing to micronutrient deficiency alongside excess energy intake, a profile commonly observed in food-insecure children (Neri et al., 2022).

Despite growing evidence across these domains, a critical research gap persists: the relationship between UPF consumption, food insecurity, and childhood obesity remains fragmented across three largely disconnected bodies of literature, and no systematic synthesis has integrated them within a unified analytical framework. Studies on UPF consumption and childhood obesity have largely operated in isolation from food insecurity as a structural determinant. De Amicis et al. (2022) found that evidence linking UPF intake to obesity and adiposity parameters in children was limited and heterogeneous, with longitudinal studies yielding positive associations but most cross-sectional studies reporting null findings — inconsistency attributed to variability in dietary assessment tools, age group definitions, and outcome operationalisation, rather than to socioeconomic or food access contexts. Similarly, Robles et al. (2024) confirmed inconclusive evidence from 23 studies on UPF and excess adiposity in children and adolescents, identifying methodological heterogeneity as the primary explanatory factor. Research on food insecurity and childhood obesity has demonstrated a co-occurrence, yet the role of UPF as a mediating dietary pathway remains poorly specified. St Pierre et al. (2022) concluded that food insecurity and childhood obesity frequently co-occur among low-income children, but emphasised that the mechanisms through which food insecurity drives weight gain — including the dietary quality pathway — remain critically underexplored. Likewise, Moradi et al. (2021) confirmed that food insecurity significantly increases the risk of overweight and obesity in children and adolescents, yet did not distinguish UPF reliance as the specific dietary mechanism. While Leung et al. (2022) demonstrated a direct association between food insecurity and higher UPF consumption, this three-way relationship has not been systematically examined in the context of childhood obesity outcomes, particularly in children under five years of age and in LMICs where dietary transitions are most dynamic. Collectively, these limitations — domain fragmentation, absence of integrated pathway modelling, narrow geographic and age-group focus, and failure to account for the food environment as a structural variable — constrain the capacity of existing reviews to inform public health policy that simultaneously addresses food access and dietary quality.

This systematic review was therefore conducted to address these gaps by synthesizing available evidence on the three-way relationship between food insecurity, ultra-processed food consumption, and childhood obesity, with explicit attention to the dietary pathways through which food insecurity may drive excess adiposity in children, including feeding practices, dietary quality, and early-life nutrition. By integrating evidence across these domains within a unified analytical framework, this review aims to provide a more comprehensive evidence base to support the development of multi-component public health interventions that simultaneously address food access and diet quality in vulnerable child populations.

Methods

Study Design

This study used a systematic literature review design to identify, appraise, and synthesise studies examining ultra-processed food consumption, food insecurity, and childhood obesity or related nutritional outcomes.

Research Question

The research question was structured using the PECO framework (Population, Exposure, Comparator/Context, Outcome) to ensure systematic and transparent eligibility decisions throughout the review process. Table 1 showed PICO framework.

Table 1. PICO Framework

PECO Element	Definition
P (Population)	Children under 5 years of age, including mother–child dyads where child nutritional outcomes were reported, residing in settings characterised by food insecurity or limited access to nutritious food
E (Exposure)	Consumption of ultra-processed foods (UPFs), as defined by the NOVA classification system (Group 4), including unhealthy dietary patterns, energy-dense feeding practices, and high reliance on industrially formulated food products
C (Comparator / Context)	Households or settings experiencing food insecurity, low dietary diversity, or constrained access to nutritious food, compared to food-secure or higher dietary diversity contexts; contextual evidence from community-level or national nutrition transition analyses was also considered
O (Outcome)	Childhood overweight, obesity, or excess adiposity; poor dietary quality; stunting or wasting; unhealthy feeding practices; and related anthropometric or metabolic outcomes in children under 5 years of age

Based on this framework, the review was guided by the following research question: Among children under 5 years of age living in food-insecure settings (P), is consumption of ultra-processed foods (E), compared to lower UPF intake or food-secure contexts (C), associated with increased risk of overweight, obesity, poor dietary quality, or related nutritional outcomes (O)?

