FORENSIC INSIGHTS AND HEALTH SCIENCES BULLETIN

Volume 4: Issue 2: 2026

https://doi.org/10.56770/fihsb2026423

IMPACT OF ULTRA PROCESSED FOOD ON EATING BEHAVIOUR AND FOOD CRAVINGS

Khudaija Saeed[*1], Hafsa Saeed[2], Haya Habib[3], Hania Malik[3], Esha Qasim[3], Hamza Ishfaq[4]

[1]Gulzar Surgimed Hospital, Civil Hospital Road, Bahawalpur, Punjab, Pakistan.
[2]Govt.Sadiq College Women University, Bahawalpur, Punjab, Pakistan.
[3]Department of Human Nutrition and Dietetics, Faculty of Medicine and Allied Health Sciences, The Islamia University of Bahawalpur, Punjab, Pakistan.
[4]Department of public Health, School of Clinical Medicine and Public Health, Far Eastern Federal University, Vladivostok, Russia

Submitted: May 14, 2026; Revised: July 25, 2026; Accepted: July 25, 2026; Published: October 31, 2026

ABSTRACT

The development of the NOVA classification, which groups foods according to the degree of industrial processing rather than conventional nutrient density, was prompted by the rise in metabolic health problems worldwide, such as obesity and type 2 diabetes. Modern diets, especially in developed countries, are dominated by ultra-processed foods (UPF), which are industrially created formulas characterized by high quantities of additives and low whole food content. The purpose of this review is to examine how UPF consumption affects human eating habits, cardiometabolic health, and social eating patterns, with a particular emphasis on the role that "food literacy" plays in reducing these consequences. Results show that UPFs are designed to be extremely tasty by using high concentrations of fats, sugars, salts, and chemical enhancers that can override the body's natural satiety signals. Beyond their low nutritional profiles, which frequently lack protein and fiber, UPFs have deteriorated food matrices that promote overconsumption and enhance caloric bioaccessibility.High UPF intake is continuously associated with a considerable increase in the risk of cardiovascular disease, metabolic syndrome, many types of cancer, and all-cause death, according to epidemiological research. When ready-to-eat items are consumed in isolation, UPFs lead to "mindless eating."

Keywords: Ultra processed foods, Diseases and eating behavior, Metabolic syndrome, Caloric bioaccessibility.

[*]**Corresponding Author.** E-mail: khudaija107@gmail.com

INTRODUCTION

The concept of ultra-processed food (UPF) as a descriptor of unhealthy foods within dietary patterns is increasingly recognized in the nutrition literature [**1-5**] and authoritative reports [**6**,**7**].The NOVA classification, a proposed new food classification, is where the term "ultra-processed food" originated. It is based on the level of food processing rather than nutritional intake, which is a fundamental difference from accepted recommendations on ideal dietary patterns. Foods are divided into four categories by the NOVA categorization based on the degree of industrial processing: unprocessed or minimally processed foods (MPFs), processed culinary ingredients (PCIs), processed foods (PFs), and ultra-processed foods (UPFs) [**7, 8**]. This article is based on the definitions of this food category and its consequences for policy. The most popular classification system in the world, NOVA divides all foods and food products into four categories according to the degree and type of industrial processing they undergo **[8]**. Ultra-processed foods, according to the NOVA system, are combinations of food ingredients that are often chemically modified before being combined into consumable, extremely tasty food and drink products using flavors, colors, emulsifiers, and a range of other cosmetic additions [**7**].

The bulk of the energy in the US diet comes from ultra-processed foods [**9**], which are described as industrially produced, ready-to-eat or ready-to-heat compositions that contain few whole foods**.** These foods comprise a variety of advertised and perceived healthy foods, including breakfast cereals, flavored yogurts, reduced-calorie/low-fat items, and goods "enriched" with healthy ingredients, in addition to so-called junk food [**8**]. Hydrogenated oils, protein

FIHSB is published by AMMANIF Publisher. The authors retain the copyright without restriction. This article is an open access article published under the terms and conditions of Creative Commons Attribution 4.0 International License.

isolates, and chemical additives such colorants, emulsifiers, taste enhancers, and artificial hues are among the components of UPFs that are not frequently seen in home kitchens. Soft beverages, packaged snacks, processed meat products, and a range of ready-to-eat convenience meals are a few examples. UPFs have taken center stage in many cultures' diets in recent decades, especially in developed nations [**10**].

