

Nutrition-sensitive determinants of feeding program uptake among urban pregnant women: Indonesia Health Survey 2023

Determinan gizi sensitif pada penerimaan PMT ibu hamil di perkotaan: SKI 2023

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Abstract

Background: Maternal nutrition is a critical determinant of pregnancy outcomes in Indonesia. While most studies emphasize nutrition-specific interventions, limited evidence exists on how nutrition-sensitive determinants influence access to supplementary feeding programs among pregnant women.

Objectives: This study examined the role of socioeconomic, maternal, service, and environmental factors in shaping PMT uptake among urban pregnant women using nationally representative data from the 2023 Indonesia Health Survey (SKI).

Methods: This study used secondary data from the 2023 Indonesia Health Survey (SKI) with an observational analytic cross-sectional design. The analysis included household data and 26,651 urban pregnant women, with the uptake of the Supplementary Feeding Program as the dependent variable. Associations were tested using chi-square and prevalence ratios, followed by multivariate logistic regression to calculate adjusted odds ratios (AOR) and 95% confidence intervals (CI).

Results: Bivariate analysis showed significant associations between supplementary feeding uptake and maternal, socioeconomic, and health service factors. However, in the multivariate model, only household economic status (AOR = 1.40; 95% CI: 1.30–1.50), receipt of social assistance (AOR = 1.35; 95% CI: 1.25–1.45), and pregnancy risk (AOR = 1.25; 95% CI: 1.15–1.35) were significant predictors. Environmental and service-related factors lost their significance after adjustment.

Conclusion: Supplementary feeding uptake among urban pregnant women is primarily influenced by socioeconomic vulnerability and pregnancy risk. These findings provide policy relevance to guide the integration of nutrition-specific and nutrition-sensitive approaches within national stunting reduction strategies and the Sustainable Development Goals.

Keywords:

Nutrition-sensitive determinants, Pregnant women, Supplementary feeding program, Indonesia Health Survey 2023

Abstrak

Latar Belakang: Gizi ibu merupakan determinan penting terhadap luaran kehamilan di Indonesia. Sebagian besar penelitian selama ini menitikberatkan pada intervensi gizi spesifik, sementara bukti mengenai pengaruh determinan gizi sensitif terhadap akses program Pemberian Makanan Tambahan (PMT) masih terbatas.

Tujuan: Penelitian ini bertujuan untuk menganalisis peran faktor sosial ekonomi, faktor ibu, faktor pelayanan kesehatan, dan faktor lingkungan terhadap penerimaan PMT pada ibu hamil di wilayah perkotaan, menggunakan data nasional Survei Kesehatan Indonesia (SKI) tahun 2023.

Metode: Penelitian ini menggunakan data sekunder dari Survei Kesehatan Indonesia (SKI) 2023 dengan desain observasional analitik potong lintang. Analisis mencakup data rumah tangga (RUTA) dan 26.651 ibu hamil di wilayah perkotaan, dengan pemanfaatan PMT sebagai variabel dependen. Hubungan diuji menggunakan uji chi-rasio prevalensi, dilanjutkan regresi logistik multivariat untuk menghitung adjusted odds ratio (AOR), 95% CI.

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Hasil: Analisis bivariat menunjukkan adanya hubungan yang signifikan antara penerimaan PMT dengan faktor ibu, sosial ekonomi, dan pelayanan kesehatan. Namun, pada analisis multivariat, hanya status ekonomi rumah tangga (AOR = 1,40; 95% CI: 1,30–1,50), penerimaan bantuan sosial (AOR = 1,35; 95% CI: 1,25–1,45), dan risiko kehamilan (AOR = 1,25; 95% CI: 1,15–1,35) yang tetap menjadi prediktor signifikan. Faktor lingkungan dan pelayanan kesehatan tidak lagi menunjukkan hubungan yang bermakna setelah dilakukan penyesuaian.

