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Urban-Rural Differences in Food Beliefs and Practices in Indonesia: A Qualitative Study

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ABSTRACT

Introduction: Food beliefs and cultural practices have a significant influence on food choices, recommendations, and taboos, with variations shaped by the context of ecological, social, and local knowledge. Rural populations generally adhere to long-established traditional practices, whereas urban environments undergo more rapid dietary transitions driven by globalization and the commercial food industry. This cultural framework shapes individual interpretations of nutritional information, often leading to the rejection of health messages that contradict established belief systems. In Indonesia, considerable ethnic and geographical diversity gives rise to culturally embedded diets that can impact nutritional status; however, the dynamic interactions between food choices, recommendations, and taboos remain insufficiently studied. To address this gap, a qualitative study that explores regional variations in food beliefs and practices in Indonesia, focusing on urban–rural differences across diverse socio-ecological settings was conducted.

Methods: In-depth interviews with 28 respondents and focus group discussions with 42 respondents were conducted in four provinces (West Java, Central Sulawesi, East Kalimantan, and West Nusa Tenggara) under the Socio-ecological Model (SEM) framework to investigate how dietary choices, food recommendations, and food taboos are shaped. The study was conducted in 2022. Ethical approval was obtained and all participants provided consent.

Results: The findings reveal three main insights: (1) a paradoxical decoupling between dietary diversity and nutritional outcomes, wherein greater dietary diversity in Eastern Indonesia does not directly correlate with better nutrition outcomes; (2) food recommendations for mothers and infants vary, with urban areas favoring commercial products and rural areas relying more on local knowledge; and (3) food taboos persist across regions, particularly in rural Eastern Indonesia, often affecting infant and maternal nutrition.

Conclusion: This study contributes to a nuanced, culture-sensitive framework to inform health communication and nutrition policies in Indonesia. These findings highlight the need for culturally sensitive and context specific nutrition policies.

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INTRODUCTION

Food beliefs and cultural practices significantly influence dietary choices, food recommendations, and taboos, with variations often shaped by ecological contexts, local knowledge systems, and social structures (1,2). In many parts of the world, rural communities tend to maintain traditional dietary practices that are closely tied to locally available resources, while urban areas experience more rapid shifts in food behavior due to globalization, commercial food markets, and health promotion campaigns (3,4).

These cultural frameworks shape not only the foods that people consume, but also how they interpret dietary guidance and health-related information (5,6). Food beliefs operate as filters through which choices are evaluated, reinforced, or rejected. In many cases, what is considered healthy or beneficial is grounded less in biomedical evidence and more in inherited cultural logics (7,8). Consequently, understanding how food beliefs relate to choices, recommendations, and taboos is essential for understanding health behaviors. For example, in rural Ethiopia and Nigeria, pregnant women commonly avoid nutritionally beneficial foods such as cabbage, pumpkin, and certain meats because of food taboos, which affect maternal and fetal health (9,10). Similar patterns have been documented in rural communities in Malaysia and Cambodia, where food taboos limit dietary diversity, increasing the risk of malnutrition and the associated adverse health outcomes (11,12). Such restrictions tend to be more rigid in rural communities, where adherence to inherited customs remains stronger and access to formal nutrition education is more limited (13,14).

Indonesia has complex geographical conditions, comprising over 1,300 ethnic groups distributed across more than 17,000 islands (15). These conditions significantly shape the local dietary practices. For instance, Dayaknese women in Central Kalimantan traditionally avoid protein-rich foods such as fish, meat, and eggs during pregnancy, resulting in an increased prevalence of anaemia (16). Similarly, in Sampang, Madurese cultural norms dictate food practices for children, which negatively impacts growth (17). On Kei Besar Island, Maluku, seafood prohibitions during pregnancy strongly adhere to cultural norms and influence maternal nutritional intake (18). Furthermore, in rural Sulawesi, traditional food taboos rooted in cultural practices and socialization by local community leaders and shamans contribute to chronic energy deficiencies among women (19). When food recommendations ignore such belief systems, they are often met with resistance or fail to produce the desired health outcomes (20,21). These examples highlight the urgent need for culturally embedded nutritional interventions in Indonesia.

Despite the growing literature on food practices in Indonesia, there remains a gap concerning how food choices, recommendations, and taboos interact dynamically, especially within and across urban and rural settings. Much of the existing research emphasizes nutritional outcomes or food security but rarely addresses the sociocultural dimension (22,23). Existing studies predominantly focus on singular aspects, such as the nutritional impacts of food taboos or dietary patterns within isolated contexts, neglecting broader socio-cultural dynamics and their implications for nutrition policy (4,24). For example, a research investigated maternal and child healthcare practices in Greater Jakarta, uncovering associations with childhood overweight status, yet did not compare urban-rural differences nor deeply explore cultural influences (25). Similarly, a study utilizing data from the Indonesian Family Life Survey, identified disparities in stunting rates between urban and rural Indonesian populations, yet lack of cultural analysis of dietary behaviors (26). Given Indonesia's extensive ethnic and regional diversities, this gap is critical. Importantly, urban and rural classifications themselves should not be overgeneralized, as intra-category variation in stunting rates, food access, and cultural practices across provinces suggests a need for more nuanced analysis.

To address this gap, this study utilizes the Socio-ecological Model (SEM) within a Social and Behavior Change Communication (SBCC) framework (27). Socio-ecological Model is well-suited for this research as it focuses on how food-related behaviors are shaped by multiple layers of influence, including individual beliefs, interpersonal networks, community norms, and broader societal conditions (27). Applying this model allows for a nuanced analysis of how dietary recommendations can align with or challenge existing food practices and taboos, potentially enhancing the effectiveness and cultural acceptability of nutrition interventions (28,29). In nutrition research, this model is especially useful for contextualizing how food practices are formed, reinforced, or contested across different levels of social organization (30,31).

At the individual and interpersonal levels, personal beliefs, nutritional knowledge, family traditions, and social interactions strongly influence adherence to food recommendations or taboos (1,32). Meanwhile, community level norms dictate acceptable dietary practices and influence collective adherence to cultural informed food

recommendations or taboos (33,34). Broader societal factors, including agricultural policy, economic status, market availability, and national health programs, shape overall food availability and culturally acceptable dietary choices (35,36). Utilizing the socio-ecological model, this study aims to: 1) identify the types of food commonly chosen in urban and rural areas of Indonesia; 2) examine the food recommendation and taboos for mothers and infants in these settings, looking at both health-related and culturally influenced recommendations; and 3) demonstrate how SEM can inform health and nutrition interventions responsive to Indonesia's diverse cultural landscape. By fulfilling these aims, this research seeks to deepen the understanding of the sociocultural dimensions of food practices and provide critical insights that can inform the design of culturally sensitive nutrition interventions and policies tailored specifically to diverse Indonesian contexts.

