The sociodemographic factors on food insecurity among household living in disaster-prone area in Central Java, Indonesia

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ABSTRACT

Background: Demak, as a disaster-prone coastal area in Central Java, faces issues such as malnutrition and food insecurity due to the impacts of climate change. As a result of coastal disasters, vulnerable people in coastal areas often experience loss of livelihoods, limited access to nutritious food, and increased risk of malnutrition.

Objective: The study aimed to analyze the association between household food security and household demographic factors in Central Java's coastal areas.

Materials and Methods: A cross-sectional study was conducted on 138 households living in the coastal area of Demak by simple random sampling. The socio-demographic characteristics were conducted by interviewing the mother/child caregiver. The degree of household food security (HFS) was obtained using the Household Food Security Survey Module (HFSSM) Questionnaire. Descriptive statistics and Chi-square were used for statistical analysis.

Results: Based on HFS status, 49.3% of respondents were food secure, 26.1% were food insecure without hunger, 20.3% were food insecure with moderate hunger, and 4.3% were food insecure with severe hunger. There was significant correlation between father's educational level, mother's educational level, and monthly household income per month on the HFS status ($p<0.05$).

Conclusion: Sociodemographic factors associated with household food security status were father's and mother's education and monthly household income ($p<0.05$). The potential negative impact of household food insecurity on the nutritional status of family members needs to be studied further, especially vulnerable age groups such as toddlers and mothers in the household.

Keywords: Demak; Food security; Food insecurity; Socio-demographic; Climate change; Coastal

BACKGROUND

Climate change has caused more frequent climate related natural disasters that threaten do increase vulnerable people's food insecurity. It negatively impacts all dimensions of food security, including undernutrition[1]. Indonesia is one of the vulnerable areas to the impacts of climate change. Temperature changes, rainfall changes, sea level rise, increased hydro-meteorological disasters, robust infrastructure damage, increased fire hazards, ecosystem damage, health problems, and increased discomfort for residents directly or indirectly affect the economy[2,3]. Coastal abrasion and accretion occur on the north coast of Central Java. These two natural phenomena have change coast line in which coastal abrasion affects accretion in other area because of longshore current activities[4]. Droughts and floods, crop failures, degradation of natural resources are increasingly linked to, or exacerbated by climate change and already having negative impact on people's livelihoods and food security[5].

Food insecurity is a worldwide problem in both developed and developing countries, which has an impact on health and nutrition status. Food insecurity can affect health both directly and indirectly through changes in nutritional status indicated by deficiency or excess nutrition[6]. Research in developed countries states that food insecurity is associated with excess nutrients that result in low health status, while research in the developing country, food insecurity is more associated with malnutrition[7-9]. This paradox highlights the complex interplay of factors influencing food insecurity. Food insecurity, the lack of consistent access to enough affordable, nutritious food, manifests differently in developed and developing nations. In developed countries, abundance often leads to overnutrition, with processed foods and sugary drinks causing obesity and chronic diseases. Conversely, developing countries face undernutrition, characterized by stunting, wasting, and micronutrient deficiencies due to limited food access and poverty.

Climatic and environmental factors and people's ability to cope with shocks determine the capacity of a country or region to achieve and maintain food and nutrition security. This aspect of food and nutrition

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security is based on the impact of natural disasters and environmental degradation on food availability and access. Deforestation, rainfall variability and the area affected by floods and landslides are some of the indicators used to explain transient food insecurity in Indonesia[10]. The targeted population of this research is the people living in the coastal areas of Sayung District, Demak Regency, as most of the at least 7 coastal village areas are directly affected by extreme weather due to climate change (rob, flood, and drought), namely Sriwulan, Bedono, Surodadi, Sayung, Kalisari, Jetaksari, and Bulusari villages. Coastal regions are particularly susceptible to climate change impacts like floods, droughts, and rising sea levels. Previous studies separated rural and urban areas and analysed household sociodemographic and household food security investigates these factors nationally[11–13], but this study adds the specific coastal context. This study can provide crucial insights into how these environmental changes affect food security at the household level. Based on the above, the author is interested in exploring the relationship between sociodemographic factors (father's education level, mother's education level, father's occupation, mother's occupation, family income, family type, household expenditure allocation, disaster-affected assets, and government assistance programs) and the household food security of Sayung District, Demak Regency Central Java, Indonesia.

