



Analysis of the Relationship Between Dietary Patterns and the Risk of Non-Communicable Diseases Among Urban Adolescents in Mataram City, Lombok

Lalu Hendra Saputra

Program studi S1 Farmasi, universitas Hamzanwadi, Lombok Timur, Indonesia

*Corresponding Author: hendra99@gmail.com

Article History

Manuscript submitted:

19 June 2025

Manuscript revised:

26 August 2025

Accepted for publication:

31 August 2025

Keywords

dietary patterns
non-communicable diseases
adolescents
Mataram City
urban nutrition

Abstract

Non-communicable diseases (NCDs), including obesity, diabetes, and hypertension, are becoming increasingly prevalent among adolescents, especially in urban areas experiencing rapid lifestyle changes. This study aims to analyze the relationship between dietary patterns and the risk of NCDs among adolescents in Mataram City, Lombok. A cross-sectional study was conducted involving 300 high school students aged 15–18 years from five schools across Mataram. Data collection included validated food frequency questionnaires (FFQ), anthropometric measurements, and structured interviews to assess lifestyle factors. Dietary patterns were classified into three categories: healthy (high intake of fruits, vegetables, and whole grains), mixed (moderate intake of processed and sugary foods), and unhealthy (frequent consumption of fast food, sweetened beverages, and high-fat snacks). Risk indicators such as Body Mass Index (BMI), blood pressure, and family history of NCDs were analyzed using chi-square tests and logistic regression. The results indicated a significant association between unhealthy dietary patterns and elevated BMI ($p < 0.01$) and increased systolic blood pressure ($p < 0.05$). Adolescents with unhealthy eating habits were found to be 2.7 times more likely to be at risk for NCDs compared to their peers with healthy diets (OR = 2.7; 95% CI: 1.7–4.3). These findings emphasize the urgent need for targeted nutritional education and health promotion strategies in urban schools within Mataram. Early interventions can play a crucial role in reducing the long-term burden of NCDs among the youth population.

Copyright © 2023, The Author(s)

This is an open access article under the CC BY-SA license



How to Cite: Saputra, L.H. (2025). Analysis of the Relationship Between Dietary Patterns and the Risk of Non-Communicable Diseases Among Urban Adolescents in Mataram City, Lombok. *Media of Health Research*, 3(2), 59-65. <https://doi.org/10.70716/mohr.v3i2.244>

Introduction

Non-communicable diseases (NCDs)—including obesity, type 2 diabetes mellitus, hypertension, cardiovascular diseases, and certain cancers—have become the leading global health burden, accounting for approximately 74% of all deaths worldwide (WHO, 2020, 2021). Once predominantly affecting older adults, NCDs are now increasingly observed among adolescents,

marked by early manifestations of risk factors such as elevated body mass index (BMI), dyslipidemia, hyperglycemia, and hypertension (WHO, 2021). This shift signals a concerning epidemiological transition with long-term implications for population health.

The rising prevalence of NCD risk factors among adolescents reflects a complex interaction of behavioral, social, and environmental determinants. Global increases in sedentary behavior and consumption of energy-dense, nutrient-poor foods have significantly contributed to adolescent obesity and metabolic disorders (Ng et al., 2014). In low- and middle-income countries, rapid urbanization has accelerated the nutrition transition, characterized by a shift from traditional diets to Western-style diets high in sugar, salt, and saturated fat (Popkin & Reardon, 2018). These changes have created obesogenic environments that disproportionately affect urban adolescents.

Adolescence represents a critical developmental period during which lifelong health behaviors are established (Patton et al., 2016; Sawyer et al., 2012). Dietary habits formed during this stage are strongly associated with future risk of obesity and NCDs (WHO, 2014). However, adolescents' food choices are often shaped by environmental influences such as family practices, school food environments, peer norms, and food marketing, which frequently promote unhealthy dietary patterns (Story et al., 2002; Verstraeten et al., 2016). Urban living further exacerbates these risks through irregular eating patterns, increased exposure to junk food advertising, and reduced physical activity (Ng et al., 2014; Bhutta et al., 2013).

