Conceptual framework of women's food environments and determinants of food acquisition and dietary intake in low- and middle-income countries: a scoping review

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Women in low-income and middle-income countries (LMICs) are disproportionately affected by malnutrition in all its forms. Diets link human health and environmental sustainability; however, existing food environment frameworks rarely consider the unique needs of women that can differ due to sociocultural norms and lower social status, potentially reducing the effectiveness of nutrition initiatives. We conducted a systematic scoping review of peer-reviewed literature published in English, Spanish, Portuguese, and French to identify determinants of food acquisition and dietary intake of women in LMICs. By synthesising evidence from 518 studies across 125 countries, we identified 143 eco-social, structural, and individual-level determinants to develop an empirically grounded food environment conceptual framework for women. Women's agency—encompassing decision making and financial autonomy, bargaining power, control over time, and freedom of movement—emerged as a prominent mediator of food acquisition practices and dietary intakes across diverse regions and the rural–urban continuum. Our findings highlight the importance of addressing legislative, structural, and sociocultural determinants mediating women's agency, alongside other key external and individual-level food environment determinants influencing procurement and consumption of nutritious diets. This empirically grounded conceptual framework can guide research priorities and analytical approaches and identify intervention points for policies and programmes to optimise women's nutrition.

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Introduction

Transformative change within food systems remains poorly supported by robust evidence to support human and planetary health,[1] especially for the most vulnerable populations[2,3] in low-resource contexts.[4–8] Rapidly evolving food environments are associated with malnutrition in all its forms,[9,10] including persistent micronutrient deficiencies,[11] and increasing prevalence of diet-related non-communicable diseases.[9,12] The *Lancet* series on malnutrition, sustainable food systems, social equity, and maternal nutrition and health highlights a long-standing emphasis on biomedical approaches. In contrast, rights-based[13] and preventive food-based approaches,[10] particularly those addressing the broader eco-social determinants of health,[1,14] especially for women,[15] have been overlooked. Effective responses demand dual-purpose actions to address the root causes of malnutrition in all its forms through cost-effective systems-based solutions.[16] These approaches should tackle unsustainable food systems and dietary practices,[1] persistent gender disparities,[2] and the intensifying climate change and malnutrition crises.[14]

Women of reproductive age in low-income and middle-income countries (LMICs) experience a disproportionate burden of malnutrition compared with men,[14,17] driven by both heightened nutritional needs and gender inequality.[18–21] Globally, over two-thirds of women have insufficient access to healthy diets, with 1·2 billion experiencing one or more micronutrient deficiencies.[11] Less than 20% of pregnant women in Guatemala, India, Pakistan, and the Democratic Republic of the Congo achieved the recommended nutrient intakes for folate, vitamin B12, and choline, with inadequacies of calcium and other B vitamins also high.[22] Despite ambitious global targets, crises such as pandemics, climate extremes, conflict, and economic downturns contribute to growing inequalities, perpetuating and deepening food insecurity and malnutrition of women.[17] No LMIC is on track to meet the Sustainable Development Goals for maternal nutrition.[17]

Food environments—the setting in which individuals acquire food from the wider food system—offer a key entry point to improve nutrition.[3] Multiple conceptual frameworks for food environments have been developed[4–6,23–25] ranging from the globally applicable[5,23] to those for specific contexts[6,24,25] and populations.[4] However, most existing frameworks are not gender-sensitive, risking the effectiveness of nutrition initiatives.[16,26–28] Therefore, the need to consider the interaction of influences across multiple levels and determinants of the external (national, regional, community, institutional) and personal (social, household, individual) food environment dimensions is gaining recognition.[4,6,23,25] Additionally, incorporating food security elements,[23] including newly emphasised pillars, such as agency and sustainability,[13] has become increasingly important. Most empirical research applying food environment frameworks has predominantly focused on urban markets in high-income and middle-income countries.[6–8,14,25] However, food environments in low-income countries and rural or periurban areas remain poorly understood, despite the intensifying double burden of malnutrition and scarcity of health resources.[9]

In this Review, we aimed to develop the first empirically grounded food environment conceptual framework for women in LMICs using a systematic scoping review to identify determinants of food acquisition and dietary intake. By mapping key determinants, this framework is intended to inform effective actions to improve women's nutrition, health, and wellbeing through equity and sustainability lenses.[3,13]

Methods

Study design

The protocol for this review has been published previously.[29] Briefly, a systematic scoping review was conducted to synthesise evidence from heterogeneous disciplines to map the evidence base and define concepts,[30] according to PRISMA-ScR[31] and the Joanna Briggs Institute.[32] The PRISMA-ScR checklist and expanded methods are outlined in the appendix (pp 2–5).

See Online for appendix

Search strategy and selection criteria

This Review considered peer-reviewed quantitative, qualitative, mixed method, or review studies published between 2010 and 2023 reporting on associations between one or more food environment determinants with one or more food acquisition practices or dietary intakes of women of reproductive age (15–49 years) in LMICs, as defined by the World Bank in 2021.[33] No restrictions on language were applied during the search; however, due to resource constraints, studies published in languages other than English, French, Portuguese, or Spanish were excluded. Only one study was identified in other languages, indicating that its effect on the results was likely minimal. Databases (n=21) across EBSCO, Web of Science Core Collection, and PubMed were searched using a broad criterion based on emerging food environment concepts,[5,23] and the expanded food security definition, including availability, accessibility (physical, financial, and social), stability, agency, and sustainability (environmental, economic, and sociocultural).[13] The full search criterion is provided in a previously published protocol.[29] The final search was conducted on May 26, 2023. Screening was performed in duplicate by researchers fluent in the relevant language, with discrepancies resolved by group discussion. The PRISMA flow chart illustrates the study selection process (figure 1). From 3751 retrieved studies, 518 were included. The most common reasons for exclusions were data not disaggregated by gender, participants outside the target age range, or outcomes measured at the household or child-level.

Data extraction and synthesis, and framework development

Data on participants, concept, context, study design, methods, and findings relevant to the study objective were extracted. Determinants were identified using a tool iteratively developed by LO and TH in collaboration with the wider team. To ensure the comprehensive identification of food environment characteristics, determinants of food acquisition and dietary intake were extracted inductively using an iterative approach. Due to resource constraints, data was extracted singularly; however, complex studies were discussed as a team to ensure consistency. The patterns of food acquisition and dietary intakes in relation to food environment determinants were charted, mapped, and summarised in tabular and graphical formats. Determinants were then mapped against existing food environment frameworks to identify novel dimensions.[4–6,23–25] A socioecological model was chosen as it visualises the interdependence between individuals and their broader environments, acknowledging that individuals are embedded within multiple, interacting levels of influence. A preliminary framework was then developed and refined through multiple rounds of revisions involving all authors and presented at two international academic conferences in 2023, followed by incorporation of expert feedback received. Iterative discussion among authors led to the final selection of key determinants in our framework.

Given the large volume of material, key studies were selected for inclusion in the written results through discussion and consensus among our multidisciplinary team. This process was designed to capture both the breadth and depth of the evidence base by incorporating a diverse range of studies, including reviews, studies with an explicit food environment focus, multicountry or nationally representative research, and rich qualitative work. We intentionally selected studies that represented patterns across diverse contexts, as well as those offering novel insights into women's food environment determinants. We also drew attention to new contributions to the food environment discourse and areas where research gaps persist. For key emerging areas—such as women's agency, sustainability, and COVID-19 disruptions—we undertook additional iterative synthesis to ensure comprehensive coverage.

We have provided a searchable spreadsheet of all included studies to enable readers to understand how the identified studies informed the insights described and support future research efforts. This dataset is publicly available,[34] allowing users to filter according to study design, target population, geographical region or country, food acquisition and dietary outcome variables, and food environment determinants. The food environment subthemes are mapped with all corresponding references in the appendix (pp 15–23).

Results

Descriptive statistics

Our review included 518 studies (figure 1), representing 125 countries (figure 2; appendix p 9). Some multicountry studies were not included in the visualisation because the countries could not be identified from the text.[35–40] Most reported determinants of food acquisition and dietary intakes of non-pregnant, non-lactating women (or those with unspecified physiological status) 381 (73·6%) of 518, with fewer on pregnant 158 (30·5%) and lactating women

83 (16·0%) (table 1). Most were in sub-Saharan Africa (SSA) 213 (41·1%) and south Asia (SA) 107 (20·7%), spanning lower-middle 231 (44·6%), upper-middle 129 (24·9%), and low-income 115 (22·2%) countries. Rural 364 (70·3%) and urban or periurban 287 (55·4%) contexts were represented. Most used only quantitative methods 323 (62·4%). Dietary intake as an outcome variable was more often considered 488 (94·2%) than food acquisition 248 (47·9%). Annual publication numbers increased from 2010, with exponential growth from 2016 onwards (appendix pp 6–8).

Conceptual framework

The conceptual framework (figure 3) distinguishes four socioecological layers of influence on women's food acquisition and dietary intakes, building on previous frameworks.[4–6,23,25] External determinants are reflected at national, regional, community, and institutional levels, while personal determinants exist at household and individual levels, reflecting wider social contexts. We include a novel layer: women's agency, characterised by an individual's ability to exert control over resources, as a key mediator of women's food acquisition and dietary intakes. Sustainability and stability are represented in the outer ring as key elements across all levels and determinants. Fourteen key food environment determinants (figure 4) and their operational definitions (table 2; appendix pp 10–14) were identified across regions, informed by 143 subthemes (appendix pp 15–23). Approximately a third of studies reported on women's agency 186 (35·9%) of 518, and stability and sustainability 218 (42·1%). Food security is represented in the framework by the following pillars: availability, accessibility (physical, financial, and social), stability, agency, and sustainability. The most reported determinants were food literacy 296 (57·1%), affordability 277 (53·5%), and availability 261 (50·4%) (figure 4; appendix pp 9, 15–23).

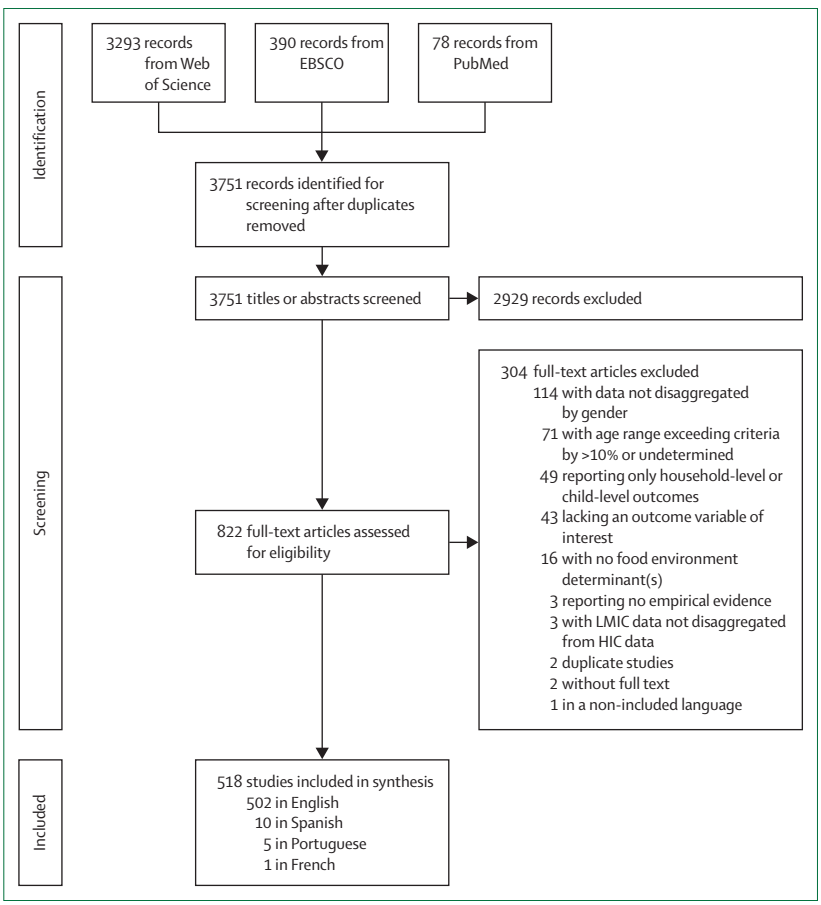

Figure 1: **PRISMA flow diagram of study selection**
LMIC=low- and middle-income country. HIC=high-income country.

