

Nutrition transition era: how does nutritional balance of West Sumatra fishermen's families perform?

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ABSTRACT

The purpose of this study is to observe the nutritional balance of fisherman's families in the Mandeh area of West Sumatra, Indonesia, in terms of food diversity, a clean and healthy lifestyle, physical activity, and nutritional status during the nutritional transition period. The sample size was 119 fishermen's families from the Mandeh area who were chosen randomly. An interview method that included a questionnaire and anthropometric measurements was used as the data collection technique. The interaction trend of nutritional status with food diversity, a clean and healthy lifestyle, and physical activity was seen by Chi-square analysis. The results found a significant relationship between physical activity and the nutritional status of fishermen's families, with a p-value of 0.020. Meanwhile, there was no correlation between food diversity, a clean and healthy lifestyle, and nutritional status ($p > 0.05$). Additionally, nutritional problems, particularly obesity and malnutrition cases in fishermen's families in the Mandeh area of West Sumatera during the nutritional transition period, require attention; for instance, increasing prevention strategies to maintain nutritional balance.

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1. INTRODUCTION

Nutritional balance is a condition in which a person consumes a variety of foods in the right proportions [1] and consumes the right amount of food and drink to achieve and maintain a healthy weight [2]. Humans need nutrition to stay healthy, especially balanced nutrition, where nutritional intake does not exceed the recommended daily calories [3] [4]. Nutritional balance can also be defined as the condition in which a person provides all the energy needed to stay active throughout the day [5]. The nutrients required are beneficial for growth and repair, as well as preventing obesity and diet-related diseases such as non-communicable diseases (NCD's), cardiovascular and cancer [6].

The nutrition transition is closely related to the demographic and epidemiological transitions. The effects of major changes in diet and physical activity patterns have been seen, particularly in the last decade or two of the 20th century [7], [8]. Modern society tends to prefer a diet high in saturated fat, sugar, and processed foods but low in fiber [9]. In most developing countries, such as Indonesia, the nutritional transition is described by an increase in consumption of fat and sugar but a decrease in consumption of vegetables and fruit [10]. The

sedentary lifestyle makes people's level of physical activity lower [11]. These changes in nutritional status are reflected in changes in average height, body composition, and morbidity. On the other hand, increasing rates of obesity and overweight and declining rates of malnutrition and stunting are problems that trigger the nutrition transition.

The prevalence of obesity in Indonesia in 2018 was 21.8%, which has increased from 2013 of 15.45%. West Sumatra itself has also experienced an increase in the prevalence of obesity where in 2013 it was only around 13.3% but in 2018 it was 19.2%. In contrast to the prevalence of obesity, the prevalence of stunting in 2018 was 30.8% and the rate has decreased from 2013 with 37.2%. The prevalence of stunting in West Sumatra itself in 2018 was 29.9% which also decreased compared to 2013 of 39.2% [12], [13].

The determining factor for a healthy nation is seen in the nutrition among the people [14]. Nutritional status is influenced by diet [15]. Suboptimal nutrition is closely related to poor health and a high risk of disease [16]. Nutritional balance is a composition of food that contains nutrients, and the amount is based on the needs of the body [17]. The family's nutritional balance can be achieved if the food pattern [18] adheres to the four pillar principles of food diversity, a clean and healthy lifestyle, physical activity, and regular weight monitoring in order to maintain a healthy body weight [19], [20].

Food diversity is very important to achieve optimal nutritional status since it refers to food diversity refers to the consumption of a mix of foods from different food groups [21]. The amount and type of different foods consumed can vary within a food group, by meal of the day, from day to day, by season, and across life [22]. One of the reasons for food diversity is that different foods have different nutrients. Having food diversity can benefit one's health by reducing the risks associated with malnutrition or overnutrition, which occur when people don't get the right amount of nutrients from their food [23]. Regular physical activity can help a person improve their cardiorespiratory fitness, build strong bones and muscles, control weight, reduce symptoms of anxiety and depression, and reduce the risk of developing health conditions such as NCDs, cardiovascular disease, and cancer [24]. Physical activity also helps people increase their need for vitamins and minerals [25].

