Ultra-processed foods as a topic of study in global bioethics

Los alimentos ultraprocesados como un tema de estudio de la bioética global

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Let your food be your medicine and your medicine be your food.
Hippocrates (1)

Abstract

This article proposes to consider food in general and ultra-processed foods and sugar-sweetened beverages in particular, as an issue that concerns global bioethics. The first section explains the relationship between the consumption of ultra-processed foods and health, the second section relates the so-called non-communicable diseases and

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mental health with food, and the third section argues the role that bioethics, especially global bioethics, should play around food.

Keywords: food and health, non-communicable diseases, bioethics.

1. Introduction

Food plays a fundamental role in people's health, and there is evidence of the damage caused in people by the consumption of ultra-processed foods (2), which is manifested in the so-called non-communicable diseases such as overweight, obesity, diabetes, hypertension, some respiratory diseases and even cancer (3). In addition, some authors also relate mental health problems, such as depression and anxiety, to the consumption of ultra-processed foods (4).

On the other hand, bioethics is the systematic study of the moral dimensions, including moral visions, decisions, behaviors and policies of life sciences and health care, in an interdisciplinary context (5), and global bioethics transcends national and cultural boundaries, addressing ethical challenges related to health and science that impact the world.

In recent years, globalization has modified economic, cultural, and social aspects that make bioethics global in scope (4), which has also influenced the way humanity feeds itself.

The food we eat has an impact on our health, both physical and mental, and it is essential to have a diet that provides the nutrients necessary for our development. The World Health Organization (WHO) states that "nutrition is a critical part of health... an adequate diet reduces the risks of acquiring non-communicable diseases, such as diabetes or cardiovascular disease" (6). Therefore, ultra-processed foods and sugary drinks should be part of the global bioethics' agenda, while recognizing that there are other factors that also influence health, such as physical activity, rest or a healthy lifestyle.

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Faced with this scenario, it is essential to become aware as a society and act as a company, government and consumer to reverse the unfavorable future that awaits us if we fail to act.

Food must be placed as a central theme of global bioethics, to initiate reflection and then action in favor of human health.

2. Ultra-processed foods and sugar-sweetened beverages and their relationship to health

There is evidence of the damage to health caused by the consumption of ultra-processed foods and sugar-sweetened beverages, products that have flooded the consumer in the prevailing market economies around the world.

According to Monteiro, an ultra-processed food is a food that "contains formulations of various ingredients that, in addition to salt, sugar and fats, include food substances not used in culinary preparations, in particular, flavorings, colorings, sweeteners, emulsifiers and other additives used to mimic the sensory qualities of unprocessed or minimally processed foods and their culinary preparations, or to mask undesirable qualities of the final product" (7). Some examples of these foods are sweetened cereals, carbonated beverages, processed fruit juices, instant soups, margarines or fried foods (8).

According to the WHO (9), ultra-processed products contain a careful combination of sugar, salt, fat and additives, concluding that they cause obesity, diabetes, cardiovascular diseases and some types of cancer. The consumption of these products has displaced traditional diets based on healthier foods.

The relationship between sugar, salt, fats and additives on people's health is mentioned below. We begin with sugar.

2.1. Sugar and health

The WHO (10) also details that the consumption of sugars raises the overall caloric density, without constituting an adequate sum of

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the necessary calories from a nutritional perspective. In addition, constant movements in the levels of sugars ingested cause abrupt changes in body weight and body mechanisms.

Among other notes and research, it has been found that free sugars provide energy devoid of specific nutrients, so it is recommended that the more vulnerable the daily diet is, the more care should be taken with the intake of free sugars, recommending that the intake of free sugars should constitute less than 10% of the total caloric intake, so that any other circumstances and alterations in the diet do not significantly impact the health status of the person (11).

According to the National Confectioners Association (NCA), 41% of Americans consume at least one confectionery per day; in the Mexican case, it has been reported that 90% of confectionery products are oriented to children. These already high figures are increasing in other countries. In Colombia, it is estimated that 75% and 80% of the population consumes sweets and soft drinks every day (12).

