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Optimizing Local Food Systems for Public Health: Insights from Distribution and Consumption Challenges in East Kalimantan

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Abstract:

Aims: This study analyzed the potential of local foods in East Kalimantan, the consumption patterns, and nutritional risk factors of pregnant women and designed sustainable interventions and evidence-based policy recommendations to improve food security and mother-child health holistically.

Background: East Kalimantan is rich in diverse local foods, such as endemic fish, yams, and sago, which are nutrient-dense. However, these foods are often perceived as less prestigious compared to commercial foods, limiting their utilization. Nutritional deficiencies, particularly among pregnant women, are a significant issue in the region, necessitating sustainable solutions to improve maternal-child health.

Objective: This study aimed to explore the potential of local foods, identify consumption patterns and nutritional challenges among pregnant women, and propose evidence-based interventions and policies to address food security and health issues in East Kalimantan.

Methods: The study employed a qualitative research design involving in-depth interviews with key stakeholders, such as provincial-level government agencies related to food management, wholesale market traders, pregnant women, and nursing mothers. A literature review complemented the interviews to examine perceptions, accessibility, and policies regarding local foods. Data analysis was performed using NVivo software for thematic coding.

Result: The findings revealed several challenges in utilizing local foods, including unequal distribution, inadequate infrastructure, and social stigma that devalues local foods as less prestigious than commercial products. Programs like Diverse, Nutritious, Balanced, and Safe have raised awareness about the benefits of local foods but have not been implemented consistently across the region. Rural areas have better access to local foods, while urban areas are more reliant on commercial food products.

Conclusion: The study highlights the importance of nutrition education, infrastructure development for better distribution, and cross-sector collaboration to optimize the use of local foods. Addressing these challenges can significantly improve food security and the nutritional status of vulnerable populations, particularly pregnant women, in a sustainable manner.This study highlights local food systems' role in food security and maternal health, providing insights for policymakers and emphasizing collaboration to build a sustainable, resilient food system in East Kalimantan.

Keywords: Local food, Food security, Nutrition of pregnant women, Mother-child health, Market traders, Nursing mothers.

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1. INTRODUCTION

Food security and nutrition are critical components of maternal health, directly influencing the growth and development of the fetus during pregnancy. East Kalimantan Province, designated as the new capital of Indonesia, boasts abundant natural resources; however, significant challenges in food security and nutrition persist. Pregnant women often experience nutritional deficiencies that adversely impact their health and the development of their fetuses [1]. Maternal nutrition is a pivotal determinant of fetal growth, necessitating targeted interventions to mitigate food insecurity and enhance neonatal health outcomes [2, 3]. These challenges underscore the urgency of investigating local solutions to address maternal nutritional needs effectively.

One of the primary nutritional issues faced by pregnant women is iron deficiency, which often results in anemia. Anemia during pregnancy is associated with fatigue, weakened immunity, and severe complications, such as preterm births [4, 5]. Additionally, folic acid deficiency remains a persistent concern, as it is essential for preventing neural tube defects such as spina bifida and supporting rapid cellular growth in fetuses [6]. Calcium deficiency, critical for fetal bone and tooth development, as well as maternal bone health, increases the risk of osteoporosis in pregnant women. Protein, a fundamental nutrient for fetal growth and development, when deficient, hampers fetal progress and increases the risk of preterm delivery [7, 8].

Furthermore, vitamin D deficiency compromises calcium absorption and bone formation, leading to skeletal problems and chronic disease risks for expectant mothers. Sufficient energy intake is also imperative to support fetal development and physiological changes during pregnancy; its deficiency often leads to maternal weight loss and an increased risk of preterm birth [9]. Unbalanced diets, lack of food variety, and irregular eating patterns exacerbate nutritional deficiencies, posing substantial health risks for both mother and child.

Despite its wealth of natural resources, East Kalimantan has underexplored the potential of its local foods, which are rich in essential nutrients such as iron, folic acid, calcium, protein, and energy. Studies indicate that effective utilization of these resources could significantly enhance maternal nutrition and food security [10]. However, comprehensive knowledge of the potential role of these local foods in ensuring food security and maternal nutrition remains limited. Research on this topic is crucial to developing interventions tailored to the nutritional needs of pregnant women in East Kalimantan, thereby aligning with governmental efforts to improve maternal and child health outcomes [11]. Leveraging local food resources sustainably can address food security challenges and promote better health outcomes [12]. Understanding local contexts and community preferences is vital for designing precise, sustainable interventions to tackle these issues effectively.

