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AL-KAUNIYAH JOURNAL TEMPLATE

STATUS NUTRISI ANAK PAPUA DAN NONPAPUA DALAM KAITANNYA DENGAN KEMAMPUAN KOGNITIF DAN MOTORIK

NUTRITIONAL STATUS OF PAPUAN AND NON PAPUAN CHILDREN IN RELATION WITH COGNITIVE AND MOTORIC ABILITY

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Abstract

Setiap orang mempunyai kemampuan berbeda-beda dalam meresponi kondisi lingkungan internal dan eksternal, dan berupaya untuk menyesuaikan diri dengan perubahan lingkungan tersebut. Salah satu variasi fenotipik manusia yang mengalami perubahan dalam upaya menyesuaikan dengan kondisi lingkungan adalah pertumbuhan fisik. Salah satu dampak tekanan lingkungan terhadap pertumbuhan anak adalah kekurangan gizi. Tujuan penelitian ini adalah melihat asosiasi status gizi dengan kemampuan kognitif, motorik, dan pola makan pada anak-anak usia sekolah tingkat dasar di Oransbari Manokwari Selatan Papua Barat. Riset dilaksanakan di SD Inpres 54 dan SDN 09 Oransbari Manokwari Selatan Provinsi Papua Barat pada bulan Januari-September 2023. Design penelitian *cross sectional* dilakukan pada anak-anak usia 6-12 tahun. Total subjeck sebanyak 161 anak. Wawancara *semistructural* dengan panduan kuesioner dilakukan untuk mengumpulkan data kemampuan kognitif dan motorik. Selain itu dilakukan pengukuran tinggi badan dan berat badan untuk menilai status gizi indek massa tubuh menurut umur (BMI.U). Penelitian kami menunjukkan perbandingan status gizi antara anak-anak Papua dan non Papua berbeda cukup signifikan. Terdapat kecenderungan anak-anak yang berasal dari suku di luar Papua memiliki gizi yang lebih baik dibandingkan anak-anak asal suku-suku di Papua. Kasus obesitas dan overweight (19,2%) ditemukan cukup banyak pada anak-anak non Papua dibandingkan anak Papua (1,8%). Hasil uji *Chi Square* menunjukkan status gizi dengan kategori malnutrisi tidak berkaitan dengan kemampuan kognitif (*p-value* 0,41) dan motorik (*p-value* 0,35). Demikian halnya dengan kasus obesitas dan *underweight* juga tidak berasosiasi dengan kemampuan kognitif (*p-value* 0,09 dan 0,89) dan motorik (*p-value* 0,99).

Kata Kunci: Status gizi, kemampuan motorik, kemampuan kognitif, Papua

Abstract

One of the phenotypic variations in humans that experience changes as adaptation to environmental conditions is physical growth. The impacts of environmental pressure on children's growth is malnutrition. This research aims to assess the association of nutritional status with cognitive abilities and motor skills in elementary school-age children in Oransbari Manokwari Selatan, West Papua. The research was carried out at SD Inpres 54 and SDN 09 Oransbari Manokwari Selatan, West Papua Province in January-June 2023. The cross-sectional research design was carried out on children aged 6-12 years. The total subjects were 161 children. Semistructured interviews guided by a questionnaire were carried out to collect data on cognitive and motor abilities.Body height and body weight were measured to assess the nutritional status of

body height for age (BH/U) and body mass index for age (BMI/U). Our research showed that the comparison of nutritional status between Papuan and non-Papuan children was quite significantly different. There was a tendency for children from tribes outside Papua to have better nutrition than children from native tribes in Papua. The percentage of short body size was found to be 22.31%. Obesity and overweightwere found quite high in non-Papuan children (19.2%) compared to Papuan children (1.8%). Chi-Square test showed that nutritional status in the malnutrition category was not related to cognitive (p.value 0.41) and motor skills (p.value 0.35). Likewise, obesity and underweight were also not associated with cognitive abilities (p-values 0.09 and 0.89) and motor skills (p-value 0.99). The high incidence of short body size in children in Oransbari may not be related to chronic malnutrition but it was a natural response of the body to environmental conditions.