Thus, it can be outlined that sugar is necessary in low quantities for specific functions of the organism. However, its use in food processing has increased its consumption among the population, making it a factor of high impact and attention, since it is also related to various diseases, such as obesity.

2.2. Fat and health

Fats are useful in some functions of the organism. However, the current diet of the population also includes trans-fatty acids (TFA), which come from hydrogenated foods and do not supply any of the body's functions (13), making them fats that affect people's health, regardless of age, gender or socioeconomic level.

In addition to constituting an energy reserve for the body and its functioning, they are responsible for transporting fat-soluble vitamins so that they can be correctly used. However, their high and diverse presence in many foods and preparations makes them a risky

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element for health. For example, high consumption of saturated fatty acids (SFA) is associated with increased cardiovascular risk (14). In turn, TFA are related to elevated LDL cholesterol and decreased HDL cholesterol. In addition to these data, the WHO estimates that excess consumption of TFA causes more than half a million deaths annually around the world, as it generates coronary heart disease (15).

In an article written by the Director General of the WHO, Tedros Adhanom Ghebreyesus, he states that: "food should not be a cause of disease, but a source of health. The time has come to throw trans fats into the dustbin of history" (16). He also states that, in 2018, WHO called for "the complete elimination of industrially produced trans fats from the global food supply by the end of 2023" (16).

2.3. Salt and health

Common salt is an important substance for the proper functioning of the body in normal doses. It has the function of providing the body with sodium, which is responsible for fluid retention in cells and blood, as well as for the regulation of blood pH. It also contributes to the correct functioning of transmissions between neurons, allowing the activity of the central nervous system that sustains the entire human organism (17).

In contemporary industrialized societies, a large part of the diet is nourished by processed products, which frequently contain added salt or other sodium-based substances, which has led to an excessive consumption of this ingredient in modern populations (18). According to the Pan American Health Organization (PAHO), most of the world's population consumes 9 to 12 grams of salt per day, which is more than twice the recommended amount (19).

Several medical studies have demonstrated and reaffirmed the relationship between excessive salt consumption and the propensity to develop various diseases, mainly arterial hypertension, which can lead, among other consequences, to cardiovascular or cerebrovascular events (17).

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2.4. Additives and health

Food additives are substances that are added to foods to improve their taste, appearance, texture, preservation, or safety. Additives can be of natural or synthetic origin and are used in a wide variety of processed foods, including canned goods, frozen foods, baked goods, dairy products, meats, beverages, snacks, and more.

The most common food additives are:

1. Preservatives (they seek to prolong the shelf life of foods).
2. Colorants (used to improve the color of food).
3. Sweeteners (sweeten foods without adding calories).
4. Flavor enhancers (intensify or improve the flavor of foods).
5. Emulsifiers (used to mix ingredients that would not normally mix, such as water and oil).
6. Antioxidants (which prevent oxidation of foods while maintaining their freshness and quality).

It is important to note that food additives are subject to regulations and safety controls by health authorities in most countries to ensure that they are safe for human consumption and do not pose a health risk. However, some people may be sensitive or allergic to certain additives, so it is advisable to read food labels and consult a health professional if you have concerns about their consumption.

The WHO mentions that "food additives are substances that are added to foods to maintain or improve their safety, freshness, taste, texture or appearance. It is necessary to check that these substances cannot cause adverse effects on human health before using them" (20).

Facing the adverse effects of the consumption of food additives on health, little notice has been taken of ultra-processed foods and sugar-sweetened beverages. According to Grimm (21), several physicians have come to suspect that these chemical products added to food are the cause of aortic valve calcification. Moreover, additives

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are present in most ultra-processed foods and sugary beverages. Because they appear harmless and are used legally, consumers are not aware of their harmful effects. In this regard Grimm argues that:

> Colorants go so far as to cause learning disorders. Migraines and hyperactivity can be triggered by certain additives. As far as cancer is concerned, sweeteners are often under suspicion. Preservatives can damage the intestine and disrupt the immune system (21).

