



TECHNIUM
SOCIAL SCIENCES JOURNAL

www.techniumscience.com



Vol. 73/2025
A New Decade for Social Changes

PLUS
COMMUNICATION P



International
Communication & PR

Policy Implementation of Food Security Program in North Minahasa Regency

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Abstract. This study aims to find out, analyze and describe the Food Security Program Policy in the rice sector as well as the determinant factors in achieving food security in the rice sector in North Minahasa Regency with a focus on the main indicators, namely rice availability, rice production, rice access and rice price stability. The research used a qualitative approach with a descriptive method, through in-depth interviews with the Food Service Office, farmers, and the community, as well as document review related to regional food security policies. The results show that the availability of rice in North Minahasa Regency is good and stable, characterized by surplus stocks in the first quarter of 2025. Rice production has increased thanks to government assistance in the form of superior seeds, subsidized fertilizers, training, and agricultural tools. However, production is still constrained by land shrinkage, erratic weather, and limited irrigation. Access to rice in mainland areas is considered quite good, but island areas still face distribution barriers due to lack of infrastructure and sea transportation. Determinant factors affecting food security, particularly in the aspects of rice production and access, include agricultural land area, weather and irrigation conditions, distribution infrastructure, people's purchasing power, and local government policies. Based on these findings, it is recommended that the government strengthen the protection of agricultural land, improve distribution infrastructure, especially in remote areas, expand the scope of cheap food programs, and encourage the use of adaptive agricultural technology. Future research is recommended to use a quantitative approach or a comparative study between regions to expand the scope of the analysis.

Keywords. Policy Implementation, Food Security, Rice Availability, Rice Production, Rice Access, Rice Price Stability, Agriculture

A. INTRODUCTION

Food is a fundamental need for humans and has a central role in the development of quality human resources, both physically and spiritually. Adequate fulfillment of food needs is one of the main indicators of community welfare and social stability. Therefore, the state has the responsibility to ensure the availability, accessibility and quality of safe and nutritious food for all levels of society. This effort reflects the principles of food sovereignty, food self-reliance and food security, which are the main basis for organizing the national food system (Limenta & Chandra, 2017) [1].

Food security is the condition of fulfilling food needs for the community, both in quantity, quality and affordability. Food security is also defined as the ability to access food. The components of food security include aspects of food availability which depends on domestic production with optimal utilization of local resources, food accessibility which includes affordability both economically and physically, as well as the utilization of healthy and nutritious food to improve the quality of life of the community. In this context, the food policy implemented must be oriented towards national independence by prioritizing the utilization of domestic resources and considering social, economic and environmental aspects (Rozaki, 2021) [2].

North Minahasa Regency as one of the agricultural regions has great potential in supporting food security, especially in the rice food sector which is a basic need of the community. Based on data from the Agriculture Office of North Minahasa Regency, agricultural land in North Minahasa Regency until the end of 2022 is 47,801.04 hectares, of which 40,146.46 hectares are coconut plantations. The potential of paddy fields in North Minahasa Regency until the end of 2022 is 2,351.55 hectares with 1,175.33 hectares of reserve land, which is currently a Sustainable Food Agricultural Land (LP2B) which is an area of paddy fields that cannot be converted. However, there are a number of problems that hinder the achievement of food security in this area, including agricultural land degradation, land conversion, low agricultural productivity due to limited access to technology and fertilizers, and fluctuations in rice prices that often harm farmers and consumers. In addition, suboptimal irrigation infrastructure and dependence on rice distribution from outside the region are also challenges that need to be overcome.

As a legal umbrella, Government Regulation No. 17/2015 on Food Security and Nutrition regulates various aspects related to food planning, food availability and accessibility, consumption and nutrition, food safety, and community participation in realizing a sustainable food system. In addition, Presidential Regulation No. 83/2017 on Food Security and Nutrition Strategy Policy consists of food availability, food affordability, food utilization, community gazi improvement and strengthening food and nutrition institutions. Regulation of the Minister of Agriculture No. 38/2018 on the Management of Government Rice Reserves also regulates the mechanism for managing rice food stocks, in order to maintain the adequacy of government rice reserves both in quantity and quality and meet food safety requirements to anticipate fluctuations in supply and prices, as well as Decree of the Head of the National Food Agency No. 01/KS.02.02/K/I/2023 on Guidelines for the Implementation of Stabilization of Rice Food Supply and Prices at the Consumer Level in 2023 so that the implementation of activities runs well and on target.

