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## **Review on Food Sustainability: Challenges and Strategies**

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### **Abstract**

The long-term goal of food sustainability is to produce enough food to maintain the human population. Within sustainable food systems, the significance of a sustainable diet is an emerging notion. Food preferences, choices and eating habits are notoriously hard to change as they are a central aspect of people's lifestyles and their socio-cultural environment. Although there is now an enormous gap between the public's favourable perceptions of sustainable food and their actual consumption and purchase of more sustainable food products, this gap continues to be bridged. Fertile soil, water, fertilizers, a stable climate, and energy are the essential components of a sustainable food system. But as the world's population rises, human actions also play a role in determining how much food is required in the future. A building storm of quickly changing climate, increased hunger and malnutrition, and severe socioeconomic imbalances revolves around food systems. This study evaluates a few human activities, such as diet, obesity, food miles, food waste, and genetically modified organisms, that could have an impact on the food supply chain's ability to continue sustainably.

**Keywords:** Food, sustainable, obesity, Health, Hunger & Climate.

### **Introduction**

According to terms, a sustainable food system is one that "delivers food security and nutrition for all while maintaining the economic, social, and environmental foundations to generate food security and nutrition for future generations." The food system today is causing intolerable environmental damage and depleting non-renewable resources, which makes the food we eat today unsustainable. Because it is produced using fossil fuels, non-renewable mineral resources, depleted groundwater supplies, and severe soil loss, our food can be considered "fossil food." The fundamental basis of international attempts to control and regulate the world's food supply for humans is the concept of sustainable food systems. Goal 2 ("end hunger, achieve food security and improved nutrition and promote sustainable agriculture"), Goal 12 ("ensure sustainable consumption and production patterns"), and Goal 13 ("take urgent action to combat climate change and its impacts") are among the many important global issues that are the focus of the sustainable development goals. However,

these goals are closely related to the necessity of shifting the world's food systems from fossil fuels to sustainable ones. It's important to think about what a food system means by "sustainable" in order to comprehend how to meet the challenge posed by these aims. "The management and conservation of the natural resource base, and the orientation of technological and institutional change in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations" is how the Food and Agriculture Organization (FAO) council defined sustainable development in 1989. Climate change, increasing obesity rates, population increase, and environmental degradation associated with the food system have made "food sustainability" a crucial issue affecting social, environmental, and agricultural sciences as well as public health nutrition (O'Kane G, 2012). Sustainability of the food system is further threatened by general overconsumption and excessive intake of meat and dairy products, two dietary habits that are associated with negative health consequences (Friel et al., 2016) (McMicheal AJ et al., 2007). The general public's conception of food sustainability typically incorporates notions such as social justice, animal welfare, fair labour and trade, organic food production, local farming, and the idea of "natural," to name a few of the most significant ones. The term "natural" has no official definition. As a result, various people interpret "natural" in different ways. Food miles are another concept that is frequently misattributed to food sustainability by the general public.

### **The production challenge**

The predicament is framed as follows: the world's population is expanding and becoming more urbanized; we are also becoming net consumers; and in the near future, a declining percentage of people will work as farmers, at least as their primary source of income. People's dietary habits are shifting as wages rise, with a growing desire for dairy and meat products. Food production may need to increase by as much as 60-110% by 2050 overall in order to meet this demand (Confronti, P et al., 2011). Simultaneously, there needs to be a decrease in the harm that food production causes to the environment, both directly and indirectly through deforestation. Therefore, more food needs to be produced on existing farmland in methods that don't impose undue environmental costs in order to feed urban consumers.

According to this points of view, the food business plays a critical role in supplying meals that satisfy consumer preferences while posing less of a "cost" to health or even improving it in both developed and developing nations. The nutrient density of the foods available will be improved by fortification, biofortification, supplementation, and increased low-cost livestock production; obesity, on the other hand, can be addressed by product reformulations, education, and, where necessary, medical interventions. The idea of dietary diversity is given less thought, with the exception of the possibility that rising meat output will broaden people's nutritional horizons.

### **The consumption challenge**

In an alternative interpretation of the food sustainability issue, the consumer-the last link in the supply chain-becomes the main subject of concern. The belief that overindulgence,

especially in high-impact foods like meat and dairy products, is a major contributor to the current environmental disaster is at the heart of this viewpoint. The problem cannot be solved by technological advancements alone. For instance, one study finds that even with a wide range of production-side mitigation strategies, agricultural emissions are expected to increase if global consumption is not reduced given current dietary patterns in demand (Popp, A, Lotze-Campen, H & Bodirsky, B et al.,2010). Another claims that by 2050, the expansion of the cattle industry may undermine the planet's ability to support human life. It suggests that, in order to maintain current levels of meat consumption, per capita meat consumption in 2050 may need to be reduced by 20-40%. (Pelletier, N & Tyedmers, P et al., 2010).

