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Indirect Determinants Analysis of the Protein Intake Status of Stunted Under-Five Children at the Kedundung Health Service, Mojokerto City, Indonesia

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Abstract

The highest prevalence of stunted in the Kedundung Health Center working area in Mojokerto City exceeds the Stunting Prevalence Threshold. Stunted is influenced by the adequacy status of nutritional intake consumed by children, especially the level of protein nutrition intake. Both indirect and direct factors influence protein intake status. This research aims to identify indirect factors using quantitative cross-sectional method. This research used secondary data on stunted under-five children at the Kedundung Health Center, with more than 48 under-five children. The sampling technique used is nonprobability-purposive sampling, which then eliminates missing data through technical data analysis using the Chi-square correlation test. The results obtained for the five independent variables studied, the variable family income level, the father's education and the mother's education, have a significant relationship. The father's employment status variable can not be concluded. The father's employment status in the literature is related to protein intake through the father's role in regulating the low protein intake of under-five children. The mother's employment status variable has no significant relationship with the intake status of under-five children. Mothers do not have sufficient knowledge and skills to regulate under-five children's intake patterns, including prioritizing food spending and controlling the adequacy of protein intake. The implications of this study show that the family's economic conditions and the parent's knowledge affect the protein intake status of under-five children; also, regional financial stability impacts the family economy.

Keywords: family income; food intake; malnutrition; parent's education; parent's occupation

INTRODUCTION

Cases of stunting in Indonesia are still a national problem. Stunting indicates chronic nutritional deficits that cause failure to thrive and develop in children under-five years of age caused by malnutrition, recurrent infections and inadequate psychosocial support. Meanwhile, Widaryanti (2019) describes stunted as a potential factor causing stunting, characterized by length faltering or decreasing the height index relative to age. Stunted is one of the conditions that can encourage children to experience stunting if stunted status and problems are not resolved immediately. Stunted is reversible or can be cured by suitable nutrition measures and interventions accompanied by history management (Katmawanti et al., 2022).

According to the Indonesian Nutritional Status Survey (SSGI), in 2021, the prevalence of stunting cases in Indonesia will reach 21.6% (Ministry of Health, 2022). This figure is relatively high based on the reference limit value set by the World Health Organization (WHO). The maximum prevalence value for a region is 2.5%. In Mojokerto City in 2022, based on

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the electronic report of community-based nutrition recording and reporting (E-PPGBM), the prevalence of stunting reached 4.08%. It became the region with the lowest stunting in East Java in 2021. Apart from this achievement, most stunting per working area of the public health center reached inequality. Based on the E-PPGBM data report for the working area of the Kedundung Health Center, it has the highest prevalence of 4.8%. According to the Stunting Prevalence Thresholds, it describes the condition in the moderate category, while the maximum majority is 2.5% (de Onis et al., 2019).

Jeong et al. (2018) stated that direct and indirect factors caused the risk factors or determinants of stunted. Indirect factors include at-risk gestational age, history of chronic energy deficiency in pregnancy, low parental education, low family income, parental employment status, number of families, and sanitation. Direct factors include macronutrient, micronutrient and mineral intake, low birth weight (LBW), prematurity, and a history of infectious diseases (Lemaking et al., 2022). Millward (2017) states that the distal determinant is a lack of macronutrient intake leading to stunted children. Protein is a macronutrient with a vital function for child growth. Kurniawan et al. (2022) proved that the causes of LBW, prematurity and disease infections could be prevented if the nutritional intake of under-five children was good. Nilasari and Iskandar (2021) stated that proteins function to produce insulin-like growth factor 1 (IGF-1) or somatomedin C through amino acids. IGF-1 carries out the proliferation and differentiation of chondrocytes in the growth epiphyseal plate and activates 25 hydroxy-vitamin D3 to turn into 1.25 dihydroxy-vitamin D3, which helps the absorption of calcium and potassium in the intestine for bone growth (Sari et al., 2016).