The central problem addressed in this study is the prevalence of nutritional deficiencies among pregnant women in East Kalimantan, exacerbated by limited access to diverse and nutritious foods. Although anemia caused by iron deficiency and complications arising from other nutrient deficits have been documented, the availability and utilization of nutrient-dense local foods remain underexplored. A general solution to this issue lies in promoting better awareness, accessibility, and utilization of local food sources. Additionally, tailored nutritional interventions during pregnancy are essential to mitigate the adverse health impacts of nutritional deficiencies. The research emphasizes the potential of local food resources as a sustainable solution to improve maternal and neonatal health outcomes.

Existing literature highlights various strategies to address maternal nutritional deficiencies. Supplementation programs targeting iron, folic acid, calcium, protein, and vitamin D have demonstrated success in reducing anemia, preventing neural tube defects, and improving maternal bone health [4, 5]. Food fortification and community-based nutritional counseling have also proven effective in enhancing dietary diversity and nutrient intake among pregnant women [6, 8]. While these approaches provide generalized solutions, they often fail to incorporate local food systems and cultural contexts, thereby limiting their sustainability and impact in specific regions such as East Kalimantan.

Studies have also highlighted the benefits of leveraging local food resources to address nutritional deficiencies. A study by Enthroven *et al.* specifically underlines the importance of integrating traditional and local food sources into maternal nutrition programs to ensure cultural acceptability and cost-effectiveness [10]. Wahi *et al.* advocate for qualitative research to understand the role of local foods in enhancing maternal nutrition [11]. Furthermore, Fanzo *et al.* emphasize the need for multi-stakeholder collaboration in optimizing local food systems to promote food security and nutrition [12]. These findings underscore the potential of local food systems as sustainable solutions to maternal nutrition challenges.

Despite these advancements, there remains a significant research gap in comprehensively analyzing the nutritional potential of local foods in East Kalimantan, and their role in improving maternal health outcomes. Current studies lack a focused examination of how local food resources can be effectively utilized to meet the nutritional needs of pregnant women in this region. This gap highlights the necessity for region-specific research that integrates local food systems, community preferences, and sustainable nutritional interventions. Addressing this gap is crucial for developing targeted strategies to improve maternal and neonatal health outcomes in East Kalimantan.

The primary objective of this study is to identify and analyze the nutritional potential of local foods in East Kalimantan, focusing on their role in enhancing food security and meeting the nutritional needs of pregnant women. This research aims to explore dietary patterns among pregnant women, identify risk factors contributing to nutritional imbalances, and propose sustainable

interventions to address these issues. Additionally, the study seeks to provide evidence-based recommendations to policymakers and stakeholders for optimizing local food resources to improve maternal and child health outcomes. By incorporating local contexts and community preferences, this research contributes to the development of precise, sustainable solutions for food security and nutrition challenges in East Kalimantan. The novelty of this study lies in its integrative approach, which combines qualitative research, local food system analysis, and community-based interventions to address maternal nutritional needs comprehensively.

2. METHODS

The data collected included information on potential identification, regional policies on local food management and utilization, and challenges in implementation. The method used was phenomenological, and data were collected through in-depth interviews. Informants for in-depth interviews included representatives from the Health Office, Food Security Office, Agriculture Office, Livestock Office, and Fisheries and Marine Office at the provincial government level.

The Ethical feasibility test was submitted to the Social Humanities Ethics Commission of the National Research and Innovation Agency. This research received a certificate of ethical feasibility No.359/KE.01/SK/05/2024 on April 24, 2024.

Data analysis was performed using NVivo 12 software to support a systematic and traceable qualitative coding process. NVivo was selected due to its ability to efficiently manage large volumes of textual data and facilitate thematic coding aligned with the study's phenomenological approach. The software enabled the organization of interview transcripts, identification of key themes, and analysis of cross-cutting issues across diverse stakeholders. This approach followed the method devised by Miles *et al*., which includes descriptive, process, and NVivo-assisted coding [13]. The use of NVivo contributed to analytical rigor, allowing for an in-depth exploration of participants' perceptions, policy challenges, and social constructs surrounding local food utilization.