Because UPFs are designed to last a long time, they come into touch with packaging materials for extended periods of time, which enables the absorption of compounds from those materials that have also been linked to an elevated risk of type 2 diabetes. By substituting shared experiences of obtaining, preparing, cooking, and consuming local and traditional foods with eating ready-made, ubiquitous foods alone, UPFs can alter the social element of eating and potentially promote mindless eating [**9**]. According to reports these dietary shifts also divert funds from smallholder production of unprocessed and minimally processed foods to ready-to-eat UPFs sold by major international businesses [**9,11**].

Impact of UPFs

The idea of UPF was first put forth in 2009 when Brazilian epidemiologists suggested that the level of food processing was disregarded in favor of the nutrient contents of foods after noticing a significant rise in the prevalence of type 2 diabetes and obesity within a few years [**12**]. Different food classification systems have been proposed due to changes in the scope and aim of food processing, as well as worries regarding the effects of food processing on human health [**13**]. According to a secondary analysis of cross-sectional data from the Korea National Health and Nutrition Examination Survey, UPF consumption is negatively correlated with adult intake of carbohydrates, fiber, minerals, and vitamins and positively correlated with intake of total sugars and total and saturated fat [**14**]. Unhealthy eating habits among consumers have been linked to a rise in daily energy intake from UPF.

CVDs

Recent epidemiological research indicate that higher intake of ultra-processed foods is linked to an increased risk of CVD, though the evidence is still developing. Each extra daily serving of ultra-processed foods was linked to a 7% increase in the incidence of incident CVD in the Framingham Offspring Study after 18 years of follow-up [**15**].Epidemiologic studies have also connected ultra-processed meals to several CVD risk factors, such as metabolic syndrome, obesity, and hypertension [**16,11]**. Consumption of UPF is associated with higher rates of cardiovascular disease, all-cause mortality, and certain types of cancer [**17]**.

Weight Gain

In light of their nutritional composition, ultra-processed foods may cause weight gain by replacing low-calorie, nutrient-dense, minimally processed foods in the diet. Ultra-processed foods are extremely appetizing due to their high quantities of fat, salt, sugar, and artificial flavorings, which may override endogenous satiety systems. Compared to minimally processed foods and food preparations based on minimally processed foods, ultra-processed diets are typically less satisfying and more hypercaloric [**18]**.

Obesity Due to Hyperpalatability

The main factor influencing food choice is consistently evaluated as the food's sensory popularity [**19**]. One important argument is that because UPFs are so flavorful they encourage increased energy intake and weight gain [**20, 21**]. Although there isn't a commonly accepted definition of hyperpalatable, an attempt to do so by pulling descriptions from the literature revealed that it has to do with the sensory characteristics of fat, sugar, and salt [**22**].As a result, formulation rather than processing plays a major role in determining it. A recent multinational cohort study found that when comparing the upper and lower quintiles of UPF intake (i.e., a contrast of dietary extremes), there is only a 15% higher risk of becoming overweight or obese in individuals who are normal weight and a 16% higher risk of becoming obese in individuals who are overweight [**23**].

Impact on Eating Behaviour

Understanding food preferences is thus a critical issue in health studies. Here, we concentrate on the characteristics of the foods themselves, despite the fact that several factors affect food choice [**24]**. UPFs are typically handled like food rather than as highly refined, industrialized compounds whose components and qualities need to be researched. Ultra-processed foods (UPFs) have rapidly become a dominant component of modern diets, raising concern about their impact on human health. These foods, ranging from sugary drinks and packaged snacks to plant-based meat alternatives and ready-to-eat meals, are increasingly displacing fresh, whole foods in many countries **[25**]. Bioaccessibility can also be changed by food processing itself. Processed peanut products like peanut butter or peanut oil release more calories than whole peanuts and extensive milling results in flours that are simpler to digest [**26**]. According to experimental research, visual signals and pictures of appetizing items, such those found in food commercials, might trigger brain regions that lead to overeating and may promote eating even when one is not hungry [**27**].

