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Household food security and children's food consumption diversity in the different agroecological regions in West Java, Indonesia

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ABSTRACT

Introduction: Food security is essential for a country's development. This is emphasized in the SDG's goal of zero hunger. Food security means that a household can consistently access sufficient quantity and quality food. Geographical location influences access to food. This research aims to analyze food security and diversity in different agroecological regions (highlands and coastal) in West Java.

Methods: The design used in this research is a cross-sectional study. This research was conducted in Cianjur Regency (highlands) and Karawang Regency (coastal) West Java Province, Indonesia. The population in this study were households with children aged 12-24 months. The total number of households sampled in this study was 154. Data on children's food consumption was collected using the 1x24-hour food recall method, while other data was collected by interviews using questionnaires. Descriptive analysis and the Mann-Whitney Test SPSS version 26.0 was used.

Results: As many as 63.6% of subjects in the highlands were aged 12-18 months and 49.4% in coastal area. Maternal education in the highlands was higher than in the coastal ($p<0.05$). Family members of ≤4 people were more common on the coastal ($p<0.05$). As many as 62.3% of households in the highlands and 81.8% in the coastal areas allocate food expenditure <60% of total spending. There is no difference in household food security in the highlands and the coastal ($p>0.05$), but the food consumption of toddlers in the highlands was more diverse than in the coastal area ($p<0.05$).

Conclusion: Mothers in the highlands generally have a higher level of education than mothers on the coastal and so was the household income. The number of households in the highlands with food secure was higher than in the coastal but it was not significantly different. And children's food consumption is more diverse in the highlands than in the coastal.

KEYWORDS

Family Economy, Food Access, Food Expenditure, Nutritional Assessment, Nutritional Education.

INTRODUCTION

Indonesia is one of the countries affected by COVID-19 whose economic conditions have changed from previously high-middle death country status to a low-middle death country starting July 2021[1]. The condition of COVID-19 in Indonesia has had an impact on increasing poverty rates in Indonesia. Poverty is a factor that determines food security conditions at the household level. This happens because food access and household expenditure depend on the income earned[2]. Poverty causes limited access to food, which results in household food insecurity and a high prevalence of malnutrition in children.

People's eating habits depend on the food available in their area or the food that people can buy, and the geographical location of an area influences this. Research conducted by Auliya *et al.* (2015) in Jepara, Central Java, shows differences in food consumption patterns in the highlands and the coastal areas[3].

Food consumption patterns are closely related to household food security. *F*ood security is defined as a condition where a household can consistently access food in sufficient quantity and quality to ensure a healthy and productive life. Meeting

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food needs is a fundamental right for every individual and household[4]. Lack of access to food can cause problems with children's nutrition and long-term household welfare.

West Java Province has a diverse regional topography ranging from highlands to coastal areas. Different characteristics of the area where you live can influence a person's food access, food availability, food utilization, and eating habits. This research analyzes food security and diversity in different agroecological regions in West Java Province, Indonesia.

METHOD

Design, Location, and Time

The design used in this research was a cross-sectional study. The research was conducted in West Java Province, Indonesia, in Cianjur Regency (highlands) and Karawang Regency (coastal). This research was conducted in February 2024 and has received ethical approval from the Ethics Commission of the Bogor Agricultural Institute with Number 887/IT3.KEPMSM-IPB University/SK/2023.

Population and Sample

The sample in this study consisted of 77 households in each region, so the total sample was 154. This research involved two subjects: mothers and children aged 12-24 months. Data on the population of children 12-24 months was obtained from the local *posyandu* (integrated health and nutrition post). The inclusion criteria for this study were mothers with children aged 12-24 months, the child's condition is not undergoing routine treatment, and are willing to be respondents in the research as proven by signing an informed consent form. The exclusion criteria in this study were that the respondent was not present at the time of the study. Subjects were taken using an accidental sampling technique.