Keywords: Nutritional status, motoric skill, cognitive ability, Papua

INTRODUCTION

Each person has different abilities in responding to internal and external environmental conditions and tries to adapt to environmental changes. One of the phenotypic variations in humans that experience changes to adapt to environmental conditions is physical growth, such as body height, body weight and body fat.

Officially, the Ministry of Health (Kemenkes, 2020) has issued standards for assessing the growth and nutritional status of Indonesian children which are a national reference based on anthropometric measurements. These standards refer to WHO standards which are also a reference for various countries in the world. Several previous studies relating to the growth patterns of Indonesian children in various ethnic groups showed variations (Widiyani et al., 2011; Kawulur et al., 2012; Artiningrum et al., 2014; Rohmatullayaly et al., 2017), and below normal when compared with a growth reference standard curve. Variations in growth are related to environmental conditions such as food, disease and socio-economic conditions. From an evolutionary perspective, body size that is smaller and lighter than normal standards is more related to body plasticity and growth strategies in the face of environmental stress. However, other perspectives reveal that growth and nutrition that are below standard are serious health problems (Pelto & Pelto, 1989; Walker et al 2006; Walker & Hamilton, 2008).

Indonesia is a developing country which has a major problem in the form of malnutrition. Based on data from the Ministry of Health in 2022, the prevalence of chronic malnutrition or stunting in Indonesia is 24.4%, acute malnutrition (wasting) is 7.1% and underweight is 17.0% (Ministry of Health of the Republic of Indonesia, 2022). According to the World Health Organization (WHO), this is considered a serious public health problem. Therefore, currently, stunting is a nutritional problem that receives special attention both nationally and internationally, even reducing stunting has become a national programme, and one of the priority areas is West Papua Province (Trihono, 2015; Satriawan, 2019); Presidential Decree, 2021; Kemenkes, 2021).

Good nutrition contributes positively to the growth and development of children, as well as the child's ability to play, learn, participate and be useful, while malnutrition will have a negative impact on the child's future (WHO, 2017). Low nutritional status has a negative impact on children's academic and motor skills. Chronic malnutrition results in lower academic achievement for school children. Children who are stunted due to malnutrition are more likely to enter school late, are absent more often and do not go to class (Sa'adah et al., 2014).

Children who are malnourished are easily sleepy and less enthusiastic about the learning process at school so learning achievement will decrease, and children's thinking power will also decrease because brain growth is not optimal (Sari et al., 2016). Apart from that, children's motor skills are also low so they are less skilled in carrying out physical activities (Noviyanti and Marfuah, 2017). Therefore, nutritional status a factor that has a significant influence on a person's motor performance and abilities. Nutrition is an important factor in contributing to the quality of human resources (Sa'adah et al., 2014).

The majority of the Oransbari District is inhabited by transmigration from Javanese and Papuan tribes. These area experience a transition period from an isolated area to an expansion area which is slowly experience significant changes after access to transportation begins to improve. Limited access to transportation, health and communication illustrates environmental pressures that can impact culture and the lives of people in the area. Previous studies explained that environmental stress experienced by a person in early life produces an adaptive response in the form of accelerated growth and reproduction (Kawulur et al., 2023). Environmental pressures might be also have an impact on children's lives related to their growth and development, which is shown by the quite high cases of malnutrition among children found in this area (Kemenkes, 2021). This research aims to assess the association of nutritional status with cognitive abilities and motor skills in children in the Oransbari District West Papua Province.

