

RESEARCH ARTICLE

Early Impacts of COVID-19 on Nutrition Intake and Household Dietary Diversity in Kupang District, East Nusa Tenggara, Indonesia

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Abstract

One of the social problems solving the direct impact on the community is overcoming household food security due to the COVID-19 pandemic. This study aims to analyze household food security during the COVID-19 pandemic and link it to the nutrient intake and nutritional status of children under five in the Kupang district area. This cross-sectional study is based on a survey conducted on the Timorese population in Kupang, East Nusa Tenggara, Indonesia, from May to October 2021. Data on household dietary diversity was collected through the 24-hour food recall using the household dietary diversity score (HDDS). The study sample was taken from Timorese population families with toddlers under five years, and 1,444 families voluntarily participated in this study. Subjects were taken at each public health using a simple random method. This study analyzes the Spearman correlation test with the HDDS and the proportion of food expenditure. A 63% of households had a balance of less cost (<50%) with an average of 63.9. Generally, households (90.4%) had a pretty good diet diversity score. Food groups that were relatively highly consumed by most households included cereals (100%), sugar and sweeteners (90.2%), oils and fats (93.7%), seasonings, and spices (89.4%). A significant effect with $p < 0.05$ was on HDDS during the COVID-19 pandemic. The food consumption score is another indicator widely used in determining household food security. Therefore, it is necessary to revalidate tests in further studies of these indicators.

Keywords: COVID-19, dietary diversity, food security, HDDS

Introduction

As of March 12, 2020, the coronavirus disease 2019 (COVID-19) has been confirmed in 125,048 people worldwide, bringing a mortality rate of around 3–7%, compared to the mortality rate of influenza (less than 1%). There is an urgent need for effective treatment. The current focus is on developing new therapies, including antivirals and vaccines.¹ The first coronavirus case emerged and attacked humans in Wuhan, China. Initially, it was suspected of pneumonia with symptoms similar to the flu, including cough, fever, fatigue, shortness of breath, and no appetite.¹ However, unlike influenza, the coronavirus developed rapidly, resulting in severe infections, organ failure, and death. This emergency condition mainly occurs in patients with previous health problems.² It also affects the individual and community levels of the social and food security sectors. The resolution of the COVID-19 problem, especially on social impacts, will involve the minor elements of the community, such as overcoming

household food security. Therefore, issues related to food security challenge all countries directly related to improving the economy and achieving the quality of human life.^{3,4}

According to FAO, food security is the condition of food fulfillment for everyone, both in quantity and quality. Fulfilling the right to food is the primary key to overcoming hunger. World data from study reports from Rosen et al.⁵ stated that the number of people who consumed calories below the recommended in 2015 reached 13.4%. This data generally occurs in developing countries and is projected to increase to 15.1% in 2025.

Food security has been a top priority for the world community for decades in addressing the basic nutritional needs of the poor and vulnerable. Food insecurity still affects hundreds of millions of people in Sub-Saharan Africa, where more than one in four people (nearly 218 million) are malnourished. Food and nutrition security is a global challenge and a prerequisite for a healthy and prosperous society. Food

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security occurs when "all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their dietary needs and preferences for an active and healthy life." Nutritional security exists when safe access to an appropriately nutritious diet is coupled with environmental sanitation, adequate health services, and care to ensure a healthy and active life.⁶

Issues and debates about global food security have resurfaced since the 2008 food crisis when prices of essential food commodities spiked dramatically, showing that securing food supply and accessibility to meet the needs of the world's 9 billion people by 2050 is a formidable task. The world population is estimated to increase from 7.3 billion to 9 billion in 2050. Food production requires regular production systems and consumption patterns that need policy action to increase agricultural productivity by 30-40% to fulfill the need for food.⁷

Therefore, programs integrated into joint efforts politically, economically, and socially mobilize awareness of the importance of accurate information systems in providing fast and timely information. Of course, this will help overcome the problem of changing food consumption patterns during the COVID-19 pandemic. This study aims to analyze household food security during the COVID-19 pandemic and link it to the nutrient intake and nutritional status of children under five in the Kupang district area.

