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Food Security of Dry Land Farmer Households in West Lombok, Indonesia

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A B S T R A C T
This study aims to investigate the status of food security among dryland farmer households in West Lombok, Indonesia. This can contribute to effective strategies to enhance food security. The study used mixed-methods, and this approach that allows for the collection of both quantitative data to assess the extent of food security in the region. The findings reveal that the food security condition in West Lombok in 2024 reflects a dual challenge: while the majority of households are food secure, a significant portion of the population still experiences food insecurity. To improve land and food security for dryland farmers in West Lombok, efforts should focus on better land access, sustainable farming, and water management. This should be followed with policies, financial aids, strengthening farmer cooperatives and improving access to resources.

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INTRODUCTION

Food security is a complex and multi-dimensional concept that encompasses various aspects, including food availability, accessibility, utilization, and stability. It is a critical issue that affects millions of people worldwide, especially in developing countries where agricultural practices are the backbone of the economy. In regions such as drylands, food security poses significant challenges due to the unpredictability of environmental conditions, socio-economic pressures, and limited agricultural potential. These challenges are particularly evident in West Lombok, Indonesia, where agricultural production plays a central role in sustaining the livelihoods of many households. The district of West Lombok, located on the island of Lombok, is largely characterized by dryland farming, with farmers dependent on rain-fed agriculture to produce crops such as rice, maize, vegetables, and fruits.

Food security has been defined by the Food and Agriculture Organization (FAO) as a situation where "all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (FAO, 2001). The concept of food security includes four key dimensions: availability, accessibility, utilization, and stability. These four dimensions are defined as follows. Availability is the presence of sufficient food supplies to meet the nutritional needs of a population. Accessibility is the ability of individuals or households to acquire food, including financial and physical access. Utilization is the proper use of food through adequate nutrition, storage, and food safety practices. Stability is the ability of a community to maintain food security in the face of economic, social, or environmental shocks (FAO, 2008a). For dryland farmer households, these dimensions are intricately linked to environmental factors, such as soil fertility, water availability, and climate conditions, as well as socio-economic factors like income levels, market access, and government policies. The interaction between these factors significantly affects the food security outcomes for dryland farmers.

West Lombok is characterized by a predominantly dryland environment where rainfall is often unreliable and seasonal, leading to challenges for agricultural production. The region has a tropical climate, with a pronounced dry season from May to October, during which crops are highly susceptible to water stress. Farmers in the area are primarily engaged in subsistence agriculture, cultivating crops such as rice, maize, cassava, and various fruits and vegetables. However, due to the dry conditions, many farmers face difficulties in sustaining their production throughout the year.

According to research by Nurdin et al. (Nurdin, Kurniawan, & Rahman, 2017), dryland areas in West Lombok are highly vulnerable to droughts, which lead to crop failure and subsequent food insecurity. This vulnerability is exacerbated by limited irrigation infrastructure, which reduces farmers' ability to cope with the long dry season. Moreover, the degradation of soil quality and the lack of access to modern agricultural technologies further undermine the agricultural productivity of dryland farmers (Sahputra, Syamsuddin, & Prabowo, 2019).

Despite these challenges, dryland farming in West Lombok is crucial for the local economy, as agriculture is the main source of livelihood for many rural households. Understanding the various factors affecting food security in this context is vital for developing appropriate policies and strategies to support sustainable agricultural practices and improve food security outcomes for dryland farmers.

