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# The Dynamics of Food security in Indonesia: A Study on the Availability, Affordability, and Utilization of Food in Districts and Cities with the Lowest Index in 2022

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**Abstract**

In 2022, a total of 70 districts (16.83% of the total 416 districts) and 4 cities (4% of the 98 cities) were reported to have low scores in the Food security Index (FRI). This research aims to analyze the impact of the availability, affordability, and utilization of food on the Food security Index (FRI) in districts and cities with the lowest Food security Index in Indonesia. The research is quantitative with a correlational design, aiming to analyze the effect of availability, affordability, and utilization of food on the Food security Index. The study was conducted in 74 districts and cities that had the lowest Food security Index in 2022. Secondary data were obtained from the National Food Agency of the Republic of Indonesia, and data analysis was carried out using Multiple Linear Regression methods. The research findings affirm that the availability of food has a significant positive impact on the Food security Index in districts and cities with the lowest Food security Index. Meanwhile, the affordability of food also shows a significant positive influence on the Food security Index at the same local level. However, the utilization of food is not proven to have a significant impact on the Food security Index in districts and cities with low levels of food security.

**Keywords:** *Food security, Availability, Affordability, Utilization*

## INTRODUCTION

Food security of a nation refers to its ability to ensure the availability, accessibility, and stability of food for its entire population. This encompasses sufficient food production, efficient distribution, and the population's access to quality and nutritious food. Food security extends beyond quantitative aspects, involving qualitative and sustainable elements, including environmental, economic, and social factors (FAO, 2018). These factors play a crucial role in building a robust food system capable of addressing challenges such as climate change, food price fluctuations, and inequalities in food access. Achieving food security success also requires cross-sector collaboration, supportive policies, and efforts to enhance the capacity of farmers and stakeholders in the agricultural sector (Tilman et al., 2011).

The importance of food security becomes increasingly evident in the face of global challenges, particularly with climate change impacting food production and distribution patterns. A nation's food security is closely linked to environmental sustainability, where sustainable farming practices are key to ensuring that natural resources used in food production remain preserved for future generations (Pingali, 2012). In this context, technological innovation and policies supporting sustainable agriculture become essential in achieving holistic and sustainable food security (Godfray et al., 2010).

The significance of food security for a nation can be seen across various aspects involving food security, public health, economic stability, and environmental sustainability. Food security includes sustainable food production, fair distribution, and equitable access to nutritious food (Foley et al., 2011). Specifically, food security significantly contributes to a country's social and political stability, reduces inequality, and enhances community resilience to economic and health crises.

The increasingly evident climate change and environmental crises add urgency to the importance of sustainable food security. Sustainable farming practices not only consider productivity and quantity but also maintain ecosystem sustainability, reduce negative environmental impacts, and improve the well-being of farmers (Aldaya et al., 2021). Therefore, investments in environmentally friendly agricultural innovations and policies supporting sustainable farming are crucial in building food security resilient to future challenges. Food security has become a complex and multidimensional issue, involving aspects such as food availability, accessibility, stability, and the utilization of nutritious food (Suryana, 2014). External factors, such as climate change and environmental crises, further contribute to the complexity of achieving sustainable food security.

All countries worldwide face food security issues; hence, the Food and Agriculture Organization (FAO) consistently provides up-to-date information on food conditions in various countries. FAO supports the development of government and

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community capacities to address food and nutrition resilience challenges (Berek, 2018). This aligns with Law Number 7 (1996), stating that a region must be able to provide safe, equitable, and affordable food for all its residents to achieve food security in that region. Susanti (2017) also states that food security is the level of food and nutrition needs for every individual and community in fulfilling health and well-being. Therefore, food security is the condition of ensuring safe and nutritious food for every community to support the achievement of health and well-being in a region.

Food security plays a crucial role in fulfilling the food needs of each individual. There is an assessment index that can determine the level of food security in a region called the Food Security Index (FSI). This index includes various supporting factors influencing food security, including availability, affordability, and, finally, the utilization of food (National Food Agency, 2018).