Data Collection

Characteristic data (education, family size, family income, expenditure, and children's age and sex) were collected through interviews using questionnaires. The household food security data instrument is the Household Food Insecurity Access Scale (HFIAS). There are 8 HFIAS question items that respondents must answer. If the respondent answers "ever", they are given a value of 1, whereas if "never", they are given a value of 0. Each answer, "ever" will be followed by a question regarding the frequency with which the respondent has experienced food insecurity. Answer choices related to the frequency of experiencing food insecurity are divided into three and given a value of 1 if they say rarely (1-2 times in 4 weeks), a value of 2 if they say sometimes (3-10 times in 4 weeks), and a value of 3 if they say often (>10 times in 4 weeks). The HFIAS score is then categorized into food insecurity (score 0-1), mild food insecurity (score 2-7), moderate food insecurity (score 8-14), and severe food insecurity (score 15-27)[5]. HFIAS is used to measure household food security because it has been validated and proven to differentiate the conditions of food secure and food insecure households and is widely used by other countries. Children's food diversity is assessed using the Minimum Dietary Diversity (MDD) indicator based on the results of a 1x24-hour food recall. Food consumed is grouped into eight groups of ingredients, namely: 1) breast milk, 2) cereals and tubers, 3) nuts, 4) milk and processed foods, 5) meat/poultry/fish/offal, 6) eggs, 7) fruit and vegetables rich in vitamin A, and 8) other fruit and vegetables. Vegetables and fruit are rich in vitamin A if 100 g contains 120 RE of vitamin A. MDD in subjects is achieved if they consume five or more of the eight food groups. If in each food group, there is at least one type of food consumed, it is given a score of 1; if there is none, it is given a score of 0, so the maximum MDD value is 8.

Statistical Analysis

The data processing includes coding, editing, entry, cleaning, and analysis. Data processing was carried out with the help of Microsoft Excel 2019 software and IBM Statistical Program for Social Sciences (SPSS) version 26.0. Univariate analysis was used to describe the frequency of each variable measured in this study. Before bivariate analysis, a data normality test was carried out using Kolmogorov-Smirnov. The different test used is the Mann-Whitney Test.

RESULTS

Characteristics of Mothers and Toddlers

The level of parental education influences parents in receiving information. Parents with a higher level of education will find it easier to receive nutritional information so that it becomes a provision for parents to care for their children[6]. Based on Table 1, it can be seen that in the highlands, mothers have a high school education (37.7%) and a university (20.8%), while in the coastal areas, the mother's education is generally lower (79.3%), namely only elementary/middle school graduates.

This shows that the mother's education in the highlands is higher than in the coastal areas ($p<0.05$). The number of family members is related to family income, food expenditure, and food consumption in the household. The greater the number of family members, the greater the household costs incurred for food consumption[7]. This study showed that on the coastal, 75.3% of families had family members ≤4 people, and in the highlands, 59.7% had a family size ≤4. Family size in households significantly differs between those living in the highlands and the coastal ($p<0.05$).

Family income is the total income of household members, which is used to meet collective and individual needs in the household[8]. Based on the 2021 poverty line cutoff for West Java Province, it is known that 87% of households on the coastal and 64.9% in the highlands are above the poverty line. The average per capita monthly income on the coastal is

Table 1. Distribution of subjects based on family characteristics

Family characteristics	Highlands		Coastal		Total		p-value
	n	%	n	%	n	%	
Mother's education							
ES/equivalent	17	22.1	28	36.4	45	29.2	0.020*
JHS/equivalent	31	40.3	33	42.9	64	41.6	
SHS/ equivalent	28	36.4	12	15.6	40	26	
University	1	1.3	4	5.2	5	3.2	
Number of family member							
Small	46	59.7	58	75.3	104	67.5	0.040*
Medium	31	40.3	19	24.7	50	32.5	
Median (Min-Max)	4 (3-6)		4 (3-6)		4 (3-6)		
Mean±SD	4.1±0.9		4.0±0.8		4.0±0.8		

*Mann-Whitney Test, p<0.05.