Agency in women

We analysed the decision-making autonomy, bargaining power, and financial autonomy of women and observed that social norms shaped agency among women in making dietary decisions. In the Asia–Pacific region[37,51–60] and SSA,[61–67] the lack of autonomy over food-related decisions, including control over finances, influenced the dietary quality of women. In many households, men often controlled the purchases of animal-source food, especially meat.[52,56,62,63,66–68] Therefore, when women did not have the autonomy to purchase meat themselves, or when men consumed ready-to-eat meals containing flesh foods away from home during food shortages, the dietary intake of iron-rich foods among women in SA and SSA declined.[58,62,66–68] Household food expenditure decisions were influenced by multiple competing financial and sociocultural demands, especially in rural areas, where produce is used for both income and home consumption;[59,62,63,69–72] however, men often dominated decisions around food production, and sales.[52,61,65,73–75] Due to sociocultural norms, women were expected to buy or prepare food based on preferences of their husband and children[69–72] or as decided by male household heads or older female household members.[59,62,63] Social norms prioritising food allocation to other household members affected women's dietary quality in SA[55] and SSA.[64] Within households, women often ate last.[37,52,55,57,62,63,65,67,76–78] It was socially expected that women prioritise the dietary needs of other household members, a norm sometimes enforced by gender-based violence,[51,57] with subsequent negative effects on women's dietary quality compounded by food insecurity.[52,55,57,62,64,67,69,76,78–83] Preferred meat cuts and larger quantities were often prioritised for men, while milk and eggs were given preferentially to children.[52,63] The inequitable intrahousehold allocation of animal-source food was associated with diminished dietary quality among women.[52,55,57,62,65,76]

In SA, the gender gap in dietary diversity scores was high,[84] often persisting regardless of household socioeconomic status or caste.[55,58] However, urbanisation and growing awareness regarding women's nutritional needs have helped to reduce gender-related disparities in food provisioning in SA[55,58] and SSA.[71,85] In some cases, men and other household members shared unpaid responsibilities and purchased additional foods for pregnant women.[71,75,79,86]

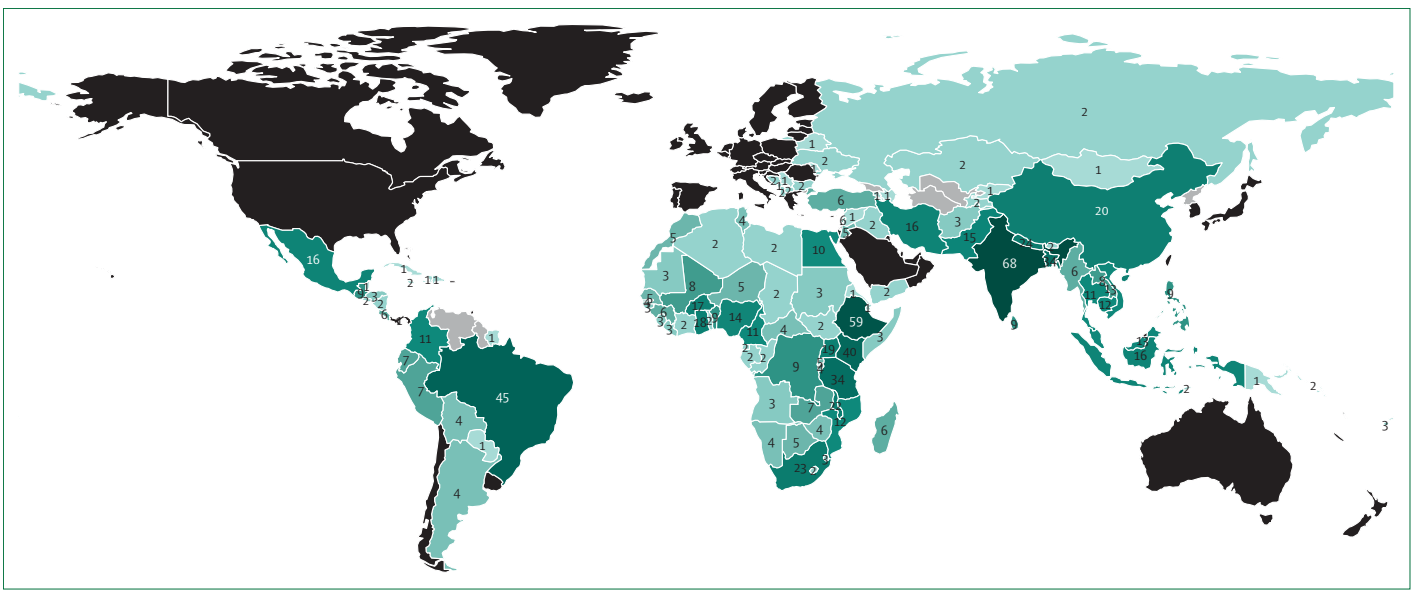

Figure 2: **Map showing the distribution of included studies (n=518) by country (n=125)**
Numbers indicate the number of studies identified within each country and included in our analysis. Lighter green shading indicates fewer studies in that country and darker green shading indicates more studies. Black shading indicates excluded high-income countries and grey shadings indicates countries for which no studies were identified.

Occasional examples of more equitable food allocation were observed in some contexts.[52,55,58,84,87,88] However, systematic constraints to women's agency often limited their control over food. Forms of oppression, such as coercive control, manipulative behaviours, economic abuse, and physical or sexual violence, reinforced harmful sociocultural norms in some settings.[51,52,57,62,89] Women were sometimes subjected to violence when food-related actions were perceived as challenging existing power dynamics, such as allocating equal portion sizes,[57] participating in food-related decision making or finances[57,73,89] such as purchasing meat[52,62] or changing which foods were prepared at home.[51] In abusive environments, withholding food was a form of control,[57] and some women consumed less or poorer-quality foods as a result.[52,57]

When evaluating agency among women in terms of their control over time and freedom of movement, we observed that women carried disproportionately higher work burdens due to unpaid reproductive work.[55,67,68,76,90] Limited control over time, combined with paid employment[55,70,91–95] and agricultural work doubled their work burden.[74,75,89,90,96] Time poverty was negatively associated with women's dietary diversity scores in SSA and the Asia–Pacific region,[90] which has been linked with constrained food access and dependence on convenience foods. During peak agricultural periods, such as planting and harvesting, pregnant women often reported eating less food due to lack of time and exhaustion.[55,79,82]

Social norms and physical safety concerns restricted mobility among women, limiting food access globally,[38,97] including SSA,[85,86,97–100] the Asia–Pacific region,[97,101] and Latin America and the Caribbean (LAC).[97] Social norms restricting mobility were strong in SA,[38,58,59,97] where food markets were considered male spaces.[58,59,68,102] More freedom of movement was observed in SSA[103] and southeast Asia.[54]

Stability and sustainability

In terms of stability, interruptions in physical and economic access to food had adverse effects on women's dietary intake[104,105] across regions including SSA,[98,104–111] the Asia–Pacific region,[54,101,104,105,112–120] LAC,[104,105,121–124] and the Middle East and north Africa (MENA).[104,125] Longitudinal studies indicated dietary quality changes across seasons,[54,76,106,108–111,113,114,126] associated with changes in women's dietary diversity scores[76,109,110,113,114,126] and nutrient intake.[106,108,111] Protracted conflict-related and climate-related crises,[111,127–131] acute shocks,[98,101,104,105,116–125] and severe weather events[107] negatively affected the dietary quality of women. The socioecological impact of the COVID-19 pandemic further impaired affordability and accessibility of food globally,[104] contributing to the decline in the dietary quality of women in Asia,[117–119] Africa,[98,125] and small island developing states.[105] This decline was particularly pronounced in adolescent girls and pregnant and lactating women in the most resource-constrained settings with severe pandemic-related restrictions.[98,101,116] During food security crises, women who received food aid[107,119,121] or had better access to cultivated or wild foods[118,122] experienced less severe dietary deterioration. Notably, the deterioration in dietary quality was greater in women than in men during the pandemic,[125] and the closure of national feeding centres was associated with a decline in women's dietary diversity scores.[117] In times of severe food insecurity, some women consumed unsafe or low-quality foods, such

as discarded food.[80,98,132] Women's dietary quality was also adversely affected by maternal buffering, a practice in which women prioritise food for their children during periods of food shortage, in SSA,[63,67,76,79,82,132] the Asia–Pacific region,[52,54,57,102,119,133,134] and LAC.[80,83,122,135] During periods of food insecurity, some food-sourcing strategies included survival sex (the exchange of sexual favours for basic subsistence needs including food),[98,132] and scavenging for discarded food.[80,132]

In terms of sustainability, food biodiversity positively influenced dietary quality across seasons and the rural–urban continuum in SSA,[136–141] LAC,[142–144] the Asia–Pacific region,[84,115,145] and MENA.[146] Agrobiodiversity of cultivated and wild food species was positively associated with women's dietary diversity scores or minimum dietary diversity for women,[137–139,141,143] and micronutrient intakes or adequacy,[84,141,143,144] including diversity in indigenous foods consumed.[144,147–151] A few studies investigated indigenous food systems and transformative farming practices in SSA,[86,141,152,153] LAC,[73,74,142] and the Asia–Pacific region.[88,115] Degradation of natural resources were found to restrict the supply of wild and cultivated foods for marginalised groups,[86,88,112,115,134,152,154] whereas sustainable agriculture practices were associated with improved food sovereignty,[73] better production diversity, higher women's dietary diversity scores, and better micronutrient intakes.[141,142] Agrobiodiversity, especially of indigenous foods, was an important aspect of women's ethno-nutrition knowledge supporting climate-adaptive strategies to overcome seasonal variations in food availability.[86,153] Women faced gendered barriers in adopting and leveraging transformative farming practices aimed at diversifying production and bridging seasonal gaps in food supply, for both home consumption and income to purchase foods.[73,74,86,152] These barriers included violent community backlash,[73] multiple work burdens, lack of land or agricultural asset ownership, and limited decision-making autonomy.[74,152] Research examining the environmental sustainability of existing diets remains scarce.[155–158] Among lactating women from food-insecure, rural settings in SSA, food costs were a major barrier to adhering to sustainable diets.[158] In contrast, in urban LAC, sociocultural traditions and convenience were the primary barriers.[156]

	n (%)
Physiological status of women*	
Non-pregnant and non-lactating or unspecified	381 (73·6)
Pregnant	158 (30·5)
Lactating	83 (16·0)
Age (years)	
15–17	188 (36·3)
18–49	330 (63·7)
Country classification by income level†	
Lower middle	231 (44·6)
Upper middle	129 (24·9)
Low income	115 (22·2)
Multicountry or multiregion	43 (8·3)
Region†	
Sub-Saharan Africa	213 (41·1)
South Asia	107 (20·7)
Latin America and Caribbean	79 (15·3)
East Asia and Pacific	62 (12·0)
Middle East and north Africa	29 (5·6)
Multiregion	22 (4·2)
Europe and Central Asia	6 (1·2)
Level of urbanisation*	
Rural	364 (70·3)
Urban	271 (52·3)
Peri-urban	46 (8·9)
Methodology	
Quantitative	323 (62·4)
Qualitative	88 (17·0)
Mixed methods	79 (15·3)
Review	28 (5·4)
Outcomes	
Food acquisition	248 (47·9)
Non-transactional food acquisition*	185 (35·7)
Food purchasing*	160 (30·9)
Dietary intake	488 (94·2)
Dietary diversity, dietary pattern, food, or food group(s)*	455 (87·8)
Micronutrient(s)*	137 (26·4)
Macronutrient(s)*	121 (23·4)

*Values might deviate from a sum of 100% because some studies included multiple elements. †According to the World Bank, in 2021.

Table 1: **Descriptive statistics of the included studies (N=518)**

External food environment

In terms of availability, women acquired food from various sources. Across the rural–urban continuum, fresh produce markets (predominately informal) were a dominant source of unprocessed, nutrient-rich foods in SSA,[92,99,104,137] the Asia–Pacific region,[97,104,145,159] LAC,[104,142,160] and small island developing states.[105] In rural and periurban areas, home production and wild environments were important sources of healthy food.[66,84,96,97,104,105,112,118,133,139,140,142,147,151,161–163] In urban areas[99,104,145,159,160] and non-agricultural rural settings,[70,92] small-scale informal vendors and fresh produce markets played a huge role in providing access to healthy food. Food aid and national feeding programmes were important sources of food globally,[39] especially in SA,[117,119,148,164] SSA,[79,130] and LAC.[121,135] Social exchange of food was common.[52,54,57,58,63,65,71,72,79,80,132–134,142,165,166]

In terms of food quality, microbial contamination and aflatoxin spoilage were key food safety risks in SSA,[37,63,85,97,99,167,168] whereas chemical contamination was more commonly observed in the Asia–Pacific region.[69,72,159,167,169–174] In LAC,[22,97,121,123,124,142,175–177] and small island developing states,[112,115] ultra-processed foods were a prevalent concern, particularly due to their association with inadequate micronutrient intake among pregnant women in LAC.[175–177] Concerns about vendor hygiene, adulteration, and mislabelling also influenced vendor and food choices.[63,69–72,92,97,99,159,172] Women valued vendors who provided credit and sold fresh, high-quality, and

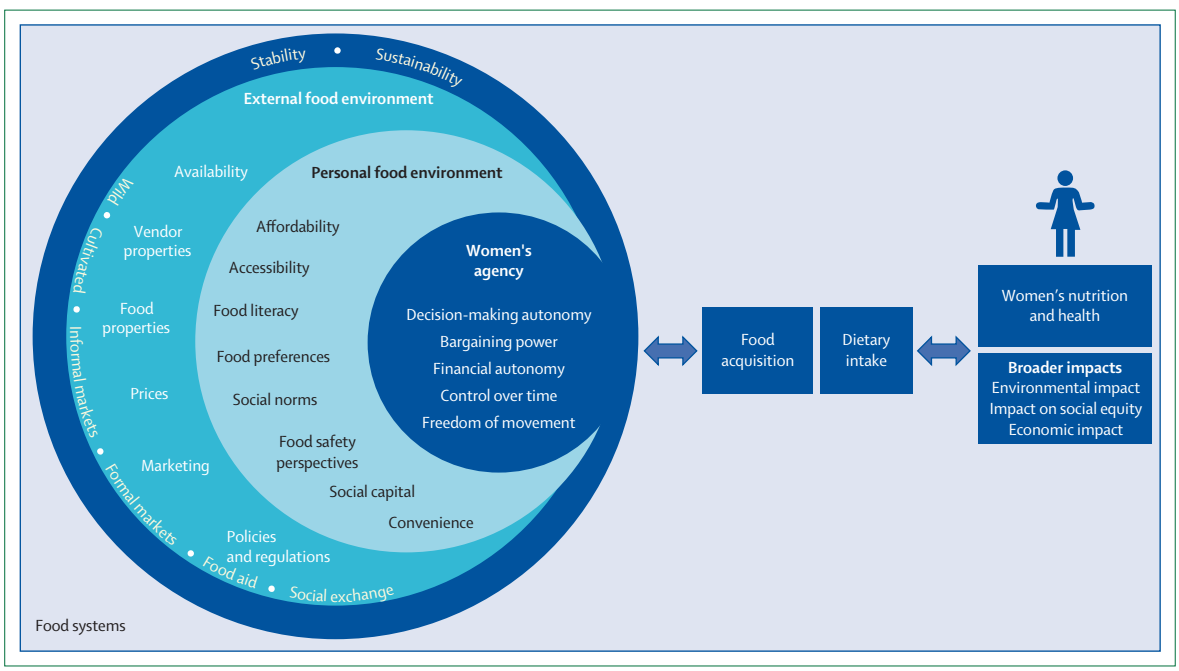

***Figure 3*: Conceptual framework of women's food environments, presenting key determinants of food acquisition practices and dietary intakes among women in LMICs, derived from 143 themes identified from the literature**

The external food environment presents determinants at the national, regional, community, and institutional levels, while the personal environment highlights social, household, and individual determinants. A novel layer is presented—women's agency as a key mediator of an individual's ability to exert control over resources that shape dietary outcomes. Stability (access to sufficient food in the event of sudden shocks or cyclical events) and sustainability (environmental, economic, and sociocultural) are key considerations across all levels and determinants. LMICs = low- and middle-income countries.