Some possible harms caused by the consumption of additives are the following: increased intake of phenolic antioxidants is correlated with increased frequency of allergic diseases (22); synthetic dyes have been associated with mild hypersensitivity reactions to chronic urticaria, angioedema, asthma and atopic dermatitis. They can also cause weight gain, as in the case of curcumin, which inhibits the release of leptin, a slimming hormone that serves to curb appetite, and which, in low concentrations, causes obesity; some preservatives, such as sulfites and benzoates, have been associated with allergic reactions. Regarding sulfites, hypersensitivity has been found in asthmatic patients. On the other hand, hypersensitivity reactions to benzoates have been reported, such as orofacial granulomatosis, chronic urticaria and bronchial asthma. In addition, it is argued that sodium benzoate promotes diabetes, hyperactivity and growth disorders; it is also attributed with the ability to damage cells, to the extent of causing neurodegenerative diseases such as Parkinson's disease (21).

Flavorings are used to add or intensify the flavor or aroma of products. Monosodium glutamate has been associated with several clinical pathologies: neck numbness, headache, nausea, vomiting, diaphoresis, palpitations, flushing.

Emulsifiers are used to form or maintain a uniform emulsion of a product. Their use has been related to cases of occupational asthma, contact dermatitis, exacerbation of atopic dermatitis and chronic urticaria (21).

According to Trasande (23), at least in the United States, more than ten thousand chemicals have been allowed to be used in foods

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designated as "generally safe" (GRAS) due to failures within the food safety system, which has led to substantial gaps in the data on the potential health effects of food additives. In addition, there are studies that suggest that colorings, flavorings, added chemicals, as well as those substances in the materials that come into contact with food, can contribute to illness in the population, with children being particularly susceptible to their effects. The above reinforces the point that food additives added to food imply a health risk for consumers.

As we have seen in this section, some of the substances contained in ultra-processed foods, such as added sugars, salt, fats and additives, are closely related to human health. In the following, we will briefly review how food contributes to the so-called non-communicable diseases, as well as mental health.

3. Non-communicable diseases associated with diet

Eating disorders are associated with a variety of noncommunicable diseases (NCDs) that significantly affect the quality of life of people and represent a health problem of social character, attended as such by health institutions. Among the diseases associated with eating disorders are overweight, obesity, type 2 diabetes mellitus, various cardiovascular and respiratory diseases, and cancer. Therefore, these NCDs are the subject of study in this section, where they are analyzed in greater depth.

3.1. Overweight and obesity

Overweight and obesity have been defined by the WHO as: "an abnormal or excessive accumulation of fat that can be harmful to health" (24). This excessive accumulation is due to an imbalance between a person's energy intake and expenditure, since by consuming more fat than a person can process and convert it into energy, it

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begins to accumulate in the body. These types of conditions are closely linked to the type of diet of the people who suffer from them, placing individuals at the center of the problem rather than those factors that surround them, such as the "correlation between the increase in chronic diseases and globalization [...]"(25).

In 2016, more than 1.9 billion adults aged 18 years and older were overweight, of whom more than 650 million were obese. And since 1975, obesity has nearly tripled worldwide. In 2016, 39% of adults aged 18 or older were overweight, and 13% were obese (26).

According to the *World Obesity Atlas* (WOA) (26), global levels of overweight and obesity in 2023 are estimated to affect about 4 billion people, up from 2.6 billion in 2020.

Both overweight and obesity are associated with a variety of comorbidities that significantly affect the quality of life of the person, also reducing their life expectancy by exposing them to various complications that can even lead to death. Amelia Martí (27) conducted a systematic review to evaluate the possible association between the consumption of ultra-processed foods and the development of obesity. They selected a total of 12 papers that they separated according to the classification system by type of processing (called NOVA), as the first group, and other systems, as the second group. Under the criteria of the first group, the papers concluded with the existence of a relationship between the consumption of Ultraprocessed Foods and industrially produced sugar-sweetened beverages (UPAs) and weight gain in the seven studies that were conducted between 2015 and 2019 in 19 European countries, in addition to the United States and Brazil. Regarding the second group, there were five studies, three of which found a direct relationship between consumption of UPAs and two that found no conclusive evidence of association.

Among the physical-motor comorbidities, resulting from the extra effort made by the skeletal-muscular system generated by the additional weight, osteoarthrosis, hypoventilation and sleep apnea stand out. Some studies also point to overweight and obesity as the cause of cardiomyopathies and a higher incidence of varicose veins and abdominal hernias (28).