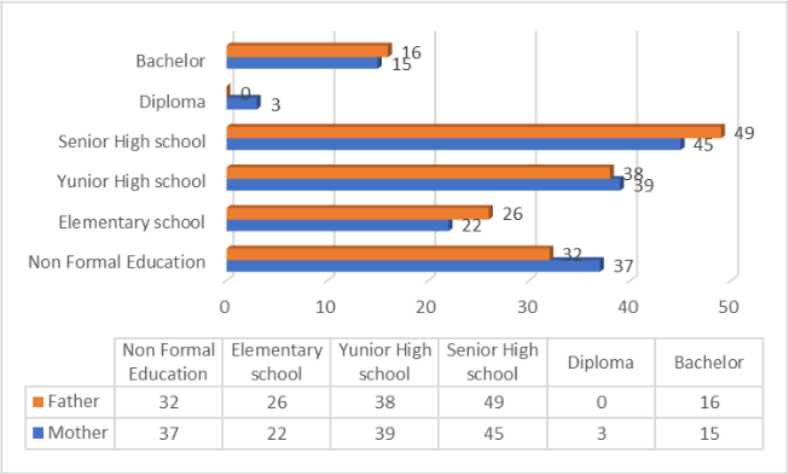
MATERIALS AND METHODS

The research was carried out at SD Inpres 54 and SDN 09 Oransbari Manokwari Selatan, West Papua Province in January-June 2023. The cross-sectional research design was carried out on children aged 6-12 years. The total number of subjects who were successfully interviewed was 250 children, however, several subjects were eliminated due to incomplete data, leaving 161 children remaining. Semistructured interviews guided by a questionnaire were carried out to collect data on cognitive and motor abilities. In addition, height and weight were measured to assess nutritional status. The subject's statement of consent to be involved in research voluntarily was carried out before collecting data.

Cognitive ability was taken from the average subject report scores related to the knowledge of all students. Motoric skill was measured using a hand-strength coordination test (wall passing). The nutritional status assessment category based on body mass index at age (BMI/U) refers to (Ministry of Health, 2020). Sseverely thinness if the BMI/U value is <-3 SD; Thinness if BMI/U-3 SD sd <- 2 SD; Good nutrition (normal) if BMI/U is 2 SD to +1 SD; Overweight if BMI/U + 1 SD to +2 SD; and obesity (obese) if BMI/U > + 2 SD. The nutritional status category based on height according to age (TB/U) aged 7-12 years refers to Chandra et al., (2019). The category consisting of severely stunted if <-3SD, moderately stunted if -3<SD<-2, marginally stunted if -2<SD<-1, and normal if -1<SD<0. The Pearson Chi-Square test with a significance level of p-value <0.05 was used to see the relationship between nutritional status and cognitive and motor abilities.

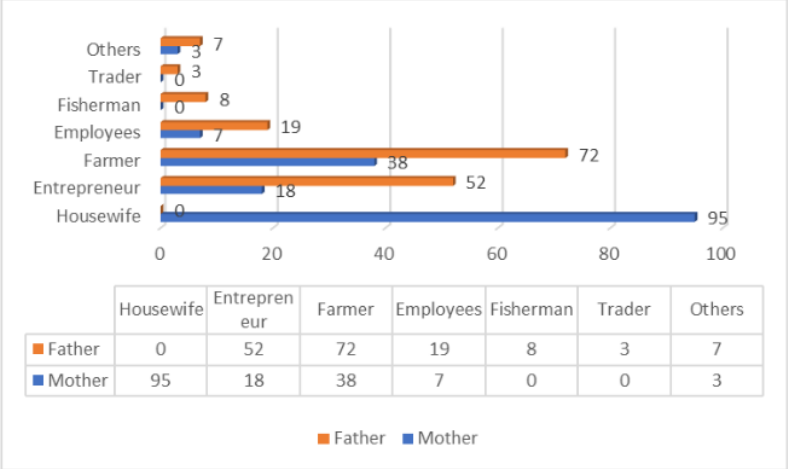
RESULTS

The Oransbari area is rural so in general, the socio-economic status of the people was categorized as low. There was reflected in the education of the parents, most of whom have an education lower than high school level, with quite a number not even having formal education (Figure 1). The father's job is mostly as a farmer, while the mother's job is as a housewife (Figure 2). By age, the father's income ranges from 1-2 million. This value was lower when compared to the Regional Minimum Wage in West Papua Province of Rp. 3,282,000.



