

HOUSEHOLD DIETARY DIVERSITY AND NUTRITIONAL STATUS AMONG PRESCHOOL CHILDREN IN EARLY CHILDHOOD INSTITUTIONS

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ABSTRACT

Background: Nutrition problems in preschool children (underweight, stunted, overweight) are a concern in Indonesia. Household dietary diversity may impact family food intake, especially for children under five years. Low dietary diversity is associated with an increased likelihood of double-burden malnutrition. **Objective:** This study aimed to determine the relationship between household dietary diversity and the nutritional status of preschool children in Allifa's Early Childhood Institution. **Method:** This research was an observational study with a cross-sectional design. The sampling method was purposive sampling in 85 families with preschool children. Household dietary diversity was measured by the Household Dietary Diversity Questionnaire (HDDS). Several indices including weight for age Z-score (WAZ), height for age Z-score (HAZ), and BMI for age Z-score (BAZ) were used to calculate the nutritional status of preschool children. Family characteristics were measured by interview using a structured questionnaire, which included age, education level, occupation of the head of household, and number of family members. Data were analyzed using Fisher's exact test. Subjects were 54.1% female and 45.9% male. The mean age of preschool children was 59,13±14,97 months. **Results:** Most of the children were 4 years old. The proportion of underweight preschoolers was 5.9%, stunted 12.9%, and overweight 15.3%. The median HDDS score was 10.82±1.356. Most subjects had a high household dietary diversity status (92.9%). Household dietary diversity status was not significantly associated with underweight ($p=0.657$; 95% CI=0.049-4.357), stunted ($p=0.318$; 95% CI=0.078-1.923), and overweight ($p=0.756$; 95% CI=0.369-4.234) incidence. **Conclusion:** household dietary diversity is not associated with nutritional problems in preschool children.

Keywords: Household Dietary Diversity, Nutritional Status, Preschool Children

INTRODUCTION

One of the most prevalent health issues facing developing countries like Indonesia is the double burden of malnutrition, where a region experiences both undernutrition and overnutrition at the same time. This issue can manifest in individuals, families, or entire populations and is prevalent across all ages, ranging from infants to preschoolers, school-age children, adolescents, and adults (Barth, 2020; Sekiyama, 2015). The Indonesian Nutrition Status Survey 2022 (SSGI) revealed the presence of various nutritional problems among infants and young children in Indonesia, including underweight (17.1%), wasting (7.1%), stunting (21.6%), and overweight (3.5%). Notably, there appears to be a high prevalence of multiple nutritional challenges in PAUD facilities throughout the country. The nutritional situation in the Yogyakarta Special Region mirrors that of the country. Sleman Regency, located in Yogyakarta Province, ranks third among regencies with multiple nutritional challenges among children under five age. The prevalence rates of stunting, wasting, underweight, and overweight are 15%, 6.4%, 12.3%, and 3.4%, respectively (Kementerian Kesehatan 2022).

The occurrence of a double burden malnutrition in preschool children negatively affects their health because growth and development during the first five years of life can have consequences for adult health. Inadequate management of nutritional problems among young children can increase the risk of adult obesity, diabetes, and heart disease (Ardianti, 2021). The double burden of malnutrition in children under five years of age can be caused by several

factors, including: a) lack of parental knowledge about managing children's health and nutrition, especially related to breastfeeding and complementary foods, b) limited access to healthy and nutritious foods which will have an impact on food diversity in individuals or families, c) unbalanced eating habits, d) suboptimal monitoring of health and nutritional status by parents, health workers or cadres, and so on (Ardianti et al., 2021; Barth-Jaeggi et al., 2020; Sekiyama et al., 2015).

Family is one of the environments that influence the growth of child development. Dietary diversity is an indicator of food security that influences the incidence of malnutrition and has a relationship with anthropometric values in children (Steyn et al., 2005; Mumtaza, 2024). Food security in the homes of children aged 12-59 months in Pandeglang, West Java is significantly associated with anthropometric indices of WAZ, HAZ, and WHZ. Household food insecurity, which can have a negative impact on the nutritional status of children under the age of five, particularly in terms of the diversity of their diet (Suryana et al., 2023). Household food availability affects the fulfillment of food intake of young children, which supports the nutritional status of young children (Maulida et al., 2023).