METHOD

Research Type

This research employed a qualitative design to investigate deeply embedded food practices and cultural norms that are not easily observable through quantitative methods. Qualitative research is well-suited for exploring meanings, beliefs, and contextual factors underlying social behavior (42). The study was conducted in June 2022 in West Java, East Kalimantan, West Nusa Tenggara, and Central Sulawesi.

Population and Sample/Informants

Purposive sampling was used to select participants who possess firsthand or institutional knowledge of food-related behaviors, especially in relation to maternal and child nutrition. The population of interest included both those who directly make food-related decisions (e.g., mothers) and those who influence such decisions (e.g., health workers and community leaders). Informant categories included: (1) midwives, community health volunteers, and traditional birth attendants who interact closely with mothers and often convey both biomedical and culturally informed nutrition advice; (2) village heads (men and women), religious leaders, and teachers who are highly respected community figures and play central roles in shaping social norms and influencing household practices; and (3) mothers of children under five, both with healthy children and those experiencing stunting, to capture actual household practices and outcomes.

Participants were identified through local health offices, while sub-districts within each selected district were chosen in coordination with district health offices, based on stunting prevalence, access variability, and ethnic diversity. The information is listed in Table 1, selected purposively to ensure representation from various demographics, including gender, occupation, and geographical location.

Table 1. List of informants

Characteristics	IDI	FGD	Total
Urban Areas			
Sukabumi, West Java	7	9	16
Palu, Central Sulawesi	8	5	13
Mataram, West Nusa Tenggara	-	9	9
Balikpapan, East Kalimantan	-	4	4
Rural Areas			
Cianjur, West Java	4	-	4
Parigi Moutong, Central Sulawesi	7	5	12
Lombok Utara, West Nusa Tenggara	-	9	9
Paser, East Kalimantan	10	6	16
Social Status			
Teacher	4	6	10
Midwife	4	11	15
Community Health Volunteers	5	11	16
Traditional Birth Attendants	3	-	3
Village Heads (Men)	2	3	5
Village Heads (Women)	2	3	5

Characteristics	IDI	FGD	Total
Religious Leaders	4	5	9
Mother with Children Under Five Years Old			
Mother with Healthy Children	3	-	3
Mother with Stunted Children	4	-	4
Gender			
Female	26	39	65
Male	2	3	5

Research Location

This study purposively selected several sites across Indonesia to explore food practices, beliefs, and taboos across different cultural and regional settings. The study included locations from both Western and Eastern Indonesia, drawing on classifications commonly used in academic literature, where Java and Sumatra are considered Western Indonesia, while Kalimantan, Sulawesi, and West Nusa Tenggara are categorized as Eastern Indonesia (37). West Java was selected as the province representing Western Indonesia due to its relatively more homogeneous socio-economic profile and logistical accessibility. Three provinces were selected from Eastern Indonesia (East Kalimantan, West Nusa Tenggara, and Central Sulawesi) to capture the region's higher internal diversity in culture, food systems, and nutritional challenges. This distribution aimed to capture the diverse cultural, ecological, and nutritional dynamics found across the Indonesian archipelago.

Urban and rural classifications followed Statistics Indonesia Regulation No. 120 of 2020, and were cross-referenced with Books 1 and 2 of the regulation, which provide granular classification of each village and district. However, we also considered socio-economic and infrastructural indicators to complement the administrative classification. For example, while Cianjur is officially urban according to BPS, several sub-districts within it exhibit strong rural characteristics, including high dependence on agriculture, limited service infrastructure, and high stunting rates (38). For this reason, such areas were treated as functionally rural in this study. Table 1 presents the selected study sites and their characteristics.

Table 2. Study sites' characteristics

Province	Urban Site	Rural Site	**Key Justification: Stunting Rates** (39) **and District Characteristics**
West Java	Sukabumi	Cianjur	Sukabumi as an urban area, stunting 19.2%; Cianjur shows rural socio-economic conditions despite urban classification; high agricultural reliance, food insecurity, stunting 13.6% (38).
East Kalimantan	Balikpapan	Paser	Industrial urban vs. traditional rural contrast; stunting in Balikpapan 19.6%, Paser 24.9% (40)
West Nusa Tenggara	Mataram	North Lombok	Urban market access vs. rural subsistence farming; stunting in Mataram 25.8% while North Lombok 35.9% (41).
Central Sulawesi	Palu	Parigi Moutong	Urban dietary transition vs. rural traditional food practices (4); stunting in Palu 24.7% while Parigi Moutong 27.4%

Instrumentation or Tools

Topic guides were developed based on the Socio-ecological Model, with questions structured around individual beliefs, interpersonal influences, community norms, and broader social conditions (27). Key concepts such as "food taboo," "food staple," and "food recommendation" were defined at the beginning of each session to ensure clarity. Moderators used a semi-structured approach, and were trained in qualitative facilitation, contextual adaptation, and ethical research practices.

Data Collection Procedures

Data collection involved 28 in-depth interviews (IDIs) and 42 focus group discussions (FGDs), conducted across the eight sites. The choice between FGDs and IDIs was based on logistical feasibility, participant availability, and local preferences. In some locations, only one method was feasible. While standard FGD size ranges from 6–12 participants, some groups had as few as four participants due to practical constraints in remote areas. Nevertheless,

these smaller groups provided in-depth insights and allowed for detailed exchanges, especially when participants were carefully selected for their relevance and knowledge (43).

Data Analysis

The results of FGDs and In-Depth Interviews (IDIs) were analyzed using a triangulation approach, a method commonly used in qualitative research to enhance the validity and depth of findings. Patton emphasizes the benefit of integrating multiple data sources to provide a more comprehensive understanding of the research topic (44). In this study, FGDs provided group-level insights into food practices and beliefs, while IDIs allowed for detailed individual perspectives. Both data sources were coded separately in the initial analysis and then integrated during the second phase to identify common themes and patterns across both group and individual data. This integration helped ensure a holistic understanding of the food practices across urban and rural settings.

All IDIs and FGDs were transcribed verbatim and analyzed using "QSR NVivo 12 Pro", a qualitative data analysis software. Data analysis was conducted using two coding cycles (45). In the first cycle, codes are assigned to the data chunks to detect recurring patterns. From these patterns, the second cycle clusters similar codes to create a smaller number of categories or pattern codes. In the first cycle, researchers used in vivo coding. In vivo coding uses words or short phrases from participants' own language in the data record as codes. In the second cycle, we aimed to identify patterns from existing codes and categorize them into fewer broader themes. This structured approach ensured a thorough and systematic analysis of the data, allowing the identification of patterns and themes related to food culture and taboos across different regions and communities. Descriptive and quantitative data visualizations were created using "Python". To improve analytic resilience, the process of encoding and developing themes is discussed periodically with other researchers in the team. Different interpretations are discussed until consensus is reached, and analytic decisions are documented reflectively during the analysis process.

Ethical Approval

This study protocol was approved by the Ethics Committee of IPB University (Approval Number: No. 680/IT3.KEPMSM-IPB/SK/2022). All participants provided informed consent prior to participating in the study. The confidentiality of all participants was strictly maintained throughout the research process.