Based on previous studies, several determinant factors causing stunted indirectly have a significant relationship to protein intake deficits in under-five children. In addition, a study conducted by Qodrina (2021) states that the tendency to determine stunting in children is caused by socioeconomic level, parental education level, and parental employment status. Susanti et al. (2018) stated that parents with low economic and educational levels and working status for mothers pose a significant risk related to fulfilling child nutrition. This condition is closely related to the provision of optimal nutritional intake for children. Based on stunted observation data at the Kedundung Health Center, the highest nutritional deficiency occurred in protein intake, which was 60.4%. Factors that influence nutritional information are the father's education (RR 1.6), the mother's education (RR 2.6) (Jeong et al., 2018), the father's employment status (RR 4.43) (Lemaking et al., 2022), the mother's employment status (OR 2.18) (Maynarti, 2021) and the parents' income level (OR 3.182) (Lestari et al., 2022).

As the region with the highest prevalence in Mojokerto City, the community and health agencies need to show determinants that are closely causalities of the lack of protein nutrition intake, which has an impact on stunted nutritional status in under-five children so that interventions can be carried out with optimal management of nutrition for these children. So far, the government has made various efforts to improve under-five children's nutrition by holding a particular catering program. Still, the program's results have yet to improve nutritional status continuously, so it is necessary to disclose facts that occur in the field. The absence of similar studies that have been conducted has prompted researchers to uncover the problem of solid determinants of under-five children's nutrition. This study examines the indirect determinant factors influencing under-five children's protein intake in the Kedundung Health Center, Mojokerto City.

MATERIALS AND METHOD

This study used an analytic observational method using a cross-sectional study based on secondary data obtained from observational data on the determinant of stunted in 2022 conducted by the Department Health, Population Control and Family Planning of Mojokerto City, Indonesia. The samples included in this study were children aged 6 to 59 months from stunted children in the Kedundung Health Center working area. The inclusion criteria for this study are children who live within the working area of the Kedundung Health Center and under-five children experiencing stuntedness as of May 2022, recorded in the E-PPGBM. The exclusion criteria for this study were under-five children with chronic tuberculosis (TBC), under-five children with incomplete observation data, under-five children who were still in exclusive breastfeeding,

and children who were over 59 months and under 6 months old. The sampling technique used is nonprobability-purposive sampling, which then eliminates missing data. After going through the data selection and data sorting, the samples included in this research were 48 under-five children (Figure 1).

The dependent variables are the category of the adequacy of protein intake in under-five children. In contrast, the factors studied as independent variables include the parents' income level, father's education level, mother's education level, the father's employment status, and the mother's employment status. Data collection in this study used secondary data sources from the Department of Health, Population Control, and Family Planning of Mojokerto City. Collecting data through interview methods and direct measurement observations. Observational sample data were obtained from monthly E-PPGBM reports on under-five children who experienced growth faltering and stunted nutritional status. Data obtained from interviews resulted from observational data on the determinant of stunting in 2022 included family characteristics (questionnaire code KK1-KK10), the identity of under-five children (questionnaire code IB1-IB4), exclusive breastfeeding (questionnaire code AE1-AE2), health services (questionnaire code PK1-PK6), environmental sanitation (questionnaire code SL1-SL2), birth history (questionnaire code RK1-RK2), infectious diseases (questionnaire code PI1-PI2) and food frequency questionnaire (FFQ questionnaire). The data analysis used in this study was carried out in two stages: univariate analysis and bivariate analysis. The univariate analysis described the prevalence distribution of the dependent and independent variable data presented in tabular form, bivariate analysis using the Chi-square test. Univariate and bivariate analyses were performed using the Statistical Program for Social Science (SPSS) software version 19.0. Procedures to ensure research safety and validity, this research has been ethically qualified by the Health Research Ethics Commission (HREC) Faculty of Dentistry, Universitas Airlangga, with proof of certificate number 361/HRECC.FODM/IV/2023.

RESULTS AND DISCUSSION

Based on the data processing of sample inclusion and exclusion criteria, it was found that the sample size obtained was 48 under-five children. Protein adequacy status is assessed if an under-five child's protein intake exceeds 80% of the nutritional adequacy rate according to their age, then the level is sufficient or adequate. If the protein intake of a under-five children is < 80% of the nutritional adequacy rate according to his age, then the status is lacking or inadequate (Tsai et al., 2022). The city minimum wage (UMK) is based on Governor Regulation of East Java number 188/803/KPTS/013/2021 Concerning District/City Minimum Wages in East Java for 2022, which states the minimum