Indonesia, similar to many other countries worldwide, faces significant issues and challenges in the field of food security. Despite having vast and diverse agricultural potential, including fertile land and supportive climates, Indonesia still encounters serious challenges in ensuring adequate and equitable food availability for its entire population. Rapid population growth, urbanization, and changes in societal consumption patterns are factors adding additional pressure to the national food system. Additionally, climate change and natural disasters pose serious threats to agricultural productivity and food availability. Inequality in food distribution and access to agricultural resources is also a major issue. Some regions, particularly remote and isolated ones, struggle to obtain sufficient food supplies. Furthermore, low technological levels in the agricultural sector, lack of infrastructure, and limited access to global markets hinder overall efforts to enhance food security.

Based on the calculations of the Food Security Index (FSI) for the year 2022, it was found that 70 districts, equivalent to 16.83% of the total 416 districts, had low FSI scores. The distribution of these FSI scores can be categorized into three priorities: Priority 1 with 25 districts, Priority 2 with 16 districts, and Priority 3 with 29 districts. Priority 1 districts, indicating very high vulnerability levels, are spread across two main provinces, namely Papua with 19 districts and West Papua with 6 districts. Meanwhile, when focusing on city regions, it was found that 4 cities, or about 4% of the total 98 cities, had low FSI scores. This distribution analysis provides an overview that low food security is not only a challenge at the district level but also extends to urban areas.

The data above illustrates that food security challenges are not limited to rural contexts and district levels but also extend to urban areas. This creates a solid foundation for conducting more detailed and specific research to understand the dynamics of food security in various contexts. This study aims to analyze the effect of the variables of availability, affordability, and utilization of food on the Food Security Index.

## METHODS

This research adopts a quantitative approach employing a correlational design to examine the impact of the variables of availability, affordability, and utilization of food on the Food Security Index in districts and cities across Indonesia. The selection of a correlational design aims to investigate the extent of the relationship between these variables without asserting causation. The study encompasses 74 districts and cities characterized by the lowest Food Security Index in 2022. Quantitative data sourced from the National Food Agency of the Republic of Indonesia were utilized for analysis.

The data analysis method employed was Multiple Linear Regression, aimed at gauging the extent to which the variables of availability, affordability, and utilization of food contribute to explaining variations in the Food Security Index. Multiple Linear Regression involves multiple independent (predictor) variables. According to Kleinbaum et al. (1988), Multiple Linear Regression is a statistical analysis method employed to assess the relationship between one dependent variable and two or more independent variables. In this context, the dependent variable represents the variable to be predicted or explained, while the independent variables constitute the factors utilized for prediction. Multiple Linear Regression facilitates an understanding of the extent to which variations in one or more independent variables explain the variation in the dependent variable.

## RESULTS AND DISCUSSION

### Results

Three variables suspected to have a significant impact on achieving food security are availability, affordability, and utilization of food. Table 1 presents the data for the three independent variables and the food security index.

**Table 1: Data on Availability, Affordability, Utilization of Food, and Food security Index**

| No. | District/City | Food security Index | Food Availability Index | Food Affordability Index | Food Utilization Index |
|---|---|---|---|---|---|
| 1 | Kota Pagar Alam | 46.47 | 0.00 | 56.36 | 38.38 |
| 2 | Kota Tual | 45.18 | 0.00 | 42.95 | 47.01 |
| 3 | Kota Gunungsitoli | 43.70 | 0.00 | 42.85 | 44.40 |