Several factors influence the food security of dryland farmers in West Lombok, ranging from environmental conditions to socio-economic aspects. These factors include: climate change and weather variability, soil degradation, access to water and irrigation, socio-economic factors, and government policies and support. Climate change has emerged as one of the most significant threats to food security, particularly for farmers who depend on rain-fed agriculture. Changes in rainfall patterns, rising temperatures, and increased frequency of extreme weather events (such as droughts and floods) have a profound impact on agricultural productivity. Research by Hadi et al. (Hadi, Widodo, & Sari, 2020) highlights that farmers in West Lombok have been increasingly facing unpredictable weather patterns, which hinder their ability to plan and manage their crops effectively. These changes disrupt the planting and harvesting cycles and lead to reduced yields and food insecurity. Soil degradation, caused by erosion, over-cultivation, and deforestation, is another key challenge affecting the food security of dryland farmers in West Lombok. Soil fertility is critical for the success of agricultural crops, and when soil quality deteriorates, farmers experience lower yields and are unable to meet their food needs. According to a study by Jaya et al. (Jaya, Sumarni, & Adi, 2018), soil degradation in West Lombok has led to a decrease in crop productivity, thereby reducing household food security. Farmers often lack the knowledge and resources to implement sustainable soil management practices, making it difficult to address this issue effectively. Water availability is a critical factor in dryland farming, as crops in these regions are heavily reliant on rainfall or irrigation systems. However, water scarcity and poor access to irrigation infrastructure remain significant barriers to food security in West Lombok. Inadequate irrigation systems often force farmers to rely on rainwater, which can be highly variable from year to year. As a result, many households experience periods of water scarcity that lead to crop failure and food insecurity (Suyanto & Sari, 2016).

Socio-economic status of farmers also plays a crucial role in determining food security. Low-income levels, limited access to credit, and poor market infrastructure hinder farmers' ability to invest in inputs such as seeds, fertilizers, and pesticides, which are necessary to boost agricultural productivity. According to a study by Mulyani et al. (Mulyani, Wibowo, & Rahman, 2017), farmers in West Lombok often face challenges in accessing credit and financial resources, which limits their ability to adopt new technologies and practices that could improve their food security. Additionally, the fluctuation of food prices and market access also impacts the affordability of food for dryland farmers. Government policies, including agricultural subsidies, infrastructure development, and support for climate change adaptation, are essential for improving food security in dryland regions. In West Lombok, there is a need for

more targeted policies that address the specific challenges faced by dryland farmers. While some government initiatives aim to promote agricultural productivity and rural development, more support is needed to enhance the resilience of farmers to climate change and other external shocks (Arsyad, Firdaus, & Hadi, 2020). Dryland farming in West Lombok is increasingly vulnerable to factors such as erratic rainfall, poor soil quality, climate change, and market fluctuations, all of which contribute to food insecurity. As such, understanding the various factors that affect the food security of dryland farmer households is crucial for developing effective interventions and policies to improve food security in the region. This introduction seeks to outline the key factors affecting food security among dryland farmers in West Lombok, Indonesia, and provide an overview of the issues and challenges that need to be addressed in order to improve food security in this region.

This study aims to investigate the status of food security among dryland farmer households in West Lombok, Indonesia. The findings of this research will provide valuable insights for policymakers, development organizations, and farmers themselves to design effective strategies to enhance food security and improve the livelihoods of dryland farmers.

LITERATURE REVIEW

Food security

Food security is a critical global concern, for ensuring a healthy life for all individuals (FAO, 2006). The increasing challenges posed by climate change, population growth, economic instability, and political conflicts make food security an urgent issue requiring multidisciplinary approaches. Food security has four dimensions, including food availability, access, utilization, and stability (FAO, 2006)). Food can be available through domestic production, imports, food stocks, and food aid. Studies have indicated that agricultural productivity, technological advancements, and infrastructure improvements play crucial roles in food availability (Godfray et al., 2010). Food is accessible through economic and physic, and this is a significant barrier in many developing countries, like Indonesia. Food insecurity often results from insufficient access rather than inadequate food production, highlighting the importance of income distribution and market stability (Sen, 1981). Further, proper nutrition and the body's ability to absorb nutrients are key aspects of food utilization. Research by Smith & Haddad (Smith & Haddad, 2015) suggests that dietary diversity, healthcare, and sanitation significantly influence nutritional outcomes and food security. Finally, **s**tability refers to the ability of food systems to withstand shocks such as climate change, economic downturns, and conflicts. A study by Wheeler & Von Braun (Wheeler & Von Braun, 2013) demonstrates how climate change threatens food stability through extreme weather events, affecting agricultural yields and supply chains.