Table 2. Distribution of subjects based on household characteristics

Family characteristics	Highlands		Coastal		Total		p-value
	n	%	n	%	n	%	
Household income (IDR/cap/month)							
< IDR 427,400	27	35.1	10	13	37	24	0.002*
≥ IDR 427,400	50	64.9	67	87	117	76	
Median (IDR)	525,000		733,333		600,000		
Min (IDR)	116,667		200,000		116,667		
Max (IDR)	6,000,000		5,433,333		6,000,000		
Mean (IDR)	731,813		856,028		793,921		
SD (IDR)	913,893		671,498		801,708		
Proportion of food expenditure							
Low <60%	48	62.3	63	81.8	111	72.1	<0.001*
High ≥60%	29	37.7	14	18.2	43	27.9	
Median (Min-Max) (%)	51 (18-85)		54 (26-79)		53 (18-85)		
Mean±SD (%)	52.2±16.6		53.4±10.2		52.8±13.8		

*Mann-Whitney Test, p<0.05

IDR 856,028, and in the highlands, IDR 731,813. Statistically, there is a significant difference between household income in the highlands and the coastal areas (p<0.05). Low income affects the quality and quantity of food families consume[9]. This study found that the proportion of household food expenditure <60% was found in households in the highlands. The proportion of household food expenditure is relatively low namely on the coastal, it is more than four-fifths (81.8%), while in the highlands, it is almost two-thirds (62.3%). Engel's Law states that spending on food will decrease as family income increases[7].

Table 3 shows that in the highlands, 55.8% of the children in this study were boys, and on the coastal, 50.6% were boys. Children aged 12-18 months accounted for 63.6% in the highlands and 49.4% on the coastal.

Food Security

Table 4 shows that 35.1% of households in the highlands are classified as food secure, while those on the coastal are 28.6%. More households have severe food insecurity on the coastal (14.3%) than in the highlands (7.8%). This shows that households in the highlands are more food secure than households on the coastal (p=0.05).

Food Diversity

MDD is an indicator designed by WHO to assess food diversity as part of child feeding practices. WHO's guiding principles for feeding breastfed and non-breastfed children recommend that children aged 6-23 months be given a variety of foods to ensure their nutritional needs are met[10].

Table 3. Distribution of subjects based on toddler characteristics

Toddler characteristic	Highlands		Coastal		Total	
	n	%	n	%	n	%
Gender						
Male	43	55.8	39	50.6	82	53.2
Female	34	44.2	38	49.4	72	46.8
Age (months)						
12-18	49	63.6	38	49.4	87	56.5
19-24	28	36.4	39	50.6	67	43.5
Median (Min-Max)	18 (12-24)		19 (12-24)		18 (12-24)	
Mean±SD	18.1±3.9		19.0±4.1		18.6±4.0	

Table 4. Distribution of subjects based on household food security

Household food security (HFIAS)	Highlands		Coastal		Total		p-value
	n	%	n	%	n	%	
Food security	27	35.1	22	28.6	49	31.8	0.050
Mild food insecurity	31	40.3	24	31.2	55	35.7	
Moderate food insecurity	13	16.9	20	26	33	21.4	
Severe food insecurity	6	7.8	11	14.3	17	11	
Median (Min-Max)	3 (0-22)		5 (0-26)		3,50 (0-26)		
Mean±SD	4.79±5.55		7.00±7.07		5.91±6.46		

*Mann-Whitney Test, p<0.05.

Based on Table 5, it can be seen that in the highlands, 63.6% of children and on the coastal, 62.3% of children have a variety of food consumption. However, the average food diversity score was higher in the highlands (5.0±1.3) than on the coastal (4.6±1) ($p<0.05$). The distribution of food groups in MDD indicators in the different agroecology is presented in Figure 1.

Based on Figure 1, it can be seen that 83.2% of the subjects were still breastfed in the highlands, while on the coast only 58.4% of the subjects were. Almost all subjects consumed cereals and tubers. About a third (31.2%) of subjects in the highlands consumed nuts, while only 23.4% on the coast. For the eight types of food groups, it is known that consumption in the highland regions is generally higher than on the coast.

