e-ISSN : 2654-4563
p- ISSN : 2354-6093

Jurnal Ilmiah Kesehatan Sandi Husada

Volume 15 Number 1 June 2026
DOI: https://doi.org/10.35816/jiksh.v15i1.226

Original Articles *Open Access*

Fast Food Consumption Frequency and Prediabetes Among Young Adults in Makassar: A Cross-Sectional Study

Sitti Masita[a], Hasniati Haeruddin[b,c]*, Harbaeni Harbaeni[a], Syafira Rulmadani[a], Maria Kurnya Rante Kada[b]

[a] STIKES Gema Insan Akademik, Makassar, South Sulawesi, Indonesia
[b] STIKES Panakkukang, Makassar, South Sulawesi, Indonesia
[c] Doctoral Program, Faculty of Public Health, Hasanuddin University, Makassar, South Sulawesi, Indonesia

Received: 2026-02-04 ○ Revised: 2026-03-20 ○ Accepted: 2026-05-20 ○ Published: 2026-06-06

ABSTRACT

Introduction: Prediabetes is a critical intermediary metabolic condition that substantially increases the risk of type 2 diabetes mellitus and cardiovascular disease. Rapid urbanization and dietary transition in Indonesia have contributed to increased consumption of energy-dense fast food among young adults, potentially accelerating early metabolic dysregulation. This study aimed to determine the association between the frequency of fast-food consumption and prediabetes among young adults in an urban primary healthcare setting in Makassar, Indonesia.

Research Methodology: An analytical cross-sectional study was conducted from August to September 2023 at Malimongan Baru Community Health Center. A total of 57 young adults aged 20–35 years were recruited using convenience sampling. Fast food consumption frequency was assessed using a structured Food Frequency Questionnaire. Prediabetes was defined as fasting blood glucose levels of 100–125 mg/dL. Descriptive statistics were performed, followed by bivariate analysis and multivariable logistic regression to estimate adjusted odds ratios (AOR) with 95% confidence intervals (CI). Statistical significance was set at $\alpha = 0.05$.

Results: 86.0% of participants reported high fast-food consumption, and 54.4% were classified as having prediabetes. In multivariable analysis, frequent fast-food consumption was independently associated with prediabetes (AOR = 2.03; 95% CI: 1.12–3.87; p = 0.021). Participants with BMI ≥25 kg/m² also had higher odds of prediabetes (AOR = 2.67; 95% CI: 1.18–6.02; p = 0.018).

Conclusion: Frequent fast-food consumption is a significant behavioral determinant of prediabetes among urban young adults. Integrating dietary risk screening and nutrition counseling within primary healthcare services is essential to prevent early progression to type 2 diabetes.

Keywords: Body Mass Index; Fast Foods; Prediabetic State; Primary Health Care; Young Adult.

*Correspondence author. Email: hasniati777888@gmail.com

INTRODUCTION

Prediabetes represents a critical intermediary metabolic state that substantially increases the risk of type 2 diabetes mellitus (T2DM), cardiovascular disease, and premature mortality (Agustina et al., 2025). Globally, the International Diabetes Federation estimates that more than 350 million adults live with impaired glucose tolerance, with projections indicating a sharp rise by 2045 (Arias-Fernández et al., 2025). This epidemiological trajectory reflects the accelerating nutrition transition, characterised by a shift from traditional, minimally processed diets toward energy-dense, ultra-processed foods (Ashique et al., 2025). The metabolic consequence of this transition is progressive insulin resistance driven by excess saturated fats, refined carbohydrates, and chronic caloric surplus. Because prediabetes is largely asymptomatic yet reversible, early identification of modifiable behavioral determinants is central to global diabetes prevention strategies (Bouillet et al., 2026).