A clean and healthy lifestyle condition is one of the factors related to a person's nutritional status [26]. Implementation of a clean and healthy lifestyle in the household is not only the household's responsibility; it is important for every family member to carry out a clean and healthy lifestyle effort. It means that the failure to implement a clean and healthy lifestyle by a family member will result in the emergence of communicable and noncommunicable diseases [27]. Family members who do not practice a clean and healthy lifestyle will be more at risk of experiencing disease than family members who apply a clean and healthy lifestyle, this will also be related to the ability to absorb nutrients in the body, which will later affect nutritional status [28].

The Mandeh area is in West Sumatra, specifically located in South Coastal Regency. Geographically, it is located on the edge of Carocok Bay, in Koto XI Tarusan Subdistrict. Most of the Mandeh people make a living as fishermen. Fishermen are one group of community members who have the lowest level of welfare. The fulfillment of household food needs can be obtained from food availability, purchasing power, and household pattern levels. The low purchasing power of fishermen is also influenced by their low-income family.

2. RESEARCH METHOD

A quantitative study with a cross-sectional design is used in this study. The data was gathered by using survey and interview techniques. The total respondents to this study were 119 fishermen's families who were randomly chosen. The data on food diversity, a clean and healthy lifestyle, and activity were obtained by interview.

The respondents' identity data, in the form of name, age, physical activity, and food pattern were included as the data on this study. A questionnaire was utilized to gather information on food patterns and physical activity, whereas a food recall and food frequency questionnaire was used to gather information on the food patterns of the fishermen's families. Anthropometric measurements are used to calculate the body mass index (BMI). By assessing the respondents' BMI, anthropometry was used to gauge the fishermen's family's nutritional status. The US Centers for Disease Control and Prevention (CDC) divides the BMI percentile into strata. This is also in consensus with the national rules established by the Indonesian Ministry of Health. BMI is divided into five categories: severely underweight (<17); underweight (17-18.5); normal (18.5-25.0); overweight (>25-27); and obese (>27) [29].

The data was analyzed using SPSS 21 software, and a data normality test was done before executing the analysis. A descriptive analysis was utilized on the characteristics of the respondents (age, gender, height, and weight). A chi-square test analysis was utilized to see the relationship between nutritional status and food diversity, a clean and healthy lifestyle, and physical activity. The p-value in the analysis will later explain the significance of the relationship between variables.

3. RESULTS AND DISCUSSION

3.1. Characteristics of a sample of fishermen's families

The required number of samples have been collected based on a survey conducted among fishermen's families in the Mandeh area. Based from Table 1, the characteristics of the respondents observed in this study were mostly female (82.4%), and the average age was 35-49 years (45.4%). It was also found that the fishermen's families had a relatively high nutritional status in the obesity category (31.1%).

Table 1. Characteristics of fishermen's families

Characteristics	Frequency (n)	Percentage (%)
Gender		
Woman	98	82.4
Man	21	17.6
Age		
20-34 Years	35	29.4
35-49 Years	54	45.4
50-64 Years	22	18.5
>65 Years	8	6.7
Nutritional status		
Severely underweight	13	10.9
Underweight	5	4.2
Normal	48	40.3
Overweight	16	13.4
Obesity	37	31.1

3.2. Food diversification

Food diversification is important for nutritional balance [30]. Food diversification is an effort to increase the diversity of food production. The classification of food diversity is based on the scores obtained by respondents through a questionnaire. Figure 1 shows that most of the fishermen's families consume unvaried food (58.8%). Only (4.2%) of fishermen's families consume very varied food.

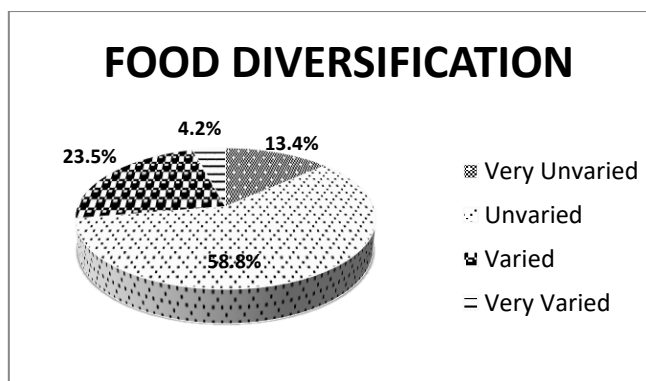


Figure 1. The distribution of food diversity

Table 2 shows that fishermen's families typically choose foods with a high oil level; only 34.45% indicated that they preferred foods with a low oil level. The percentage of fishermen's families that correctly identified the various categories of staple foods that include carbohydrates was only 42.86%. Only 34.45% of respondents attempted to decrease their salt consumption, which indicates a relatively high level of salt consumption.