Table 5. Distribution of children based on food diversity

Food diversity(MDD)	Highlands		Coastal		Total		p-value
	n	%	n	%	n	%	
Diverse	49	63.6	48	62.3	97	63	0.039*
Not diverse	28	36.4	29	37.7	57	37	
Median (Min-Max)	5 (2-8)		5 (3-7)		5 (2-8)		
Mean±SD	5.08±1.30		4.62±1		4.85±1.18		

*Mann-Whitney Test, $p<0.05$.

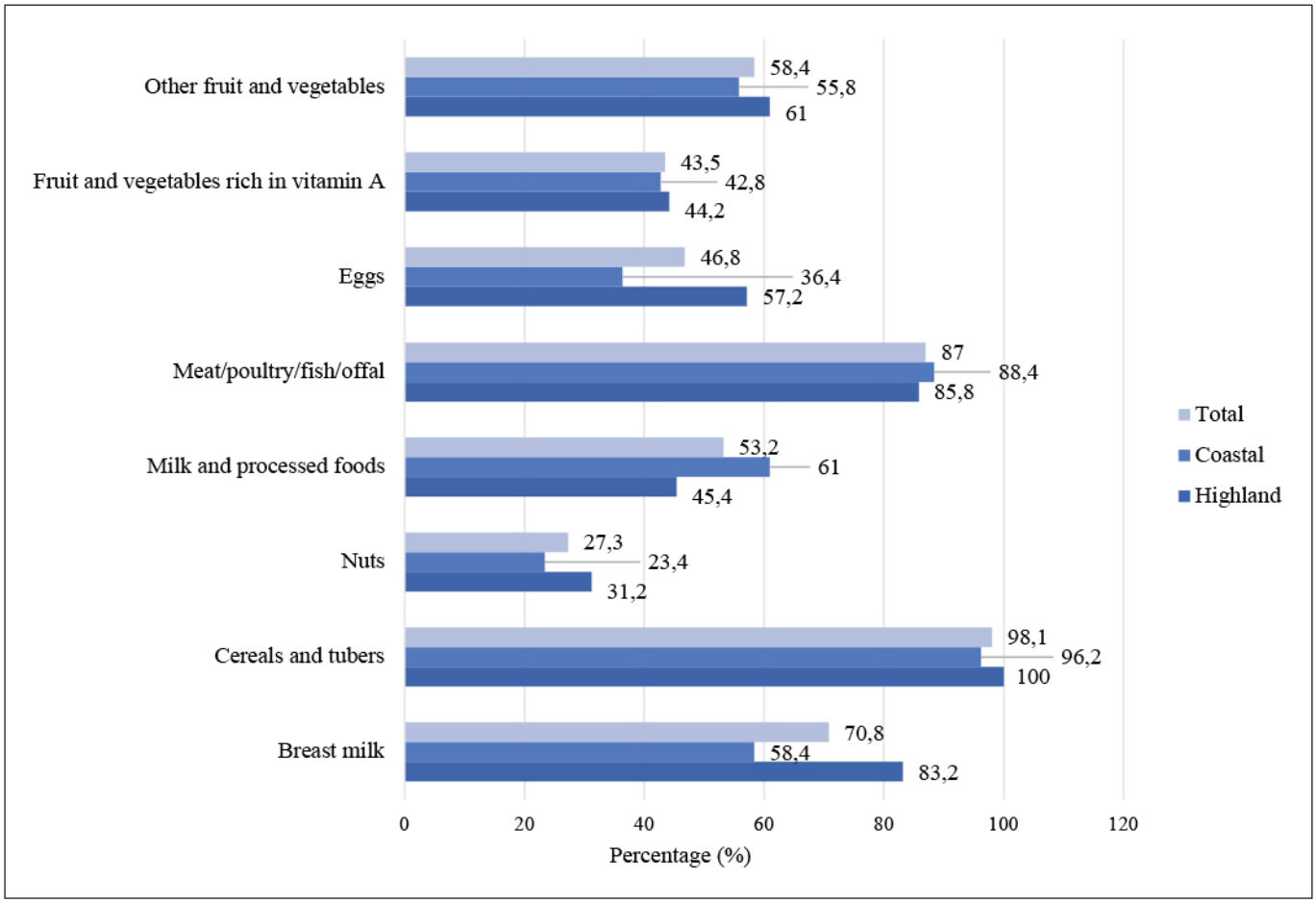

Figure 1. Distribution of subjects based on food consumed

DISCUSSION

Access to food is a human right stated in the 1945 Constitution of the Republic of Indonesia and is very important for creating quality human resources. Indonesia has a vast population and diverse natural and food resources. Indonesia is obliged to meet the food needs of its people to achieve good food security. Food security is a condition of food fulfillment that can be seen from the availability of adequate food, both quantity and quality, safe, varied, nutritious, evenly distributed, affordable, and not contrary to community beliefs and culture so that the goal of living a healthy, active, and productive life is achieved. The focus of food security is the availability of food from the individual to the national level to achieve the fulfillment of community nutritional needs[11]. Household food security has six dimensions: availability, access, utilization or consumption of food, stability, agency, and sustainability[12]. Household food security determines a person's nutritional status; in other words, nutritional problems are closely related to food security problems[13].

This research found that household food security was better in the highlands than on the coastal. However, the statistical analysis results show that household food security in the highlands and the coastal are the same. Meanwhile, research conducted by Bayu (2013) in Ethiopia stated that households in highlands agroecological zones were more likely to experience food insecurity[14]. In this research, food-insecure households were often found in coastal areas. This happens because the accessibility of households on the coastal to markets or shopping centers is very far compared to households living in the highlands. Apart from that, food availability in the highlands is also greater than on the coastal because households in the highlands generally have agricultural land whose agricultural products can be used to support daily food needs. Good food security is a prerequisite for obtaining optimal nutritional status. However, various interrelated factors strongly influence optimal nutritional status[15]. If someone experiences food insecurity, it will affect that person's productivity and, in turn, will have an impact on the low quality of human resources[16]. Besides that, severe food insecurity can negatively impact the nutritional status of newborns, potentially leading to premature births[17].

