Dietary Intake and Nutritional Status of Children in Kajang: A Study at An Indigenous Area in Indonesia

Asupan Makanan dan Status Gizi Anak di Kajang: Studi pada Wilayah Adat di Indonesia

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DOI: 10.24252/al-sihah.v14i1.78780
Received: 13 May 2022 / In Reviewed: 18 May 2022 / Accepted: 14 June 2022 / Available online: 30 June 2022
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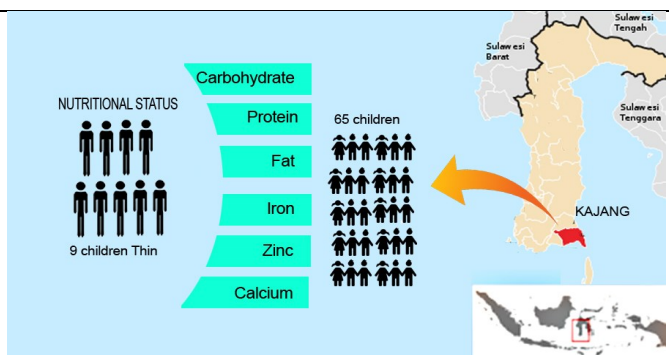
ABSTRACT

Malnutrition in children can contribute to growth limitations, and susceptibility to infection, which ultimately can inhibit the children's growth and development. This study aimed to determine the fulfillment of macronutrient intake, micronutrient intake, and nutritional status of elementary school children at State Elementary School (hereafter SDN) Ammatoa Area, Kajang District, and Bulukumba Regency. This research was a descriptive study involving a population of 131 children and a sample of 65 children obtained by accidental sampling. The data were analyzed by using descriptive analysis of the percentage test. The results showed that the majority of macro-carbohydrate intakes (56.9%) were in the sufficient category, the majority of protein and fat (61.5% and 84.6%) were in the less category, while the intake of micronutrients, namely iron, zinc, and calcium primarily (83.1%, 80%, and 92.3%) in the less category, and the majority of nutritional status (86.2%) in the normal category. It was concluded that the intake of macro and micronutrients in elementary school children at the SDN Ammatoa region tended to be still lacking/low, despite their nutritional status, which tended to be normal. It is hoped that the relevant agencies will provide counseling to students regarding healthy and nutritious food by utilizing local food diversification in the Ammatoa customary area.

ABSTRAK

Gizi kurang pada anak dapat menimbulkan keterbatasan pertumbuhan, dan kerentanan penyakit infeksi, sehingga menghambat tumbuh kembang anak. Penelitian ini bertujuan untuk mengetahui pemenuhan asupan gizi makro, asupan gizi mikro dan status gizi pada anak sekolah dasar di SDN Kawasan Ammatoa Kecamatan Kajang Kabupaten Bulukumba. Penelitian ini adalah penelitian deskriptif, dengan populasi sebesar 131 anak, dan sampel sebanyak 65 anak yang diperoleh secara *accidental sampling*. Data dianalisis menggunakan uji analisis deskriptif persentatif. Hasil penelitian menunjukkan bahwa asupan zat gizi makro karbohidrat mayoritas (56,9%) dengan kategori cukup, protein dan lemak mayoritas (61,5% dan 84,6%) dengan kategori kurang, sedangkan asupan zat gizi mikro, yaitu zat besi, zink dan kalsium sebagian besar (83,1%, 80%, dan 92,3%) dengan kategori kurang, serta status gizi mayoritas (86,2%) dengan kategori normal. Disimpulkan bahwa asupan gizi makro dan mikro pada anak sekolah dasar di SDN Kawasan Ammatoa cenderung masih kurang, walaupun status gizinya cenderung normal. Diharapkan instansi terkait memberikan penyuluhan kepada siswa terkait makanan sehat dan bergizi dengan memanfaatkan diversifikasi pangan lokal di wilayah Kawasan adat Ammatoa.

GRAPHICAL ABSTRACT



Keyword
indigenous area
children in kajang
nutritional status
macronutrient intake
elementary school students

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ISSN-P : 2086-2040
ISSN-E : 2548-5334

INTRODUCTION

The limitation of growth and susceptibility to infectious diseases, which ultimately inhibit the growth and development of children, are some of the impacts of malnutrition. Therefore, children need to get nutritional intake from daily food in the right amount and of good quality (Rosela et al., 2017). Malnutrition at an early age can impact the emergence of various diseases in adulthood (Sheehy et al., 2019). Taylor et al. (2019) reported that the children's growth is strongly influenced by their diet during their childhood.