3.3. A clean and healthy lifestyle

The interviews and surveys revealed that the application of a clean and healthy lifestyle at the household level has been applied on average in the daily lives of fishermen's families in the Mandeh area. Table 3 showed that the majority of the fishermen's families have a childbirth that is assisted by health personnel, although a small number of fishermen's families still have a traditional way. Exclusive breastfeeding at 40.34% and weighing babies at 34.45% are things that need to be considered by fishermen's families.

Table 2. Average results of survey answers on food diversity

Statement	Most answers	%
a. Know the various types of staple foods that contain carbohydrates	Appropriate (4)	42.86
b. Understand the benefits of consuming staple foods	Inappropriate (2)	47.90
c. Not only consuming 1 type of staple food	Inappropriate (2)	47.90
d. Know the nutritional content of the side dishes eaten	Inappropriate (2)	51.26
e. Understand the benefits of consuming various side dishes	Inappropriate (2)	57.14
f. Choose to consume side dishes that are high in protein	Inappropriate (2)	60.50
g. Ensure the side dishes consumed are fresh/good	Appropriate (4)	58.82
h. There are various kinds of side dishes that can be found around the neighborhood	Appropriate (4)	47.06
i. Understand the benefits of consuming vegetables for the body	Neutral (3)	57.98
j. Try to reduce the consumption of sugar in drinks	Appropriate (4)	50.42
k. Try to reduce the use of salt in the food consumed	Neutral (3)	34.45
l. Choose to eat foods that do not contain oil	Inappropriate (2)	34.45

Table 3. Average results of survey answer a clean and healthy lifestyle

Statement	Most answers	%
a. Wash hands with running water	Appropriate (4)	56.30
b. Wash hands with soap before eating	publiccAppropriate (4)	43.70
c. Wash all food ingredients before processing them	Appropriate (4)	53.78
d. Use clean water for eating and drinking (no smell, color and taste)	Very Appropriate (5)	42.02
e. Childbirth is assisted by health personnel	Appropriate (4)	48.74
f. Give exclusive breastfeeding	Appropriate (4)	40.34
g. Weigh toddlers every month	Appropriate (4)	34.45
h. Families use healthy latrines (clean/closed/have complete cleaning equipment)	Inappropriate (4)	42.02
i. A house free from mosquito larvae (no stagnant water / clean house / no lush plants)	Inappropriate (2)	46.22
j. Consume vegetables and fruit every day	Neutral (3)	46.22
k. Exercise every day	Inappropriate (2)	37.82
l. Do not smoke	Very Appropriate (5)	60.50

The availability of clean water in Mandeh area is sufficient for most of the people's needs. There were 43.70% of fishermen's families who wash their hands with clean water and soap. Most of the fishermen's families have already washed their food ingredients before handling them (53.78%). However, several indicators have not been implemented optimally, including consuming vegetables and fruits, eradicating mosquito larvae, and engaging in physical activity.

3.4. Factors affecting nutritional balance

This section will be focused on food diversity, a clean and healthy lifestyle, and physical activity in relation to nutritional status in fishermen's families. Table 4 presents the analysis results of the relationship between the independent variables (food diversity, a clean and healthy lifestyle, physical activity) and the dependent variable (nutritional status) based on the Chi-square test. Of the three independent variables, one variable has a relationship with food security where the p-value <0.05. There is a relationship between physical activity and nutritional status with a p-value of 0.020. Food diversity, a clean and healthy lifestyle have a weak relationship with fishermen's families' nutritional status.

The table above shows that most of the obese (42.9%) and severely underweight (35.7%) respondents have a very unvaried food pattern. Severely underweight respondents (15.8%) performed bad in maintaining a clean and healthy lifestyle. Respondents who have a normal nutritional status tend to have a very good clean and healthy lifestyle. Physical activity appears to be moderate (43.6%) in obese fishermen's families. So it differs from fishermen's families with normal nutritional status and a high level of physical activity (60%).

