IMPACT OF ULTRA-PROCESSED FOOD CONSUMPTION ON THE RISK OF OBESITY IN THE PRODUCTIVE AGE GROUP - LITERATURE REVIEW

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Abstract

Consumption of UPFs continues to increase with the development of the food industry and urbanization. UPFs are high in calories, fat, sugar, additives, and low in nutrients. Excessive intake of these foods leads to an energy surplus in the body, which can trigger fat accumulation and increase the risk of obesity. This study aims to examine the relationship between UPF consumption and the risk of obesity in productive-age Indonesians. This study employed a qualitative method through a literature review, analyzing scientific articles related to UPF and obesity in productive age groups from 2020 to 2025. The literature was searched online, selected based on inclusion criteria, and analyzed descriptively and qualitatively using a thematic approach. The study results show that most studies found a significant association between UPF consumption and an increased risk of obesity. Factors contributing to high consumption of ultra-processed foods among those of productive age include easy access, attractive packaging, delicious taste, low price, and convenient preparation. Psychological factors such as the reward system and dopamine play a role in regulating eating behavior and may encourage UPF consumption. High consumption of UPF is a major risk factor for obesity in the productive age group. Nutrition education, regulation of UPF product promotion, strengthening of labeling policies, and increased access to healthy foods are needed to reduce UPF consumption and reduce the prevalence of obesity in the productive age group.

Keywords: Ultra Processed Food, Obesity, Productive Age

Introduction

Ultra-processed foods (UPFs) have garnered increasing attention in recent years due to their significant global public health impact.[1] UPFs are commercially produced items created through the chemical modification of food ingredients, involving the addition of sugar, salt, oils, fats, and various additives such as sweeteners, colorants, emulsifiers, and preservatives.[2] These UPF products include packaged snacks, bottled beverages, candies, processed meats, mass-produced bread, and more.[3] With the rapid development of the food industry and global urbanization, UPF consumption has sharply increased in various countries. This shift from fresh and minimally processed foods toward ultra-processed options has contributed to a rise in numerous health problems.

Recent data indicates that UPFs account for over half of the total caloric intake in the United States (58%), the United Kingdom (57%), and Canada (46% among children and adolescents). In other middle- and high-income countries, their contribution ranges between 20–40%, with sales trending upwards.[4] This phenomenon is also observed in Indonesia, where UPFs contributed approximately 45% of total daily caloric intake in 2020, particularly among children and adolescents.[1] The connection

between UPF consumption and obesity is increasingly strengthened by various scientific findings, which show that these ultra-processed foods are closely associated with an increased total intake of energy, fat, and sugar. This contributes to a caloric surplus and an overall decline in diet quality. One study found that 79.1% of subjects were overweight, with 64.4% of them exhibiting high levels of UPF consumption.[5]

Obesity itself is a condition resulting from an imbalance between energy intake and expenditure, characterized by excessive fat accumulation in the body.[6] Global data shows an increase in obesity prevalence in men from 4.8% (1990) to 14.0% (2022), and in women from 8.8% to 18.5% during the same period, with the total number of affected individuals reaching 878 million in 2022.[7] Despite extensive research on the impact of ultra-processed foods on obesity, there is still limited research specifically highlighting the productive age group as a vulnerable population, as well as the various factors that can influence it. Therefore, this literature review aims to analyze how ultra-processed food consumption patterns contribute to an increased risk of obesity in individuals of productive age (15–64 years) based on the latest scientific findings.

Method

This research employs a qualitative method with a literature review approach. This literature review aims to collect, summarize, and analyze information relevant to the issue of ultra-processed food (UPF) consumption and obesity in the productive age group. Literature was searched online from March to June 2025 using several databases such as Google Scholar, PubMed, Perpusnas, and ScienceDirect. Keywords used in the literature search process included "consumption," "ultra-processed food," "obesity," and "productive age." The search was conducted by combining keywords using Boolean operators such as AND and OR to obtain more specific results. Articles selected for review were those available in full text, open access, from reputable scientific journals, and published within the last five years (between 2020 and 2025). Articles also had to specifically discuss the relationship between UPF consumption and obesity in the productive age group (15-64 years). Meanwhile, articles not available in full text, irrelevant to the study topic, or researching populations outside the productive age group were excluded from the analysis.