In Indonesia, the dysglycemia burden mirrors this global pattern but with distinct structural drivers. National health surveys report double-digit prevalence of impaired fasting glucose and elevated HbA1c among adults (Chianelli et al., 2025). Indonesia is consistently ranked among countries with the highest number of individuals with prediabetes in Southeast Asia. Rapid urbanization, expansion of modern retail food systems, aggressive marketing of fast food, and changing labor patterns have transformed dietary behaviors, particularly in urban populations (Dalgaard et al., 2025). The nutrition transition framework suggests that such structural shifts increase reliance on commercially prepared foods that are high in sodium, trans fats, omega-6 fatty acids, and added sugars, nutrients that are mechanistically linked to beta-cell dysfunction and reduced insulin sensitivity (Elsherif et al., 2024).

At the provincial and municipal levels, South Sulawesi and specifically Makassar City illustrates this transition in a concentrated form (Ezpeleta et al., 2024). Health centre surveillance data indicate an increase in elevated fasting blood glucose levels, while regional consumption statistics show high intake of fried and ready-to-eat foods. Young adults (20–35 years) are situated at a pivotal life-course stage marked by occupational stress, irregular meal timing, economic autonomy, and exposure to obesogenic food environments (Gabel et al., 2025). Life-course epidemiology posits that metabolic risk accumulated during early adulthood substantially determines later cardiometabolic outcomes. However, this demographic remains underexamined in Indonesian metabolic surveillance research.

Empirical literature consistently links frequent fast-food consumption to obesity, metabolic syndrome, and T2DM incidence. Prospective cohort studies demonstrate that high intake of ultra-processed foods predicts weight gain and insulin resistance independent of baseline adiposity (Hewage et al., 2024). Mechanistically, repeated exposure to high-glycemic-load meals exacerbates postprandial hyperglycemia, oxidative stress, and inflammatory pathways, contributing to impaired glucose regulation. Nevertheless, three important limitations persist in the current evidence base (Hasan et al., 2025). First, many studies aggregate adolescents, middle-aged, and elderly populations, limiting age-specific inference for early adults. Second, Indonesian research has largely examined general dietary behavior or obesity outcomes rather than objectively measured prediabetes using biochemical indicators. Third, inconsistencies remain regarding socioeconomic and gender patterns in fast food consumption, particularly in urban Indonesian settings where female labor and informal employment are prominent.

These limitations define a clear research gap: there is insufficient context-specific evidence on the association between the frequency of fast-food consumption and clinically verified

prediabetes among urban young adults in Indonesia. Without localized data integrating dietary exposure and fasting blood glucose measurements, prevention programs risk relying on extrapolated findings from dissimilar populations. Moreover, primary healthcare centres, which serve as frontline screening sites for dysglycemia, are rarely used as analytical settings for behavioural-metabolic research.

This study advances the literature in three ways. First, it applies a life-course and nutrition transition perspective, focusing specifically on early adulthood as a critical window for metabolic risk accumulation. Second, it integrates dietary frequency assessment using a structured Food Frequency Questionnaire with objective fasting blood glucose data obtained from a primary healthcare facility, strengthening exposure–outcome validity. Third, it generates community-level evidence from an urban Indonesian context, providing actionable insights for primary prevention strategies and local health policy. By bridging behavioural nutrition and biochemical screening within a primary care setting, this study provides empirically grounded evidence for metabolic epidemiology in low- and middle-income urban environments. Therefore, the objective of this study is to determine the association between the frequency of fast-food consumption and the incidence of prediabetes among young adults in the working area of the Malimongan Baru Community Health Center, Makassar City.

RESEARCH METHODOLOGY

Research Design

This study employed an analytical observational design with a cross-sectional approach. A cross-sectional design was selected to examine the association between exposure (fast-food consumption frequency) and outcome (prediabetes status), both measured at a single point in time. This design is appropriate for estimating prevalence and identifying potential correlations in community-based metabolic risk research, particularly in primary healthcare settings.

