

URBAN FOOD DIVERSIFICATION AND DIETARY OUTCOMES IN A MEDIUM-SIZED CITY: EVIDENCE FROM CIREBON, INDONESIA

DIVERSIFICAÇÃO ALIMENTAR URBANA E RESULTADOS DIETÉTICOS EM UMA CIDADE DE MÉDIO PORTE: EVIDÊNCIAS DE CIREBON, INDONÉSIA

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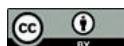
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Abstract

Urban food diversification has become increasingly important in improving dietary quality and food system resilience, particularly in medium-sized cities where structural constraints limit food production and distribution capacity. This study examines the relationship between urban food diversification and dietary outcomes in Cirebon, Indonesia, by analysing food availability, consumption patterns, and stakeholder governance within an urban food system framework. A mixed-methods case study approach was employed, combining secondary data analysis of food availability and consumption indicators with qualitative insights from key stakeholders representing the pentahelix model. Dietary outcomes were assessed using the Food Pattern Score (PPH) to evaluate the diversity and balance of food consumption over the period 2019–2024. The findings indicate that overall food availability in Cirebon is sufficient; however, stability varies across food groups, with strategic commodities such as fish, chili, and shallots remaining vulnerable to price and supply fluctuations. Despite gradual improvements in dietary diversity, PPH values consistently remain below the ideal benchmark, reflecting persistent

Resumo

A diversificação alimentar urbana tem se tornado cada vez mais importante para melhorar a qualidade da alimentação e a resiliência do sistema alimentar, especialmente em cidades de médio porte, onde restrições estruturais limitam a capacidade de produção e distribuição de alimentos. Este estudo examina a relação entre a diversificação alimentar urbana e os resultados alimentares em Cirebon, na Indonésia, por meio da análise da disponibilidade de alimentos, dos padrões de consumo e da governança das partes interessadas dentro de um quadro do sistema alimentar urbano. Foi empregada uma abordagem de estudo de caso com métodos mistos, combinando a análise de dados secundários sobre indicadores de disponibilidade e consumo de alimentos com insights qualitativos de partes interessadas-chave que representam o modelo penta-hélice. Os resultados alimentares foram avaliados utilizando o Índice de Padrão Alimentar (PPH) para avaliar a diversidade e o equilíbrio do consumo alimentar no período de 2019 a 2024. Os resultados indicam que a disponibilidade geral de alimentos em Cirebon é suficiente; no entanto, a estabilidade varia entre os grupos



reliance on rice-based and animal-source foods and limited consumption of locally available food groups. Governance analysis further reveals the dominance of government actors and weak multi-stakeholder collaboration, constraining the effective utilisation of local food resources for diversification. This study provides empirical evidence from a medium-sized city context, highlighting the need for integrated urban food system governance and targeted dietary interventions to strengthen food diversification and improve dietary outcomes in rapidly urbanising regions.

Keywords: Urban Food Diversification. Dietary Outcomes. Urban Food Systems. Food Consumption Patterns. Stakeholder Governance. Indonesia.

alimentares, com commodities estratégicas como peixe, pimenta e cebola-roxa permanecendo vulneráveis a flutuações de preço e oferta. Apesar de melhorias graduais na diversidade alimentar, os valores do PPH permanecem consistentemente abaixo do parâmetro ideal, refletindo a dependência persistente de alimentos à base de arroz e de origem animal e o consumo limitado de grupos alimentares disponíveis localmente. A análise da governança revela ainda o domínio dos atores governamentais e a fraca colaboração entre as múltiplas partes interessadas, limitando a utilização eficaz dos recursos alimentares locais para a diversificação. Este estudo fornece evidências empíricas a partir do contexto de uma cidade de médio porte, destacando a necessidade de uma governança integrada do sistema alimentar urbano e de intervenções alimentares direcionadas para fortalecer a diversificação alimentar e melhorar os resultados alimentares em regiões em rápida urbanização.

