



Trends in Ultra-Processed Food Consumption and Its Correlation to Obesity Risk in Urban Adolescents

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Abstract: *The trend of ultra-processed food (UPF) consumption among urban adolescents has increased along with the modern, fast-paced lifestyle. This consumption pattern has the potential to increase the risk of obesity, especially in school-age groups. This study aims to analyze the relationship between the level of ultra-processed food consumption and the risk of obesity in adolescents based on Body Mass Index (BMI). The study was conducted with a quantitative approach and cross-sectional design on 200 high school students in the DKI Jakarta area. Data were collected through a Food Frequency Questionnaire (FFQ) and anthropometric measurements (weight and height). The analysis technique used the Kolmogorov-Smirnov normality test, Pearson correlation test, and simple linear regression with a significance level of $p < 0.05$. The results showed that the majority of respondents consumed ultra-processed foods in the moderate to high category. The highest average BMI was recorded in the high UPF consumption group (24.3), while the low consumption group had an average BMI of 21.4. The Pearson correlation test yielded an r value of 0.479 ($p = 0.000$), and linear regression showed a 23% contribution of UPF consumption to BMI variation ($R^2 = 0.230$). This study concluded that there is a significant positive relationship between ultra-processed food consumption and obesity risk in urban adolescents. These results provide an important basis for strengthening nutrition education programs, limiting unhealthy food advertising, and implementing healthy canteen policies in school environments.*

Keywords: *Ultra-Processed Foods, Adolescents, Obesity*

INTRODUCTION

The development of the modern food industry has brought about significant changes in the consumption patterns of global society, including Indonesia. This change is evident in the increasing consumption of ultra-processed foods (UPFs), which have now become an essential part of daily life, particularly among urban youth. UPFs refer to food products that have undergone intensive industrial processing, typically containing numerous additives such as colorings, artificial flavors, sweeteners, preservatives, and emulsifiers. Examples of UPFs include instant noodles, packaged sausages, sweetened



beverages, packaged snacks, and other ready-to-eat foods (Monteiro, 2019). The increasing trend in UPF consumption reflects the phenomena of globalization and urbanization, which have impacted people's lifestyles. In large cities, adolescents tend to choose convenient and affordable instant foods as substitutes for home-cooked meals. This phenomenon is exacerbated by a lack of nutrition education, limited time due to busy academic schedules, and the influence of social media, which massively promotes viral UPF-based food trends (Fardet Edmond, 2015; UNICEF, 2020).

International studies confirm that ultra-processed foods are high in energy, low in fiber, and contain large amounts of trans fats and added sugars. Regular consumption of these foods has been linked to an increased risk of various health problems, particularly obesity. Hall (2019) demonstrated through clinical research that individuals consuming ultra-processed foods experienced a significant increase in daily calorie intake compared to those consuming unprocessed foods, despite having similar macronutrient levels. In the long term, this excess calorie intake, not balanced by physical activity, is a major cause of obesity. In Indonesia, the problem of obesity among adolescents has become a pressing public health issue. According to the 2018 Basic Health Research (Riskesdas), the prevalence of overweight and obesity among adolescents aged 13–18 years reached 13.5%, up from 10.8% in 2013 (Kesehatan, 2018). This figure indicates a consistent trend that has the potential to worsen if serious intervention is not undertaken. Obesity not only impacts physical appearance, but is also closely related to various chronic diseases such as type 2 diabetes, hypertension, and cardiovascular disease in adulthood (Biro Michelle, 2010).

Adolescents are an age group highly vulnerable to lifestyle changes. The transition from childhood to young adulthood is often accompanied by hormonal changes and eating behaviors. Furthermore, exposure to digital media and unhealthy food advertisements through online platforms creates a consumption environment that is not conducive to health (Robinson et al., 2013). A study by Moubarac (2013) found that increased consumption of UPFs is closely linked to lifestyle changes in urban areas, including a tendency toward sedentary lifestyles, eating out, and reliance on food delivery services. Adolescents in urban Indonesia, particularly in Jakarta and other large cities, face a dual nutritional challenge: micronutrient deficiencies due to insufficient fruit and vegetable consumption, and overweight due to excessive calorie consumption from ultra-processed foods. This phenomenon is exacerbated by the lack of open spaces for physical activity and high academic pressure, which leads adolescents to spend more time sitting or playing with devices (Ismail, 2022).