The variety of food consumption and foods should be implemented from the household level. The more diverse the food types consumed, the more diverse the nutritional intake consumed. In addition, the quantity of food consumed must be sufficient amount, because if it is excessive, it can lead to other nutritional problems (Purwaningsih et al., 2019), including the age group of elementary school children. Colecraft et al. (2017) reported that two-thirds (67.0%) of school children in Ghana experienced stunting, being underweight, and being anemic. The study also suggested that increasing the quantity and quality of food from school feeding programs could contribute to the overcoming of malnutrition in children.

The deficiencies of iron, zinc, iodine and vitamin A are the most frequently reported nutritional problems in school-age children (Colecraft et al., 2017). Malnutrition affects children's health and capacity to do well in schools. It has been reported that there was a relationship between malnutrition and low school attendance, intelligence, school achievement, and morbidity in school-age children (Omwami et al., 2011). Meanwhile, the problem of nutritional status in school children in Africa has been associated with morbidity, hygiene practices, food intake, and socioeconomic status of the family. It is therefore recommended that the food provided in schools should meet at least 30% of the energy and micronutrient needs of school children (Mesfin et al., 2015).

The prevalence of nutritional problems in school-age children is a major public health problem (Bogale et al., 2018; Rathnayaka & Agampodi, 2017; Tariku et al., 2018), one of which is in the groups of school children residing in the customary areas. One of the primary schools which attracted the attention was the primary school in the Ammatoa area. The Ammatoa Kajang area is a traditional area in South Sulawesi, which is located in Bulukumba Regency. Based on the initial survey conducted by researchers, the majority of school children who attended SDN Ammatoa Kajang are children living in the customary area and outside of the area (around the customary area). The indigenous people firmly adhere to the customs inherited by their ancestors, especially in consumption patterns. Several studies on the customary areas associated with the people's consumption patterns have been investigated (Kuhnlein, 2015; Lemke & Delormier, 2017; Mosby & Galloway, 2017). However, to the knowledge of the researcher, there has been no research that specifically examines the nutritional status of children in in-

Table 1
The Characteristics of Respondents

Respondents		n (65)	%
Sex			
	Males	30	46,2
	Females	35	53,8
Age			
	6 years	1	1,5
	7-9 years	26	40
	10-12 Years	30	46,2
	13 Years	8	12,3

digenous areas. Therefore, the researchers are interested in knowing the food intake and nutritional status of elementary school children in the Ammatoa Kajang customary area.

METHODS

The research was conducted using descriptive research. The analysis was directed to describe the characteristics of age, gender, macronutrient intake, micronutrient intake, and nutritional status of elementary school children at the state elementary school of Ammatoa Kajang Region. This research was conducted during the period of November-December 2021.

The students were used as respondents (samples) after accidental sampling was carried out. This study used the descriptive percentage analysis technique to describe the intake of macronutrients, micronutrients, and nutritional status. The data on food intake was obtained by using the Food Recall 24-Hour questionnaire in which respondents were previously asked for their readiness to fill out the informed consent, and then the input was made in the Nutri Survey Software to know the range of macro and micro nutrient intakes consumed. The use of the Nutri Survey was based on the variables of gender, age group, and the portion of food according to the Daily Nutritional Adequacy Rate (RDA), while assessing the nutritional status was done based on the assessment of Body Mass Index (BMI).

RESULTS

This research was conducted in the village of Tana Toa, Kajang District, Bulukumba Regency, South Sulawesi Province, Indonesia. This area is the fifth-largest sub-district in Bulukumba Regency, covering an area of 129.06 km2. Administratively, Kajang District is divided into 17 villages and 2 sub-districts. One of the famous things about the Kajang District is the existence of the Ammatoa indigenous people who live in one of the villages, namely Tana Toa village, which is the Ammatoa Kajang customary area.

