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Market Proximity, Income, and Home Gardening: Investigating Determinants of Household Food Security for Young Children in Samarinda City

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ABSTRACT

Food insecurity remains a significant public health issue, especially among infants and young children. This study aimed to identify the determinants of food security among 6-23-month-old infants in Mangkupalas, Samarinda, Indonesia. A cross-sectional study was conducted among 137 households with infants aged 6-23 months in Puskesmas Mangkupalas area. The study used consecutive sampling in 3 villages namely tenun, mesjid and mangkupalas. Quantitative data were collected using a structured questionnaire and analyzed using spearman rank correlation test. A total of 73.7% of households located near markets were food secure compared to 52.5% of those far from markets, and this distance was statistically associated with household food security *(p = 0.019, r = -0.201). Household income showed a significant positive association with food security (p = 0.008, r = 0.226), where 76.7% of households earning ≥3,500,000 IDR/month were food secure compared to only 52.2% among those earning ≤1,500,000 IDR/month. Interestingly, home gardening, which theoretically influences food security, was not found to have a significant association (p = 0.884, r = 0.017). The findings indicate that in urban areas, where food access heavily depends on purchasing power and proximity to food sources, household food security is shaped more by economic stability and market access than by subsistence practices like home gardening. Limited land availability and a narrow variety of cultivated crops may constrain the effectiveness of home gardening in contributing to nutritional adequacy.*

Keywords *: Food Security ; market proximity; home gardening; Children; household income*

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INTRODUCTION

One in eleven people worldwide experienced hunger in 2023. From 2021 to 2023, around 4.9% of the Indonesian population, equivalent to approximately 13.6 million people, faced moderate food insecurity. Although this figure shows a decrease compared to previous years, this level is still at an alarming level.(1) According to the 2023 Indonesian Health Survey (SKI), 2.6% of the population was classified as severely malnourished, while 6.6% were undernourished. Children aged 6-23 months have a higher prevalence of malnutrition, based on measurements of weight for length, compared to infants aged 0-5 months.(2) The 6-11 month age group is particularly important for intervention, as this period marks the introduction of complementary feeding (IYCF) following exclusive breastfeeding.

Household food security has been widely recognized as a significant factor influencing the nutritional status of young children.(3–6) Food security is defined as a situation in which all individuals, at all times, have physical and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life.(7) In Samarinda, the Food Security Index in 2021 had a composite score of 83.72, indicating good food security, although this figure has declined since 2019.(8) There are 5.49% of the population of Samarinda City was reported to have insufficient food consumption.(9) Food insecurity is not only linked to undernutrition but has also been associated with an increased risk of chronic diseases (10) and cancer (11) later in life.

The determinants of food insecurity among young children include household size, socioeconomic status, seasonality, gender, parental education, and morbidity.(12–15) Empirical evidence indicates that households located closer to central markets tend to have higher overall household consumption expenditures, a more diverse diet, and lower levels of food insecurity compared to those located farther from markets.(16) Therefore,

understanding these determinants is crucial as a preliminary step in developing preventive interventions to reduce the risk of malnutrition and related diseases.

In the UPTD Puskesmas Mangkupalas area of Samarinda City, 21% (111 children) were reported to be stunted, 3 children were severely malnourished, and 10.8% (52 children) were classified as severely underweight in 2022.(17) Immediate action is needed to address these issues, including efforts to strengthen household food security. Although studies on food security among young children have been conducted in various regions of Indonesia, there is still limited research on this topic within the context of Samarinda City.

Based on this background, the present study aims to analyze the determinants of household food security among families with children aged 6–23 months in the working area of Puskesmas Mangkupalas. The findings of this research are expected to provide evidence-based insights for the development of targeted malnutrition prevention programs, thereby reducing the risk of stunting by addressing nutritional challenges within the first 1000 days of a child's life. This age group was chosen due to its critical role within the first 1000 days of life, a foundational window for cognitive and physical development. Inadequate nutrition during this period has been linked to irreversible growth faltering, compromised brain development, and long-term health consequences, underscoring the urgency of addressing food security as a preventive measure.