Inclusion and Exclusion Criteria

Studies were eligible for inclusion, they are : 1). required to examine children under 5 years of age, including mother–child dyads in cases where child nutritional outcomes were the primary reported endpoint. 2). required to have assessed ultra-processed food (UPF) consumption, unhealthy dietary patterns, infant and young child feeding practices, or household food insecurity as a primary or secondary exposure variable. 3). reported at least one of the following outcomes: childhood overweight, obesity, or excess adiposity; malnutrition or stunting; poor dietary quality; or related anthropometric or metabolic outcomes in children under 5 years of age. 4). required to have employed a recognised quantitative, qualitative, repeated cross-sectional, prospective or retrospective cohort, or intervention study design. 5) only studies published in English. Some studies are excluded because only provided abstracts / proceedings, reviews, or protocols, it did not provide sufficient outcome data relevant to the review question, it Focused exclusively on adults without child nutrition implications.

Search Strategy

The literature search was performed in four databases using combinations of keywords and Bolen related to child obesity, food insecurity, and ultra-processed foods. The data search was conducted in stages over a period of nearly one week, from 7th April to 10th April. The following search structure was used and adapted for each database:

Core search terms with “ultra-processed food” OR “ultra processed food” OR UPF OR “processed food”, AND child OR children OR

preschool* OR infant OR adolescent AND obesity OR overweight OR "body mass index" OR BMI OR adiposity OR malnutrition AND "food insecurity" OR "food insecure" OR "low food security" OR "household food insecurity"

Study Selection Process

Records identified through database searching were combined and screened for eligibility. A total of 109 records were identified from four databases (ScienceDirect: 33, PubMed: 10, Cochrane: 1, Europe PMC: 65) covering the period from 2016 to 2026.