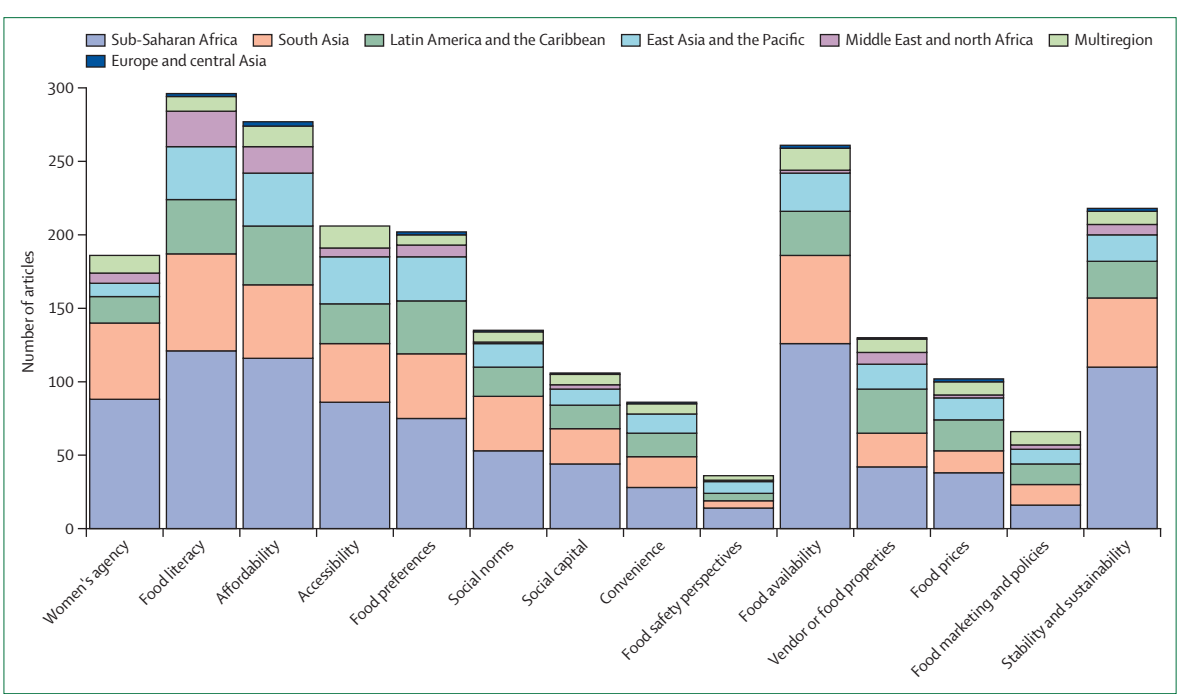

***Figure 4*: Number of included papers (n=518) reporting on each key determinant (n=14) of food acquisition practices and dietary intakes among women in LMICs, presented overall and by geographical region**

LMICs=low- and middle-income countries.

		Definition	Summary of sub-themes (n=143)
1	**Women's agency**	Agency refers to the capacity and power of an individual to exercise control over their circumstances and to provide meaningful input to governance processes. In food environments, it refers to the capacity or power of an individual to act independently to make choices about the foods they acquire and consume.[41]	
	Decision-making autonomy	Decision-making autonomy emphasises the individual's rights to self-govern and make choices without interference or control by others.[41,42]	Decision-making autonomy and bargaining power influence: Food procurement, preparation, and consumption decisions Food production, including sale or home consumption
	Bargaining power	Bargaining power is an individual's agency (power) to negotiate favourable allocation of resources at societal and intra-household levels. An individual's level of education, income, and assets are important aspects of bargaining power.[43]	Deficiency of decision-making autonomy and bargaining power around food and intra-household allocation owing to: Intra-household power imbalances Social norms privileging decision-making power to other household members Denial of food and dependence on others for food acquisition and intra-household allocation owing to: Violations of decision-making autonomy, financial autonomy, control over time, and freedom of movement related to coercive control (eg, controlling or manipulation behaviour) and gender-based violence, including harmful social norms
	Financial autonomy	Financial autonomy is the ability of an individual to make autonomous decisions related to their income, expenses, and level of debt.[41,42]	Women's financial independence and control over income Autonomy to make financial decisions about food Women's livelihoods outside of the home
	Control over time	Control over time refers to the autonomy and ability of an individual to make and act upon strategic choices about how to allocate one's time.[44]	Women's workloads (unpaid and paid), time use, and time poverty Social norms about unpaid work (eg, caregiving)
	Freedom of movement	Freedom of movement can be shaped by individual decision-making autonomy, personal safety in public places, and financial autonomy to afford transport fees.[42,45]	Physical safety and social norms influencing mobility and ability to procure food
Personal Food Environment (social, household, or individual levels)			
2	**Food literacy**	A collection of interrelated knowledge, skills, and behaviours required to make informed decisions and actions related to planning, managing, selecting, preparing, and consuming foods to meet needs and determine intake. Food literacy extends beyond knowledge to also include practical skills relating to food procurement, storage, and preparation.[46]	Nutrition knowledge Women's level of education Level of education or nutrition knowledge of other household members (eg, male household head, husbands, mothers-in-law) Food-related knowledge and skills: How to grow food (eg, conventional and sustainable farming practices) Cooking or food preparation skills Where or how to acquire food, food preservation skills, and resources How to store food to maintain quality and safety, how to interpret food labels
3	**Affordability**	Economic access to food. Affordability is determined by the interaction between food prices and household or individual purchasing power. Affordability is mediated by an individual's financial autonomy and agency.[23]	Household income or wealth Individual income or wealth Socioeconomic status or class Employment and livelihood status Cash transfers or vouchers Household expenditure and debt Purchasing power: Income relative to food prices, perceived affordability of food or food group, cost of nutrient-rich foods relative to income, cost of other foods relative to income or nutrient-rich foods.
4	**Accessibility**	Physical access to food. Accessibility is relative to individuals. Accessibility is highly dynamic and can include distance, time, space, and place, daily mobility, and modes of transport that collectively shape individual activity spaces.[23]	Geographical differences (eg, agro-ecological zones, regions, or districts) Rural–urban comparison or rural–urban continuum Physical access to food sources: Cultivated, informal and formal markets, wild, prepared food outlets, food aid, national feeding programmes, or price-controlled food sources Physical distance to food sources: Proximity and travel time Mobility: Daily mobility or individual activity space, transport costs, access to transport, and acute shocks affecting physical access (eg, extreme weather events, government-mandated restrictions to movement owing to pandemics or epidemics).
5	**Food preferences**	The evaluative attitudes that people express towards preferred or desired foods or diets, shaped by sensory aspects (eg, taste, smell, texture, and mouth-feel), morbidity (eg, disease status) or physiological status (eg, pregnancy and lactation), cultural (eg, food taboos and prestige foods), religious (eg, food restrictions or promotions), and personal aspirations (eg, vegetarianism).[23,46]	Food preferences or desired foods Perceived healthfulness of food Culturally acceptable or appropriate foods Taste or sensory appeal of food Food taboos Attitudes towards food Dietary preferences (eg, vegetarian) Acceptability of products (eg, fortified or therapeutic foods) Perceptions about the suitability of food based on gender and age Prestige foods

(Table 2 continues on next page)

		Definition	Summary of sub-themes (n=143)
(Continued from previous page)			
6	**Social norms**	Social norms are the perceived informal, spoken, or unspoken rules about what behaviours are appropriate, typical, or obligatory within a given group, reflecting the influence of community and household beliefs on individual behaviour. Sociocultural norms, alongside the influence of kin and community, households, spousal, children, and peers' food preferences and habits, can influence individual decision-making about food procurement, preparation, communal sharing, and consumption. Norms can also shape sociocultural expectations of what is appropriate or typical regarding an individual's access to resources, including food, finances, and time for nutrition-related activities.[26,47]	Sociocultural food beliefs or expectations Household or family food preferences Peer influence Sociocultural food-sharing expectations Pester power (pressure felt in relation to children's food preferences)
7	**Social capital**	The sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit. Social capital comprises both the network and the resources that might be mobilised through that network.[48]	Social networks or support between neighbours, family, or friends Food sharing or gifting of food Sharing of nutrition knowledge or how or where to access resources Rapport with food vendors Level of rapport or trust between community members Women's collaborative groups (formal and informal)
8	**Convenience**	A characteristic that results in a reduced requirement for resources, including time, physical effort, mental effort, and skills, by the consumer in relation to the planning, acquisition, preparation, storage, transport, consumption, or clean-up of food.[49]	Perceived time or effort required to: Produce, grow, acquire, preserve, prepare, cook, and consume food Time allocation for food acquisition, preparation, and cooking Storage or cooking facilities (presence or absence)
9	**Food safety perspectives**	An individual's perspectives about agrochemicals, adulteration, food hygiene or environmental sanitation, or livestock health.[23]	Concerns about: Chemical and microbiological contaminants, vendor sanitation, packaging, storage, and relabelling beyond use-by-date Safe foods conflated with healthy foods
External Food Environment (national, regional, institutional, or community levels)			
10	**Food availability**	Physical availability of food. Availability refers to whether or not a vendor or product is present within a given context. Availability always precedes accessibility (eg, food cannot be accessible if it is not available). Food sources in LMICs include cultivated, informal and formal markets, wild harvest, food aid (including national feeding programmes) and social exchange (eg, gifts, remittances, barter).[23]	Food available from different food sources: Home production, informal and formal markets, wild, food aid and national feeding programmes, kin and community, prepared food outlets, discarded food, and institutions (eg, school, university, workplace, refugee camp) Food diversity: Farm, agricultural, or production diversity; nutritional, functional diversity; wild food diversity; and agrobiodiversity Presence of markets or food retail outlets National food supply or trade Foods available in the home
11	**Vendor and food properties**	Vendor properties refer to aspects such as the type of food vendors, opening hours, and services provided. Food properties refer to aspects such as quality, safety, level of processing, shelf life, and packaging.[23]	Vendor or food source type Vendor services (eg, opening hours, offers credit, or food delivery) Food or product quality Food safety (objective and perceived) Processing (eg, ultra-processed foods) Food composition (eg, fortification) Packaging Perishability or shelf life
12	**Food prices**	Prices refer to the cost of food products. Prices interact with individual and household purchasing power to determine affordability. Prices and affordability are sensitive to fluctuations in food availability and accessibility.[23]	Food prices Cost of diet
13	**Food marketing, policies, and regulation**	Marketing includes promotional information, branding, advertising, sponsorship, and labelling pertaining to the sale of foods. The regulation includes policies pertaining to the production, distribution, and sale of foods. For example, regulations can include providing incentives for improving the nutritional quality of processed foods and their promotion in food retail and advertising and disincentives for non-adherence.[23,50]	Promotional food information (eg, product labels and messaging) Brand advertising Food policies: Food subsidies, control on food import or export, government food aid and national feeding programmes, disaster response, food regulation (eg, mandatory fortification)
14	**Stability and sustainability**		
	Stability	Having the ability to ensure sufficient food acquisition and consumption in the event of sudden shocks or cyclical events.[50]	Seasonal fluctuations in food availability and food prices Variations in food availability or food shortages owing to: Instability of income or purchasing power Chronic stresses such as climate change Acute shocks (eg, epidemics, conflicts, floods, and droughts) Water availability Transhumance or nomadic practices Globalisation and trade liberalisation Household food security Individual food security Moderate to severe food insecurity coping behaviours (eg, meal skipping or rationing food) Hungry all the time or worried about where the next meal is coming from

(Table 2 continues on next page)

	Definition	Summary of sub-themes (n=143)
(Continued from previous page)		
Sustainability	Food system and food environment practices that contribute to the long-term regeneration of natural (environmental), social, and economic systems, ensuring the food needs of the present generations are met without compromising the food needs of future generations.[50]	Agrobiodiversity Indigenous foods Sustainable diets or carbon footprint of food Regenerative farming practices or climate adaptation Loss of agrobiodiversity or natural resource base Food sovereignty or culturally appropriate food supply Traditional food knowledge

These themes and sub-themes were identified through the literature search (In total, 518 papers were reviewed). See appendix (pp 10–14, 15–23, 24–70) for a full glossary of terms, full list of sub-themes, and corresponding references. LMICs=low-income and middle-income countries.