The people who live in the Ammatoa customary area are known as the "*ilalang embayya*" community. These people still fully adhere to the Ammatoa custom and practice a very simple way of life known as "*tu kamase-maseya*" (Akib, 2008) and reject anything which adopts modernization. The people of the Ammatoa indigenous area perceive that technological objects can have a negative impact on their lives because they are destructive to the preserva-

Table 2
The Distribution of Respondents by Macro and Micro Nutrients Intake

Intake	Intake Category	n (65)	%	Mean	Min-Max
Macro Nutrients					
Carbohydrate	Sufficient	37	56,9	271,39	62,3 - 3572
	Less	28	43,1		
Protein	Sufficient	25	38,5	45,04	8,8 - 334
	Less	40	61,5		
Fat	Sufficient	10	15,4	25,94	1,4 – 125,1
	Less	55	84,6		
Micro Nutrients					
Iron	Sufficient	11	16,9	5,04	1,0 – 92,0
	Less	54	83,1		
Zinc	Sufficient	13	20	4,15	1,10 – 52,0
	Less	52	80		
Calcium	Sufficient	5	7,7	225,80	20,80 -1341,20
	Less	60	92,3		

tion of natural resources. The forests in Ammatoa customary area are protected and well preserved. In addition, the Ammatoa indigenous people wear black clothes every day, which symbolizes equality for all indigenous people. Therefore, due to this custom - the Ammatoa customary area is known as *Kajang Le'leng* (The Black Kajang) (Amin, 2019).

Table 1 shows the majority of respondents in this study were girls involving 35 people (53.8%). Meanwhile, the age of the average respondents ranged between the ages of 6-13 years (table 2), with the youngest being six years old (1 person) and the oldest being 13 years old (8 people). The majority of children in this research sample were 10-12 years old.

Meanwhile, table 2 shows that the intake of macro-carbohydrate nutrients is more in the sufficient category for 37 people (56.9%), protein intake is more in the less category for 40 people (61.5%), and fat intake is more in the category less than 55 people (84.6%). The majority of children have a low intake of micronutrients in the form of iron, zinc, and calcium. The average intake of iron is 5.04 mg, zinc is 4.15 mg, and calcium intake is 225.80 mg.

Table 3 shows that the majority of respondents have normal nutritional status, as many as 56 people (86.2 people).

DISCUSSION

Macronutrient Intake

School children who became the respondents in this study were aged between 6 and 13 years old. Age is an important factor in assessing daily nutritional adequacy. In addition to age, the daily nutritional intake needs also differ between boys and girls. Macronutrient intake is the intake of nutrients needed in large quantities. Macronutrients include carbohydrates, proteins, and fats. These macronutrients are a critical factor in producing the energy required to carry out daily activities.

Carbohydrate consumption of elementary school children in the Ammatoa customary area is more in the sufficient category. The results of this study are in line with the research reported by Fiamanatillah et al. (2019) that the majority of elementary school-age children had a normal carbohydrate intake. However, this is different from the results of the research reported by

Table 3
The Distribution of Respondents by Nutritional Status Category

Nutritional Status	n (65)	%
Very Thin	1	1,5
Thin	8	12,3
Normal	56	86,2

(Bergström et al., 2020), which states that the majority of school children were actually lower than the standard daily intake needs of children. Meanwhile, it was also reported that the consumption of carbohydrates was actually excessive at the age of elementary school children (Aliyah et al., 2018). In this study, the majority of carbohydrate sources consumed by children were rice and corn. This is because the respondents' parents were generally farmers who yielded rice and corn, all of which greatly affected the children's daily intake.

Based on the interviews with local customary leaders (Ammatoa), it was found that more agricultural products are usually stored at home than sold. This is done to meet the consumption needs until the next harvest period so that the people of the Ammatoa indigenous area do not have to worry about the shortage of essential food ingredients at the household level. This habit is a tradition that has been passed down from generation to generation until now.

Furthermore, this study showed that protein consumption was more in the category of low protein intake (61.5%) compared to sufficient protein intake (38.5%). The average protein intake of respondents was 45.04 grams. Meanwhile, the reference standard for children's needs ranged from 35-72 grams for boys aged 6-13 years and 35-69 grams for girls. The low rate of protein intake in elementary school children in the Ammatoa Kajang area could be influenced by the access to and production of protein sources of food. The majority of food sources of protein are obtained by having to buy in the market, while in the Ammatoa customary area, there is no market for buying and selling food ingredients. The source of protein available at the household level is chicken eggs, which are also self-produced by the Ammatoa indigenous community and are obtained by raising native chickens. Therefore, to gain access to other foodstuffs, the Ammatoa indigenous people must leave the customary area (*i pantarang embayya*) or even go to the capital market of the Kajang District. The low production and availability of protein source foods in the Ammatoa customary area are one of the factors for the low protein intake of elementary school children.

Beef or free-range chicken dishes are rarely consumed by school children because they usually have to wait for an important day or a certain day. Even beef consumption is usually only if there is a celebration. In the Ammatoa customary area, no one raises chicken pieces, even though the price of one free-range chicken is relatively higher, in the range of 75,000-150,000 rupiahs.

