

Health Hazards of Ultra-Processed Foods and The Challenges Facing Humanity

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Abstract. Over the past few years, researchers have proposed a food sort system depend on the level of processing, called NOVA, which includes four parts: low-processed foods, processed cooking sauces, processed foods and ultra-processed foods (UPFs). These foods were developed to meet the increasing pace of life. Initially, they were only used to supplement energy in special situations, but in recent years they have become an indispensable source of food, such as ice cream and chocolate. Studies by various researchers have shown that it is associated with many health problems: obesity, cardiovascular diseases and even cancer. The incidence of cancer soars with the proportion of UPFs in a person's dietary, especially for ovarian cancer. For every 10% rise in the ingestion of UPFs, there was a 6% growth in entire cancer mortality. This is a serious health risk for people. This article summarizes the current influences of UPFs on human life, in particular the major health impacts, and predicts their future trends.

Keywords: UPFs; Obesity; Cancer; Diet.

1. Introduction

The NOVA criteria depend on the assessment of the degree of food processing in the diet. Among them, ultra-processed foods mainly refer to the food that is finally formed after complex processing of a certain food. This type of food is usually high in sugar, salt, and calories. Ultra-processed foods contain non-nutritive sweeteners (NNS), and NNS can provide sweetness as a sugar substitute, but the body affects metabolic function as well as gut microbes when it consumes it. Studies have shown that intake of NNS during pregnancy and lactation may also adversely affect infant metabolism [1].

In addition, ultra-processed foods contain food additives such as antioxidants and preservatives, which greatly extend the shelf life and reduce the possibility of waste caused by spoilage of products due to unpurchased products. Ultra-processed foods in order to meet customer palatability and extend shelf life, often ignore the nutrition of the food itself, in the processing process of food nutrients lost a lot, but the energy contained in it is very high, so in the case of ensuring that the intake of nutrients reaches the daily standard, you need to eat more calories. Foods with low processing degrees retain high-quality protein, dietary fiber and other essential substances for the human body. Common cream cakes, potato chips, chocolate, etc. are ultra-processed foods. Because it can be eaten immediately, it is also called "convenience food". With the development of industrialization, the food processing mode has shown scale and mechanization, and highly processed foods have become a vital component of people's lives. Although it is practical for people, it also has a negative impact on human health, and even poses many threats. Nowadays, chronic diseases have become the number one killer of human health worldwide, and according to most studies, the gradual increase in the proportion of chronic diseases is closely linked to the climb in the proportion of UPFs consumed by people. At present, it seems that ultra-processed foods obviously have food safety problems that cannot be ignored, and in order to continue to develop ultra-processed foods in the future, many problems need to be overcome.

2. People Who Prefer Ultra-Processed Foods

Mealtimes are an important factor in people's choice of whether to eat ultra-processed foods (Fig. 1). Late eating refers to the delaying of previous mealtimes compared to normal mealtimes, usually

delayed for lunch or dinner. People who eat late tend to use fewer energy from carbs and more energy from fats. Whereas late eaters were more impossible to consume low-processed foods than early eaters, rather chose UPFs. The research was conducted in an Italian region where the traditional dietary pattern is the Mediterranean diet, which is a hitherto healthy dietary pattern. However, the late eaters were less possible to adhere to the Mediterranean diet due to the influence of UPFs, and the poor sustenance value of the foods in their diet accounted for the majority of the study. It is evident that the intake of UPFs was positive correlation with delayed mealtimes [2].