METHODS

This study is an analytical observational study with a cross-sectional design. The research was conducted in the working area of UPTD Puskesmas Mangkupalas, Samarinda City. The study population comprised households within the Puskesmas Mangkupalas jurisdiction that have children aged 6 to 23 months. The sampling method used was consecutive sampling, selecting three urban villages with the highest number of undernourished children at Puskesmas Mangkupalas, namely Kelurahan Masjid,

Mangkupalas, and Tenun. The total number of children aged 6–23 months in these three villages as of March 2024 was 515. The sample size was calculated using the Lemeshow formula with the WHO application "Sample size determination in health studies," applying a 95% confidence level and an absolute precision (d) of 0.05. The estimated population of children aged 6–23 months in 2024 was approximately 515. The prevalence of stunting, as one of the consequences of inadequate intake due to food insecurity, was 13.9% among the total children aged 6–23 months. Therefore, the estimated sample size required was 140 individuals. The final study included 137 respondents, because there were mother of children who refused to be interviewed.(18) Data collection was carried out in May-July 2024. This study received ethical approval from the Health Research Ethics Committee of Poltekkes Kemenkes Kalimantan Timur, with the ethical clearance number DP.04.03/F.XLII.25/0640/2024.

Inclusion criteria were based on factors potentially influencing the study variables: 1) children aged 6–23 months residing within the Puskesmas Mangkupalas working area; and 2) mothers or caregivers willing to participate and provide informed consent. Exclusion criteria included children with indications for special diets. The primary variables investigated were household food security and its determinants. Determinant factors studied included household income, home gardening ownership, and market location.

These variables are grounded in the FAO's four pillars of food security framework: availability, access, utilization, and stability. The selection of household income, home gardening, and market proximity as determinant variables was based on the FAO's food security framework. Household income and market proximity relate to the access pillar, while home gardening contributes to availability. Together, these factors also influence the stability of food access over time (19).

Quantitative data collected through structured interviews with mothers or primary caregivers responsible for the child's food consumption. Food security was assessed using

the Food Insecurity Experience Scale (FIES) developed by the FAO, consisting of eight questions with a 12-month recall period. The results were categorized into three levels: low, moderate, and high food insecurity.(20) Market proximity was categorized as "near" or "far" based on respondents' perceptions during interviews. Home gardening referred to the presence or absence of any food-producing plants around the household, including potted, backyard, or vertical gardens. Data analysis was conducted in stages, including statistical tests to verify the research hypotheses. Univariable analysis used frequency distribution, while bivariate analysis employed the Spearman Rank Correlation Test.

RESULTS

Table 1 presents the frequency distribution of respondent characteristics for a total of 137 children under two years old (baduta). The observed characteristics include demographic variables, such as villages (kelurahan), child age, and gender, as well as socioeconomic factors like health insurance status, maternal education, maternal employment, families with active smokers, household size, and the number of young children in the household.

The majority of respondents reside in Mangkupalas sub-district (43.1%), followed by Mesjid (35.0%) and Tenun (21.9%). In terms of age distribution, most children are between 12-23 months old (66.4%), which represents the critical period for rapid physical and cognitive development, as well as and the start of children consuming household foods. There is a slight gender imbalance, with boys being more prevalent (54.7%, n = 75) compared to girls.

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Table 1
Characteristics of Respondents in the Mangkupalas Health Center Area

Characteristics	Category	n	%
Villages	Tenun	30	21.9
	Mangkupalas	59	43.1
	Mesjid	48	35
Age	6 – 11 Months	46	33.6
	12 – 23 Months	91	66.4
Gender	Male	75	54.7
	Female	62	45.3
Health insurance	BPJS	119	86.9
	Private	4	2.9
	None	14	10.2
Maternal Education	No Formal Education	5	3.6
	<9 years	29	21.2
	9 years	69	50.4
	>9 years	34	24.8
Father's Occupation	Farmer	1	0.7
	Laborer	12	8.8
	Entrepreneur	31	22.6
	Private Sector	83	60.6
	Government Employee (PNS/Police/Military)	3	2.2
	Unemployed	1	0.7
	No Father	6	4.4
Mother's Occupation	Entrepreneur	10	7.3
	Government Employee (PNS/Police/Military)	3	2.2
	Private Sector	18	13.1
	Housewife	106	77.4
Household Size	Small (1-3 members)	49	35.8
	Medium (4-6 members)	80	58.4
	Large (>7 members)	8	5.8
	1 Child	100	73

