



Dietary Patterns and Obesity Risk Among Adolescents in Denpasar City, Bali, Indonesia

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Abstract

Adolescent obesity has become a growing public health concern in Indonesia, particularly in urban areas such as Denpasar City, Bali. Rapid urbanization, lifestyle changes, and increased availability of energy-dense foods have significantly altered adolescents' dietary patterns, contributing to excess weight gain. This study aims to examine dietary patterns and their association with obesity risk among adolescents in Denpasar City through an integrative literature-based analysis supported by empirical contextual evidence. A narrative synthesis method was applied using peer-reviewed national and international studies published between 2021 and 2025, focusing on dietary behaviors, fast food consumption, dietary diversity, and obesity-related outcomes among adolescents. The findings indicate that high consumption of fast food, sugar-sweetened beverages, and low intake of fruits and vegetables are consistently associated with increased obesity risk. Studies conducted in Denpasar and Bali demonstrate similar patterns, reinforced by insufficient physical activity and poor nutritional knowledge. The discussion highlights that modern dietary patterns characterized by high fat and sugar intake significantly elevate obesity risk, while balanced and diverse diets serve as protective factors. In conclusion, unhealthy dietary patterns remain a dominant determinant of adolescent obesity in Denpasar City. Strengthening school-based nutrition education, family involvement, and supportive food environments is essential to mitigate obesity risk among adolescents.

Keywords

dietary patterns;
adolescent obesity;
fast food consumption;
urban health;
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Introduction

Adolescent obesity has emerged as a major public health challenge worldwide, particularly in low- and middle-income countries undergoing rapid socioeconomic and nutritional transitions. Adolescence represents a critical stage in the life course, characterized by accelerated physical growth, hormonal changes, and the formation of long-term health behaviors. Imbalances between

energy intake and energy expenditure during this period substantially increase the risk of excessive weight gain and obesity, which often persist into adulthood and contribute to the early onset of non-communicable diseases (Anyanwu et al., 2022).

In recent decades, Indonesia has experienced a marked shift in dietary patterns, moving away from traditional diets rich in whole foods toward modern dietary patterns dominated by energy-dense, nutrient-poor foods. This transition is closely associated with increased consumption of fast food, sugar-sweetened beverages, refined carbohydrates, and foods high in saturated fat. Such dietary changes have been identified as key contributors to the rising prevalence of overweight and obesity among Indonesian adolescents (Permatasari, 2024; Sumiyati et al., 2022). The increasing availability of commercially prepared foods and aggressive food marketing further reinforce unhealthy eating behaviors among young people.

Urbanization plays a significant role in shaping adolescents' dietary behaviors and lifestyle choices. Urban environments tend to provide greater access to fast food outlets, convenience stores, and processed foods, while simultaneously promoting sedentary behaviors through increased screen time and reduced physical activity. Empirical evidence from Indonesian urban settings consistently demonstrates that adolescents residing in cities are more likely to adopt unhealthy dietary patterns and exhibit higher obesity risk compared to their rural counterparts (Achmadi & Handayani, 2024; Suha & Rosyada, 2022).

Denpasar City, as the capital of Bali Province and a rapidly developing urban area, illustrates the nutritional challenges faced by adolescents in urban Indonesia. Economic growth, tourism development, and changing family structures have contributed to lifestyle modifications among adolescents, including altered eating habits and reduced physical activity. Several local studies conducted in Denpasar and Bali report a high prevalence of unhealthy eating behaviors, particularly frequent consumption of fast food, energy-dense snacks, and sugar-sweetened beverages (Kurnianingsih et al., 2022; Wiardani & Kusumajaya, 2023). These behaviors are strongly associated with increased body mass index and elevated obesity risk among adolescents.

Fast food consumption has been repeatedly identified as a dominant dietary risk factor for adolescent obesity. Fast foods are typically characterized by high caloric content, excessive fat, sodium, and added sugars, while offering limited nutritional value. National-level literature reviews and local empirical studies in Indonesia indicate that adolescents who consume fast food frequently have a significantly higher likelihood of being overweight or obese compared to those with healthier eating patterns (Permatasari, 2024; Faidah et al., 2024). In Denpasar, exposure to fast food outlets and convenience foods has increased substantially, reinforcing unhealthy dietary choices among school-aged adolescents.

In addition to excessive fast food intake, inadequate consumption of fruits and vegetables remains a persistent concern. Fruits and vegetables provide essential micronutrients and dietary fiber that contribute to satiety regulation and overall dietary quality. Studies conducted among Indonesian adolescents consistently report low intake of fruits and vegetables, which is associated with increased energy intake and higher obesity risk (Al Kautsari & Santoso, 2022; Oktaviani et al., 2024). Evidence from Denpasar further indicates that many adolescents fail to meet dietary diversity recommendations, reflecting imbalanced food consumption patterns (Utami & Ani, 2023).

