



Maternal food literacy and its association with household food security and dietary fiber intake among primary school children in Indonesia

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ABSTRAK

Latar Belakang: Ibu memiliki peran penting dalam pengambilan keputusan terkait penyediaan pangan dan pola makan keluarga. Literasi pangan dan gizi ibu yang baik dapat meningkatkan ketahanan pangan keluarga dan kualitas diet anak.

Tujuan: Penelitian ini bertujuan untuk menguji literasi pangan dan gizi ibu serta hubungannya dengan ketahanan pangan rumah tangga dan kualitas diet anak (asupan serat) di Indonesia.

Metode: Penelitian menggunakan desain cross-sectional yang dilakukan terhadap 86 pasang ibu dan anak (anak berusia antara 9–12 tahun) di wilayah Kecamatan Kedungbanteng. Literasi pangan dan gizi ibu dievaluasi menggunakan Short Food Literacy Questionnaire (SFLQ). Ketahanan pangan rumah tangga ditentukan menggunakan Household Food Insecurity Access Scale (HFIAS), sementara konsumsi makanan dicatat melalui 24-hour food recall. Korelasi bivariat dan model regresi multivariat (logistik dan linear) digunakan untuk menganalisis data.

Hasil: Hasil analisis bivariat menunjukkan bahwa literasi ibu dan pendapatan keluarga berhubungan positif dengan ketahanan pangan. Berdasarkan regresi logistik multivariat, hanya pendapatan rumah tangga yang tetap memiliki hubungan yang signifikan dengan ketahanan pangan (AOR = 1,431; $p = 0,041$). Pada analisis regresi linier berganda, literasi pangan dan gizi ibu menjadi satu-satunya prediktor terhadap asupan serat anak ($B = 0,089$; $p = 0,043$), setelah disesuaikan dengan pendapatan rumah tangga, usia ibu, jumlah anggota keluarga, dan kovariat lain yang dimasukkan ke dalam model.

Kesimpulan: Literasi pangan dan gizi ibu berkontribusi terhadap asupan serat anak, walaupun hubungan yang diamati relatif kecil. Namun demikian, peningkatan literasi pangan dan gizi pada ibu tetap diperlukan untuk meningkatkan kualitas diet anak.

KATA KUNCI: anak sekolah dasar; asupan serat; Indonesia; ketahanan pangan; literasi pangan gizi ibu

ABSTRACT

Background: Mothers play a critical role in decision-making regarding household food security and family dietary patterns. Adequate maternal food and nutrition literacy can enhance household food security and improve children's diet quality.

Objectives: This study aimed to examine maternal food literacy and its relationship with household food security and children's dietary quality (fiber intake) in Indonesia.

Methods: A cross-sectional survey was completed in 86 mother-child pairs (child's age between 9 to 12 years) in the Kedungbanteng sub-district. Maternal food literacy was evaluated with the Short Food Literacy Questionnaire (SFLQ). Household food security was determined using the Household Food Insecurity Access Scale (HFIAS), and dietary intake was recorded using a 24-hour food recall. Bivariate correlations and multivariate regression models (logistic and linear) were used to analyze the data.

Results: Bivariate analysis showed that maternal literacy and family income were positively associated with food security. Based on multivariate logistic regression, only household income retained an association with food security (AOR = 1.431, $p = 0.041$). In a multiple linear regression model, maternal food literacy was the only predictor of child fiber intake ($B = 0.089$, $p = 0.043$), after adjusting for household income, mother's age, family size, and other covariates included in the model.

Conclusions: Maternal food and nutrition literacy contributes to child fiber intake, despite a relatively small observed association. However, enhancing maternal food and nutrition literacy is still required to improve children's dietary quality.