Stabilization of food supply and prices is one of the crucial elements to ensure the welfare of farmers, fishermen, fish farmers, as well as micro and small businesses in the food sector. In addition, this stabilization also aims to maintain people's purchasing power for basic food needs, especially rice, to ensure the sustainability of food security at the national and regional levels.

North Minahasa Regency faces challenges in maintaining food security, particularly related to the availability, accessibility and stability of rice supply and prices. The high dependency on supplies from Bulog is one of the main problems, where rice stocks for this area are highly dependent on distribution from outside. Although Bulog has prepared reserves of up to 26 thousand tons, distribution delays or logistical disruptions can affect the availability of rice in the market. In addition, rice prices still fluctuate, especially around religious holidays,

making it difficult for the community, especially the economically weaker groups, to fulfill their basic needs.

Based on data from the Food Service Office of North Minahasa Regency, in 2023 and 2024 the need for rice in North Minahasa Regency continues to increase. This is evident from the semester's data which shows a significant growth trend. In the first semester of 2023, rice demand was recorded at 10,599 tons, increasing to 10,775 tons in the second semester, reflecting an increase of about 1.66%. This increase is driven by population growth and local celebrations that increase people's consumption.

Entering the first semester of 2024, rice demand increased again to 10,939.15 tons in the first semester, increasing to 10,964.08 tons in the second semester, recording a percentage increase of 2.49% compared to the previous year. The change in people's diet, which relies more on rice as the main source of carbohydrates, is one of the main driving factors. However, the challenge of unstable supply availability is a serious concern for food security in the region. The increase was also triggered by preparations for the rainy season and increased demand towards the end of the year. With a total rice demand of 21,903.23 tons in a year, challenges in the management of rice stock, supply and price are issues that need to be addressed to ensure sustainable availability in North Minahasa.

Local rice production in North Minahasa is still unable to meet the increasing demand. One of the causes is the reduction of agricultural land due to conversion into settlements and industrial areas. In addition, the productivity of existing rice fields is still hampered by limited irrigation infrastructure and the low adoption of modern agricultural technology. Climate change also contributes to production instability, with extreme weather such as excessive rainfall or a long dry season disrupting harvests. As a result, farmers often experience reduced yields, which impacts rice supply in the region.

In addition to production challenges, the distribution of rice to various areas in North Minahasa is also an obstacle. Uneven road infrastructure has caused rice prices in some remote areas to be higher than in the city center. Expensive transportation costs are also a factor that makes rice prices difficult to control. If these problems are not addressed immediately, dependence on external supplies will increase, risking long-term food security. To overcome this, local governments need to encourage increased rice production through the provision of sustainable agricultural land, increased access to agricultural technology, and improved distribution systems so that rice prices remain stable and affordable for the community.

This study aims to find out, analyze and describe the Food Security Program Policy in the rice sector as well as the determinant factors in achieving food security in the rice sector in North Minahasa Regency with a focus on three main indicators, namely rice availability, rice production, rice access and rice price stability.

B. METHOD

This research is a qualitative study that uses descriptive methods. According to Sugiyono (2017), qualitative research is more descriptive because the data collected is in the form of picture words, so it does not emphasize numbers and the data collected after analysis is then described so that it is easily understood by others [3]. The use of this research method is expected to provide an in-depth understanding and a clear picture of the implementation of food security in North Minahasa Regency.

The research location is carried out at the Food Service Office of North Minahasa Regency, besides that researchers will also conduct field research at the Airmadidi market and

rice farmers in several districts in North Minahasa Regency, namely Kauditan, Airmadidi, Kalawat and Talawaan.