Over Consumption

In order to facilitate overconsumption through availability, hyper-palatability, low satiety, and substituting wholefoods in diets, UPFs are typically mass-produced using cheap ingredients and convincing marketing [**9**]. Consuming UPF is linked to an increased risk of overweight and obesity, cardiovascular diseases, type-2 diabetes, metabolic syndrome, irritable bowel syndrome, cancer, depression, and all-cause mortality, according to a growing body of research [**11]**. UPF's weak nutrient composition and deteriorated food matrices could also be the cause of this. By substituting shared experiences of obtaining, preparing, cooking, and consuming local and traditional foods with eating ready-made, ubiquitous foods alone, UPFs can alter the social element of eating and potentially promote mindless eating [**9**]. According to reports [**9, 11]**, these dietary shifts also divert funds from smallholder production of

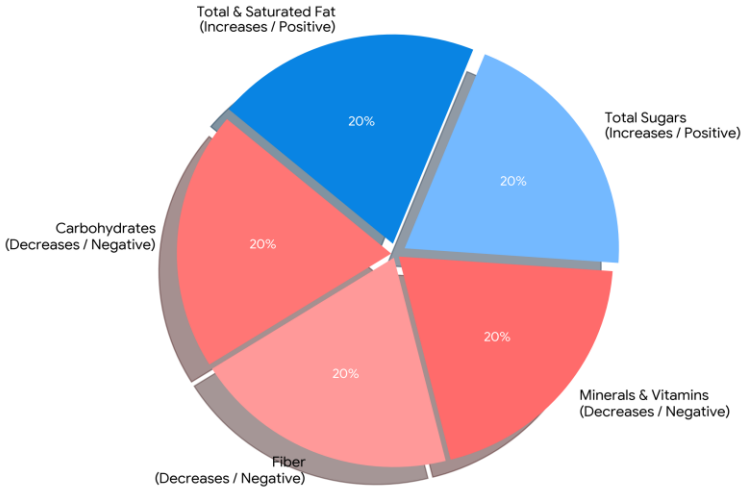


Figure 1: Proportional breakdown of dietary nutrients affected by UPF intake.

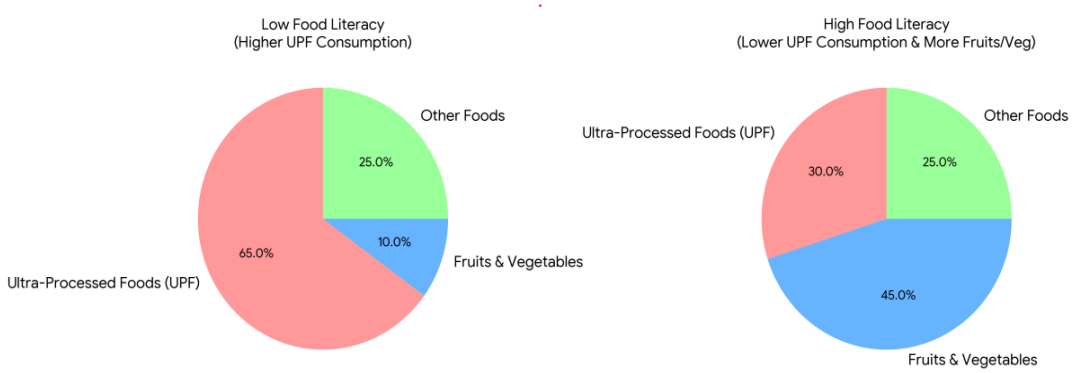


Figure 2: Evaluating adolescent food consumption patterns based on food literacy.

unprocessed and minimally processed foods to ready-to-eat UPFs sold by major international businesses.

IMPACT ON FOOD CRAVINGS

UPFs have been purposefully made to be extremely pleasant by adding additional fats, refined carbohydrates (such as sugar or white flour), and/or salt; they are not found in nature [**28, 29**].While consumption of naturally occurring foods like fruits, vegetables, and meats has shown little to no correlation with indicators of addiction, preclinical and human studies have shown that repeated intake of UPFs causes addiction-like biological (e.g., dopaminergic sensitization) and behavioral (e.g., withdrawal, use despite consequences) responses, leading to cravings for UPFs. These foods have been shown to have an addictive quality, and by influencing the brain's reward system, they may also be connected to the idea of hedonic hunger [**30**]. Nevertheless, no research has looked at how hedonic hunger affects UPF intake. Additionally, the desires for these foods cause overindulgence, which can lead to weight gain.

Food Literacy

Attention for food literacy and public health programmes targeting food literacy have been on the increase during the past decade in both society and academia [**31**]. Food literacy has been demonstrated to favorably change eating habits and influence healthy eating behaviors [**32**]. When adolescents have greater food literacy, they are more likely to make healthier food choices, such as consuming more fruits and vegetables [**33**]. According to these results, encouraging healthy eating practices and food choices may be greatly aided by increased food knowledge. Therefore, increasing food literacy could be regarded as a viable tactic to lower UPF consumption. A potential correlation between UPF consumption and food literacy was investigated in the current study.