Dietary diversity may serve as a proxy for the incidence of undernutrition in children under 5 years old (Harper et al., 2022). A greater dietary diversity was found to be correlated with decreased risk of childhood stunting in East Java, Indonesia (Mahmudiono et al., 2017). Research in Sub-Saharan Africa indicates a correlation between dietary diversity in families and the prevalence

of stunting, wasting, and undernutrition in children aged 6-23 months (Aboagye et al., 2021). A study in Pandeglang, West Java, showed that the dietary diversity of children aged between 12 and 59 months was significantly associated with the anthropometric indicators of WAZ and WHZ (Maulida et al., 2023). Similarly, Prasetyo et al. (Prasetyo et al., 2023) found a significant correlation between the dietary diversity of young children aged 2-5 years in Semarang District with the values of HAZ, WAZ, and WHZ. Most previous studies related individual food diversity with nutritional status. However, it is still rare to see the relationship between household food diversity and nutritional status of preschool living in it.

Early intervention and treatment of multiple nutrition issues are crucial. Involving Early Childhood Institutions may be a viable strategy to prevent multiple nutritional problems in preschool children, given their crucial role in providing education and healthcare to young children. Integrated Early Childhood Institutions of Allifa (PAUD Allifa) is an institution offering early childhood education in Sleman Regency, operating under the Ministry of Religious Affairs. It is accredited with decree number 202/BAN PAUD and PNF/AKR/2019. PAUD Allifa focuses on providing education to children below seven years of age (RA Allifa, 2021).

Preliminary studies conducted at PAUD Allifa showed a double burden of malnutrition. Out of 10 toddlers, two toddlers are underweight, and two toddlers with overweight. In addition, some toddlers were still found to be stunted. PAUD Allifa also conducts routine food and simple

health checks for students. In addition, PAUD Allifa also organizes regular parental meetings (parenting day) to enrich the knowledge of parents regarding matters that affect children's growth and development. Based on this background, it is interesting to study household dietary diversity and nutritional status in order to identify risk factors for double-burden malnutrition. The purpose of this study was to analyze the description of household dietary diversity and the incidence of double-burden malnutrition in preschoolers, and the relationship between household food diversity and malnutrition at Allifa's Early Childhood Institutions.

METHOD

This research was an observational study with a cross-sectional design. This study examines the relationship between household dietary diversity and the prevention of double-burden malnutrition among preschoolers at the same time. The research location was PAUD Allifa which is one of the assisted locations of the Nursing Department, Universitas Respati Yogyakarta. In addition, based on the results of the measurement of nutritional status in the last year, there are still multiple nutritional problems (underweight, stunting, and overweight) in the school. The study was conducted for 10 months from March to December 2023.

The target population was families with preschool children residing in Yogyakarta Province. The target population was the families of preschool children who attended PAUD Allifa, which amounted to 145 people. The inclusion criteria were preschool-aged children, parents willing to be research respondents as evidenced by parental consent, and

parents living under the same roof with their children. Exclusion criteria were preschoolers with a history of metabolic diseases that affect growth and experiencing illness (such as diarrhea) in the past week that could cause drastic weight loss. Respondents were mothers or heads of households who were responsible for the process of providing meals at home.

The sample size was calculated using the proportion difference formula for the incidence of stunting, underweight, and overweight in preschool children and obtained a minimum sample size of 31 people. (Dahlan, 2010). The sampling method was purposive sampling in 85 families with preschool children. Household dietary diversity was measured by the Household Dietary Diversity Questionnaire (HDDS). The HDDS uses 12 food groups as used by FAO (Swindale & Bilinsky, 2006) and several previous studies conducted in East Java Province, Indonesia (Mahmudiono et al., 2017; Wirawan & Rahmawati, 2016). The food groups used included cereals; tubers and roots; vegetables; fruits; meat; eggs; fish and other seafood; legumes, nuts, and seeds; milk and dairy products; sweets; and condiments and beverages. The vegetable group was derived from green leafy vegetables, vitamin A-rich vegetables, and other vegetables. The fruits group was assessed from the consumption of vitamin A-rich fruits and other fruits. The meat group was assessed from the consumption of food sources of beef and poultry. During data collection, respondents were asked about family members' consumption of 12 food groups in the past 24 hours. The presence or absence of food items consumed by family members in the past 24 hours was used to complete the HDDS questionnaire. If a family

member consumed food from one of the food groups, a score of 1 was assigned, and a score of 0 if the food group was not consumed by the family member in the last 24 hours. The household dietary diversity score ranged from 0-12. Then the total score of household food diversity was categorized into three groups, namely low food diversity (score ≤ 5), medium food diversity (score 6-8), and high food diversity (score ≥ 9) (Kolliesuah et al., 2023). Collecting dietary diversity data on 85 households with preschool children using a trained enumerator-administered HDDS questionnaire.