Methods

This cross-sectional study is based on a survey conducted on the Timorese population in Kupang district, East Nusa Tenggara, Indonesia, from May to October 2021. The location selection was chosen purposively considering that Kupang district has a high prevalence of nutritional problems. This study involved two subjects: children under five (12–59 months old) and mothers. Population data were obtained from cadre reports from each village recorded at each local health center. Mothers of children were chosen as research subjects because they were fully involved in providing food for all family members. The inclusion criteria considered in determining the child as a subject included children aged 12 to 59 months old, not in severe illness or carrying out routine treatment processes, and the mother's consent as evidenced by signing the informed consent form. The inclusion criteria considered

in determining the mother as a subject were: the respondent was the biological mother of the child, had a husband with the status of the household head, the mother was entirely responsible for arranging or preparing family meals, aged 17 to 50 years old, and the subject agreed to interview, evidenced by the signing of the informed consent form. The number of subjects was calculated by proportional allocation by considering each health center's level/stratum of food vulnerability. The subjects totaled 1,444, consisting of mothers and children in the Timorese population. Subjects were taken at each public health using a simple random method without replacement. The randomization process was carried out with the help of the Microsoft Excel 2013 program. The Health Research Ethics Committee of Politeknik Kesehatan Kemenkes Mataram approved the study, number LB.01.03/6/1688/2021.

Data on household dietary diversity was collected through the food recall method 24 hours earlier, using the household dietary diversity score (HDDS) indicator. Interviews were proposed to mothers who were responsible for the preparation of family meals. Subjects were instructed to tell about all types of food consumed by each household, sourced from the purchase process or self-processing at home. In addition, subjects were asked to talk about the food prepared at home for household members outside the home.

The subsequent data was the proportion of food expenditure collected by conducting structured interviews with mothers referring to the questionnaire sheet. Subjects were instructed to explain the average spending for each type of food consisting of staple foods (rice, sugar, cooking oil, coffee, tea); side dishes (chicken eggs, tempeh, tofu, fish, broiled chicken, shrimp, squid); vegetables and fruits; instant noodles; toddler milk; and spices. Subjects explain the average frequency of each type of food purchase in units of time (day/week/month) and state the amount spent on each purchase. Subjects were asked to estimate non-food expenditures paid in one month, such as water, electricity bills, regular installments, fuel, etc.

Results

Table 1 shows the proportion of child subjects by gender. Almost half of the subjects (57.1%) were female, while the proportion of males reached 42.9%.

Table 1 Distribution of Children by Age and Gender

| Characteristics | n=1,444 (%) |
|-----------------|-------------|
| Age (years) | |
| 1–3 | 841 (58.2) |
| 3–5 | 603 (41.8) |
| Gender | |
| Male | 619 (42.9) |
| Female | 825 (57.1) |

Table 2 Characteristics of the Household

| Characteristics | n=1,444 (%) |
|---------------------------------------|-------------|
| Father's occupation | |
| Farmer | 367 (25.4) |
| Fisherman | 135 (9.4) |
| Trader | 261 (18.1) |
| Private sector employee | 194 (13.4) |
| Civil servant/military/police officer | 487 (33.7) |
| Mother's occupation | |
| Housewife | 511 (35.4) |
| Trader | 273 (18.9) |
| Farmer | 258 (17.9) |
| Private sector employee | 82 (5.7) |
| Civil servant/military/police officer | 320 (22.1) |
| Household size (persons) | |
| Small (≤ 4) | 461 (31.9) |
| Medium (5–6) | 603 (41.8) |
| Big (≥ 7) | 380 (26.3) |

The data on general household characteristics analyzed in this study consisted of fathers' and mothers' occupations and household size. Based on the study results in Table 2, civil servant/military/police was the most dominant type of husband job (33.7%). The proportion of work of

Table 4 Distribution of Households by the Proportion of Food Expenditure

| Categories | n=1,444 (%) |
|-----------------------------------------------|-------------|
| Low ($>50\%$) | 853 (59.1) |
| Adequate ($\leq 50\%$) | 591 (40.9) |
| Average \pm SD (proportion) 60.9 \pm 19.8 | |

Table 5 Distribution of Households based on Diversity of Food Consumption with HDDS

| Categories | n=1,444 (%) |
|---------------------------------------------|--------------|
| Low (≤ 3 food types) | 52 (3.6) |
| Moderate (4–5 food types) | 141 (9.7) |
| High (≥ 6 food types) | 1,251 (86.6) |
| Average \pm SD (proportion) 6.3 \pm 1.8 | |

the father as a farmer was 25.4%. Meanwhile, almost half of the children's mothers (35.4%) were homemakers or did not work permanently. Some mothers act as private sector employees (5.7%).

Table 3 shows the distribution of parents by education level. Most fathers (39.0%) and mothers (30.4%) had a history of education, having graduated from secondary education. The data shows the low level of parental education.