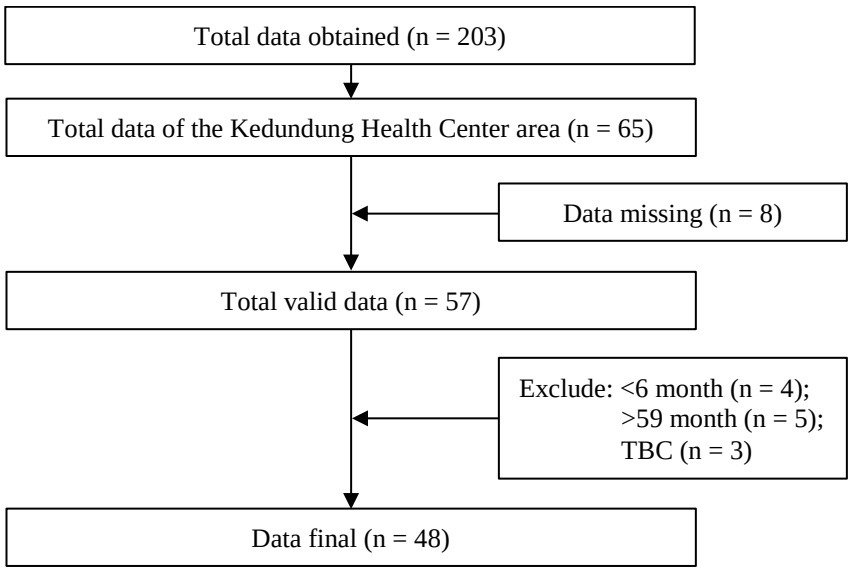

Figure 1. Data selection process

wage for the city of Mojokerto in 2022 is 2,510,452.36 IDR. Table 1 is prevalence distribution or sample frequency obtained.

Based on Table 1, the distribution of protein intake status by 29 under-five children (60.4%) experienced a deficit or lack of protein intake, while as many as 19 under-five children (39.6%) had sufficient protein intake status. Univariate analysis of mothers' education shows that most mothers have > 9 years of schooling, which can be assumed to indicate that the mother's education is relatively reasonable and that they have good parenting knowledge (Amoah and Asamoah, 2022). Categorization of educational levels based on the obligation to study for Indonesian citizens for nine years or at least Junior High School or Islamic Junior High School or equivalent level (Jeong et al., 2018). The distribution characteristics of under-five children with working fathers are 48 children (100%), while under-five children with non-working fathers is 0 (0%). Fathers with working levels indicate an excellent income to strengthen the economy and increase the food purchasing power in sufficient and suitable quantity and quality (Mecheva et al., 2021). The characteristics of the distribution of under-five children with working mothers are 8 children (16.7%). In comparison, the distribution of under-five children with non-working mothers is 40 children (83.3%). Housewives assume that they have free time with their children so that they can control their children's nutritional intake properly (Fooken and Vo, 2021).

Table 2 shows that under-five children with family income below the minimum wage with protein intake status dominate as many as 19 out of 48 children (39.5%). The results of the Chi-square correlation test showed that the P-value is more significant than 0.05, so it is solid to reject H0 so that H1 can be accepted. There is a significant relationship between family income and the status of protein intake for under-five children. Based on the analysis of risk estimation, the prevalence ratio value was 7.125 (CI 1.861-27.284), which means that under-five children in the Kedundung Health Center with family income below the minimum wage tend 7.15 times to experience a lack of protein intake compared to under-five children with family income in on MSEs. In addition, only 10 out of 48 under-five children (20.8%) experienced a status of low protein intake with a family income above the minimum wage.

This research appropriate by Sindar et al. (2019) stated that sufficient family income would increase the opportunity to purchase food both in quantity and good quality, family income which had a less significant effect on the nutritional intake and nutritional status of under-five children. On the other hand, Langi et al. (2019) stated that families with sufficient income related to spending on under-five children's food needs do not guarantee the variety or diversity of food consumed by children. The expenditure pattern on buying food or groceries depends on the priority pattern of financial spending. The need for housing and cigarettes causes most household expenses. On the other hand, families with low incomes purchasing food decisions look more at the economic side (Afifah, 2019). The inflation factor in food prices also affects the purchasing power of people with moderate and low incomes. Based on data from the Gini index for the City of Mojokerto in 2021, it is stated that most residents with low and middle incomes from 2021 to 2022 have experienced a shift in the proportion of food expenditure to non-food expenditure (Department

Table 1. Univariate analysis and respondent characteristics

Variable	Frequency	
	n	%
Protein intake status		
Inadequate	29	60.4
Adequate	19	39.6
Family income		
< Minimum wage	23	47.9
> Minimum wage	25	52.1
Father's education		
< 9 years	11	22.9
> 9 years	37	77.1
Mother's education		
< 9 years	11	22.9
> 9 years	37	77.1
Father's occupational status		
Working	48	100.0
Jobless		0.0
Mother's occupational status		
Working	8	16.7
Housewife	40	83.8

of Communication and Informatics of Mojokerto City, 2022).