This research focuses on the rice sector food security program policy in North Minahasa Regency, with indicators: rice availability, rice production, rice food access, and rice price stability. Then, the indicators for the determinant factors are rice production, rice access and price stability. The data collection techniques used were observation, in-depth interviews, and document studies. Data analysis techniques were carried out from the beginning until the research process took place, using the Miles and Huberman (2017) model in Kairupan et al. (2023) which has been modified with stages: 1) Data reduction, namely the data obtained is selected data that is in accordance with the focus and objectives of the study, 2) Data Presentation and data verification are intended to make it easier for researchers to see the results of observations, interviews and document data obtained during the research in the form of an overall picture or certain parts and analyze and search for meaning from the data collected [4]. In ensuring the validity of the data in this study, researchers used several data validity techniques, namely credibility, transferability, dependability, and confirmability (Moleong, 2013) [5].

C. RESULT AND DISCUSSION

Implementation of Food Security in North Minahasa Regency

This research uses a qualitative approach with data collection methods through interviews, observation and documentation. The analysis focused on the main indicators, namely rice availability, rice production, rice access and price stability, which are crucial aspects in ensuring food security in the region. The following are the results of the research and discussion related to the implementation of food security in North Minahasa Regency.

a. Rice Availability Indicator

Rice availability plays a crucial role in maintaining food security in North Minahasa Regency as it is the main staple food for most of the population. Adequate and sustainable availability ensures that basic food needs are met, preventing shortages that can trigger price increases and social instability. With the availability of rice maintained, the government and the community can face various challenges such as climate change, land conversion, and distribution disruptions without compromising general welfare and food security. Therefore, efforts to increase rice production and supply management are strategic priorities in maintaining economic and social stability in the region.

Interviews with FE informants in North Minahasa Regency show a positive picture of rice availability in the region. The 4% increase in rice stocks per month in the first quarter of 2025 reflects the success of local government policies in maintaining rice supply. This is in line with previous findings in the literature stating that increasing food availability is strongly influenced by effective government policies in managing agricultural resources (Sari, 2020) [6]. Food security policies that prioritize the provision of superior seeds and agricultural technology training are strategic steps that strengthen local production capacity, as expressed by informant FE. This approach shows synergy between central and local programs that focus on increasing farmers' productivity, which is in line with the principles of sustainable agricultural development described by the National Planning and Development Agency (2019) in Sidharta (2021) [7].

Nonetheless, there are significant challenges related to the reduction of agricultural land that could threaten the long-term availability of rice. This factor needs to be taken seriously in future policy planning. The decline in productive land area has been widely discussed in

agricultural studies stating that land shrinkage due to land conversion can hamper national food production (Putra et al., 2021) [8]. In addition, dependence on weather conditions and the availability of irrigation water adds to the vulnerability of the agricultural sector to climate change and environmental factors.

From a community perspective, interviews with residents and rice sellers confirmed that rice distribution is currently going well and rice stocks are relatively adequate at the consumer level. This indicates that the government has not only succeeded in increasing production, but has also been effective in distributing rice to local markets. This successful distribution is important to ensure equitable food availability and avoid shortages that could trigger price increases (Rahmawati, 2022) [9]. Adequate availability of rice in markets and stalls is a strong indicator that the supply chain system is running optimally.

Overall, the interviews illustrate that North Minahasa Regency is well positioned to maintain rice food security through appropriate policies and government support. However, the constraints of reduced agricultural land remind us of the need for mitigation strategies and alternative land development to keep production stable in the future. This is in line with food security theory, which emphasizes the importance of availability, accessibility and sustainability of agricultural resources.

Sudirman (2017) asserts that maintaining food availability is very important in realizing national food security [10]. This can be done by developing food production at the local level and ensuring efficiency in the distribution process so that food can be adequately available throughout the region. This theory is relevant to the interview results in North Minahasa Regency, which showed a 4% increase in rice availability per month in the first quarter of 2025.

This increase is inseparable from local government policies that focus on providing superior seeds and agricultural technology training to increase local production, while maintaining smooth distribution to markets so that people can easily access rice. Thus, the results of this study reinforce the concept that food availability is a key indicator of food security that must be maintained through a synergy between increased production and effective distribution.

b. Rice Production Indicators

Rice production is a fundamental aspect in ensuring food security in North Minahasa Regency. The main indicators of rice production used include the volume of rice harvested by local farmers within a certain period as well as the area of paddy fields used for rice cultivation. Land productivity influenced by technical factors such as the use of superior seeds, subsidized fertilizers, and the availability of irrigation water are important benchmarks in evaluating the effectiveness of production. In addition, the role of local government policies that provide seed assistance, fertilizers, as well as agricultural technology training directly contribute to increasing production capacity.