The nutritional status of young children was assessed using several indicators: WAZ, HAZ, and BAZ. We measured weight with a digital scale accurate to 0.1 kg and height with a microtoice with an accuracy of 0.1 cm. Both tools were calibrated by the Yogyakarta Metrology Agency. The calculation of children's nutritional status used the WHO Anthro and AnthroPlus programs (World Health Organization, 2023b, 2023a). Nutritional status based on WAZ was divided into underweight ($< -2SD$) and normal/overweight ($\geq -2SD$); based on HAZ was divided into stunted ($< -2SD$) and normal ($\geq -2SD$); and based on BAZ was divided into normal ($\leq +1SD$) and overweight ($> +1SD$) (Kementerian Kesehatan RI, 2020).

Family characteristics measured by interview using a structured questionnaire included age, education level and occupation of the head of household, and number of family members. Household food diversity data, family characteristics data, and nutritional status data were collected simultaneously at the parenting day event.

Data analysis used a statistical analysis program. Data on family characteristics were analyzed descriptively. Fisher's exact test was used to analyze the relationship

RESULTS AND DISCUSSION

The data on family characteristics indicates that the majority of family heads are aged between 25 and 35 (57.6%). Around 53% of family heads have completed university education. A higher level of education among family heads correlates with greater food diversity for their family members. Additionally, over half of the family heads are employed in the public or private sector (53.4%). Most families consist of four or fewer members living in the same household (62.4%) (Mahmudiono *et al.*, 2017). Approximately 58% of households have only one working member (Table 1).

The study examined 85 children who attended PAUD Allifa. Of this group, 54.1% were female and 45.9% were male. The children were aged between 1 and 7 years, with an average age of 59.13 ± 14.97 months. Most of the children were 4 years old (34.1%), followed by 6 years old (24.7%) and 5 years old (15.3%). On average, the children weighed 17.42 ± 4.42 kg and were 105.66 ± 9.97 cm tall.

The average score on the Household Dietary Diversity Score (HDDS) scale was 10.82 ± 1.35 , which is higher than the score found in previous research on family food diversity conducted in Indonesia (median: 9; min-max: 8-10) (Wirawan & Rahmawati, 2016). According to Table 3, 92.9% of families had high

between household dietary diversity and children's nutritional status. All data analysis results were considered significant if the p-value was less than 0.05 (Dahlan, 2017).

dietary diversity, while only 7.1% had medium dietary diversity, and no families had low dietary diversity. However, despite the high food diversity found in most families, the types of food offered to children were relatively limited in diversity, especially regarding vegetables and fruits. The preschool children are provided with a limited variety of vegetables including carrots, green spinach, tomatoes, and broccoli, while fruits such as papaya, oranges, and bananas are also limited. Parents rarely introduce other types of vegetables and fruits to their children. Chicken and its preparations including nuggets, sausages, and meatballs are the only meat group given to children. However, it is necessary to limit the intake of these preparations as they contain high amounts of sodium, which is not suitable for the growing years of children.

The majority of households consume staple foods (98.83%), vegetables (98.82%), fruits (96.47%), sugar (96.47%), condiments and beverages (96.47%), milk and processed products (95.29%), oil (94.12%), eggs (91.76%), and meat (90.58%). However, only 84.71% and 75.29% of households consume legumes and tubers, respectively. The least consumed food group by households is fish and seafood, with only 63.53% of households consuming it in the last 24 hours (refer to Figure 1).

White rice is the main staple food for most households, and most dishes are prepared through frying or stir-frying. Sweet tea is consumed almost daily by family members, and children are primarily given UHT milk or packaged milk containing added sugar as their dairy source. This is a matter of concern as it can lead to high energy and fat intake, increasing the risk of obesity among family members. The introduction of fish products to preschool children requires improvement, as salted fish is the primary source of fish intake and parents mainly consume it instead of their children, according to the study findings.