This study has several limitations that may affect the interpretation and generalization of the data. First, the research was conducted in a specific regional context —East Kalimantan—which may limit the applicability of the findings to other areas with different socio-economic, ecological, or policy conditions. Second, the use of a qualitative phenomenological approach. While suitable for exploring stakeholder perceptions in-depth, it does not allow for statistical generalization or quantification of outcomes. Third, external factors, such as evolving national policies, climate change, and global market dynamics, were not within the scope of analysis but may significantly influence the local food system. These constraints should be considered when interpreting the results, and future research incorporating broader geographic coverage and mixed-method approaches is recommended to enhance the robustness and generalizability of the findings.

Although statistical tests were not applied due to the qualitative nature of the study, descriptive analysis was used to summarize participant characteristics and thematic frequencies. The sample size (n=15) was determined based on data saturation, ensuring thematic redundancy. For future research, a mixed-method approach is recommended to strengthen generalizability and incorporate statistical validation (**Supplementary material**).

3. RESULTS

3.1. Identification of Local Food Potential

Local food in East Kalimantan has a wide diversity, including fishery products such as tilapia, catfish, tuna, and the endemic terrapin; agricultural products such as corn, cassava, sweet potato, sago, and taro; and livestock products such as beef, buffalo, goat, and chicken. In addition, fruits such as bananas, pineapples, and oranges, as well as unique plants such as barley and moringa, enrich the region's food diversity. These local foods have distinctive characteristics, anchovies, for example, have high economic value, and sago and taro are alternative sources of carbohydrates. Similarly, some foods are rich in protein, such as cork fish and tuna, while Moringa leaves contain iron, which is useful for treating anemia, especially for pregnant women. Local foods play an important role in supporting food security and community nutrition, especially in rural areas that have easier access to these resources [14]. However, the main challenge is the public perception that local food is less prestigious than commercial food, as well as distribution constraints to hard-to-reach rural areas. The government has made various efforts, such as technical training, socialization of local food benefits, and promotion of value-added products, but more intensive collaboration is needed to increase acceptance and utilization of local food [12, 15]. This is illustrated in Fig. (**1**).

Local food utilization in East Kalimantan also shows a marked difference between rural and urban areas. Rural communities consume more local food due to easier access, while urban communities tend to choose commercial food that is considered more modern. The high fish consumption in coastal areas, which reaches an average of 58 kg per capita per year, reflects great potential in supporting the nutritional needs of the community, including pregnant women. However, uneven distribution and negative stigma towards local food hamper its optimal utilization [16, 17]. Food diversification programs, such as Diverse, Nutritious, Balanced, and Safe, along with education on the benefits of local food, are steps that have been implemented to increase local food consumption, although the results have not yet been optimal. Fig. (**2**) presents examples of local food in East Kalimantan.

Fig. (1). Perception towards identification of local food potentials.

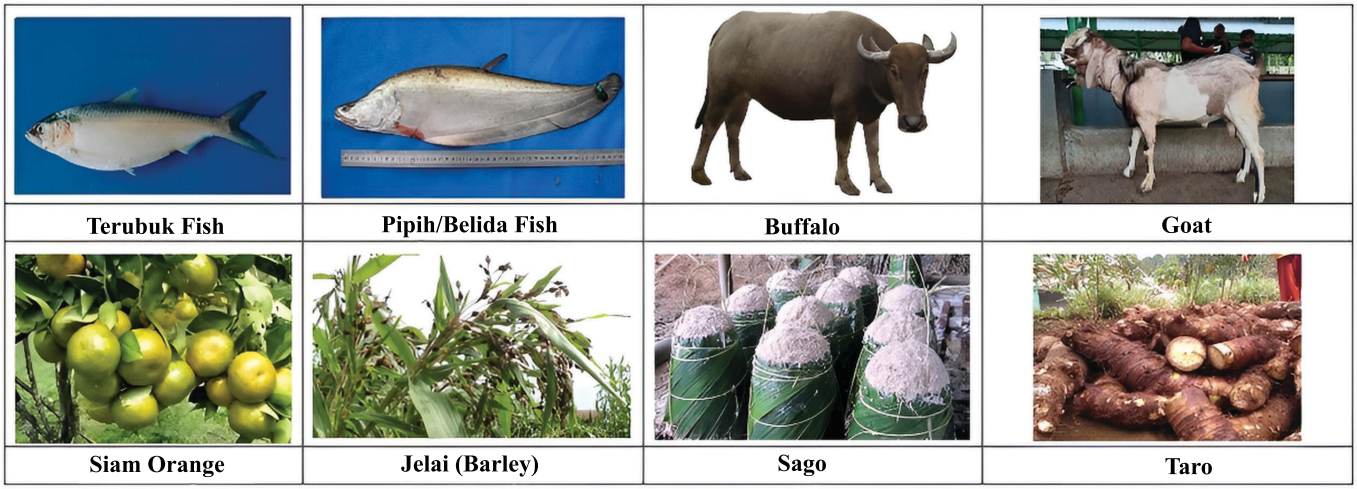

Fig. (2). Local food in East Borneo.