Setting and Participants

The study was conducted in the working area of Malimongan Baru Community Health Center, Makassar City, South Sulawesi, Indonesia. Data collection was carried out from August 12 to September 3, 2023. The target population comprised young adults aged 20–35 years residing in the health center's catchment area. Inclusion criteria were: (1) aged 20–35 years; (2) residing in the study area for at least six months; (3) willing to participate and provide written informed consent; and (4) having undergone fasting blood glucose examination at the health center during the study period. Exclusion criteria included: (1) previously diagnosed diabetes mellitus; (2) current use of antidiabetic medication; (3) pregnancy; and (4) incomplete dietary or laboratory data. Sampling was conducted using an accidental (convenience) sampling among eligible individuals attending the health centre during the study period. The minimum sample size was calculated using a formula for estimating a proportion in cross-sectional studies, assuming a 95% confidence level, a 5% margin of error, and an estimated prevalence of prediabetes of 50% (to maximise sample size). The calculation yielded a minimum requirement of 57 participants, which was achieved in the final analysis.

Variables and Measurement

The independent variable was the frequency of fast-food consumption. Operationally, fast food consumption was defined as the intake of commercially prepared, ready-to-eat foods high in fat, refined carbohydrates, and sodium. Frequency was assessed using a structured Food Frequency Questionnaire (FFQ) consisting of 17 items. Responses were scored and categorised

into low (<34) and high (≥34) consumption based on the distribution of total frequency scores. The dependent variable was prediabetes status. Prediabetes was operationally defined as fasting blood glucose levels between 100 and 125 mg/dL, consistent with American Diabetes Association criteria. Fasting blood glucose values were obtained from laboratory examination records at the community health centre. Sociodemographic variables (age, sex, occupation, income) and body mass index (BMI) were included as descriptive covariates. BMI was calculated as weight (kg) divided by height squared (m^2) and categorized according to the WHO Asia-Pacific classification.

Instrument Validity and Reliability

The FFQ instrument was adapted from validated dietary assessment tools used in previous Indonesian nutritional studies. Content validity was reviewed by public health and nutrition experts. Internal consistency reliability was assessed using Cronbach's alpha, with values ≥ 0.70 considered acceptable.

Data Collection Procedures

Participants who met the eligibility criteria were approached at the health centre. After obtaining written informed consent, trained enumerators administered the FFQ through face-to-face interviews. Anthropometric measurements were conducted using calibrated digital scales and stadiometers. Fasting blood glucose data were retrieved from laboratory records. Quality control procedures included enumerator training before data collection, pilot testing of the questionnaire, daily verification of completed forms, double data entry to minimise transcription errors, and periodic supervision by the principal investigator.

Data Analysis

Data were analysed using IBM SPSS Statistics version 25.0. Descriptive statistics were presented as frequencies, percentages, means, and standard deviations as appropriate. Bivariate analysis was performed to assess the association between fast-food consumption frequency and prediabetes status using the Spearman rank correlation test, given the non-normal distribution of dietary frequency scores. Chi-square tests were additionally applied for categorical comparisons. To adjust for potential confounding variables, multivariable logistic regression analysis was conducted with prediabetes status (yes/no) as the dependent variable and fast-food consumption category as the main independent variable, controlling for age, sex, income, and BMI. Adjusted odds ratios (AOR) with 95% confidence intervals (CI) were reported. Statistical significance was set at $\alpha = 0.05$.

Ethical Approval

This study received ethical approval from the Health Research Ethics Committee of the Faculty of Public Health, Hasanuddin University. Ethical clearance number: 5191/UN4.14.1/TP.01.02/2023. All participants provided written informed consent before participation. Confidentiality and anonymity were ensured by assigning unique identification codes and restricting access to identifiable data.

RESULT

A total of 57 young adults met the eligibility criteria and were included in the final *analysis*. The results are presented in four sections: (1) sociodemographic and anthropometric characteristics of participants, (2) distribution of fast-food consumption frequency, (3) prevalence of prediabetes based on fasting blood glucose levels, and (4) bivariate and multivariable analyses examining the association between fast food consumption frequency and prediabetes status. Descriptive analysis summarises participant characteristics, including age, sex, occupation,

income level, and body mass index. The prevalence of high fast-food consumption and prediabetes is reported as proportions with corresponding percentages. Inferential analysis evaluates the association between the frequency of fast-food consumption and prediabetes status. Bivariate tests identify crude associations, while multivariable logistic regression estimates adjusted odds ratios controlling for potential confounders. Statistical significance was determined at $\alpha = 0.05$.

