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Household food insecurity and children dietary diversity during the COVID-19 outbreak

Kerawanan pangan rumah tangga dan keragaman konsumsi balita pada masa pandemi COVID-19

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Abstract

The COVID-19 pandemic raises the likelihood of food insecurity and affects the nutritional status of children. This study aims to examine the relationship between household food poverty and children's dietary diversity. The cross-sectional study has done at Lhokseumawe City and North Aceh District. A sample of 289 children aged 12–59 months participated in this study. The Food Insecurity Experience Scale (FIES) was used to measure household food insecurity. Meanwhile, the Individual Dietary Diversity Score (IDDS) was done to assess children's dietary diversity. The Chi-square was employed to analyze the association between household food insecurity and children's dietary diversity. The prevalence of household food insecurity was 8,3%, consisting of 5,5% moderate food insecurity and 2,8% severe food insecurity. Most children had diverse food consumption (88,6%). However, 11,4% of children had low dietary diversity. Household food insecurity was significantly correlated with children's dietary diversity (p= 0,002). Conclusion, the COVID-19 pandemic indirectly impacts household food insecurity, which can worsen the condition of food consumption for toddlers, especially regarding diversity in food consumption. A strategy is required to assist food-insecure households to maintain and increase children's dietary diversity.
Keywords: Consumption, diet quality, FIES, food security, food variety

Abstrak

Pandemi COVID-19 dapat meningkatkan risiko kerawanan pangan rumah tangga dan berdampak terhadap status gizi balita. Penelitian bertujuan untuk menganalisis kerawanan pangan rumah tangga dengan keragaman konsumsi pangan balita. Penelitian cross-sectional dilakukan di Kota Lhokseumawe dan Kabupaten Aceh Utara, tahun 2021. Sebanyak 289 anak usia 12-59 diikursetakan sebagai sampel. *Food Insecurity Experience Scale* (FIES) digunakan untuk mengukur kerawanan pangan rumah tangga dan *Individual Dietary Diversity Score* (IDDS) untuk mengukur keragaman konsumsi balita. Analisis data menggunakan uji Chi-square. Hasil, prevalensi kerawanan pangan rumah tangga sebesar 8,3%, terdiri dari 5,5% rawan pangan tingkat sedang dan 2,8% rawan pangan tingkat berat. Sebagian besar balita mengonsumsi pangan yang cukup beragam (88,6%). Terdapat hubungan antara kerawanan pangan rumah tangga dengan keragaman konsumsi pangan balita (p= 0,002). Kesimpulan, pandemi COVID-19 memiliki dampak secara tidak langsung terhadap kerawanan pangan rumah tangga yang dapat memperburuk kondisi konsumsi pangan balita terutama pada aspek keberagaman konsumsi pangan. Perlu adanya strategy untuk membantu rumah tangga rawan pangan agar dapat mempertahankan dan meningkatkan keragaman konsumsi pangan anak.
Kata Kunci: FIES, keragaman dan ketahanan pangan, konsumsi, kualitas diet

Introduction

Food security has become a major global, national, community, household, and individual concern, particularly during the COVID-19 pandemic (Sulaiman et al., 2021). Many countries have undertaken efforts to prevent the spread and reduce the impact of COVID-19. Some of these efforts include *social distancing* policies, mobility restrictions, and temporary closure of most workplaces better known as '*lockdown'* (HLPE, 2020). Indonesia is one of the countries affected by the COVID-19 pandemic, including the Aceh Province.

Food poverty is when people cannot obtain sufficient and suitable food for a healthy and active life, including poor people, disaster-affected people, and people in geographical conditions where access to food is unaffordable (UU RI No.18, 2012). Household food poverty has been identified as a determining factor that may underlie malnutrition, especially in babies. Children's nutrition problems in Aceh are quite high such as *stunting* (33,2%), *wasting* (10,7%), and being *underweight* (23,8%)(Kemenkes RI, 2021). Malnutrition is also high in the North Aceh District and Lhokseumawe. It may indicate that the food security of some households in Aceh is not sufficiently sensitive to food.

Household food infertility has increased during the COVID-19 pandemic (Gebeyehu et al. 2022). Research results in Peru have shown that during the COVID-19 pandemic, the prevalence of moderate and severe household food virginity was 24% (Curi-Quinto et al., 2021). Meanwhile, in Tehran, Iran, household food poverty is higher, with 61% and 34,9% experiencing severe food vulnerability (Pakravan-Charvadeh et al., 2021). Studies in rural Southwest Bangladesh show a very high prevalence of food poverty (80%), with more than 50% suffering from food virginity (Ahmed et al., 2021). Food insecurity is categorized as food-resistant households, medium-level food susceptibility, and heavy food sensitivity (FAO, IFAD, UNICEF, WFP, and WHO, 2019).