Meanwhile, the order of eating at the household level usually starts with feeding

the children. According to Ammatoa, children tend to be hungry more quickly than adults or older people. So, the children should be fed earlier. If there is a ready-to-eat fish, usually the child is given the middle part of the fish, which is considered to have a few bones. The inclusion of fish bones in the food consumed by children is something that parents fear because it can cause pain in the throat and disturb the children's appetite.

Not only in terms of access to protein-rich foods, but another influential factor is also in terms of storage. Electricity facilities are denied and prohibited from 'entering' the Ammatoa customary area. Thus, food storage media to make it more durable (such as a refrigerator) cannot be used. In contrast, high protein sources of food are very easily damaged because of their high water content, such as fresh fish, chicken, beef, and nuts. All of these cannot be stored for a long time without adequate food storage media. This also affects the low protein intake in school children.

These things contribute to the low intake of food sources of protein in elementary school children in the Ammatoa customary area. In addition to low protein intake, protein absorption factors are also very influential on children's growth and development. Protein absorption can be influenced by micronutrient adequacy (Abrha et al., 2016).

Vegetable food ingredients in the Ammatoa traditional area are vegetables that are ready to be picked when they are about to be processed, such as peanut leaves and fruits, Moringa leaves, sweet potato leaves, kale, and young papaya fruits, and pumpkins. These vegetables are usually grown around the houses of the Ammatoa indigenous people and are picked only when they are going to be cooked, so they do not require storage at home. Vegetables are very rich in vitamins and minerals, including micronutrients. Micronutrients cannot be produced by the body or are non-essential nutrients. Micronutrients can only be obtained from food intake that enters the body. Some vitamins work as cofactors or coenzymes in many metabolic processes, both in the metabolism of carbohydrates, proteins, and fats. In addition, adequate consumption of vitamins and minerals can also improve immune function, growth and development, and bone formation (Akram et al., 2020). This is in line with research conducted by Gose et al. (2016), which states that protein consumption decreased and fat increased over time. In this study, the average respondent's fat consumption was 25.94 grams, with a distribution of 84.6% in the less consumption category and only 15.4% with sufficient consumption. Based on the RDA, the range of needs for children aged 6 -13 years is 62-83 grams for boys and 62-71 grams for girls. The lowest fat consumption was 1.4 grams, and the highest fat consumption was 125.1 grams.

Food consumption as an energy producer dramatically affects the concentration power of school children (Fiamanatillah et al., 2019). It is crucial to optimize the intake of food containing macronutrients in the normal category, to support the increased activity and concentration in children's learning process.

Micronutrient Intake

Micronutrients are generally divided into vitamins and minerals. The level of need is only in small sizes, so they are called micronutrients. Mineral intake dramatically influences the growth and development of childhood (Bird et al., 2017). In this study, the micronutrients studied were merely limited to a few types of minerals, including iron, zinc, and calcium. This is because those three types of minerals are very influential on children's growth (van Stuijvenberg et al., 2015; Rubio-López et al., 2017). The results of data collection conducted in this study indicated that the majority of elementary school children had a low intake of micronutrients, both iron, zinc, and calcium intake.

The average iron intake was 5.04 mg, while the standard daily iron intake requirement is 9-19 mg for boys and 9-26 mg for girls. Even the minimum intake of iron is 1 mg, and the maximum intake is 92 mg. Likewise, the average zinc intake is 4.15 mg, while the standard daily intake of zinc is 11-17 mg for boys and 11-16 mg for girls. The minimum intake of zinc is 1.10 mg, and the maximum intake is 52 mg. The average intake of calcium is 225.80 mg, while the standard daily intake of calcium is 1000-1200 mg, both for boys and girls. The minimum amount of calcium intake is 20.80 mg, and the maximum intake is 1341.20 mg. This shows that the average calcium intake of school children is only about a quarter of the total range of daily needs of children aged 6-13 years.

Zinc deficiency during childhood will affect the growth and development of children. Most of the outcomes of zinc deficiency during infancy are thought to impair immunity, growth retardation, and impaired neuro-development (Abdollahi et al., 2019).

Micronutrient deficiency is a significant factor that contributes to health problems and suboptimal growth and development, especially for young children (Abbaspour et al., 2014; Oh et al., 2020). Micronutrients also affect the immune system. Body conditions that are often sick and are caused by low immunity affect the growth and development of children (Abbaspour et al., 2014; Gombart et al., 2020). Even zinc is reported to have a significant impact on the incidence of failure to thrive or stunting (Hess et al., 2015; Yazbeck et al., 2016).