Long Term Objectives

Unhealthy diet can lead to various health problems such as fatigue, poor concentration and weakened immune systems [**34, 35**]. Furthermore, the lack of time for planning the daily diet of university students, combined with limited budget, inadequate cooking skills, and accessibility, generally leads to diets based mainly on ready-to-eat or quickly prepared meals made from ultra-processed foods (UPFs) [**36**]. We believe that promoting sustainable and healthful eating habits could help lower UPF consumption. Based on this approach, this study also looked for any potential connections between UPF consumption and

sustainable and healthful eating practices. In this study, and we sought to ascertain university students' UPF consumption, food literacy, and sustainable and healthful eating practices. We also looked at the potential relationship between UPF consumption and food literacy and sustainable and healthy eating practices. In the future, our main objective is to assist people in regaining control and equilibrium in their relationship with food. Our goal is to uncover the ways in which ultra-processed foods have subtly altered our eating patterns, going beyond merely recognizing the issue to discover practical solutions to address our innate hunger signals. This entails striving for a time when making healthy decisions is the simplest and most economical choice for everyone, rather than just a luxury for a select few. In order to ensure that parents can trust what's in their pantry and children can grow up without being continuously encouraged to consume, we want to see a food system that places a higher priority on nourishment than shelf life and honesty over cunning.

CONCLUSION

When people chose soft, high-calorie foods that are quick to swallow, they typically consume more calories. Harder, lower-calorie foods, on the other hand, take longer to chew and slow us down. The "fast-eating" component, according to researchers, is one of the main reasons why participants in the study consumed so much more ultra-processed food. Ultimately, the rise in ultra-processed foods (UPFs) represents a significant shift in our eating habits. Real, natural foods have given way to lab-engineered goods that put "crave-ability" and shelf life ahead of our actual health. As this review shows, the problem isn't just that these foods lack nutrients—it's that they are designed to bypass our natural "fullness" triggers, leading to overeating and a much higher risk of chronic heart issues and metabolic disease. Additionally, the effect is not merely bodily. The social link of cooking and sharing food, which has always been a fundamental aspect of human society, is lost when we depend on ready-to-heat meals. But there's a clear way forward. We can assist individuals in ending the cycle of industrial food dependence by emphasizing "food literacy"—providing them with the knowledge and practical skills to comprehend what they are putting into their bodies. One of the best methods to regain our health and go back to a more sustainable way of eating is to teach these habits, particularly to students and young adults.

Authors Contribution: data collection, S. Khudaija and S. Hafsa; resources, H. Habib and M. Hania; supervision, Q. Esha; review and editing, I. Hamza.
Funding: No funding involved.
Ethical Approval: Not applicable
Conflict of Interest: Nil.
Consent for Publication: All authors approved the manuscript for publication.