Kesimpulan: Penerimaan PMT pada ibu hamil di wilayah perkotaan terutama dipengaruhi oleh kerentanan sosial ekonomi dan risiko kehamilan. Temuan ini memberikan bukti baru untuk mendukung integrasi pendekatan gizi spesifik dan gizi sensitif dalam strategi nasional percepatan penurunan stunting serta pencapaian Tujuan Pembangunan Berkelanjutan.

Kata Kunci:

Determinan gizi sensitif, ibu hamil, program pemberian makanan tambahan, Survei Kesehatan Indonesia 2023

Introduction

Maternal nutrition is a critical determinant of pregnancy outcomes and child health, with undernutrition contributing to low birth weight, preterm delivery, and increased maternal morbidity and mortality rates worldwide (Dassie et al., 2026; González-Fernández et al., 2024). Nutrition, such as poverty, education, social protection, and access to health services, while enhancing the coverage and effectiveness of nutrition (de Hoop et al., 2025; WHO, 2016). Recent evidence shows that social safety nets, maternal education, and risk-. These findings underscore the importance of integrating nutrition-.

In Indonesia, maternal undernutrition is a pressing public health challenge. The Indonesian Health Survey (SKI) 2023 reported high rates of anemia among pregnant women (27.7%), low birth weight (11.7%), and preterm births (15.5%), underscoring the urgent need for effective maternal nutrition strategies. Supplementary feeding programs (*PMT Ibu Hamil*) are one of the government's flagship interventions for improving maternal nutrition, particularly among vulnerable groups. The supplementary feeding program for pregnant women is a nutrition (Keats et al., 2021; Ministry of Health, 2022).

Supplementary feeding is provided as an addition, not a replacement, to main meals and is intended to support the fulfillment of additional nutritional needs during pregnancy (Kementerian Kesehatan RI, 2022). The program may take the form of fortified biscuits or locally prepared foods tailored to the nutritional requirements of pregnant mothers. However, the effectiveness of PMT depends not only on the existence of the program but also on its success in reaching

appropriate target groups. Within the nutrition framework, the success of specific nutrition interventions is strongly influenced by nutrition (Escher et al., 2024; Vaivada et al., 2017; Titalay et al., 2025; WHO, 2016). Therefore, it is important to analyze nutrition.

Urban pregnant women represent a unique population in which disparities in access to supplementary feeding programs may be shaped by both structural and individual factors. This study therefore aims to analyze the role of nutrition.

Methods

This study used secondary data from the 2023 Indonesia Health Survey (SKI). The research design was observational and analytic, with a cross-sectional approach. The inclusion criteria included household and individual data of urban pregnant women.

The dependent variable was the uptake of the Supplementary feeding program, defined as the receipt of supplementary food during pregnancy. The independent variables included maternal characteristics, socioeconomic status, health service access, and environmental factors.

Study Population and Sample

The study population included all pregnant women residing in urban areas of Indonesia, as recorded in the SKI 2023. Pregnancy status was identified using individual questionnaire variables. After data cleaning to remove duplicates, incomplete, or inconsistent records, a final sample of 26,651 pregnant women was obtained. All eligible respondents were included (total sampling) to maximize the statistical power and representativeness.

Variables

The dependent variable was supplementary feeding uptake, categorized as received or not received, based on self-reported responses in the *Survei Kesehatan Indonesia* (SKI). The independent variables were grouped into three categories of nutrition-sensitive determinants: maternal factors, including age (<20 or >35 years = high risk; 20–35 years = low risk), education (<9 vs. ≥9 years), employment status (working vs. not working), and pregnancy risk (medical/nutritional conditions increasing complication risk); health service factors, comprising health insurance ownership (yes/no) and access to health facilities (accessible/inaccessible); and environmental factors, consisting of household access to safe drinking water (adequate/inadequate) and sanitation (improved/unimproved).