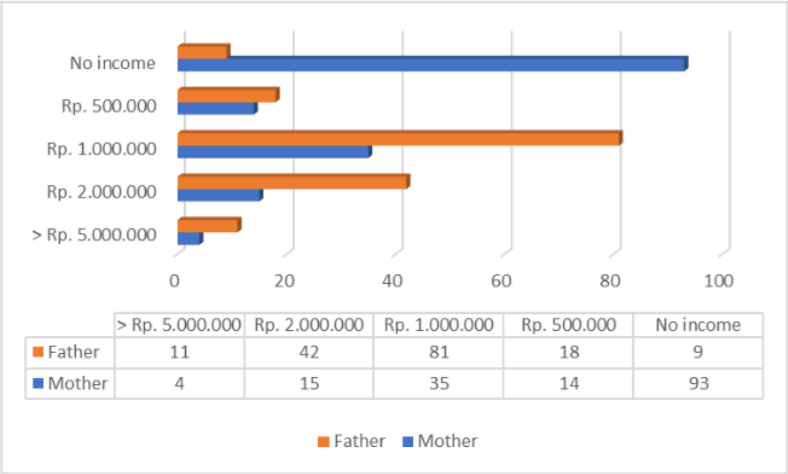
	Non Formal Education	Elementary school	Yunior High school	Senior High school	Diploma	Bachelor
Father	32	26	38	49	0	16
Mother	37	22	39	45	3	15

Figure 1. Education of Parents



	Housewife	Entrepreneur	Farmer	Employees	Fisherman	Trader	Others
Father	0	52	72	19	8	3	7
Mother	95	18	38	7	0	0	3

Figure 2. Occupation of Parents



	> Rp. 5.000.000	Rp. 2.000.000	Rp. 1.000.000	Rp. 500.000	No income
Father	11	42	81	18	9
Mother	4	15	35	14	93

Figure 3. Income of Parents

Oransbari society consists of various tribes. In general, the dominant tribes are the Javanese and the Arfak, which are the native tribes of Manokwari. Other tribes with relatively small numbers are Ambon, Batak, Biak, Bima, Bugis, Buton, Key, Lampung, Makassar, Wate, Ende, Serui, Ternate, Toraja and Waropen. In summary, all these tribes were divided into two, tribes originating from Papua are categorized as Papuan, while other tribes originating from outside Papua are categorized as non-Papuan. The majority of ethnic groups come from non-Papuans with a percentage of 73.91% (119 people), while ethnic groups from Papua are 26.08% (42 people) (Figure 4).

Nutritional status based on body height for age showed that short body height of children in Oransbari was fairly high (22,31%), while stunting children (short and very short category) was 4,54% (Figure 5). The normal height category was 77,69%.