The study presents the distribution of households based on the proportion of food expenditure described in Table 4. The study results explained that the ratio of lower prices (more than 50% of households) still dominated most families at 59.1%. Meanwhile, the % of households with a proportion of food expenditure categorized as good was 40.1%. The average value of the proportion of food expenditure as a whole household was 60.9%. Table 4 explains

Table 3 Distribution of Parents by Education Level

| Education Level | Father | | Mother | |
|---------------------------------------------------------------------------------------------|---------|------|---------|------|
| | n=1,444 | % | n=1,444 | % |
| None | 48 | 3.3 | 23 | 1.6 |
| Primary/lower education (elementary school/equivalent) | 307 | 21.3 | 291 | 20.1 |
| Junior secondary education (junior high school/equivalent) | 564 | 39.0 | 439 | 30.4 |
| Upper secondary education (high school/equivalent) | 281 | 19.5 | 417 | 28.9 |
| Higher education (associate degree diploma-3/bachelor degree/master degree/doctoral degree) | 244 | 16.9 | 274 | 19.0 |

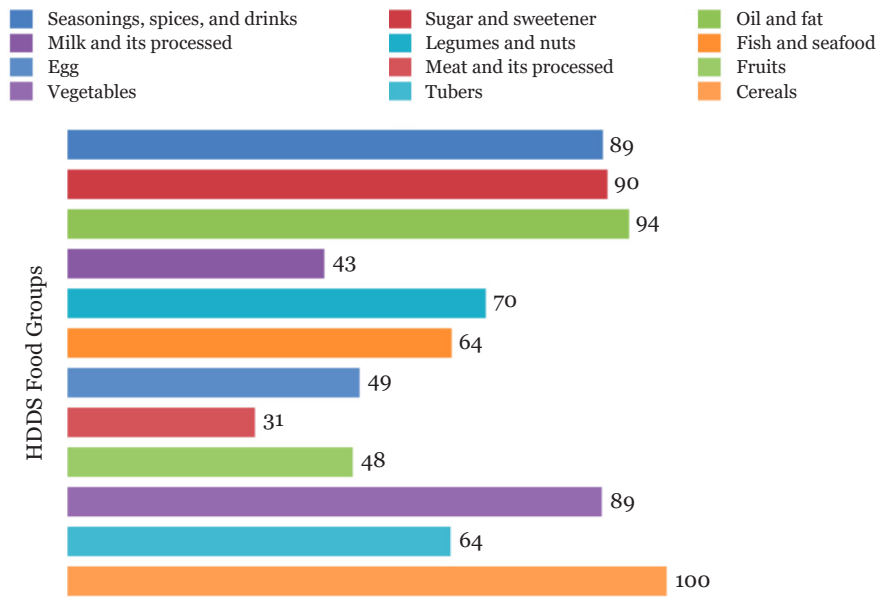


Figure Distribution of Households by Food Group Consumed

that almost half of the households experience food insecurity conditions. Income was the main element that had implications for the proportion of food expenditure.

The distribution of households based on the consumption of food types is described in detail in Figure. Food groups that were relatively highly consumed by most households included cereals (100%), sugar and sweeteners (90.2%), oils and fats (93.7%), seasonings and spices (89.4%).

Dietary diversity illustrates household consumption over a certain period and is an essential indicator of food security. The study results in Table 5 show that as many as 86.6% of households had a reasonably high HDDS.

Discussion

Growth, health, and psychosocial development in children under five are continually occurring, so good nutrition is needed during this period. The general characteristics of children under five in this study were the distribution of subjects based on age and gender. Table 1 explains that most children were aged 1–3 years (58.2%), and the remaining 41.8% were aged 3–5. The grouping of children's age was determined based on the division of the age range in the Table of Indonesian Recommended Dietary Allowances (RDA). Children from early life to 3 years old need nutrients to support brain development which

has long-term consequences.⁸ Fulfilling nutrition, primarily for toddlers aged 3–5 years (preschool age), is generally used to support children's cognitive and motor development accompanied by stimulation. Children under five who lack nutrient intake can cause nutritional problems/malnutrition. According to WHO, malnutrition is the main element or factor that causes death and reduces the health status of children under five.⁹

The Economic Survey data analysis showed that employment status and household size determine household food security.¹¹ According to Ip et al., households with the father's primary occupation as a farmer generally have dynamic food security conditions because they follow the harvest season of agricultural production.¹² The father's role is vital to creating a good food security condition in the household. According to Ochieng et al., children and women in households headed by a father or a man have significantly more diverse diets than in households headed by a woman.¹³