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RESULTS

Food Choices across Regions in Indonesia

Based on these observations, we categorized the study sites into three clusters of food diversity based on informants' answers in Figure 1. Cluster A (High Diversity) includes regions like Parigi Moutong and North Lombok, which exhibit high food diversity and access to various local ingredients. Cluster B (Moderate Diversity) represents regions like Mataram and Lombok Utara, where food variety is moderate but still includes some local specialties. Cluster C (Low Diversity) includes areas like Sukabumi and Cianjur, which have more limited food options primarily focused on rice and tubers.

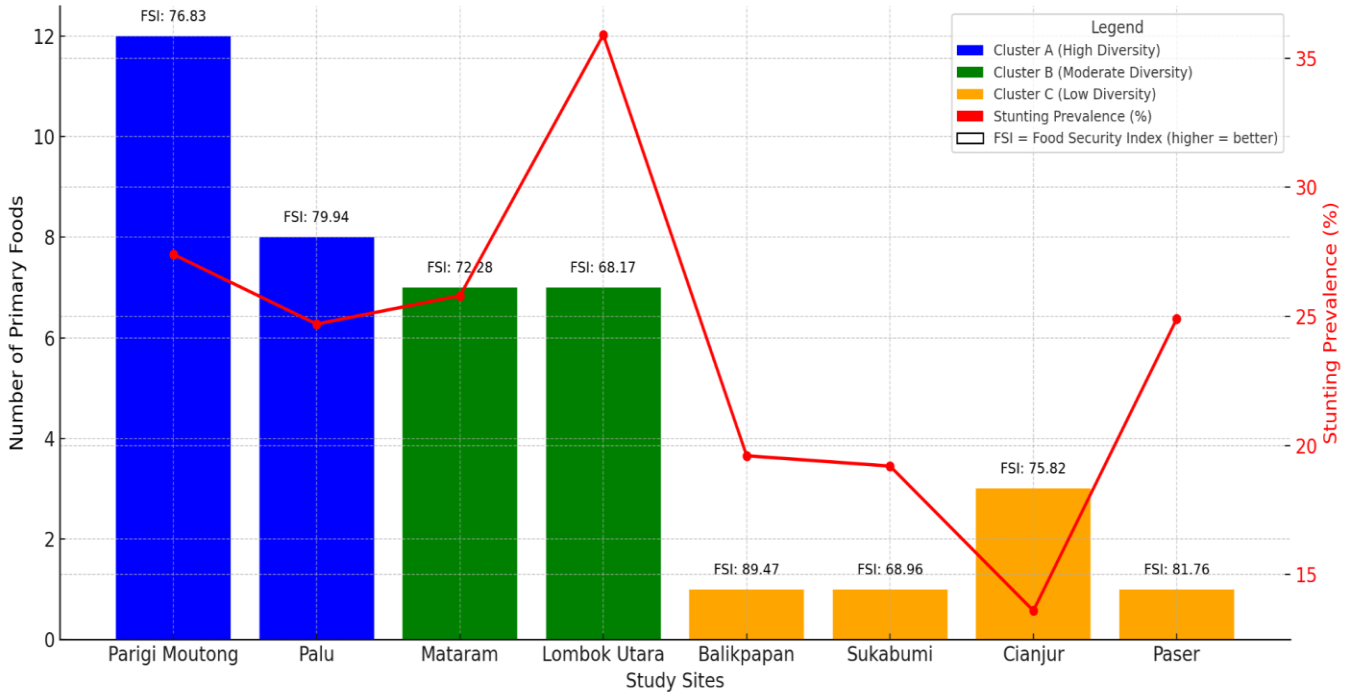

Figure 1. Food diversity, stunting prevalence, and food security index across study sites. Bar colors represent clusters of food diversity: Cluster A (high diversity), Cluster B (moderate diversity), and Cluster C (low diversity). The red line indicates stunting prevalence (%), with higher values signifying worse nutritional outcomes. Food Security Index (FSI) values are labeled above each bar; higher FSI values indicate better food access and security.

Figure 1 presents a composite visualization of food diversity, stunting prevalence, and food security index (FSI) across study sites. While regions such as Parigi Moutong and North Lombok demonstrate high food diversity (Cluster A), they also exhibit some of the highest stunting rates (27.4% and 35.9%, respectively). Conversely, sites like Cianjur, which have relatively low food diversity (Cluster C), report the lowest stunting prevalence (13.6%).

These paradoxical findings from Figure 1, where higher food diversity does not always translate into improved nutrition, are better understood when contextualized through the cultural meanings and beliefs that shape food consumption in each region. Six major themes emerged regarding food beliefs, which are summarized in Table 3.

Table 3. Emerging Themes in Food Beliefs and Cultural Meanings Attached to Commonly Consumed Foods

Theme	Food Item Examples	Key Beliefs	Excerpts from Informants
Staple Food Symbolism and Completeness	Rice	Meal is incomplete without rice, symbol of fulfillment and gratitude to God	"*We have to eat rice, especially for Sundanese people. If we haven't eaten rice, it's like we haven't eaten at all. Even if we've had lontong, ketupat, or porridge, it's still rice that is essential. It is a high carbohydrate food*." Community Health Volunteers, Women, Cianjur
Energy and Satiety Beliefs	Rice, Sago, Sweet Potatoes, Corn, Cassava	Source of strength, keeps you full longer, essential for daily activity	"*The common benefit (from the food) people feel is staying strong and energetic. If you eat sago, it lasts longer in your stomach, or you feel full for a longer time*." Midwives, Palu
Health Benefits and Healing	Moringa Leaves, Banana	Moringa reduces cholesterol and diabetes, fish is	*"The most common vegetable and frequently eaten is moringa. It is easy to grow in the garden and is also cheap",* Mother of Healthy Children from Palu

Theme	Food Item Examples	Key Beliefs	Excerpts from Informants
Beliefs	Blossom, Fish, Sorghum	healthy and protein source	*"Yes, I believe moringa can reduce cholesterol and diabetes. My neighbors also believe this."* Midwives, Parigi Moutong "*In this community, some people also eat sorghum as an alternative to rice for those with diabetes*", Community Health Volunteers, Women, Mataram
Local Production and Accessibility	Spinach, Cabbage, Moringa Leaves, Fish	Foods are valued for being easy to grow or catch, locally available = healthy	*"The most common vegetable and frequently eaten is moringa. It is easy to grow in the garden and is also cheap",* Mother of Healthy Children from Palu "*Fish, being widely available here, is one of the main dishes. It is healthy and locally produced. Living here, it's a must to eat fish*." Religious Leaders, Men, Balikpapan. *"Yes, here the community often eats sago and bananas because there is an abundance of food produced locally.",* Village Heads, Women, Parigi Moutong. "*For regular meals, the vegetables are usually spinach or cabbage. They are widely available here.*" Mother with Healthy Children, Lombok Utara.
Substitution and Adaptive Strategies	Corn Rice, Sweet Potatoes, Cassava	Used as alternative staples when rice is unavailable, mix rice with corn for harvest adaptation	*"The habit here is to mix rice and corn. When the rice harvest fails, rice is mixed with corn to make it more filling."* Midwives, Lombok Utara
Cultural Identity and Social Function	Biapong Cake	Special snack for local events, represents community traditions	"*Biapong cake is a common snack we often eat. It is a local specialty frequently served at events or to guests*." Midwives, Parigi Moutong

Food Recommendations for Mothers and Infants

The previous section explored the broader patterns of daily food choices across study sites, focusing on daily consumption and local available food. It is important to recognize that food practices are not uniform across all demographic groups. We listed several foods on Table 4.