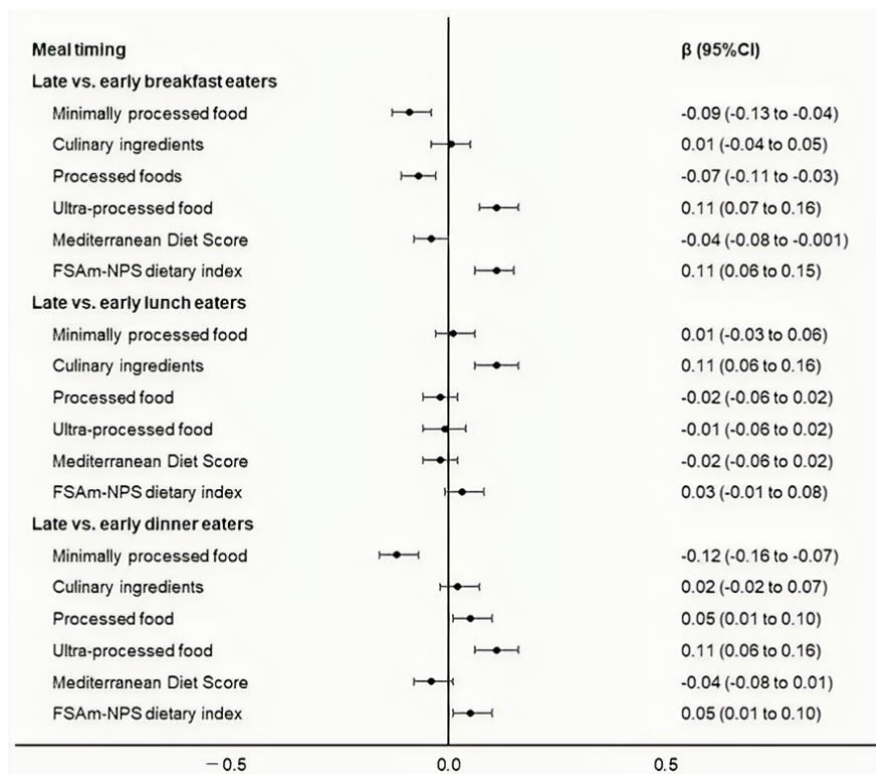


Fig 1. Relationship between early or late eating and consumption of different types of diets [2].

3. Market Change

With the development of modern food industry, food processing is becoming automated, social productivity and division of labor are gradually expanding, creating international food trade, fast food industry is booming, snacks also break into people's sight. Customers are attracted by low prices and flavors, and manufacturers profit from low costs, so that sales of ultra-processed foods have grown rapidly in the last few years. According to a survey by Stefanie Vandevijvere and her team, 36.4% of the daily food consumed by Belgian citizens between 2014 and 2015 was ultra-processed food, more than a third of the total [3]. A survey of countries in different income brackets shows that UPFs lead food supply in high-pay nations, with an upward trend in other regions. [4]. In Brazil, the rates of UPFs in gross intake rose rapidly from 14% to 17% in the five years from 2002 to 2009 [5].

In recent years, ultra-processed foods have evolved from their humble beginnings of noodles, chocolates and cakes to a wider variety of foods, such as home-made hot pots produced with reference to the hot pots of the Sichuan and Chongqing regions of China, which combine the local characteristics of eating spicy food to satisfy the tastes of diners from different regions. In addition, Costco, a large US supermarket, launched "Doomsday Cans" in 2018, which merchants marketed in response to consumers' fear of natural disasters. These cans have a shelf life of decades, enough for a family of four to last a year. The food industry was greatly impacted by the outbreak of the new crown pneumonia in 2019 under its continued impact. With a 25% reduction in the food labor force and major challenges in supply chains, food is in short supply in many regions. People are shifting

from traditional foods to convenience foods. During quarantine, people prefer to hoard food, which requires a longer shelf life.

4. Influence of Ultra-Processed Foods

4.1. Nutrients

Steele studied the relation between the energy ingestion of UPFs and its key nutrient content in the U.S. diet. The results showed a reduction in protein content (from a bottom fifth of 17.9 percent to a high of 13.1 percent), as well as a significant decrease in average levels of vitamins and elements (Zn, Mg, Ca, etc.). In contrast, carbs, caloric sweeteners, and saturated fat increased content [6].