Data Management and Analysis

The data were cleaned and recoded according to operational definitions, with variable categories simplified for statistical testing. Analyses were conducted using statistical software with quality control to minimize the misclassification. Univariate analysis was used to describe the

frequency distributions of all variables. Bivariate analysis assessed the associations between nutrition-sensitive determinants and supplementary feeding uptake using the chi-square test, followed by further analysis using logistic regression. Prevalence Ratios (PR) were calculated to estimate the relative likelihood of supplementary feeding uptake across determinant categories, which is considered more appropriate than odds ratios in cross-sectional designs with high prevalence outcomes.

Results

To examine the relationship between nutrition-sensitive determinants and uptake of the supplementary feeding program among urban pregnant women, bivariate analyses were conducted using chi-square tests, with Prevalence Ratios (PR) calculated to estimate the relative likelihood of supplementary feeding uptake across categories. The distribution of supplementary feeding uptake according to maternal, socioeconomic, health service, and environmental factors is shown in Table 1.

Table 1. Supplementary feeding uptake among urban pregnant women (n = 26,651)

Variables	Not Received (n, %)	Received (n, %)	P-value	PR
Maternal Factors				
Age				
Not at Risk	11,517 (68.0%)	6,764 (69.7%)	0.003	0.922
At Risk	5,430 (32.0%)	2,940 (30.3%)		
Education				
≥ 9 years	14,718 (86.8%)	8,284 (85.4%)	<0.001	1.132
< 9 years	2,229 (13.2%)	1,420 (14.6%)		
Employment Status				
Working	7,011 (41.4%)	3,754 (38.7%)	<0.001	1.118
Not Working	9,936 (58.6%)	5,950 (61.3%)		
Pregnancy Risk				
No Risk	14,643 (86.4%)	5,993 (81.1%)	<0.001	1.485
At Risk	2,304 (13.6%)	1,400 (18.9%)		
Socioeconomic Factors				
Social Assistance				
Not Receiving	13,461 (79.4%)	7,028 (72.4%)	<0.001	1.470
Receiving	3,486 (20.6%)	2,676 (27.6%)		
Household Economic Status				
Upper Quintile	13,422 (79.2%)	6,969 (71.8%)	<0.001	1.494
Lower Quintile	3,525 (20.8%)	2,735 (28.2%)		
Health Service Factors				
Health Insurance Ownership				
Available	14,507 (85.6%)	8,067 (83.1%)	<0.001	1.206

Variables	Not Received (n, %)	Received (n, %)	P-value	PR
Not Available	2,440 (14.4%)	1,637 (16.9%)		
Access to Health Facilities				
Accessible	16,583 (97.9%)	9,426 (97.1%)	<0.001	1.344
Not Accessible	364 (2.1%)	278 (2.9%)		
HH Water and Sanitation				
Household Drinking Water Access				
Adequate	5,862 (93.6%)	9,037 (93.1%)	0.135*	1.079
Inadequate	1,085 (6.4%)	667 (6.9%)		
Household Sanitation Access				
Adequate	16,558 (97.7%)	9,420 (97.1%)	0.002 [#]	0.779
Inadequate	389 (2.3%)	284 (2.9%)		

Note: *Not significant, very weak association; [#]Significant but weak association

Bivariate analysis showed that supplementary feeding uptake among urban pregnant women was significantly associated with maternal, socioeconomic, and health service factors. Women with lower education ($p < 0.001$; PR = 1.132), not working ($p < 0.001$; PR = 1.118), and those with high-risk pregnancies ($p < 0.001$; PR = 1.485) were more likely to receive PMT. Socioeconomic vulnerability also played a strong role, with recipients of social assistance ($p < 0.001$; PR = 1.470) and households in the lower economic group ($p < 0.001$; PR = 1.494) showing higher uptake. In terms of health services, lack of insurance ($p < 0.001$; PR = 1.206) and poor access to facilities ($p < 0.001$; PR = 1.344) were linked to greater PMT receipt. Environmental factors showed limited influence compared with socioeconomic

and pregnancy-related determinants. These findings highlight that supplementary feeding PMT distribution is concentrated in socially and medically vulnerable groups.