Table 4. Foods Recommended for Mothers and Infant Across Regions

Region	Pregnant Mothers	Breastfeeding Mothers	Infants (0–6 months)	Infants (>6 months)
Sukabumi	Avocado, Mung Beans, Vegetables, Rujak (Fruit salad), Moringa Leaves, Herbal Drinks, Formulated Pregnancy Milk, Coconut Water, Lentik Oil, Cassava, Potatoes	Moringa Leaves, Papaya, Vegetables, Formulated Breastfeeding Milk, Coconut Water, Herbal Drinks	Only Breast Milk, Black Coffee for Fever	Porridge with Vegetables/Fruits, Soft Rice, Mung Beans
Palu	Mung Beans, Vegetables, Fruits, Water Spinach, Proteins	Mung Beans, Vegetables	Only Breast Milk, Colostrum	Porridge with Vegetables, Fruits, Mung Beans
Mataram	Fish, Eggs, Milk, Mung Beans Vegetables, Fruits, Turri Leaves, Soupy Foods, Vitamins	Fruits, Green Vegetables, Legumes	Only Breast Milk, Colostrum, Bananas	Porridge with Fish, Soft Rice, Mung Beans, Carrots

Region	Pregnant Mothers	Breastfeeding Mothers	Infants (0–6 months)	Infants (>6 months)
Balikpapan	Milk, Tofu, Tempeh, Spinach	Same as Pregnant Mothers	Only Breast Milk	No specific recommendation
Cianjur	Formulated Pregnancy Milk, Herbal Drinks, Vegetables, Red Meat, Fish, Rice, Sambal	Formulated Breastfeeding Milk, Herbal Drinks, Fish, Vegetables, Fruits	Only Breast Milk	Instant porridge, Blended Fruits, Regal Biscuits
North Lombok	Vegetables, Vitamins, Legumes	Mung Beans, Vegetables	Only Breast Milk	Strained Porridge, Instant Porridge
Parigi Moutong	Porridge, Sweet Potato Leaves Vegetables, Fruits, Fish, Coconut Water, Moringa Leaves	Banana Blossoms, Porridge, Vegetables, Fruits, Spinach, Moringa Leaves	Only Breast Milk, Colostrum, Bananas	Strained/Instant Porridge
Paser	Green Vegetables, Ginger, Legumes, Canned/Salted Foods, Fish, Coconut Water	Same as Pregnant Mothers	Only Breast Milk, Colostrum	Instant Porridge, Fish, Fruits, Bananas

To better illustrate emerging patterns distinguishing urban and rural recommendations, Figure 2 is comparing the number of foods recommended in urban and rural areas. The figure showed four main themes in the variety of recommended foods between urban and rural areas. The four themes include variety, consistency, location specifics, and commercial influence

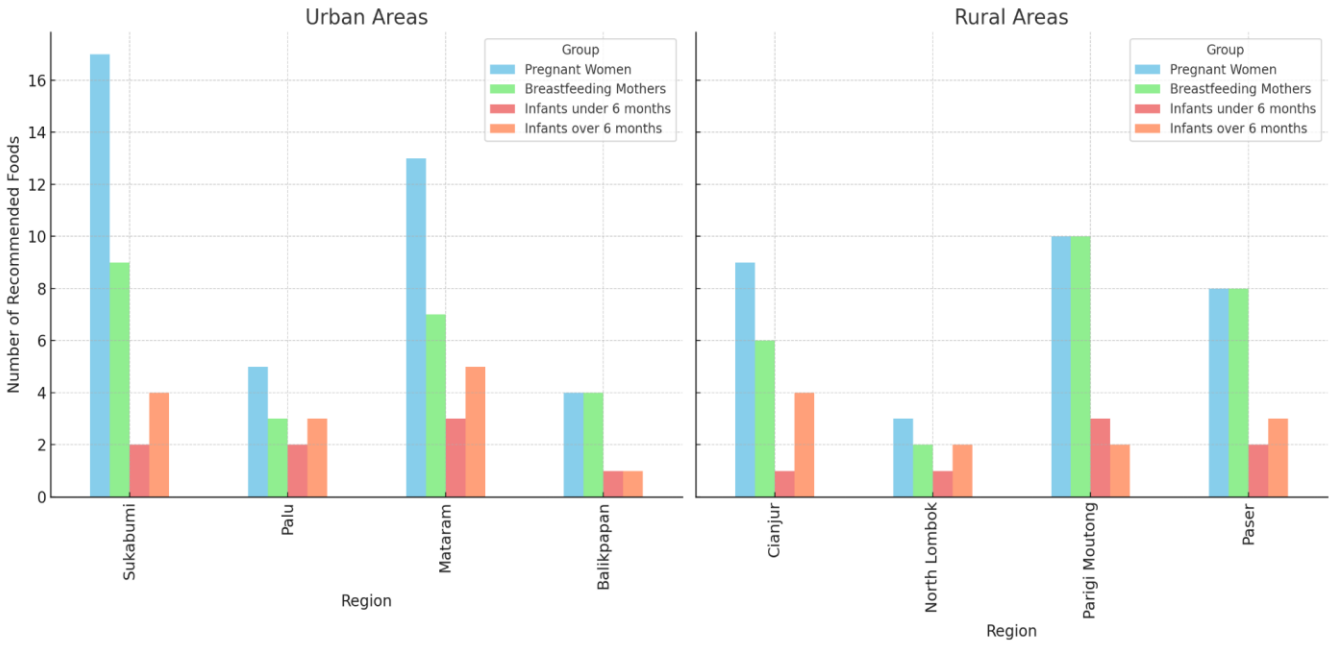

Figure 2. Comparison chart showing the total number of recommended foods in urban and rural areas

Food Taboos for Mothers and Infants

Table 5 presented a cross-regional overview of food taboos, categorized by target group. Across study sites, certain foods such as spicy food, pineapple, jackfruit, squid, and shrimp were commonly restricted for pregnant and breastfeeding women. These taboos were typically motivated by concerns over potential harm to the fetus or baby. For example, spicy foods were believed to "enter the breast milk" and cause digestive issues for infants, while pineapple or jackfruit were feared to cause miscarriage or "soft bones" in the unborn child. These beliefs are consistent with ethnographic literature on Southeast Asian pregnancy taboos.