Under-five children with a father's education > 9 years and a high protein intake status dominate as many as 19 out of 48 children (39.5%). The Fisher's Exact test correlation results show that the P-value is more significant than 0.05, so it has the strength to reject H0, then H1 can be accepted. There is a significant relationship between the educational duration of the father and the status of the under-five children's protein intake. Based on the analysis of risk estimation, the prevalence ratio was 9.474 (CI 1.099-81.684), which means that under-five children at the Kedundung Health Center with father's education < 9 years tend 9.47 times to experience a lack of protein intake compared to under-five children whose father's education status is > 9 years.

In line with the research of Jeong et al. (2018), the relationship between the educational duration of fathers and the incidence of stunting in low-income areas is significantly related to fathers with an academic period < 9 years with a risk ratio (RR) value of 1.6 times higher. The higher the education level, the more parents are assumed to have good knowledge to understand a healthy lifestyle by applying a balanced nutritional consumption pattern. The role of fathers with an understanding of good nutrition can be a positive value and direct families to fulfill under-five children's nutrition (Rachman et al., 2021). For most, fathers of under-five children, if they have sufficient education, will often be exposed to information about nutrition and children's health. With good habituation and knowledge, fathers can apply and control the nutritional intake of under-five children so that there are no dietary deficits and the child's nutritional status improves (Martin et al., 2020).

Under-five children with a mother's education duration of > 9 years with protein intake status dominate as many as 19 out of 48 children (39.5%). The Fisher's Exact test correlation results that the P-value is more significant than 0.05, so it has the strength to reject H0, then H1 can be accepted. There is a significant relationship between the educational duration of the mother and the status of the under-five children's protein intake. Based on the analysis of risk estimation, the prevalence ratio value was 2.056 (CI 1.476-2.862), which means that under-five children at the Kedundung Health Center with a mother's education < 9 years tend 2.06 times to experience a lack of protein intake compared to under-five children whose mother's education status is > 9 years.

In line with the research of Jeong et al. (2018), the relationship between a mother's education duration and the incidence of stunting in low-income areas is significantly related to mothers with an education duration < 9 years with a risk ratio value of 2.6 times riskier, while the education duration of mothers > 9 years has a significant deal with a risk ratio value of only two times more dangerous (McGowan et al., 2022). In addition, mothers have an essential role

Table 2. Results of bivariate analysis of family income level with protein intake status

Variable	Protein status intake				OR (95% CI)	P-value
	Deficient	%	Adequate	%		
Family income						
< Minimum wage	19	82.6	4	17.4	7.125	0.007[a]
> Minimum wage	10	40.0	15	60.0	(1.861-27.284)	
Father's education						
< 9 years	10	90.9	1	9.1	9.474	0.032[b]
> 9 years	19	51.4	18	48.6	(1.099-81.684)	
Mother education						
< 9 years	11	100.0	0	0.0	2.056	0.002[b]
> 9 years	18	48.6	19	51.4	(1.476-2.862)	
Father's occupational status						
Jobless	0	0.0	0	0.0	-	-
Working	29	60.4	19	39.6		
Mother occupational status						
Working	7	87.5	1	12.0	0.175	0.123[b]
Housewife	22	55.0	18	45.0	(0.20-1.554)	

Note: a = use Continuity Correlation test; b = use Fisher's Exact test

in regulating intake patterns in the family, especially under-five children. Low mothers' knowledge can affect the variety of food given. Most under-five children, as their bodies develop and grow, cannot respond quickly to the intake they need and only provide food with static nutritional intake values that have the potential to hinder children's growth (Khaeriyah et al., 2020). Pusparina and Suciati (2020) confirm that under-five children born to mothers with low education have a higher mortality rate caused by a lack of nutritional intake due to the limited and insufficient amount of food consumed and not meeting the nutrition needed by under-five children. The results of the analysis above are corroborated by the research of Kurniawati and Ardiansyah (2022), which states that there are significant results between higher education background (> 9 years) and mothers understanding regarding the management of local food-based menus to prevent stunting in Mojokerto City.