Interviews with FE informants in North Minahasa Regency confirmed that rice production in the area is sufficient to meet the needs of the community. The FE informant stated that rice production in the first quarter of 2025 increased significantly by 44.61%, indicating the success of efforts to increase production in a relatively short period of time. This statement shows the effectiveness of food security policies implemented by the local government, particularly in the provision of superior seeds, irrigation support and agricultural technology training to farmers. Such technical support and production facilities have contributed to the increase in farmers' yields and productivity.

From the farmers' perspective, the interviews also show that rice production is doing quite well as long as weather conditions are favorable and the availability of irrigation water is guaranteed. However, farmers also expressed a major challenge in the form of decreasing agricultural land area, which could be a serious obstacle to the sustainability of production in the future. This constraint is an important concern in planning and managing agricultural resources in the area.

In addition, farmers assert that government assistance in the form of superior seeds and fertilizers is very helpful in reducing production costs and thus providing economic benefits. Modern agricultural technology assistance such as tractors and rice milling machines are also considered effective in accelerating the production process and increasing work efficiency. This shows that government intervention is not only quantitative in providing production inputs, but also qualitative in supporting sustainable agricultural mechanization.

These findings are in line with the opinion of Sudirman (2017) that rice production is an important indicator in ensuring food security in the region, as seen from the results of research in North Minahasa Regency which showed a significant increase in rice production. Increased food production must be supported using appropriate agricultural technology and the availability of production facilities such as superior seeds and subsidized fertilizers. This is certainly an inseparable component.

Related to the research findings that farmers' rice production is supported by government policies is in line with the opinion of Hasibuan (2018) who highlights the importance of government support in the form of technical assistance and production inputs so that farmers can optimally increase their yields. This study shows that government intervention through the assistance of modern agricultural equipment such as tractors and rice milling machines is very helpful in increasing efficiency and productivity [11].

Overall, the results of these interviews illustrate that rice production in North Minahasa Regency has increased significantly thanks to comprehensive government policies and direct support to farmers. However, the issue of shrinking agricultural land remains a major challenge that must be managed well so that food security can be assured sustainably in the future.

c. Rice Access Indicator

The rice food access indicator in North Minahasa Regency reflects the community's ability to obtain rice easily and affordably according to their daily needs. Interviews with FE informants in North Minahasa Regency revealed that the distribution of rice to all areas, including remote areas and islands, has been running well. This shows the effectiveness of the distribution network as well as the local government's success in improving supporting infrastructure such as roads and transportation facilities, which are important factors in ensuring the affordability and availability of rice in the local market.

Local governments also actively run cheap food programs that are routinely organized to maintain the purchasing power of the community, especially vulnerable groups. Informant FE's statement that people enthusiastically take advantage of the program shows that this policy has succeeded in improving economic access to staple food. The support of the subsidy program and price control through cheap food shows the government's efforts to maintain price stability and ensure the affordability of rice amid market fluctuations.

Community perspectives obtained from interviews with resident informants NT and TM reinforce these findings. Residents stated that the availability of rice in the market is adequate and evenly distributed, making access easier for consumers. However, there are concerns regarding fluctuations in rice stocks and prices, which can negatively impact

purchasing power, especially for low-income families. This statement indicates that while the distribution and availability of rice is good, the challenge of maintaining price stability remains a crucial issue in food access.

These findings are in line with the theory put forward by Pinstrup-Andersen (2009) that food access is not only related to the physical availability of food, but is also highly dependent on the economic ability of the community to obtain the food at an affordable and reasonable price [12]. In the context of food security, this economic aspect becomes very important because even if food is available in sufficient quantities, if people cannot afford it, food security will still not be achieved. Therefore, the stability of food prices and people's purchasing power are key factors in ensuring adequate and sustainable access to food.

This theory provides an important foundation for public policies that focus on price controls and food subsidy programs, especially for economically vulnerable groups. Thus, effective policies must be able to keep food prices stable and affordable, so as not to hamper people's access to their basic needs.