Table 5. Food Taboos for Mothers and Infant Across Regions

Region	Pregnant Mothers	Breastfeeding Mothers	Infants over 6 months	Infants
Sukabumi	Durian, Spicy Food, Salak, Chicken Tail, Pineapple, Papaya, Banana Blossoms, Noodles, Tapioca, Salted Fish, Fermented Cassava, Chayote, Coconut Water, Avocado, Undercooked Meat	Spicy Food, Fruits, Seafood, Long Beans	Chicken Tail, Hard-textured Food, Spicy and Sour Food, Chicken Feet, Glutinous Rice, Celery, Bananas, Salak	-
Palu	Durian, Pineapple, Spicy Food, Jackfruit, Squid, Shrimp, Coconut-based Food, Mango, Pair Fish, Coconut Water, Ice	Spicy Food, Mango, Jackfruit, Squid, Shrimp, Coconut-based Food, Moringa Leaves, Crab	Corn, Sago	-
Mataram	Spicy Food, Pineapple, Chicken Tail, Squid, Shrimp, Stingray, Durian, Mango, Octopus, Seafood, Hanging and Clustered Fruits, Ice Water	Protein, Spicy Food, Squid, Eggs, Fish, No Fried Food	-	-
Balikpapan	Pineapple, Durian, Spicy Food	Hot Food, Spicy Food	-	
Cianjur	Spicy Food, Durian, Salak, Mango, Pineapple, Jackfruit, Papaya, Banana Blossoms, Fatty Foods	Spicy Food, Chicken Tail, Non-Halal Food, Durian, Salak, Cucumber, Mango, Pineapple, Jackfruit, Protein	Spicy Food, Chicken Tail	-
North Lombok	Spicy Food, Squid, Shrimp, Other Seafood	Spicy Food, Chicken Tail, Protein, Squid, Shrimp	Eggs, Long Beans	Colostrum
Parigi Moutong	Mango, Pineapple, Jackfruit, Fatty Foods, Squid, Stingray, Salted Fish, Banana Blossoms, Roasted Eggplant, Grilled Shrimp, Skipjack, Sweet Foods, Water Spinach, Non-local Fish	Breadfruit, Squid, Salted Fish, Apples, Skipjack, Water Spinach, Anchovy, Non-Halal Food, Cucumber, Mango, Pineapple, Jackfruit	-	-
Paser	Bamboo Shoots, Ginger, Stingray, Eel, Banana Stem, Goat Meat, Deer Meat, Seafood, Eggs, Sweet Potatoes, Jackfruit Leaves, Pineapple, Durian, Hot Foods	Spicy Food, Bamboo Shoots, Goat Meat, Deer Meat, Chicken, Fried Food, Seafood, Eggs, Sweet Potatoes, Durian, Hot Foods	Bamboo Shoots, Spicy Food, Foods with MSG	Colostrum

Meanwhile, Figure 3 compares the overall prevalence of food taboos across rural and urban sites. Several patterns emerge: (1) prevalence; (2) groups affected; (3) cultural specificity; and (4) consistency.

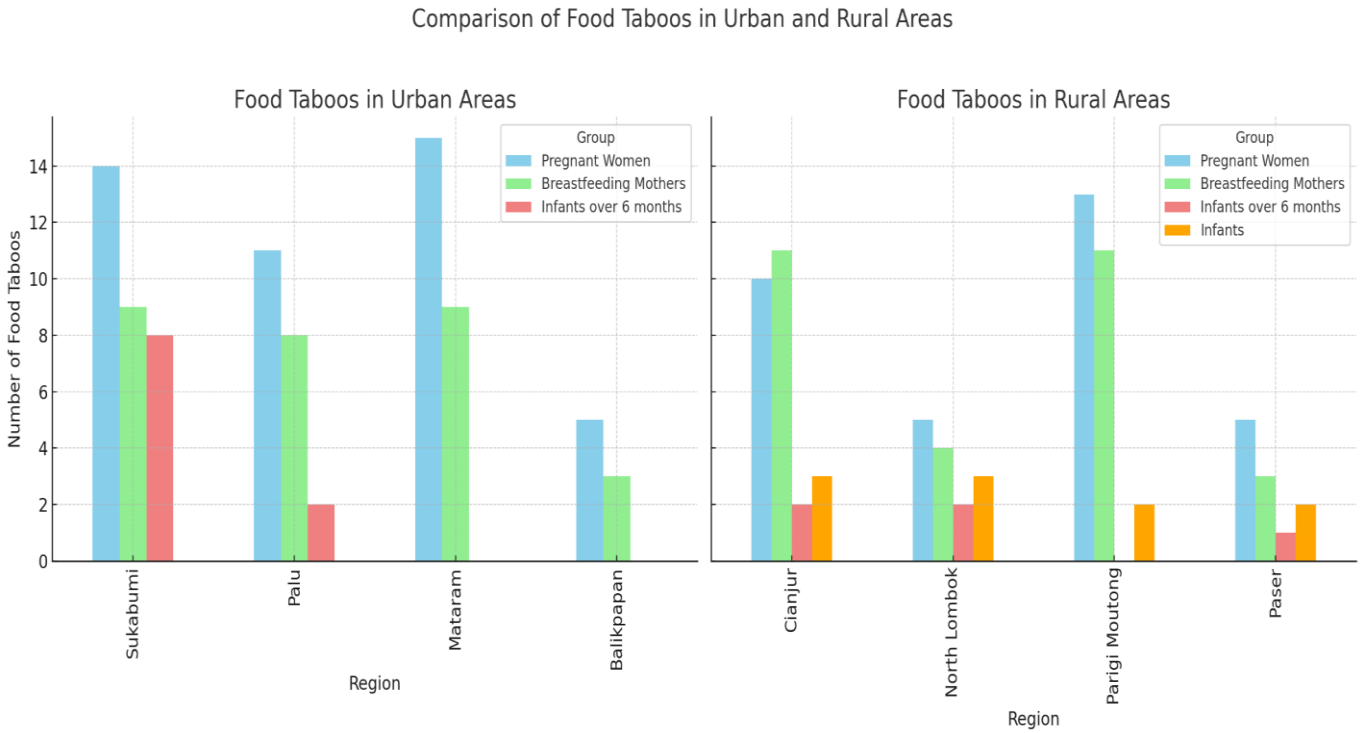

Figure 3. Comparison chart showing the total number of food taboos in urban and rural areas

DISCUSSION

Food Choices across Regions in Indonesia

Analysis of food choices across the study sites revealed substantial variation, particularly in how commonly consumed foods were defined by participants. In Cianjur and Sukabumi, the food choices are dominated by rice, sweet potatoes, and cassava. Rice was consistently mentioned as the primary food, reflecting not only its role as the main carbohydrate source but also its cultural significance as an essential component of a "proper meal". This finding is consistent with other research that rice is not only the dominant staple in regions like Cianjur and Sukabumi, but Indonesia as whole that holds deep cultural significance, reflecting a broader national pattern where rice is perceived as an essential component of a proper meal (46). This finding underscores a food culture where rice is synonymous with the concept of food itself.