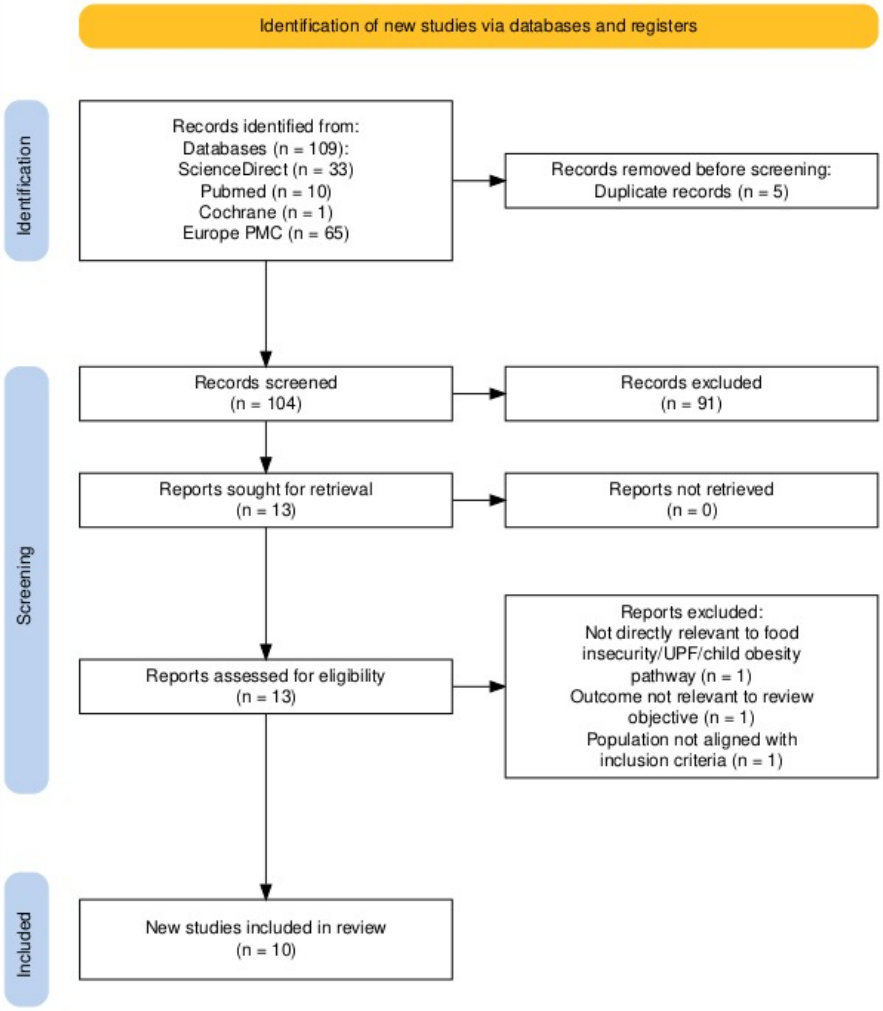

Figure 1. PRISMA 2020 flow diagram for the study selection process

The screening and selection processes were conducted independently by six reviewers to minimize the risk of selection bias. Duplicate records were removed prior to screening. Subsequently, 104 records were screened based on title and abstract according to the predefined eligibility criteria. Each article was assessed independently by the reviewers to ensure consistency and methodological throughout the selection process.

All reviewers discussed the screening results collectively, and no major conflicts or disagreements occurred during the study selection process. Thirteen articles proceeded to full-text assessment, which was also conducted independently using the same eligibility criteria. Following full-text review, 10 studies were included in the final narrative synthesis.

Quality Appraisal

Risk of bias was assessed using design-appropriate appraisal tools selected according to the methodological design of each included study. For analytical cross-sectional studies, the JBI Critical Appraisal Checklist for Analytical Cross-Sectional Studies was applied. Qualitative studies were appraised using the JBI Checklist

for Qualitative Studies, while quasi-experimental studies were evaluated using the JBI Checklist for Quasi-Experimental Studies. For studies employing a cohort-type follow-up design, a modified version of the Newcastle-Ottawa Scale was applied.

Table 2. Risk of bias assessment of included studies

Study	Design	Appraisal tool	Key concerns	Overall judgement
Farias DR et al.	Cross-sectional	JBI Cross-Sectional	Single-day dietary recall; cross-sectional temporality	Moderate
Adams EL et al.	Cross-sectional	JBI Cross-Sectional	Convenience sampling; retrospective self-report; unvalidated home food environment items	Moderate-High
Lee H et al.	Qualitative	JBI Qualitative	Small purposive sample; limited transferability	Moderate-High
Drengler A et al.	Secondary cohort/follow-up analysis	Newcastle-Ottawa adapted	Self-reported program participation; residual confounding	Moderate
Kranjac AW et al.	Repeated cross-sectional	JBI/analytical relevance appraisal	Cross-sectional nature; missing confounders in some NHANES waves	Moderate
Castro IRR et al.	Repeated cross-sectional	JBI/analytical relevance appraisal	Different biomarker methods between surveys; temporal comparability issues	Moderate
Faienza MF et al.	Cross-sectional pilot	JBI Cross-Sectional	Small sample; pilot nature; dietary misclassification possible	Moderate-High
Sousa JM et al.	Cross-sectional	JBI Cross-Sectional	Small sample; post hoc power limitations	Moderate
Salazar G et al.	Quasi-experimental	JBI Quasi-Experimental	No full randomised individual allocation; short follow-up	Moderate
Castro Mello JV et al.	Cross-sectional	JBI Cross-Sectional	Self-reported intake; no causal inference	Moderate

Data Extraction and Synthesis

Data extraction was performed independently by reviewers using a pre-designed structured extraction form. The form was developed prior to extraction and piloted on studies to ensure consistency and completeness before full application. For each included study, the following information was extracted: author(s), country, publication year, study objective, study design, sample size, outcome measures, points of measurement, main results, effect size or measure of association, confounders adjusted for, study limitations, and risk of bias judgement. Following independent extraction by each reviewer, the completed forms were cross-checked to identify any discrepancies in extracted data. Disagreements were resolved through discussion and consensus between six reviewers; where agreement could not be reached, a third reviewer was consulted. Findings were synthesised narratively due to substantial heterogeneity in study designs, exposure definitions, outcome measures, and population characteristics, which precluded quantitative pooling through meta-analysis