Food-resistant households have sufficient access to the quality and quantity of food. Households undergoing interviews are confronted with uncertainty or inability to obtain food. They are forced to reduce food quality and quantity because they lack money or other resources. Thus, food infertility refers to a lack of consistent access to food, reduced quality diets, and interference with normal diets, and can have negative consequences for nutrition, health, and well-being. Households experiencing severe food scarcity, the likelihood of food shortages, hunger, and the most extreme days without eating can jeopardize their health and well-being (FAO, IFAD, UNICEF, WFP, and WHO, 2019).

Food insecurity during the COVID-19 pandemic was influenced and supported by various factors, such as low formal mother education, larger family size (>5), families with at least one child under five years of age, living in the countryside, low wealth assets, increased spending, and decreased incomes (Curi-Quinto et al., 2021). According to Pakravan-Charvadeh et al. (2021), food abundance is affected by a decline in production, rising prices of goods, especially food and beverages, and a decrease in purchasing power. Among these factors, virginity continuously affects household virility.

The different impacts of food poverty during the COVID-19 pandemic are reduced quantity and quality of baby consumption, so households with baby children are vulnerable to nutritional problems (HLPE, 2020). Nutrition problems in early life and early age due to the impact of the COVID-19 pandemic have intergenerational consequences on the growth and development of children and lifelong impacts on the risk of chronic diseases and human resources (Headey et al., 2020).

The food intake of babies is influenced by the household food security status (Mei et al., 2020). Household food virginity conditions contribute to poor food consumption quality, such as calorie intake and other important nutrients (Sulaiman et al., 2021). Very food-sensitive families have much lower food diversity in children than food-resistant families (Karim & Tasnim, 2022).

Some studies have shown that the impact of food poverty during the COVID-19 pandemic on babies' health and nutritional status, serious malnutrition problems, and wasting also allows for slow growth (Sulaiman et al., 2021). Household food scarcity caused by the COVID-19 pandemic can affect children's dietary diversity and cause acute malnutrition (Karim & Tasnim, 2022). The consumption of less varied foods in babies can risk babysitters with very low weight (Utami & Mubasyiroh, 2020). Based on this study, we aimed to analyze the relationship between household food virginity and the variety of food

consumed by babies during the COVID-19 outbreak.

Methods

Quantitative research used a cross-sectional study design in Lhokseumawe Town (Banda Sakti Public Health Center) and Northern Aceh District (Muara Batu Public Health Center). The research was conducted from August to November 2021. Samples were selected according to the inclusion criteria of 12-35 months old, healthy or unhealthy, and willing to participate in the study. All samples were selected using accidental (*accidental*) techniques during posyandu activity during the study. A total of 289 samples were used. This study involved the mother of the baby as the respondent.

The primary data for this study were obtained through direct interviews using questionnaires in compliance with the health protocol applied by the researchers. The primary data included (1) the characteristics of the baby (gender, age), (2) the family characteristics (age, education, work of the mother or father, and the big family), (3) the diversity of baby food consumption, and (4) the virginity of household food data.

The *Food Insecurity Experience Scale* (FIES) was used to identify household food virginity conditions. There are eight questions to be answered by respondents, including concerns that household members (ART) will not have enough food to eat; ART cannot eat healthy and nutritious foods; ART only eats a small amount of food; ART has never missed a mealtime on a particular day; ART eats less than it should be; ART is not eating enough; ART feels hungry but does not eat; and Art does not eat all day (Ville et al., 2019). The 'yes' answer to each question describes the situation experienced by the respondents. The greater the choice of "yes" answers, the worse the respondents' food virginity experience. This experience occurred at least once in the last year due to limited access due to a lack of money or other resources (Ville et al., 2019). Other resource variables are the availability of other means that can be used to obtain food, including food from production and production from agricultural activities that may be sold. Categorize household food virginity by using the *cut off* as follows: Food resistance level light or food resistance (if score <4); Food sensitivity level moderate (if score = 4–6); Food vulnerability level high (if scoring = 7–8).