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Finally, the psychosocial consequences stand out, since obesity and overweight confront the person with self-rejection, discrimination (particularly in the adolescent population with overweight and obesity) and aversion based on a cultural structure that elevates the slim figure as an aesthetic ideal.

3.2. Type II diabetes

Diabetes mellitus is a group of metabolic diseases with different etiologies, whose basic characteristic is the presence of chronic hyperglycemia. Type 2 diabetes (DM2) accounts for more than 90% of all cases, and genetic and environmental factors are involved in its pathogenesis. Two of the risk factors are obesity and poor diet, a diet rich in sugar, dairy products and meat, and low in fruits and vegetables (29).

It can be inferred that foods high in fatty acids and diets with non-recommended amounts of carbohydrates may increase the risk of obesity and thus the development of insulin resistance. For this reason, people with type 2 diabetes can prevent or treat the disease with a healthy diet and regular physical activity.

This is supported by the research conducted by María Alcántara (30) in which she carried out a systematic review of 53 studies on the relationship between high fructose intake and the metabolic dysregulation it caused. Among their findings, they found that one of the conditions caused by fructose, linked to prediabetes and type 2 diabetes mellitus, is insulin resistance and the basic alterations induced by its consumption are increased oxidative stress and protein glycosylation. On the other hand, they found that fructose promotes inflammation and reduces intestinal permeability, which affects the liver and the digestive system. The authors concluded that the evidence suggests that consuming this substance on a regular basis creates dependence and, therefore, compromises health.

As can be seen in this section, the development of type 2 diabetes is linked to the consumption of ultra-processed foods and

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sugar-sweetened beverages, products that, because they contain elements such as fructose, create dependence and contribute to the development of NCDs.

3.3. Cardiovascular diseases

According to the WOA (31), cardiovascular diseases (CVD) are the leading cause of death in the world and, among its factors, is inadequate nutrition and it is known that its growth was favored by the modernization of agriculture, food processing and formulations in the last century (32). In general, it can be said that energy-dense diets, with high intakes of added sugar, salt and fat, are a determining factor in the increase of NCDs, specifically CVD (33).

To demonstrate the degree to which diet is affected in relation to CVD, the example of the consumption of sugar-sweetened soft drinks is given. It is known that its consumption increases the risk of adiposity and has been associated with a higher incidence of hypertension and coronary heart disease. These determinants are those that associate the risk of CVD with the consumption of this type of beverage due to increased adiposity and the accumulation of visceral fat or the production of uric acid (34).

In addition to those mentioned above, several studies have shown the correlation between CVD and a diet based on ultra-processed foods, excessive in additives, sugars and trans fats.

3.4. Respiratory diseases

Asthma, a respiratory disease, is associated with various exogenous factors such as exposure to tobacco smoke, environmental pollution and diet. Regarding the latter, it has been shown to have protective effects on the risk of recurrent wheezing and asthma. On the other hand, asthma is a non-communicable disease of greater impact in adolescence. Despite this, there are few studies on UPA consumption and its connection with respiratory diseases in childhood (35).

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According to a study conducted by the Spanish Association of Pediatrics (AEP), the most frequent diseases in the pediatric age group are respiratory diseases, with asthma being the most prevalent chronic disease in childhood in developed countries. In a cross-sectional study carried out by the AEP, within the Child Follow-up for Optimal Development project, on 513 Spanish children, the consumption of UPAs was calculated, classifying foods according to the NOVA system, which classifies foods by their degree of processing, to estimate daily consumption and the percentage of kilocalories from UPAs. The study concluded that a higher consumption of UPAs had an impact on the probability of wheezing respiratory diseases in the pediatric age, recurrent bronchitis/wheezing and asthma, which allowed determining that there is a direct association between UPA consumption and wheezing diseases in childhood (36).