Table 2: **Definitions of the overarching themes (n=14) and sub-themes (n=143) for key determinants of food acquisition practices and dietary intakes of women in LMICs presented in our conceptual framework.**

affordable foods.[63,70,72,92,99,159,174,178] Some women purchased directly from farmers for reduced costs and higher quality.[63,72,99,169,174]

The cost of a nutritious diet posed a challenge globally,[179] especially in SSA,[158,179,180] the Asia–Pacific region,[179,181] and MENA.[179,182] High prices for animal-source foods and vegetables were key drivers of these costs.[158,179–181] Diets designed using low-cost, locally sourced, and culturally familiar foods could meet most recommended nutrient intakes; however, ensuring adequacy for all micronutrients remained challenging due to the cost of meat.[37,181,182] Iron was the most expensive micronutrient to obtain, especially to meet increased needs during menstruation and pregnancy.[37,181–183] Although women aspired to purchase natural or unadulterated foods, high prices often posed a barrier.[69,72,99,159,169,174]

Marketing, alongside attractive packaging and children's pester power, was associated with increased purchases of processed foods.[35,69,72,85,88,94,97,99,100,159,167,172,174,184,185] Food marketing was more prevalent in urban areas.[94,99,159,167,186] Nutrition labels had the potential to influence food purchases;[187–191] however, their effectiveness was limited by technical language, cultural incompatibility, and lack of trust in manufacturers.[187–189]

Most regulations have focused on fortifying staple foods with micronutrients;[22,67,135,166,192–201] however, evidence of their effectiveness in improving women's nutrition remains insufficient.[40,166,192,196,200,202–204] Some evidence from southeast Asia link urban policies that favour supermarkets with higher produce costs.[72,145] Few studies have examined the effects of agricultural policies, biofortification, globalisation, international trade, and food subsidies on the dietary intake of women.[40,205,206]

Personal food environment

Low purchasing power has restricted access to nutrient-rich food purchases globally,[37,38,97,104,105,167] including in SSA,[35,62,63,79,82,85,98–100,111,140,207] the Asia–Pacific region,[54,55,84,101,112,117,118,133,134,159,174,208–211] LAC,[80,94,95,121,122,156,212] and MENA,[128,213,214] especially during periods of environmental, economic, and health shocks.[98,101,104,105,107,111,117,118,121,122,127–129,131,133] Economic constraints were major barriers to dietary adequacy during pregnancy and lactation, particularly for animal-source food, with affordability further restricted for women whose caregiving responsibilities reduced their opportunities to take on income-generating work.[64,97]

Food literacy, food preferences, and social norms mediated the relationship between women's financial and physical access to food and their dietary quality in SSA,[35,61,64,79,85,97,99,100,207,215] the Asia–Pacific region,[54,97,112,159,216,217] and LAC.[94,95,97,212,218] In cases of limited decision-making autonomy among women, the food literacy and preferences of household decision makers strongly affected the association between women's nutrition-related knowledge and dietary quality in SA,[55,56,75,219–222] SSA,[76,82,86,223,224] southeast Asia,[52,225] LAC,[73,74] and MENA.[226] Religious fasting and food taboos often affected the consumption of nutrient-rich foods among women[37,54,55,64,65,67,76,77,79,82,167,224,227,228] and were associated with lower dietary quality.[55,166,210] Family members played a key role in shaping dietary intake during pregnancy and lactation,[55,64,65,79,82,100,224] while peer pressure was commonly linked to food choices among adolescent girls.[71,97,172,185] In LAC, children's pester power was a key driver for the purchase and consumption of ultra-processed food among mothers.[93,95,229] In some cases, food safety was conflated with healthy food.[69,92,97]

Physical accessibility influenced the ability of women to acquire food globally, a challenge intensified by gendered constraints on mobility due to additional time demands of reproductive and community work, concerns about physical safety, and sociocultural norms,[97,104,105] especially in SSA,[79,85,99,100] the Asia–Pacific region,[54,72,159,171] and LAC.[160,212] Although purchasing food in bulk at large produce markets or supermarkets was perceived as more economical, this was not always possible due to constraints in time, financial resources, and cold storage,[70,72,85,92,97,99,100,160] which are factors associated with reduced odds of nutrient-rich food consumption.[171] Women's time-related constraints were associated with an increased demand for convenience foods in LAC,[91,93–95,156,229,230] SSA,[70,85,92,99,167] and the Asia–Pacific region.[69,72,167,186,189,231] Easier access to unhealthy foods was linked to a higher presence of food vendors,[35,91,94,95,97,100,112,157,159,160,186,189,214,229,232,233] especially near schools and workplaces.[91,97,100,156] Access to healthier foods was better in areas with small-scale informal vendors located close to homes.[72,159,160,163,171] Poor infrastructure for walking and personal safety concerns, including gender-based harassment in public places, limited

access to urban food markets;[97,99,100] whereas in rural areas, distance and social norms that designate public spaces as male posed stronger constraints.[79,84,89,234] Pandemic-related mobility restrictions,[98,101,105,117,118] extreme weather,[107] and increases in gender-based violence during times of crises also obstructed access.

Social capital also played a role in the personal food environment of women as social networks are important sources of food. In times of financial hardship, women often bought food on credit from familiar vendors[54,62,63,70,80,92,99] or sourced food or money from kin and community members.[54,57,58,63,71,72,80,132–134,142,165] In low-resource settings, cultural ceremonies provided an opportunity for animal-source food consumption.[52,65,79,132,166] Women also leveraged social networks to share unpaid labour demands,[70,72,93,165,235,236] and pool purchasing power for bulk food purchases.[72,178] Additionally, women's groups provided access to food- and agriculture-related knowledge, resources and food exchange.[38,56,57,75,130,142,164,215,237]

Discussion

This paper presents the first conceptual food environment framework for women in LMICs, empirically grounded in 143 inductively identified determinants of women's food acquisition practices and dietary intakes from 518 studies across 125 countries. By incorporating novel determinants, including integration of gender-disaggregated evidence on agency, sustainability, and food security, this framework expands existing food environment models and highlights key considerations for women in LMICs. Based on the wide geographical scope of the included studies, the framework is likely to capture determinants relevant across multiple contexts, including historically under-represented rural and periurban settings in low-income countries. This is in contrast with previous frameworks and reviews, which used expert consultations[5,23] or deductive approaches[7,8] that predominately derived evidence from higher-income and urban contexts.[6–8,25,35,97,167]

Considering women's agency is essential for policies and programmes aiming to improve equality in dietary quality.[14,20,21] Social norms influence women's agency, ie, their ability to exercise control over food-related decisions, finances, workloads, and mobility.[26] This influence affects their ability to translate nutrition-related knowledge into action, aligns with the observed association between women's nutrition empowerment with women's dietary outcomes and nutrition in LMICs.[19–21] Initiatives often target women as agents for sustainable food production, food security, and household dietary changes. If such efforts are designed without identifying the relative importance of various determinants—or without addressing agency—they risk reduced impact,[20,21] inefficient allocation of resources, and unintended gendered consequences.[27,238]

This Review highlights the need to address social norms and intrahousehold power dynamics in developing and implementing policies to improve dietary quality among women.[55,64,223] In patriarchal societies, in which the decision making generally rests with men, community leaders, and older household members, it may not be helpful, and potentially harmful, to advise women to change their eating practices without considering their social support and agency.[26,27] Therefore, policies and programmes should engage women, men, and key decision makers in creating supportive social environments to enhance women's agency in food acquisition and consumption. The positive influence of women's groups and social capital on collective agency underscores the value of fostering social networks to support the exchange of resources and skills related to food.[57,164,178] Such inclusive, community-wide approaches can help to create shared responsibility for nutrition,[26] and drive sociocultural change for gender equality and women's nutritional empowerment.[20,21]

Efforts to improve women's nutrition, whether through interventions or research, will require the adoption of a holistic systems-based approach that considers interconnections across framework levels and distinguishes enabling resources, such as nutrition knowledge, from agency.[20,21] Even when a woman has economic and physical access to nutritious food, she may face challenges in procurement and consumption if her agency is constrained. It is important to differentiate nutritional empowerment from other empowerment forms, such as educational and economic, as these might not lead to improved nutrition due to mediating factors such as lack of decision-making autonomy. Context-specific approaches are essential as facilitators and barriers to nutritional empowerment vary across geographic, governance, socioeconomic, and cultural contexts.[26]

The mediating role of agency in the uptake of climate-adaptive practices also warrants attention. Disempowerment might contribute to a negative feedback loop,[38] compounding the effects of climate change, unsustainable use of natural resources, food insecurity, conflict, and malnutrition.[239,240]

Changes in governance, laws, policies, and infrastructure are essential to support women's agency and develop healthier, more resilient, and enabling food environments.[26,241] Broader policy domains, such as land tenure, agriculture, trade, infrastructure, and social protection, affect the availability and accessibility of food at multiple levels, highlighting the importance of multisectoral approaches.[28] For instance, infrastructure planning policies that promote public safety, walkability, and proximity to healthy food sources can support positive food acquisition and consumption behaviours.[72,97,99] The pervasive influence of commercial determinants of consumption requires effective strategies to address external food environment factors, including the cost of healthier food and regulation of ultra-processed food availability and marketing.[14] While crop biofortification holds promise for addressing micronutrient deficiencies among women, further research is needed to assess intermediate indicators that might influence uptake of nutrient-rich foods

such as iron rich beans or orange fleshed sweet potatoes among women.[40]

Different food sources and biodiversity protected dietary quality among women, particularly during shocks, when women needed to diversify food sources to address food insecurity.[24,99,104,159,242] Given the importance of biodiversity in resilient ecosystems, more research is needed to better understand how various food sources contribute to sustainable and nutritious diets for women.[1,14]

We found that dietary outcomes among women were particularly vulnerable to shocks and scarcity, indicating that relying solely on household-level indicators is inadequate for assessing women's diets. Dietary intake among women could serve as a sentinel indicator to monitor food security and dietary changes in response to crises and food environment transformations, especially in settings with gender imbalance. Therefore, the routine collection of individual-level indicators for women, including monitoring minimum dietary diversity for women within large-scale nationally representative surveys and indicators used for assessing progress towards international development goals, is warranted.[17]

Our review found more studies on women's personal food environments than sustainability and external food environment determinants, which limits our understanding of the impact of climate change and macro-level policies and programmes. Only few studies have examined food acquisition practices and quantified micronutrient intakes, restricting the identification of actionable pathways to address deficiencies.[17] Although there has been a noticeable shift towards system approaches after publication of leading frameworks on food environments,[5,23] holistic, multidisciplinary studies that explore feedback loops and trade-offs remain scarce. The bulk of evidence comprises small-scale, quantitative, cross-sectional studies, with inconsistent methods for assessing determinants across long causal pathways, hindering comparability across studies. The smaller number of qualitative studies provided valuable insights into lived experiences of women, although many relied on perceived rather than objective measures of some determinants such as food safety. Additionally, there was a noticeable lack of focus on adolescent girls, lactating women, and women in climate- and conflict-affected regions.

This Review is subject to some limitations inherent to scoping reviews. While our broad search criteria enabled the synthesis of diverse methodologies and evidence across disciplines and geographies, the use of specific search terms and exclusion of grey literature may have led to the omission of some relevant studies. Our focus on intra-household food environment determinants for women might have also resulted in the exclusion of evidence on broader sustainability and macro-level policy and programme determinants. As with all literature reviews, publication bias could have affected the body of evidence identified. Although all screening was conducted in duplicate, data extraction was performed by a single reviewer due to the large number of studies, which might reduce methodological rigour. Additionally, while we extracted data on marginalised groups, such as women with low incomes and limited education, we did not incorporate an explicit intersectionality lens, and thus did not assess the compounding effects of multiple, overlapping forms of disadvantage. We also did not conduct a quality appraisal of included studies; therefore, the described associations between determinants and outcomes cannot be generalised to specific populations. Given these limitations, our findings reflect broad themes in the literature rather than precise estimates and should be interpreted accordingly. Future systematic reviews can build on the foundations of this Review by incorporating grey literature, using more specific search terms—particularly those related to intersectionality—and undertaking formal risk of bias assessments to strengthen the robustness and generalisability of findings. Furthermore, future research is also required on upstream determinants of food acquisition and consumption in women, including sustainability across environmental, economic, and sociocultural dimensions, as well as external food environment factors. Finally, while there could be some overlap among a small number of constructs within the socioecological framework, the proposed framework remains a valuable conceptual tool for identifying policy entry points.

Conclusion

Sustainable approaches to improve women's nutrition require policies and programmes that address underlying legislative, structural, and sociocultural determinants that mediate women's agency, along with other food environment determinants that influence nutritious diets. By addressing key determinants through coordinated and targeted actions, policy makers in LMICs can improve the impact of nutrition interventions, particularly as evolving environmental, political, and economic contexts risk perpetuating nutrition inequalities. The dietary intake of women is often differentially affected compared with that of other household members, warranting individual-level monitoring. Although the interrelated effects of determinants are complex, the lack of progress regarding women's nutrition underscores the need for multisectoral strategies to improve women's agency and food environments. By systematically mapping crucial determinants that influence women's food acquisition and dietary intakes, this Review identifies novel food environment determinants and offers a robust framework that is applicable across LMICs and the rural–urban continuum. This robust framework can guide future research priorities, analytical approaches, and key intervention features to optimise women's nutrition.

Contributors

LO, JdB, KW, EF, and PDS conceptualised the study. LO, TH, RH, MFP, and PDS curated the data. LO, JdB, TH, PDS, MFP, RH, CT, KW, and EF performed the formal analysis. LO, JdB, and KW were responsible for funding acquisition. LO was responsible for the investigation and project

administration, managing the software, and writing the original draft. LO, JdB, PDS, KW, EF, CT, TH, and MS contributed to the study methodology. LO and MS acquired the necessary software and conducted the search. LO, JdB, PDS, KW, and EF supervised the project. LO and JdB were involved in visualisation. LO, JdB, PDS, EF, MFP, CT, TH, RH, and KW reviewed and edited the manuscript.

Declaration of interests

We declare no competing interests.

Data sharing

A searchable database of the reviewed studies is available at 'O'Meara, Lydia (2025), Systematic scoping review: Determinants of women's food acquisition practices and dietary intakes in LMICs',[34] Mendeley Data, V2, doi:10.17632/x4rcx7bmdx.2. All data that support the findings of this review are included in the manuscript and online appendix.