The results of this study are in line with research on preschool children in Poland, Timor Leste, and Ethiopia which show that the consumption of preschool children is not balanced, such as the consumption of monotonous staple foods (white rice), limited consumption of animal protein (most commonly consumed from eggs and chicken), infrequent consumption of vegetables and fruits, and consumption of ultra-processed foods (highly processed fatty and salty snacks, sausages, nuggets) (Bonis-Profumo *et al.*, 2021; Keyata *et al.*, 2022; Orkusz, 2022). We know that these food groups are rich in protein, vitamins and minerals. They are essential for optimizing growth and development in preschool children.

The results from the nutritional status measurement in the research location showed that 5.9% of preschool children were underweight, 12.9% were stunted, and 15.3% were overweight (Figure 2). Among 3-5-year-olds, 2.4% were underweight, 9.5% were stunted, and 10.5% were overweight, indicating a dual burden of malnutrition. These findings are

important as the 3-5 years age range is critical for a child's growth and development into adulthood. Children who are overweight before the age of 5 are at a higher risk of obesity in adulthood and are more likely to develop non-communicable diseases later in life (Koyama *et al.*, 2014; Ohlsson *et al.*, 2012; Reilly *et al.*, 2005).

The analysis results of the relationship between household dietary diversity and the nutritional status of preschool children are presented in Table 3. The study found no significant association between household dietary diversity and underweight ($p=0.657$; 95% CI=0.049-4.357), stunting ($p=0.318$; 95% CI=0.078-1.923), and overweight ($p=0.756$; 95% CI=0.369-4.234) (Table 4).

The research findings show that there is no connection between household dietary diversity and the occurrence of stunting and underweight in children, which aligns with previous studies involving families with young children (Wirawan & Rahmawati, 2016). However, this contradicts the results of a study conducted in Tanzania involving children aged 6 to 23 months (Khamis *et al.*, 2019). The research indicates that most families with high dietary diversity have children with normal nutritional status, as indicated by the measured BAZ, WAZ, and HAZ. Previous studies suggest that families with good dietary diversity can predict good dietary quality in children, thus contributing to sufficient nutrient intake and good nutritional status (Bandoh & Kenu, 2017).

The relationship between household dietary diversity and the nutritional status of preschool children is complex and influenced by many factors, such as food quality, economic

and social status, household food security, feeding practices (meal preparation, parental feeding style) (Bwalya et al., 2023; Hussein et al., 2018; Roba et al., 2024). The diversity of the family diet does not guarantee that it is rich in essential nutrients for preschool children. The diet may be diverse in terms of food groups. However, it may lack essential vitamins and minerals for children's growth and development. This can be

seen in the low intake of animal-based foods and fruits and vegetables among those studied. The Indian study noted that despite dietary diversity, many children had inadequate intake of essential nutrients, resulting in poor nutrition (Nithya & Bhavani, 2018).

Table 1. Distribution characteristics of respondent and sample

Characteristics	Frequency	Percentage (%)
Sex of child		
Male	39	45.9
Female	46	54.1
Age of child		
1 year	1	1.2
2 years	6	7.1
3 years	12	14.1
4 years	29	34.1
5 years	13	15.3
6 years	21	24.7
7 years	3	3.5
Age of Household Head		
25-35 years	49	57.6
36-45 years	32	37.7
46-55 years	3	3.5
56-65 years	1	1.2
Education of Household Head		
Primary School	3	3.5
Secondary school	32	37.6
Diploma (D3/D4)	5	5.9
Degree (S1/S2/S3)	45	53.0
Family Size		
Small (≤ 4 person)	53	62.4
Medium (5-6 person)	25	29.4
Large (≥ 7 person)	7	8.2
Occupation of Household Head		
Educated/Profesional	7	8.0
Self-employed	22	25.0
Public/Private Employes	47	53.4
Manual Workers (laborer, driver, etc)	1	1.1
Not working/Housewife	5	5.7
Other	3	3.4
Number of Income earner in household		
1 source	50	58.8
2 sources	35	41.2
Total	85	100

Table 2. Household Dietary Diversity of sample

	Frequency	Percentage (%)
Household Dietary Diversity		
Low	0	0.0
Medium	6	7.1
High	79	92.9
Total	85	100.0