Meanwhile, mothers' work as housewives is strongly correlated with good food security conditions in the family.¹⁴ This is related to the number of times mothers are at home to be involved in the buying process to provide food for household members.¹⁵ Table 2 also presents data on the distribution of households based on the number of family members. Generally, households were classified as medium-sized, with

a proportion of 41.8%. The ratio of small-sized households was 31.9%, and 26.3% were included in large-sized households. According to Mango et al., a small household size can guarantee better food security. The smaller the family size, the more food opportunities for everyone.¹⁶ This becomes important in improving the optimal nutritional status of each individual in the household.¹⁷ The presence of many children in the family usually causes limited resources to meet household needs. In addition, limited access to households in providing nutritional quality food can have implications for suboptimal nutritional conditions in children.

The quality of education greatly determines the quality of human resources because it acts as a means to improve intelligence and human skills. In the food security system, the education level of the head of household and mother is one of the indicators included in social access from the dimension of food access.¹⁸ It will affect the low access of parents in obtaining good jobs to fulfill the needs of family life.¹⁹ The study results of Petralias et al. stated that fathers or mothers who do not complete compulsory education would be more at risk of causing food insecurity conditions. It is due to limited access to nutritious and balanced food. According to Vollmer et al., higher education levels of mothers and fathers are closely related to decreased malnutrition in children. Therefore, education is essential to support socioeconomic status and food and nutrition security conditions at the household level. The proportion of food expenditure is the income allocated to spend on food every month and divided by total household expenditure.

A household with a large proportion of food expenditure is quite at risk of experiencing food insecurity.¹⁹ According to Smith and Subandoro,³⁴ households can achieve good food security conditions if the average proportion of food expenditure is less than 50%. Impoverished households spend more to access basic needs, reduce food quality, and reduce consumption of the cheapest food.²⁰ These conditions will impact the achievement of nutritional status that is not optimal in individuals. Expenditure on food can be defined as consumption expenditure at current food prices divided by income. Food is a primary need, so low household income can lead to higher expenditure allocations for food. HDDS indicator provides an overview of the household's ability to access food based on the food group consumed in

the previous 24 hours. According to Russel et al., the diversity of food consumption indicates food insecurity in households.²¹ The average score of HDDS as a whole was 6.3. Melani supports the results of this study, where most households in agro-ecological areas (72.7%) have high HDDD.²²

The food consumed by each individual in determining the HDDS can be obtained through several ways, such as self-cooking, buying, and through assistance or giving. Households in this study generally received food for consumption by cooking and buying. The main menu for the family, such as rice and side dishes, naturally came from the processing itself at home through the cooking process. Meanwhile, processed food menus, including snacks, are mostly consumed by children in the household from the nearest food stalls. According to the Ministry of Trade, the Indonesian people's consumption rate in the four food groups is relatively high, the leading national strategic point. Based on the Ministry of Health total diet study, the main staple food in Indonesian society still relies on the cereal group as the primary energy source, and this is in line with a total diet study; cereal and processed groups are foodstuffs with a reasonably high consumption rate by the Indonesian population.²³ While other food groups, households in this study revealed they needed to be better at consuming meat and processed products (41.4%), milk and derivative products (43.1%), and fruits (47.8%).

The sample households' dairy and processed food groups are mainly powdered milk by children under five. The total diet study in 2014 reported that the level of consumption of the vegetable and processed groups in the population in East Nusa Tenggara was relatively high, with an average consumption of 92.7 grams per person per day.²⁴ This is supported by the high level of community preference for vegetables and their processed products in a geographical environment surrounded by hills and mountains.

The consumption rate of the meat and processed food group needs to be increased because it contributes to meeting the needs for protein, vitamins, and minerals that can support body health.²⁵ Most households still have relatively low consumption figures for several food groups. About 48% of households consume fruits, meat, and their derivatives, milk, and derivatives. Several factors contributing to this food group's low consumption are income level, type of work, gender, household size, and community

knowledge of food and nutrition.²⁶ The utilization of local food for root crops, legumes, and nuts needs to be increased to diversify food to find alternative sources of carbohydrates and protein other than rice and meat.

This study has several limitations, such as using a single indicator widely used in determining resilience in household food: food consumption score (FCS), average household energy intake, and the household food insecurity access scale score (HFIAS). Therefore, it is necessary to revalidate these indicators.

Conclusion

There was a change in household food security in the Kupang district community due to the COVID-19 pandemic.

Conflict of Interest

None declared.

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