4.2. Human Disease

4.2.1 Obesity and cardiovascular disease

Obesity rates have always been a common health problem, especially as adolescent obesity is becoming more common and its proportion is increasing year by year. Monteiro, a professor, noted that under current global health policies, obesity is projected to grow to 1/3 of the world's people by 2030, and so far no government has been successful in keeping obesity rates down [7].

In 2022, Camilla Almeida Menezes conducted a study of sugar intake and micronutrient impairment in Brazilian children and observed that the overweight prevalence, hypertriglyceridemia and hypercholesterolemia was higher than previous data in Brazilian children. It is also noted that a large ingestion of UPFs is linked to high sugar and trans-fat intake [8]. Ultra-processed foods contain saturated fatty acids, cholesterol and other ingredients that are not beneficial to the human body. Therefore, when the more ultra-processed foods are consumed, the more fat accumulates in the body, which will cause the body to gain weight abnormally. Leonardo V Silva and his team studied the relation between UPFs consumption and obesity in overweight gaggle. Scoring different types of foods, the final statistics showed that the obesity rate of low-limit processed foods was -5.9%. The proportion of obesity in UPFs is 3.7%. Therefore, it is concluded that the more consumption of UPF, the more chance of obesity (Fig. 2) [9].

Obesity places a significant burden on the body and has many potential health risks, but the damage caused by obesity itself is far less serious than the other diseases it induces. Obesity causes atrial and ventricular remodeling, and impedes the systolic and diastolic functions of the heart.

At an average follow-up of more than ten years, Guo-Chao Zhong investigated 1.236 million person-years and recorded 5490 cardiovascular disease deaths, of which about four-fifths were cardiac deaths and the rest were cerebrovascular deaths. Throughout the survey record, participants in the top and bottom quintiles of UPFs intake died from cardiovascular and cardiac disease had the highest risk. Subgroup analysis showed that women had an enormously higher risk of death from UPFs than men (Fig. 3) [10].

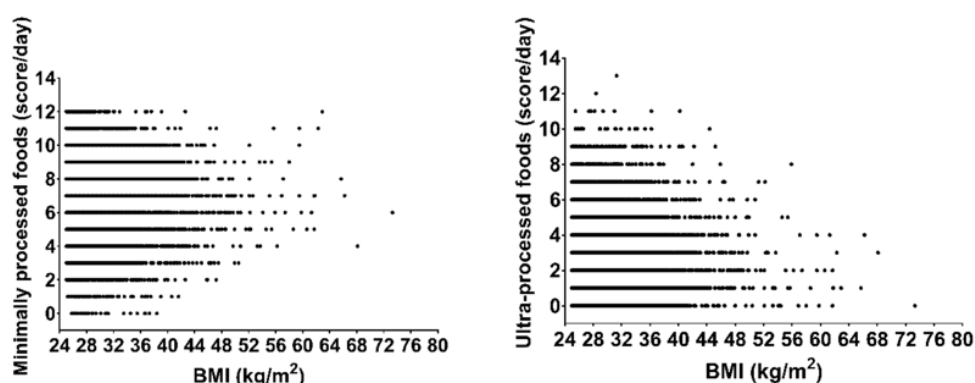


Fig 2. Relationship between foodstuff digestion and BMI [9].