Overall, the results of these interviews indicate that access to rice food in North Minahasa Regency is already in a good condition, supported by equitable distribution and proactive government policies in providing cheap food for vulnerable communities. However, attention is needed to address stock and price fluctuations so that food access can be maintained sustainably, especially for vulnerable economic groups.

d. Indicators of Rice Price Stability

The indicator of rice price stability refers to a condition in which the price of rice does not experience sharp fluctuations within a certain period of time, so that it remains affordable for the community, especially low-income groups or vulnerable to food insecurity. This stability reflects the effectiveness of food security policies in maintaining the accessibility of key staples.

The results of interviews with informants illustrate that the price of rice in North Minahasa Regency has fluctuated quite significantly in recent months. Price increases mainly occurred at the beginning of the year, triggered by a decrease in supply due to extreme weather and the lack of a harvest season. Price stability only began to return after the main harvest took place in several areas in April.

Information from farmers shows that although the price of grain at the farm level has risen, it does not automatically improve farmers' welfare because price control is more in the hands of middlemen or distributors. On the trader side, it is known that supply delays from suppliers cause rapid and erratic price changes at the retailer level. Consumers felt the brunt of the increase in rice prices, which had an impact on household expenditure, especially for low-income groups.

The fluctuation of rice prices in North Minahasa Regency reflects the vulnerability in the local food system, especially in the aspect of price stability as one of the main indicators of food security. The price instability that occurred at the beginning of the year indicates that the price buffer mechanism has not worked effectively, either through government reserve stocks or distribution chain control.

Dependence on seasonal crops and supplies from outside the region shows that the region's capacity to fulfill its rice needs independently is still limited. This shows the importance of strengthening sustainable local production through the support of production facilities, coaching farmers, and guaranteeing a fair selling price at the producer level.

On the distribution side, the involvement of middlemen and large distributors in price setting leads to market distortions, where the prices received by farmers and paid by consumers

do not reflect ideal market conditions. This creates asymmetric conditions that harm the two main groups of producers and consumers. Therefore, government intervention needs to be expanded, not only in the form of cheap markets, but also through distribution supervision and the creation of a fairer and more transparent trading system.

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The increase in rice prices, which has a direct impact on household consumption, makes it clear that food security policies have not fully reached the aspects of availability and affordability for vulnerable communities. Short-term policies, such as market operations, can reduce temporary fluctuations, but achieving sustainable price security requires a long-term strategy:

Newbery (2019) explains that buffer stock policy is a market intervention designed to reduce commodity price volatility by stabilizing supply in the market. Ineffectiveness in buffer stock management can lead to prolonged price instability [13]. This is in line with the findings in North Minahasa Regency, where rice price fluctuations that occurred at the beginning of the year indicate that price buffer mechanisms, such as government rice reserves, have not functioned optimally. The inability to manage the stock and distribution of rice reserves leads to price instability which impacts on the vulnerability of the local food system. Thus, this study confirms that strengthening buffer stock management is essential to achieve sustainable price stability, as expressed in Newbery's theory.

Determinant Factors Affecting the Implementation of Food Security in North Minahasa Regency

The implementation of food security policies does not work alone but is influenced by many interrelated factors. These factors determine whether the policy can succeed or face many obstacles. In North Minahasa, social, economic, environmental and other conditions shape how the food security policy is implemented.

In this section, we will discuss the main factors that, according to the research results, affect the implementation of food security policies, particularly in the rice sector, which is the staple food of the community. These factors include physical conditions such as the size of agricultural land and weather, technical aspects such as the availability of technology and agricultural assistance, socio-economic conditions such as government support, farmers' capacity, and how food markets and distribution operate. Equally important is how planning

and coordination between relevant parties as well as budget support affect the course of the policy.

a. Rice Production Indicator

Interviews with FE informants in North Minahasa Regency and local farmers of PB revealed various factors that influence the level of rice production in the region. From the local government's perspective, rice production is strongly influenced by the shrinking availability of agricultural land due to land conversion, the availability of water for irrigation, and weather uncertainty. In addition, support from the government such as the provision of superior seeds, subsidized fertilizers, and agricultural technology are considered important elements that can encourage increased yields. This is in line with farmers' statements that the more land is available, the higher the potential for rice production. Farmers also highlighted the importance of climate stability, the existence of irrigation systems, as well as the role of fertilizer subsidies and modern farming tools such as tractors in reducing costs and increasing work efficiency in the field.