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| | | | | | |
|---|---|---|---|---|---|
| 4 | Kota Sabulussalam | 23.93 | 0.00 | 44.15 | 7.40 |
| 5 | Musi Rawas Utara | 59.23 | 51.69 | 67.91 | 58.39 |
| 6 | Melawi | 59.04 | 33.03 | 79.35 | 63.32 |
| 7 | Alor | 58.97 | 75.48 | 59.45 | 46.22 |
| 8 | Karimun | 58.76 | 0.00 | 91.16 | 78.53 |
| 9 | Lingga | 58.43 | 29.14 | 78.58 | 65.28 |
| 10 | Sumba Barat Daya | 58.36 | 90.61 | 41.67 | 46.69 |
| 11 | Bengkulu Utara | 58.31 | 31.02 | 81.62 | 61.30 |
| 12 | Bangka Tengah | 57.97 | 0.00 | 92.30 | 75.71 |
| 13 | Indragiri Hulu | 57.96 | 0.00 | 92.84 | 75.28 |
| 14 | Natuna | 57.86 | 0.00 | 95.17 | 73.29 |
| 15 | Buru Selatan | 57.79 | 28.49 | 75.46 | 66.51 |
| 16 | Bintan | 57.68 | 0.00 | 92.63 | 74.73 |
| 17 | Tana Tidung | 57.17 | 0.00 | 93.72 | 72.63 |
| 18 | Sarmi | 57.07 | 38.26 | 77.97 | 55.49 |
| 19 | Wakatobi | 56.62 | 20.03 | 76.63 | 69.06 |
| 20 | Kampar | 56.28 | 0.00 | 87.82 | 743.82 |
| 21 | Kepulauan Sangihe | 56.15 | 5.60 | 77.95 | 77.73 |
| 22 | Sabu Raijua | 55.04 | 74.13 | 46.94 | 46.81 |
| 23 | Rokan Hulu | 54.91 | 0.00 | 83.06 | 74.99 |
| 24 | Labuhan Batu Selatan | 54.52 | 0.00 | 86.70 | 71.27 |
| 25 | Kepulauan Anambas | 54.19 | 0.00 | 92.46 | 66.13 |
| 26 | Kep. Seribu | 54.18 | 0.00 | 68.77 | 83.88 |
| 27 | Gunung Mas | 53.74 | 0.00 | 90.85 | 66.22 |
| 28 | Halmahera Selatan | 53.42 | 0.00 | 90.08 | 66.00 |
| 29 | Mahakam Ulu | 53.29 | 0.00 | 82.97 | 71.00 |
| 30 | Kep. Siau Tagulandang Biaro | 52.61 | 0.00 | 87.96 | 65.55 |
| 31 | Kepulauan Mentawai | 52.48 | 45.18 | 66.65 | 47.33 |
| 32 | Halmahera Barat | 52.05 | 0.00 | 90.58 | 62.20 |
| 33 | Aceh Singkil | 51.88 | 20.95 | 65.78 | 64.65 |
| 34 | Halmahera Tengah | 50.67 | 0.00 | 84.74 | 63.13 |
| 35 | Kepulauan Sula | 50.64 | 0.00 | 89.90 | 59.18 |
| 36 | Banggai Laut | 50.35 | 0.00 | 76.10 | 68.81 |
| 37 | Maluku Tenggara | 49.50 | 4.29 | 71.95 | 66.57 |
| 38 | Biak Namfor | 48.16 | 0.00 | 67.44 | 69.62 |
| 39 | Bener Meriah | 48.14 | 0.00 | 72.65 | 65.87 |
| 40 | Murung Raya | 48.08 | 0.00 | 87.25 | 54.75 |
| 41 | Fak-Fak | 46.63 | 0.00 | 68.67 | 65.07 |
| 42 | Kaimana | 45.43 | 0.00 | 73.25 | 58.65 |
| 43 | Waropen | 44.89 | 41.53 | 53.00 | 41.33 |
| 44 | Kepulauan Yapen | 44.82 | 0.00 | 61.54 | 65.90 |
| 45 | Raja Ampat | 44.60 | 2.29 | 71.32 | 56.30 |
| 46 | Kepulauan Tanimbar | 44.58 | 0.00 | 43.38 | 67.27 |
| 47 | Pulau Taliabu | 44.39 | 0.00 | 82.95 | 48.76 |
| 48 | Sorong | 43.19 | 0.00 | 63.60 | 60.28 |
| 49 | Kepulauan Aru | 42.36 | 0.00 | 60.65 | 60.41 |
| 50 | Teluk Bintuni | 39.37 | 0.00 | 55.52 | 56.79 |
| 51 | Maybrat | 39.33 | 0.00 | 61.62 | 52.10 |
| 52 | Asmat | 38.98 | 51.38 | 44.00 | 25.92 |
| 53 | Boven Digoel | 38.87 | 0.00 | 66.96 | 46.96 |
| 54 | Sorong Selatan | 37.75 | 0.00 | 65.82 | 45.01 |
| 55 | Pegunungan Arfak | 34.90 | 0.00 | 47.30 | 51.77 |