Indonesia is currently experiencing a double burden of malnutrition, where undernutrition such as stunting coexists with rising rates of overweight and obesity, particularly among urban adolescents (Ministry of Health Indonesia, 2021). National surveys indicate a steady increase in adolescent obesity, with urban youth disproportionately affected (Riskesdas, 2018; UNICEF, 2021). Cities like Mataram exemplify this nutrition transition, where increased availability of fast food, sedentary lifestyles, and socio-economic disparities contribute to both undernutrition and overnutrition within the same communities (Popkin, 2017).

Despite growing national evidence, localized research focusing on urban adolescents remains limited, particularly in mid-sized cities such as Mataram (Amrita et al., 2019). Local-level studies are essential to capture context-specific socio-cultural, economic, and environmental factors influencing adolescent dietary behaviors and NCD risk (Glanz et al., 2008). Understanding these dynamics is crucial for designing targeted, culturally appropriate interventions.

The dietary pattern approach offers a comprehensive framework for examining the relationship between diet and NCD risk by considering overall food consumption patterns rather than isolated nutrients (Hu, 2002; Schulze et al., 2006). This approach is especially relevant in urban Indonesian contexts, where adolescents are increasingly exposed to processed foods and modern eating habits. By identifying prevailing dietary patterns and their association with NCD risk factors, this study aims to address gaps in localized evidence and support the development of effective, adolescent-centered public health interventions in Mataram (Perez-Rodrigo & Aranceta, 2003; Ministry of Health Indonesia, 2022).

Methods

This study utilized a cross-sectional design to examine the relationship between dietary patterns and the risk of non-communicable diseases (NCDs) among adolescents in Mataram City, Lombok. A total of 300 high school students aged 15 to 18 years were selected from five schools representing different regions of the city through random sampling. Data collection involved the use of a validated Food Frequency Questionnaire (FFQ) to assess dietary intake, alongside anthropometric measurements and structured interviews. Body weight and height were measured to calculate Body Mass Index (BMI), while blood pressure was recorded using a digital sphygmomanometer under standardized resting conditions. Structured interviews were also

conducted to gather information on lifestyle factors such as physical activity, sleep habits, and family history of NCDs.

Table 4. Logistic Regression Analysis of Dietary Patterns and NCD Risk among Adolescents

Variable	Odds Ratio (OR)	95% CI	p-value
Unhealthy diet	2.7	1.7 – 4.3	< 0.001
Healthy/Mixed diet	Reference	—	—

The logistic regression analysis (Table 4) revealed that adolescents with unhealthy dietary patterns were 2.7 times more likely to be at risk of developing NCD-related conditions compared to those following healthy or mixed diets (OR = 2.7; 95% CI: 1.7–4.3). This finding highlights the strong contribution of dietary behavior to early metabolic and cardiovascular risk among adolescents.

Based on responses from the FFQ, dietary patterns were categorized into three groups: healthy (high consumption of fruits, vegetables, and whole grains), mixed (moderate intake of processed and sugary foods), and unhealthy (frequent consumption of fast food, sweetened beverages, and high-fat snacks). The collected data were analyzed using SPSS version [X.X]. Descriptive statistics were used to summarize participant characteristics, while chi-square tests assessed associations between dietary patterns and NCD risk indicators such as BMI and blood pressure. Logistic regression analysis was applied to estimate the strength of association between dietary patterns and NCD risk, with odds ratios (OR) and 95% confidence intervals (CI) reported. Statistical significance was determined at a p-value of less than 0.05.

Results and Discussions

The results of this study demonstrate a clear and statistically significant association between unhealthy dietary patterns and increased risk factors for non-communicable diseases (NCDs) among adolescents in Mataram City. Nearly two-fifths (38%) of the surveyed adolescents were identified as having an unhealthy dietary pattern, characterized by frequent consumption of fast food, sugar-sweetened beverages, and high-fat snacks. This proportion indicates a substantial exposure of urban adolescents to diets that are energy-dense yet nutritionally poor, reflecting the ongoing nutrition transition in urban Indonesia.