Numerous studies have revealed a link between ultra-processed food consumption and obesity in various countries. In the United States, a study by Juul (2021) found that UPF consumption significantly increases a person's risk of obesity and metabolic syndrome. In Canella (2022) found that UPF contributes more than 50% of adolescents' energy intake, which correlates with a high prevalence of overweight. A study by Zhang (2021) in China showed that excessive UPF consumption in children and adolescents increases the risk of obesity by 80% compared to a group consuming minimally processed foods. However, in Indonesia, studies specifically highlighting the relationship between UPF consumption and obesity risk in adolescents in urban areas are still very limited. Most local studies only describe instant food consumption patterns without directly linking them to health parameters such as Body Mass Index (BMI) or waist circumference (Putri, 2021; Wulandari R., 2023). Furthermore, few studies have used a quantitative approach based on survey data and adequate anthropometric measurements.

A significant research gap lies in the lack of empirical studies linking the intensity of ultra-processed food consumption to objective data on adolescent nutritional status, particularly in the context of urban Indonesia. Furthermore, social environmental factors, the influence of digital media, and the abundant

accessibility of fast food in urban areas have not been widely integrated into analytical frameworks. Yet, these factors play a crucial role in shaping adolescent eating behavior and deserve special attention in designing policy interventions (Organization, 2021) (Swinburn et al., 2011; WHO, 2021). The novelty of this study lies in its specific focus on high school adolescents in the Jakarta area, which represents an area with high exposure to food industrialization, digitalization, and limited access to fresh food. This study uses a quantitative approach with a standardized instrument to measure food consumption (Food Frequency Questionnaire/FFQ) and direct measurement of nutritional status through Body Mass Index. Furthermore, this study attempts to identify contextual factors underlying UPF consumption preferences among adolescents, such as practical reasons, time constraints, and social influences. This study not only aims to generate descriptive data on trends in ultra-processed food consumption but also contributes to advocacy efforts for evidence-based health policies, particularly in the education and public health sectors. The results are expected to form the basis for more targeted interventions, such as adolescent nutrition campaigns, school canteen reform, and regulation of unhealthy food advertising on social media. Therefore, the purpose of this study is to analyze trends in ultra-processed food consumption among adolescents in urban areas and examine their correlation with obesity risk based on Body Mass Index (BMI).

METHODOLOGY

This study used a quantitative approach with a cross-sectional design to identify the relationship between the level of ultra-processed food consumption and the risk of obesity in adolescents in urban areas. This study was associative, focusing on the correlation analysis between two main variables, namely the level of ultra-processed food consumption and Body Mass Index (BMI). The study was conducted in three State Senior High Schools (SMAN) located in the DKI Jakarta area, namely in South Jakarta, Central Jakarta, and East Jakarta. These areas were chosen because they represent urban environments with socio-economic characteristics and high exposure to ultra-processed foods. Data collection was conducted from March to April 2025. The population in this study were all grades 10 and 11 high school students aged 13–18 years in the three SMANs.

Purposive sampling technique was used to select respondents with the following inclusion criteria:

- Willing to be a respondent (fill out the informed consent),
- Have no history of chronic disease or metabolic disorders,
- Comes from a family that has lived in an urban area (Jakarta) for at least the last 5 years.

The sample size was 200 respondents, which was considered sufficient for correlation analysis in a cross-sectional design. This study involved two main variables: the independent variable, the level of ultra-processed food consumption, measured using the Food Frequency Questionnaire (FFQ), categorized into low, medium, and high based on weekly consumption frequency; and the dependent variable, the risk of obesity, measured using the Body Mass Index (BMI), calculated from weight and height measurements, and classified based on WHO standards for adolescents. Data in this study were collected through two main methods: questionnaires and anthropometric measurements. The questionnaire used was the Food Frequency Questionnaire (FFQ) which had been adapted to the types of ultra-processed foods commonly consumed by adolescents in Indonesia, consisting of 12 food/drink items, and was used to assess the frequency of respondents' consumption in the past week. Meanwhile, anthropometric data were obtained through height measurements using a stadiometer and weight using a digital scale, which were then used to calculate the Body Mass Index (BMI). In addition, additional data such as age, gender, and daily physical activity were also collected as control variables. The analysis was conducted using SPSS version 25.



Descriptive analysis was used to describe the characteristics of the respondents. Normality tests were performed using the Kolmogorov-Smirnov test. The Pearson correlation test was used to examine the relationship between UPF consumption and BMI, and simple linear regression was used to measure the contribution of UPF consumption to obesity risk. Significance was determined at $p < 0.05$.

RESULTS AND DISCUSSION

The aim of this study was to analyze trends in ultra-processed food consumption among adolescents in urban areas and examine its correlation with obesity risk based on Body Mass Index (BMI). The following data were obtained:

UPF and BMI Consumption Results Table

No	UPF Consumption Category	Number of Respondents	Average BMI	Dominant Nutritional Status
1.	Low	40	21.4	Normal
2.	Currently	80	22.7	Normal-Tends to be Overweight
3.	Tall	80	24.3	Overweight - Obesity

This study involved 200 high school students in the DKI Jakarta area who were grouped into three categories based on their ultra-processed food consumption: low, medium, and high. Based on the data processing, 40 students were categorized as low-consumer, 80 as medium-consumer, and 80 as high-consumer. This data indicates that most respondents have a fairly high consumption pattern of ultra-processed foods. From the results of anthropometric measurements, the average Body Mass Index (BMI) values were obtained for each consumption group. In the low-consumer group, the average BMI was 21.4, which is still included in the normal nutritional status category. The moderate-consumer group had an average BMI of 22.7, which is close to the threshold for overweight. Meanwhile, the high-consumer group showed an average BMI of 24.3, which is already heading towards the overweight to obese category.

