THE RELATIONSHIP BETWEEN FOOD CONSUMPTION, INCOME, AND FOOD EXPENDITURE WITH HOUSEHOLD FOOD SECURITY IN CARINGIN DISTRICT, BOGOR

Dadang Herdiansyah[1*], Noorlatifah[1], Nur Romdhona[1], Andi Eka Yunianto[2], Mega Asyifa[1], Dzul Fadly[3]
[1] Department of Public Health, Faculty of Public Health, Universitas Muhammadiyah Jakarta, Jakarta, Indonesia
[2] Medical Education Study Program, Faculty of Medicine, Universitas Lampung, Bandar Lampung, Indonesia
[3]Department of Food Science and Technology, Faculty of Agriculture, *Universitas Tanjungpura*
[*]E-mail: dadang.herdiansyah@umj.ac.id

ABSTRACT

Hunger is a condition of food insecurity. One of the efforts that can be made to reduce the incidence of food insecurity is to maintain food security, especially in households. This research aimed to analyze the relationship between food consumption and income and food expenditure with household food security in Caringin District, Bogor Regency. This is an analytic observational study with a cross-sectional design with a random sample of 60 households in Caringin district, Bogor regency. Assessment of household food availability based on a food availability questionnaire consisted of several types of food groups. Income and expenditure were measured by assessing household income. The condition of household food diversity measured using the HDDS questionnaire. The chi-square test was used to analyze the relationship between consumption behavior, income, household expenditure, and household food security. There was a relationship between income ($p<0.001$) and expenditure ($p<0.001$) with household food security, while consumption behavior is not ($p>0.05$). It is concluded that there was a relationship between income and expenditure on food security, but behavior did not show an insignificant relationship. There needs to be an in-depth analysis to find other factors influencing food security apart from the variables examined in this study.

Keywords: consumption behavior, household, income, food security, expenditure

INTRODUCTION

Poor diet is a major cause of death and morbidity worldwide, exceeding the burden caused by many significant global health challenges, one of which is the resulting global malnutrition crisis, including hunger and malnutrition. Hunger is caused by insecurity that occurs in the household (Dhamija et al., 2022). Food insecurity is responsible for poorer health (Alaimo et al., 2020). Hunger is identified with chronic malnutrition, a person's inability to obtain sufficient food to meet minimum daily dietary energy requirements for one year (Webb et al., 2018).

Famine is again looming throughout the world due to the Covid-19 pandemic. It is projected that between 720 and 811 million people in the world will face hunger in 2020, or an estimated increase in the number of more than half of the world's malnourished population found in Asia (418 million) and more than a third in Africa (282 million). Compared with 2019, approximately 46 million more people in Africa, 57 million more in Asia, and approximately 14 million more in Latin America and the Caribbean were affected by hunger in 2020. The global prevalence of moderate or severe food insecurity (measured by the Experience of Food Insecurity Scale) has slowly increased since 2014; one in three people in the world, or around 2.37 billion people, did not have access to sufficient food in 2020 or the equivalent of an increase of almost 320 million people in just one year. One form of business that can be done is to increase food security to end hunger, food insecurity, and malnutrition (FAO, 2021).

Not everyone has the ease of obtaining the food they need; this leads to hunger and malnutrition on a large scale worldwide. Part of the world's population now experiences chronic food shortages and cannot obtain enough food to meet energy needs. Millions of children under five years old (toddlers) suffer from chronic or acute malnutrition during food shortages, seasons of hunger, and social unrest (Kementerian PPN/ Bappenas, 2023).

The aim of building food security is to ensure the availability and consumption of sufficient,

 Received 11-09-2023, Accepted 08-12-2023, Published online 30-01-2024.

safe, quality, nutritious, and balanced food at the household, regional, and national levels at all times and evenly and is affordable and does not conflict with the religion, beliefs, and culture of the community, to be able to live a healthy, active and productive life in a sustainable manner (UUD RI, 2012).

The direct causes of nutritional problems are food intake and disease. According to UNICEF, food intake is determined by food availability. Food availability is related to the physical presence of food in sufficient quantities. This availability includes aspects of quantity and quality. Several studies show a positive relationship between food diversity and quality, micronutrient intake for children under five, and household food security (Antwi et al., 2022; Jun et al., 2019). Apart from that, research conducted by (Prasetyaningtyas, 2017) Found a relationship between food availability and the food diversity of farmworker households (Prasetyaningtyas & Nindya, 2018).