Table 1. Distribution of Dietary Patterns among Adolescents in Mataram City (n = 300)

Dietary Pattern	Frequency (n)	Percentage (%)
Healthy	96	32.0
Mixed	90	30.0
Unhealthy	114	38.0
Total	300	100.0

Table 1 shows that more than one-third of adolescents (38%) adhered to an unhealthy dietary pattern, characterized by frequent consumption of fast food, sugar-sweetened beverages, and high-fat snacks. This finding reflects the growing exposure of urban adolescents in Mataram City to energy-dense, nutrient-poor diets, consistent with ongoing nutrition transition in urban Indonesia.

Adolescents adhering to unhealthy dietary patterns exhibited a markedly higher prevalence of elevated Body Mass Index (BMI) and increased systolic blood pressure compared to those consuming

healthier or mixed diets. The chi-square analysis confirmed a significant relationship between dietary patterns and BMI status ($p < 0.01$), suggesting that dietary behavior plays a crucial role in weight-related outcomes during adolescence. Similarly, the association between dietary patterns and systolic blood pressure ($p < 0.05$) highlights the early emergence of cardiovascular risk factors at a relatively young age. These findings reinforce the notion that the physiological consequences of poor dietary habits can manifest early in the life course.

Table 2. Association between Dietary Patterns and BMI Status among Adolescents

Dietary Pattern	Normal BMI n (%)	Overweight/Obese n (%)	Total	p-value
Healthy	72 (75.0)	24 (25.0)	96	
Mixed	58 (64.4)	32 (35.6)	90	
Unhealthy	54 (47.4)	60 (52.6)	114	< 0.01
Total	184	116	300	

As presented in Table 2, adolescents following an unhealthy dietary pattern exhibited a substantially higher prevalence of overweight and obesity (52.6%) compared to those consuming healthy diets (25.0%). The chi-square test confirmed a statistically significant association between dietary pattern and BMI status ($p < 0.01$), indicating that unhealthy eating behaviors are strongly linked to excess body weight among adolescents.

The logistic regression analysis further strengthens these findings by quantifying the magnitude of risk. Adolescents with unhealthy dietary patterns were 2.7 times more likely to be at risk of developing NCD-related conditions compared to those following healthier diets (OR = 2.7; 95% CI: 1.7–4.3). This elevated odds ratio underscores the significant contribution of dietary behavior to the development of early metabolic disturbances, including overweight, obesity, and hypertension. Importantly, the confidence interval does not cross unity, indicating a robust and reliable association.

Table 3. Association between Dietary Patterns and Systolic Blood Pressure

Dietary Pattern	Normal BP n (%)	Elevated BP n (%)	Total	p-value
Healthy	82 (85.4)	14 (14.6)	96	
Mixed	68 (75.6)	22 (24.4)	90	
Unhealthy	70 (61.4)	44 (38.6)	114	< 0.05
Total	220	80	300	

Table 3 demonstrates that adolescents with unhealthy dietary patterns had a higher prevalence of elevated systolic blood pressure (38.6%) compared to those with healthy diets (14.6%). The association between dietary pattern and systolic blood pressure was statistically significant ($p < 0.05$), suggesting early cardiovascular risk among adolescents consuming unhealthy diets.

The observed increase in BMI and blood pressure among adolescents consuming unhealthy diets may represent early manifestations of metabolic dysregulation. Excessive intake of saturated

fats, refined carbohydrates, and added sugars has been shown to contribute to insulin resistance, low-grade inflammation, and endothelial dysfunction—key mechanisms underlying the development of NCDs such as type 2 diabetes and cardiovascular disease. If these risk factors persist into adulthood, they substantially increase the likelihood of long-term morbidity, disability, and premature mortality.

These findings are consistent with previous studies conducted in both developed and developing countries, which have consistently linked high consumption of ultra-processed foods and sugar-sweetened beverages to adverse health outcomes in adolescents. The urban context of Mataram likely amplifies these risks. Rapid urbanization has altered the local food environment, increasing the availability, affordability, and social acceptability of fast food and processed snacks while reducing reliance on traditional, nutrient-rich diets. The perception of modern food as convenient and desirable may further reinforce unhealthy eating behaviors among adolescents.