Dietary diversity is recognized as an important indicator of diet quality and nutritional adequacy. Limited dietary diversity among adolescents is often influenced by household characteristics, socioeconomic status, and food availability. In Denpasar City, family-related factors, including parental education and household food practices, have been shown to significantly influence adolescents' dietary diversity (Utami & Ani, 2023). Low dietary diversity not only compromises nutrient intake but also contributes to excessive reliance on energy-dense foods, thereby increasing obesity risk.

Nutritional knowledge also plays a crucial role in shaping adolescents' dietary behaviors. Adolescents with limited understanding of healthy eating principles are more likely to engage in unhealthy eating practices, such as frequent fast food consumption and irregular meal patterns. Research conducted among adolescents in Denpasar demonstrates a significant association between low nutritional knowledge and the incidence of obesity (Faidah et al., 2024). These findings suggest that inadequate nutrition literacy may exacerbate the adoption of unhealthy dietary patterns during adolescence.

Dietary behaviors do not operate in isolation but interact with lifestyle factors, particularly physical activity and sedentary behavior. Several studies in Indonesia highlight that unhealthy dietary patterns combined with low levels of physical activity substantially increase the risk of overweight and obesity among adolescents (Hubaybah et al., 2022; Sholihah et al., 2024). In urban settings such as Denpasar, increased screen time and reduced opportunities for physical activity further intensify the negative impact of poor dietary habits on adolescents' nutritional status.

Despite the growing body of literature on adolescent obesity in Indonesia, most studies focus on national or provincial trends without providing a comprehensive synthesis tailored to specific urban contexts. Research that integrates both local and broader empirical evidence remains limited, particularly for Denpasar City. This gap restricts the development of context-specific interventions and policies aimed at addressing adolescent obesity at the municipal level.

Therefore, this study aims to analyze dietary patterns and their association with obesity risk among adolescents in Denpasar City, Bali, through a synthesis of national and international literature. By integrating empirical findings relevant to urban Indonesian settings and local evidence from Denpasar, this study seeks to provide a comprehensive understanding of dietary determinants of adolescent obesity. The findings are expected to inform the development of targeted nutrition education programs, school-based interventions, and supportive food environments to reduce obesity risk among adolescents in Denpasar City.

Materials and Methods

Study Design

This study employed a narrative literature review design to synthesize existing evidence on dietary patterns and their association with obesity risk among adolescents, with a specific contextual focus on Denpasar City, Bali, Indonesia. The narrative approach was selected to allow a comprehensive and integrative interpretation of findings from diverse empirical studies, particularly those examining dietary behaviors, fast food consumption, dietary diversity, and obesity-related outcomes among adolescents. This design is appropriate for identifying consistent patterns, contextual similarities, and key determinants relevant to urban adolescent populations.

Data Sources and Search Strategy

Relevant peer-reviewed articles were identified from national and international scientific databases commonly used in health and nutrition research. The literature search focused on studies published between 2021 and 2025 to ensure the inclusion of recent and relevant evidence. Keywords and combinations of terms related to adolescent obesity, dietary patterns, fast food consumption, dietary diversity, and urban health were applied. The search strategy emphasized studies conducted in Indonesia or in comparable urban settings to enhance contextual relevance to Denpasar City.

Eligibility Criteria

Studies were selected based on predefined inclusion criteria. Eligible articles included empirical research, literature reviews, and secondary data analyses that focused on adolescents aged 10–19 years, as defined by the World Health Organization. Included studies examined dietary patterns, eating behaviors, fast food or junk food consumption, fruit and vegetable intake, dietary

diversity, and their association with overweight or obesity outcomes. Studies conducted in Indonesia, particularly those providing local evidence from Bali or Denpasar City, were prioritized. Articles not published within the specified time frame or not addressing dietary factors related to obesity among adolescents were excluded.

Data Extraction

Data extraction was conducted systematically to ensure consistency across the reviewed studies. Key information extracted from each article included author and year of publication, study location, study design, population characteristics, dietary variables assessed, obesity-related outcomes, and principal findings. Particular attention was given to results that demonstrated clear associations between dietary patterns and obesity risk among adolescents. Extracted data were organized thematically to facilitate comparison and synthesis across studies.

Data Analysis and Synthesis

The analysis was performed using a thematic narrative synthesis approach. Studies were grouped based on dominant dietary patterns and key dietary behaviors, including fast food consumption, intake of sugar-sweetened beverages, fruit and vegetable consumption, and dietary diversity. The association between these dietary patterns and obesity risk was examined by identifying consistent trends and recurring findings across the literature. Local evidence from Denpasar City and Bali was integrated with national and international findings to strengthen contextual interpretation.