Energy intake a measure of food security

Energy intake is a fundamental indicator of food security, as it directly reflects an individual's ability to access sufficient food to meet dietary needs. Food security, defined by the FAO (FAO, 2019) , encompasses food availability,

access, utilization, and stability. Among these dimensions, dietary energy intake serves as a quantitative measure of access, as inadequate caloric consumption is associated with food insecurity (Smith, Rabbani, & Miles, 2017). Studies have shown that energy intake varies across different socioeconomic groups, with low-income households often consuming diets that are insufficient or unbalanced (Jones, Ngure, Pelto, & Young, 2013). Additionally, research indicates that food-insecure populations may experience fluctuations in energy intake due to seasonal food shortages or economic instability (de Haen, Klasen, & Qaim, 2011). Therefore, tracking energy intake can serve as a practical approach to assessing food security at the household and individual levels.

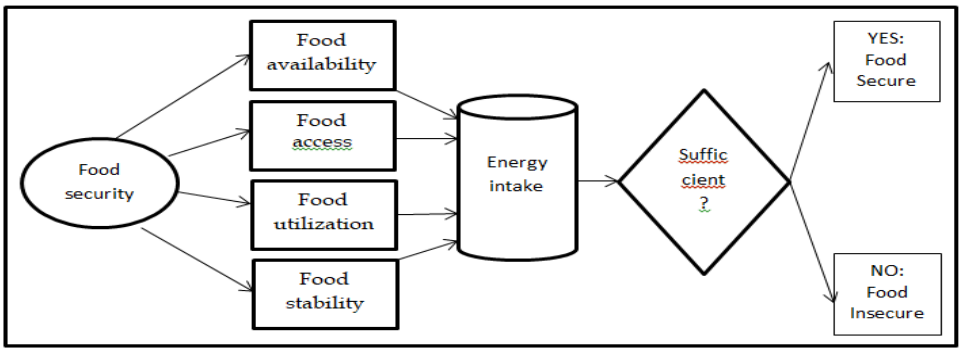

Figure 1. Conceptual Framework

METHODOLOGY

This study used a mixed-methods approach (Creswell, 2014; Neuman, 1994), and this approach allows for the collection of both quantitative data to assess the extent of food insecurity and qualitative data to explore underlying social, economic, and environmental factors (Creswell, 2014). The combination of both methods ensures a comprehensive understanding of food security challenges in dryland farming communities. The study was conducted in West Lombok, a regency located in the province of West Nusa Tenggara, Indonesia. The region is characterized by dryland agriculture, which faces challenges related to soil fertility, erratic rainfall patterns, and limited access to irrigation systems (Sugiarto, Lestari, & Purnomo, 2017). These challenges significantly affect food production and food security in the area, making it an ideal location for the study.

This research was conducted in 2024 in the sampled locations. The district of Sekotong Tengah was selected purposively, as having the largest are of dryland. Two villages, i.e. the villages of Sekotong Barat and Cendi Manik, were selected purposively for having the conditions of insecurity in food. Households of samples were determined as many as 70 households, distributed as many as 47 households to Cendi Menik Village and 34 households to Sekotong Barat Village. Households that included as respondents to be interviewed were selected as in the procedure of systematic random sampling. Researchers collected dietary data using household food consumption surveys as prescribed by Gibson (Gibson, 2005).

The analysis of status of food security of the households in the region is counted as energy intake. The Food and Agriculture Organization (FAO) estimates that an average adult requires about 2,100 kilocalories per day, albeit this varies by age, sex, and activity level (FAO, 2008b). These data are then converted into calorie values using food composition tables and compared against recommended daily intake levels. When a person or household consistently consumes fewer calories than needed, they are considered food insecure, with varying degrees of severity. If a person consumes at or more than the needed, than those persons are in the condition of food secure. The number of households for each category is counted to show its distributions, and then be described (Gartner, 2018; Provost & Fawcett, 2013).