The data collection process was conducted systematically. The first step was determining the topic and search keywords. Subsequently, literature was searched and selected based on the established inclusion and exclusion criteria. Articles that passed the selection were then read and analyzed in depth. The data analysis technique used was qualitative descriptive, which involved identifying main themes, patterns of relationships between variables, and important findings from each article. The information obtained was then categorized into several main topics, such as the characteristics and nutritional content of ultra-processed foods, trends in UPF consumption in Indonesia, the impact of UPF consumption on nutritional status and health, and obesity risk factors in the productive age related to dietary patterns. The results of the analysis are presented in narrative form and thematic tables to strengthen the exposition.

Results

A literature review on the relationship between ultra-processed food (UPF) consumption and obesity in the productive age group in Indonesia reveals that most analyzed studies indicate a significant link between high UPF consumption and an increased risk of obesity. For instance, a study by Setyaningsih et al. among university students in Surakarta found that 79.1% of respondents were overweight. Of these, 62.15% had poor diet quality, and 64.4% were in the third quintile of UPF consumption. High UPF consumption correlated with an increased total intake of energy, protein,

carbohydrates, and fat, and showed a negative correlation with diet quality (r = -0.480). This means that higher UPF consumption leads to lower diet quality, which can contribute to an increased risk of obesity due due to energy imbalance.[5]

These findings are reinforced by another study by Ramadhani and Djamaluddin, which demonstrated a positive relationship between the consumption of processed and ready-to-eat foods and the incidence of obesity. Obese individuals tend to consume larger amounts of processed and ready-to-eat foods, with an average consumption value of 217.407. Each unit increase in processed food consumption raised the probability of obesity by 0.756, particularly in urban populations. Furthermore, high consumption of fast food among children and adolescents also diminishes diet quality and encourages unhealthy food choices. High energy density, high glycemic load, and excessive portion sizes are significant factors driving the increase in overweight and obesity prevalence.[8]

Meanwhile, other research by Putri, Setyaningsih, and Nurzihan indicated a positive relationship between sedentary activity and UPF consumption with students' nutritional status. Though the correlation strength was relatively low (r = 0.304), increased frequency of UPF consumption was still associated with a rise in overweight status. In this study, 18.18% of respondents were overweight and 18.18% were obese. All respondents reported consuming UPFs within the last month, indicating a consumption pattern that could negatively impact nutritional status. [9]

Furthermore, a study by Fauziyyah, Diana, and Femelia showed that nearly half of the adult respondents (45.6%) were obese, and 43.4% had high UPF consumption. Additionally, poor sleeping habits (55.1%) and unhealthy online food ordering practices (59.6%) were prevalent among the majority of respondents. Statistical tests revealed a significant relationship between UPF consumption and obesity (p = 0.034), where individuals with high UPF consumption had a 2.10 times greater risk of obesity compared to those with low consumption.[10] This is supported by research from Maulidina and Alwi, which, after logistic regression statistical testing, showed that the influence of ultra-processed foods on obesity in adolescent girls at SMK-SMAK Makassar had a p-value of 0.012 (p < 0.05). Thus, it can be concluded that there is an influence of ultra-processed food consumption.[11]

While most studies indicate a significant relationship between UPF consumption and obesity, some research reports differing results. For instance, Raishi, Firlia, and Utami, through an analytical case-control study, found that despite 53.2% of respondents in the case group frequently consuming UPFs, there was no significant relationship between UPF consumption and obesity. Their chi-square test yielded a p-value of 0.409 (p < 0.05), meaning the UPF consumption variable could not be consistently linked to the incidence of obesity in the studied group.[12] Similar findings were obtained by Husna, Zenia, and Imas, who, through bivariate analysis, found no significant relationship between UPF consumption and overweight status (p = 0.156), even though there was a tendency for respondents who frequently consumed UPFs to have a higher proportion of overweight individuals (61.5%) compared to those who consumed them rarely (20.0%).[13]