REFERENCES

1. Elizabeth L, Machado P, Zinöcker M, Baker P, Lawrence M. Ultra-processed foods and health outcomes: a narrative review. Nutrients. 2020 Jun 30;12(7):1955. https://doi.org/10.3390/nu12071955
2. Costa CS, Del-Ponte B, Assunção MC, Santos IS. Consumption of ultra-processed foods and body fat during childhood and adolescence: a systematic review. Public health nutrition. 2018 Jan;21(1):148-59. https://doi.org/10.1017/S1368980017001331
3. Fardet A, Rock E. Ultra-processed foods: a new holistic paradigm?. Trends in Food Science & Technology. 2019 Nov 1;93:174-84.
4. Poti JM, Braga B, Qin B. Ultra-processed food intake and obesity: what really matters for health—processing or nutrient content?. Current obesity reports. 2017 Dec;6(4):420-31.
5. Silva Meneguelli T, Viana Hinkelmann J, Hermsdorff HH, Zulet MÁ, Martínez JA, Bressan J. Food consumption by degree of processing and cardiometabolic risk: a systematic review. International journal of food sciences and nutrition. 2020 Aug 17;71(6):678-92. https://doi.org/10.1080/09637486.2020.1725961
6. Food UP. Drink Products in Latin America: Sales, Sources, Nutrient Profiles, and Policy Implications. Pan American Health Organization: Washington, DC, USA. 2019;72.
7. Monteiro, C; Cannon, Geoffrey; Lawrence, Mark; Louzada, M; Machado, Priscila (2019). Ultra-processed foods, diet quality, and health using the NOVA classification system. Deakin University. Report. https://hdl.handle.net/10779/DRO/DU:21291759.v2
8. Monteiro CA, Cannon G, Levy RB, Moubarac JC, Louzada ML, Rauber F, Khandpur N, Cediel G, Neri D, Martinez-Steele E, Baraldi LG. Ultra-processed foods: what they are and how to identify them. Public health nutrition. 2019 Apr;22(5):936-41. https://doi.org/10.1017/S1368980018003762
9. Juul F, Martinez-Steele E, Parekh N, Monteiro CA, Chang VW. Ultra-processed food consumption and excess weight among US adults. British Journal of Nutrition. 2018 Jul;120(1):90-100. https://doi.org/10.1017/S0007114518001046
10. Cordova R, Viallon V, Fontvieille E, Peruchet-Noray L, Jansana A, Wagner KH, Kyrø C, Tjønneland A, Katzke V, Bajracharya R, Schulze MB. Consumption of ultra-processed foods and risk of multimorbidity of cancer and cardiometabolic diseases: a multinational cohort study. The Lancet Regional Health–Europe. 2023 Dec 1;35. DOI: 10.1016/j.lanepe.2023.100771
11. Elizabeth L, Machado P, Zinöcker M, Baker P, Lawrence M. Ultra-processed foods and health outcomes: a narrative review. Nutrients. 2020 Jun 30;12(7):1955. https://doi.org/10.3390/nu12071955
12. Monteiro CA. Nutrition and health. The issue is not food, nor nutrients, so muchas processing. Public health nutrition. 2009 May;12(5):729-31. https://doi.org/10.1017/S1368980009005291
13. de Araújo TP, de Moraes MM, Afonso C, Santos C, Rodrigues SS. Food processing: comparison of different food classification systems. Nutrients. 2022 Feb 9;14(4):729. https://doi.org/10.3390/nu14040729
14. Shim JS. Ultra-processed foods and total sugars intake in Korea: evidence from the Korea National