Individual Dietary Diversity Score (IDDS) is the number of foods or food groups consumed during a given period (Ruel, 2003)(). The *food recall* method 1 × 24 h was used to identify the diversity of food consumption by babies. The processing of food consumption diversity data is carried out by giving code 1 (if food is consumed according to the food group IDDS) and 0 (if the food is not consumed in the IDDS food group), then summing up the total given code 1, and finally categorizing according to to *cut off* the diversity of food consumption. The food group on the IDDS instrument consisted of herbicide foods, green vegetables, fruits and vegetables, sources of vitamin A, other fruits and vegetables, strawberries, meat and fish, nuts and grains, and milk and dairy products. *Cut off* food consumption diversity as follows: less diversified if (<4 food groups); sufficiently diverse if (≥4 food groups). The relationship between household virginity and child food consumption diversity was tested using the *Chi-Square test* with a 95% confidence value (α = 5%).

Ethical approval for this study was obtained from the Health Research Ethics Commission (KEPK) of Polytechnic Health Kemenkes Mataram, Nusa Tenggara West. Ethical approval is based on the Decision of Examination No: LB.01.03/6/3412/2021, issued on April 21, 2021.

Result and Discussion

Characteristic Respondent and Sample

Based on the characteristics of respondents, most mothers included productive age 20-45 years and did not work or were housewives. The fathers' and mothers' levels of education were very high. More than half of the babysitters were high school graduates or graduates.

Meanwhile, according to the primary subsistence eye, more than half of the fathers (55,0%) work as private entrepreneurs and 26,7% as farmers/ horticulture/welfare workers. 60,9% are small families (<4 persons), and more than a quarter have several family members of 5-9 persons (Tabel 1).

Table 1. Distribution characteristics of respondent and sample (n= 289)

Characteristic	n	%
Mother Age		
20-32 Year	158	54,7
33-45 Year	126	43,6
46-58 Year	5	1,7
Education of Mother		
Low	29	10,0
Medium	58	20,1
High school	202	69,9
Education of father		
Low	41	14,2
Medium	72	24,9
High school	176	60,9
Mother's work		
No working/ housewife	254	87,9
Working	35	12,1
Father's work		
Civil servants	15	5,2
Self-employed	159	55,0
Agriculture/Farming	77	26,7
Other	38	13,1
Large Family		
≤4 person (small)	176	60,9
5-6 person (medium)	109	37,7
≥ 7 Person (large)	4	1,4
Age of child		
12-23 Month	92	31,8
24-41 Month	108	37,4
42-59 Month	89	30,8
Sex of child		
Male	153	52,9
Female	136	47,1

The sample characteristics in this study included age and sex of the children. Table 1 shows the age of the infants spread evenly between 12-23 months, 24-41 months, and 42-59 months. The percentage of boys was slightly larger (52,9%) compared to girls (47,1%).

Household Food Insecurity

During the COVID-19 pandemic, the prevalence of food virility in this study was 8,3%, consisting of a moderate level of food susceptibility (5,5%) and a severe degree of food sensitivity (2,8%).

The prevalence of food virility was much lower in this study compared to food virality found in several other studies. The prevalence of food insecurity is quite high, especially in countries that are experiencing food and health crises (Dasgupta & Robinson, 2021; Grey et al., 2020; Murakami, 2022). These countries suffer from food shortages and rising prices due to a lack of production and a minimum in exports and imports. The rates of poverty, hunger, and food poverty in India have increased during the COVID-19 pandemic (GAIN, 2020).

The United States Department of Agriculture (USDA) defines food insecurity as a condition at the socioeconomic level of a household with limited or uncertain access to sufficient food (Coleman-Jensen et al., 2016). The *High-Level Task Force on Global Food Security* (HLTF) defines food security and nutrition as a condition in which everyone, at all times, has access to adequate physical, economic, social, safe, and nutritious food that can meet dietary needs and food preferences for a healthy and active life (HLPE, 2020). Food security has become a major global, national, community, household, and individual concern, particularly during the COVID-19 pandemic (Sulaiman et al., 2021). There is plenty of evidence that the impact of this pandemic contributes heavily to increased food virility at the household or individual level (Fang et al., 2022; Niles et al., 2020).

Table 2 shows that more than a quarter of households (28,7%) feel concerned about insufficient food. Meanwhile, less than a quarter of households are beginning to reduce the quality or diversity of their consumption. On the other hand, less than 10% of households have reduced their consumption, and 2,8% have experienced hunger. Although there was severe food susceptibility in the households, the study did not find household members who had never eaten daily.