Figure 2 shows the nutritional status of fishermen's families in the Mandeh area based on food diversity, a clean and healthy lifestyle, and physical activity. Figure 2(a) shows that fishermen's families in the Mandeh area with a varied food have a good nutritional status. While fishermen's families with an underweight to severely underweight nutritional status have unvaried, to very unvaried food diversity. Figure 2(b) shows that in a clean and healthy lifestyle, fishermen's families who performed bad have a severely underweight level, even though this is a contradiction in research results where families who performed bad in a clean and healthy lifestyle actually have normal nutritional status. This may be influenced by other factors that have not been examined in this study, which are quite high, even though many fishermen's families who performed good in a clean and healthy lifestyle have normal nutritional status. Figure 2(c) depicts the physical activity of fishermen's families, stating that fishermen's families in the Mandeh area who engage in light physical activity

are more likely to be obese, whereas fishermen's families who engage in moderate and heavy physical activity are more likely to be normal weight.

Table 4. Factors affecting nutritional balance

Table 4. Factors affecting nutritional status													
Variable	Severely underweight		Underweight		Normal		Overweight		Obesity		Total		p-value*
	N	%	n	%	N	%	n	%	N	%	n	%	
Food diversity													
Very unvaried	5	35.7	0	0	2	14.3	1	7.1	6	42.9	14	100	0.165
Unvaried	4	6.2	4	6.2	27	41.5	11	16.9	19	29.2	65	100	
Varied	3	8.8	1	2.9	16	47.1	4	11.8	10	29.4	346	100	
Very varied	1	16.7	0	0	3	50	0	0	2	33.3		100	
A clean and healthy lifestyle													
Very bad													0.405
Bad	0	0	0	0	3	50	2	33.3	1	16.7	6	100	
Good	6	15.8	2	5.3	16	42.1	5	13.2	9	23.7	38	100	
Very good	4	7.7	3	5.8	17	32.7	9	17.3	19	36.5	52	100	
	3	13.3	0	0	12	52.2	0	0	8	34.8	23	100	
Physical activity													
Light	6	10.9	2	3.6	12	21.8	11	20	24	43.6	55	100	0.020*
Moderate	4	9.1	2	4.5	24	54.5	4	9.1	10	22.7	44	100	
Heavy	3	15	1	5	12	60	1	5	3	15	20	100	