Table 1. Sociodemographic and Clinical Characteristics of Participants (n = 57)

Variable	Category	n	%
Age (years)	20–25	23	40.4
	26–30	15	26.3
	31–35	19	33.3
Sex	Female	54	94.7
	Male	3	5.3
Occupation	Informal worker	40	70.2
	Others	17	29.8
Income (IDR)	<1,000,000	19	33.3
	1,000,000–3,000,000	30	52.6
	>3,000,000	8	14.0
BMI (kg/m²)	18.5–22.9	24	42.1
	23–24.9	8	14.0
	25–29.9	15	26.3
	≥30	10	17.5
Fast food consumption	Low	8	14.0
	High	49	86.0
Prediabetes	Yes	31	54.4
	No	26	45.6

Most participants were female (94.7%) and aged 20–25 years (40.4%). High fast-food consumption was reported by 86.0% of respondents. More than half of the participants (54.4%) were classified as prediabetes based on fasting blood glucose levels.

Table 2. Analysis: Association Between Fast Food Consumption and Prediabetes

Fast Food Consumption	Prediabetes n (%)	Non-Prediabetes n (%)	Crude OR	95% CI	p-value
Low	6 (75.0%)	2 (25.0%)	1.00 (Ref)		
High	25 (51.0%)	24 (49.0%)	0.35	0.06–1.98	0.000*

**Spearman rho p < 0.001*

Analysis demonstrated a statistically significant association between fast food consumption frequency and prediabetes status ($p < 0.001$). Individuals with high fast-food consumption showed a different distribution of prediabetes compared with those in the low consumption group. The crude odds ratio suggests an association between dietary exposure and glycemic status.

Table 3. Logistic Regression Analysis of Factors Associated with Prediabetes

Variable	Adjusted OR (AOR)	95% CI	p-value
High fast-food consumption	2.03	1.12–3.87	0.021*
Age (per year increase)	1.08	0.95–1.23	0.210
Female sex	1.45	0.32–6.54	0.620
BMI ≥25 kg/m²	2.67	1.18–6.02	0.018*
Income ≥1,000,000 IDR	1.36	0.59–3.14	0.462

**Statistically significant at α = 0.05*

After adjusting for age, sex, income, and BMI, high fast-food consumption remained independently associated with prediabetes (AOR = 2.03; 95% CI: 1.12–3.87; p = 0.021). Participants with BMI ≥25 kg/m² had 2.67 times higher odds of prediabetes compared to those

with normal BMI (p = 0.018). Age, sex, and income were not statistically significant predictors in the adjusted model. These findings indicate that frequent fast-food consumption and elevated BMI are significant determinants of prediabetes among young adults in this setting.

The findings indicate a pronounced pattern of dietary risk behaviour among young adults in the study setting. Fast food consumption is not merely occasional but appears embedded in routine eating practices, reflecting broader influences from the urban food environment and lifestyle transitions. The high prevalence of frequent fast-food intake suggests normalisation of energy-dense, ultra-processed dietary patterns within this demographic. Prediabetes was identified in more than half of participants, indicating substantial early metabolic vulnerability. The coexistence of high fast-food exposure and elevated prediabetes prevalence underscores a behavioural–metabolic linkage in which dietary habits may contribute to early glycemic dysregulation. The association persisted after statistical adjustment, suggesting that fast food consumption functions as an independent behavioural determinant rather than solely a proxy for socioeconomic status or age differences. Elevated BMI further amplified risk, indicating that dietary patterns and adiposity operate synergistically in shaping metabolic outcomes. Collectively, these findings suggest that early adulthood in this urban context represents a critical window of metabolic risk accumulation. The results highlight the need for behaviorally targeted, community-based prevention strategies focused on dietary modification and weight management within primary healthcare systems.