Grimm (25) conducted a research on food additives used in the manufacture of ultra-processed foods and their relationship with respiratory disorders. According to his research, tartrazine, a colorant used in the production of mustard, pudding and pastry products, can cause respiratory difficulties or asthma-like episodes in sensitive asthmatics. Carmine, another colorant used in the manufacture of jams, candies and alcoholic beverages, can in rare cases cause allergic reactions such as asthma-like episodes in sensitive individuals. Azorubin, used to color fruit ice cream, as well as candies and fruits, is also associated with asthma episodes. Amaranth, used in certain alcoholic beverages; cochineal red A, added to certain deli foods, such as chorizo; glossy black BN, artificially manufactured from petroleum derivatives and used to blacken candy; all of these additives are linked to breathing difficulties or asthma-like episodes. According to Grimm, carotene, a colorant considered healthy and used in the manufacture of creams, desserts and ice cream, is supported by several studies that its daily intake could increase the risk of lung cancer and heart attacks in smokers and people with cardiovascular conditions. Sulfur dioxide and sulfites can trigger induced asthma in hypersensitive people, adding to bronchial narrowing and airway inflammation.

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3.5. Cancer

Cancer is a term that the WHO refers to as: "a group of diseases that can originate in almost any organ or tissue of the body when abnormal cells grow in an uncontrolled manner, exceeding their usual limits and invading adjacent parts of the body or spreading to other organs" (37). Among the risk factors, diet and sedentary lifestyle are among those responsible for its development (38).

The industrial development of food can also be considered as another determinant factor of cancer due to the treatments they receive to be consumed. In this regard, Emilia Mora comments:

> The way food is preserved, the additives, the type of packaging used for preservation and storage, as well as the methods used and the amount ingested, have also been related to an increased risk of cancer (39).

Some authors have attempted to explain how body fat increases the risk of cancer. First, excess fat causes insulin resistance, causing the pancreas to increase. These factors are what stimulate cell growth that favors the proliferation of cancer cells. On the other hand, in relation to adipose tissue, with a higher body mass index there is a higher concentration of estrogen and testosterone levels, which is associated with an increased risk of tumors (39).

Regarding fats, the so-called bad fats include saturated fats and trans fats from industrial processes. Although the role of fats in cancer risk does not yet allow firm conclusions to be drawn, some results have suggested that the consumption of total fats could increase the risk of lung cancer; foods rich in saturated fatty acids could increase the risk of pancreatic cancer; and animal fats could develop tumors of the colon and rectum (39).

On the other hand, WHO experts classified processed meat as carcinogenic for humans, based on evidence that showed that its consumption caused colorectal cancer, and concluded that for each

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50g portion of processed meat consumed daily, the risk of developing this cancer increases by 18% (40).

Fiolet (41) conducted a population-based cohort study to evaluate prospective associations between consumption of ultra-processed foods and cancer risk. During his study, 2,228 incident cases of cancer, including breast, prostate, and colorectal cancers, were diagnosed and validated. According to their analysis, the intake of these products was associated with an increased risk of general cancer and breast cancer. Specifically, ultra-processed fats and sauces, sugary products, and beverages were associated with an increased risk of overall cancer; in addition, ultra-processed sugary products were associated with breast cancer risk. The authors concluded that their study was the first to investigate and highlight an increased overall cancer risk associated with the intake of ultra-processed foods and highlighted the need for further studies to better understand the effects related to nutritional composition, food additives, contact materials, and related contaminants.

From the data discussed in this section, it can be inferred that there is a strong positive correlation between cancer development and diet, specifically in the consumption of processed foods.

3.6. Mental health

The WHO defines mental health as "a state of well-being in which a person is aware of his or her own capacities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community" (42). This definition coincides fundamentally with that given by the American Psychological Association (APA) (43). The definition of the Spanish Association of Neuropsychiatry (AEN) is: "mental health is the balance between the individual and his environment that allows him to adapt and develop in his life according to his potential, satisfying his emotional, cognitive and relational needs." (44). As can be seen, both definitions refer to a person's capacity to develop individually and

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socially and to achieve well-being. The WHO considers that one in eight people in the world suffers from some type of mental disorder, with anxiety and depression being the most frequent (45).