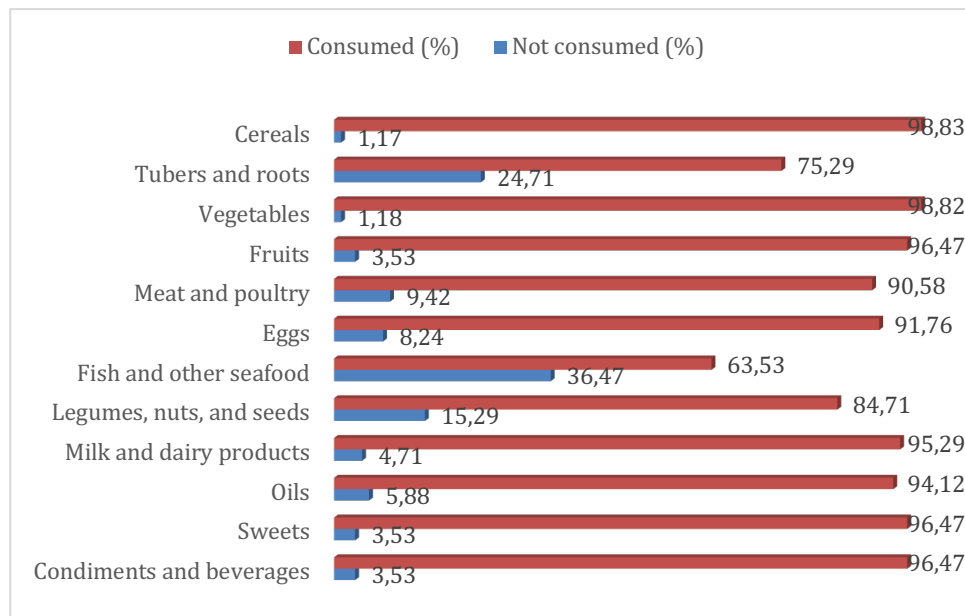


Figure 1. Proportion of Household diversity consumption by food groups (%)

Table 3. Nutritional Status of Children

Nutrition Status Index	Total	
	n	%
Weight for Age Z-score (WAZ)		
Underweight	5	5.9
Normal/Risk of Overweight	80	94.1
Height for Age Z-score (HAZ)		
Stunted	11	12.9
Normal	74	87.1
Body Mass Index for Age Z-score (BAZ)		
Normal	72	84.7
Overweight	13	15.3
Total	85	100

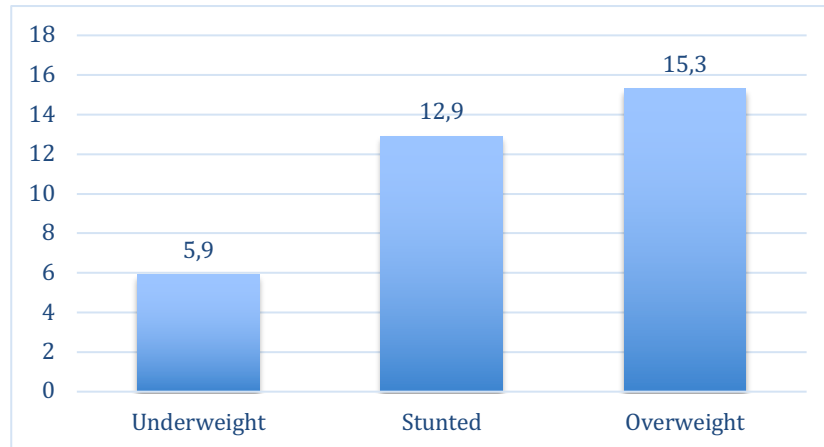


Figure 2. Proportion of malnutrition among preschoolers

Table 4. Association between household dietary diversity and nutritional status among preschoolers

		Underweight	Normal/ Overweight	p- value	CI 95%
Household dietary diversity	Low diversity	1	28	0.657	0.049-4.357
	High diversity	4	52		
		Stunted	Normal	p-value	CI 95%
Household dietary diversity	Low diversity	2	27	0.318	0.076-1.923
	High diversity	9	47		
		Overweight	Normal	p-value	CI 95%
Household dietary diversity	Low diversity	5	24	0.756	0.369-4.234
	High diversity	8	48		

CONCLUSIONS AND SUGGESTIONS

Household dietary diversity is not associated with nutritional problems (underweight, stunted, overweight) among PAUD Allifa preschoolers. However, regular nutritional status measurements and education on providing diverse meals for children are necessary in schools.

THANK-YOU NOTE

The researchers would like to thank the Research and Community Service Institute (LPPM) of Universitas Respati Yogyakarta, which provided funding through an

internal research grant for 2023. The researchers would also like to thank Mrs Sumirah the school principal for her support and permission for this research, as well as the enumerators who helped in the research data collection.

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