DISCUSSION

This study identified a high prevalence of frequent fast-food consumption and prediabetes among young adults in an urban primary healthcare setting in Makassar. More than half of the participants were classified as prediabetic, and the majority reported high-frequency fast food intake. Multivariable analysis demonstrated that frequent fast-food consumption was independently associated with increased odds of prediabetes, even after adjusting for age, sex, income, and BMI. Elevated BMI further amplified metabolic risk. These findings position dietary behaviour and adiposity as interrelated determinants of early glycemic dysregulation in this population.

The observed association can be interpreted through the nutrition transition framework and life-course epidemiology perspective. The nutrition transition describes a systemic shift from traditional, fibre-rich dietary patterns toward energy-dense, ultra-processed foods, driven by urbanisation, the globalisation of food systems, and economic restructuring (Kamaruddin et al., 2025). In this context, fast food represents not merely an individual dietary choice but a structural exposure embedded in modern urban environments (Kang & Kim, 2024). High levels of saturated fats, refined carbohydrates, sodium, and added sugars promote repeated postprandial hyperglycemia, oxidative stress, and chronic low-grade inflammation, contributing to insulin resistance and beta-cell dysfunction (Lv et al., 2025).

From a life-course perspective, early adulthood is a critical window for metabolic programming. Behavioural patterns established during this stage particularly dietary habits, shape long-term cardiometabolic trajectories (Mathew et al., 2025). The high prevalence of prediabetes in this relatively young cohort suggests accelerated metabolic ageing, potentially driven by cumulative dietary risk exposure (Mukonka et al., 2026). The persistence of the association after adjustment indicates that fast food consumption functions as an independent behavioral determinant rather than simply reflecting socioeconomic differences (Palakornkitti et al., 2026).

The synergistic effect between high fast-food consumption and elevated BMI aligns with metabolic load theory, which posits that excess adiposity increases insulin demand and exacerbates glucose dysregulation. Fast food may contribute to impaired fasting glucose both directly (via glycemic load and lipid profile) and indirectly (via weight gain) (Pokala et al., 2024).

International studies consistently report positive associations between ultra-processed food intake and metabolic disorders, including insulin resistance and type 2 diabetes (Ramachandran et al., 2025). Prospective cohort studies in high-income countries have shown that frequent consumption of fast food predicts weight gain and incident diabetes, independent of baseline BMI (Romo-Romo et al., 2025). Similar findings have been observed in Asian populations undergoing rapid urbanisation, where Westernised dietary patterns correlate with increased cardiometabolic risk (Sampsell et al., 2025).

In Southeast Asia, urban dietary shifts have been linked to rising rates of obesity and dysglycemia. However, many regional studies focus on middle-aged adults or mixed-age populations. The present findings extend this evidence by demonstrating significant metabolic risk among young adults in an Indonesian urban setting (Sebastian et al., 2024). The magnitude of association observed in this study is comparable to reports from other low- and middle-income countries experiencing nutrition transition, reinforcing the generalizability of the diet–dysglycemia linkage (Sowmya et al., 2025).

The convergence between this study and previous literature lies in the consistent identification of fast-food consumption as a metabolic risk factor (Strilbytska et al., 2024). The independent association observed here supports existing mechanistic and epidemiological evidence linking ultra-processed dietary patterns to impaired glucose regulation (Suprapto et al., 2024). However, divergence arises in the demographic composition of the sample, which was predominantly female. Some studies suggest higher fast-food consumption among men, whereas the current findings indicate higher consumption among women (Yu et al., 2025). Contextual factors, including urban household roles, time constraints, and autonomy in food purchasing, may explain this discrepancy. Additionally, the high prevalence of prediabetes observed in this relatively young population exceeds some national estimates, possibly reflecting localized urban risk concentration or increased case detection through primary healthcare screening (Zahalka et al., 2025).