In contrast, rural sites such as North Lombok, Paser, and Parigi Moutong, participants listed a broader variety of foods when asked about daily food choices. Their responses included sago, moringa leaves, banana blossoms, and fish, indicating a more diverse food system. The variety of foods, including lesser-consumed items such as banana blossoms, *biapong* cake (a round, white-bread-like snack filled with coconut and sugar), and taro, illustrates a diverse diet that incorporates both staple foods and unique, culturally significant items. Sago and corn rice are characteristic of Eastern Indonesia (47,48), while moringa leaves, sweet potato leaves, and banana blossoms are also commonly found in household gardens, making them easily accessible for self-cultivation (49,50). Here, the notion of a primary food source was less anchored to a single commodity, as the foods most regularly relied upon, shaped by local accessibility than cultural fixation (51).

While Cianjur and Sukabumi are categorized as low-diversity sites, this classification obscures important internal variation. For instance, Cianjur is administratively urban, but participants described food access and practices more typical of rural communities. This finding highlights the limitations of generalizing from urban–rural categories without accounting for infrastructural, economic, and cultural distinctions within each zone.

We found these variations in food diversity are important as they reflect the availability of different food groups, which directly impacts dietary patterns and nutrition outcomes. However, Figure 1 shows some meaningful insight. This paradox indicates that dietary diversity alone does not guarantee improved nutritional outcomes.

Socioeconomic factors such as household poverty, healthcare access, maternal education, and persistent food taboos play critical roles. Despite moderate-to-high food security scores in some areas (Paser and Palu), high stunting rates persist, suggesting that food access must be accompanied by effective nutrition knowledge and healthcare utilization. These findings challenge the common assumption that dietary diversity leads directly to improved nutritional outcomes (52,53). While food variety was higher in Eastern sites, this did not translate into better nutrition outcomes. Structural factors—such as household poverty, limited maternal education, weak health infrastructure, and cultural taboos—appear to mediate the relationship between diet and stunting. This pattern aligns with recent national data showing that Eastern provinces face systemic service gaps despite rich agro-biodiversity (39).

In Table 3, six major themes emerged regarding food beliefs. The first theme, staple food symbolism and completeness, highlights the centrality of rice, particularly in West Java (Cianjur and Sukabumi), where meals are culturally perceived as incomplete without rice. Rice was perceived not only as a dietary staple but as a symbol of energy, satiety, and gratitude to God. In western Indonesia, rice is considered a staple food, with cassava and sweet potatoes as supporting foods. Indonesia has a long history of rice cultivation, particularly on Java Island (54). During Suharto's regime, Indonesia achieved rice self-sufficiency in 1984 by expanding its agricultural land for rice fields. This history and policy show how rice became the main food in Indonesia, especially in Java (55). Rice is also regarded as a gift from God, as reflected in local legends about Dewi Sri, a goddess who protects rice (54). This shows that rice has a complex history intertwining agricultural system and policy, industrialization, cultural, and spiritual significance.

The second theme, energy and satiety beliefs, was reflected in how foods like sago, sweet potatoes, corn, and cassava were valued for their ability to sustain physical energy and maintain satiety throughout the day. Particularly in rural sites, foods that prolonged the feeling of fullness were highly favored. Cassava and sweet potatoes have historically been used as alternatives to rice, although their cultivation is not as extensive as rice (56). The third theme, health benefits and healing beliefs, was evident in the way participants described the consumption of moringa leaves, banana blossoms, and fish. These foods were associated with specific health benefits, such as lowering cholesterol and preventing diabetes, indicating that health-related attributes influenced food choices.

The fourth theme, local production and accessibility, emphasized the role of environmental availability in shaping food beliefs. Foods like spinach, cabbage, and fish were valued not only for their nutritional qualities but also because they were easy to access, grow, or catch locally, reinforcing the interplay between ecological context and food meaning. The fifth theme, substitution and adaptation strategies, reflected the community-level strategies for coping with agricultural shortfalls. In some areas, mixing rice with corn or substituting cassava during rice shortages demonstrated both ecological adaptation and cultural flexibility in sustaining food traditions. Finally, the sixth theme, cultural identity and social function, emerged in discussion of foods like Biapong cake, which were associated with social events and local identity, highlighting how food beliefs extend beyond health or survival to encompass social cohesion and cultural celebration.

Food Recommendations for Mothers and Infants

Mothers, particularly during pregnancy and breastfeeding, along with infants and young children, represent nutritionally vulnerable populations who are often subject to distinct food recommendations shaped by cultural beliefs, local knowledge systems, and available resources (1,2). Understanding the specific foods recommended for these groups provides critical insights into how food choices are prioritized and adapted within different life stages and social contexts (57). This section examines those recommendations across different sites, highlighting the interplay between traditional knowledge and modern influences.

The analysis of food recommendations across the study sites, in Table 4, revealed a rich diversity in both the types of foods suggested and the underlying cultural rationales. In North Lombok, recommendations for mothers frequently emphasized the consumption of moringa leaves, sweet potato leaves, and mung beans, valued for promoting postpartum recovery and enhancing breast milk production. As mentioned,

> *"Moringa is for health. It helps with recovery and breast milk. That's why mothers are told to eat it after childbirth. It is easy to find moringa leaves here"*—Midwife, North Lombok

Similarly, in Parigi Moutong, recommendations centered on consuming cassava leaves, banana blossoms, and local fish, perceived as important for strength and healing. In Paser, coconut water and herbal drinks were

recommended for similar purposes. Meanwhile, in urban areas such as Sukabumi and Mataram, include formulated pregnancy milk, vitamin-enriched breastfeeding supplements, and commercial multivitamins, reflecting the influence of modern health information and market access.

"Pregnant women are told to drink milk for the baby's brain. They also take vitamins from the health post."— Community Health Volunteer, Sukabumi

The recommendations also include foods believed to accelerate postpartum recovery for the mothers, such as catfish, green vegetables, spices like ginger, or boiled foods. Traditional and locally grown foods, such as tamarind, ginger slices, and sambal, are more prevalent in rural diets. This reliance on local and traditional foods reflects both the availability and cultural practices in these areas.

Regarding infant feeding practices, colostrum was generally encouraged across most sites, recognizing its importance in building infant immunity. Breastfeeding was universally promoted, with exclusive breastfeeding for the first six months widely endorsed. However, in Mataram and Parigi Moutong, bananas are still mentioned for infants. Differences emerged on complementary feeding recommendations. In rural sites like Parigi Moutong and Paser, complementary foods remained largely home-prepared, including mung bean porridge, porridge, and vegetable-based porridge. In contrast, urban sites such as Sukabumi and Mataram showed greater adoption of commercially prepared foods, with parents recommending instant porridge, commercial baby cereals, and even commercial biscuits for young children. Often seen as convenient and modern, these foods have also entered some rural areas, indicating that processed products are no longer confined to urban contexts (58).