People's perception of local food in East Kalimantan is still influenced by economic, cultural, and accessibility factors. In rural areas, local food is considered part of daily life due to its availability, while in urban areas, local food is often considered less prestigious. The stigma that local food is food for people with low economic status is a major obstacle [18, 19]. For example, cassava and yam are often seen as less appealing than commercial products, such as rice or modern preparations. To change this perception, the government has introduced socialization programs, such as diverse, nutritious, balanced, and safe, and promoted value-added processed products, such as tuna rendang and processed seaweed, which are expected to increase the attractiveness of local food among the public.

The potential of local food to fulfill the nutritional needs of the community, especially pregnant women, is enormous. Foods such as cork fish, anchovy, moringa leaves, sago, and seaweed are rich in essential nutrients, including protein, iron, and vitamin A. Utilizing these foods can help address anemia in pregnant women and support postpartum recovery. Utilizing these foods can help address the problem of anemia in pregnant women and support postpartum recovery [20]. However, distribution challenges in rural areas and less positive perceptions of local foods are barriers to their widespread utilization. Proposed solutions include education to increase public awareness of the nutritional value of local food and stronger government policies in the promotion and distribution of local food [21]. With an integrated approach, the potential of local food in East Kalimantan can be optimized to support food security and community nutrition.

3.2. Policy and Implementation.

The local food policy in East Kalimantan has a strategic objective to support food security and community nutrition through increased production and consumption of local food, such as fish, livestock meat, and food crops, such as yam, taro, and sago. This policy is implemented through various programs by relevant agencies, namely the Food Service Office, Health Service Office, Livestock

Service Office, and Marine and Fisheries Service Office, which include providing technical training, facility assistance, and capital support for the community. However, the implementation of this policy faces significant challenges, including budget constraints, infrastructure, and public perception that local food is less prestigious than commercial food [22]. In addition, geographical barriers and the difficulty of distribution to remote areas further complicate the implementation of the program in the field. These policy issues are illustrated in Fig. (**3**).

Policy implementation shows complex dynamics, especially in empowering aquaculture groups and managing food production. The Fisheries Agency, for example, has provided training in local fish farming and seaweed processing in areas such as Bontang, while the Livestock Agency has focused on livestock management training. However, the limited facilities and experience of community groups often become obstacles to achieving optimal results [23]. Distribution of local food to remote areas is also a major challenge due to geographical conditions and lack of infrastructure, such as access to fish auction centers (PPIs) or transportation facilities to distribute livestock products. Public perception of local food is also an obstacle, as most still prefer commercial food because it is considered more practical and prestigious [24, 25].

Cross-agency collaboration is one way to overcome these obstacles. For example, the Health Office collaborates with the Livestock Office in a stunting prevention program through the distribution of eggs as a source of protein for children under the age of two. In addition, the Maritime Affairs and Fisheries Office collaborates with the Freshwater Center to develop products based on endemic fish and seaweed, involving MSMEs in marketing. However, barriers such as budget constraints, differences in priorities between agencies, and a lack of trained human resources still limit the effectiveness of this collaboration [26]. Previous research, such as that by Ferichani *et al*., suggests that strong synergies between agencies can improve the efficiency of local food distribution and accessibility, but the geographical context of East Kalimantan remains a major challenge [27].

Technical support and resources from relevant agencies play an important role in improving the capacity of community groups. Technical training is conducted to improve the quality of local food, such as biofloc techniques for fish farming or processing agricultural products into value-added products [5]. However, budget and infrastructure limitations, such as the lack of slaughterhouses or market access in remote areas, are obstacles that require further attention. The study by Sartika *et al*. emphasizes that continuous training must be balanced with infrastructure development in order for local food distribution to be more equitable and sustainable [28].