KEYWORDS: fiber intake; food security; Indonesia; maternal food literacy; primary school children

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INTRODUCTION

Food and nutrition literacy (FNLIT) is centered on accessing, understanding, and applying nutrition information to make informed daily dietary decisions. It comprises knowledge of nutrients and dietary guidelines, as well as practical skills such as food prep, budgeting, and thorough label reading. High levels of food literacy are largely attributed to greater autonomy in making food-related decisions and better health outcomes (1,2,3). Parents, especially mothers, play a crucial role in shaping family food environments because they often serve as primary caregivers and make key decisions about food selection, preparation, and feeding practices. Maternal food literacy significantly affects household food management and purchasing decisions, which in turn shape children's regular eating habits (4,5). Children whose mothers have good nutritional knowledge tend to adopt a healthier diet, rich in vegetables and whole grains (6). Conversely, mothers with limited nutritional knowledge may struggle to prepare nutritious meals regularly, especially because of financial constraints or lack of time (7,8).

Focusing on dietary fiber intake among school-aged children is particularly important because dietary habits established during childhood often persist into adolescence and adulthood. School-aged children represent a critical developmental stage during which food preferences and eating behaviors become increasingly independent while still being strongly influenced by the household food environment and parental (9,10). Adequate dietary fiber intake during childhood has been associated with multiple health benefits, including improved gastrointestinal function, healthier body weight regulation, and reduced risk of future metabolic and chronic diseases. However, studies have consistently reported that dietary fiber consumption among children often remains below recommended levels, mainly because of inadequate intake of fruits, vegetables, whole grains, and other fiber-rich foods (11,12). Food literacy is increasingly recognized as a key factor in household food security, especially in low-income countries. Food-secure households have reliable access to sufficient food and can use it

safely and in accordance with their culture. Insufficient food literacy is closely related to a higher risk of food insecurity and poor eating habits in children (4,13,14). Parents' level of food literacy is closely related to the development of nutritional awareness and healthy eating habits in children. Approximately 60% of parents have low levels of food literacy, which significantly impacts children's nutritional knowledge (15,16). Those living in food-insecure conditions need culturally appropriate nutrition education that addresses challenges related to affordability, meal preparation, and planning (17,18). Therefore, strengthening parents' food literacy is essential for improving the quality and stability of food access in households (7,19).

Maternal food literacy is particularly important in Indonesia, where child nutrition problems remain a public health concern. According to the 2024 Indonesian Nutritional Status Survey (SSGI), the national prevalence of stunting was reported at 19.8%, although improvements have been observed compared with previous years (20). These findings suggest that many Indonesian children continue to face nutritional challenges that may be linked to inadequate dietary quality and household feeding practices. Strengthening maternal capabilities in food selection, preparation, and nutritional decision-making may therefore contribute to improving child dietary quality and long-term nutritional outcomes. Studies explicitly examining the influence of parental food literacy on household food security are limited. Examining maternal food literacy provides a novel perspective that is crucial for addressing nutritional challenges inherent within family dynamics. Therefore, this study aims to analyze the influence of maternal food literacy on food security and children's intake. The analysis is crucial for informing policies and complex interventions geared toward fostering food security and optimal child development in varied socioeconomic settings (6,7,21).

MATERIALS AND METHODS

A cross-sectional descriptive study design was adopted to adequately accomplish the objective. The study was conducted at two elementary schools in Kedungbanteng District, Banyumas Regency, Indonesia. The locations

were selected due to the high prevalence of malnutrition among school children in the Kedungbanteng District, where 32.98% were classified as wasted or severely wasted, and 10.18% were overweight or obese (22). The data used were collected between April and May 2025. A total of 86 participants, consisting of parents and their children in grades 4 and 5 (aged 9–12 years), were recruited from the selected primary schools. The two schools were purposively selected due to their high malnutrition prevalence. Rather than using a sample-size formula, we employed total sampling, recruiting all available and eligible mother-child pairs in grades 4 and 5 from both schools.