Palavras-chave: *Diversificação Alimentar Urbana. Resultados Alimentares. Sistemas Alimentares Urbanos. Padrões de Consumo Alimentar. Governança das Partes Interessadas. Indonésia.*

1 INTRODUCTION

Rapid urbanisation and changing dietary patterns have become defining features of contemporary food system challenges, particularly in developing countries (Lundberg et al., 2025). Urban populations are increasingly exposed to dietary homogenisation, rising consumption of energy-dense foods and declining dietary diversity, which together contribute to multiple forms of malnutrition, including micronutrient deficiencies and diet-related non-communicable diseases (Larin, 2023. Makaiko, 2022). These dynamics place growing pressure on urban food systems to ensure not only sufficient food availability, but also access to diverse, nutritious, and culturally appropriate diets (Makaiko, 2022. Yao, 2023).

In this context, food diversification is increasingly recognized as a critical strategy for improving dietary quality and strengthening food security. However, food

diversification is often narrowly understood as diversification at the production level, primarily within rural and agricultural settings (Nguyen & Qaim, 2025. Waseem et al., 2025). Such perspectives tend to overlook the increasingly central role of cities as sites of food consumption, governance, and system coordination (Aliabadi et al., 2021).

Urban agriculture defined as the production, processing, distribution, and sale of food within urban, suburban, and peri-urban areas for commercial, non-commercial, hobby, educational, or nonprofit purposes (Adeyemi et al., 2025). While the food system embraces all the entire range of actors and their interlinked value-adding activities. The activities are the production, processing, distribution, consumption, and disposal of food products that originate from agriculture (including livestock), forestry, and the food industry (Food and Agriculture Organization of the United Nations, 2026). Urban agriculture and food system are sufficiently connected as it serves different benefits, such as social, economic, community and health benefits. This serves as a critical way to address food security challenges.

Existing studies tend to focus on large metropolitan areas and global cities, where food system dynamics are shaped by highly complex and globalised supply chains (Battersby et al., 2023, Demicheli, 2025). As a result, less is known about how more typical urban contexts operationalise food diversification strategies. Nevertheless, empirical evidence on how urban areas, particularly medium-sized cities, can actively promote food diversification through locally embedded resources and policies remains limited (Demicheli, 2025).

Assessing the outcomes of food diversification requires appropriate indicators of dietary quality. Globally, dietary diversity is commonly measured using indicators such as the Household Dietary Diversity Score (HDDS) or Minimum Dietary Diversity (MDD) (FAO & FHI 360, 2016). While these indicators enable cross-country comparison, they may not fully capture context-specific dietary norms, food preferences, and policy frameworks.

In Indonesia, the Food Pattern Score (Pola Pangan Harapan—PPH) has been widely used as a policy-relevant indicator to assess the balance and diversity of food consumption relative to national dietary guidelines (Badan Pangan Nasional, 2024. Wardana et al., 2023). However, the application of PPH has largely remained within policy and planning documents, with limited integration into academic analyses of urban

food systems. Exploring how such contextualised dietary indicators can inform urban food diversification analysis offers an opportunity to bridge policy, practice, and empirical research.

Food diversification in urban settings is not solely a technical or nutritional issue, but also a governance challenge involving multiple actors and interests. Increasing attention has been paid to the role of multi-stakeholder governance arrangements in food system transformation, including collaborations among government, private sector, academia, and civil society (Pittore & Debons, 2023). In many developing country contexts, however, empirical studies examining how such stakeholder configurations function in practice remain limited, particularly at the city level (Haysom, 2015).

While collaborative governance frameworks are widely discussed in the literature, there is limited empirical evidence on how these arrangements contribute to food diversification initiatives in urban contexts, particularly in relation to local resource utilisation and dietary outcomes. This gap highlights the need for context-specific empirical studies that examine stakeholder roles and interactions in supporting urban food diversification.

Based on the above, there is a clear need for empirical studies that examine food diversification within urban food systems of medium-sized cities in the Global South, integrating dietary quality assessment, local resource potential, and governance dynamics. This study addresses this gap by analysing urban food diversification in Kota Cirebon, Indonesia, a medium-sized city characterised by limited agricultural land but rich local food resources and active policy initiatives.

This study contributes to the literature in three ways. First, it provides empirical evidence on food diversification in a medium-sized urban context, an area that remains underrepresented in urban food system research. Second, it demonstrates the use of a context-specific dietary quality indicator (PPH) to assess food diversification outcomes in an urban setting. Third, it examines the role of multi-stakeholder (pentahelix) governance in supporting food diversification based on local resource potential.