Overall, local food policies in East Kalimantan show progressive efforts in supporting food security and community nutrition. However, significant challenges, such as limited infrastructure, community perceptions, and distribution bottlenecks, call for improved cross-sectoral coordination, adequate resource allocation, and more contextualized local strategies. With stronger synergy between local governments, relevant agencies, and communities, local food programs have the potential to improve community welfare, especially in remote areas and vulnerable groups like pregnant women [2, 29].

3.3. Challenges and Local Food Utilization

Local food utilization in East Kalimantan faces multidimensional challenges covering availability, distribution, and social and economic aspects. In terms of availability, local foods such as yam, taro, and local vegetables are more accessible to rural communities that produce their own food. However, limited availability in urban areas indicates a significant dependence on supplies from outside the region [30]. Distribution constraints further exacerbate this situation, mainly due to East Kalimantan's hard-to-reach geography and lack of adequate transportation infrastructure. The study by Thilmany D *et al*. confirms that geographical and infrastructural constraints are major barriers to food distribution in rural areas [31], which is also evident in the case of East Kalimantan. As a result, local foods are more expensive in remote areas, which has a direct impact on people's access to nutritious food such as meat and fishery products, especially for pregnant women. These constraints are summarized in Fig. (**4**).

From a social perspective, the stigma against local food poses a significant challenge. Foods such as yams and cassava are often considered less prestigious than imported foods, resulting in low consumption levels among urban communities. Diana R *et al*. note that this negative perception is synonymous with lower social status, leading people to prefer commercial food even though it is not always nutritionally better [32]. In addition, economic challenges also limit access to local food, especially in urban areas. Relatively high prices, especially during holiday celebrations, make local food unaffordable for low-income groups. In comparison, Wijaya *et al*. highlighted the importance of nutrition education through counseling to change people's mindsets, which can encourage local food consumption while improving food security [33].

In addition, consumer behavior also affects the low levels of local food consumption. Consumption of imported food, which is considered more modern and prestigious, is an obstacle to popularizing local food. Educating the public about the health benefits and sustainability of local food is crucial to changing this perception. A study by Amiruddin *et al*. suggests that community-based education programs can improve people's understanding of the nutritional value and sustainability of local food [34]. By improving nutrition literacy through social media, schools, and communities, East Kalimantan can encourage changes in consumption patterns that favor local products. This not only supports food security but also contributes to local economic development through increased demand for local agricultural and fishery products.

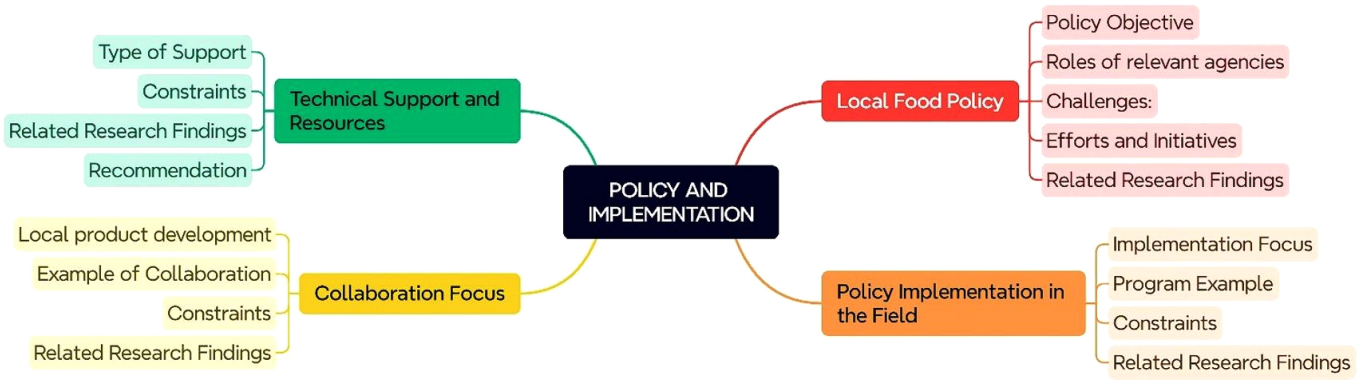

Fig. (3). Local food management policy.