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References

1 Willett W, Rockström J, Loken B, et al. Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems. *Lancet* 2019; **393:** 447–92.

2 Bohren MA, Iyer A, Barros AJD, et al. Towards a better tomorrow: addressing intersectional gender power relations to eradicate inequities in maternal health. *EClinicalMedicine* 2024; **67:** 102180.

3 High Level Panel of Experts. Reducing inequalities for food security and nutrition. June 15, 2023. https://openknowledge.fao.org/server/api/core/bitstreams/3b32bc6c-b4e8-46b3-bdae-acc32afe222f/content (accessed June 1, 2025).

4 Ambikapathi R, Boncyk M, Gunaratna NS, et al. Expanding the food environment framework to include family dynamics: a systematic synthesis of qualitative evidence using HIV as a case study. *Glob Food Sec* 2024; **42:** 100788.

5 Downs SM, Ahmed S, Fanzo J, Herforth A. Food environment typology: advancing an expanded definition, framework, and methodological approach for improved characterization of wild, cultivated, and built food environments toward sustainable diets. *Foods* 2020; **9:** 532.

6 Gupta N, Deshmukh V, Verma S, Puri S, Tandon N, Arora NK. Food environment framework in low- and middle-income countries - an integrative review. *Glob Food Sec* 2023; **39:** 100716.

7 Turner C, Kalamatianou S, Drewnowski A, Kulkarni B, Kinra S, Kadiyala S. Food environment research in low- and middle-income countries: a systematic scoping review. *Adv Nutr* 2020; **11:** 387–97.

8 Westbury S, Ghosh I, Jones HM, et al. The influence of the urban food environment on diet, nutrition and health outcomes in low-income and middle-income countries: a systematic review. *BMJ Glob Health* 2021; **6:** e006358.

9 Popkin BM, Corvalan C, Grummer-Strawn LM. Dynamics of the double burden of malnutrition and the changing nutrition reality. *Lancet* 2020; **395:** 65–74.

10 Scrinis G. Reframing malnutrition in all its forms: a critique of the tripartite classification of malnutrition. *Glob Food Sec* 2020; **26:** 100396.

11 Stevens GA, Beal T, Mbuya MNN, Luo H, Neufeld LM, , Global Micronutrient Deficiencies Research Group. Micronutrient deficiencies among preschool-aged children and women of reproductive age worldwide: a pooled analysis of individual-level data from population-representative surveys. *Lancet Glob Health* 2022; **10:** E1590–99.

12 Firoz T, Pineles B, Navrange N, Grimshaw A, Oladapo O, Chou D. Non-communicable diseases and maternal health: a scoping review. *BMC Pregnancy Childbirth* 2022; **22:** 787.

13 Clapp J, Moseley WG, Burlingame B, Termine P. Viewpoint: the case for a six-dimensional food security framework. *Food Policy* 2022; **106:** 102164.

14 Swinburn BA, Kraak VI, Allender S, et al. The global syndemic of obesity, undernutrition, and climate change: the Lancet Commission report. *Lancet* 2019; **393:** 791–846.

15 Souza JP, Day LT, Rezende-Gomes AC, et al. A global analysis of the determinants of maternal health and transitions in maternal mortality. *Lancet Glob Health* 2024; **12:** e306–16.

16 Hawkes C, Ruel MT, Salm L, Sinclair B, Branca F. Double-duty actions: seizing programme and policy opportunities to address malnutrition in all its forms. *Lancet* 2020; **395:** 142–55.

17 Food and Agriculture Organization of the United Nations/International Fund for Agricultural Development/UNICEF/World Food Programme/WHO. The state of food security and nutrition in the world: financing to end hunger, food insecurity and malnutrition in all its forms. 2024. https://openknowledge.fao.org/handle/20.500.14283/cd1254en (accessed June 1, 2025).

18 Van Der Ham M, Bolijn R, De Vries A, Campos Ponce M, Van Valkengoed IGM. Gender inequality and the double burden of disease in low-income and middle-income countries: an ecological study. *BMJ Open* 2021; **11:** e047388.

19 Jones RE, Haardörfer R, Ramakrishnan U, et al. Intrinsic and instrumental agency associated with nutritional status of East African women. *Soc Sci Med* 2020; **247:** 112803.

20 Lentz E, Bageant E, Narayanan S. Empowerment and nutrition in Niger: insights from the Women's Empowerment in Nutrition grid. *Food Secur* 2021; **13:** 1227–44.

21 Narayanan S, Lentz E, Fontana M, De A, Kulkarni B. Developing the women's empowerment in nutrition index in two States of India. *Food Policy* 2019; **89**.

22 Lander RL, Hambidge KM, Westcott JE, et al. Pregnant women in four low-middle income countries have a high prevalence of inadequate dietary intakes that are improved by dietary diversity. *Nutrients* 2019; **11:** 1560.

23 Turner C, Aggarwal A, Walls H, et al. Concepts and critical perspectives for food environment research: A global framework with implications for action in low- and middle-income countries. *Glob Food Sec* 2018; **18:** 93–101.

24 Bogard JR, Andrew NL, Farrell P, Herrero M, Sharp MK, Tutuo J. A typology of food environments in the Pacific region and their relationship to diet quality in Solomon Islands. *Foods* 2021; **10:** 2592.

25 Osei-Kwasi HA, Laar A, Zotor F, et al. The African urban food environment framework for creating healthy nutrition policy and interventions in urban Africa. *PLoS One* 2021; **16:** e0249621.

26 Litvin K, Grandner GW, Phillips E, et al. How do social and behavioral change interventions respond to social norms to improve women's diets in low- and middle-income countries? A scoping review. *Curr Dev Nutr* 2024; **8:** 103772.

27 van der Harst M, Koch DJ, van den Brink M. A review of the unintended gender effects of international development efforts. *Public Admin Dev* 2023; **43:** 280–92.

28 Neufeld LM, Nordhagen S, Leroy JL, et al. Food systems interventions for nutrition: lessons from 6 program evaluations in Africa and South Asia. *J Nutr* 2024; **154:** 1727–38.

29 O'Meara L, de Bruyn J, Dominguez-Salas P, et al. Characteristics of food environments that influence food acquisition and diets of women in low- and middle-income countries: a scoping review protocol. *JBI Evid Synth* 2023; **21:** 1270–79.

30 Munn Z, Peters MDJ, Stern C, Tufanaru C, McArthur A, Aromataris E. Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach. *BMC Med Res Methodol* 2018; **18:** 143.

31 Tricco AC, Lillie E, Zarin W, et al. PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. *Ann Intern Med* 2018; **169:** 467–73.

32 Peters MDJ, Godfrey C, McInerney P, Munn Z, Tricco AC, Khalil H. Scoping reviews. In: Aromataris E, Munn Z, eds. JBI manual for evidence synthesis. Joanna Briggs Institute, 2020.

33 World Bank. World Bank country and lending groups. 2021. https://datahelpdesk.worldbank.org/knowledgebase/articles/906519 (accessed May 26, 2023).

34 O'Meara L. Systematic scoping review: determinants of women's food acquisition practices and dietary intakes in LMICs. *Mendeley Data V2*. 2025. https://data.mendeley.com/datasets/x4rcx7bmdx/2 (accessed June 1, 2025).

35 Gissing SC, Pradeilles R, Osei-Kwasi HA, Cohen E, Holdsworth M. Drivers of dietary behaviours in women living in urban Africa: a systematic mapping review. *Public Health Nutr* 2017; **20:** 2104–13.

36 Keats EC, Rappaport AI, Shah S, Oh C, Jain R, Bhutta ZA. The dietary intake and practices of adolescent girls in low- and middle-income countries: a systematic review. *Nutrients* 2018; **10:** 1978.

37 McKune SL, Mechlowitz K, Miller LC. Dietary animal source food across the lifespan in LMIC. *Glob Food Sec* 2022; **35:** 100656.

38 Njuki J, Eissler S, Malapit H, et al. A review of evidence on gender equality, women's empowerment, and food systems. *Glob Food Sec* 2022; **33:** 100622.

39 Olney DK, Gelli A, Kumar N, Alderman H, Go A, Raza A. Social assistance programme impacts on women's and children's diets and nutritional status. *Matern Child Nutr* 2022; **18:** e13378.

40 Ruel MT, Alderman H. Maternal and Child Nutrition Study Group. Nutrition-sensitive interventions and programmes: how can they help to accelerate progress in improving maternal and child nutrition? *Lancet* 2013; **382:** 536–51.

41 Kabeer N. Resources, agency, achievements: reflections on the measurement of women's empowerment. *Dev Change* 1999; **30:** 435–64.

42 Sinclair K, Thompson-Colón T, Bastidas-Granja AM, Matamoros SEDC, Olaya E, Melgar-Quiñonez H. Women's autonomy and food security: connecting the dots from the perspective of indigenous women in rural Colombia. *SSM - Qual Res Health* 2022; **2.**

43 Doss C. Policy Research Working Paper 6337: Intrahousehold Bargaining and Resource Allocation in Developing Countries. 2013. http://econ.worldbank.org (accessed June 1, 2025).

44 Illy D, Howes H, Jelušič P, Lavand'homme P, Dix H, Pedersen SA. Measuring women's empowerment: gender and time-use agency in Benin, Malawi and Nigeria. *Dev Change* 2022; **53:** 1010–34.

45 Chen X, Kwan MP. Contextual uncertainties, human mobility, and perceived food environment: the uncertain geographic context problem in food access research. *Am J Public Health* 2015; **105:** 1734–37.

46 Vidgen HA, Gallegos D. Defining food literacy and its components. *Appetite* 2014; **76:** 50–59.

47 UNICEF/UCSD. What Are Social Norms? How Are They Measured? 2014. https://cnxus.org/wpcontent/uploads/2022/04/42009203020Whole20What20are20Social20Norms.pdf (accessed June 1, 2025).

48 Nahapiet J, Ghoshal S. Social capital, intellectual capital, and the organisational advantage. *Acad Manag Rev* 1998; **23:** 242–66.

49 Bogard JR, Downs S, Casey E, et al. Convenience as a dimension of food environments: a systematic scoping review of its definition and measurement. *Appetite* 2024; **194:** 107198.

50 Food Security and Nutrition HLPE. Building a Global Narrative towards 2030. High Level Panel of Experts. 2020; 112. https://openknowledge.fao.org/server/api/core/bitstreams/8357b6eb-8010-4254-814a-1493faaf4a93/content (accessed June 1, 2025).

51 Barolia R, Clark AM, Higginbottom G. Exploring the impact of gender inequities on the promotion of cardiovascular health of women in Pakistan. *Nurs Inq* 2017; **24:** e12148.

52 Bonis-Profumo G, do Rosario Pereira D, Brimblecombe J, Stacey N. Gender relations in livestock production and animal-source food acquisition and consumption among smallholders in rural Timor-Leste: a mixed-methods exploration. *J Rural Stud* 2022; **89:** 222–34.

53 Diamond-Smith N, Shieh J, Puri M, Weiser S. Food insecurity and low access to high-quality food for preconception women in Nepal: the importance of household relationships. *Public Health Nutr* 2020; **23:** 2737–45.

54 Gibson E, Stacey N, Sunderland TCHH, Adhuri DS. Dietary diversity and fish consumption of mothers and their children in fisher households in Komodo District, eastern Indonesia. *PLoS One* 2020; **15:** e0230777.

55 Harris-Fry H, Shrestha N, Costello A, Saville NM. Determinants of intra-household food allocation between adults in South Asia - a systematic review. *Int J Equity Health* 2017; **16:** 107.

56 Harris-Fry H, Prost A, Beaumont E, et al. Intrahousehold power inequalities and cooperation: unpacking household responses to nutrition-sensitive agriculture interventions in rural India. *Matern Child Nutr* 2023; **19:** e13503.

57 Lentz EC. Complicating narratives of women's food and nutrition insecurity: domestic violence in rural Bangladesh. *World Dev* 2018; **104:** 271–80.

58 Levay AV, Mumtaz Z, Faiz Rashid SF, Willows N. Influence of gender roles and rising food prices on poor, pregnant women's eating and food provisioning practices in Dhaka, Bangladesh. *Reprod Health* 2013; **10:** 53.

59 Morrison J, Giri R, Arjyal A, et al. Addressing anaemia in pregnancy in rural plains Nepal: a qualitative, formative study. *Matern Child Nutr* 2021; **17** (suppl 1)**:** e13170.

60 Vijay J, Patel KK. Recommendations to scale up dietary diversity data at household and individual level in India. *Diabetes Metab Syndr* 2021; **15:** 102310.

61 Aberman N-L, Roopnaraine T. To sell or consume? Gendered household decision-making on crop production, consumption, and sale in Malawi. *Food Secur* 2020; **12:** 433–47.

62 Bukachi SA, Ngutu M, Muthiru AW, Lépine A, Kadiyala S, Domínguez-Salas P. Gender and sociocultural factors in animal source foods (ASFs) access and consumption in lower-income households in urban informal settings of Nairobi, Kenya. *J Health Popul Nutr* 2022; **41:** 30.

63 Galié A, Farnworth CR, Njiru N, Alonso S. Intra-household handling and consumption dynamics of milk in peri-urban informal markets in Tanzania and Kenya: a gender lens. *Sustainability* 2021; **13:** 3449.

64 Kavle JA, Landry M. Addressing barriers to maternal nutrition in low- and middle-income countries: a review of the evidence and programme implications. *Matern Child Nutr* 2018; **14:** e12508.

65 Musyoka MM, Bukachi SA, Muga GO, Otiang E, Kwoba EN, Thumbi SM. Addressing child and maternal nutrition: a qualitative study on food prescriptions and proscriptions determining animal source food consumption in rural Kenya. *Food Secur* 2023; **15:** 901–17.