Some authors mention the relationship between NCDs and mental health, where people with emotional alterations may develop some NCDs (overweight, obesity, type 2 diabetes, cardiovascular diseases, respiratory diseases and even some types of cancer) (46). Conversely, people with NCDs may develop mental disorders due to stress, anxiety or chronic pain associated with the disease. Some authors even affirm that mental health should be part of NCDs, as well as the role played by the consumption of ultra-processed foods and sugar-sweetened beverages in some behaviors of people that can be considered emotionally affected, such as anxiety or depression (46).

The WHO has published some reports on the relationship between mental health and chronic diseases, including diabetes, cardiovascular diseases and cancer (47).

On the other hand, the United States Center for Disease Control and Prevention (CDC) states that the state of mental health influences how we think, feel and act and that aspects of depression are associated with physical problems, such as diabetes and heart disease and, similarly, the presence of NCDs can lead to a deterioration of mental health. The CDC mentions that more than 50% of Americans will have some mental disorder in their lifetime, one of the causes being some brain chemical imbalance (48).

There are several studies that reaffirm the relationship between the consumption of ultra-processed foods and mental health, such as the following: 1. A study of 1,046 women between 20 and 93 years of age, randomly selected in Australia (49); 2. Another study showed that the study group substantially improved their symptoms of depression when they changed their diet to a Mediterranean style (50); 3. Some studies conducted on consumers of UPA show brain damage in areas related to spatial memory, learning and memories (51); and 4. Jacques (52) conducted an analysis of more than 300

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research studies on the relationship between sugar consumption and some emotional aspects, such as anxiety and depression, and concluded that there is "overwhelming evidence" of some brain changes that led to pathological behaviors resulting from the consumption of sugars in excess of the recommendations of the competent authorities.

Lopresti (53) affirms that depression should be considered a non-communicable disease and that diet, sleep and physical activity influence the prevalence levels of some mental health alterations in people. This author proposes that mental health should be part of the spectrum of so-called non-communicable diseases.

This reaffirms the argument that ultra-processed foods and sugar-sweetened beverages not only contribute to the so-called non-communicable diseases, but also to the affectation of people's mental health.

Table 1 lists some of the risks to human health of overconsumption of some ingredients present in industrially processed foods:

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Table 1. Process food consumption risks

Product	Recommended daily consumption according to the WHO	Risks associated with noncommunicable diseases	Risks associated with mental illness
Sugar	Not to exceed 10% of total caloric intake and suggests a reduction to less than 5% for additional health benefits (54)	Obesity, type 2 diabetes, heart disease, increased triglyceride levels, stroke and fatty liver (29,30,55,56,57,58,59)	Depression and other mood disorders (42,46)
Salt	Less than 5 grams of salt per day (60)	Arterial hypertension, cardiovascular disease, renal disease, osteoporosis, gastric cancer and fluid retention (33,61,62,63,64)	High salt intake can contribute to the development of physical diseases that, in turn, can have a negative impact on mental health. For example, high blood pressure, which can be caused by excessive salt consumption, has been linked to an increased risk of depression, anxiety, and dementia (45) (46)
Saturated fats above WHO recommendations	Less than 10% of total daily calories. (65)	Cardiovascular disease, type 2 diabetes, obesity and certain types of cancer (colon) (33,36,66,67,68,69)	Studies suggest that a diet high in saturated fats and low in healthy fats may negatively affect mental health through its effects on the nervous and cardiovascular systems (46)

Trans fats above WHO recommen-dation	Not to exceed 1% of daily energy intake (70)	Cardiovascular disease, type 2 diabetes, cancer, increased LDL ("bad") cholesterol, breast cancer (36,71,72,73,74,75)	A diet high in trans-fat can have a negative impact on overall health, which may contribute to mental health problems. For example, obesity and type 2 diabetes, which can be caused by a diet high in trans-fat, have been linked to an increased risk of depression and other mental disorders (46)
Food additives	None	Some food additives, such as monosodium glutamate, have been linked to headaches, nausea, sweating, palpitations and other symptoms in some people. Other additives, such as artificial colors, have been linked to an increased risk of hyperactivity and attention deficit disorder in children. In addition, some additives, such as preservatives, can be toxic if consumed in large amounts. In addition, some additives have been linked to specific diseases. For example, it has been suggested	Some studies have suggested that certain food additives, such as artificial colors, may be associated with the development of hyperactivity symptoms in children and adolescents. A 2007 study found an association between consumption of artificial food dyes and increased hyperactivity symptoms in children aged three and a half to nine years. Another 2012 study suggested that food additives, including dyes, preservatives, and sweeteners, may be associated with