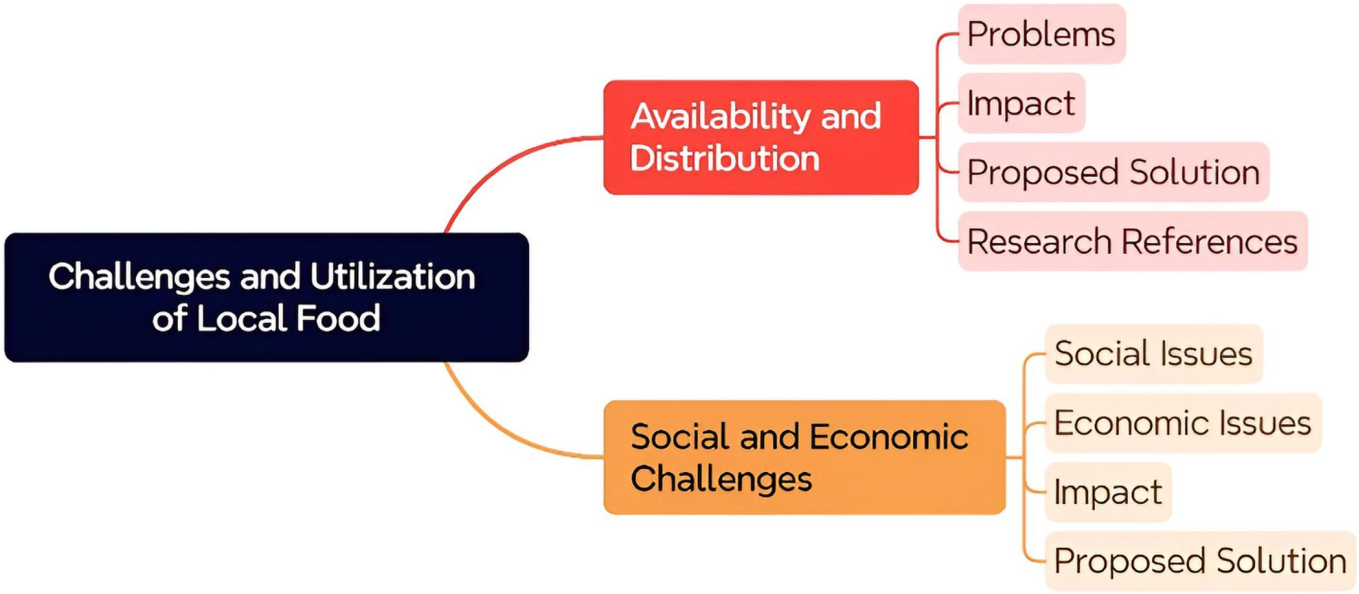

Fig. (4). Challenges and constraints of local food utilization.

To overcome these challenges, a holistic approach is needed, which includes distribution optimization, commu-nity education, and local market development. Improving trans-portation infrastructure can be a first step to ensure more efficient distribution, especially in remote areas. In addition, social campaigns to educate the public on the nutritional value of local food need to be intensified to reduce social stigma. Price subsidies can also be a solution to increase people's purchasing power for quality local food. In the policy context, collaboration between health, agriculture, and infrastructure agencies is crucial to creating an ecosystem that supports the sustainable use of local food [35]. With these measures, East Kalimantan can strengthen its food security while improving the welfare of the community, especially vulnerable groups such as preg-nant women.

4. DISCUSSION

Food security is one of the most important issues in sustainable development, especially in areas with rich biodiversity like East Kalimantan. Local food diver-sification has great potential to improve people's nutritional security and support the regional economy. Local foods are often higher in nutrients and can be obtained at a lower cost, but various challenges, including limited infrastructure, negative perceptions of local foods, and lack of nutritional awareness, hinder this potential [36, 37].

Local food diversification has a strategic role in improving community nutrition security. A study by Fanzo *et al.* in Africa showed that local food diversification in rural communities reduced the prevalence of micronutrient deficiencies by 30% [12]. This suggests that utilizing local food resources can reduce dependence on imported foods that often contain little or no essential micronutrients. East Kalimantan, with its incredible biodiversity, has great potential to support nutrition security through local foods such as fruits and vegetables

native to the region. Therefore, local food diversification in East Kalimantan can be an important solution to addressing malnutrition, especially in vulnerable groups, such as children and pregnant women.