Food insecurity can be caused by a lack of food availability, insufficient purchasing power, and inadequate distribution and use of food at the household level (FAO 2013). During the COVID-19 pandemic, household and individual food virginity was affected by several factors, such as the occupation of the head of the household, poor households, and families with infants (Das et al., 2020), loss of employment due to PHK, low education, having a large number of children, physical access such as access to shops during pandemics, economic access (increase in food) (Fang et al., 2022), and households with large families and households headed by women (Shahzad et al., 2021).

Table 2. Distribution of respondents according to the measurement of food virility (n = 289)

Question Items	No		Yes	
	n	%	n	%
Worried about not having enough food	206	71,3	83	28,7
Unable to consume healthy and nutritious food	224	77,5	65	22,5
Only consume a few types of food	248	85,1	43	14,9
Never skipped a meal on a particular day	275	95,2	14	4,8
Eat less than should	265	91,7	24	8,3
The household is running out of food	276	95,5	13	4,5
Feeling hungry but not eating	281	97,2	8	2,8
Did not eat all da	289	100	0	0,0

Food poverty is also closely linked to regional poverty. According to the results of the Zakiah study, Lhokseumawe is a district/city in the province of Aceh, whose energy consumption growth is positive, and the poverty rate is the lowest (Zakiah, 2018). Meanwhile, North Aceh District is one of the districts with a poverty rate above the average of 20.3%. The disadvantage of this study is that it is not distinct in measuring food virginity in the City of Lhokseumawe and northern Aceh District to predict food virginity due to poverty.

In the survey that was conducted in the province of Aceh on food poverty after five years of the natural disaster Tsunami, the prevalence of virginity is quite high, namely, food vulnerability at the medium level (21,7%) and food vulnerability at the heavy level of 78,3% (Dahlan, 2010). Furthermore, it was confirmed that no district/city area in the province of Aceh had low food virginity status or food resistance (Dahlan, 2010). In contrast to the current prevalence, this may be due to differences in the methods used to determine household food virility, the research's time, and the area coverage and samples used.

The conditions of food poverty during the COVID-19 pandemic were affected by most poorly classified communities receiving government aid related to poverty reduction, in particular, social protection programs, such as fast food, food aid, and direct cash aid (Ling et al., 2022; Shuvo et al., 2022; Singh et al., 2021). If associated with the food security of the community, such aid indirectly has a positive impact on food security or household food security (Dasgupta & Robinson, 2021). Nearly all households use government aid in cash and food (Lawson-Lartego & Cohen, 2020).

For some rural households with low incomes and experiencing food poverty, *coping strategies* are generally conducted by adjusting diets during the COVID-19 pandemic, such as avoiding fast food and snacks, avoiding expensive protein sources, using alternative protein sources other than fish, such as eggs, and increasing dependence on sustainable food ingredients. (Mandal et al., 2021). There are several things families can do in anticipating food insecurity (*coping strategies)* during a pandemic, such as eating less, buying different and cheaper foods, receiving food from friends and family, taking advantage of government programs, loans, or food cuisines (Niles et al., 2020), increasing the use of local food, and increasing the consumption of self-produced food (Widiyanto, 2019).

Diversity of Food Consumption for Toddlers

Figure 1 shows that most toddlers (88,6%) consumed a variety. However, 11.4% of toddlers still consume less diverse food. The diversity of food consumption for toddlers in this study was quite good regarding one aspect of the quality of food consumption.

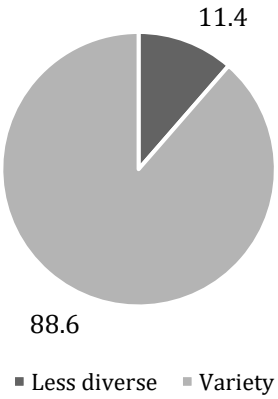

Figure 2. Distribution of diversity of food consumption under five

However, it cannot describe food consumption in terms of quantity or amount according to the needs of toddlers. The high percentage of diversity in food consumption for children under five in the moderate category in this study is thought to be influenced by the large

proportion of selected households coming from urban areas. The food consumption of toddlers living in urban areas is more diverse than that in rural areas (Utami & Mubasyiroh, 2020).

The increased diversity in child food consumption can also be due to the mother's or caregiver's knowledge and educational factors (Frempong & Annim, 2017; Rahmadi et al., 2022; Suryana et al., 2022). Mothers with sufficient education and knowledge will understand the importance of balanced nutrition to provide the best food for their children. Studies have shown that providing various foods can improve babies' nutrition and health (Darawati et al., 2020; Frempong & Annim, 2017; Suryana et al., 2022).