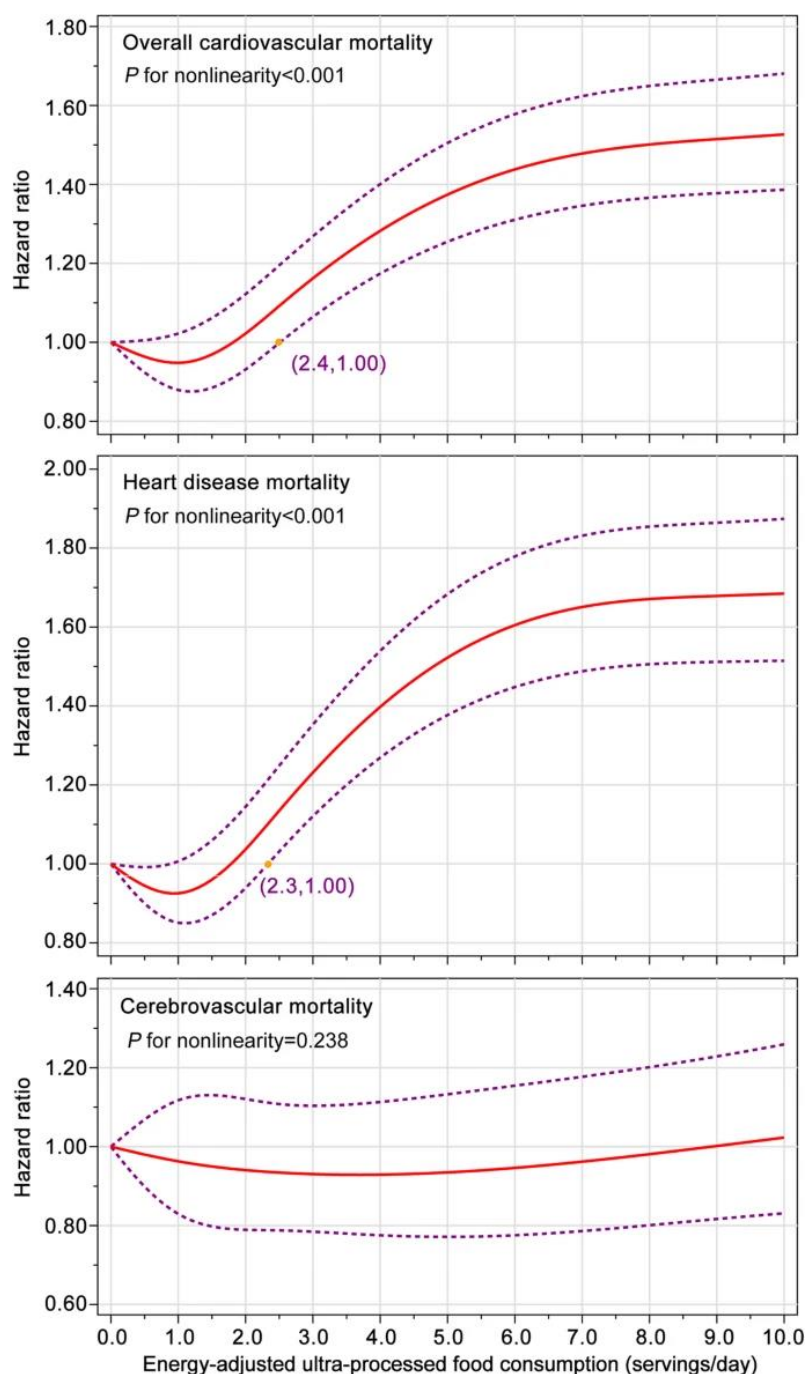


Fig 3. Correlation between the danger of death from cardiovascular disease and ingestion of UPFs [10].

4.2.2 Dental caries

Dental caries is a dental disease caused by a bacterial infection. In general, keeping your mouth clean and eating a healthy diet does not cause dental caries. But in the current period, the food on the market is not so friendly to teeth. UPFs are full of added sweeteners and sugar, especially when the intake of sugary drinks is growing, increasing the threat of dental caries. In a study about tooth decay in children and consumption of sugary drinks, tooth caries in young kids was inextricably linked to sugary drinks and dental health trends in older kids could be inferred from consumption of snacks, cakes and biscuits [11].

Jialan Hong's survey mentioned that children on sugar-free diets are less likely to have significant dental caries than children who consume added sugars more frequently, demonstrating a positive correlation between dental caries and high sugar intake in children [12].