MATERIALS AND METHODS

This is a cross-sectional study conducted on 138 households living in the coastal area of Sayung District, Demak Regency Central Java, from April to July 2022. The selected households are people who live in seven (7) villages that are directly affected by extreme weather due to climate change (rob, flood, and drought), namely Sriwulan, Bedono, Surodadi, Sayung, Kalisari, Jetaksari, and Bulusari villages in Sayung District, Demak Regency, Central Java. Mothers in the household were given an explanation regarding the research procedure and expressed their willingness to voluntarily participate in the survey by signing an informed consent. Data collection was conducted using in-depth interview techniques with a door to door system. Only one person in the household will be interviewed, who is likely the most responsible for food availability and preparation, will be interviewed using a set of questionnaire. Degree of food security (HFS) was obtained using Household Food Security Survey Module (HFSSM) Questionnaire. Data collection on household characteristics was conducted by interviewing the mother, including the socio-demographic characteristics of the family such as father's education level, mother's education level, father's occupation, mother's occupation, family income, family type, monthly household income (MHI), household expenditure allocation, disaster-affected assets (open ended question yes/no house asset affected), and government assistance programs (open-ended question yes/no recipient of government program assistance or not). The determination of food security is based on the maximum total score of 18 questions that describe household food security in the last 12 months. Negative responses are given a score of 0 and positive responses are given a score of 1. The total score is then categorized into 2 categories of food security, namely food secure if the score is 0 and food insecure if the score is 1-18[14]. The total HFS score was then categorized into food secure (0 or no affirmative responses), food insecure without hunger (no more than 1 affirmative response), food insecure with moderate hunger (2 to 5 affirmative responses), and food insecure with severe hunger (6 or more affirmative responses)[14].

The data obtained will be processed and analyzed using the IBM statistical package for social science (SPSS) computer program version 25.0. Data analysis includes, univariate analysis conducted to determine the characteristics of the research subjects and describe all the variables studied then described by entering the mean, median, frequency, and percentage in the distribution table and bivariate analysis using the Chi-square test used to see the relationship between variables. Ethical clearance (86/EC/KEPK/FK-UNDIP/IV/2022) was obtained from the Faculty of Medicine, Universitas Diponegoro, Indonesia.

RESULTS

The relationship between climate change, sociodemographic characteristics, and HFS status within these communities remains under-investigated. While different studies have explored the impact of climate change on food security, few have addressed the specific sociodemographic factors that influence household vulnerability in these areas. In the term of HFS status, 68 (49.3%) respondents were food secure, 36 (26.1%) food insecure without hunger, 28 (20.3%) food insecure with moderate hunger, and 6 (4.3%) food insecure with severe hunger, respectively (Table.1). Almost half of the families in this study (52.2%) were low-income (IDR 2,513,005), with food expenditure outweighing non-food expenditure (83.3%). Moreover, 80% of

respondents were from nuclear family. Over fifty percent of the families interviewed (52.2%) claimed that disasters impacted their assets and houses, with 55.1% getting government assistance.

Table 1. Socio-Demographic Characteristics of Respondents in Coastal Sayung, Demak (n = 138)