		that excessive consumption of nitrites and nitrates, which are used as preservatives in processed meats, may increase the risk of colorectal cancer. It has also been suggested that excessive consumption of benzoic acid, which is used as a preservative in some foods and beverages, may increase the risk of asthma and other respiratory problems (21,39,41,76,77,78)	an increased risk of mood and behavioral disorders in children and adolescents (78,79)

Source: prepared by the author.

4. The role of bioethics in the field of nutrition

The definition of bioethics contained in the first volume of the Encyclopedia of Bioethics published in 1978 is: "the systematic study of human behavior in the area of life sciences and health care, examined in the light of human principles and values" (80). In the second volume published in 1995, the modified definition is as follows: "Bioethics is a compound term derived from the Greek words bios (life) and ethike (ethics) and is defined as the systematic study of the moral dimensions, including moral views, decisions, behaviors, and policies of the life sciences and health care, employing a variety of ethical methodologies in an interdisciplinary context" (81). The following is an analysis of the most updated definition from a bioethical perspective applied to ultra-processed foods and their relationship with people's health:

1. Systematic study: understood as a rigorous approach to research or analysis that follows a structured process seeking valid results. It includes an exhaustive and critical review of the existing literature about the relationship between ultra-processed foods and their negative contribution to people's health.
2. Moral dimensions: refer to the different social, ethical, or moral aspects that may be present in a situation, a problem, an action or a decision, morality being those principles, values, norms and beliefs that guide human behavior and ethical choices in decision making, highlighting the following:
    a) The individual dimension: these are the beliefs, values and ethical principles that guide a person's behavior in his or her decision making and actions. It involves internal reflection and consideration of what is right or wrong in moral terms, in this case in relation to food and its effects on the individual.

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b) The social dimension: these are the ethical norms, values and beliefs that govern interactions and relationships between individuals and groups in a society. It involves considerations on how individual actions may affect others and how they should behave in the context of the community, in this case, how society influences the eating behaviors of its members.
c) The cultural dimension: has to do with the norms, values and ethical beliefs that are shared by a particular community or society and that influence the behavior and decision making of its members, in this case, feeding through ultra-processed foods.
d) The professional dimension: refers to the ethical standards and codes of conduct that guide the practice of a specific profession or field, in this case, food science as applied to ultra-processed products and sugar-sweetened beverages. Professionals have specific ethical responsibilities in their practice and must consider the moral implications of their decisions and actions and,
e) The global dimension points to the ethical implications of actions and decisions in a global context, considering how they affect people, communities and the environment worldwide. It involves considerations of social justice, global responsibility, sustainability and equity in a global context.

3. Life sciences: Food sciences fit into this section by virtue of being a multidisciplinary discipline that studies the scientific, technological and safety aspects related to the production, processing, preservation, quality, safety and nutritional value of food.
4. Health care: which refers to the maintenance, improvement or restoration of people's health. It can address a wide range of health needs, including disease prevention (through adequate nutrition), promotion of healthy lifestyles (eliminating

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the consumption of ultra-processed foods and sugar-sweetened beverages), management of chronic diseases (understanding the main causes of such diseases, being inadequate nutrition one of the main ones) and mental health (where there is evidence of the affectation that the consumption of ultra-processed foods and sugar-sweetened beverages cause in people's mental health), among others.