Table 1 Summary of Articles According to Research Objectives

No	Author	Year	Country	Article Title	Design of The Study	Findings
1.	Aryanti Setyaningsih, Indri Mulyasari, Puji Afiatna, Happy Risa Putri	2024	Surakarta	The Relationship between Ultra-Processed Food Consumption with	Cross-Sectional	A correlation has been identified between the consumption of ultra-processed foods and the prevalence of obesity and diet quality in young adults (aged 18-25 years).
2.	Ira Chinta Ramadhani, Sartika Djamaluddin	2024	Indonesia	The Impact of Processed and Ultra-Processed Food Consumption on Obesity in Indonesia	Instrumental Variable Probit Regression (IV probit)	There is a positive association between obesity and the consumption of processed foods among adults aged 19 years and older.
3.	Raishi Amatullah Hanifa1, Firlia Ayu Arini, Utami Wahyuningsih	2024	Jakarta	Night Eating Syndrome, Ultra-processed Foods Consumption, and Physical	Observational Analytic Study with a Case-Control Design	There is no significant correlation between the consumption of ultra-processed foods and physical activity, and overweight status in adults (aged 19-23 years).
4.	Happy Risa Putri, Aryanti Setyaningsih, Nastitie Cinintya Nurzihan	2023	Surakarta	Relationship of Sedentary Activity and Consumption of Ultra-Processed Foods with Nutritional Status Among College Students in Kusuma Husada Surakarta University	Quantitative Research with a Cross-Sectional Approach	There is a significant relationship between ultra-processed food consumption and nutritional status in adults (aged 19-25 years), although the correlation is low.
5.	Hana Fauziah, Fivi Melva Diana, Welly Femelia	2022	Padang	Relationship of Ultra-Processed Food Consumption, Sleep Habits, and Online Food Ordering Practices with Obesity in Adults	Quantitative Research with a Cross-Sectional Approachl	There was a significant association observed between the consumption of ultra-processed foods and obesity among adults (20 to >50 years old).
6.	Husna Dzakya Azzahra, Zenia Elsa Fitri, Imas Arumsari	2025	Banten	The Relationship between Ultra-Processed Food (UPF) Consumption, Sedentary Behavior, and Overweight Status among Students at SMAN 1 Tangerang, Banten, Indonesia	Quantitative Research with a Cross-Sectional Approach	There is no significant relationship between UPF consumption and overweight status (p-value 0.156).

7.	Putri Dwi Maulidina, Muhammad Khidri Alwi, Sitti Patimah, Muhammad Ikhtiar, Yusriani	2025	Makassar	The Effect of Ultra-Processed Food or Beverage Consumption on the Incidence of Obesity in Adolescent Girls at SMK-SMAK Makassar	Quantitative Research with Cross-Sectional Approach	There is an association between ultra-processed food consumption and the incidence of obesity in adolescent girls (aged 15-18 years). Though the correlation strength was relatively low (r = 0.304)

Discussion

The NOVA classification system categorizes foods based on their level of processing. Ultra-Processed Foods (UPFs) fall into group four, which includes a wide range of ready-to-eat products. Such as packaged snacks, soft drinks, instant noodles, ready-to-heat frozen meals, and various other instant food items. A key characteristic of UPFs is the significant alteration of their food structure and texture, often containing little to no whole food ingredients. These products heavily rely on various food additives to enhance their flavor, texture, appearance, and shelf life. Furthermore, UPFs typically have a poor nutritional profile; they're often high in energy, salt, sugar, and saturated fat, while being low in fiber, micronutrients, and vitamins.

In recent decades, Indonesia has experienced a significant shift in people's consumption patterns, especially among productive age groups such as teenagers and young adults. One prominent transformation is the increasing consumption of Ultra-Processed Food (UPF). This change cannot be separated from the development of the global food industry and the ease of access to processed products that are increasingly widespread in the market. In line with this, a study conducted by Oddo et al. shows that the trend of UPF consumption in Indonesia has increased significantly along with the rapid pace of urbanization and economic growth. Through data from the Indonesian Family Life Survey, it is known that the prevalence of overweight in adults increased from 17.1% in 1993 to 33% in 2014. During the same period, ultra-processed food consumption became ubiquitous, including among adolescents and young adults.[14]

Furthermore, similar results were reported by Pries et al. who analyzed Gallup World Poll data from five Southeast Asian countries including Indonesia. The results revealed that more than 75% of Indonesian adolescents aged 15-19 years consume UPF. Compared to adults, adolescents show a higher tendency to choose convenience foods that are generally cheaper and more accessible, especially in urban areas. The trend of ultra-processed food consumption in Indonesia shows an alarming increase, especially in productive age groups such as late adolescents and young adults.[15]