Variable	*n* (%)
Area type	
Rob-area	60 (43.5)
Drought-area	33 (23.9)
Flood-area	45 (32.6)
Father's educational level	
Junior high school or below	63 (45.7)
Senior junior high school or above	75 (54.3)
Mother's educational level	
Junior high school or below	61 (44.2)
Senior junior high school or above	77 (55.8)
Father's occupation	
Unemployed	3 (2.2)
PNS/Polri/TNI/BUMN/BUMD	1 (0.7)
Farmers/farm laborers	2 (1.4)
Fisherman	6 (4.3)
Labores/driver/household assistant	22 (15.9)
Staff	58 (42.0)
Self-employment	23 (16.7)
Other	23 (16.7)
Mother's occupation	
Unemployed	88 (63.8)
Study	1 (0.7)
Labores/driver/household assistant	2 (1.4)
Staff	17 (12.3)
Self-employment	13 (9.4)
Other	17 (12.3)
Monthly household income	(IDR 400,000 - IDR 14,000,000)
≤IDR 2,513,005	66 (47.8)
>IDR 2,513,005	72 (52.2)
Household expenditure allocation	
Food expenditure > non-food expenditure	115 (83.3)
Food expenditure < non-food expenditure	23 (16.7)
Disaster-affected assets	
Yes	72 (52.2)
No	66 (47.3)
Government assistance programs	
Yes	76 (55.1)
No	62 (44.9)
Family type	
Nuclear family	95 (68.8)
Extended family	43 (31.2)
HFS status	
Food secure	68 (49.3)
Rob-area	26 (38.2)
Drought-area	17 (25.0)
Flood-area	25 (36.8)
Food insecure without hunger	36 (26.1)
Rob-area	13 (36.1)
Drought-area	8 (22.2)
Flood-area	15 (41.7)
Food insecure with moderate hunger	28 (20.3)
Rob-area	18 (64.3)
Drought-area	6 (21.4)
Flood-area	4 (14.3)

Table 1. Socio-Demographic Characteristics of Respondents in Coastal Sayung, Demak (n = 138) (Lanjutan…)

Variable	n (%)
Food insecure with severe hunger	6 (4.3)
Rob-area	3 (50.0)
Drought-area	2 (33.3)
Flood-area	1 (16.7)

Table 2 shows the household food security status and its association with some family demographic factors in Central Java's Coastal Areas. There was significant correlation between father's educational level, mother's educational level, and monthly household income on the HFS status (p<0.05). However, other sociodemographic factors such as father's occupation, mother's occupation, family type, household expenditure allocation, disaster-affected assets, and government assistance programs on the HFS status (p>0.05).

Table 2. The Socio-Demographic Factors Associated with HFS Status of Respondents in Coastal Sayung, Demak (n = 138)

Variable		n	HFS status n (%)		p-value*
			Food secure	Food insecure	
Father's educational level	Low	63	22 (34.9)	41 (65.1)	**0.002**
	High	75	46 (61.3)	29 (38.7)	
Mother's educational level	Low	61	17 (27.9)	44 (72.1)	**<0.001**
	High	77	51 (66.2)	26 (33.8)	
Father's occupation	Not working	3	2 (66.7)	1 (33.3)	0.617
	Working	135	66 (48.9)	69 (51.1)	
Mother's occupation	Not working	88	42 (47.7)	46 (52.3)	0.724
	Working	50	26 (52.0)	24 (48.0)	
Monthly household income	≤IDR 2,513,005	66	22 (33.3)	44 (66.7)	**<0.001**
	>IDR 2,513,005	72	46 (63.9)	26 (36.1)	
Household expenditure allocation	Food expenditure > non-food expenditure	115	56 (48.7)	59 (51.3)	0.822
	Food expenditure < non-food expenditure	23	12 (52.2)	11 (47.8)	
Disaster-affected assets	Yes	72	33 (45.8)	39 (54.2)	0.496
	No	66	35 (53.0)	31 (47.0	
Government assistance programs	Yes	76	36 (47.4)	40 (52.6)	0.732
	No	62	32 (51.6)	30 (48.4)	
Family type	*Nuclear family*	95	46 (48.4)	49 (51.6)	0.855
	Extended family	43	22 (51.2)	21 (48.8)	