66 Ochieng J, Afari-Sefa V, Lukumay PJ, Dubois T. Determinants of dietary diversity and the potential role of men in improving household nutrition in Tanzania. *PLoS One* 2017; **12:** e0189022.

67 Saldanha LS, Buback L, White JM, et al. Policies and program implementation experience to improve maternal nutrition in Ethiopia. *Food Nutr Bull* 2012; **33** (suppl 2)**:** S27–50.

68 Sedlander E, Talegawkar S, Ganjoo R, et al. How gender norms affect anemia in select villages in rural Odisha, India: a qualitative study. *Nutrition* 2021; **86:** 111159.

69 Daivadanam M, Wahlström R, Thankappan KR, Ravindran TKS. Balancing expectations amidst limitations: the dynamics of food decision-making in rural Kerala. *BMC Public Health* 2015; **15:** 644.

70 Stokes-Walters R, Fofana ML, Songbono JL, et al. "If you don't find anything, you can't eat" – mining livelihoods and income, gender roles, and food choices in northern Guinea. *Resour Policy* 2021; **70:** 101939.

71 Wanjohi MN, Pradeilles R, Asiki G, et al. Community perceptions on the factors in the social food environment that influence dietary behaviour in cities of Kenya and Ghana: a photovoice study. *Public Health Nutr* 2023; **26:** 661–73.

72 Wertheim-Heck SCO, Raneri JE. Food policy and the unruliness of consumption: an intergenerational social practice approach to uncover transforming food consumption in modernizing Hanoi, Vietnam. *Glob Food Sec* 2020; **26:** 100418.

73 Deaconu A, Mercille G, Batal M. The agroecological farmer's pathways from agriculture to nutrition: a practice-based case from Ecuador's highlands. *Ecol Food Nutr* 2019; **58:** 142–65.

74 Bacon CM, Flores Gomez ME, Shin V, et al. Beyond the bean: analyzing diversified farming, food security, dietary diversity, and gender in Nicaragua's smallholders coffee cooperatives. *Agroecol Sustain Food Syst* 2023; **47:** 579–620.

75 Prost A, Harris-Fry H, Mohanty S, et al. Understanding the effects of nutrition-sensitive agriculture interventions with participatory videos and women's group meetings on maternal and child nutrition in rural Odisha, India: a mixed-methods process evaluation. *Matern Child Nutr* 2022; **18:** e13398.

76 Geta TG, Gebremedhin S, Omigbodun AO. Dietary diversity among pregnant women in Gurage zone, South Central Ethiopia: assessment based on longitudinal repeated measurement. *Int J Womens Health* 2022; **14:** 599–615.

77 Lusambili A, Naanyu V, Manda G, et al. Nutritional influences on the health of women and children in Cabo Delgado, Mozambique: a qualitative study. *Int J Environ Res Public Health* 2020; **17:** 6205.

78 Morrison J, Dulal S, Harris-Fry H, et al. Formative qualitative research to develop community-based interventions addressing low birth weight in the plains of Nepal. *Public Health Nutr* 2018; **21:** 377–84.

79 Bezabih AM, Wereta MH, Kahsay ZH, Getahun Z, Bazzano AN. Demand and supply side barriers that limit the uptake of nutrition services among pregnant women from rural Ethiopia: an exploratory qualitative study. *Nutrients* 2018; **10:** 1687.

80 de Morais Sato P, Unsain RF, Gittelsohn J, da Silva JG, Perez IC, Scagliusi FB. Strategies used by overweight and obese low-income mothers to feed their families in urban Brazil. *Appetite* 2017; **111:** 63–70.

81 D'souza A, Tandon S. Intrahousehold nutritional inequities in rural Bangladesh. *Econ Dev Cult Change* 2019; **67:** 625–57.

82 Maykondo BK, Horwood C, Haskins L, et al. A qualitative study to explore dietary knowledge, beliefs, and practices among pregnant women in a rural health zone in the Democratic Republic of Congo. *J Health Popul Nutr* 2022; **41:** 51.

83 Piperata BA, Schmeer KK, Hadley C, Ritchie-Ewing G. Dietary inequalities of mother-child pairs in the rural Amazon: evidence of maternal-child buffering? *Soc Sci Med* 2013; **96:** 183–91.

84 Singh S, Jones AD, DeFries RS, Jain M. The association between crop and income diversity and farmer intra-household dietary diversity in India. *Food Secur* 2020; **12:** 369–90.

85 Downs SM, Fox EL, Zivkovic A, et al. Drivers of food choice among women living in informal settlements in Nairobi, Kenya. *Appetite* 2022; **168:** 105748.

86 Ebile PA, Phelan L, Wünsche JN. The role of home gardens in empowering minority women and improving food and nutrition insecurity: a case of Mbororo community in Cameroon's Northwest region. *Acroecol Sustain Food Syst* 2022; **46:** 1002–24.

87 Abassi MM, Sassi S, El Ati J, Ben Gharbia H, Delpeuch F, Traissac P. Gender inequalities in diet quality and their socioeconomic patterning in a nutrition transition context in the Middle East and North Africa: a cross-sectional study in Tunisia. *Nutr J* 2019; **18:** 18.

88 Ellena R, Nongkynrih KA. Changing gender roles and relations in food provisioning among matrilineal Khasi and patrilineal Chakhesang Indigenous rural people of North-East India. *Matern Child Nutr* 2017; **13** (suppl 3)**:** e12560.

89 Bain C, Ransom E, Halimatusa'diyah I. Dairy livestock interventions for food security in Uganda: what are the implications for women's empowerment? *Rural Sociol* 2020; **85:** 991–1020.

90 Komatsu H, Malapit HJL, Theis S. Does women's time in domestic work and agriculture affect women's and children's dietary diversity? Evidence from Bangladesh, Nepal, Cambodia, Ghana, and Mozambique. *Food Policy* 2018; **79:** 256–70.

91 Bojorquez I, Rosales C, Angulo A, de Zapien J, Denman C, Madanat H. International migration and dietary change in Mexican women from a social practice framework. *Appetite* 2018; **125:** 72–80.

92 Nordhagen S, Fofana ML, Barry AO, et al. Between the city and the farm: food environments in artisanal mining communities in Upper Guinea. *Public Health Nutr* 2022; **25:** 368–80.

93 Oddo VM, Surkan PJ, Hurley KM, Lowery C, de Ponce S, Jones-Smith JC. Pathways of the association between maternal employment and weight status among women and children: qualitative findings from Guatemala. *Matern Child Nutr* 2018; **14:** e12455.

94 Sato PM, Couto MT, Wells J, Cardoso MA, Devakumar D, Scagliusi FB. Mothers' food choices and consumption of ultra-processed foods in the Brazilian Amazon: a grounded theory study. *Appetite* 2020; **148:** 104602.

95 Villegas E, Hammons AJ, Wiley AR, Fiese BH, Teran-Garcia M. Cultural influences on family mealtime routines in Mexico: focus group study with Mexican mothers. *Children (Basel)* 2022; **9:** 1045.

96 Depenbusch L, Schreinemachers P, Brown S, Roothaert R. Impact and distributional effects of a home garden and nutrition intervention in Cambodia. *Food Secur* 2022; **14:** 865–81.

97 Trübswasser U, Verstraeten R, Salm L, et al. Factors influencing obesogenic behaviours of adolescent girls and women in low- and middle-income countries: a qualitative evidence synthesis. *Obes Rev* 2021; **22:** e13163.

98 Ahoya B, Kavle JA, Kiige L, et al. How COVID-19 affected food systems, health service delivery and maternal and infant nutrition practices: implications for moving forward in Kenya. *Matern Child Nutr* 2023; **19:** e13466.

99 Downs SM, Fox EL, Mutuku V, et al. Food environments and their influence on food choices: a case study in informal settlements in Nairobi, Kenya. *Nutrients* 2022; **14:** 2571.

100 Yiga P, Seghers J, Ogwok P, Matthys C. Determinants of dietary and physical activity behaviours among women of reproductive age in urban sub-Saharan Africa: a systematic review. *Br J Nutr* 2020; **124:** 761–72.

101 Kumar B, Pinky SD, Pulock OS, Kamal RS, Aziz R. Covid-19 and the Rohingya refugees in Bangladesh: socioeconomic and health impacts on women and adolescents. *Int J Asia Pac Stud* 2022; **18:** 179–99.

102 Diamond-Smith N, Puri M, Neuhaus J, Weiser S, Kadiyala S. Do changes in women's household status in Nepal improve access to food and nutrition? *Matern Child Nutr* 2022; **18:** e13374.

103 Alaofè H, Zhu M, Burney J, Naylor R, Douglas T. Association between women's empowerment and maternal and child nutrition in Kalalé District of Northern Benin. *Food Nutr Bull* 2017; **38:** 302–18.

104 O'Meara L, Turner C, Coitinho DC, Oenema S. Consumer experiences of food environments during the Covid-19 pandemic: global insights from a rapid online survey of individuals from 119 countries. *Glob Food Sec* 2022; **32:** 100594.

105 Sutcliffe S, Lau J, Barnes M, et al. COVID-19 impacts on food systems in fisheries-dependent island communities. *Ecol Soc* 2023; **28:** 1.

106 Baye K, Mekonnen D, Choufani J, et al. Seasonal variation in maternal dietary diversity is reduced by small-scale irrigation practices: a longitudinal study. *Matern Child Nutr* 2022; **18:** e13297.

107 Dembedza VP, Chopera P, Mapara J, Mpofu-Hamadziripi N, Kembo G, Macheka L. The relationship between climate change induced natural disasters and selected nutrition outcomes: a case of cyclone Idai, Zimbabwe. *BMC Nutr* 2023; **9:** 19.

108 Fahey CA, Chevrier J, Crause M, Obida M, Bornman R, Eskenazi B. Seasonality of antenatal care attendance, maternal dietary intake, and fetal growth in the VHEMBE birth cohort, South Africa. *PLoS One* 2019; **14:** e0222888.

109 Hanley-Cook GT, Argaw A, de Kok B, et al. Seasonality and day-to-day variability of dietary diversity: longitudinal study of pregnant women enrolled in a randomized controlled efficacy trial in rural Burkina Faso. *J Nutr* 2022; **152:** 2145–54.

110 Jordan I, Röhlig A, Glas MG, et al. Dietary diversity of women across agricultural seasons in the Kapchorwa District, Uganda: results from a cohort study. *Foods* 2022; **11:** 344.

111 Muggaga C, Okello-Uma I, Kaaya AN, Taylor D, Ongeng D, Basil M. Dietary intake and socio-economic predictors of inadequate energy and nutrient intake among women of childbearing age in Karamoja sub-region of Uganda. *J Health Popul Nutr* 2023; **42:** 12.

112 Albert J, Bogard J, Siota F, et al. Malnutrition in rural Solomon Islands: an analysis of the problem and its drivers. *Matern Child Nutr* 2020; **16:** e12921.

113 Bonis-Profumo G, Stacey N, Brimblecombe J. Maternal diets matter for children's dietary quality: seasonal dietary diversity and animal-source foods consumption in rural Timor-Leste. *Matern Child Nutr* 2021; **17:** e13071.

114 Na M, Mehra S, Christian P, et al. Maternal dietary diversity decreases with household food insecurity in rural Bangladesh: a longitudinal analysis1-3. *J Nutr* 2016; **146:** 2109–16.

115 Vogliano C, Raneri JE, Coad J, et al. Dietary agrobiodiversity for improved nutrition and health outcomes within a transitioning indigenous Solomon Island food system. *Food Secur* 2021; **13:** 819–47.

116 Chen HT, Li H, Cao Y, et al. Food intake and diet quality of pregnant women in China during the COVID-19 pandemic: a national cross-sectional study. *Front Nutr* 2022; **9:** 853565.

117 Gupta S, Seth P, Abraham M, Pingali P. COVID-19 and women's nutrition security: panel data evidence from rural India. *Econ Polit (Bologna)* 2022; **39:** 157–84.

118 Head JR, Chanthavilay P, Catton H, Vongsitthi A, Khamphouxay K, Simphaly N. Changes in household food security, access to health services, and income in northern Lao PDR during the COVID-19 pandemic. *BMJ Open* 2022; **12:** e055935.

119 Husain Z, Ghosh S, Dutta M. Changes in dietary practices of mother and child during the COVID-19 lockdown: results from a household survey in Bihar, India. *Food Policy* 2022; **112:** 102372.

120 Lecoutere E, van den Berg M, de Brauw A. Changes in women?s empowerment in the household, women?s diet diversity, and their relationship against the background of COVID-19 in southern Bangladesh. *J Asian Econ* 2023; **84:** 101559.

121 Pradeilles R, Pareja R, Creed-Kanashiro HM, et al. Diet and food insecurity among mothers, infants, and young children in Peru before and during COVID-19: a panel survey. *Matern Child Nutr* 2022; **18:** e13343.

122 Ceballos F, Hernandez MA, Paz C. Short-term impacts of COVID-19 on food security and nutrition in rural Guatemala: phone-based farm household survey evidence. *Agric Econ* 2021; **52:** 477–94.

123 Oliveira LA, Della Lucia CM, Rezende FAC, et al. Food craving and its associated factors during COVID-19 outbreak in Brazil. *Am J Health Educ* 2022; **53:** 207–18.

124 Smaira FI, Mazzolani BC, Esteves GP, et al. Poor eating habits and selected determinants of food choice were associated with ultraprocessed food consumption in Brazilian women during the COVID-19 pandemic. *Front Nutr* 2021; **8:** 672372.

125 Turki S, Bouzekri K, Trabelsi T, El Ati J. Impact of COVID-19 lockdown on food habits, appetite and body weight in Tunisian adults. *J Nutr Sci* 2022; **11:** e60.

126 Dulal B, Mundy G, Sawal R, Rana PP, Cunningham K. Homestead food production and maternal and child dietary diversity in Nepal: variations in association by season and agroecological zone. *Food Nutr Bull* 2017; **38:** 338–53.