Based on a study conducted by Setyaningsih et al., the majority of students aged 18 to 25 years were recorded to consume a fairly high amount of UPF, which was around 14.89 - 24.10% of the total daily energy needs.[5] In addition, research by Putri et al. involving university students in Surakarta also reinforced the picture of the increasing trend. The findings showed that as many as 43.2% of respondents consumed in high frequency, with a tendency to make products such as packaged chips, frozen foods, and sugar-sweetened beverages part of daily consumption. Both findings reflect a shift in eating patterns away from traditional fresh foods towards convenience and ready-to-eat foods.[9]

Ultra-processed foods (UPF) are known for having a high energy content as they are high in added sugars, unhealthy fats and very low in fiber. This composition has a direct impact on appetite regulation and metabolic function. Due to their very high caloric content, especially from sugar and fat, they can lead to an unnoticed excess of daily energy intake, as these foods do not provide a sense of satiety in balance with the amount of calories taken in.[10] The strong savory and sweet flavors in UPF are deliberately created to increase the attractiveness of the food so that it is consumed in large

quantities. This can interfere with the body's natural signals in regulating hunger and satiety, so a person tends to eat more than needed. The low fiber and protein content also inhibits the release of satiety hormones such as leptin and GLP-1, which ultimately worsens the control of food intake.[5]

Regular consumption of Ultra Processed Food will reduce the quality of diet and trigger a persistent increase in blood sugar levels and the hormone insulin, which in the long run can lead to insulin resistance and increased fat storage, especially in the abdominal area.[11] In addition, the content of additives such as artificial sweeteners and emulsifiers in UPF can also disrupt the balance of good bacteria in the gut, causing chronic low-grade inflammation that is closely associated with metabolic disorders, so the combination of low nutritional quality, metabolic disorders, and the tendency to be consumed in excess makes UPF an important factor in increasing the risk of overweight and obesity.[8]

In addition to high sugar and fat content, food texture influences satiety by affecting cognitive, sensory and post-digestive signals, with dense, harder foods promoting greater satiety than liquid or softer-textured foods.[16,17] The structure of certain foods can also slow gastric emptying and suppress appetite, while higher viscosity foods have been shown to reduce the rate of eating and delay gastric emptying, thereby increasing satiety.[18–20] Ultra-processed foods (UPFs) often have a disrupted food matrix due to industrial processing, which reduces oral processing effort, accelerates gastric emptying and improves nutrient absorption, factors which are associated with increased energy intake and weight gain.[21]

From a psychological perspective, UPF consumption stimulates the activation of the reward system in the brain, which plays a crucial role in shaping eating behaviour. This system operates through two primary pathways: the exteroceptive pathway and the interoceptive pathway. The exteroceptive pathway includes anticipatory stimuli, such as visual and olfactory cues, as well as contextual stimuli, including food taste. Meanwhile, the interoceptive path is triggered by satiety signals from the body, including gastric distension and the release of satiety hormones produced by the gastrointestinal tract in response to the presence of nutrients.[22]

In addition to these sensory stimuli, the reward system is also influenced by cognitive-affective processes that ultimately determine the perceived affective value of food and shape appetite and eating behaviour. The main components of the reward system include pleasure (the hedonic response to food), desire (the urge to consume), and learning (memory associations and previous experiences). The combination of these three creates a reward cycle that encourages repeated consumption, especially of intensely flavoured foods such as UPF.[23,24]

Neurobiologically, the reward system is strongly influenced by the action of neurotransmitters, particularly dopamine, as well as other compounds such as neuropeptides and endogenous opioids.[22,25] Dopamine plays a role in reinforcing reward-related behaviors, including eating behavior. Activation of the mesolimbic dopamine system originating from the ventral tegmental area (VTA) and substantia nigra, leads to various brain areas such as the striatum, limbic system, and hypothalamus, all of which are involved in the regulation of emotion, motivation, and eating behavior.[26,27]

The increase in Ultra Processed Food consumption in the productive age group is influenced by various interrelated factors. The high consumption of ultra-processed foods in the adult population is triggered by the excellent accessibility of the products. For example, in the Padang Panjang area, which is famous as a culinary destination, this type of food can be found easily and affordably by various groups of people, so that it becomes part of daily routine consumption. The limited knowledge of adults about the content and adverse effects of UPF also contributes to the increased consumption of these products. Lack of awareness of nutritional information means that most people are unaware of the potential health hazards that can result from consuming UPF in excess.[10]