*Chi-square test was performed to find the significance level at P < 0.05

DISCUSSION

Demak Regency is a northern coastal area in Central Java which in addition to having great resource and economic potential, is also an area with many ecological problems such as prone to land subsidence[15], tidal flooding, erosion, sea level rise vulnerability index scores, coastal changes and coastline degradation with an average rate of 100 m/year[3]. More specific, Sayung District is one of those Districts that is most directly affected by climate change, characterized by significant changes in the coastline every year. There are 20 villages in Sayung District that are vulnerable to three climate change hazards: flooding (Karangasem, Tambakroto, Dombo, Kalisari, Sayung and Prampelan villages), tidal flooding (Sriwulan, Bedono, Surodadi, Gemulawak, Timbulsloko, Sidogemah, Tugu, Sidorejo, Banjarsari and Purwosari villages) and drought (Pilangsari, Bulusari, Jetaksari and Loireng villages). Residents' settlements are at risk of being affected by tidal flooding as the sea level rises and inundates their houses with heights varying from 0.50-1.00 meters, so many residents raise their houses by at least 1 meter per year. The results of local residents' interviews related to the impacts of tidal floods experienced, felt, and feared in 10 years. The results showed that as a result of this phenomenon, the community experienced physical losses, material losses, and impacts on the quality of health of the local community. The direct impact at the individual level is related to concerns about food insecurity. By focusing on Sayung District and its unique environmental and social characteristics, it offers a

deeper understanding of the complex interplay between sociodemographic factors, climate change, and household food security, paving the way for more effective interventions to improve food security in coastal communities. Previous study in West Java coastal area analysed how fishing communities in facing the problem of food insecurity, but there is no collective action in the community caused by poverty and a lack of functioning local leadership in the community which is able to mobilize the community to develop local food sources and change to more adaptive and healthier eating patterns[16].

Household food security is defined as the ability of households to meet their members' food sufficiency on a regular basis in order for them to live healthy and carry out daily activities, with food conditions that are sufficient, available, affordable, equitable, safe, nutritious, and not contrary to religion, culture, or community beliefs[17,18]. Food insecurity can be illustrated by changes in food consumption that lead to the thinking of quantity and quality, including changes in the frequency of staple food consumption[19]. In the term of HFS status (Table. 1), 68 (49.3%) respondents were food secure, 36 (26.1%) food insecure without hunger, 28 (20.3%) food insecure with moderate hunger, and 6 (4.3%) food insecure with severe hunger, respectively. The results of this study were similar to the study of coastal areas of South Buru Regency, Maluku Province in 2017 which showed the results of a high percentage of coastal communities experiencing food insecurity[20]. Temporary food insecurity that persists can lead to a decrease in the quality of household livelihoods, a decrease in endurance, and can even turn into chronic food insecurity[5,21].

Parents' level of education and type of occupation are socioeconomic parameters that play an important role in relation to the awareness output of selected food sources that are nutritious and sufficient to meet their needs[22]. Furthermore, the preference for nutritious food is closely related to the household's income and the level of food insecurity experienced in the household. In this study, fathers and mothers with low education levels and low monthly household income played a role in household food insecurity. At this point, families with a high family economic status buy enough food for their families in terms of quantity, variety, and quality. Low-income levels cause food insecurity indirectly and directly because low-income families have limited purchasing power in terms of quality and quantity of food to meet the nutritional adequacy of family members[23].

In the present study, the proportion of food-insecure households in the Sayung coastal area was found to be higher in households with low levels of parental education. In accordance to research conducted in the Iranian city of Qazvin, there is a relationship between parental education level and household food security status ($p<0.05$)[22]. The level of understanding of parents about the allocation of spending on nutritionally balanced food needs influences nutritional intake, which is directly related to the level of knowledge and education level of parents, particularly mothers as the organizer of the fulfillment of food needs in the household[24]. Furthermore, knowledge is related to education; the mother's level of knowledge is important in household management, and this can influence the mother's attitude toward food consumption by the family. Mothers with good nutritional knowledge recognize the significance of good nutritional status for the health and well-being of their families.

CONCLUSIONS

In this study, 50.7% of households in coastal areas have food insecurity. Sociodemographic factors associated with household food security status are father's and mother's education and monthly household income. The potential negative consequences of household food insecurity on the nutritional status of family members need to be studied further, especially vulnerable age groups such as toddlers and mothers in the household.

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