Availability of food and sufficient food consumption are factors in obtaining a variety of safe, quality, and nutritious food. This depends on the level of poverty in the household. Food security will have a significant impact on reducing poverty. Bogor Regency is one of the districts that has experienced an increase in population below the poverty line, amounting to 7.69% of the population below the poverty line. Researchers are interested in studying one of the sub-districts, namely Caringin, because, based on data from Caringin Sub-district, there are still quite a lot of households that fall into the underprivileged group (Badan Pusat Statistik Kabupaten Bogor, 2021). This research aims to analyse food availability, income, expenditure, and household food diversity in Caringin District, Bogor Regency.

METHODS

This research is an analytical observational study with a cross-sectional design. The population in this study was all households in Caringin Village, Caringin District, Bogor Regency. The samples were taken using the random sampling technique. The minimum sample required using the estimation formula was 60 households in the selected sub-districts. The basis for calculating the sample based on food security index data in Bogor Regency in 2020 with a random household sampling technique. Data collection in this research carried out by interviews using a structured questionnaire related to food availability and expenditure and a food consumption diversity questionnaire.

Assessment of household food availability based on a food availability questionnaire, which consisted of several types of food groups (animal source food, vegetable source food, fruit, milk/dairy products, and vegetables) that are available or not available. Household food availability categorized into two compared with normative consumption per individual (300 grams per day), namely insufficient if food availability <300 grams/day and sufficient if food availability (Santi & Andrias, 2015).

Income and expenses are measured by assessing household income consisting of the number of household members who have income; the amount of income then asked about the frequency, daily, weekly, or monthly (Widyareni, 2011). Total income calculated for one month from the frequency of household income. The assessment of household expenditure grouped into two, namely food and non-food expenditure, then the amount of expenditure and frequency of expenditure measured and then totaled into expenditure in one month. The proportion of food expenditure calculated by the percentage of food expenditure compared to total expenditure. The proportion of food expenditure classified into 2, namely < 60% and ≥ 60% (Widyareni, 2011).

The condition of household food diversity measured using the Household Dietary Diversity Score (HDDS) questionnaire. The HDDS score calculated by writing the number 1 for the type or group of food consumed and 0 if it is not consumed. Then, add up all the scores from all food groups. The total results range from 0 to 12. The HDDS score grouped into 3 criteria: a low score of less than 3, a medium score of 4-5, and a high score of more than 6. Next, the average HDDS score for the household calculated (Swindale & Bilinsky, 2006).

Household food security status measured using the United States Household Food Security Survey Module (US-HFSSM) form, which then classified as food secure if the value between 0-2, food insecure without hunger between 3-7, food insecure with degrees moderate hunger between

8-12, and food insecurity was severe hunger if the value between 13-18 (Bickel et al., 2000).

The statistical analysis used to determine the relationship between consumption behavior, income, and household expenditure with household food security is the Chi-Square test with $p < 0.05$.

RESULTS AND DISCUSSIONS

General characteristics of respondents showed that most respondents were aged 18-40 years (72.2), and the rest were aged 41-65 years (27.8%). This shows that most respondents are of productive age. The highest level of education of respondents was high school (61.1%), while the least was elementary school (2.8%). Most respondents' occupations were not working or acting as a housewife (54.2%), and 15.3% of respondents had jobs other than being self-employed and private employees.

Table 1. Characteristics of Respondents

Characteristics	n (%)
Age	
18 – 40 y.o	52 (72.2)
41 – 65 y.o	20 (27.8)
Educational background	
Elementary school	2 (2.8)
Junior high school	8 (11.1)
Senior high school	44 (61.1)
College	18 (25.0)
Occupation	
Housewife	39 (54.2)
Self-employed	9 (12.5)
Entrepreneur	6 (8.3)
Private sector employee	7 (9.7)
Other	11 (15.3)

Table 2 shows that almost all respondents eat various types of food. However, the type of food that respondents consumed the lowest was fish; only 84.7% of respondents consumed it. This is supported by previous research, which shows that most of the research conducted in rural Indonesia from 2000-2015 showed a decline in food groups such as fish. This based on previous research that low consumption of fish is influenced by several factors, one of which is household production (Mehraban & Ickowitz, 2021).