The inclusion criteria were enrollment in a primary school and agreement to participate in the study. The exclusion criteria were reluctant parents or students who were unwilling to participate, absent from school, or ill during data collection. We collected age, mother's occupation, and education level, along with household size and income. Parents' food and nutrition literacy was measured using a 12-item validated Short Food Literacy Questionnaire (SFLQ)(23), which was translated into Indonesian, revised, and reviewed by experts. Items were rated on a five-point Likert scale, with 'don't know' or incomplete responses scored as 0. Based on this scoring, participants' observed total scores ranged from 7 to 52 (out of a maximum theoretical range of 12 to 60). Household food security was measured using the nine-item Household Food Insecurity Access Scale (HFIAS). This instrument assessed whether any of the conditions that characterize food insecurity were experienced during the previous 30 days. Although HFIAS is conventionally categorized into four severity levels according to Coates et al. (24), these categories were dichotomized into two groups for binary logistic regression: 'food secure' (scores of 0–1) and 'food insecure' (scores of >1). This binary transformation was necessary to meet the requirements of the logistic regression model, with the 'food insecure' group combining the original mild, moderate, and severe food insecurity categories to estimate the odds of experiencing any level of food insecurity. Dietary intake was evaluated using a 24-hour dietary recall. We assessed consumption over two non-consecutive days. Fiber consumption was

analyzed and averaged to obtain dietary fiber intake. Nutrient adequacy was established by comparison with Indonesian Recommended Dietary Allowances (RDA) (25).

Analyses were conducted using SPSS version 22, where frequencies and percentages were presented for categorical variables. Continuous variables were presented as means and standard deviations. Family income was recorded and converted into millions of Indonesian Rupiah for analytical precision. Pearson's correlation test was used to examine the relationship between participant characteristics and household food security, as well as children's nutrient consumption. To determine the independent predictors of the outcomes, binary logistic and multiple linear regression analyses were conducted. Binary logistic regression was adopted to identify factors associated with household food security (categorized as food secure vs. food insecure). Predictor variables included mother's age, total FNLIT (Food and Nutrition Literacy for Toddlers), household income, and family size. The results were reported as Adjusted Odds Ratios (AOR) with 95% Confidence Intervals (CI). Multiple linear

regression was used to examine the predictors of children's fiber intake as a continuous variable. Furthermore, variables such as maternal literacy, income, age, and family size were entered into the model. Goodness of fit was assessed using the R-square (R^2) value, and the results were presented as unstandardized (β) and standardized (β) coefficients. Ethical approval for this study was provided by the Jenderal Soedirman University Faculty of Health Sciences Ethics Commission, Purwokerto, with approval No. 1843/EC/KEPK/V/2025. The study was described to the participants, and consent was obtained. Parents were clearly informed, and consent was obtained for children's participation. The participants were given code numbers rather than names to ensure confidentiality. Participants were informed that they were able to withdraw from the study at any time without consequences.

RESULTS AND DISCUSSIONS

Respondent Characteristics

Table 1 presents participant characteristics for the 86 parent student pairs recruited from two schools.

Table 1. Characteristic of participants

Variables		Total
Age of mothers (years)		40.26±7.05
FNLIT-Score		25.08±6.94
Family income (IDR)		2,546,744.18 ± 2,876,821.13
Family member		4.51±1.19
Household Food Security Score		4.58±4.01
Mother's education level (%)	Basic education (9 years)	47 (54.70%)
	Advanced education (>9 years)	39 (45.30%)
Mother's working status	Working mother	13 (15.10%)
	Housewife	73 (84.90%)
Children's Nutrition Intake (Main / % nutritional adequacy)		
	Energy	1055.23 ± 418.04 kkal (79.85%)
	Protein	53.93±20.87 g (107.86%)
	Fiber	5.73±3.56 g (20.87%)

Table 1 presents comprehensive demographic and nutritional characteristics of participating mother-child pairs. A notable finding was the low dietary fiber intake among children, with average adequacy reaching only 20.87% of the recommended level, whereas protein intake

exceeded the recommended adequacy (107.86%).

In addition, the Household Food Security Score suggested that many households faced food security challenges. Most mothers had only basic education (54.7%) and were predominantly

housewives (84.9%), indicating that maternal characteristics may play an important role in

household food-related practices and children's dietary intake

Table 2. Correlation of characteristics of participants and household food security

Variables	Household food security	
	r	p value
Age of mothers (years)	0.11	0.28
FNLIT-Score	-0.31	0.00*
Family income (IDR)	-0.28	0.00*
Family member	-0.02	0.83

*Positive significant

Analysis of Factors Correlated with Household Food Security

Table 2 presents the correlation between participant characteristics and household food security. Maternal FNLIT ($p=0.00$) and family income ($p=0.00$) were significantly correlated with household food security. In contrast, mother's age, education level, number of family members, and working status showed no significant correlation with food security ($p>0.05$).