Food diversity is one factor determining an individual's nutritional adequacy. MDD is an indicator designed by WHO to assess dietary diversity in children aged 6-23 months. WHO recommends providing additional food for children aged six months to meet the calorie, protein, and micronutrient needs for growth and development[18]. This research shows that the food consumption of children aged 12-24 months in the highlands is more diverse than on the coastal. The statistical analysis results show significant differences in children's food diversity in the highlands and the coastal. This aligns with research conducted by Abera et al. (2019) in Ethiopia, which states that food consumption is more diverse in the highlands. Consumption patterns are often influenced by the availability of food in a region[19]. Geographical and topographic differences can also provide unique characteristics of a person's regional consumption patterns[3]. Research conducted by Paudel et al. (2012) in Nepal shows that children with a food diversity score below the WHO recommended score are four times more likely to experience nutritional problems than children with a food diversity score that is by WHO recommendations[20].

STUDY LIMITATIONS

There are several limitations in this research. The sample size was limited, so the results were difficult to generalize to all regions or other demographic groups. Apart from that, the measurement of food consumption of toddlers using the 1x24-hour recall method, which relies on the memory of the respondent's mother, may not reflect the accurate intake of the children. Further research should be conducted with a larger sample size by considering variables not measured in this study.

CONCLUSION AND RECOMMENDATION

Mothers in the highlands generally have a higher level of education than mothers on the coastal. The number of household members ≤4 is most often found on the coastal. Family income is higher in the highlands. As many as 62.3% of households in the highlands and 81.8% of households on the coastal have a proportion of food expenditure <60% of total expenditure. Households in the highlands are more food secure (35.1%) than on the coastal (28.6%). As many as 65% of households in the highlands and 71.5% on the coastal are classified as food insecure. Children's food consumption is more diverse in the highlands (63.6%) than on the coastal (62.3%).

The government intervenes according to the problems in each region. In highlands and coastal areas it is recommended to carry out cross-sector collaboration, in this case the National Food Agency and the Department of Agriculture, to increase food availability and access to safe and nutritious food for the community.

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