Table 2. Distribution of Food Diversity Consumed According to Respondents

Type of Food	Consumption Pattern n (%)	
	Yes	No
Wheat	72 (100)	0 (0.0)
Vegetables	72 (100)	0 (0.0)
Tubers	72 (100)	0 (0.0)
Fruit	72 (100)	0 (0.0)
Meat	72 (100)	0 (0.0)
Eggs	72 (100)	0 (0.0)
Fish	61 (84.7)	11 (15.3)
Nuts	70 (97.2)	2 (2.8)
Dairy products	72 (100)	0 (0.0)
Foods made from oil, fat, or butter	72 (100)	0 (0.0)
Sugar/honey	72 (100)	0 (0.0)
Other foods	71 (98.6)	1 (1.4)

Table 3 shows that 73.6% of households had insufficient food availability (individual normative consumption in the household <300 g). Bivariate analysis was carried out to measure the relationship between normative cereal consumption behavior and food security status. A correlation test using Spearman with $\alpha = 0.05$ obtained a $p = 0.14$, meaning there is no significant relationship between normative cereal consumption behavior and the status of food security in society.

Table 3. Relationship between Normative Cereal Consumption and Food Security Status

Normative Cereal Consumption	Food Security Status						Total		p- value
	Food insecure, moderate degree of hunger		Food insecure, without hunger		Food security				
	n	%	n	%	n	%	n	%	
< 300 g	7	9.7	17	23.6	29	40.3	53	73.6	0.14
≥ 300 g	1	1.4	4	5.6	14	19.4	19	26.4	
Total							72	100	

Table 4. Relationship between Monthly Food Expenditure and Food Security Status

Monthly Food Expenditures	Food Security Status						Total		P value
	Food insecure, moderate degree of hunger		Food insecure without hunger		Food security				
	n	%	n	%	n	%	n	%	
≥ 60 %	0	0.0	0	0.0	16	22,2	16	22.2	
< 60%	8	11.1	21	29.2	27	37.5	56	77.8	<0.001
Total							72	100	

These results align with research conducted by Santi dan Andrias (2015) in Lumajang, which resulted in an analysis of no relationship between food stock availability as measured by household cereal consumption and food security status. Other research shows different results indicating a relationship between normative household food consumption and food security status (Hapsari & Rudiarto, 2017). Food availability generally influences food security status because it determines the degree of hunger and household consumption. Food availability is influenced by other factors, such as the number of family members, age, and food allocation in the household (Drammeh et al., 2019). In Caringin District, this insignificant relationship could occur due to variations in age within households and different allocations in terms of food consumption. So, household members ignore how much food they should consume.

Most households had food expenditure <60% of their monthly expenditure (Table 4). Correlation analysis using Spearman's rank obtained p value <0.001, meaning there was a significant relationship between monthly food expenditure and household food security status in Caringin District. This aligns with research Sutyawan, Khomsan, dan Sukandar (2019), that a real negative relationship exists between the food security index and the proportion of household food expenditure. Higher food expenditure compared to other needs makes households more vulnerable to food insecurity. This condition usually occurs in low-income families (Kh'ng et al., 2022). Households with low income will focus on buying food without paying attention to its nutritional content. Finally, the proportion of food expenditure will be greater than other expenditures. This is different from households that have higher incomes. High-income households will consume varied and nutritious foods (Manyullei & Arundhana, 2021).

After grouping respondents' income based on the District Minimum Wage, it was found that 69.4% of respondents had an income over the district minimum wage. The remaining 30.6% had incomes below the district minimum wage, and it was known that some of them worked odd jobs with an uncertain income. The results of the Spearman rank correlations test showed p value<0.001, which means there was a significant relationship between monthly income and food security status, meaning that the lower the respondent's income, the more food insecure they are (Table 5).