Both interviewees emphasized that a combination of natural factors and technical interventions from the government greatly affect production outcomes in the field. When these factors are met, rice production tends to increase and can fulfill local food needs. Conversely, if one of these factors is disrupted, such as crop failure due to extreme weather or delays in fertilizer distribution, production can decline significantly.

Thus, it can be concluded that the determinant factors affecting rice production in North Minahasa Regency include: (1) agricultural land area, (2) weather and climate conditions, (3) availability of irrigation water, and (4) government support in the form of superior seeds, subsidized fertilizers, and modern agricultural technology. These four factors are interrelated and are key in ensuring sustainable rice production and meeting the needs of the local community.

Government policies in agriculture play a major role in supporting rice production in the region. As explained by Rukmana (2020), policies that favor farmers, for example through the provision of subsidies, superior seed assistance, and the development of agricultural infrastructure and technology can encourage increased productivity and strengthen food security [14]. Findings in North Minahasa Regency support this, where government assistance in the form of subsidized fertilizers, agricultural training, and modern agricultural tools such as tractors and rice milling machines are felt to be very helpful by farmers. They admitted that this support has reduced production costs and increased yields.

On the other hand, challenges such as the reduction of agricultural land due to conversion are serious problems that directly affect production capacity. This shows that not all policies have been optimal, especially in protecting productive land. Erratic weather and limited irrigation also indicate the need for more adaptive and long-term policies, such as the development of seasonal irrigation systems or strengthening farmers' institutions.

By looking at the results of this interview, it can be concluded that agricultural policies that support both technical and institutional aspects are one of the key factors that determine the success of rice production in North Minahasa. In Kairupan (2013), government policies must be in favor of the general public [15]. Without consistent policies that favor farmers, challenges in the field will be difficult to overcome, and local food security could be compromised.

b. Rice Access Indicator

The results of interviews with various parties show that community access to rice in North Minahasa Regency is generally quite good. FE informants emphasized that smooth distribution is the main factor affecting the ease with which people can obtain rice. This distribution is largely determined by the transportation infrastructure, especially the roads connecting production areas and markets. When infrastructure is adequate, distribution is smooth and the supply of rice in the market is maintained. However, archipelagic regions still face obstacles due to limited sea transportation that makes distribution not always able to run consistently. This is an important note for local governments in encouraging equitable access to food between regions.

Apart from the physical distribution aspect, stable and affordable rice prices are also a major concern. The cheap food and subsidy programs run by the government are very helpful to the community, especially families with low incomes. This is reinforced by the views of people who claim that rice is easy to find in markets, stalls, and other points of sale. However, they also expressed concern when rice stocks decline, as this is usually followed by a significant price spike. These price increases greatly affect the ability of limited-income families to fulfill their daily basic needs.

From the farmers' perspective, infrastructure also plays an important role, not only for consumer access, but also to make it easier for farmers to sell their crops. When distribution channels are good, farmers can bring their crops to market more efficiently, and this indirectly supports supply stability at the consumer level.

Overall, the interviews illustrate that access to rice food in North Minahasa Regency is supported by two main things: smooth distribution, which depends on infrastructure, and affordability, which is assisted by government programs. These two aspects have been working quite well, but there are still specific challenges on the islands that need to be addressed so that all people, without exception, can enjoy equitable and sustainable access to food.

The theory put forward by Pingali (2012) emphasizes that adequate infrastructure such as roads, markets and distribution facilities have a central role in maintaining the efficiency of the food system [16]. Good infrastructure allows food produced in one region to be distributed quickly, evenly and efficiently to other regions, thus preventing inequality in food availability between regions. In addition, modern agricultural technologies, such as the use of appropriate fertilizers, efficient irrigation systems, and post-harvest tools, also play a major role in increasing productivity and supporting food security.

Research results in North Minahasa Regency reflect this theory. Interviews with FE informants revealed that the smooth distribution of rice is highly dependent on the road infrastructure that connects production areas to consumption centers such as markets and stalls. When distribution runs smoothly, people find it easy to access rice at affordable prices. However, challenges arise in the islands where access is limited due to the lack of adequate sea transportation, resulting in uneven distribution and potential price spikes in these areas.