Nutritional Status

The nutritional status of elementary school children was assessed by using data on the children's weight, height, and age. The data were input into the WHO Anthro application to identify and classify the children based on their categories of nutritional status. Based on the data collection and data analysis, the majority of elementary school children in the Ammatoa area had normal nutritional status, which was 86.2%. The results of this study are in line with the research reported by Aliyah et al. (2018), which stated that there are more students who attend school for half a day with normal nutritional status (80.4%) compared to those with more nutritional status (19.6%). Likewise, the research conducted by Fiamanatillah et al. (2019) re-

ported that most or 34 students (58.6%) had a normal nutritional status.

Elementary school children, especially those who only attend school for half a day (half day), tend to have breakfast and lunch patterns at home compared to buying snacks at school, especially for students who study in rural areas. Based on the results of the researcher's observations, there are only three snack vendors and one small yellow rice vendor with a price of Rp. 5,000 (five thousand rupiahs) around the school, which are always sold every day. Based on what several children said, they usually have breakfast at home before going to school and have lunch at home when going home. This is one of the factors leading the majority of school children to have normal nutritional status because they consume more foods that are cooked by their mother/ caregiver.

In addition to the above factor, physical activity also plays a great role in forming a normal nutritional status. When entering the Ammatoa traditional area, the school children will take off their shoes and socks. They walked barefoot on rocky grounds. According to the head of the Ammatoa custom, walking barefoot inside the customary area has become a hereditary habit which means that land for the Ammatoa community is associated with a mother who grows various kinds of natural products to meet the needs of the community. Therefore, it is believed that the Ammatoa indigenous people always attach themselves to those who grow various kinds of natural products.

The whole thing associated with modernity is not allowed to enter the territory of the Ammatoa customary area. Therefore, they are also known as "*tu kamase-masea*", which means the people who live simple lives, including their lifestyles and diets. Based on the observations conducted by the researcher, it takes about 20-25 minutes on foot to reach the residential area of the Ammatoa indigenous people. When entering the customary area, firstly go through the forest areas which have been preserved for generations by the Ammatoa indigenous people.

Walking is one of the everyday habits done by the indigenous people. Even when they leave the customary area, they often just walk. In addition to walking activities, school children are also used to lifting water from springs that are far from home to be used for cooking purposes. This is done when the children go to the water source to take a bath in the morning, after school, and take a bath in the afternoon. Not to mention the activities of school children who help their parents in farming or gardening. Physical activities carried out by the children at school age is a hereditary habit. This has a reciprocal effect because a good nutritional status will also support optimal physical activity, and the body will be healthy and fit (Hills et al., 2015).

CONCLUSIONS

This study provides critical information regarding the contribution of the local wisdom from the Ammatoa customary area to the dietary habit of elementary school children. Thus, macro, micro, and nutritional status can be identified. The majority of macronutrient intakes in the form

of carbohydrates occupy a sufficient category, whilst the majority of protein and fat intakes occupy the less category. This is due to the low access, production, and storage (freezer) of protein source foods because they have not been touched by modern technology. In addition, protein absorption is also influenced by the adequacy of micronutrients, whereas micronutrient intake (iron, zinc, and calcium) dominantly occupies the fewer categories. In contrast to the nutritional status of elementary school children in the Ammatoa customary area, it is known that the dominant category is ordinary; this is because most children consume the food prepared by their mothers or caregivers before going to school and after school, so very few children engage in snacking behavior at school. Additionally, physical activity such as walking barefoot in the Ammatoa traditional area also plays a crucial role in forming the normal nutritional status of elementary school children there. However, this study has not revealed the detail regarding the effect of local food diversification on macro and micro-nutrient intake and nutritional status of elementary school children.

The attention and role of the government are highly required for this case. Therefore, it is expected that the relevant agencies will provide counseling services to the students regarding healthy and nutritious food by utilizing local food diversification in the Ammatoa customary area. Finally, further researchers can examine the access pattern and eating pattern of the Ammatoa Kajang indigenous people.

ACKNOWLEDGMENT

Our deepest gratitude goes to the Institute for Research and Community Service (LP2M) of UIN Alauddin Makassar and the Directorate of Islamic Religious Higher Education, which provided this research grant. Likewise, the Government of Bulukumba Regency, Kajang District, especially the Ammatoa Customary Chair and Principal, and students of SDN Ammatoa Kajang Region who had collaborated to get involved in carrying out this research.

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