To compare the food recommendations across study sites, a comparison chart is shown in Figure 2. The figure showed four main themes in the variety of recommended foods between urban and rural areas: (1) variety: urban areas featured a broader variety of recommended foods for pregnant women, breastfeeding mothers, and infants compared to rural areas like North Lombok and Paser; (2) consistency: breastfeeding was universally emphasized across regions. For infants over 6 months, porridge mixed with rice, vegetables, fruits, or fish is a common recommendation; (3) location specifics: certain foods are uniquely recommended in specific locations. For instance, fish is more commonly recommended in Mataram and Palu; and (4) commercial influence: Urban areas show a tendency towards more commercially available products like formulated pregnancy milk and instant porridge. However, this tendency also occurred in rural areas.

The diversity of food recommendations across sites reflects how maternal and infant nutrition is shaped by multilevel influences. In rural areas, the prominence of plant-based and home-prepared foods aligns with both ecological availability and strong community reliance on traditional knowledge systems. In contrast, urban sites displayed more diversified and commercialized dietary advice, reflecting access to health facilities, exposure to advertising, and greater purchasing power. These patterns echo the nutrition transition described in Southeast Asia, where urbanization and economic development shift urban and rural household diets toward more processed and market-based foods (30,59).

Food Taboos for Mothers and Infants

Food taboos refer to the intentional avoidance of certain foods due to cultural norms rather than personal preference or medical advice (60,61). Some studies suggest that malnutrition is indirectly caused by food taboos (62). These taboos are deeply rooted in tradition, often transmitted across generations through oral knowledge or ritual practices. While they may be perceived as protective for the mother or infant, food taboos can also significantly impact nutritional status to these demographics. Table 5 provides an overview of cross-regional food taboos, categorised by target group.

In many areas, people believe that breaking a food taboo can cause direct harm, like stomach problems, skin rashes, or illness in the baby. Others fear spiritual consequences, such as bad luck or a child developing slowly. In contrast, some mothers in urban areas said they tried foods like eggs or bananas despite taboos, especially after receiving advice from health workers. These examples show that beliefs can be strong, but some people are beginning to question or change them.

Food taboos also extended to infants and young children, especially in rural sites. In North Lombok dan Paser, infants were not allowed to consume eggs which are nutritionally valuable protein sources. In Cianjur, infants were restricted from eating chicken tails and spicy foods. These taboos were shaped by spiritual concepts such as

'pamali' (a Sundanese term for forbidden), often cited in Cianjur, and similar beliefs in Parigi Moutong, where violations were linked to bad luck or supernatural consequences. These beliefs were not only maintained by elders in the community, and sometimes for health volunteers or traditional birth attendants, especially in rural areas (63,64).

A particularly striking finding was the taboo surrounding colostrum in certain regions. In North Lombok and Paser, it was believed that colostrum, the first drops of breast milk, was dirty or spoiled and should be discarded. Some mothers were also advised to discard breast milk after returning from outside the house, based on beliefs that it had been contaminated. These practices stand in direct contrast with scientific consensus, which recognizes colostrum as rich in antibodies and essential for neonatal immunity (65). The persistence of such practices underscores the importance of culturally sensitive breastfeeding education.

"Here, the practice is that the breast milk must be discarded first when the mother returns from going out, until clear milk comes out, or a little bit should be discarded when the baby is first born as a requirement."
—Midwife, North Lombok Regency.

"Eggplant and shrimp should not be grilled, as it is said to attract evil spirits and bad things into our lives."
—Community health worker, Parigi Moutong

On the other hand, strict adherence to food taboos can trap communities in cycles of poor health. Food taboos in rural areas are more diverse compared to urban areas. Previous studies have noted high adherence to food taboos in rural areas (2). Rural communities with less access to education and modernization are more likely to maintain traditional taboos. However, this study finds that belief in food taboos persists in urban areas, a topic not extensively covered in earlier research. In Eastern Indonesia, participants tended to adhere more strongly to taboos, while in Western Indonesia, participants were more skeptical or unsure. In Eastern Indonesia (e.g., Parigi Moutong, North Lombok, and Paser), participants expressed taboos with strong conviction, using definitive language such as "you must not eat that" or "it will harm the baby." These beliefs were often rooted in spiritual or ancestral logic and enforced by respected community figures like elders or traditional birth attendants. In contrast, participants from Western Indonesia (e.g., Cianjur and Sukabumi) tended to express food taboos in more uncertain or qualified terms, using phrases like "I heard it's not good" or "some people say that." This pattern suggests a regional gradient, with the Central and East exhibiting more rigid belief systems and the West showing greater ambivalence or openness to reinterpretation.

This distinction is programmatically significant. In areas with rigid taboos, nutrition interventions must engage with local cosmologies and involve trusted cultural intermediaries to shift beliefs without triggering resistance (66,67). In contrast, in settings where taboos are more negotiable, evidence-based messaging and peer-led approaches may be more effective (68). Understanding this gradient of belief helps tailor interventions that respect local knowledge systems while addressing nutritional risks posed by restrictive food taboos.

Meanwhile, Figure 3 compares the overall prevalence of food taboos across rural and urban sites. Several patterns emerge: (1) prevalence, taboos are widespread across both urban and rural areas for pregnant and breastfeeding women. However, rural sites show more food taboos affecting infants and children; (2) scope of restriction: in urban areas, taboos primarily affect adult women, whereas in rural settings, the restrictions often extend to children and infants over 6 months; (3) cultural specificity: local beliefs shape the type and logic of food taboos. In coastal communities, seafood is more commonly restricted in upland areas, agricultural products like jackfruit or eggplant are avoided; and (4) consistency: spicy foods and tropical fruits were universally restricted for pregnant and breastfeeding women, suggesting a culturally widespread interpretation of food's impact on reproductive health.

Figure 3 highlights four themes regarding food taboos in urban and rural areas: (1) prevalence of food taboos: both urban and rural areas exhibit a significant number of food taboos for pregnant women and breastfeeding mothers. Urban areas have fewer food taboos for infants over 6 months compared to rural areas, which also include food taboos for infants; (2) groups affected: in urban areas, the focus of food taboos is mainly on pregnant women and breastfeeding mothers, with fewer restrictions for infants over 6 months. In rural areas, food taboos extend beyond pregnant women and breastfeeding mothers to include infants, and infants over 6 months, showing a broader impact across different age groups; (3) cultural influence: the number and type of food taboos are influenced by cultural practices and local beliefs, as seen in the variations between regions within both urban and rural areas; and (4) consistency across groups: there is a consistency in food taboos for pregnant women and breastfeeding mothers across

both urban and rural areas, indicating a common cultural belief system regarding food restrictions during pregnancy and lactation.