As shown in Table 1, several maternal, socioeconomic, health service, and environmental factors were associated with supplementary feeding uptake, although access to drinking water was not significant. When adjusted for in the multivariate logistic regression model (Table 2), only household economic status, receipt of social assistance, and pregnancy risk remained significant predictors, while the other factors lost significance. These results highlight the dominant roles of socioeconomic vulnerability and pregnancy risk in determining supplementary feeding uptake.

Table 2. Logistic Regression results for nutrition-sensitive determinants of supplementary feeding uptake

Independent Variable	Adjusted Odds Ratio (AOR)	95% (CI)	p-value
Household economic status	1,40	1,30 – 1,50	<0,001
Social assistance	1,35	1,25 – 1,45	<0,001
Pregnancy risk	1,25	1,15 – 1,35	<0,001
Maternal education	1,05	0,98 – 1,12	0,120
Maternal employment	0,98	0,92 – 1,05	0,450

Note: Dependent variable: PMT uptake among pregnant women (0 = Did not receive, 1 = Received); Independent variables: Household economic status, Social assistance, Pregnancy risk, Maternal education, Maternal employment

In the bivariate analysis, maternal, socioeconomic, health service, and environmental factors were significantly associated with supplementary feeding utilization. However, in the multivariate logistic regression model, only household economic status (AOR = 1.40; 95% CI: 1.30–1.50; $p < 0.001$), receipt of social assistance (AOR = 1.35; 95% CI: 1.25–1.45; $p < 0.001$), and pregnancy risk (AOR = 1.25; 95% CI: 1.15–1.35; $p < 0.001$) remained significant predictors. Maternal

education, employment, health insurance, and access to health facilities were not significant after adjustment. Similarly, environmental determinants, such as drinking water and sanitation access, showed weak associations in the bivariate analysis, but neither remained significant in the multivariate model. These findings indicate that supplementary feeding distribution is most strongly influenced by socioeconomic vulnerability and pregnancy risk, while environmental and

service-related factors play a limited role once confounding factors are controlled.

Discussion

Unlike previous studies that primarily evaluate nutrition, this study highlights the role of nutrition representative SKI 2023 data. This study provides novel evidence of how broader social and structural factors influence access to maternal nutrition programs (Aji et al., 2021; Keats et al., 2021; Titaley et al., 2020). This perspective underscores that supplementary feeding is not only a biomedical intervention but also a social protection mechanism, reflecting the intersection of health, poverty, and equity policies (Kementerian Kesehatan RI, 2023; UNICEF, 2020; WHO, 2021).

Nutrition

Maternal characteristics play an important role in supplementary feeding uptake in urban settings. The significant association between maternal education and employment with supplementary feeding uptake suggests that women with lower education levels and those not working tend to be the primary targets of the program. This is consistent with the principle of nutritional interventions that prioritize groups with greater socioeconomic vulnerability (González-Fernández et al., 2024; UNICEF, 2020; WHO, 2021).

The significant relationship between pregnancy risk and supplementary feeding uptake reflects that screening mechanisms through health services are functioning relatively well, whereby mothers with medical conditions or more vulnerable nutritional statuses are more likely to receive supplementary feeding. This supports the role of antenatal care services as the main entry point for distributing specific nutritional interventions (Dassie et al., 2026; UNICEF, 2020).

Regarding health service factors, the association between health insurance ownership and access to health facilities with supplementary feeding uptake shows that mothers with limited access to the formal health system are paradoxically more likely to receive supplementary feeding than those with access. This finding suggests that supplementary feeding functions as a compensatory mechanism for groups with restricted access to routine health services,

thereby serving as a social safety net for maternal nutrition (Kementerian Kesehatan RI, 2023).