5. Ethical methodologies: these are approaches used to address ethical issues and dilemmas in different contexts and situations, providing a structured and reflective framework to address ethical problems and make informed and justified decisions. For the case referred to in this article, they apply ethical analysis (which analyzes the ethical aspects in the actors involved in the ultra-processed food industry covering governments, companies, consumers and the community), principled ethics (which is the foundation of my doctoral thesis called "The application of the principles of global bioethics in the commercial determinants of health within the ultra-processed food and sugar-sweetened beverages sector contributing to non-communicable diseases" and encompasses the principles of justice, responsibility, prevention, solidarity, precaution, autonomy, informed consent through conscious consumption and freedom, all of which pertain to global bioethics).
6. Interdisciplinary context: since the issue of ultra-processed food is a complex problem that addresses different fields of knowledge or disciplines that seek collaboration among all of them to reach the best possible solution. These disciplines include business activities (production processes covering raw materials, processing, marketing, distribution, sale, consumption and post-consumption), legal regulations and their effective application, social norms accepted in the community, all health-related disciplines such as medicine, biotechnology, food science, nutrition, etc., specialized community

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ranging from civil society organizations to national and international agencies.

a) The above has a worldwide scope, hence it is the subject of study of global bioethics. Ultra processed foods are present in those countries based on a market economy, the capitalist model being the predominant one at present in practically the whole world. Global bioethics refers to the ethics of life and health with a worldwide scope, transcending national and cultural boundaries, addressing ethical challenges related to health and science. Henk ten Have (4), describes the criteria necessary to consider a problem to be in the sphere of global bioethics:
b) Global scale: ultra-processed foods are wreaking havoc on the health of populations worldwide,
c) Interconnectivity: consumers of such products are affected at the individual level by situations created at the macro level,
d) Persistence: this issue is of indefinite validity, i.e., it has no defined temporality since it persists over time,
e) Interdisciplinarity: this problem involves billions of people around the world belonging to a wide range of disciplines that need to work in a coordinated manner, and
f) Global action is needed: here it is framed that this problem needs the major world bodies, such as the United Nations (UN) and its agencies, to align interests among all actors with a focus on global health.

5. Conclusion

This article reviewed the topics related to food and health: food science and noncommunicable diseases associated with food intake. After analysis, the following conclusions were reached:

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1. Excessive consumption of sugar present in ultra-processed foods and sugar-sweetened beverages is related to obesity and other NCDs. In addition, the problem seems to affect mostly children exposed to aggressive advertising of this type of products.
2. Also, excessive fat consumption increases the risk of obesity, overweight, cardiovascular problems and cancer.
3. The consumption of salt also present in these products is intrinsically related to heart disease and hypertension risks, among other ailments. This is in consideration of the fact that there are warnings issued by national and international health institutions on the effects of consuming these products, which do not seem to have any effect on consumers.
4. In addition, excessive consumption of additives is related to respiratory diseases and carcinogenic agents, among others.
5. Mental disorders: depression and anxiety are aspects of human behavior that have been related, among other causes, to ultra-processed foods.

Therefore, the consumption of ultra-processed foods and sugary beverages is closely linked to the development of non-communicable diseases (overweight and obesity, type II diabetes, cardiovascular diseases, respiratory diseases and cancer), as well as mental disorders. Since there is sufficient scientific information, it is possible to affirm that non-communicable diseases are promoted by the consumption of these products, so it can also be affirmed that the food industry in charge of manufacturing them contributes to the promotion of these diseases.

Addressing these problems requires deep bioethical reflection and the adoption of policies and actions that promote a healthier and more sustainable diet for the world's population. To achieve this goal, a comprehensive and holistic vision involving various stakeholders, such as governments, companies, consumers and the specialized community, is needed. It is essential to consider an interdisciplinary

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perspective that encompasses anthropological, legal, philosophical, health and economic aspects.

Within this context, ultra-processed foods and sugar-sweetened beverages are a crucial issue for global bioethics due to their impacts on health and social justice. On the one hand, unbiased studies have demonstrated the relationship between the consumption of these products and non-communicable diseases, which underlines the importance of addressing this problem from an ethical perspective.

On the other hand, health inequality is also a relevant aspect, as these foods are often cheaper and more accessible, encouraging their consumption in communities with fewer economic resources. In addition, the food industry often involves business practices that are questionable from a global bioethical perspective, such as legislative lobbying to protect its economic interests or marketing that promotes the consumption of unhealthy products.

Global bioethics can play a catalytic role in promoting greater responsibility in the food industry, without detracting from the autonomy and responsibility of the individual in his or her consumption choices.

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