Chi-square test note: *p-value <0.05

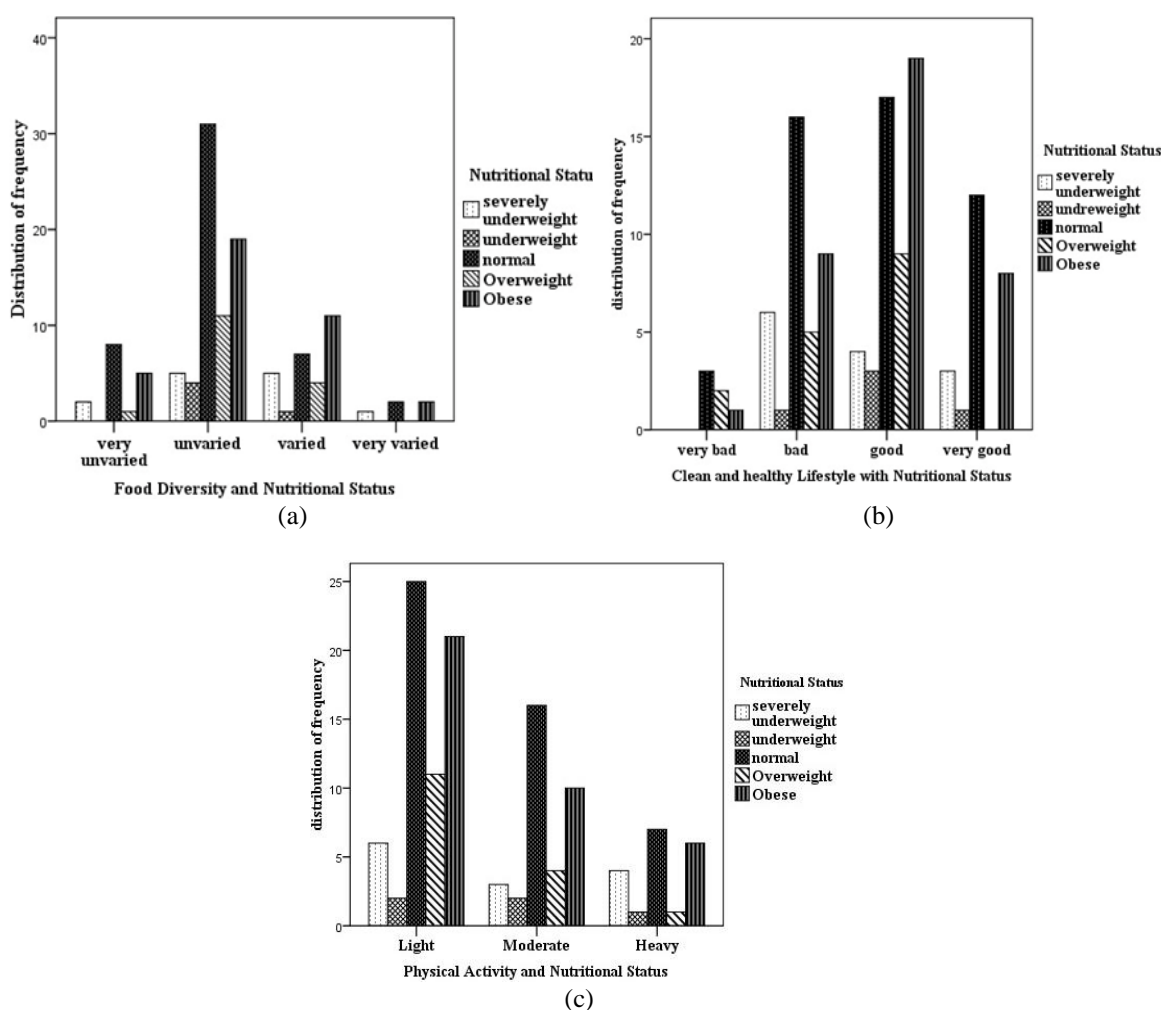


Figure 2. Food diversity, physical activity, a clean and healthy lifestyle with nutritional status (a) food diversity and (b) clean and healthy lifestyle (c) physical activity

Figure 3 explains how the nutritional transition relates to a shift in food patterns that are less varied, which are more towards being high in saturated fat, sugar, salt, and ultra-processed foods but low in fiber [31], [32]. The level of physical activity also tends to approach the state of a sedentary lifestyle [33]. These changes in nutritional status are reflected in changes in average height, body composition, and morbidity. Body composition is related to the nutritional balance that the body achieves, as in the case of obesity, which is related to a food pattern high in carbohydrates and fats and low in micronutrients, coupled with sedentary lifestyle activities [34].

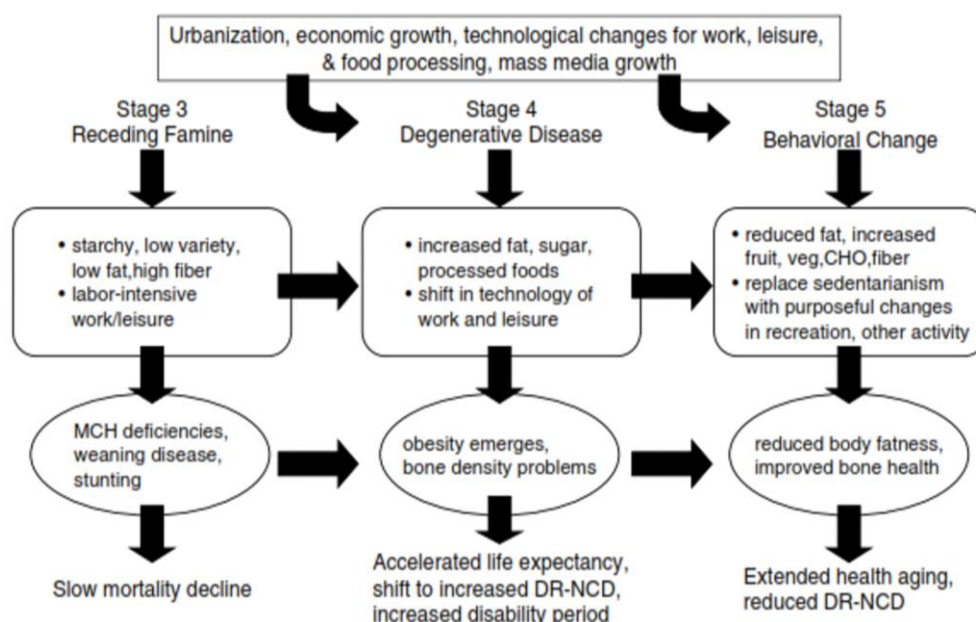


Figure 3. Stages of nutrition transition [49]

Increasing food diversity can be an approach to reducing the burden of stunting and chronic malnutrition among children in food-insecure areas [35]; Research conducted on children aged 24-59 months in 33 provinces in Indonesia, found that the food pattern of children under five years of age with normal nutritional status is more diverse than children under five years of age with short nutritional status [36]. A person's good nutritional status shows a balance in nutrition. A balanced nutritional intake cannot be met by consuming only one type of food, but rather by consuming a variety of food ingredients [37]. There will be a variety of vitamins, minerals, and nutrients if one consumes a variety of foods [38], and phytochemicals that can help prevent nutritional deficiencies and chronic disease [36].