Despite the huge potential of local food in East Kalimantan, food distribution is often constrained by limited infrastructure. Research by Stein *et al.* in Eastern Europe found that investments in local food distribution infrastructure can increase local food consumption by up to 25% [38]. This is particularly relevant for East Kalimantan, which consists of many remote and hard-to-reach areas. Limited transportation infrastructure exacerbates the problem of local food distribution, which often leads to an imbalance between demand and supply. Therefore, the development of adequate infrastructure, such as roads and efficient distribution networks, should be a priority to increase local food availability in areas far from urban centers.

Education and social campaigns play an important role in building positive perceptions of local food. Gusnedi *et al.* showed that educational campaigns on the nutritional benefits of local food can increase consumption by up to 15% [39]. In East Kalimantan, there is still a social stigma that considers local food as low-class food, even though it is rich in nutrients and more affordable. Through educational programs and evocative public campaigns, people can better understand the importance of local food consumption for maintaining good health, and increase demand for local food products [40]. Educational programs that include an understanding of the nutrients contained in local food can be an effective strategy to change this perception.

Strengthening local food value chains can have a significant impact on regional economies, in addition to improving food security. Through their investigation, Raji *et al.* in South America demonstrated that strengthening local food value chains can increase farmers' income by up to 30% [41]. In East Kalimantan, the development of markets for local food and the integration of local farmers into regional markets can strengthen the regional economy. It will also provide economic incentives for farmers to improve the quality of their products. The local food value chain can be strengthened by introducing more efficient agricultural technology, improving the distribution system, and developing value-added local food products [37, 42].

Culinary innovation can be an important strategy to increase the attractiveness of local food, especially in wider markets. Enthoven *et al.* showed that the development of moringa-based processed products in Southeast Asia succeeded in increasing the added value of local food by 20% [10]. In East Kalimantan, local food ingredients, such as moringa, coconut, or cassava, can be processed into more attractive and easily consumed processed products, such as health drinks or nutritious snacks. This innovation in processed products not only increases local food consumption but also provides new business opportunities that can empower local communities.

Climate change is a global challenge that affects every local food system. Ecker *et al.* stated that the adaptation of agricultural systems to climate change can help maintain the stability of food production [15]. East Kalimantan, with its geographical challenges and uncertain climate, needs to develop agricultural systems that are adaptive to climate change. The use of crop varieties that are more resistant to changing climatic conditions, as well as environmentally friendly agricultural technologies, could be measures to consider. In addition, utilizing local biodiversity also plays an important role in creating food systems that are more sustainable and resilient to external shocks.

Women's empowerment in the agricultural sector has a significant impact on food security. A study by Okello *et al.* performed in East Africa revealed that women's empowerment can increase fruit and vegetable consumption by 40% [25]. In East Kalimantan, women are often the main managers of family food needs, both as producers and consumers. Providing training to women to improve their skills in local food cultivation and local food business management can improve household food security. In addition, empowering women can also improve the welfare of families and communities as a whole.

Integrated food security policies based on local food can improve people's access to quality food. Studies have shown that policies prioritizing local food distribution can strengthen regional food systems. In East Kalimantan, the local government needs to develop policies that support the strengthening of the local agricultural sector, improve infrastructure, and promote local food consumption. In addition, collaboration between the government, private sector, and local communities is essential to create an ecosystem that supports food security.

Technological developments, especially digitization and the use of big data can improve efficiency in local food distribution and management. Studies highlighted that technologies such as the Internet of Things (IoT) can monitor agricultural conditions in realtime, enabling quick responses to climate change or pest attacks [16, 43]. Galli *et al.* also found that big data can be used to plan food distribution more efficiently, reduce waste, and ensure that the food reaches consumers at more reasonable prices [30]. Implementation of these technologies in East Kalimantan could reduce dependence on imports and increase transparency in the local food distribution system.

Food security in East Kalimantan can be improved through innovations that utilize local wisdom and regional potential. Diversifying local food products, such as moringa, cassava, or Kalimantan endemic fruits, into attractive modern processed products like healthy snacks or energy drinks, while also elevating the value of traditional foods, such as amplang and spicy porridge. Education and social campaigns based on local culture, such as the use of folklore, local food festivals, and nutrition education in schools, can increase public understanding of the benefits of local food [19, 44]. Innovative infrastructure also needs to be developed, such

as village-scale cold storage to extend the shelf life of crops and the use of river transportation routes for food distribution to remote areas. Digital technologies, such as specialized marketing platforms for local products and IoT for farm monitoring, can help farmers improve efficiency and market access.