The synthesis emphasized empirical consistency rather than statistical aggregation, as the included studies varied in design, measurement tools, and analytical approaches. Findings were described descriptively and interpreted in relation to the urban context of Denpasar City, highlighting environmental and behavioral factors that influence adolescents' dietary practices.

Methodological Rigor

To enhance the credibility of the review, only peer-reviewed articles from reputable journals were included. The use of clearly defined inclusion criteria and systematic data extraction minimized selection bias. Although this study did not employ a meta-analytic approach, the narrative synthesis was conducted transparently by linking conclusions directly to the evidence reported in the reviewed literature.

Ethical Considerations

This study relied exclusively on secondary data obtained from published literature and publicly accessible datasets. Therefore, ethical approval and informed consent were not required. All sources were appropriately cited to acknowledge original authors and to maintain academic integrity.

Results and Discussion

Overview of Reviewed Evidence

The synthesis of the reviewed literature demonstrates a consistent association between unhealthy dietary patterns and increased obesity risk among adolescents. Studies conducted at the national level and in urban settings, including Denpasar City and Bali Province, reveal similar trends in adolescents' eating behaviors. High consumption of fast food, sugar-sweetened beverages, and energy-dense snacks, combined with inadequate intake of fruits and vegetables, emerges as a dominant dietary pattern associated with overweight and obesity outcomes (Kurnianingsih et al., 2022; Wiardani & Kusumajaya, 2023; Permatasari, 2024).

The reviewed studies vary in methodological design, including cross-sectional surveys, literature reviews, and secondary data analyses. Despite these differences, the findings consistently

highlight dietary behavior as a key determinant of adolescent obesity in urban Indonesian contexts. Local evidence from Denpasar strengthens the relevance of these findings by demonstrating similar dietary risks within the city's adolescent population.

Fast Food Consumption and Obesity Risk

Fast food consumption is the most frequently reported dietary risk factor across the reviewed studies. Adolescents who regularly consume fast food exhibit a higher likelihood of overweight and obesity compared to those with healthier eating habits. Fast foods are characterized by high energy density, excessive fat, sodium, and added sugars, which contribute to positive energy balance and weight gain.

Empirical studies in Indonesia consistently report a significant association between frequent fast food consumption and obesity among adolescents (Sumiyati et al., 2022; Permatasari, 2024; Amelia et al., 2025). Local studies conducted in Denpasar further confirm that adolescents with high fast food intake demonstrate higher body mass index and poorer overall dietary quality (Faidah et al., 2024; Kurnianingsih et al., 2022). These findings align with international evidence linking modern dietary patterns to increased obesity risk among young populations (Anyanwu et al., 2022).

Table 1 summarizes key empirical findings related to fast food consumption and adolescent obesity.

Author(s)	Study Location	Study Focus	Key Findings
Sumiyati et al. (2022)	Indonesia	Fast food intake	Frequent fast food consumption associated with higher obesity prevalence
Permatasari (2024)	Indonesia	Literature review	Strong positive association between fast food consumption and obesity
Faidah et al. (2024)	Denpasar	Nutritional knowledge and fast food	Low knowledge linked to higher fast food intake and obesity
Kurnianingsih et al. (2022)	Denpasar	Eating habits during pandemic	Increased fast food intake associated with higher BMI

Fruit and Vegetable Intake and Dietary Diversity

Low intake of fruits and vegetables is another recurring finding in the reviewed literature. Fruits and vegetables contribute dietary fiber, vitamins, and minerals that support satiety regulation and metabolic health. Inadequate consumption reduces dietary quality and increases reliance on energy-dense foods, thereby elevating obesity risk.

Studies among Indonesian adolescents consistently report insufficient fruit and vegetable intake, which is significantly associated with overweight and obesity (Al Kautsari & Santoso, 2022; Oktaviani et al., 2024). Research conducted in Denpasar highlights limited dietary diversity among adolescents, influenced by family characteristics and household food practices (Utami & Ani, 2023). Low dietary diversity not only reflects imbalanced food consumption but also increases vulnerability to excessive caloric intake from processed foods.

Table 2 presents empirical findings related to fruit and vegetable intake and dietary diversity.

Author(s)	Study Location	Dietary Indicator	Main Findings
Al Kautsari & Santoso (2022)	Jakarta	Fruit and vegetable intake	Low intake associated with obesity and central obesity
Oktaviani et al. (2024)	Indonesia	Vegetable and fruit consumption	Inadequate intake linked to poor nutritional status
Utami & Ani (2023)	Denpasar	Dietary diversity	Low dietary diversity influenced by family characteristics

Interaction Between Dietary Patterns and Lifestyle Factors

Dietary behaviors interact closely with lifestyle factors, particularly physical activity and sedentary behavior. Several studies emphasize that unhealthy dietary patterns combined with low physical activity significantly increase obesity risk among adolescents (Hubaybah et al., 2022; Sholihah et al., 2024). In urban environments such as Denpasar City, increased screen time and limited opportunities for physical activity further exacerbate the negative impact of poor dietary habits.