127 Abou-Rizk J, Jeremias T, Cocuz G, et al. Food insecurity, low dietary diversity and poor mental health among Syrian refugee mothers living in vulnerable areas of Greater Beirut, Lebanon. *Br J Nutr* 2022; **128:** 1832–47.

128 Jomaa LH, Naja FA, Kharroubi SA, Diab-El-Harake MH, Hwalla NC. Food insecurity is associated with compromised dietary intake and quality among Lebanese mothers: findings from a national cross-sectional study. *Public Health Nutr* 2020; **23:** 2687–99.

129 Jomaa L, Naja F, Cheaib R, Hwalla N. Household food insecurity is associated with a higher burden of obesity and risk of dietary inadequacies among mothers in Beirut, Lebanon. *BMC Public Health* 2017; **17:** 567.

130 Dozio E, Peyre L, Morel SO, Bizouerne C. Integrated psychosocial and food security approach in an emergency context: Central African Republic. *Intervention* 2016; **14:** 257–71.

131 Nidzvetska S, Rodriguez-Llanes JM, Aujoulat I, et al. Maternal and child health of internally displaced persons in Ukraine: a qualitative study. *Int J Environ Res Public Health* 2017; **14:** 54.

132 Militao EMA, Salvador EM, Silva JP, Uthman OA, Vinberg S, Macassa G. Coping strategies for household food insecurity, and perceived health in an urban community in Southern Mozambique: a qualitative study. *Sustainability* 2022; **14:** 8710.

133 Law LS, Norhasmah S, Gan WY, Nasir MTM. Qualitative study on identification of common coping strategies practised by indigenous peoples (Orang Asli) in Peninsular Malaysia during periods of food insecurity. *Public Health Nutr* 2018; **21:** 2819–30.

134 Sulaiman N, Yeatman H, Russell J, Law LS. A Food insecurity systematic review: experience from Malaysia. *Nutrients* 2021; **13:** 945.

135 Malpeli A, Ferrari MG, Varea A, et al. Short-term evaluation of the impact of a fortified food aid program on the micronutrient nutritional status of Argentinian pregnant women. *Biol Trace Elem Res* 2013; **155:** 176–83.

136 Ambikapathi R, Gunaratna NS, Madzorera I, et al. Market food diversity mitigates the effect of environment on women's dietary diversity in the Agriculture to Nutrition (ATONU) study, Ethiopia. *Public Health Nutr* 2019; **22:** 2110–19.

137 Bellon MR, Ntandou-Bouzitou G, Lauderdale JE, Caracciolo F. Combining market and nonmarket food sources provides rural households with more options to achieve better diets in Southern Benin. *Food Secur* 2023; **15:** 411–22.

138 Ekesa B, Ariong RM, Kennedy G, Baganizi M, Dolan I. Relationships between land tenure insecurity, agrobiodiversity, and dietary diversity of women of reproductive age: evidence from Acholi and Teso subregions of Uganda. *Matern Child Nutr* 2020; **16** (suppl 3): e12965.

139 Forsido SF, Tadesse F, Belachew T, Hensel O. Maternal dietary practices, dietary diversity, and nutrient composition of diets of lactating mothers in Jimma Zone, Southwest Ethiopia. *PLoS One* 2021; **16:** e0254259.

140 Mashingaidze N, Ekesa B, Ndayisaba CP, et al. Participatory exploration of the heterogeneity in household socioeconomic, food, and nutrition security status for the identification of nutrition-sensitive interventions in the Rwandan highlands. *Front Sustain Food Syst* 2020; **4:** 47.

141 Owoputi I, Booth N, Luginaah I, et al. Does crop diversity influence household food security and women's individual dietary diversity? A cross-sectional study of Malawian farmers in a participatory agroecology and nutrition project. *Food Nutr Bull* 2022; **43:** 395–411.

142 Deaconu A, Berti PR, Cole DC, Mercille G, Batal M. Market foods, own production, and the social economy: how food acquisition sources influence nutrient intake among Ecuadorian farmers and the role of agroecology in supporting healthy diets. *Sustainability* 2021; **13:** 4410.

143 Jones AD, Creed-Kanashiro H, Zimmerer KS, et al. Farm-level agricultural biodiversity in the Peruvian Andes is associated with greater odds of women achieving a minimally diverse and micronutrient adequate diet. *J Nutr* 2018; **148:** 1625–37.

144 Penafiel D, Cevallos-Valdiviezo H, Espinel R, Van Damme P. Local traditional foods contribute to diversity and species richness of rural women's diet in Ecuador. *Public Health Nutr* 2019; **22:** 2962–71.

145 Wertheim-Heck S, Raneri JE, Oosterveer P. Food safety and nutrition for low-income urbanites: exploring a social justice dilemma in consumption policy. *Reg Environ Change* 2019; **31:** 397–420.

146 Gaillard C, Verger EO, Dury S, Dop MC, El Ati J, , MEDINA Study Group. Farm production diversity and women's dietary diversity: evidence from central Tunisia. *PLoS One* 2022; **17:** e0263276.

147 Ghosh-Jerath S, Kapoor R, Singh A, et al. Agroforestry diversity, indigenous food consumption and nutritional outcomes in Sauria Paharia tribal women of Jharkhand, India. *Matern Child Nutr* 2021; **17:** e13052.

148 Ghosh-Jerath S, Kapoor R, Bandhu A, Singh A, Downs S, Fanzo J. Indigenous foods to address malnutrition: an inquiry into the diets and nutritional status of women in the indigenous community of Munda tribes of Jharkhand, India. *Curr Dev Nutr* 2022; **6:** nzac102.

149 Ghosh-Jerath S, Singh A, Magsumbol MS, Lyngdoh T, Kamboj P, Goldberg G. Contribution of indigenous foods towards nutrient intakes and nutritional status of women in the Santhal tribal community of Jharkhand, India. *Public Health Nutr* 2016; **19:** 2256–67.

150 Ghosh-Jerath S, Singh A, Lyngdoh T, Magsumbol MS, Kamboj P, Goldberg G. Estimates of indigenous food consumption and their contribution to nutrient intake in Oraon tribal women of Jharkhand, India. *Food Nutr Bull* 2018; **39:** 581–94.

151 Singh A, Dhasmana A, Bandhu A, Kapoor R, Baalasubramanian S, Ghosh-Jerath S. Contribution of natural food environments to nutritional intake and biomarker status: insights from the women of indigenous Santhal communities of Jharkhand, India. *BMC Nutr* 2023; **9:** 20.

152 Galiè A, Teufel N, Girard AW, et al. Women's empowerment, food security and nutrition of pastoral communities in Tanzania. *Glob Food Sec* 2019; **23:** 125–34.

153 Powell B, Bezner Kerr RB, Young SL, Johns T. The determinants of dietary diversity and nutrition: ethnonutrition knowledge of local people in the East Usambara Mountains, Tanzania. *J Ethnobiol Ethnomed* 2017; **13:** 23.

154 Powell B, Hall J, Johns T. Forest cover, use and dietary intake in the East Usambara mountains, Tanzania. *Int For Rev* 2011; **13:** 305–17.

155 Auma CI, Pradeilles R, Blake MK, Holdsworth M. What can dietary patterns tell us about the nutrition transition and environmental sustainability of diets in Uganda? *Nutrients* 2019; **11:** 342.

156 Blanco-Murcia L, Gomati de la Vega I, Perdomo-Ortíz J, Rodríguez-Pinilla JP. Towards sustainable food consumption: emerging tensions behind the plate in a Colombian university community. *Agroecol Sustain Food Syst* 2022; **46:** 758–88.

157 Llanaj E, Hanley-Cook GT. Adherence to healthy and sustainable diets is not differentiated by cost, but rather source of foods among young adults in Albania. *Br J Nutr* 2021; **126:** 591–99.

158 Quarpong W, Wakoli S, Oiye S, Williams AM. Interpreting alignment to the EAT-Lancet diet using dietary intakes of lactating mothers in rural western Kenya. *Matern Child Nutr* 2023; **19:** e13512.

159 Downs SM, Glass S, Linn KK, Fanzo J. The interface between consumers and their food environment in Myanmar: an exploratory mixed-methods study. *Public Health Nutr* 2019; **22:** 1075–88.

160 Vedovato GM, Trude ACB, Kharmats AY, Martins PA. Degree of food processing of household acquisition patterns in a Brazilian urban area is related to food buying preferences and perceived food environment. *Appetite* 2015; **87:** 296–302.

161 Alaofè H, Burney J, Naylor R, Taren D. The impact of a solar market garden programme on dietary diversity, women's nutritional status and micronutrient levels in Kalalé district of northern Benin. *Public Health Nutr* 2019; **22:** 2670–81.

162 Alderman H, Gilligan DO, Leight J, Mulford M, Tambet H. The role of poultry transfers in diet diversity: a cluster randomized intent to treat analysis. *Food Policy* 2022; **107:** 102212.

163 Weerasekara PC, Withanachchi CR, Ginigaddara GAS, Ploeger A. Understanding dietary diversity, dietary practices and changes in food patterns in marginalised societies in Sri Lanka. *Foods* 2020; **9:** 1659.

164 Harris-Fry HA, Paudel P, Harrisson T, et al. Participatory women's groups with cash transfers can increase dietary diversity and micronutrient adequacy during pregnancy, whereas women's groups with food transfers can increase equity in intrahousehold energy allocation. *J Nutr* 2018; **148:** 1472–83.

165 Sylvester O, Segura AG, Davidson-Hunt IJ. Wild food harvesting and access by household and generation in the Talamanca Bribri indigenous territory, Costa Rica. *Hum Ecol* 2016; **44:** 449–61.

166 Kim C, Mansoor GF, Paya PM, et al. Review of policies, data, and interventions to improve maternal nutrition in Afghanistan. *Matern Child Nutr* 2020; **16:** e13003.

167 Karanja A, Ickowitz A, Stadlmayr B, McMullin S. Understanding drivers of food choice in low- and middle-income countries: a systematic mapping study. *Glob Food Sec* 2022; **32:** 100615.

168 Ogallo IO, Kaindi DWM, Abong GO, Mwangi AM. Dietary aflatoxin exposure of lactating mothers of children 0–6 months in Makueni County, Kenya. *Matern Child Nutr* 2023; **19:** e13493.

169 Brown SM, Nguyen-Viet H, Grace D, et al. Understanding how food safety risk perception influences dietary decision making among women in Phenom Phnom Penh, Cambodia: a qualitative study. *BMJ Open* 2022; **12:** e054940.

170 Cai H, Zhu Y, Qin L, et al. Risk-benefit assessment of methylmercury and n-3 polyunsaturated fatty acids through fish intake by pregnant women in Shanghai, China: findings from the Shanghai diet and health survey. *Food Chem Toxicol* 2023; **174:** 113668.

171 Duong M-C, Nguyen-Viet H, Grace D, et al. Perceived neighbourhood food access is associated with consumption of animal-flesh food, fruits and vegetables among mothers and young children in peri-urban Cambodia. *Public Health Nutr* 2022; **25:** 717–28.

172 Islam MR, Trenholm J, Rahman A, Pervin J, Ekström EC, Rahman SM. Sociocultural influences on dietary practices and physical activity behaviors of rural adolescents—A qualitative exploration. *Nutrients* 2019; **11:** 2916.

173 Daivadanam M, Wahlström R, Ravindran TKS, Thankappan KR, Ramanathan M. Conceptual model for dietary behaviour change at household level: a 'best-fit' qualitative study using primary data. *BMC Public Health* 2014; **14:** 574.

174 Morgan EH, Vatucawaqa P, Snowdon W, et al. Factors influencing fruit and vegetable intake among urban Fijians: a qualitative study. *Appetite* 2016; **101:** 114–18.

175 Graciliano NG, Da Silveira JACD, De Oliveira ACM. The consumption of ultra-processed foods reduces overall quality of diet in pregnant women. *Cad Saude Publica* 2021; **37:** e00030120.

176 Miele MJO, Souza RT, Calderon IM, et al. Profile of calories and nutrients intake in a Brazilian multicenter study of nulliparous women. *Int J Gynaecol Obstet* 2022; **156:** 34–41.

177 Paulino DSM, Pinho-Pompeu M, Assumpção D, Kasawara KT, Surita FG. Dietary intake profile in high-risk pregnant women according to the degree of food processing. *J Matern Fetal Neonatal Med* 2022; **35:** 3330–36.

178 Lukwa AT, Odunitan-Wayas F, Lambert EV, Alaba OA. Can informal savings groups promote food security and social, economic and health transformations, especially among women in urban sub-Saharan Africa: a narrative systematic review. *Sustainability* 2022; **14:** 3153.

179 Bai Y, Alemu R, Block SA, Headey D, Masters WA. Cost and affordability of nutritious diets at retail prices: evidence from 177 countries. *Food Policy* 2021; **99:** 101983.

180 Sarfo J, Keding GB, Boedecker J, Pawelzik E, Termote C. The impact of local agrobiodiversity and food interventions on cost, nutritional adequacy, and affordability of women and children's diet in Northern Kenya: a modeling exercise. *Front Nutr* 2020; **7:** 129.

181 Hamid ZBS, Rajikan R, Elias SM, Jamil NA. Utilization of a diet optimization model in ensuring adequate intake among pregnant women in Selangor, Malaysia. *Int J Environ Res Public Health* 2019; **16:** 4720.

182 Brouzes CMC, Darcel N, Tomé D, et al. Local foods can increase adequacy of nutrients other than iron in young urban Egyptian women: results from diet modeling analyses. *J Nutr* 2021; **151:** 1581–90.

183 Raymond J, Kassim N, Rose JW, Agaba M. Optimal dietary patterns designed from local foods to achieve maternal nutritional goals. *BMC Public Health* 2018; **18:** 451.