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| | | | | | |
|---|---|---|---|---|---|
| 56 | Mappi | 33.82 | 0.00 | 56.03 | 42.52 |
| 57 | Teluk Wondama | 31.95 | 0.00 | 52.56 | 40.46 |
| 58 | Supiori | 29.87 | 0.00 | 34.88 | 48.50 |
| 59 | Tambrauw | 29.26 | 0.00 | 50.67 | 35.14 |
| 60 | Paniai | 27.91 | 0.00 | 49.17 | 32.89 |
| 61 | Jayawijaya | 25.00 | 0.00 | 43.66 | 29.75 |
| 62 | Deiyai | 24.70 | 0.00 | 44.01 | 28.74 |
| 63 | Pegunungan Bintang | 24.10 | 0.00 | 38.30 | 31.52 |
| 64 | Tolikara | 23.28 | 0.00 | 40.56 | 27.79 |
| 65 | Mamberamo Raya | 22.96 | 0.00 | 46.94 | 22.19 |
| 66 | Dogiyai | 22.93 | 0.00 | 41.07 | 26.53 |
| 67 | Yalimo | 22.37 | 0.00 | 34.61 | 29.97 |
| 68 | Yahukimo | 22.31 | 0.00 | 28.70 | 34.25 |
| 69 | Puncak Jaya | 19.34 | 0.00 | 17.22 | 35.44 |
| 70 | Lanny Jaya | 19.18 | 0.00 | 22.70 | 30.93 |
| 71 | Puncak | 18.27 | 0.00 | 31.80 | 21.82 |
| 72 | Mamberamo Tengah | 18.14 | 0.00 | 26.14 | 24.74 |
| 73 | Intan Jaya | 17.21 | 0.00 | 27.73 | 22.24 |
| 74 | Nduga | 15.66 | 0.00 | 25.62 | 19.95 |

*Source: National Food Agency of the Republic of Indonesia, 2023*

Table 1 reveals that regencies and cities with a Food Security Index (FSI) below 59.58 for regencies and 51.29 for cities are characterized by a high vulnerability level. If we establish the threshold of 59.58 as the benchmark for regency food security, it becomes evident that more than half of the total 74 regencies and cities, including Pagar Alam City, Tual City, and Gunungsitoli City, are operating at a heightened vulnerability level. This signifies that critical variables such as the Food Availability Index, Food Accessibility Index, and Food Utilization Index exhibit relatively low values in these regions, culminating in conditions of precarious food security. This underscores the necessity for targeted attention and comprehensive interventions to ameliorate the state of food security in these areas.

Further examination of Table 1 reveals that several regencies and cities, including Pagar Alam City, Tual City, and Gunungsitoli City, exhibit a Food Availability Index of 0.00. This particular value underscores the existence of areas in Indonesia grappling with substantial challenges pertaining to food availability. A Food Availability Index registering at 0.00 in certain regions of Indonesia points to severe hurdles in satisfying the dietary needs of the local populace. This phenomenon indicates that numerous regions encounter significant impediments in either producing or accessing food adequately. Some areas may contend with heightened dependence on restricted natural resources, such as fertile land or ample water sources. This predicament can curtail the capacity for agricultural production, leading to diminished food availability. The efficacy of food production and availability is contingent upon robust agricultural infrastructure. Factors such as restricted market access, inadequate modern agricultural technology, or insufficient storage facilities can impede food availability within a region.

**Table 2. The effect of Food Availability, Food Accessibility, and Food Utilization on the Food security Index in Regencies and Cities with the Lowest Index in Indonesia**

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 6.297255 | 1.831755 | 3.437825 | 0.0010 |
| Food Availability | 0.285973 | 0.028945 | 9.880019 | 0.0000 |
| Food Affordable | 0.537160 | 0.028328 | 18.96249 | 0.0000 |
| Food Utilization | 0.009540 | 0.007350 | 1.297995 | 0.1985 |
| R-squared | 0.875554 | Mean dependent var | | 43.36662 |
| Adjusted R-squared | 0.870220 | S.D. dependent var | | 13.64371 |
| S.E. of regression | 4.915140 | Akaike info criterion | | 6.075056 |
| Sum squared resid | 1691.102 | Schwarz criterion | | 6.199600 |
| Log likelihood | -220.7771 | Hannan-Quinn criter. | | 6.124738 |
| F-statistic | 164.1639 | Durbin-Watson stat | | 1.561336 |
| Prob(F-statistic) | 0.000000 | | | |

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According to Fajaryani (2011), if the significance value (sig) is < 0.05, it means that partially the independent variable (X) has an effect on the dependent variable (Y). In Table 2, it is evident that the variables of food availability and food accessibility have a significant effect on the Food Security Index in Regencies and Cities with the Lowest Index. Meanwhile, the variable of food utilization does not have a significant effect on the Food Security Index in Regencies and Cities with the Lowest Index.