Results

A total of 109 records were identified from four databases (ScienceDirect: 33, PubMed: 10, Cochrane: 1, Europe PMC: 65) covering the period 2016 to 2026. Following deduplication, five duplicate records were removed, yielding 104 unique records for title and abstract screening. Of these, 91 records were excluded at the title and abstract stage because they did not meet the predefined eligibility criteria, including studies that focused exclusively on adult populations without child nutrition outcomes, studies that examined dietary patterns unrelated to ultra-processed food consumption or food insecurity, and studies that were not primary research (e.g. editorials, commentaries, conference abstracts, and narrative reviews). The remaining 13 records

proceeded to full-text assessment. At this stage, three articles were excluded because the study populations did not meet the age criterion — specifically, the studies examined children aged five years or older and did not include children under five years of age as a distinct subgroup with separately reported outcomes. The remaining 10 studies met all eligibility criteria and were included in the final narrative synthesis.

Ultra-Processed Food Consumption and Childhood Obesity

Three studies directly examined the association between UPF consumption and obesity-related outcomes in young children. Farias et al. (2025), using data from the Brazilian National Survey on Child Nutrition (ENANI-2019) with a nationally representative sample of 11,789 children aged 6–59 months, found that higher UPF intake was associated with increased odds of overweight (OR approximately 1.7–1.8), after adjusting for child age, maternal BMI, socioeconomic status, and dietary diversity. The prevalence of overweight in the sample was 9.5%, while wasting was 2.6%, indicating the coexistence of both forms of malnutrition. Faienza et al. (2025), in a cross-sectional pilot study of 41 children in Italy, reported that children diagnosed with Metabolic Dysfunction-Associated Steatotic Liver Disease (MASLD) had significantly higher fructose intake and greater consumption of foods rich in saturated fats compared to those without MASLD ($p < 0.01$), underscoring the metabolic consequences of unhealthy food consumption beyond weight status alone. Kranjac et al. (2024), using age-period-cohort modelling of U.S. national data (NHANES, n = 6,234 children aged 2–5 years), found that rising BMI z-score trends were driven primarily by period effects rather than cohort effects, with not being breastfed ($\beta = 0.12$) and Hispanic ethnicity ($\beta = 0.16$) as significant predictors. Together, these findings support the interpretation that UPF intake is a meaningful contributor to childhood overweight and related metabolic risks, and that the wider food environment plays a determining role in shaping obesity trends over time.

Food Insecurity and Diet Quality

Two studies addressed the relationship between food insecurity and dietary quality in children under five. Castro Mello et al. (2025), analysing data from the Brazilian National Survey on Child Nutrition (ENANI-2019, n = 14,558), found that severe household food insecurity was independently associated with significantly lower odds of achieving minimum dietary diversity (OR 0.40) and more than double the odds of zero fruit or vegetable intake (OR 2.48), after adjusting for income, education, region, housing conditions, and household crowding. These findings indicate that food insecurity functions as a structural determinant of poor dietary quality, limiting access to diverse, nutritious foods and increasing children's dependence on monotonous, calorie-dense diets. Drengler et al. (2025), in a secondary cohort analysis of a randomised controlled trial involving 582 low-income preschool children in the United States, found that UPF intake exceeded 60% of total caloric intake across the sample. Notably, UPF consumption did not differ significantly by participation in nutrition assistance programmes (SNAP/WIC; Wald $\chi^2 = 12.52$, $p = 0.4$), suggesting that food assistance alone was insufficient to reduce children's exposure to ultra-processed foods. Taken together, these findings indicate that food insecurity compromises dietary quality through both reduced food diversity and a structural tendency toward low-cost, energy-dense UPF options.