The food pattern of fishermen's families tends to focus on quantity (as long as they are full) rather than nutritional quality (nutritional balance), as evidenced by their lack of food diversity and nutrition status; consumption of more fruits and vegetables rich in vitamin A, eggs, and animal protein that is crucial in achieving nutritional balance. Although food diversity is not related to the nutritional status of respondents, this is reflected in the p value ($p > 0.05$), there is evidence that malnutrition and obesity exist in the fishermen's families in the Mandeh area. Fishermen's families who diversify their food have a good nutritional balance, as can be seen from their nutritional status, which is also good. In line with this research conducted in Kenya on 15,317 women, there is a clear relationship between dietary diversity and BMI. Dietary diversity was associated with a 14.7% increase in BMI for lean women and a 7.0% decrease in BMI for obese women. This explains the potential of food diversity, which has an important role to play in addressing the problems of underweight and obesity, both of which are associated with food insecurity and nutritional balance [39].

The relationship between a clean and healthy lifestyle and the nutritional status of fishermen's families in the Mandeh area is not significant. The analysis results showed that in general, fishermen's families who performed bad in clean and healthy lifestyles were underweight. Fishermen's families that performed good in a clean and healthy lifestyle had good nutritional status. A study conducted in one of the Public Health Center's working areas in Indonesia discovered a link between a clean and healthy lifestyle and nutritional status with a p-value=0.0001 [40]. According to this study, research conducted in East Sumba found that a clean and healthy lifestyle has a strong correlation with nutritional status and can improve good nutritional status with p-value <0.05[41].

As seen from the finding, it is evident that fishermen's families in the Mandeh area tend to do light physical activity. Physical activity is a planned, structured activity that is repeated consistently to maintain the body's physical fitness in order to achieve optimal health status [42]. In other words, regular physical activity will help to balance the body's nutritional intake [43], because physical activity involves the movement of muscles, which requires energy expenditure [44]. It can be said that through physical activity, one can reduce the excess fat and calorie intake in their body [45]. Further, obesity is one of the effects of a lack of physical activity [46]. Research conducted in China shows that there is a significant interaction between physical activity and nutritional intake [47]. Physical activity in this study provided a significant relationship with nutritional status. It is no different from a study conducted in Taiwan, which also revealed that regular physical activity (TPA) is effective in reducing the risk of being underweight or overweight ($p < 0.05$) [48].

Although this article explains factors related to nutritional balance, the factors studied are still not very representative since this research only investigates a clean and healthy lifestyle, food diversity, and physical activity. However, there are still many other factors that can influence the nutritional balance of fishermen's families, such as specific food patterns and the nutritional intake consumed by fishermen's families, that have not been studied further.

4. CONCLUSION

A detailed explanation about the nutrition transition of fishermen's families in the Mandeh area of west Sumatra has been provided in the findings. It is shown that nutritional problems, particularly obesity and malnutrition cases, among fishermen's families in the Mandeh area of West Sumatera during the nutrition transition period require attention. It is seen in sedentary lifestyles, a clean and healthy lifestyle, and food diversity that are still not optimal, or, in other words, the implementation of balanced nutrition is still not properly implemented. There is a need for lifestyle improvements to maintain nutritional balance in fishermen's families. Prevention strategies are urgently needed to prevent overweight and obesity, as well as nutrition education that can overcome double-burden problems. By stating the fact that unhealthy lifestyles, especially sedentary lifestyles in society, are one of the main threats that contribute to this challenge. The future research is suggested to investigate the independent or interactive effects of food diversity, physical activity, and a clean and healthy lifestyle, as well as the nutrition intake in fishermen's families.

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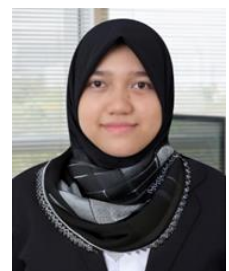
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