The following are the statistical test results from the SPSS analysis.

Statistical Test Results Table

No	Test Type	Results
1.	Normality Test (Kolmogorov-Smirnov)	Sig. = 0.073 (normal)
2.	Pearson Correlation Test	$r = 0.479$; $p = 0.000$ (significant)
3.	Simple Linear Regression Analysis	$R^2 = 0.230$ (contribution of UPF consumption to BMI)

Pearson correlation analysis results showed a positive and significant relationship between the level of ultra-processed food (UPF) consumption and adolescents' Body Mass Index (BMI) ($r = 0.479$; $p = 0.000$). This moderate correlation indicates that the more frequently adolescents consume ultra-processed foods, the higher their likelihood of being overweight or obese. Simple linear regression analysis showed that UPF

consumption accounted for 23% of the variation in BMI values ($R^2 = 0.230$), meaning that consumption of these foods is a substantial predictor of an increased risk of obesity. This finding is consistent with research by Hall et al. (2019) which showed that a UPF-based diet causes an unconscious increase in daily calorie consumption, even though the macronutrient content is equivalent to a fresh food diet. This study reinforces the fact that high processing increases palatability and speed of consumption, which encourages overeating. Monteiro et al. (2019) also confirmed that ultra-processed foods are hyper-palatable and low in fiber, causing disruption of the body's satiety signals.

A study by Rauber (2020) in Brazil found that UPF contributes between 30 and 50% of total daily energy intake in adolescents, which is closely linked to the increasing prevalence of obesity. Meanwhile, Juul et al. (2021) found that US adolescents who regularly consumed UPF showed a significant weight gain trend within two years. This suggests that obesity trends are not solely determined by genetic factors, but also by changes in the food environment and consumption preferences resulting from exposure to industrial food products. In the Indonesian context, these findings are relevant to the results of Putri (2021) who found that adolescents in Jakarta who consumed fast food more than three times per week had a 1.7 times greater risk of being overweight than those who consumed it less frequently. Furthermore, Wulandari R., (2023) reported that instant food consumption was the most influential variable in a predictive regression model for the nutritional status of adolescents in urban areas. Not only nutritional aspects, but UPF consumption is also closely related to psychosocial and behavioral factors. Boyland (2016) in their meta-analysis highlighted the dominant role of social media and digital advertising in shaping adolescents' food preferences, particularly high-calorie, low-nutrient foods. Most respondents in this study also reported that their decisions to consume UPF were influenced by advertising, viral food trends, and limited time and money. In terms of nutritional education, low nutritional literacy among adolescents is one of the main causes of high UPF consumption. Sarmugam Anthony (2015) noted that the ability to read food labels and understand nutritional information significantly influences healthy food choices. In this study, only a small proportion of respondents were able to explain the meaning of calorie content, trans fat, or added sugar in packaged foods.

The combination of a high-UPF diet with low physical activity worsens nutritional status. A study by (Taveras, 2011) showed that sedentary behavior in children and adolescents, such as excessive use of mobile devices, reduces time for balanced physical activity and significantly increases the risk of obesity. This is consistent with field findings, where most respondents reported spending more than three hours per day on sedentary activities. Finally, from a policy and intervention perspective, these findings indicate the importance of a multidisciplinary approach. Taillie, (2021) showed that the implementation of excise taxes on UPF products in several Latin American countries successfully reduced consumption and reversed obesity trends. In Indonesia, similar interventions need to be supported by nutrition education in schools, strengthening healthy canteen policies, and restricting unhealthy food advertising targeting adolescents. Thus, the correlation between UPF consumption and increased BMI is not simply a statistical relationship, but rather a reflection of the food and social environment challenges facing urban adolescents today. These findings provide a strong empirical basis for designing more contextual and sustainable public health interventions.

CONCLUSIONS



Based on the research conducted, it can be concluded that the results of the Pearson correlation test indicate a positive and significant relationship between the level of consumption of ultra-processed foods (UPF) and Body Mass Index (BMI) values in urban adolescents, with a correlation coefficient value of $r = 0.479$ and $p = 0.000$. This value indicates that the more frequently adolescents consume ultra-processed foods, the higher the likelihood of them being overweight or obese.

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