Table 3. Summary of Data Extraction from Included Articles

Author (Year)	Country	Year	Study Design	Sample Size (n)	Outcome Measures	Main Results	Effect Size	Confounders	Limitations	Appraisal Tool	Appraisal Score / Checklist Summary	Risk of Bias
Farias DR et al.	Brazil	2025	Cross-sectional (ENANI-2019 secondary analysis)	11,789	Wasting; overweight; BMI/WHZ	Overweight prevalence 9.5%; wasting 2.6%. Higher UPF intake associated with increased odds of overweight.	OR ~1.7-1.8 for overweight with higher UPF intake	Child age; maternal BMI; SES; dietary diversity	Single-day recall; cross-sectional design; limited causal inference	JBI Cross-Sectional	7/8 (met: clear objective, valid exposure/outcome measures, appropriate analysis, adequate sample, confounders identified; not met: single recall day limits reproducibility)	Moderate
Adams EL et al.	United States	2020	Cross-sectional observational	584	Food security; home food environment; parent feeding practices	Very low food security increased during COVID-19 with greater processed food availability and controlling feeding in food-insecure households.	Significant increase in concern about overweight and pressure to eat among food-insecure households	Household income; parental stress; employment; food access	Convenience sample; recall bias; self-report measures	JBI Cross-Sectional	5/8 (met: clear objective, relevant exposure and outcome; not met: convenience sampling, retrospective self-report, unvalidated home food environment items, no adjustment for key confounders)	Moderate-High
Lee H et al.	United States	2023	Qualitative study	11 families	Processed food consumption; food insecurity; screen time; sedentary behavior	Parents reported increased processed food intake, child screen time, and difficulty affording healthy foods.	Not applicable	Household income; food insecurity; employment changes; family structure	Small purposive sample; limited transferability	JBI Qualitative	6/10 (met: congruity of methodology, clear research question, participant selection, data collection; not met: small sample, limited reflexivity, transferability not established, no member checking reported)	Moderate-High
Drengler A et al.	United States	2025	Secondary cohort analysis of RCT	582	% calories from UPFs; food insecurity; SNAP/WIC participation	UPF intake exceeded 60% of total calories; did not significantly	Wald x2 = 12.52, p = 0.4	Child age; sex; BMI z-score; parent education; food security	Recall bias; self-reported program participation; residual confounding	Newcastle-Ottawa Scale (adapted)	6/9 (stars: representativeness of cohort +, ascertainment of exposure +, outcome	Moderate

Author (Year)	Country	Year	Study Design	Sample Size (n)	Outcome Measures	Main Results	Effect Size	Confounders	Limitations	Appraisal Tool	Appraisal Score / Checklist Summary	Risk of Bias
						differ by SNAP/WIC participation status.					assessment +; deducted: self-reported SNAP/WIC participation, short follow-up per recall window, residual confounding possible)	
Kranjac AW et al.	United States	2024	Repeated cross-sectional (age-period-cohort modelling)	6,234	BMI z-score; obesity trends	BMI trends driven primarily by period effects. Hispanic ethnicity, high birthweight, and not breastfeeding were significant predictors.	Hispanic ethnicity b=0.16; birthweight >=9 lbs b=0.27; not breastfed b=0.12	Sex; race/ethnicity; maternal age; smoking in pregnancy; income	Cross-sectional design; missing confounders in some NHANES waves; residual confounding	JBI/Analytical Relevance Appraisal	Adequate (clear research question, appropriate use of NHANES data, advanced modelling; limitations acknowledged; cross-sectional temporality limits causal inference)	Moderate
Castro IRR et al.	Brazil	2023	Repeated cross-sectional (national surveys)	4,817 (2006); 14,558 (2019)	Anemia; stunting; excessive weight; dietary diversity; UPF consumption	Excessive weight increased from 6.0% to 10.1%. In 2019, 88.8% consumed UPFs; 25.7% did not consume fruits or vegetables.	Excessive weight increased ~68% from 2006 to 2019	Region; maternal education; maternal race; sanitation; income transfer	Cross-sectional surveys; missing values; different biomarker methods across waves	JBI/Analytical Relevance Appraisal	Adequate (nationally representative data, transparent methods, appropriate trend analysis; limited by methodological differences between survey waves and cross-sectional design)	Moderate
Faienza MF et al.	Italy	2025	Cross-sectional pilot study	41	Fructose intake; unhealthy food consumption; MASLD; insulin resistance	Children with MASLD had significantly higher fructose intake and more unhealthy food rich in saturated fats.	MASLD group: significantly higher fructose intake ($p < 0.01$)	Age; pubertal status; visceral adiposity; insulin resistance	Small sample; pilot design; dietary misreporting possible	JBI Cross-Sectional	5/8 (met: clear objective, valid diagnostic criteria, standardised measures, appropriate comparison; not met: very small pilot sample, no population-based sampling, dietary	Moderate-High