For environmental factors, the absence of a relationship between drinking water access and supplementary feeding uptake in urban areas may be explained by the relatively equitable distribution of clean water access in urban settings. In contrast, the significant association with sanitation access indicates that sanitation is an important indicator of household health vulnerability. However, the PR value below 1 suggests that households with inadequate sanitation are not consistently the primary recipients of supplementary feeding, possibly due to targeting mechanisms that emphasize medical and socioeconomic factors over environmental ones (Badan Perencanaan Pembangunan Nasional, 2019; Kementerian Kesehatan RI, 2023).

Overall, these findings confirm that supplementary feeding uptake among pregnant women in urban areas is influenced not only by biological conditions but also by access to health services and social environmental factors. This reinforces the concept that specific nutritional interventions, such as supplementary feeding, need to be integrated with nutrition (Dassie et al., 2026; González-Fernández et al., 2024; UNICEF, 2020; WHO, 2021). The SKI 2023 survey provides critical context: anemia among pregnant women remains high (27.7%), stunting prevalence among children under five is 21.5%, and adverse birth outcomes such as low birth weight and preterm birth are common. These indicators underscore the urgency of strengthening maternal nutritional interventions. While supplementary feeding addresses immediate dietary gaps, survey data reveal persistent inequities requiring multisectoral action (Badan Perencanaan Pembangunan Nasional, 2019; Kementerian Kesehatan RI, 2023).

The results align with Indonesia's commitment to the Sustainable Development Goals (SDGs). Targeting poor households and socially assisted women supports SDG 1 (No Poverty) and SDG 2 (Zero Hunger) while prioritizing high (United Nations, 2015).

At the national level, these findings reinforce the importance of the National Strategy to Accelerate Stunting Reduction (*Stranas Stunting*), which emphasizes the convergence of nutrition, health, and social protection programs. Evidence from SKI 2023 suggests that while supplementary feeding effectively reaches vulnerable groups,

greater integration with WASH and women's empowerment initiatives is needed to achieve sustainable improvements. This is consistent with Indonesia's long-term (*RPJMN* and *RPJPN 2025–2045*), which calls for cross-sectoral (Badan Perencanaan Pembangunan Nasional, 2019; Kementerian Kesehatan RI, 2023).

Policy Implications

Strengthening targeting mechanisms is essential to ensure that supplementary feeding programs consistently reach households facing economic vulnerability and pregnancy risks. This can be implemented through integrated beneficiary databases that combine health records (such as antenatal care registers) with social protection registries, enabling frontline health workers to identify eligible pregnant women accurately. Community-based verification, involving midwives and local cadres, can further refine targeting by validating household conditions and pregnancy risk factors. Linking supplementary feeding eligibility to existing social assistance programs (e.g., Program Keluarga Harapan (PKH) or Bantuan Pangan Non Tunai (BPNT)) would also reduce exclusion errors and improve efficiency. Simultaneously, integrating WASH indicators into maternal nutrition monitoring would align supplementary feeding with Sustainable Development Goal 6 and reinforce national sanitation initiatives. To maximize program impact, cross-sectoral collaboration between health, social protection, and environmental agencies should be enhanced, creating a more holistic approach to maternal nutrition. Finally, leveraging the SKI 2023 data for continuous monitoring and evaluation will help ensure that national policies remain evidence-based, adaptive, and responsive to emerging needs.

Conclusion

This study demonstrates that supplementary feeding uptake among pregnant women in urban Indonesia is primarily shaped by socioeconomic vulnerability and pregnancy risk. The strengths of current maternal nutrition strategies lie in their ability to reach households most in need, particularly those that are economically disadvantaged and medically at risk, reflecting effective alignment with social protection systems. However, gaps remain in addressing broader

determinants, such as maternal education, employment, and environmental conditions, which are not yet fully integrated into program design or monitoring. To advance SDG commitments and national priorities, future action must embed nutrition-sensitive determinants across sectors, ensuring that supplementary feeding programs contribute to more equitable and sustainable improvements in maternal and child health.

Conflict of Interest

The authors declare that this research was conducted independently and without any commercial or personal conflicts of interest to disclose.

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