Analysis of Factors Correlated with Nutrient Intake of Children

The correlation of participant characteristics and children's nutrient intake is presented in **Table 3**. The results showed that maternal food and nutrition literacy (FNLIT-SCORE) had a significant positive correlation with children's fiber intake ($r = 0.24$, $p=0.02$). However, no significant relationships were observed between mothers' age, family members, or FNLIT scores and children's energy and protein intake.

Table 3. Correlation characteristics of participants and nutrition intake of children

Variables	Energy		Protein		Fiber	
	r	p value	r	p value	r	p value
Mother's age (years)	0.09	0.39	0.01	0.87	0.01	0.90
FNLIT-SCORE mothers	-0.03	0.74	0.00	0.95	0.24	0.02*
Family member	-0.03	0.72	0.05	0.62	0.05	0.61

*Positive significant

Income is the primary driver for access to food (food security), while maternal literacy is the primary driver for the quality of food chosen (fiber intake). Mothers with higher food literacy were more prone to understand the importance of nutrient-dense, plant-based foods, making fruits, vegetables, and whole grains available in diets (19,26). This result is consistent with the idea that the quality of children's diets may be improved through improvements in maternal food management and nutrition knowledge, even when financial resources are held constant (21).

There is a lack of clear association between maternal literacy level and total energy and protein intake. This may suggest that locally available staple foods that provide calories and protein are

widely accessible in the community, regardless of literacy level. The choice of energy-dense food items may be determined more by portion sizes and feeding behaviors of the caretaker, independent of nutrition knowledge (27). These results show that food assistance is necessary to secure nutrition. However, focused nutrition education to enhance maternal food literacy remains a crucial strategy for preserving children's nutritional health over time.

Analysis of predictors of household food security

The results of the analysis of factors influencing household food security can be seen in **Table 4**.

Table 4. Frequency distribution of macronutrient and potassium

Variables	AOR	p value	95% CI
FNLT	1.05	0.15	(0.98-1.11)
Family income	1.43	0.04*	(1.01-2.02)
Family member	0.69	0.14	(0.42-1.12)
Mother's age	0.93	0.11	(0.85-1.01)

AOR = Adjusted Odds Ratio; CI = Confidence Interval. * Significant at $p < 0.05$

A binary logistic regression analysis was conducted to identify the predictors of household food security. The final model included mother's age, FNLT, total household income (in millions), and family size as independent variables. The results, as detailed in Table 4, showed that family income was the only significant predictor of food security status ($p = 0.04$). Specifically, for every one-million IDR increase in income, the odds of being food secure increase by a factor of 1.43 [AOR = 1.43; 95% CI (1.01, 2.02)]. Interestingly, maternal food literacy was not significantly associated with household food security after adjustment, whereas household income remained a significant predictor. This finding suggests that although food literacy may improve knowledge and skills related to food selection, preparation, and dietary decision-making, these capabilities alone may not be sufficient to ensure food security when financial resources are limited. Food

security is strongly influenced by economic access to food; therefore, households with constrained income may have adequate nutrition knowledge but still struggle to obtain adequate and diverse foods. In low-resource settings, food purchasing decisions are frequently driven by affordability rather than nutritional considerations, causing families to prioritize inexpensive and energy-dense foods over more diverse and nutrient-rich options. Consequently, even mothers with better food literacy may struggle to translate nutritional knowledge into healthier food practices when household economic conditions are constrained (26,28,29).

Analysis of Predictors of Children's Fiber Intake

The results of the analysis of factors influencing fiber intake in children can be seen in **Table 5**.