Based on the food group, more than 50% of children under five have consumed all food groups except offal (3,1%). Most (99,0%) toddlers eat starchy staple foods, such as rice, which is the main staple food. The source of animal protein consumed by toddlers was milk (87,2%), followed by eggs (76,8%), chicken meat (75,4%), and nuts (64,4%). Over half of the children under five years of age consumed vegetable and fruit sources of vitamin A, green vegetables, and other fruits (Table 3).

Table 3. Description of the diversity of food consumption by food group

Foods Group	No		Yes	
	n	%	n	%
Staple food	286	99,0	119	1,0
Green vegetable	170	58,8	119	41,2
Vitamin A vegetables	153	52,9	136	47,1
Other vegetables	148	51,2	141	48,8
Innards	9	3,1	280	96,9
Meat	218	75,4	71	24,6
Egg	222	76,8	67	23,2
Nuts	186	64,4	103	35,6
Milk	252	87,2	37	12,8

The results of this study are in line with the results of the analysis of the Indonesian Food Consumption Survey (IFCS), which shows that the food groups of cereals, roots, and tubers are the most co-summed foods by toddlers, while fruits and nuts are the least consumed food groups (Utami & Mubasyiroh, 2020). One of the pillars of the Principles of Balanced Nutrition (PGS) is diversity in food consumption (Kemenkes RI, 2014). Food diversity refers to food consumption consisting of staple foods, side dishes, vegetables, fruits, and water. The diversity of foods consumed can increase their potential for providing various nutrients and healthy phytochemicals (Habte & Krawinkel, 2016).

The Relationship between Food Insecurity and Consumption Diversity

Table 4 shows that the proportion of children with diverse food consumption occurs in households experiencing severe levels of food insecurity. In contrast, the number of children whose consumption varied was higher in households with mild food security or food insecurity.

The chi-square results showed a significant relationship between household food insecurity and the diversity of food consumption for children under five years of age (p= 0,002).

Table 4. Relationship between food insecurity and consumption diversity of toddlers

Level of Household Food Insecurity	Diversity of Food Consumption				p-value
	Less Diverse		Variety		
	n	%	n	%	
Food-resistant or mildly food insecure	28	84,8	237	92,6	0,002
Moderate level of food insecurity	1	3,0	15	5,7	
Severe food insecurity	4	12,2	4	1,7	

The results of this study align with previous research conducted by Legawa (2017), which shows that household food insecurity has a significant relationship with the variety of food

consumed by children under the age of five. Families with severe food insecurity have lower toddler food diversity (Yang et al., 2019). The higher the food insecurity score, the lower the toddler food consumption diversity score (Chandrasekhar et al. 2017; Yang et al. 2019). Research conducted in China shows that food-insecure households have a much lower variety of food consumption for toddlers than food-insecure households. Furthermore, food-insecure households are 6,5 times more likely to experience *stunting* and moderately food-insecure households are 3.5 times more likely to experience *stunting* than food-secure or mildly food-insecure (Yang et al., 2019).

Household food insecurity is the main predictor of dietary diversity among children (Antwi et al., 2022). Households that experience food insecurity have an increased risk of low food diversity for children under five (Antwi et al., 2022). Dietary diversity is a useful indicator of food quality and nutritional adequacy (Dangura and Gebremedhin, 2017).

Families cannot provide food that is sufficiently diverse for toddlers to consume. Most respondents consumed fewer animal food sources. It is related to the lack of family purchasing power to meet animal protein needs and the low consumption of vegetables and fruits (Annashr et al., 2022; Atmadja et al., 2020; Yunianto et al., 2022). In addition, restrictions on people's activities during the COVID-19 pandemic affected access to food so that food consumption became less and less diverse

(Kristiandi, 2021). Thus, family food insecurity is related to the diversity of toddler food consumption, which negatively impacts the nutritional status of family members, especially vulnerable groups such as toddlers (Septiani et al., 2021).

Conclusion

There is a relationship between the level of household food insecurity and the diversity of food consumption among children under five. The COVID-19 pandemic indirectly impacts household food insecurity, which can exacerbate toddler food consumption, nutritional status, and health.

As a suggestion, households with toddlers can utilize their yards for local food production and take advantage of government assistance to access sufficient and quality food for families and toddlers to meet their nutritional needs and avoid nutritional problems.

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