In addition, adaptation of agriculture to climate change is important with the development of local crop varieties that can withstand extreme conditions and the implementation of agroforestry systems. Community empowerment, especially farm women's groups, through training in local agricultural product management, can increase household income and family food security [41]. Government policies also need to be directed towards providing minimum price incentives for local products, establishing food ecosystem zones, and collaborating with Indigenous communities to preserve local seeds and develop local food-based educational tourism. The management of food waste into compost or bioenergy has also the potential to support the sustainability of the food system [10, 14, 25]. By integrating ecotourism and local food promotion, such as the concept of “farm-to-table” tourism, East Kalimantan is not only able to overcome food security challenges but also strengthen the local economy and preserve the cultural wisdom of the community.

Research results on the application of water-saving technologies in Uzbekistan's agriculture have strong relevance to the management of local food potential in Indonesia, particularly in East Kalimantan [45]. East Kalimantan province faces similar challenges, such as dependence on traditional irrigation systems, climate change impacting water availability, and the need to increase the productivity of drylands and rainfed lands.

East Kalimantan has considerable local food potential, such as field rice, cassava, maize, sago, and various tubers and horticultural crops. However, limited irrigation infrastructure and conventional cultivation practices have not optimized water use efficiency. In this context, the adoption of water-saving technologies, such as drip and sprinkler irrigation, as well as soil moisture monitoring, has the potential to improve the efficiency of cultivation on drylands and marginal lands that are prevalent in East Kalimantan.

The application of this technology is also in line with the national agenda of food sovereignty and climate change adaptation, as well as supports the achievement of SDG 2 (Zero Hunger) and SDG 13 (Climate Action). In addition, this approach can strengthen regional food security through the optimization of local food based on local wisdom and sustainable agriculture. Local policy support, farmer training, and collaboration between the government, private sector, and local communities are key to successful implementation in East Kalimantan.

CONCLUSION

The results of this study demonstrate that local food resources in East Kalimantan hold significant potential to enhance public health, particularly for vulnerable groups such as pregnant women. Foods such as taro, moringa, yam, and sago offer valuable nutritional content, including iron, protein, and vitamins essential for maternal and fetal well-being. However, challenges such as underdeveloped infrastructure, limited distribution networks, negative social perceptions, and inconsistent policy implementation continue to hinder optimal utilization.

To overcome these barriers, a holistic and cross-sectoral approach is needed. This includes (1) enhancing infrastructure, especially for cold chain logistics and rural connectivity, (2) expanding education and awareness campaigns to address stigma and promote the benefits of local food, (3) supporting value-added product development to increase market appeal, and (4) improving inter-agency coordination to ensure the sustainability and effectiveness of local food policies. Digital technologies and community empowerment—particularly involving women—can further strengthen the resilience and equity of local food systems.

Future research should explore mixed-method approaches to quantify the impact of local food interventions and examine the scalability of successful programs across different regions. In the context of national food security and the SDGs, this study provides evidence that local food-based strategies are not only culturally relevant and environmentally sustainable but also critical to improving maternal and child health in decentralized regions like East Kalimantan.

AUTHORS’ CONTRIBUTIONS

The authors confirm contribution to the paper as follows: R.A.D.: Community Nutrition, Nutritional Epidemiology, Food and Nutrition Policy and Public Health; M.D.: Medical Nutrition; N.M.N.: Human Nutrition; E.P.Y.: Regional and Rural Development Planning; All authors reviewed the results and approved the final version of the manuscript.

ABBREVIATION

IoT = Internet of Things

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The Ethics Commission for Social Humanities of the National Research and Innovation Agency has given ethical clearance to this study with decision letter No. 359/KE.01/SK/05/2024 on 24 April, 2024.

HUMAN AND ANIMAL RIGHTS

All procedures performed in studies involving human participants were in accordance with the ethical standards of institutional and/or research committees, and with the 1975 Declaration of Helsinki, as revised in 2013.

CONSENT FOR PUBLICATION

Individual data were collected in this study, and all participants provided written informed consent prior to data collection. In the case of child participation, permission was given by a parent or legal guardian.

AVAILABILITY OF DATA AND MATERIALS

The data supporting the findings of the article is available at: https://bit.ly/3Q6zYuj.

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CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest that could influence the outcome of this study.

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SUPPLEMENTARY MATERIAL

Supplementary material is available on the publisher's website along with the published article.

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