Characteristics	Category	n	%
Number of Children 6-23 months	2 or More Children	37	27
Passive Smoker	Yes	83	60.6
	No	54	39.4
Household Income (IDR)	≤ 1.500.000	23	16.8
	>1.500.000 – 2.500.000	22	16.1
	>2.500.000 - <3.500.000	19	13.9
	≥ 3.500.000	73	53.3
Market Proximity	Near	114	83.2
	Far	23	16.8
Homegardening	Yes	18	13.1
	No	119	86.9

Source: Primary Data, 2024

Regarding the household composition, 73.0% of families have only one child under two years old, 24.8% have two, and 2.2% have three. This distribution may reflect broader family planning trends, household's ability to provide childcare and economic considerations in food choices the study area. Maternal education levels indicate that the majority of mothers have completed the mandatory 9 years of basic education, though 24.8% have not reached this level, potentially affecting their access to health information and child care practices.

Most mothers or caregiver in this study (77.4%) are housewife, providing them with more direct caregiving time, while 86.9% of children are covered by BPJS health insurance, a crucial factor for access to healthcare services. However, 10.2% of children still don't have health insurance, which may pose barriers to essential medical care. Family size in this sample is typically moderate, with 4-6 household members, but 16.8% of households report a total income below Rp 1,500,000, which significantly below the regional minimum wage

in Samarinda. Additionally, 60.6% of families have at least one active smoker, potentially increasing the risk of respiratory infections and other health issues among young children.

Table 2

Bivariate Analysis of Risk Factors Associated with Household Food Security

Characteristics	Food Security Categories (n(%))				p-value	r
	Severely Food Insecure	Moderately Food Insecure	Mildly Food Insecure	Food Secure		
Market Proximity						
Near	3 (2.6)	5 (4.4)	22 (19.3)	84 (73.7)	0.019	-0.201
Far	2 (8.7)	4 (17.4)	5 (21.7)	12 (52.5)		
Owning Home Garden						
Yes	1 (5.6)	0 (0.0)	5 (27.8)	12 (66.7)	0.884	0.017
No	4 (3.4)	9 (7.6)	22 (18.5)	84 (70.6)		
Household Income						
≤ 1.500.000	3 (13)	3 (13)	5 (21.7)	12 (52.2)	0.008	0.226
>1.500.000 - 2.500.000	2 (9.1)	1 (4.5)	5 (22.7)	14 (63.6)		
>2.500.000 - <3.500.000	0 (0.0)	3 (15.8)	2 (10.5)	14 (73.7)		
≥3.500.000	0 (0)	2 (2.7)	15 (20.5)	56 (76.7)		

Source: Primary Data, 2024

The Spearman correlation analysis in this study examined the relationship between various household characteristics and food security status. The results indicate that proximity to markets has a significant influence on household food security. Households located near a market tend to be more food secure (r = -0.201, p = 0.019). The negatif correlation indicates that proximity increases (meaning shorter distance), households food security tends to increase. Although the strength of this correlation is relatively weak, but it is apparent that the majority of food secure families are in areas close to (73.7%), compared to only 52.5% of those who do not have access to the nearest market. This

suggests that households that are far from markets are more likely to experience food insecurity.

In contrast, the analysis found no significant association between household food security and ownership of home garden (p = 0.884, r = 0.017). Despite the intuitive expectation that owning food crops in home might enhance household food security by providing a direct food source. However, household income exhibited a significant positive correlation with household food security (p=0.008, r=0.226). The data show a trend, where housels with higher income levels, particularly those earning above 3.5 million, demonstrate a higher proportion of food security (56 respondents) compared to those earning below 1.5 million (12 respondents).