RESEARCH RESULT

The surveys in West Lombok revealed the results, as presented in Table 1.

Table 1. Food security condition West Lombok, 2024

Item	Quantity
1. Recommended energy intake (kcal per person per day)	2,100
2. Mean of actual energy intake (kcal per person per day)	2,491
3. Highest of actual energy intake (kcal per person per day)	5,096
4. Lowest of actual energy intake (kcal per person per day)	884
5. Number of households with condition food secure (households)	57
6. Number of households with condition of food unsecure (households)	24
7. Percentage of households with condition food secure (%)	70
8. Percentage of households with condition of food unsecure (%)	30

DISCUSSION

Food Security Status of Dryland Farmer Households in West Lombok

Food security is defined by the Food and Agriculture Organization (FAO) of the United Nations as a state in which all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life (FAO, 2021). One of the fundamental aspects of food security is the ability to consume an adequate amount of energy, measured in kilocalories (kcal), to maintain overall health and productivity. The amount of energy intake required for food security varies depending on several factors, including age, gender, physical activity level, and health status. The recommended daily energy intake is determined based on the physiological needs of individuals. According to the United States Department of Agriculture (USDA), the estimated daily caloric intake for an adult male ranges from 2,500 to 3,000 kcal, while for an adult female, it ranges from 1,800 to 2,400 kcal (USDA, 2020). These recommendations are based on moderate activity levels and can vary significantly for individuals with higher physical activity demands.

The FAO estimates that the global average minimum dietary energy requirement is approximately 1,800 kcal per day (FAO, 2021). This value is often used as a benchmark in assessing global hunger levels, as individuals consuming

less than this threshold are considered undernourished. However, meeting the minimum caloric requirement does not necessarily indicate food security if the diet lacks essential macronutrients (carbohydrates, proteins, and fats) and micronutrients (vitamins and minerals) (World Health Organization (WHO, 2022). While caloric sufficiency is crucial for food security, the quality of food consumed is equally important. Diets that primarily consist of energy-dense but nutrient-poor foods may contribute to malnutrition despite meeting daily caloric needs. Nutrient-rich foods, including whole grains, lean proteins, fruits, and vegetables, are essential for preventing micronutrient deficiencies and promoting long-term health (WHO, 2022).

Ensuring adequate energy intake is crucial for achieving food security in Indonesia. The country's diverse population, spanning various age groups and activity levels, necessitates tailored nutritional strategies to meet varying dietary needs. According to the Food and Agriculture Organization, the Indonesian Ministry of Health's Balanced Nutrition Guidelines recommend a daily energy intake of approximately 2,100 kilocalories (kcal) per person to maintain healthy bodily functions and support daily activities (FAO, 2008b). Despite these recommendations, disparities exist between the suggested energy intake and actual consumption among Indonesians. Data from Statista indicates that in 2022, the average per capita daily calorie intake was about 2,240 kcal, with rural areas slightly lower at 2,130 kcal per person per day (BPS Indonesia, 2022). This marginal difference suggests that while the national average meets the recommended intake, certain regions may still face challenges in achieving optimal energy consumption.