Table 5. Multiple linear regression analysis of factors associated with fiber intake

Predictor Variables	Unstand B	SE	Stand β	t	p-value	95% CI
(Constant)	8.62	5.94		1.45	.15	-3.20, 20.44
FNLT	0.08	0.04	.23	2.05	.04*	0.00, 0.17
Family income	-0.07	0.14	-.06	-0.53	.59	-0.35, 0.20
Mother's age	-0.50	0.52	-.10	-0.97	.33	-1.55, 0.53
Family member	0.02	0.33	.01	0.08	.93	-0.63, 0.68

SE = Standard Error; β = Standardized Beta; CI = Confidence Interval
 $R^2 = 0.075$; Adjusted $R^2 = 0.030$

We analyzed predictors of fiber intake using multiple linear regression and summarized the results in Table 5. The model accounted for 7.5% of the total variance in fiber intake ($R^2 = 0.07$). Among the variables examined, Total FNLT was the only significant predictor. Specifically, for every one-unit increase in its score, the fiber intake increased by 0.08 units ($B = 0.08$). The 95% CI for Total FNLT was [0.00, 0.17], confirming statistical significance. In contrast, household income, mother's age, and family size did not show significant associations with fiber intake in

this model ($p > 0.05$). Literacy is crucial for food utilization and preparation, but its impact on overall food access appears to be mediated by financial capacity. Households with higher income can more readily procure diverse and high-quality food options. This makes income stability a more dominant structural enabler of food security in the population (30,31). Similarly, the effect of socioeconomic status often outweighs knowledge when resources are severely limited (7,15).

Despite the significant relationship between maternal literacy and fiber intake, the regression

model explained only a small proportion of the variance (Adjusted $R^2 = 0.03$). Fiber-rich foods, including fruits, vegetables, legumes, and whole grains, may be perceived as less affordable compared with energy-dense processed foods, particularly among low-income households. In developing countries such as Indonesia, households frequently prioritize foods that provide greater satiety at lower cost, leading to a preference for calorie-dense foods and processed snacks that are often high in sugar and fat but relatively low in dietary fiber. Consequently, mothers may struggle to translate nutrition knowledge into healthier food purchasing decisions because economic considerations become a more immediate priority than nutritional quality. This phenomenon suggests that household food choices are influenced not only by individual knowledge and skills but also by structural economic constraints that limit access to healthier food options. Future studies should therefore explore broader environmental and behavioral determinants of dietary quality among school-aged children (3,32–34).

Overall, the findings indicate that improving household economic conditions alone may not guarantee better dietary quality among children. While income is essential for achieving food security, maternal food literacy appears to be crucial for promoting healthier food choices and improving diet quality (29,35). Therefore, integrated interventions combining economic support with culturally appropriate nutrition education may provide the greatest benefit for child nutrition outcomes in Indonesia.

This study has several limitations that should be considered when interpreting the findings. First, the cross-sectional design limits the ability to establish causal relationships between maternal food and nutrition literacy, household food security, and children's dietary intake. Therefore, the observed associations should be interpreted as correlational rather than causal. Second, the relatively small sample size ($n = 86$) may have reduced the statistical power to detect smaller associations and may limit the generalizability of the findings to broader populations. Specifically, with only 24 participants (27.9%) in the food-secure category, the logistic regression model yielded approximately 6 events per predictor

variable (EPV). This falls below the commonly recommended threshold of 10 EPV, which may potentially affect the stability and precision of the Adjusted Odds Ratio (AOR) estimates. Future studies with larger and more diverse populations are recommended to improve external validity and provide a more comprehensive understanding of the relationships among maternal food literacy, household food security, and children's dietary outcomes.

CONCLUSION AND RECOMMENDATION

In conclusion, this study showed that maternal FNLIT, as well as household income, were the most important predictors of household food security. Meanwhile, mothers' age, working status, or family members tended not to be significant predictors. Maternal food literacy also contributed to children's eating behavior, as stronger skills were associated with higher fiber intake, reflecting better diet quality and greater consumption of plant-based foods. Food literacy within the family supports improved diet quality and nutritional status in children. Based on these findings, nutrition policies should move beyond general educational interventions and prioritize integrated strategies targeting vulnerable households, particularly low-income families. Targeted food or financial assistance programs should be combined with maternal food literacy interventions that strengthen practical skills such as healthy food selection, meal planning, budgeting, and preparing affordable, nutrient-rich meals. Integrating these programs into community health services and school-based nutrition initiatives may improve household food security and support healthier dietary patterns among children in the long term.

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