In addition, from the farmers' perspective, good road infrastructure is not only important for distributing rice to the market but also helps them sell their harvest more efficiently. This has a direct impact on the availability and affordability of rice for the community. While the technology adoption part is more prominent in the context of production, the interviews also show that farmers are greatly helped by the presence of modern farming tools, such as tractors and grinding machines, which support their work efficiency and help maintain the sustainability of food supply.

Thus, the results of this study reinforce Pingali's (2012) theory that distribution infrastructure and the adoption of appropriate technologies are not only important in the context of production, but are also decisive factors in ensuring smooth, equitable and sustainable access to food for communities, especially in geographically challenging areas such as islands.

c. Price Stability Indicators

Based on interviews with the Head of the Food Availability and Insecurity Division of the Food Security Agency, farmers, traders, and the community, it was found that rice price stability in North Minahasa Regency is influenced by several key factors. First, weather and climate change are the most significant determinants. Extreme weather such as excessive rain or drought disrupts the planting and harvesting period, resulting in decreased production and supply shortages that drive up prices.

Second, distribution and supply chains play an important role in price formation. Delays in supply from outside the region, limited transportation facilities, and the involvement of many parties in the distribution chain such as middlemen and large traders cause prices to be unstable at the retailer level. Farmers do not get favorable prices, while consumers must bear high prices.

Third, production costs such as increased fertilizer and fuel prices also depress yields and affect the final selling price. In conditions of limited supply and high production costs, the market price of rice tends to increase.

Fourth, government intervention through cheap market operations and absorption of local farmers' grain has a role in stabilizing prices, but it is still sporadic and not yet a long-term solution. These interventions are more responsive than preventive to price fluctuations.

The results show that one of the factors affecting the price of rice in North Minahasa Regency is weather, such as erratic rainfall or a prolonged dry season, which has a direct impact on farmers' planting time and crop yields. This condition reflects one important aspect of the theory proposed by Mastrorillo et al. (2024), that climate change not only disrupts food productivity, but can also reduce the quality and diversity of food available, and threaten the stability of the food system as a whole [17].

In the local context of North Minahasa, climate disruptions have led to a decline in crop yields, which has resulted in reduced rice supply and price hikes in the market. This shows that food security, especially in terms of price stability and food accessibility, is highly vulnerable to climate variability. When supplies are insufficient due to crop failure, prices become unstable and difficult to reach for low-income communities.

D. CONCLUSION

Based on the results of research and discussion on the implementation of food security in North Minahasa Regency, which is analyzed through indicators: rice availability, rice production, rice access and price stability, the following conclusions can be drawn:

1) **Rice Availability:** Rice availability in North Minahasa Regency is good. Data and interviews show that rice stocks tend to be in surplus, especially in the first quarter of 2025, with an increase of 4% per month. This reflects the government's success in maintaining rice supply through supportive policies and effective distribution efforts.

2) **Rice Production:** Rice production has increased significantly. This increase was driven by government assistance in the form of superior seeds, subsidized fertilizers, agricultural technology training, and modern farming tools. However, there are still constraints

such as shrinking agricultural land, weather changes, and limited irrigation systems that could hamper production in the long run.

3) Access to Rice: Access to rice is considered quite good in the mainland, with equitable distribution to markets and stalls. The cheap food program has also proven to help low-income communities. However, the islands still face access challenges due to limited sea transportation and the risk of price fluctuations when rice stocks run low.

4) Rice Price Stability: Rice prices in North Minahasa Regency have tended to fluctuate in recent months, rising before stabilizing after the main harvest. The main factors are extreme weather that disrupts production, poor supply distribution, and the role of middlemen in determining prices.

Meanwhile, the determinant factors affecting the implementation of food security in North Minahasa Regency analyzed based on three main indicators, namely production, access to rice and price stability, identified several determinant factors affecting the implementation of food security, namely: (1) Extent and availability of agricultural land, (2) Climate or weather conditions and availability of irrigation water, (3) Quality of transportation and distribution infrastructure, especially for islands, (4) Purchasing power and stable rice prices, (5) Support from government policies and programs in agriculture.

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