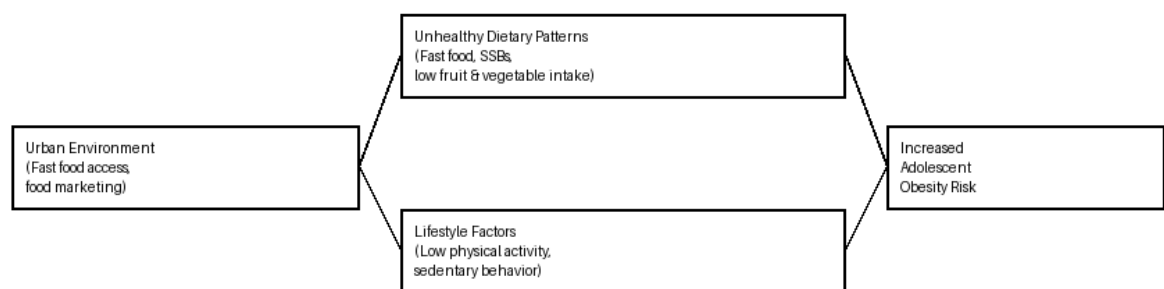
Evidence from Bali indicates that adolescents experiencing obesity often exhibit multiple risk behaviors simultaneously, including unhealthy eating patterns, low physical activity, and excessive internet use (Wiardani & Kusumajaya, 2023). These findings suggest that obesity among adolescents results from the cumulative effect of dietary and lifestyle factors rather than isolated behaviors.

Conceptual Integration of Findings

Based on the synthesized evidence, adolescent obesity risk in Denpasar City can be understood as the outcome of interactions between the urban food environment, unhealthy dietary patterns, and lifestyle behaviors. Urban settings increase access to fast food and processed foods, which shape adolescents' dietary choices. When combined with sedentary lifestyles, these dietary patterns substantially elevate obesity risk.

A conceptual diagram summarizing this relationship is provided below.

Figure 1. Conceptual Framework of Dietary Patterns and Obesity Risk Among Adolescents



This framework is derived from consistent empirical findings reported in the reviewed literature and does not introduce new variables or assumptions. It illustrates how environmental and behavioral factors jointly influence adolescent obesity risk in urban contexts.

Implications for Obesity Prevention in Denpasar City

The findings underscore the need for integrated obesity prevention strategies that address dietary behaviors and lifestyle factors simultaneously. School-based nutrition education programs have demonstrated potential in improving dietary knowledge and promoting healthier eating

practices among adolescents (Stefani & Fadlina, 2023). Strengthening family involvement and creating supportive food environments are also essential to reduce adolescents' reliance on fast food and energy-dense snacks.

Conclusion

This study synthesizes empirical evidence demonstrating that unhealthy dietary patterns remain a primary determinant of obesity risk among adolescents in Denpasar City, Bali. High consumption of fast food, sugar-sweetened beverages, and energy-dense snacks, combined with inadequate intake of fruits and vegetables and limited dietary diversity, consistently emerge as dominant dietary behaviors associated with increased obesity risk. These patterns reflect broader nutrition transitions occurring in urban Indonesian settings and are reinforced by environmental and lifestyle factors.

The findings highlight that dietary behaviors during adolescence are shaped by urban food environments that facilitate access to unhealthy foods while limiting opportunities for balanced dietary choices. Local evidence from Denpasar confirms that adolescents' dietary practices are further influenced by nutritional knowledge, family characteristics, and lifestyle behaviors, particularly low levels of physical activity. The interaction of these factors contributes to sustained positive energy balance and increased vulnerability to obesity.

From a public health perspective, the results underscore the importance of comprehensive obesity prevention strategies that prioritize improvements in dietary quality among adolescents. Strengthening school-based nutrition education, enhancing adolescents' nutrition literacy, and promoting balanced and diverse diets are essential components of effective intervention. In addition, creating supportive food environments through family engagement and community-level initiatives may help reduce adolescents' dependence on fast food and processed products.

Overall, addressing unhealthy dietary patterns among adolescents is a critical step toward reducing obesity risk and improving long-term health outcomes in Denpasar City. The evidence synthesized in this study provides a foundation for targeted, context-specific policies and programs aimed at preventing adolescent obesity in urban Indonesia.

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