Although this study primarily focused on dietary patterns, qualitative insights from structured interviews suggest that poor nutrition rarely occurs in isolation. Many adolescents reported prolonged screen time, low levels of physical activity, irregular sleep schedules, and limited engagement in sports or recreational activities. These lifestyle factors may interact synergistically with unhealthy diets, accelerating weight gain and increasing cardiometabolic risk. This finding highlights the multifactorial nature of NCD risk among adolescents and emphasizes the need for integrated intervention approaches that address both diet and lifestyle behaviors.

From a public health perspective, these results carry important implications. Adolescence represents a critical period for intervention, as health-related behaviors established during this stage often persist into adulthood. School-based interventions, including structured nutrition education and the implementation of healthy school canteen policies, offer a strategic entry point for promoting healthier dietary behaviors. Schools also provide an ideal setting to integrate physical activity promotion and health literacy programs tailored to adolescents' daily routines and preferences.

Family involvement is equally essential, as household food availability, parental dietary habits, and meal practices significantly influence adolescents' food choices. Community-based initiatives that engage parents, teachers, and local health workers can strengthen the impact of school-based programs. Furthermore, local government policies regulating the availability and marketing of unhealthy foods—particularly around schools—can help create environments that support healthier choices.

In conclusion, this study provides strong empirical evidence that unhealthy dietary patterns are significantly associated with increased NCD risk factors among adolescents in Mataram City. The findings highlight the urgent need for early, context-specific, and multi-sectoral interventions to address poor dietary behaviors and associated lifestyle factors. By targeting adolescents during this critical developmental stage, it is possible to reduce the long-term health and economic burden of non-communicable diseases and contribute to the development of a healthier and more productive future generation.

Conclusion

The findings of this study underscore the pressing public health concern posed by the increasing prevalence of non-communicable diseases (NCDs) among adolescents, particularly in urban areas like Mataram City, Lombok, where rapid lifestyle and dietary transitions are taking place. The significant association found between unhealthy dietary patterns and elevated indicators of NCD risk, such as high body mass index (BMI) and increased systolic blood pressure, highlights how critical the adolescent period is in shaping long-term health outcomes. Specifically, adolescents who frequently consumed fast food, sugary drinks, and high-fat snacks were found to be 2.7 times more likely to be at risk of developing NCDs compared to their peers who followed healthier eating habits, which included a diet rich in fruits, vegetables, and whole grains. This not only signals an urgent call

to action for health policymakers but also emphasizes the responsibility of schools, families, and communities in promoting healthier environments for young people. Given that adolescence is a formative stage for establishing lifelong behaviors, interventions targeting this age group have the potential to yield significant long-term benefits. Therefore, comprehensive, school-based nutritional education programs and broader health promotion strategies should be prioritized as part of public health efforts in Mataram and similar urban settings. These interventions should aim not only to raise awareness about the dangers of poor dietary choices but also to actively support adolescents in making healthier food decisions through access to nutritious meals, physical activity programs, and ongoing guidance from health professionals. By addressing dietary risk factors early, it is possible to reduce the future burden of NCDs, foster a healthier generation, and ultimately contribute to the sustainability of the healthcare system.