In Ethiopia, households with low incomes are 5 times more likely to experience food insecurity than households with high incomes (Derso et al., 2021). Food insecurity due to low income also occurred in England in 2004-2016, with an increase of 18.1% of households experiencing food insecurity. It is also associated with poor health and disability (Loopstra et al., 2019). The unique thing that can be found in this research is that several households with low incomes can still avoid food

Table 5. Relationship between Monthly Income and Food Security Status

Monthly income	Food security status						Total		P value
	Food insecure, moderate degree of hunger		Food insecure without hunger		Food security				
	n	%	n	%	n	%	n	%	
≤ Rp 2.975.000 (Low)	7	31.8	10	45.5	5	22.7	22	30.6	
> Rp 2.975.000 (High)	1	2.0	11	22.0	38	76.0	50	69.4	<0.001
Total							72	100	

insecurity (5%). Although low income is a fairly strong factor in predicting household food security status, this parameter cannot be the only reason behind food insecurity (Pool & Dooris, 2022). The results of research in Bogor are not different from those in other places where low income is associated with food insecurity. As shown in Table 5, the majority of respondents have incomes above IDR 2,975,000, perhaps because the location of the Caringin sub-district borders the Sukabumi district and is an industrial location.

CONCLUSION

This research concludes that many households still have food insecurity status in Caringin Village, Caringin District, Bogor Regency. The analysis results show that food security status is caused by the proportion of monthly food expenditure and monthly income. The way to manage monthly expenses and income is that there needs to be a role for the housewife in the household in arranging a food menu that is more varied and highly nutritious. Therefore, it is necessary to increase mothers' knowledge as one of the dimensions of food security in the aspect of affordability. Analysis shows there is no relationship between food availability and food security. The weakness of this research is that respondents' participation is still relatively small. Apart from that, there is a need for in-depth analysis to find out other factors that influence food security apart from the variables examined in this research. In the future, this research will encourage households to increase their food security by paying more attention to local food. In addition, strengthening human resources by empowering small-scale food businesses, which is the dominant feature of the Indonesian agricultural economy, requires aligning or integrating small-scale food business activities into the food supply chain.

ACKNOWLEDGEMENTS

Our gratitude addressed to the Chancellor of UMJ, LPPM UMJ for the funding and facilitation. Funding comes from the 2022 Muhammadiyah University Jakarta Internal Grant. To the Faculty, our Study Program would like to express our gratitude for the support of the facilities so that this research runs well.

REFERENCES

Alaimo, K., Chilton, M., & Jones, S. J. (2020). Food insecurity, hunger, and malnutrition. In *Present Knowledge in Nutrition* (pp. 311–326). Elsevier. https://doi.org/10.1016/B978-0-12-818460-8.00017-4

Antwi, J., Quaidoo, E., Ohemeng, A., & Bannerman, B. (2022). Household food insecurity is associated with child's dietary diversity score among primary school children in two districts in Ghana. *Food and Nutrition Research*, *66*, 1–9. https://doi.org/10.29219/fnr.v66.7715

Badan Pusat Statistik Kabupaten Bogor. (2021). *Kabupaten Bogor Dalam Angka (Bogor Regency in Figure) 2021*. BPS Kabupaten Bogor.

Bickel, G., Nord, M., Price, C., Hamilton, W., & Cook, J. (2000). *Measuring Food Security in the United States: Guide to Measuring Household Food Security. Revised 2000.* (3rd ed.). United States Department of Agriculture.

Derso, A., Bizuneh, H., Keleb, A., Ademas, A., & Adane, M. (2021). Food insecurity status and determinants among Urban Productive Safety Net Program beneficiary households in Addis Ababa, Ethiopia. *PLoS ONE*, *16*(9 September 2021), 1–17. https://doi.org/10.1371/journal.pone.0256634

Dhamija, G., Ojha, M., & Roychowdhury, P. (2022). Hunger and Health: Reexamining the Impact of Household Food Insecurity on Child Malnutrition in India. *The Journal of Development Studies*, *58*(6), 1181–1210. https://doi.org/10.1080/00220388.2022.2029419

Drammeh, W., Hamid, N. A., & Rohana, A. J. (2019). Determinants of household food insecurity and its association with child malnutrition in Sub-Saharan Africa: A review of the literature. *Current Research in Nutrition and Food Science*, *7*(3), 610–623. https://doi.org/10.12944/CRNFSJ.7.3.02

FAO. (2021). *The State of Food Security and Nutrition in the World 2021*. Food and Agriculture Organization of the United Nations. https://www.fao.org/documents/card/en/c/cb4474en