Health and Nutrition Examination Survey 2016–2018. Nutrition Research and Practice. 2022 Aug;16(4):476-88. https://doi.org/10.4162/nrp.2022.16.4.476
15. Juul F, Vaidean G, Lin Y, Deierlein AL, Parekh N. Ultra-processed foods and incident cardiovascular disease in the Framingham Offspring Study. Journal of the American College of Cardiology. 2021 Mar 30;77(12):1520-31.https://doi.org/10.1016/j.jacc.2021.01.047
16. Juul F, Martinez-Steele E, Parekh N, Monteiro CA, Chang VW. Ultra-processed food consumption and excess weight among US adults. British Journal of Nutrition. 2018 Jul;120(1):90-100. https://doi.org/10.1017/S0007114518001046
17. Zhang Y, Giovannucci EL. Ultra-processed foods and health: a comprehensive review. Critical reviews in food science and nutrition. 2023 Dec 10;63(31):10836-48.https://doi.org/10.1080/10408398.2022.2084359
18. Ludwig DS. Technology, diet, and the burden of chronic disease. Jama. 2011 Apr 6;305(13):1352-3. doi:10.1001/jama.2011.380
19. Stanley KC, Hedrick VE, Serrano E, Holz A, Kraak VI. US adults' perceptions, beliefs, and behaviors towards plant-rich dietary patterns and practices: international food information council food and health survey insights, 2012–2022. Nutrients. 2023 Dec 1;15(23):4990. https://doi.org/10.3390/nu15234990
20. Fazzino TL, Dorling JL, Apolzan JW, Martin CK. Meal composition during an ad libitum buffet meal and longitudinal predictions of weight and percent body fat change: the role of hyper-palatable, energy dense, and ultra-processed foods. Appetite. 2021 Dec 1;167:105592.
21. Taneri PE, Wehrli F, Roa-Díaz ZM, Itodo OA, Salvador D, Raeisi-Dehkordi H, Bally L, Minder B, Kiefte-de Jong JC, Laine JE, Bano A. Association between ultra-processed food intake and all-cause mortality: a systematic review and meta-analysis. American journal of epidemiology. 2022 Jul;191(7):1323-35. https://doi.org/10.1093/aje/kwac039
22. Fazzino TL, Rohde K, Sullivan DK. Hyper-palatable foods: development of a quantitative definition and application to the US food system database. Obesity. 2019 Nov;27(11):1761-8. https://doi.org/10.1002/oby.22639
23. Cordova R, Kliemann N, Huybrechts I, Rauber F, Vamos EP, Levy RB, Wagner KH, Viallon V, Casagrande C, Nicolas G, Dahm CC. Consumption of ultra-processed foods associated with weight gain and obesity in adults: A multi-national cohort study. Clinical nutrition. 2021 Sep 1;40(9):5079-88.
24. Vabø M, Hansen H. The relationship between food preferences and food choice: a theoretical discussion. International Journal of Business and Social Science. 2014 Jun;5(7):145-57.
25. Monteiro CA, Louzada ML, Steele-Martinez E, Cannon G, Andrade GC, Baker P, Bes-Rastrollo M, Bonaccio M, Gearhardt AN, Khandpur N, Kolby M. Ultra-processed foods and human health: the main thesis and the evidence. The Lancet. 2025 Dec 6;406(10520):2667-84.
26. Traoret CJ, Lokko P, Cruz AC, Oliveira CG, Costa NM, Bressan J, Alfenas RC, Mattes RD. Peanut digestion and energy balance. International Journal of Obesity. 2008 Feb;32(2):322-8. https://doi.org/10.1038/sj.ijo.0803735
27. Stanhope KL, Goran MI, Bosy-Westphal A, King JC, Schmidt LA, Schwarz JM, Stice E, Sylvetsky AC, Turnbaugh PJ, Bray GA, Gardner CD. Pathways and mechanisms linking dietary components to cardiometabolic disease: thinking beyond calories.Obesity reviews. 2018 Sep;19(9):1205-35. https://doi.org/10.1111/obr.12699
28. Monteiro CA, Cannon G, Lawrence M, Costa Louzada MD, Pereira Machado P. Ultra-processed foods, diet quality, and health using the NOVA classification system. Rome: FAO. 2019 Aug 30;48.
29. Monteiro CA, Cannon G, Levy RB, Moubarac JC, Louzada ML, Rauber F, Khandpur N, Cediel G, Neri D, Martinez-Steele E, Baraldi LG. Ultra-processed foods: what they are and how to identify them. Public health nutrition. 2019 Apr;22(5):936-41. doi:10.1017/S1368980018003762
30. Raza, A., & Shamim, U. (2024). A hawk's eye view: The impact of climate change on food security in Pakistan. Ammanif Bulletin of Social Sciences, 1(2), 53–60.
31. Qurat ul Ain. (2025). The impact of climate change on preproduction and postproduction activities of food systems and vice versa. Practices in Science and Technology, 1(1), 20–27. https://doi.org/10.56770/pst2025113
32. Muhammad Ibrahim Umar, Muhammad Hassan Umar, M. Abdur Rehman Rais, & Syed Zeeshan Haider. (2026). Impact of innovative food packaging technologies on shelf life extension and food waste reduction. Practices in Science and Technology, 2(2), 71–78. https://doi.org/10.56770/pst2026223
33. LeBlanc J, Ward S, LeBlanc CP. The association between adolescents' food literacy, vegetable and fruit consumption, and other eating behaviors. Health Education & Behavior. 2022 Aug;49(4):603-12.
34. Almoraie NM, Saqaan R, Alharthi R, Alamoudi A, Badh L, Shatwan IM. Snacking patterns throughout the life span: potential implications on health. Nutrition Research. 2021 Jul 1;91:81-94.
35. Althunibat OY, Saghir SA, Aladaileh SH, Rawadieh A. The impact of weight loss diet programs on anemia, nutrient deficiencies, and organ dysfunction markers among university female students: A cross-sectional study. Electronic Journal of General Medicine. 2023 Feb 1;20(1):1. https://doi.org/10.29333/ejgm/12675
36. Durán-Agüero S, Valdés-Badilla P, Valladares M, Espinoza V, Mena F, Oñate G, Fernandez M, Godoy-Cumillaf A, Crovetto M. Consumption of ultra-processed food and its association with obesity in Chilean university students: A multi-center study: Ultra-processed food and obesity in Chilean university students. Journal of American College Health. 2023 Oct 13;71(8):2356-62. https://doi.org/10.1080/07448481.2021.1967960 .