Accordingly, this study aims to: (i) analyse food availability and regional carrying capacity in relation to local resource potential in Kota Cirebon. (ii) assess dietary consumption patterns and PPH achievement as indicators of urban food diversification outcomes. and (iii) evaluate stakeholder roles and governance mechanisms in supporting

food diversification initiatives. The findings are expected to provide policy-relevant insights for medium-sized cities facing similar urban food system challenges in developing countries.

2. METHODS

2.1 Study area and research design

This study was conducted in Kota Cirebon, West Java Province, Indonesia. Kota Cirebon is a medium-sized coastal city characterised by limited agricultural land, high population density, and a strong dependence on food supply from surrounding regions. Despite these constraints, the city possesses diverse local food resources, including fisheries, processed food products, and traditional local commodities, making it a relevant case for examining urban food diversification.

The study adopted a mixed-methods case study design to capture the multidimensional nature of urban food diversification. Mixed-methods approaches are widely recognised as appropriate for food system research, as they enable the integration of quantitative indicators of food availability and dietary quality with qualitative insights into governance and stakeholder dynamics (Creswell & Plano Clark, 2018. HLPE, 2017). A case study approach was selected to generate in-depth, context-specific understanding of how local resource potential, consumption patterns, and institutional arrangements interact within an urban food system (Yin, 2018).

2.2 Data sources and collection

The study utilised both secondary and primary data sources.

Secondary data were obtained from relevant national and local government institutions, including food availability statistics, food balance data, household consumption surveys, and policy and planning documents related to food security and diversification. These data were used to assess food availability, consumption patterns, and policy context in Kota Cirebon.

Primary data were collected through semi-structured interviews and focus group discussions (FGDs) with key stakeholders involved in food diversification and food security initiatives. Informants were purposively selected to represent the pentahelix framework, comprising government agencies, academic and research institutions, business actors, community organisations, and media representatives. Data collection focused on stakeholder roles, program implementation, coordination mechanisms, and perceived challenges in promoting food diversification.

2.3 Analytical framework

An integrated analytical framework was applied to examine urban food diversification from three interrelated dimensions: (i) food availability and regional carrying capacity based on local resource potential. (ii) dietary consumption patterns and dietary quality outcomes. and (iii) governance and stakeholder dynamics supporting food diversification.

This framework enabled the analysis of both outcome-oriented aspects (availability and consumption) and process-oriented aspects (institutional arrangements and stakeholder roles), providing a comprehensive understanding of urban food diversification within the study area.

2.4 Food availability and regional carrying capacity analysis

Food availability was analysed using secondary data on the supply of major food commodities in Kota Cirebon. The analysis considered the contribution of local production, inter-regional food inflows, and market availability to overall food supply. Regional carrying capacity was assessed by examining the capacity of local resources, including fisheries, urban agriculture, food processing activities, and distribution infrastructure, to support food diversification.

This analysis aimed to identify strengths and limitations in the local food system that influence the city's ability to diversify food consumption patterns.

2.5 Dietary consumption and Food Pattern Score (PPH) analysis

Dietary consumption patterns were analysed using household consumption data and assessed using the Food Pattern Score (*Pola Pangan Harapan*—PPH). PPH measures the degree of alignment between actual food consumption and nationally recommended dietary composition across major food groups (Bapanas, 2024).

In this study, PPH was used as a context-specific dietary quality indicator to evaluate food diversification outcomes at the urban level. The analysis focused on identifying gaps between actual consumption patterns and ideal dietary composition, as well as the contribution of different food groups to overall dietary diversity.

2.6 Stakeholder and governance analysis

Stakeholder analysis was conducted to examine the roles, interests, and interactions of actors involved in urban food diversification initiatives. The analysis followed established stakeholder analysis approaches commonly applied in policy and governance research (Flew & Lim, 2019. Scrich, 2023).

Qualitative data from interviews, FGDs, and document review were analysed thematically to identify patterns of collaboration, coordination, and institutional challenges. Particular attention was paid to the functioning of pentahelix arrangements, including the distribution of roles among stakeholders and the effectiveness of coordination mechanisms in supporting food diversification based on local resources.