This study demonstrates how food practices, ranging from daily choices to cultural taboos, are shaped through interactions across multiple levels of the socio-ecological model. By analyzing beliefs and behaviors across diverse regions in Indonesia, we show that food is not merely nutritional, but socially and symbolically constructed.

At the individual level, food choices were guided by both perceived function and cultural symbolism. Participants frequently described certain foods as energizing or healing (e.g., rice, moringa, sago), shaping everyday consumption. In West Java, rice was consistently viewed as essential to a "real" meal, a belief reinforced by decades of state policy and cultural narratives (54,69). Meanwhile, in Eastern regions like Parigi Moutong and North Lombok, diverse staples including cassava, banana blossoms, and local fish reflected a broader interpretation of "main food" grounded in ecological availability rather than cultural prestige (51).

At the interpersonal level, informal social networks, particularly elders, neighbors, and health volunteers, played a pivotal role in sustaining food taboos and promoting certain dietary behaviors. Taboos against pineapple or jackfruit during pregnancy, or eggs and seafood for infants, were often enforced despite nutritional value. At the community level, these patterns mirror findings across Southeast Asia and Africa, where caregivers frequently prioritize culturally embedded advice over formal nutrition education (2,12).

Community-level food norms reflected both ecological constraints and shared beliefs. Foods that were locally grown or easily sourced—such as moringa leaves, freshwater fish, or spinach—were seen as healthier not solely due to nutrient content but because they were familiar, accessible, and perceived as "natural." These perceptions illustrate how health is culturally localized and often aligned with what is ecologically sustainable. This finding is consistent with a study in Yogyakarta where traditional plant-based foods that are inexpensive and locally available were considered healthy (70).

At the societal level, historical and institutional forces shaped perceptions and access to food. For example, the rice self-sufficiency program of the 1980s institutionalized rice as the ideal staple, especially in Java, creating structural preferences that persist today (55). Meanwhile, urbanization and commercial food markets in cities like Sukabumi and Mataram have facilitated access to commercial products (e.g., instant porridge, vitamin supplements), shifting food recommendations toward packaged and fortified options. These trends mirror the broader nutrition transition occurring in Indonesia, where urban diets are becoming more processed and market-driven (30).

Importantly, this study reveals that diverse food environments do not always equate to better nutrition outcomes. Although Eastern regions displayed greater food variety, they also reported higher stunting and food insecurity rates. This indicates that structural inequalities, such as poverty, poor sanitation, and limited access to health care can override the benefits of dietary diversity (71). Policies aiming to improve nutrition must therefore address both cultural appropriateness and infrastructure equity.

The persistence of food taboos, even in urbanized areas, highlights the importance of culturally grounded interventions. Public health efforts should move beyond simple information dissemination and engage trusted local figures, such as midwives, village heads, or traditional birth attendant, to align scientific guidance with local values. These findings suggest that nutrition policies in Indonesia must move beyond standardized, top-down interventions. Effective strategies should be decentralized and tailored to local food ecologies, social norms, and belief systems. This includes integrating culturally trusted actors into behavior change efforts, investing in community-based health infrastructure, and addressing structural barriers—such as poverty and sanitation—that undermine dietary improvements even in diverse food environments (29,68).

By applying the socio-ecological model, this study demonstrates that food behaviors are not isolated choices but multi-level constructs, but shaped by personal beliefs, family and community dynamics, ecological constraints, and policy legacies. In this context, the paradoxical finding of high dietary diversity coexisting with persistent stunting reflects structural malnutrition, where low-cost, nutritionally limited options often dominate dietary choices due to economic and political constraints. For Indonesia's diverse regions, one-size-fits-all nutrition policies are unlikely to succeed. Instead, adaptive strategies that recognize regional diversity, strengthen community-level knowledge systems, and invest in health and education infrastructure are essential to achieving meaningful improvements in dietary practices and nutrition outcomes.

While the rural–urban distinction offers useful framing, it often oversimplifies more complex realities. Within both rural and urban categories, considerable variability exists in health access, economic opportunity, and cultural beliefs. Recent data shows significant nutritional differences across provinces and districts, even among areas classified under the same category (26,72). For example, rural districts on Java may fare better nutritionally than those in Eastern Indonesia. Peri-urban communities, meanwhile, increasingly face a dual burden of undernutrition and rising obesity (73). These intra-category differences point to a methodological limitation in this study. Future research should consider more nuanced classification systems, such as socio-economic strata, geographic subtypes, or ethnic groupings to better capture local dynamics.

In conclusion, this study contributes to a growing body of literature emphasizing that food practices are socially enacted and structurally conditioned. By using the socio-ecological model, we offer a comprehensive lens for understanding food practices in Indonesia, that integrates personal beliefs, community norms, ecological contexts, and historical factors. Addressing nutrition challenges in this setting will require not only technical solutions but also a culturally sensitive, equity-driven, and system-oriented approach.

CONCLUSION

This study shows that food choices, food recommendations, and food taboos for mothers and infants in Indonesia are shaped by many levels of influence. Using the socio-ecological model, we found that food practices are affected by individual beliefs, advice from family and community members, the local environment, and national-level factors such as urbanization and food programs. Applying this model helped explain how culture, food availability, and public systems interact to influence what people eat and avoid during key stages like pregnancy and early childhood.

The findings also support the use of Social and Behavior Change Communication (SBCC) approaches in nutrition programs. Food-related behaviors are often maintained through advice shared by parents, elders, traditional birth attendants, and health volunteers. These communication networks influence decisions as much as, or more than, formal health information. Programs that aim to change food-related behaviors should work with these trusted sources and adjust their messages to local beliefs, rather than only delivering standardized facts or guidelines, and should be designed differently according to regional contexts (e.g., rural–urban and East–West Indonesia) to align with local social structures and food systems.

For policy and practice, this study suggests that nutrition interventions must be adjusted to fit different regions. A single approach will not be effective across diverse communities. Governments and health programs should consider local food environments, cultural norms, and communication styles when designing nutrition strategies. Working across sectors—health, education, agriculture—and involving local leaders will improve how communities receive and respond to nutrition messages, especially for women and children.

AUTHOR CONTRIBUTION STATEMENT

AK hosted and coordinated the project. AK, HR, AF, and AVRM conducted the field study in West Java. BS, AR, MD conducted the field study in East Kalimantan, Central Sulawesi, and West Nusa Tenggara, respectively. AUS performed the data analysis. AUS and VAN wrote the original draft. All authors were involved in the review of the manuscript. All authors read and approved the final manuscript.

CONFLICTS OF INTEREST

All authors declare that they have no conflicts of interest related to this article. Authors confirm that no financial or personal relationships exist with entities that could influence the impartiality of the research. This declaration upholds the integrity of the study by transparently addressing potential influences on the research outcomes, thereby reinforcing the credibility and trustworthiness of the article.

DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

Generative artificial intelligence (AI) tools were used for language refinement and structural editing during the preparation of this manuscript.

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