Hapsari, N. I., & Rudiarto, I. (2017). Faktor-Faktor yang Mempengaruhi Kerawanan dan Ketahanan Pangan dan Implikasi Kebijakannya di Kabupaten Rembang. *Jurnal Wilayah Dan*

Lingkungan, *5*(2), 125. https://doi.org/10.14710/jwl.5.2.125-140

Jun, S., Zeh, M. J., Eicher-Miller, H. A., & Bailey, R. L. (2019). Children's dietary quality and micronutrient adequacy by food security in the household and among household children. *Nutrients*, *11*(5). https://doi.org/10.3390/nu11050965

Kementerian PPN/Bappenas. (2023). *Tanpa Kelaparan*. Kementerian PPN/Bappenas. https://sdgs.bappenas.go.id/tujuan-2/

Kh'ng, K., Chang, C. C., & Hsu, S. H. (2022). Implications of food and nutrition security on household food expenditure: the case of Malaysia. *Agriculture and Food Security*, *11*(1), 1–13. https://doi.org/10.1186/s40066-022-00367-4

Loopstra, R., Reeves, A., & Tarasuk, V. (2019). The rise of hunger among low-income households: An analysis of the risks of food insecurity between 2004 and 2016 in a population-based study of UK adults. *Journal of Epidemiology and Community Health*, *73*(7), 668–673. https://doi.org/10.1136/jech-2018-211194

Manyullei, S., & Arundhana, A. I. (2021). Analysis of household food security based on the proportion of food expenditures and energy consumption in flood-prone areas in Wajo district. *Open Access Macedonian Journal of Medical Sciences*, *9*, 241–245. https://doi.org/10.3889/oamjms.2021.5874

Mehraban, N., & Ickowitz, A. (2021). Dietary diversity of rural Indonesian households declines over time with agricultural production diversity even as incomes rise. *Global Food Security*, *28*, 100502. https://doi.org/10.1016/j.gfs.2021.100502

Pool, U., & Dooris, M. (2022). Prevalence of food security in the UK measured by the Food Insecurity Experience Scale. *Journal of Public Health (United Kingdom)*, *44*(3), 634–641. https://doi.org/10.1093/pubmed/fdab120

Prasetyaningtyas, D., & Nindya, T. S. (2018). Hubungan Antara Ketersediaan Pangan Dengan Keragaman Pangan Rumah Tangga Buruh Tani. *Media Gizi Indonesia*, *12*(2), 149. https://doi.org/10.20473/mgi.v12i2.149-155

Santi, & Andrias, D. R. (2015). Hubungan Ketersediaan Pangan Dan Keteraturan Penerimaan Raskin Dengan Status Ketahanan Pangan Rumah Tangga Penerima Raskin. *Media Gizi Indonesia*, *10*(2), 97–103.

Steyn, N., Nel, J., Nantel, G., Kennedy, G., & Labadarios, D. (2006). Food variety and dietary diversity scores in children: are they good indicators of dietary adequacy? *Public Health Nutrition*, *9*(5), 644–650. https://doi.org/10.1079/phn2005912

Sutyawan, S., Khomsan, A., & Sukandar, D. (2019). Pengembangan Indeks Ketahanan Pangan Rumah Tangga dan Kaitannya dengan Tingkat Kecukupan Zat Gizi dan Status Gizi Anak Balita. *Amerta Nutrition*, *3*(4), 201. https://doi.org/10.20473/amnt.v3i4.2019.201-211

Swindale, A., & Bilinsky, P. (2006). Household Dietary Diversity Score (HDDS) for measurement of household food access: Indicator guide. *Food and Nutrition Technical Assistance …*, 11. https://doi.org/10.1017/CBO9781107415324.004

UUD RI. (2012). *Undang-Undang Republik Indonesia Nomor 18 Tahun 2012 Tentang Pangan*.

Webb, P., Stordalen, G. A., Singh, S., Wijesinha-Bettoni, R., Shetty, P., & Lartey, A. (2018). Hunger and malnutrition in the 21st century. *BMJ (Online)*, *361*, 1–5. https://doi.org/10.1136/bmj.k2238

Widyareni, A. Y. (2011). Analisis Hubungan Proporsi Pengeluaran Dan Konsumsi Pangan Ketahanan Pangan Dengan Ketahanan Pangan Rumah Tangga Petani Di Kabupaten Kulon Progo. *UNS - Skripsi*, 1–79.