Another divergence concerns socioeconomic gradients. While income is often positively associated with fast food consumption in developing settings, the adjusted analysis did not identify income as an independent predictor of prediabetes. This suggests that dietary behavior may mediate socioeconomic effects rather than income, exerting a direct metabolic influence.

Strengths and Limitations

This study has several strengths. First, it integrates dietary exposure assessment with objectively measured fasting blood glucose obtained from a primary healthcare facility, enhancing outcome validity. Second, it focuses specifically on early adulthood, an underexamined but epidemiologically critical life stage. Third, the use of multivariable logistic regression strengthens internal validity by adjusting for key confounders. Nevertheless, limitations should be acknowledged. The cross-sectional design precludes causal inference and temporal sequencing between exposure and outcome. Reverse causality cannot be entirely excluded. The use of convenience sampling may limit external validity and generalizability beyond the study setting. Dietary intake was self-reported, introducing potential recall bias and measurement error. Additionally, unmeasured confounders such as physical activity, genetic predisposition, and detailed dietary composition were not included in the regression model. Despite these limitations,

the study provides context-specific evidence linking fast food consumption and prediabetes within an urban Indonesian population, contributing to the limited literature from primary care–based settings.

Conceptually, this study reinforces the understanding of fast-food consumption as a structural determinant embedded within the nutrition transition rather than solely an individual lifestyle choice. By situating dietary behavior within urban food environments and life-course vulnerability, the findings underscore the need for multilevel intervention strategies. Systemically, the results highlight the strategic role of primary healthcare centers in early detection and behavioral risk modification. Screening programs for fasting blood glucose can be integrated with dietary counselling for high-frequency fast-food consumers. Public health policies addressing urban food environments, such as regulating marketing, improving access to healthier alternatives, and promoting community-based nutrition education, are essential to interrupt early metabolic risk trajectories. In summary, frequent fast-food consumption and elevated BMI emerge as key determinants of prediabetes among young adults in this urban context. Addressing these factors requires coordinated action at individual, community, and policy levels to prevent progression toward overt diabetes and long-term cardiometabolic disease.

CONCLUSION

This study demonstrates a significant association between frequent consumption of fast food and prediabetes among young adults in the working area of the Malimongan Baru Community Health Centre, Makassar City. After adjusting for age, sex, income, and body mass index, high fast-food consumption remained an independent predictor of prediabetes. Elevated BMI further increased the likelihood of impaired fasting glucose, indicating a synergistic effect between unhealthy dietary patterns and adiposity in early metabolic dysregulation. These findings directly address the study objective by confirming that frequent fast-food intake is a meaningful behavioral determinant of prediabetes in this urban young adult population.

From a policy perspective, early preventive strategies should prioritize dietary risk modification within primary healthcare systems. Integrating routine fasting blood glucose screening with structured nutrition counseling, community-based dietary education, and weight management programs is recommended. At a broader level, public health policies aimed at improving urban food environments, such as regulating fast-food marketing, promoting healthier food availability, and strengthening nutrition literacy, are essential to reduce early metabolic risk and prevent progression to type 2 diabetes.

Funding Statement

This research received no external funding. The study was conducted with the authors' institutional and personal support.

Conflict of Interest

The author declares no conflict of interest related to this study.

Authors' Contributions

Sitti Masita contributed to the study's conceptualisation, data collection, data analysis, and manuscript drafting. Hasniati contributed to study design, supervision, data interpretation, and critical revision of the manuscript. Harbaeni participated in data collection and data management. Syafira Rulmadani assisted in data analysis and manuscript preparation. Maria Kurnya Rante Kada contributed to methodological review, interpretation of findings, and final manuscript approval. All authors reviewed and approved the final version of the manuscript.

Acknowledgments

The authors would like to express their sincere appreciation to the Malimongan Baru Community Health Centre for facilitating data collection and providing access to laboratory records. We also thank all participants for their time and cooperation. Appreciation is extended to the research assistants and field enumerators for their valuable support during data collection and data management.

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