*The Effect of Food Availability on the Food Security Index in Regencies and Cities with the Lowest Index in Indonesia*

Based on the analysis, the results indicate that the variable of food availability has a significant positive effect on the Food Security Index in regencies and cities with the lowest index. Adequate food availability is the fundamental basis for building food security in a region. It reflects the capacity of an area to produce sufficient food resources to meet the needs of its population. With good food availability, a region has a greater opportunity to address challenges such as agricultural production fluctuations, climate change, and food crises.

According to food security theory, adequate food availability provides the foundation for other aspects of food security, such as accessibility, utilization, and food stability. For example, the food security model proposed by the Food and Agriculture Organization (FAO) emphasizes the importance of food availability in ensuring the food security of a population (FAO, 2008).

Adequate food availability establishes the groundwork for increasing agricultural production, diversifying crops, and developing sustainable agricultural technologies. Quality and diverse food production not only enhance the quantity of food but also provide the necessary nutritional sources to achieve optimal food security at the local level (Pinstrup-Andersen, 2009). Additionally, economic growth theory supports the idea that adequate food availability can drive the economic growth of a region. Sufficient food stocks can create economic stability, enhance labor productivity, and stimulate economic activities related to the agricultural sector. Thus, the food availability variable can be considered a crucial predictor in measuring the food security of a region, which, in turn, impacts economic growth and the well-being of the local community.

However, despite the research findings indicating a positive and significant influence of the food availability variable on the Food Security Index, it is essential to consider that these results are general and provide an understanding of trends or patterns at the aggregate level of regencies and cities. The real conditions in the 74 regencies/cities with very low food availability indexes, some even reaching zero, indicate concrete challenges in ensuring food availability at the local level.

The actual conditions of the 74 regencies/cities with extremely low food availability indexes require an in-depth understanding of local contexts, food policies, and socio-economic dynamics that can influence food availability. Factors such as uneven land distribution, access to agricultural technology, and climate change can contribute to the food availability gap at the local level (De Schutter, 2010). The low food availability index is also suspected to be caused by various factors, including ineffective agricultural policies, adverse climate changes, or the inability to adopt modern agricultural technology.

Policy recommendations arising from the research findings need to be implemented, considering specific contexts and unique challenges in each regency/city. Efforts to improve food availability at the local level may involve revitalizing the agricultural sector, providing technical assistance to farmers, and developing agricultural infrastructure to enhance productivity and food diversification in that area. In line with this, policy recommendations should be formulated by considering local context differences and ensuring that the proposed interventions can respond appropriately to the complex dynamics occurring in each regency/city.

Further recommendations include the need for collaboration between the government, the private sector, and civil society to design and implement policies that align with local needs. Community-based and participatory approaches can help build local capacity, strengthen the competitiveness of farmers, and enhance sustainable food security (De Schutter, 2014). By ensuring effective coordination among involved stakeholders, policy recommendations can become more responsive instruments that can be adapted to meet diverse needs in various regions.

***The Effect of Food Accessibility on the Food Security Index in Regencies and Cities with the Lowest Index in Indonesia***

The results of the analysis indicate that the food accessibility variable has a significant positive effect on the Food Security Index in regencies and cities with the lowest index. Theoretically, this is explained through economic perspectives and accessibility theory. Food accessibility refers to the ability of the community to obtain and consume sufficient food without significant economic difficulties (Pinstrup-Andersen, 2009). From an economic theory perspective, the role of the community's income level is crucial in determining food accessibility. This concept refers to the idea that communities with higher incomes tend to have better access to quality food. de Haen (2003) emphasizes that income levels not only influence the purchasing power of the community but also create opportunities to access more diverse and nutritious food sources. With sufficient income, individuals and households can choose and consume a more nutritionally balanced diet, improving the quality of their diet and reducing the risk of nutritional deficiencies. Therefore, in the context of food accessibility, economic theory highlights the importance of policies that encourage increasing community income as a strategic step to improve food and nutrition welfare at the individual and family levels.