Author (Year)	Country	Year	Study Design	Sample Size (n)	Outcome Measures	Main Results	Effect Size	Confounders	Limitations	Appraisal Tool	Appraisal Score / Checklist Summary	Risk of Bias
											misclassification risk)	
Sousa JM et al.	Brazil	2025	Cross-sectional study	111 mother-child pairs	Maternal UPF intake; infant feeding practices; stunting; overweight; wasting	High maternal UPF intake associated with malnutrition by BMI-for-age and stunting in breastfed infants.	OR 3.38 for BMI-for-age malnutrition; OR 3.89 for stunting	Maternal age; SES; breastfeeding; infant age	Small sample; cross-sectional design; low post hoc power	JBI Cross-Sectional	6/8 (met: clear objective, valid exposure and outcome measures, confounders identified, appropriate analysis; not met: small sample limits power, cross-sectional temporality)	Moderate
Salazar G et al.	Chile	2025	Quasi-experimental intervention study	1,204	Weight-for-height z-score; body fat; physical activity; dietary and UPF intake	Intervention improved anthropometric indicators, physical activity, fruit and vegetable intake, and reduced UPF intake.	Significant improvements in weight-for-height z-scores and body fat percentage	SES; region; parental engagement; daycare attendance	Short follow-up; quasi-experimental design; attrition bias possible	JBI Quasi-Experimental	6/9 (met: clear cause-and-effect, pre/post measurement, comparable groups, complete outcome data; not met: no individual randomisation, short follow-up, attrition not fully reported)	Moderate
Castro Mello JV et al.	Brazil	2025	Cross-sectional national survey analysis	14,558	Food insecurity; minimum dietary diversity; fruit/vegetable consumption; UPF intake	Severe food insecurity associated with lower dietary diversity and higher odds of zero fruit/vegetable intake.	OR 0.40 for minimum dietary diversity; OR 2.48 for zero fruit/vegetable intake	Income; education; region; housing conditions; crowding	Cross-sectional design; self-reported food intake	JBI Cross-Sectional	7/8 (met: clear objective, representative sample, valid exposure and outcome, confounders controlled, appropriate analysis; not met: self-reported dietary intake limits precision)	Moderate

Feeding Practices in Food-Insecure Settings

Three studies examined feeding practices in the context of food insecurity and dietary vulnerability. Adams et al. (2020), in a cross-sectional study of 584 households in the United States during the COVID-19 pandemic, found that very low food security was associated with greater availability of processed foods in the home environment and more controlling feeding practices, including increased concern about child overweight and pressure to eat among food-insecure caregivers. These patterns suggest that food insecurity shapes not only what children eat, but also how caregivers respond to children's eating behaviours in ways that may increase obesity risk. Lee et al. (2023), in a qualitative study of 11 low-income families with young children in the post-COVID-19 era, documented parental reports of increased processed food intake, heightened child screen time, and difficulty affording healthy foods, illustrating the practical constraints that food insecurity places on caregivers' ability to maintain healthy feeding environments. Sousa et al. (2025), in a cross-sectional study of 111 mother-child pairs in Brazil, found that high maternal UPF consumption was associated with significantly elevated odds of malnutrition by BMI-for-age (OR 3.38) and stunting (OR 3.89) in breastfed infants, after adjusting for maternal age, socioeconomic status, breastfeeding status, and infant age. This finding highlights that caregiver diet quality during lactation may directly influence infant growth trajectories, suggesting that household feeding environments exert early-life effects on child nutritional outcomes.