2.7 Data validity and limitations

To enhance the validity of the findings, data triangulation was applied by cross-checking information from multiple sources and methods. Quantitative data were corroborated with qualitative insights from stakeholders, while policy documents were used to verify program implementation claims.

Nevertheless, the study is subject to limitations inherent in case study research, including constraints on generalisability beyond similar urban contexts. The findings are therefore interpreted as context-specific insights that may inform food diversification

strategies in other medium-sized cities facing comparable challenges in developing countries.

3. RESULTS

3.1 Food availability and local resource potential

The analysis indicates that overall food availability in Kota Cirebon is sufficient to meet basic consumption needs, yet stability varies across food groups. Staple foods such as rice, poultry, eggs, and selected vegetables exhibit relatively stable availability throughout the year. In contrast, several strategic commodities—including chili, fish, and shallots—remain vulnerable to price and supply fluctuations. Despite the city's significant local food potential, particularly from coastal fisheries, household-based production, food-related micro and small enterprises, and inter-regional supply networks with neighbouring districts, these resources have not been fully utilised to support food diversification. Constraints related to post-harvest management, limited product downstreaming, and the lack of integrated processing and packaging technologies continue to restrict the contribution of local food resources to diversified and stable urban food supply.

3.2 Dietary consumption patterns and Food Pattern Score (PPH)

Household food consumption patterns in Kota Cirebon, as measured by the Food Pattern Score (PPH), show a fluctuating trend over the period 2019–2024. The PPH score declined from 90.2 in 2019 to 86.5 in 2020, before gradually increasing to 88.2 in 2021 and surpassing 92 from 2022 onwards (92.6 in 2022, 92.8 in 2023, 92.58 in 2024). Despite this improvement, the PPH score remains below the ideal value of 100, indicating that dietary diversification has not yet fully achieved the recommended composition. The consumption structure continues to be dominated by rice-based foods and animal-source products, while the intake of tubers, legumes, vegetables, fruits, and other locally available food groups remains below the ideal proportion.

3.3 Stakeholder roles in urban food diversification

Stakeholder analysis indicates an imbalanced governance structure in urban food diversification initiatives in Kota Cirebon. Government actors play a dominant role, particularly in ensuring food availability through regulatory frameworks, program implementation, and inter-regional food supply coordination. In contrast, the involvement of academia, private sector actors, community organisations, and media remains limited, especially in activities related to innovation, value addition, market development, and public awareness. Overall, the level of stakeholder engagement and cross-sectoral partnerships in food diversification initiatives is relatively low, with collaboration largely confined to sectoral and ad hoc arrangements rather than sustained multi-stakeholder platforms.

4 DISCUSSION

This study provides empirical insights into urban food diversification in a medium-sized city context, highlighting the interplay between food availability, dietary consumption patterns, and governance dynamics. The findings demonstrate that while overall food availability in Kota Cirebon is sufficient, structural constraints persist in achieving stable and diversified food supply and consumption, particularly in relation to local food resources.

4.1 Food availability, stability, and urban food system constraints

The results reveal a distinction between food sufficiency and food stability across different food groups. Although staple foods such as rice and animal-source products exhibit relatively stable availability, several strategic commodities—including chili, fish, and shallots—remain vulnerable to price and supply fluctuations. This finding aligns with previous studies on urban food systems in developing countries, which emphasise that urban food security challenges increasingly stem from volatility and distribution inefficiencies rather than absolute food shortages (Crush et al., 2012. Djan, 2023. Matookane et al., 2025).

Despite Kota Cirebon's proximity to productive agricultural and fisheries regions, the limited utilisation of local food resources suggests structural weaknesses in post-harvest management, value addition, and supply chain integration. Similar patterns have been observed in other medium-sized cities, where local production potential does not automatically translate into diversified urban food consumption due to inadequate processing, storage, and market linkage capacities (Colasanti & Hamm, 2010. Jensen & Orfila, 2021). These findings highlight the importance of viewing urban food diversification not merely as a production issue, but as a systemic challenge embedded within urban food system governance and infrastructure.