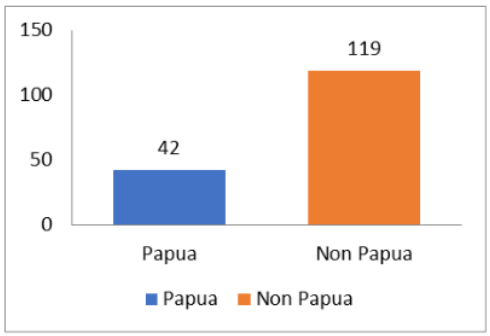


Figure 4. Comprison of Oransbari tribes based on Papuan and non-Papuan people

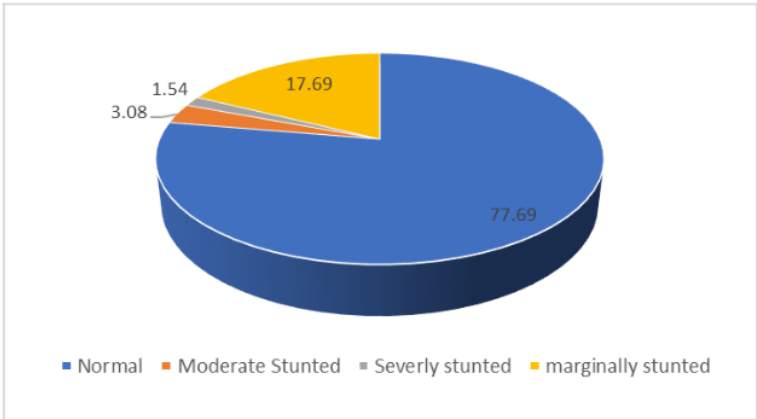


Figure 5. Percentage of nutritional status based on body height for age

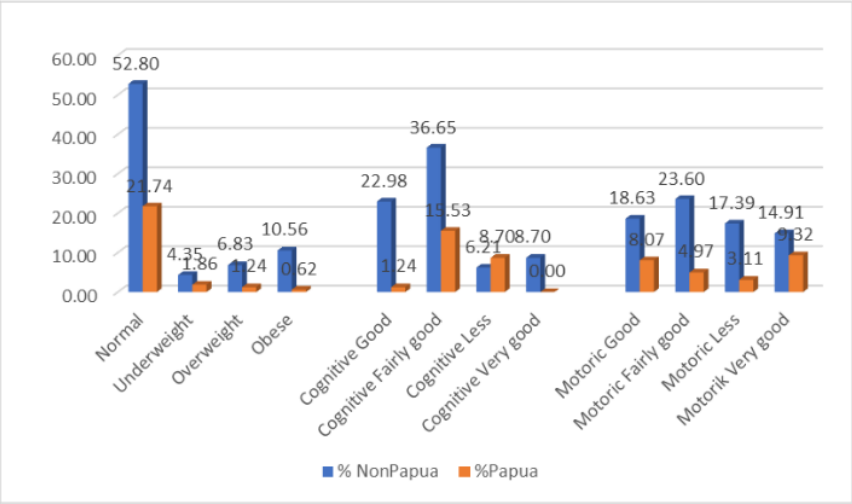


Figure 6. Percentage of nutritional status based on body mass index, cognitive ability and motoric skill of Papuan and nonPapuan children

Based on Figure 6, the comparison of nutritional status between Papuan and non-Papuan children were quite significantly different. There was a tendency for children from tribes outside Papua to have better nutrition than children from tribes in Papua. Likewise, underweight, overweight and obesity also showed quite high values in non-Papuan children. Obesity and overweight (19.2%) were found quite a lot in non-Papuan children compared to non-Papuans (1.8%). Excessive nutrition was found more often in girls (20 children) than boys (11 children).

Cognitive abilities in good and very good categories were also higher in non-Papuan children, however, cognitive abilities in the poor category were found to be higher in Papuan children (8.7%) than non-Papuan children (6.2%). Motor abilities for all categories also showed the same trend which higher levels found in non-Papuan children.

Based on Table 1, the number of children in the categories of well-nourished, overweight and obese who have good and very good cognitive abilities (51 children) were higher compared to the underweight nutritional category (2 children). Likewise with the motoric skills, the number of children who have nutritional status in the categories of good, overweight and obese (77 children) were higher than in the underweight category (5 children). This reveals that good nutrition is related to childrens's good cognitive and motor skills. However, the chi-square test showed that malnutrition category was not related to cognitive (p-value 0.41) and motoric skill (p-value 0.35). Likewise, obesity and underweight cases were also not associated with cognitive abilities (p-value 0.09 and 0.89) and motor skills (p-value 0.99). This means that underweight and obesity found in children in Oransbari were not affected their motoric and cognitive abilities (Table 1).

Table 1. Nutritional status, cognitive ability and motoric skill of children

Nutritional Status	Cognitive				Motoric				Total
	Less	Fairly good	Good	Very good	Less	Fairly good	Good	Very good	
Underweight	2	6	1	1	2	3	2	3	10
Normal	20	67	25	8	22	35	33	30	120
Overweight	1	4	6	2	6	3	3	1	13
Obese	1	7	7	3	3	5	5	5	18

Tabel 2. Association of nutritional status with cognitive ability and motor skill

Nutritional Status	Cognitive		*p-value*	Motorik		*Pvalue*
	Good	Less		Good	Less	
Malnutrition	37	4	0,41	30	11	0,35
Normal	100	20		98	22	

Nutritional Status	Cognitive				*p-value*	Motoric				*P.value*
	Less	Fairly good	Good	Very good		Less	Fairly good	Good	Very good	
Obesity	1	7	7	3	0,09	3	5	5	5	0,99
Normal	20	67	24	8		22	34	33	30	
Underweight	2	6	1	1	0,89	2	3	5	0	0,99
Normal	20	67	25	8		22	35	65	0	

DISCUSSION

Good cognitive abilities and motor skills in Oransbari childfren were related to good nutrition, although statistically, it were not showed a significant relationship, especially in cases of malnutrition. This research is in line with previous research which explained the relationship between nutritional status and cognitive and motor abilities (Subasinghe & Wijesinghe, 2017; Abdel-Rahman et al., 2017; Abidin and Yaco 2018; Muf seenin et al. 2018; Sulistyono et al., 2020). Lack of nutritional intake affects the brain's ability to think, concentrate and remember so this can have an impact on low learning achievement.