Furthermore, accessibility theory emphasizes the importance of factors such as food prices, transportation, and infrastructure in determining how accessible food is to the community (Sen, 1981). Good food accessibility requires affordable

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food prices for the majority of the population, as well as the availability of transportation and distribution infrastructure (Smith, 2003). Therefore, when the food accessibility variable has a significant positive impact on the Food Security Index, it can be assumed that efforts to increase community purchasing power, stabilize food prices, and improve the accessibility of distribution infrastructure can positively affect food security levels at the local level.

The significant positive impact of food accessibility on the Food Security Index in regencies and cities with the lowest index can also be understood through the concepts of the right to food and a holistic food accessibility framework. The right to food, as a human right, asserts that every individual has the right to adequate and quality food for a healthy life (FAO, 1996). Thus, high food accessibility is one of the indicators of well-being and the fulfillment of the right to decent food for all layers of society.

Within the framework of the food accessibility framework, Alemu (2012) emphasizes that food accessibility depends not only on economic aspects but also involves dimensions such as physical, information, and social access. Improving physical access involves efforts to enhance transportation and food distribution infrastructure so that the community can more easily reach food sources. Additionally, access to information about nutrition, food prices, and sustainable farming practices is crucial for improving food accessibility.

In the context of the 74 regencies/cities, where most are areas with difficult infrastructure access and are located far from the provincial capital, it can be understood that challenging physical accessibility conditions exist for the community to reach quality food sources. The food accessibility variable, considering factors such as food prices and distribution infrastructure, becomes increasingly important in this context.

Policy recommendations arising from this research can focus on improving physical accessibility in remote areas by prioritizing the improvement and development of transportation and food distribution infrastructure. It is essential to emphasize that the success of these policies requires a deep understanding of the local context by designing a food distribution model that aligns with the geographical and socio-economic characteristics of the area. Moreover, empowering local communities in managing food resources should also be considered a strategic step. In the social dimension, it is found that strengthening social networks and local communities can enhance community access to quality food (Alemu, 2023). Therefore, policy recommendations focusing on improving food accessibility at the local level should integrate all three dimensions to achieve a more sustainable and holistic impact.

According to Hanafie (2010), there are two methods that can be implemented to improve food security. Firstly, by pushing for an increase in the purchasing power of the poor by simultaneously promoting food production and restructuring the supply distribution to regions experiencing food shortages. This approach aims to increase the purchasing power of the community, especially the poor, and provide incentives for long-term food production improvements. This approach aligns with the policies of the Ministry of Agriculture (2015), which identify five main strategies to achieve increased food security. These strategies involve prioritizing economic development in the agricultural and rural sectors to increase domestic food production, provide employment, and increase community income. Additionally, the strategies involve providing food for groups of people who are poor or affected by disasters, utilizing local natural resources to create varied, nutritious, balanced, and safe food, promoting and educating about diverse and safe food from local natural resources, as well as addressing fresh food security.

***The Effect of Food Utilization on the Food Security Index in Regencies and Cities with the Lowest Index in Indonesia***

The results of the analysis indicate that the food utilization variable does not have a significant effect on the Food Security Index in regencies and cities with the lowest index. The presence of regencies and cities with low food utilization indices can be attributed to several complex and interacting factors. In this context, some factors that may explain the low food utilization index include limitations in nutritional knowledge, constraints in physical and economic access to nutritious food, and imbalanced dietary consumption habits.

Firstly, limitations in nutritional knowledge within the community can be a major obstacle to the utilization of healthy and quality food. Lack of understanding of the importance of consuming nutritious food and variations in dietary patterns can lead to nutritional deficiencies. Nutrition education and community awareness of the nutritional value of food can play a crucial role in enhancing optimal food utilization (Remans et al., 2014). Secondly, physical and economic accessibility to food can also be key factors influencing food utilization. Especially in remote or isolated areas, poor transportation infrastructure can hinder the distribution of good food. Additionally, low community income can result in limited purchasing power for quality food, leading to low food utilization needed to achieve food security (Smith & Haddad, 2000). Thirdly, imbalanced dietary consumption habits can also contribute to low food utilization indices. Consuming a diet lacking in diversity and insufficiently diversified in food consumption can result in nutritional deficiencies and impact overall health (Smith et al., 2006).