Under-five children with the employment status of working fathers with protein intake status dominate as many as 48 out of 48 under-five children (100%). The results of the Chi-square correlation test with a significance value of < 0.05 cannot show results because all stunted under-five children fathers are working (homogeneous), and the father's employment status variable cannot be determined to reject or accept each hypothesis (H0 and H1). Based on field observations, even though all fathers of stunted under-five children work, some fathers have low incomes (Table 1), which affects purchasing power and access to food (Table 2).

Based on the results of these frequency data, contrary to research conducted by Karlsson et al. (2019), the relationship between the father's employment status and stunting cases has a significant P-value of 0.003 < 0.05, under-five children with non-working fathers have a 4.04 risk of experiencing stunting. On the other hand, Safitri (2021), in his literature review, stated that the father's work influences the nutritional status of under-five children. Philippe et al. (2021) analyzed that even though father's work hard, low-income-triggers, an under-five child's protein intake is not fulfilled and has the potential to experience stunting. Based on data from the Gini index for the City of Mojokerto in 2021 stated that the service sector experienced an economic contraction of 14.5% and the trade and repair sector experienced an economic contraction of 9.20%, while the work sector was the dominant sector carried out by fathers. This condition is not in line with the total family expenditure, even though the whole family expenditure continues to increase from 2018 to 2021 (Nurmaliza and Herlina, 2018).

Under-five children with the status of working mothers with protein intake status dominate as many as 22 out of 48 children (45.8%). The Fishers' Exact test correlation results that the P-value shows that it is < 0.05, so it does not have the strength to reject H1, then H0 is acceptable. No significant correlation is demonstrated between the mother's employment status and the protein intake of under-five children. The analysis of risk estimation shows the prevalence ratio value was 0.175 (CI 0.20-1.554), which means that under-five children at the Kedundung Health Center with working mothers tend 0.17 times to experience a lack of protein intake compared to under-five children with the employment status of non-working mothers. This condition shows that the mother's occupation factor, in this case, is a protective factor. If the working mother leaves her child, the protein nutrition intake and the health of the under-five children cannot be adequately monitored, and quickly, the mother tends not to focus more on paying attention to her child's protein intake.

Based on the analysis above, most mothers who do not work have under-five children with low protein intake status. The researchers suspect that other factors influence protein intake status. Table 2 indicates that the length of a mother's education is significant (sig 0.002), which can impact this analysis. Mothers with low education and knowledge, even though mothers are often with their children, cannot provide the protein intake needed by under-five children. The necessary step to solve this problem is to increase knowledge and awareness of the importance of maintaining under-five children's information (Nisak, 2018). Mothers only see what is eaten but do not estimate the protein intake needs of under-five children and the intake provided. The allocation of food spending for under-five children needs to be prioritized and tends to decrease (Nurlita et al., 2018). This study still has limitations, namely related to data and influencing variables that cannot be fully defined and disclosed and data

that are not normally distributed, so causality between variables cannot be determined. The main concerns include re-examining unrelated variables, categorizing the type of animal or vegetable protein intake, and using a more extensive research scope.

CONCLUSIONS

Five independent variables studied, the variable family income, father's education, and mother's education, have a significant relationship. The father's employment status variable cannot be concluded. The father's employment status in the literature is related to protein intake through the pattern of the father's role in regulating the low protein intake of under-five children. The mother's employment status variable has no significant relationship with the intake status of under-five children. Mothers do not have sufficient knowledge and skills to regulate under-five children's intake patterns, including prioritizing food spending and controlling the adequacy of protein intake. The researcher recommends that this research be used to consider a policy brief to implement appropriate solutions and steps to address nutritional problems in under-five children. Relevant agencies can increase knowledge related to providing under-five children nutrition, monitoring the nutritional status of under-five children, and providing economic assistance or structured intake for stunted under-five children. In addition, researchers recommend that this research contribute to the development of responsiveness to the problem of stunting under-five children in Indonesia.

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