Several studies showed that malnutrition caused by nutritional intake, socio-economics, poverty and disease (Pelto & Pelto, 1989; Siddiqui et al., 2020; Scheffler & Hermanussen 2021; Ma et al., 2022). From an evolutionary perspective, the problem of small body size such as stunting is more related to body plasticity and growth strategies in facing environmental stress conditions (Pelto & Pelto, 1989; Walker et al 2006; (Walker & Hamilton, 2008). Small bodies are more efficient in regulating body metabolism and needed less energy for reproduction and survival

processes. This argument is in accordance with the "small but healthy" theory (Pelto & Pelto, 1989) which provides an understanding that small body size is not always related to health problems such as malnutrition, however, it is a natural condition as a product of the body's adaptive response to environmental conditions. Walker et al (2006) study revealed that several traditional populations living in tropical rainforest areas generally have a small and light body profile as an adaptation to forest conditions. These phenotypic characteristics make it easier to move when hunting or gathering food and are more efficient in allocating energy for metabolic needs and body functions.

We argue that the high incidence of short body size in Oransbari children may not be related to chronic malnutrition, but it was a natural response of the body to environmental conditions. Children in the short category showed that they had normal and over-normal nutritional categories based on body mass index for age. Only 3 short people were found whose nutritional status was under normal (underweight). Similar conditions were also found in Arfak children under 5 years old in Kwau Village, Arfak Mountains. The study showed that from 3 children who experienced stunting, there were 2 children in the obese category based on measurements of body weight for body height (Letfeuw, 2022). It was revealed that short body size does not always indicate malnutrition.

Malnutrition (underweight) among children in Oransbari were relatively few (6.21%), compared to elementary school children in rural areas of Sunamganj District, which was 45.76% (Nath et al. 2019); and 11.4% in Ethiopia (Yisak et al., 2021). There were 7 cases of underweight in non-Papuan children, while 3 cases in Papuan children. When compared with data on malnutrition (underweight) for children under five age old in South Manokwari of 18.6% (Kemenkes, 2022), the cases of underweight were still relatively low. This significant difference needs to be reevaluated by involving a larger sample size to get a comprehensive picture of the nutritional status of children in Papua.

Excess nutrition (overweight and obesity) found among children in Oransbari Village was relatively high, especially among non-Papuan. In general, in rural areas, cases of malnutrition-related to excess nutrition are rarely found due to limited resources such as food, socio-economics and infrastructure access. However, these condition was different with rural Oransbari.

Most of the people in the Oransbari area work as farmers, with incomes below the minimum wages. The dominant types of food they plant were rice, fruit and other horticultural crops (Kawulur et al, 2023). The Oransbari is also a producing area for rice production and horticultural crops such as vegetables and fruit which are distributed to urban Manokwari. This condition illustrates that community food security is sufficient to meet nutritional intake. The availability of sufficient food may cause excess nutrition in children to be found quite often in the Oransbari area. However, the majority of producer farmers come from the Javanese tribe, which is a transmigration community, while the majority of farmers from Papua are subsistence farmers. The relatively lower socio-economic level of the Papuan people in Oransbari may have implications for low cases of overweight and obesity in Papuan children but has an impact on lower cognitive abilities. In addition, high physical activity as a subsistence farmer causes fat reserves to decrease because energy intake is smaller than energy expenditure (Stinson, 2012).

CONCLUSION AND SUGGESTION

Undernutrition (underweight) among children in Oransbari was relatively fewer than excess nutrition (overweight and obesity). Good cognitive abilities and motor skills of children in Oransbari were related to good nutrition, although statistically, it was not showed a significant relationship, especially in cases of malnutrition. The high incidence of short body size in children in Oransbari may not be related to chronic malnutrition but it was a natural response of the body to environmental conditions. Excessive nutrition of Oransbari children was need attention because they are potentially linked to degenerative diseases in the future.

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