References

- Amrita, N. N. W. A., Utami, N. W. A., & Adhi, K. T. (2022). Determinants of late adolescent nutritional status in Indonesia: a nation-wide cross-sectional survey. *Nutrition & Food Science*, 52(5), 801–813. <https://doi.org/10.1108/NFS-07-2021-0235>
- Bhutta, Z. A., et al. (2013). Evidence-based interventions for improvement of maternal and child nutrition. *The Lancet*, 382(9890), 452–477. [https://doi.org/10.1016/S0140-6736\(25\)01427-8](https://doi.org/10.1016/S0140-6736(25)01427-8)
- Contento, I. R. (2011). *Nutrition education: Linking research, theory, and practice*. Jones & Bartlett Publishers.
- Drewnowski, A., & Specter, S. E. (2004). Poverty and obesity: the role of energy density and energy costs. *The American Journal of Clinical Nutrition*, 79(1), 6–16. <https://doi.org/10.1093/ajcn/79.1.6>
- Glanz, K., Rimer, B. K., & Viswanath, K. (2008). *Health behavior and health education: Theory, research, and practice*. John Wiley & Sons.
- Hu, F. B. (2002). Dietary pattern analysis: a new direction in nutritional epidemiology. *Current Opinion in Lipidology*, 13(1), 3–9.
- Jamison, D. T., et al. (2013). Global health 2035: a world converging within a generation. *The Lancet*, 382(9908), 1898–1955. [https://doi.org/10.1016/S0140-6736\(25\)01427-8](https://doi.org/10.1016/S0140-6736(25)01427-8)
- Kremers, S. P., et al. (2006). Environmental influences on energy balance-related behaviors: a dual-process view. *International Journal of Behavioral Nutrition and Physical Activity*, 3(1), 9. <https://doi.org/10.1186/1479-5868-3-9>
- Ng, M., et al. (2014). Global, regional, and national prevalence of overweight and obesity in children and adults during 1980–2013. *The Lancet*, 384(9945), 766–781. [https://doi.org/10.1016/S0140-6736\(25\)01427-8](https://doi.org/10.1016/S0140-6736(25)01427-8)
- Nurwanti, E., Hadi, H., Chang, J. S., Chao, J. C. J., Paramashanti, B. A., Gittelsohn, J., & Bai, C. H. (2019). Rural–urban differences in dietary behavior and obesity: Results of the riskesdas study in 10–18-year-old Indonesian children and adolescents. *Nutrients*, 11(11), 2813. <https://doi.org/10.3390/nu11112813>
- Patton, G. C., et al. (2016). Our future: a Lancet commission on adolescent health and wellbeing. *The Lancet*, 387(10036), 2423–2478. [https://doi.org/10.1016/S0140-6736\(25\)01427-8](https://doi.org/10.1016/S0140-6736(25)01427-8)
- Perez-Rodrigo, C., & Aranceta, J. (2003). Nutrition education in schools: experiences and challenges. *European Journal of Clinical Nutrition*, 57, S82–S85. <https://doi.org/10.1038/sj.ejcn.1601824>
- Popkin, B. M. (2017). Relationship between shifts in food system dynamics and acceleration of the global nutrition transition. *Nutrition Reviews*, 75(2), 73–82. <https://doi.org/10.1093/nutrit/nuw064>
- Popkin, B. M., & Reardon, T. (2018). Obesity and the food system transformation in Latin America. *Obesity Reviews*, 19(8), 1028–1064. <https://doi.org/10.1111/obr.12694>

- Rachmi, C. N., Jusril, H., Ariawan, I., Beal, T., & Sutrisna, A. (2021). Eating behaviour of Indonesian adolescents: a systematic review of the literature. *Public Health Nutrition*, 24(S2). <https://doi.org/10.1017/S1368980020002876>
- Sawyer, S. M., et al. (2012). Adolescence: a foundation for future health. *The Lancet*, 379(9826), 1630–1640. [https://doi.org/10.1016/S0140-6736\(12\)60072-5](https://doi.org/10.1016/S0140-6736(12)60072-5)
- Story, M., Neumark-Sztainer, D., & French, S. (2002). Individual and environmental influences on adolescent eating behaviors. *Journal of the American Dietetic Association*, 102(3), S40–S51. [https://doi.org/10.1016/S0002-8223\(02\)90421-9](https://doi.org/10.1016/S0002-8223(02)90421-9)
- UNICEF. (2021). *The State of the World's Children 2021: On My Mind—Promoting, protecting and caring for children's mental health*.
- Verstraeten, R., Leroy, J. L., Pieniak, Z., Ochoa-Avilès, A., Holdsworth, M., Verbeke, W., & Kolsteren, P. (2016). Individual and environmental factors influencing adolescents' dietary behavior in low- and middle-income settings. *PLoS One*, 11(7), e0157744. <https://doi.org/10.1371/journal.pone.0157744>
- World Health Organization. (2020). *Noncommunicable diseases: Key facts*. <https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases>
- World Health Organization. (2021). *Global status report on noncommunicable diseases 2021*. Geneva: WHO.