Nutrition Transition and Temporal Trends

Two studies provided longitudinal and contextual evidence on the nutrition transition and its relationship to UPF consumption trends in children. Castro IRR et al. (2023), using repeated cross-sectional data from two Brazilian national surveys (2006 and 2019; n = 4,817 and 14,558, respectively), documented a substantial increase in excessive weight prevalence among children under five years from 6.0% in 2006 to 10.1% in 2019, representing a relative increase of approximately 68% over 13 years. In parallel, the 2019 survey recorded that 88.8% of children consumed UPFs and 25.7% consumed no fruits or vegetables on the day of dietary assessment, underscoring the widespread penetration of ultra-processed foods into young children's diets during the period of rapid nutrition transition. These trends occurred alongside persistent disparities in anaemia and stunting, confirming the double burden of malnutrition. Kranjac et al. (2024) similarly found that BMI z-score increases among U.S. preschoolers between 2005 and 2018 were driven primarily by period-level effects, suggesting that environmental and structural changes in the food system — rather than individual or cohort characteristics — are the primary driver of increasing childhood obesity over time. These contextual studies situate individual dietary exposures within a broader pattern of population-level dietary shift, reinforcing the view that structural determinants of food environments must be addressed alongside individual dietary interventions.

Intervention Evidence

One study provided direct intervention evidence on the modifiability of UPF-related obesity risk in early childhood. Salazar et al. (2025), in a quasi-experimental study involving 1,204 preschool children across daycare centres in Chile, evaluated the effect of a community-based multicomponent programme incorporating physical activity, nutrition education, family engagement, and institutional dietary changes. The intervention resulted in significant improvements in weight-for-height z-scores and body fat percentage, alongside increased fruit and vegetable intake and reduced UPF consumption among participating children. Although the study did not focus specifically on food-insecure populations, its findings demonstrate that UPF intake and associated obesity risk are amenable to change through structured community-level intervention. The quasi-experimental design without individual randomisation and the relatively short follow-up period limit the strength of causal inference, but the consistency of improvements across multiple outcomes

strengthens the plausibility of effect. This study provides the only direct intervention evidence in the current review and suggests that integrated, context-sensitive approaches involving families, educators, and institutional food environments hold potential for reducing UPF exposure and improving nutritional outcomes in young children.

Discussion

This review indicates that ultra-processed food consumption is consistently linked with poorer child nutrition profiles and obesity-related outcomes in settings marked by food insecurity or dietary vulnerability. Although not all included studies examined the full pathway directly, the evidence converges on a common pattern: households facing constrained food access often rely on low-cost, energy-dense foods, while children exposed to poor dietary quality show higher risks of overweight, obesity, or related malnutrition outcomes (Farias et al., 2025; Castro Mello et al., 2025; Adams et al., 2020; Sousa et al., 2025).

The Brazilian national studies were particularly important in clarifying the context of the review question. Farias et al. showed that high UPF intake was directly associated with overweight among children aged 6–59 months, with overweight prevalence reaching 9.5% in a nationally representative sample of 11,789 children (Farias et al., 2025). Castro Mello et al. further demonstrated that severe household food insecurity was associated with significantly lower odds of minimum dietary diversity (OR 0.40) and more than double the odds of zero fruit or vegetable intake (OR 2.48) in young children (Castro Mello et al., 2025). Together, these findings support the idea that food insecurity may shape obesogenic dietary patterns through reduced access to healthier food options (Farias et al., 2025; Castro Mello et al., 2025).

The review also identified early-life and family-level mechanisms that may contribute to later obesity risk. Adams et al. documented that food insecurity during COVID-19 was accompanied by worsening home food environments and more controlling feeding practices, including increased concern about child overweight and pressure to eat in food-insecure households (Adams et al., 2020). Lee et al. similarly reported that low-income parents in the post-COVID-19 era described increased processed food intake, heightened screen time, and difficulty affording healthier options as key barriers to adequate nutrition (Lee et al., 2023). Sousa et al. showed that high maternal UPF consumption was associated with significantly elevated odds of malnutrition by BMI-for-age (OR 3.38) and stunting (OR 3.89) in breastfed infants, suggesting that household diet quality during lactation may influence growth trajectories early in life (Sousa et al., 2025).