In addition, UPF consumption is also triggered by various product characteristics that attract consumers. Attractively designed packaging, relatively low prices that are affordable for people from various backgrounds, and quick and practical serving methods make these products very popular. These

products also have a strong taste, and are reinforced by the wide distribution of advertisements in various media, which contributes to increased consumption in the community.[28] Taste is one of the main factors considered in food selection. Based on research conducted in Brazil, participants cited product flavor as the main factor driving UPF consumption. Ultra-processed foods are designed to have appetizing flavors through the addition of high sugar, fat, and sodium content.[29] The high consumption of UPF among adults is due to the easy access to these foods. The high consumption of UPF in lower middle-income countries, including Indonesia, is influenced by the transnational UPF industry, which promotes political strategies aimed at creating policies and regulations that benefit the long-term expansion and protection of their markets, leading to uncontrolled UPF production. This situation is further reinforced by the fact that the UPF sector is one of the largest contributors to Indonesia's Gross Domestic Product (GDP) outside of the oil and gas sector.[30]

Although this literature review has compiled a wide range of scientific evidence, several limitations exist regarding the relationship between UPF consumption and the incidence of obesity in the productive age. One of the main challenges is the lack of recent data that specifically captures trends in UPF consumption and obesity prevalence in Indonesia over the past five years. Most available studies use the 2018 Riskesdas data as a reference, while the dynamics of people's consumption patterns have changed, primarily due to the growth of the fast food industry and the increased ease of access to online food ordering. In addition, variations between regions and the lack of national population-based data that use comprehensive UPF consumption measurement methods, such as SQ-FFQ adapted to the local context, also limit the generalizability of the findings from these studies. Another limitation is the limited scope of the studies, as most were conducted on specific groups such as university students or school youth. This makes the results not representative of the entire productive-age population. Other lifestyle factors, such as a lack of physical activity, irregular sleep patterns, and night eating habits, often influence the results; however, these factors have not always been taken into account or clarified in the research analysis. Therefore, more in-depth follow-up research is needed, involving a more diverse group of respondents and a stronger study design, to ensure more accurate results that can serve as a reliable reference.

Conclusion

Based on the literature review, it can be concluded that the consumption of Ultra-Processed Foods (UPF) among the productive age group is a significant risk factor contributing to the rising prevalence of obesity in Indonesia. UPF is a highly processed food characterized by a high energy content but a scarcity of essential nutrients. Furthermore, UPF contains various additives such as added sugars, saturated fats, salt, and emulsifiers, all of which contribute to an imbalance in daily energy intake, ultimately leading to overweight and obesity. The negative impacts of UPF are not only limited to nutritional aspects, also affecting physiological functions of the body, including metabolism and hormonal systems. Moreover, UPF exerts a psychological influence by activating the brain's reward system, which encourages repetitive and addictive eating patterns.

External factors further exacerbate the high consumption of UPF, including their low cost, attractive packaging, easy accessibility, and pervasive promotion and advertising, particularly in digital media, which is highly familiar to adolescents and young adults. The prevailing lack of nutritional literacy and low public awareness regarding the long-term health consequences of UPF consumption worsen this situation. Consequently, UPF has become one of the primary drivers behind the increasing incidence of obesity within the productive age demographic. Long-term consumption of UPF also contributes to metabolic disturbances such as insulin resistance and chronic low-grade inflammation, accelerating the onset of obesity and other associated health complications.

These findings provide a robust scientific foundation for developing public health policies that are more responsive to modern consumption patterns. Therefore, UPF consumption must become a central focus in population-based obesity prevention strategies. Continuous nutritional education needs to be intensified through diverse channels, such as educational institutions, workplaces, and social media, to enhance food literacy and raise public awareness about the dangers of UPF consumption. The government also plays a crucial role in strengthening regulations concerning the promotion and advertising of UPF, especially in digital media, and implementing clear, easily understandable nutrition labelling to empower consumers to make informed choices.

Concurrently, efforts to improve access to fresh and healthy foods are imperative. This can be achieved through supporting local businesses, ensuring the provision of healthy canteens, and establishing local food subsidy programs. Community-based public campaigns that emphasize the importance of home-cooked meals and advocate for a reduction in UPF intake should also be expanded. Through a concerted synergy involving education, regulation, and the active participation of various stakeholders, it is strongly anticipated that UPF consumption within the productive age group can be effectively curtailed, thereby leading to a sustainable minimization of the rising obesity trend in Indonesia.

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