The primary source of caloric intake in Indonesia is cereals, predominantly rice, which constitutes the highest proportion of energy consumption. However, reliance on a single staple can lead to nutritional imbalances, underscoring the need for dietary diversification. The Balanced Nutrition Guidelines advocate for a varied diet that includes ample vegetables, fruits, and protein sources to ensure a comprehensive nutrient intake. Food security is a crucial aspect of socio-economic stability, ensuring that all individuals have access to sufficient, safe, and nutritious food to maintain a healthy lifestyle. The data presented in Table 1 provides insights into the food security condition in West Lombok in 2024. The recommended daily energy intake per person is 2,100 kcal, which serves as a benchmark to evaluate actual food consumption patterns among the population. The mean actual energy intake per person per day in West Lombok is 2,491 kcal, which is significantly higher than the recommended 2,100 kcal. This suggests that, on average, individuals consume more than the necessary caloric intake. The highest recorded energy intake is 5,096 kcal, while the lowest is 884 kcal. These figures indicate disparities in food consumption among households, which may be attributed to economic, cultural, or lifestyle differences. Over or below recommended consumption of calories can be harmful for the human. Excessive calorie consumption can lead to health risks such as obesity, cardiovascular diseases, and diabetes, while insufficient intake can result in malnutrition and other health complications (Centers for Disease Control and Prevention, 2021; Iacobellis, 2009; United Nations Children's Fund, 1998). The presence of such

disparities highlights the need for nutritional awareness programs and policies aimed at promoting balanced diets.

The data indicates that 57 households are classified as food secure, while 24 households are considered food insecure. This translates to 70% of households being food secure and 30% facing food insecurity. While a majority of households in West Lombok have adequate access to food, nearly one-fifth of the population struggles with food insecurity. This level of food insecurity could be caused by various factors, including poverty, lack of access to diverse food sources, or natural disasters affecting food supply chains.

Food insecurity is often linked to broader socio-economic factors, including poverty, unemployment, and environmental conditions that disrupt agricultural production (United Nations, 2015). Households experiencing food insecurity may resort to consuming lower-quality food, reducing meal portions, or skipping meals altogether (United Nations Children's Fund, 1998). This can have long-term negative effects on health, education, and economic productivity, particularly among vulnerable groups such as children, pregnant women, and the elderly (WHO, 2020).

Strategies for Enhancing Food Security in West Lombok

To enhance food security in West Lombok, a multi-faceted approach is required, incorporating government policies, community-based initiatives, and sustainable agricultural practices. Key strategies can include: Strengthening Agricultural Production; Improving Food Distribution Systems; Nutrition Education and Awareness Programs; Social Safety Nets and Economic Support; and Monitoring and Policy Implementation. Strengthening agricultural production can be done by promoting climate-resilient and sustainable agricultural practices. These can improve food availability. Government support in the form of subsidies, training, and improved irrigation systems can enhance productivity (FAO, 2013), therefore food production can increase and be available for people.

In improving food distribution Systems, establishing efficient food distribution networks can bridge the gap between food production and consumption, ensuring equitable access to nutritious food and reducing disparities in food intake. In relation to nutrition education and awareness Programs, public health campaigns that emphasize balanced diets and proper nutrition can help address both over and under nutrition. Schools and community organizations should play a role in disseminating this information (WHO, 2020). In social safety nets and economic support, providing direct financial assistance, food aid, and school meal programs for vulnerable households can mitigate the effects of food insecurity. Additionally, job creation programs can enhance purchasing power and improve food access (United Nations, 2024). The current government of 'free nutritious meal' (Indonesia Ministry of Health, 2025) is one the kinds of this program.

In regard to monitoring and policy implementation, regular assessment of food security conditions through data collection and policy evaluation will enable authorities to design and implement effective interventions.

Strengthening collaboration between government agencies, NGOs, and international organizations is crucial to addressing food security challenges.

CONCLUSIONS AND RECOMMENDATIONS

The food security condition in West Lombok in 2024 reflects a dual challenge: while the majority of households are food secure, a significant portion of the population still experiences food insecurity. To improve land and food security for dryland farmers in West Lombok, efforts should focus on better land access, sustainable farming, and water management. This should be followed with policies, financial aids, strengthening farmer cooperatives and improving access to resources.

ADVANCED RESEARCH

While this recommended few points, this study has limitations that those recommendations are very broad, then those mentioned aspects need to be studied further for finding more accurate and feasible actions for improving food security in the region or else.

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