Contextual studies added important insight into the broader nutrition transition. Castro IRR et al. found a marked increase in excessive weight among Brazilian children under five years, rising from 6.0% in 2006 to 10.1% in 2019, alongside a very high prevalence of UPF consumption (88.8%) and near-absent fruit and vegetable intake (25.7% consuming none) in 2019 (Castro et al., 2023). Kranjac et al. similarly showed that rising BMI trends among U.S. preschoolers between 2005 and 2018 were driven more by period effects than by cohort effects, reinforcing the role of the wider obesogenic environment rather than individual or generational factors (Kranjac et al., 2024). These findings align with the interpretation that structural and environmental changes, rather than only individual behaviour, are central to the current rise in childhood obesity (Castro et al., 2023; Kranjac et al., 2024).

Intervention evidence from Chile suggested that community-based approaches may improve both diet and activity patterns in preschool children, including reductions in ultra-processed food intake. Salazar et al. evaluated a multicomponent programme across 1,204 preschoolers in Chilean daycare centres and reported significant improvements in weight-for-height z-scores, body fat percentage, fruit and vegetable intake, and reduced UPF consumption (Salazar et al., 2025). Although this study did not focus specifically on food insecurity, it provides practical evidence that obesity-related risk can be modified through multicomponent interventions involving

families, educators, and institutions (Salazar et al., 2025).

Recent evidence from Indonesian nursing and public health literature also supports the importance of family and socioeconomic determinants in shaping early childhood feeding behaviour. Haryanti and Yuriah (2025) reported that parental socioeconomic status, knowledge, culture, education, income, and occupation were significantly associated with early complementary feeding practices among infants aged 6–12 months, highlighting the important role of household and sociocultural factors in shaping children's dietary exposure and feeding patterns. Similarly, Putri and Zahra (2025) emphasized that socioeconomic status and maternal education may moderate child nutritional and developmental outcomes, reinforcing the broader importance of early-life nutrition and caregiver practices in child health trajectories. These findings strengthen the interpretation that unhealthy dietary patterns and obesity-related risks in children are influenced not only by individual food choices, but also by broader family, educational, and socioeconomic determinants that shape feeding behavior from early childhood.

Several limitations should be considered. The included studies were heterogeneous in populations, exposures, outcomes, and designs, which precluded meta-analysis. Many studies relied on cross-sectional data and self-reported dietary measures susceptible to recall bias and limited ability to establish causality (Farias et al., 2025; Adams et al., 2020; Sousa et al., 2025; Castro Mello et al., 2025). Some studies provided indirect or contextual evidence rather than direct testing of the full food insecurity–UPF–obesity pathway (Castro et al., 2023; Kranjac et al., 2024). Studies with smaller samples also limit generalisability (Lee et al., 2023; Faienza et al., 2025). Nevertheless, the consistency of the overall pattern strengthens the interpretation that ultra-processed food consumption is an important contributor to childhood obesity in vulnerable settings (Farias et al., 2025; Castro Mello et al., 2025; Castro et al., 2023).

Conclusion and Recommendation

This systematic review concluded that ultra-processed food (UPF) consumption is strongly associated with poor dietary quality and increased obesity among children in food insecurity settings. The included studies consistently demonstrated that food insecurity contributes to greater reliance on inexpensive, energy-dense, and nutritionally poor foods, while simultaneously limiting access to healthier dietary options such as fruits and vegetables. These conditions create an obesogenic environment that increases the risk of over nutrition in children. It also influenced not only by individual dietary choices, but also by broader structural, socioeconomic, and family-related factors, including household income, parental feeding practices, maternal diet quality, education, and the wider food environment. Multicomponent community-based strategies involving families, schools, and institutions may help improve dietary behaviours and reduce UPF consumption among children.

Despite methodological limitations and heterogeneity across studies, the systematic reviews supports the conclusion that UPF consumption is an important contributor to childhood obesity in food insecurity setting. Therefore, comprehensive public health policies plays an important rules to improve access to affordable healthy foods, strengthen nutrition education, and reduce dependence on ultra-processed foods in food-insecure communities.

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Declaration on the Use of AI
In conducting this Systematic Literature Review, the author utilized artificial intelligence (AI) technology to support the writing process, including identifying research gaps, conducting literature searches, drafting sentences,

correcting grammar, and editing the manuscript. However, all ideas, analyses, literature syntheses, and conclusions were developed entirely by the author and remain the author's responsibility.

Data Availability Statement

Data sharing is not applicable to this article.

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