4.2.3 Cancer

UPFs often contain large quantities of sweeteners, fats, and processed carbs, which have a negative impact on the balance of intestinal bacteria, nutrients, biologically active substances. UPFs include food additives like food emulsifying agents and man-made sweeteners, some of which increase the risk of gastric mucosal cells becoming cancerous and causing colon cancer. In addition, most ultra-processed foods are meat, which generally contain sodium nitrate. While cooking or packaging of meat containing sodium nitrate, carcinogens (such as AM, HCAs and PAHs) were produced by the Maillard reaction may increase the risk of cancer. In addition, compounds (such as bisphenol) endocrine-disrupting and carcinogenic properties may occur in the packaging of UPFs [13].

5. Challenges and Response Measures of UPFs

UPFs are not so beneficial to the human body. This health-threatening substance can exist for so long not only because it looks delicious. When discussing the topic of "Consent Regulation", it was concluded that manufacturing products that meet health standards not only depended on legal regulations, but also related to the regulatory system established among stakeholders.

UPFs and beverages offer less satiety than less processed alternatives, and low prices give people the illusion of taking advantage of the bargain, and these physical and psychological illusions can lead to overconsumption. In addition, ultra-processed foods bring convenience to consumers, making people unable to pull out of them. The long shelf life of UPFs reduces the frequency of shopping, and the sealed packaging makes people think that the food is very safe in terms of hygiene and other aspects. Ready-to-eat packaging can reduce cooking time and fuel costs and reduce the need for adequate kitchen facilities. The profit of the unit of ultra-processed food is actually very small, since this is the case, sellers need to carry out marketing, and the marketing method attracts the attention of the general public, especially children [14].

New research shows that UPFs are more addictive to some people than low-processed foods, and their consumption promotes addictive eating behavior in some people. Evidence suggests that UPFs have a greater potential for abuse than low-processed foods, which may present unique challenges to dietary compliance [15].

Luciana Castronuovo collects the opinions of the Argentine population on reducing sodium in processed and UPFs. Stakeholders interviewed clearly supported this voluntary proposal to reduce sodium. Although Argentina's salt reduction policy has made significant progress, this is not representative of the entire population, and some will question the food policy. For example, the question of whether the actual salt intake after the implementation of this policy show a negative impact on the human body will also require transparent monitoring of the new policy. In addition to legal supervision, it is also necessary to communicate with manufacturers, companies, etc., and agree on the goal of gradually reducing salt in food processing [16].

In addition to reducing excess preparations added to food processing, the availability of artisanal foods can be increased, with meal boxes with pre-measured ingredients and illustrated recipe cards to reduce cooking frequency and shopping time. In Australia, the provision of such boxes has been effective in improving the health of residents, but some people think it is too expensive to pay for (11.65 Australian dollars; 6.40 pounds, 7.20 euros; 8 US dollars per serving). Such measures are still at the experimental stage [14].

Steele's research study on trends in ultra-processed food intake, among 54,979 volunteers surveyed between 2003-2004 and 2017-2018, showed an increase in the percentage of energy from UPFs over time among youth and adults. The number of young people and adults buying UPF from fast food outlets increased, while the number buying from schools remained the same [17].

Research by Jee Seon Shim shows that between 2010 and 2018, South Korean men, young adults, urban dwellers, and high-educated people consumed more ultra-processed foods, gradually increasing in the past ten years. Though the share of UPFs consumption varies due to social and economic features, there is always a growing trend among all sociodemographic groups [18].

6. Conclusion

Since the birth of UPFs, the audience has grown and the types of products produced through ultra-processing have become more every day, but the diseases associated with ultra-processed foods are growing. The rates of obesity and dental caries caused by ultra-processed foods are increasing every year, and these diseases have a major negative effect on the public's health and development of the population, especially children. More serious diseases caused by ultra-processed foods, such as cardiovascular disease, are gender-specific, with women more likely to die from ultra-processed foods than men. Some governments have attempted to control the ingestion of UPFs by implementing policies to improve the healthiness of the population. However, the policies that have been enacted so far appear to have limitations and have caused dissatisfaction among some citizens. In view of this, more effective measures should be taken to address the intrusion of ultra-processed foods into healthy human life, not only by limiting the intake of these products, but also by improving the processing of food at every step of the process.

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