DISCUSSION

Market location can affect the availability of food access, which is one of the keys to food security. Households located closer to the market center spend more on overall household consumption, consume more types of food, and have better food security than households located further from the market. (16,21) Several studies have provided empirical evidence on the relationship between market access and improved household food security, such as studies conducted in Sierra Leone and Ghana. Both studies show similarities in that families with market access have better dietary diversity, especially those selling a variety of fresh and affordable foods, can contribute to improved food security.(22,23)

A literature review conducted in Indonesia shows a positive effect of home gardening practices on household food security. Conceptually, the presence of food plants around the house has the potential to increase the availability and access to food that can be utilized by household members. Optimal land utilization is one of the keys to the success of home food gardening programs and the contribution of home gardens to food security. Some

techniques that enable optimal land utilization include vertical farming (verticulture), polyculture, and the use of alternative containers or media such as pots, sacks, used tires, plastic bottles, or buckets as planting media. (24) However, in this study, only 18 out of 137 respondents had food plants. No significant relationship was found between food crop ownership and household food security, which may be due to the type of plants owned. Most of the plants found were chilies, eggplants, bananas, and oranges, which are generally not the main food sources that can provide large amounts of energy. Only one respondent had food plants with higher diversity, such as spinach, katuk (sweet leaf), moringa, eggplant, tomatoes, and chilies, but were still limited to types of vegetables and spices that were not staple foods. These results are consistent with the findings of Du Toit et al. (2022), who reported that most respondents in their study depended on food purchases, so that when income decreased, access to food was also significantly affected. In addition, the limited open land in many households limits the types of crops that can be grown, so many only grow ornamental plants or herbs with relatively low nutritional value.(25)

The ability to purchase food can increase food availability at the household level. Research conducted by Herdiansyah et al. (2024) in Bogor Regency showed a positive relationship between household income and food security. The majority of respondents in this study had incomes above the regional minimum wage (UMR), which is likely related to the characteristics of the industrial areas where they live.(26) Similar findings were reported in a study in Ethiopia, where low-income households had a higher risk of experiencing food insecurity compared to higher-income households, indicating that income is an important factor in determining the level of household food security.(27)

In this study, 53.3% of households had incomes above IDR 3,500,000, with 76.7% of them classified as food-secure families. This condition is likely influenced by the location of Mangkupalas sub-district which is included in the urban area, where the majority of parents of children have permanent jobs. This economic stability allows households to maintain

consistent financial resources, thereby enhancing their capacity to achieve and sustain food security. In urban conditions such as in this study, where 83.2 percent of respondents have houses close to the market, purchasing power factors are known to affect food security. Food security in urban areas is associated with purchasing power, while in rural areas food security is related to food availability. (28)

CONCLUSIONS AND RECOMMENDATIONS

This study shows that household food security is significantly influenced by socioeconomic and demographic factors. Proximity to market and household income were found to have significant, albeit weak, correlations with food security ($p < 0.05$), indicating that households closer to markets and with higher incomes tend to have better access to diverse and affordable food, which positively impacts their food security status. In contrast, home gardening did not show a significant relationship with food security, possibly due to the limited variety of crops typically grown, which may not provide sufficient nutritional value to satisfy the hunger.

Based on these findings, it is recommended that policies focus on improving market access to reduce the distance between households and food sources such as the development of local or micro-markets dispersed at the sub-district (kelurahan) level, and also supporting mobile markets that use vehicles (cars, carts, or boats in river areas) to bring food products to households that are difficult to reach by permanent markets, enhancing income stability through employment opportunities and small business support through weekly farmers markets or MSME (Micro, Small, and Medium Enterprises) markets that bring local producers (including agricultural products from rural areas around Samarinda) directly to consumers in densely populated settlements thereby supporting the local economy, and promoting urban agriculture with a focus on nutritionally diverse crops.

Additionally, expanding social protection programs, such as health insurance and targeted food assistance, can further strengthen household food security, particularly in vulnerable communities. Future studies could explore the seasonal variability of household food security and how it affects child feeding practices and nutrition throughout the year. Studies could also investigate the **impact of urban food environments**, including informal markets and food vendor density, on household food access and diversity.

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