4.2 Dietary consumption patterns and the persistent PPH gap

The analysis of dietary consumption patterns using the Food Pattern Score (PPH) indicates gradual improvement in dietary diversity since 2021, with PPH scores exceeding 92 in recent years. Nevertheless, the persistence of a gap relative to the ideal score of 100 underscores ongoing structural imbalances in food consumption. The dominance of rice-based foods and animal-source products, alongside insufficient intake of tubers, legumes, fruits, vegetables, and other locally available foods, reflects broader dietary transitions observed in urban Indonesia and other rapidly urbanising contexts (FAO et al., 2020. Nurhasan et al., 2024. Putra et al., 2020).

These findings support earlier research suggesting that improvements in food availability alone are insufficient to drive dietary diversification without corresponding changes in consumer preferences, accessibility, and food environments (Chauhan et al., 2025. Stehl et al., 2025). The use of PPH as a context-specific dietary indicator further demonstrates its value in capturing nuanced consumption patterns that may not be fully reflected in generic dietary diversity metrics. This study thus contributes to the literature by empirically linking urban food system characteristics with policy-relevant dietary outcomes in a medium-sized city setting.

4.3 Governance gaps and the role of multi-stakeholder collaboration

The stakeholder analysis reveals a governance structure characterised by the dominance of government actors and limited engagement from other stakeholders within the pentahelix framework. While government agencies play a central role in ensuring food availability and program implementation, the relatively low involvement of academia, private sector actors, community organisations, and media constrains innovation, market development, and public awareness related to food diversification.

This finding resonates with existing literature on collaborative food governance, which highlights that effective food system transformation requires sustained multi-actor engagement beyond state-led interventions (Medina-García et al., 2022. Nugroho et al., 2025). In many developing country contexts, multi-stakeholder platforms remain fragmented or ad hoc, limiting their capacity to address complex food system challenges (Barzola Iza et al., 2020. Maryono et al., 2024). The weak integration of non-government actors observed in this study suggests that institutional arrangements for urban food diversification in Kota Cirebon have yet to fully operationalise collaborative governance principles.

4.4 Implications for urban food diversification in medium-sized cities

Taken together, the findings underscore that urban food diversification in medium-sized cities is shaped by the interaction of supply-side constraints, consumption patterns, and governance arrangements. The case of Kota Cirebon illustrates that improving dietary diversity requires more than increasing food availability. It necessitates strengthening value chains for local food resources, aligning consumption incentives with nutritional goals, and fostering inclusive governance mechanisms.

From a broader perspective, this study contributes to the growing body of urban food system research by providing empirical evidence from a medium-sized city context, which remains underrepresented in the literature. The findings suggest that policy frameworks and analytical tools developed for large metropolitan areas may not be fully transferable to smaller urban centres with different resource bases and institutional

capacities. As such, context-sensitive approaches are essential for advancing food diversification and nutrition outcomes in diverse urban settings.

5 CONCLUSION

This study examined urban food diversification in Kota Cirebon by integrating analyses of food availability, dietary consumption patterns, and stakeholder governance within a medium-sized city context. The findings demonstrate that while overall food availability is sufficient, stability varies across food groups, and the utilisation of local food resources remains limited. Despite recent improvements in dietary diversity, as reflected in increasing Food Pattern Score (PPH) values, consumption patterns have not yet reached the ideal dietary composition, indicating persistent structural imbalances in urban food consumption.

The study further highlights governance-related challenges in advancing food diversification. The dominance of government actors, coupled with limited engagement from academia, private sector, community organisations, and media, constrains collaborative efforts and innovation in urban food system development. This governance configuration limits the effective translation of local resource potential into diversified and stable food consumption outcomes.

From an academic perspective, this study contributes to the urban food system literature by providing empirical evidence from a medium-sized city in the Global South, a context that remains underrepresented in existing research. The application of a context-specific dietary indicator (PPH) also demonstrates the value of aligning empirical analysis with policy-relevant metrics to better understand urban food diversification dynamics. The findings underscore the importance of adopting a systemic approach that links food availability, consumption behaviour, and governance mechanisms in addressing urban food diversification challenges.

Future research may build on this study by incorporating comparative analyses across cities, longitudinal assessments of governance interventions, or more detailed examinations of consumer behaviour and food environments. Such efforts would further enhance understanding of how urban food systems can be strengthened to support diversified, nutritious, and sustainable diets in rapidly urbanising regions.

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Authors' Contribution

All authors contributed equally to the development of this article.

Data availability

All datasets relevant to this study's findings are fully available within the article.

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