184 Besselink D, Brandt H, Klingberg S, Draper CE. Perceptions of healthy food, and perceived facilitators and barriers to buying and consuming healthy food, among female caregivers in Soweto, South Africa. *S Afr J Child Health* 2022; **16:** 172–77.

185 Rastogi S, Mathur P, Khanna A. Gaps in nutrition knowledge and barriers to eating healthy among low-income, school-going adolescent girls in Delhi. *J Public Health (Berl)* 2019; **27:** 629–36.

186 Sufyan D, Februhartanty J, Bardosono S, et al. Food purchasing behaviour among urban slum women in East Jakarta: A qualitative study. *Mal J Nutr* 2019; **25:** S33–46.

187 Seyedhamzeh S, Nedjat S, Shakibazadeh E, Doustmohammadian A, Hosseini H, Dorosty Motlagh A. Nutrition labels' strengths & weaknesses and strategies for improving their use in Iran: a qualitative study. *PLoS One* 2020; **15:** e0241395.

188 de Morais Sato P, Mais LA, Khandpur N, et al. Consumers' opinions on warning labels on food packages: a qualitative study in Brazil. *PLoS One* 2018; **14:** e0218813.

189 Vemula SR, Gavaravarapu SM, Mendu VVR, Mathur P, Avula L. Use of food label information by urban consumers in India - a study among supermarket shoppers. *Public Health Nutr* 2014; **17:** 2104–14.

190 Aoki K, Akai K, Ujiie K. A choice experiment to compare preferences for rice in Thailand and Japan: the impact of origin, sustainability, and taste. *Food Qual Prefer* 2017; **56:** 274–84.

191 Mohan K, Maheswarappa NB, Banerjee R. Exploring the dynamics of women consumer preference, attitude and behaviour towards meat and meat products consumption in India. *Meat Sci* 2022; **193:** 108926.

192 Chong MFF, Bui CT, Jaisamrarn U, et al. A landscape of micronutrient status in women through the reproductive years: insights from seven regions in Asia. *Womens Health (Lond)* 2020; **16:** 1745506520973110.

193 Dass M, Nyako J, Tortoe C, et al. Comparison of micronutrient intervention strategies in Ghana and Benin to cover micronutrient needs: simulation of benefits and risks in women of reproductive age. *Nutrients* 2021; **13:** 2286.

194 Dijkhuizen MA, Greffeille V, Roos N, Berger J, Wieringa FT. Interventions to improve micronutrient status of women of reproductive age in Southeast Asia: a narrative review on what works, what might work, and what doesn't work. *Matern Child Health J* 2019; **23** (suppl 1)**:** 18–28.

195 Vosti SA, Adams KP, Michuda A, et al. Impacts of micronutrient intervention programs on effective coverage and lives saved: modeled evidence from Cameroon. *Ann N Y Acad Sci* 2023; **1519:** 199–210.

196 Friesen VM, Mbuya MNN, Aaron GJ, et al. Fortified foods are major contributors to apparent intakes of vitamin A and iodine, but not iron, in diets of women of reproductive age in 4 African Countries. *J Nutr* 2020; **150:** 2183–90.

197 Klemm RDW, West KP, Palmer AC, et al. Vitamin A fortification of wheat flour: considerations and current recommendations. *Food Nutr Bull* 2010; **31** (suppl)**:** S47–61.

198 Kyamuhangire W, Lubowa A, Kaaya A, et al. The importance of using food and nutrient intake data to identify appropriate vehicles and estimate potential benefits of food fortification in Uganda. *Food Nutr Bull* 2013; **34:** 131–42.

199 Wu DCN, Corbett K, Horton S, Saleh N, Mosha TC. Effectiveness of social marketing in improving knowledge, attitudes and practice of consumption of vitamin A-fortified oil in Tanzania. *Public Health Nutr* 2019; **22:** 466–75.

200 Adams KP, Jarvis M, Vosti SA, et al. Estimating the cost and cost-effectiveness of adding zinc to, and improving the performance of, Burkina Faso's mandatory wheat flour fortification programme. *Matern Child Nutr* 2023; **19:** e13515.

201 Silva DLF, Crispim SP, Almeida CCB, et al. Improving pregnant women's iodine intake estimates and its prevalence of inadequacy through the use of salt and seasoning covariates. *Nutrients* 2023; **15:** 846.

202 Angeles-Agdeppa I, Saises M, Capanzana M, Juneja LR, Sakaguchi N. Pilot-scale commercialization of iron-fortified rice: effects on anemia status. *Food Nutr Bull* 2011; **32:** 3–12.

203 Nankumbi J, Grant FKE, Sibeko L, et al. Predictors of vitamin A rich food consumption among women living in households growing orange-fleshed sweetpotatoes in selected regions in Uganda. *Front Public Health* 2022; **10:** 880166.

204 Saville NM, Maharjan M, Manandhar DS, Harris-Fry HA. Equity implications of rice fortification: A modelling study from Nepal. *Public Health Nutr* 2020; **23:** 2824–39.

205 Loewenson R, Nolen LB, Wamala S. Review article: globalisation and women's health in sub-Saharan Africa: would paying attention to women's occupational roles improve nutritional outcomes? *Scand J Public Health* 2010; **38** (suppl 4)**:** 6–17.

206 Durao S, Visser ME, Ramokolo V, et al. Community-level interventions for improving access to food in low- and middle-income countries. *Cochrane Database Syst Rev* 2020; **7:** CD011504.

207 Azene AG, Aragaw AM, Wubetie HT, et al. Dietary diversity among pregnant women and associated factors in Ethiopia: systematic review and meta-analysis. *PLoS One* 2021; **16:** e0251906.

208 Nguyen PH, Nguyen H, Gonzalez-Casanova I, et al. Micronutrient intakes among women of reproductive age in Vietnam. *PLoS One* 2014; **9:** e89504.

209 Singh DR, Ghimire S, Upadhayay SR, Singh S, Ghimire U. Food insecurity and dietary diversity among lactating mothers in the urban municipality in the mountains of Nepal. *PLoS One* 2020; **15:** e0227873.

210 Yang C, Zhao A, Lan H, et al. Fruit and vegetable consumption and serum vitamin A in lactating women: a cross-sectional survey in urban China. *Food Sci Nutr* 2021; **9:** 5676–88.

211 Yang J, Dang S, Cheng Y, et al. Dietary intakes and dietary patterns among pregnant women in Northwest China. *Public Health Nutr* 2017; **20:** 282–93.

212 Gomes CB, Vasconcelos LG, Cintra RMGC, Dias LCGD, Carvalhaes MABL. Eating habits of pregnant Brazilian women: an integrative review of the literature. *Cien Saude Colet* 2019; **24:** 2293–306 (in Portuguese).

213 Doumani N, Maalouly J, Bou-Maroun E, Sok N, Cayot P, Tueni M. Iron intake among Lebanese women: sociodemographic factors, iron-rich dietary patterns, and preparation of hummus, a Mediterranean dish. *Food Nutr Res* 2021; **65**.

214 Landais E, Bour A, Gartner A, McCullough F, Delpeuch F, Holdsworth M. Socio-economic and behavioural determinants of fruit and vegetable intake in Moroccan women. *Public Health Nutr* 2015; **18:** 809–16.

215 Ludwig-Borycz EF, Wilson ML, Colecraft EK, Jones AD. A behavior change communication intervention, but not livelihood interventions, improves diet diversity and animal-source food consumption among Ghanaian women. *Food Nutr Res* 2022; **66**.

216 Shrestha V, Paudel R, Sunuwar DR, Lyman ALT, Manohar S, Amatya A. Factors associated with dietary diversity among pregnant women in the western hill region of Nepal: a community based cross-sectional study. *PLoS One* 2021; **16:** e0247085.

217 Zhao A, Xue Y, Zhang Y, Li W, Yu K, Wang P. Nutrition concerns of insufficient and excessive intake of dietary minerals in lactating women: a cross-sectional survey in three cities of China. *PLoS One* 2016; **11:** e0146483.

218 Bojorquez I, Unikel C, Cortez I, Cerecero D. The social distribution of dietary patterns. Traditional, modern and healthy eating among women in a Latin American city. *Appetite* 2015; **92:** 43–50.

219 Haque MA, Choudhury N, Ahmed SMT, et al. Enhanced women's decision-making power after the Suchana intervention in north-eastern Bangladesh: a cluster randomised pre-post study. *BMJ Open* 2022; **12:** e054148.

220 Nguyen PH, Kim SS, Sanghvi T, et al. Integrating nutrition interventions into an existing maternal, neonatal, and child health program increased maternal dietary diversity, micronutrient intake, and exclusive breastfeeding practices in Bangladesh: results of a cluster-randomized program Evaluation. *J Nutr* 2017; **147:** 2326–37.

221 Nguyen PH, Kachwaha S, Tran LM, et al. Strengthening nutrition interventions in antenatal care services affects dietary intake, micronutrient intake, gestational weight gain, and breastfeeding in Uttar Pradesh, India: results of a cluster-randomized program evaluation. *J Nutr* 2021; **151:** 2282–95.

222 Talegawkar SA, Jin Y, Sedlander E, et al. A social norms-based intervention improves dietary diversity among women in Rural India: the reduction in anemia through normative innovations (RANI) project. *Nutrients* 2021; **13:** 2822.

223 Ambikapathi R, Passarelli S, Madzorera I, et al. Men's nutrition knowledge is important for women's and children's nutrition in Ethiopia. *Matern Child Nutr* 2021; **17:** e13062.

224 Desalegn BB, Lambert C, Riedel S, Negese T, Biesalski HK. Ethiopian Orthodox fasting and lactating mothers: longitudinal study on dietary pattern and nutritional status in rural Tigray, Ethiopia. *Int J Environ Res Public Health* 2018; **15:** 1767.

225 Wulandari R, Suwandono A, Kartasurya MI, Nugraheni SA. Postpartum care behavior improvement during COVID-19 pandemic in Indonesia using mobile-health interactive message. *Ethiop J Health Sci* 2022; **32:** 243–54.

226 Asiabar AK, Shokravi FA, Hajifaraji M, Zayeri F. The effect of an educational intervention with spouse's participation on food intake of pregnant females: a randomized controlled trial. *Iran Red Crescent Med J* 2018; **20:** e55954.

227 Gao H, Stiller CK, Scherbaum V, et al. Dietary intake and food habits of pregnant women residing in urban and rural areas of Deyang City, Sichuan Province, China. *Nutrients* 2013; **5:** 2933–54.

228 Köhler R, Lambert C, Biesalski HK. Animal-based food taboos during pregnancy and the postpartum period of Southeast Asian women–a review of literature. *Food Res Int* 2019; **115:** 480–86.

229 Almeida LB, Scagliusi FB, Duran AC, Jaime PC. Barriers to and facilitators of ultra-processed food consumption: perceptions of Brazilian adults. *Public Health Nutr* 2018; **21:** 68–76.

230 de Morais Sato P, da Rocha Pereira P, de Carvalho Stelmo I, et al. Eating practices and habitus in mothers. A Brazilian population-based survey. *Appetite* 2014; **82:** 16–28.

231 Bailey C, Garg V, Kapoor D, Wasser H, Prabhakaran D, Jaacks LM. Food choice drivers in the context of the nutrition transition in Delhi, India. *J Nutr Educ Behav* 2018; **50:** 675–86.

232 Dearth-Wesley T, Gordon-Larsen P, Adair LS, et al. Less traditional diets in Chinese mothers and children are similarly linked to socioeconomic and cohort factors but vary with increasing child age. *J Nutr* 2011; **141:** 1705–11.

233 Becquey E, Martin-Prevel Y. Micronutrient adequacy of women's diet in urban Burkina Faso is low. *J Nutr* 2010; **140**, 2079S–85S.

234 Koppmair S, Kassie M, Qaim M. Farm production, market access and dietary diversity in Malawi. *Public Health Nutr* 2017; **20:** 325–35.

235 Jang H, Janmaat KRL, Kandza V, Boyette AH. Girls in early childhood increase food returns of nursing women during subsistence activities of the BaYaka in the Republic of Congo. *Proc Biol Sci* 2022; **289:** 20221407.

236 Kraft TSS, Cummings DK, Venkataraman VV, et al. Female cooperative labour networks in hunter-gatherers and horticulturalists. *Philos Trans R Soc Lond B Biol Sci* 2023; **378:** 20210431.

237 Zivkovic A, Merchant EV, Nyawir T, Hoffman DJ, Simon JE, Downs S. Strengthening vegetable production and consumption in a Kenyan informal settlement: a feasibility and preliminary impact assessment of a sack garden intervention. *Curr Dev Nutr* 2022; **6:** nzac036.

238 Dixon V, Bamberger M. Incorporating process evaluation into impact evaluation: what, why and how. April 2022. https://www.3ieimpact.org/sites/default/files/2022-03/WP50-3ie-Process-Evaluation-Guidelines.pdf (accessed June 1, 2025).

239 Delgado C, Murugani V, Tschunkert K. Food systems in conflict and Peacebuilding settings: pathways and interconnections. June 2021. https://www.sipri.org/publications/2021/policy-reports/food-systems-conflict-and-peacebuilding-settings-pathways-and-interconnections (accessed June 1, 2025).

240 UN Office of the High Commissioner for Human Rights/UN Environment Programme. A study on women, gender inequalities and climate-induced migration in East Africa. Dec 27, 2022. https://reliefweb.int/report/uganda/study-women-gender-inequalities-and-climate-induced-migration-east-africa (accessed June 1, 2025).

241 Taylor SAJ, Perez-Ferrer C, Griffiths A, Brunner E. Scaling up nutrition in fragile and conflict-affected states: the pivotal role of governance. *Soc Sci Med* 2015; **126:** 119–27.

242 Zeitler L, Downs S, Powell B. Adapting food environment frameworks to recognize a wild-cultivated continuum. *Front Nutr* 2024; **11:** 1343021.