Effective food utilization includes aspects such as nutritional value, diversity of food types, and the community's ability to process and consume high-quality food (Remans et al., 2014). From the perspective of diversified food consumption, varied food utilization can have positive effects on food security. By consuming various types of food, communities can ensure diverse nutritional needs are met, reduce the risk of nutritional deficiencies, and enhance immunity (Smith et al., 2006). Diversified food

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consumption is a strategy that can improve food utilization and, in turn, support the Food Security Index at the local level. Additionally, nutritious food can improve the nutritional status of the population, reduce the risk of vitamin and mineral deficiencies, and support optimal growth and development (Remans et al., 2014).

This study notes that the food utilization variable does not show a significant influence on the Food Security Index in regencies and cities with the lowest index in Indonesia. This aligns with previous research findings that describe the complexity of factors affecting food security (Hoddinott et al., 2015).

The non-significant influence of the food utilization variable on the Food Security Index in regencies and cities with the lowest index in Indonesia may indicate several specific aspects and conditions. Firstly, there may be a gap or imbalance in food utilization patterns in these regions, where although food is being utilized, it is not providing a significant impact on the community's food security level. This factor could be attributed to the low awareness or knowledge within the community regarding how to optimally utilize food to meet nutritional and health needs. Secondly, external factors such as the availability of health services, nutritional education, and community empowerment programs may also play a role in the non-significance of the effect of the food utilization variable on the Food Security Index. This condition may indicate that efforts in food utilization must be accompanied by support and other supporting infrastructures to provide a significant impact on food security. Thirdly, variability in geographical and socio-economic conditions between regions can also influence the effect of the food utilization variable. Certain regions may face infrastructure or accessibility constraints that hinder optimal food utilization.

The research findings can be linked to the real conditions in the 74 regencies/cities, especially those predominantly situated in remote and isolated areas. In this context, optimal food utilization becomes increasingly crucial due to the challenges faced by communities in these remote regions. In remote and isolated areas, physical and economic accessibility to food is often a primary constraint. Limited geographical factors and infrastructure can make food distribution difficult, leading to delays and increased transportation costs, subsequently affecting food prices and the purchasing power of the community (Barrett, 2010).

With a focus on high-quality food utilization, it is anticipated that communities in regencies and cities with the lowest index can enhance food security levels and overall well-being. Another aspect to consider is the local utilization of food resources and the improvement of household-level food processing capabilities. The theory of local food resource utilization emphasizes the importance of maximizing the potential of available food resources in the local area. This may involve utilizing local products, enhancing traditional processing techniques, and supporting innovations in the utilization of local food resources that can improve nutritional value and food storage durability (Thompson & Amoroso, 2011).

Therefore, policy recommendations and intervention programs at the local level should consider supporting the utilization of local food resources, strengthening nutritional awareness, and enhancing community food processing skills. Improving food utilization in these areas requires not only the sustainability of food supplies but also solutions related to accessibility and distribution that can meet the needs of the local community. Moreover, in the context of remote areas, the utilization of local resources and adaptation of dietary habits in line with local availability should be considered. Strengthening local farming practices, promoting local food diversity, and introducing technology suitable for local conditions can enhance the utilization of diverse and quality foods in the region. By understanding the real conditions on the ground, policy recommendations and intervention programs can be designed to address the specific challenges faced by communities in remote and isolated areas, with a focus on optimal food utilization.

## CONCLUSIONS

Based on the data analysis conducted, it can be concluded that there is a significant positive impact on the availability and affordability of food on the Food Security Index in regencies and cities with the lowest index in Indonesia. However, the utilization of food does not have a significant effect on the Food Security Index in regencies and cities with the lowest index in Indonesia.
Measurable recommendations derived from this research encompass the implementation of policies aimed at enhancing food availability at the local level, with a focus on diversifying food production and strengthening the food supply chain. Additionally, efforts should be made to improve the affordability of food by optimizing distribution systems and reducing disparities in food prices. Enhancing accessibility to agricultural resources and technology is also crucial to boosting productivity and food availability. Furthermore, policies promoting better food utilization through public education on nutrition and diversified food consumption are necessary. Increased investment in agricultural infrastructure, farmer training, and community-based approaches should be reinforced to support optimal food utilization. These steps are anticipated to positively contribute to the improvement of the Food Security Index in regencies and cities with the lowest index in Indonesia.

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