## **The socio-economic challenge**

While the demand constraint viewpoint concentrates on excessive consumption, production efficiency focuses on altering production processes. The perspective on food system transformation views the issue as one of "imbalance," taking into account the relationships between the various actors in the food system and taking into account both production and consumption. The issue is not limited to production or consumption alone; rather, it stems from the unequal relationships that exist between producers and consumers both internationally and inside communities. The simultaneous issues of excess and insufficiency that result from this imbalance are seen in the environment (over and insufficient use of agricultural inputs) and in health (obesity and hunger). Because of the dynamic interconnections between natural, technological, behavioural, and economic systems, the challenges we face are socio-economic in nature rather than merely technical or the result of human decisions.

## **The Effect of Diet**

Different diets have distinct impacts on the environment in addition to their effects on health. The increased consumption of animal protein over the past 50 years has altered the worldwide diet and is associated with global affluence. It is extremely difficult for the environment to produce animal protein. Ruminants are the animals that are least efficient at converting feed into muscle, perhaps might represent a motive for this (Tilman D et al., 2014). An increased intake of vegetable protein in the diet would be one strategy for reducing the environmental impact of animal farming. Vegetable protein has the drawback of having an incomplete amino acid profile, necessitating the proper combination of amino acids to be present in the diet. Vegetable proteins have the additional drawback of being more difficult for the human digestive system to break down. However, our apparent preference for animal protein may be the greatest challenging obstacle facing humans as we work to reduce our intake of animal products. Although they are not yet widely recognized in western nations, insects are another source of protein that is utilized in many other countries. When comparing traditional cattle to insects, there is a clear advantage in terms of reduced environmental effect. Insects release less ammonia and greenhouse gases, and therefore require a lot less water. According to one source, for the same quantity of protein, the amount of greenhouse gases released by insects is equal to 1% of those released by ruminants (Oonincx DG et al., 2010).

## **Obesity and Overconsumption**

An estimated 1.9 billion adults in the world who are 18 years of age or older are overweight, with over 650 million of them being obese. The WHO claimed in 2016 that 41 million children under the age of five and over 340 million children and adolescents between the ages of five and nineteen were overweight or obese, which is even more concerning (WHO, 2018). Eating more calories than burning them off during physical activity leads to weight gain and obesity. Although a variety of foods can contribute to weight gain, calorie-dense foods are the main culprits. The growing obesity epidemic adds another obstacle to the sustainability of agriculture. More food will be required to maintain the population's excess weight in addition to meeting the needs of a growing population in terms of food production. Obesity and overweight have major effects on the environment and human health. Being overweight increases the use of motor vehicles by reducing personal mobility and physical activity. (Mann RF, 2009).

## **Food Waste**

An estimated 60 million metric tons of the 200 million metric tons of food produced yearly in the United States are wasted. Based on an examination of food waste that ends up in landfills, the residential sector accounts for 47% of the garbage [U.S. House of Representatives. 2016]. After certainly, not all leftovers are edible. Three categories apply to food waste: avoidable, potentially avoidable, and unavoidable. Food and beverages that, up until their disposal, were completely edible or drinkable but were thrown out for no specific reason are considered avoidable waste. Foods that some people eat and others throw away have components that may be avoided. For example, while certain fruit peels can be eaten, others would rather not. Inedible food components such as bones, eggshells, inedible peels, and spent coffee grinds are included in the third category, which is unavoidable food waste [Quested T et al., 2009]. Food meant for consumption at home is frequently thrown away due to the perishable nature of most fruits and vegetables and a lack of forethought while making purchases. This is frequently made worse by packages that are frequently sold in wholesale clubs and include a lot of food at a discounted price (Gudners D, 2012).

## **Local Vs Transported**

"Food miles" are a commonly used metric to indicate the distance that food has traveled from point of production to point of consumption. It is commonly believed that locally farmed food provides less of an ecological effect versus foodstuff that is produced or nurtured somewhere and then shipped [Ghoshal S. 2011]. Still, Is food grown nearby less harmful to the environment than food grown and delivered from other areas? In general, the speed of a transportation mode has an increasing effect on the environment. After airplanes, the next largest users of energy per ton of food moved are trucks, trains, inland barges, and maritime ships.

## Addressing Sustainable Strategies

- SDs are defined as "diets with low environmental impacts which contribute to food and nutrition security and to healthy lives for present and future generations" by the FAO and Biodiversity International (2010). Sustainable diets optimize natural and human resources while being safe, healthful, and nutritionally adequate. They also respect and preserve biodiversity and ecosystems and are accessible, inexpensive, equitable in terms of economics, and culturally acceptable. In actuality, sustainable development goals (SDs) are founded on five fundamental principles: consuming less meat, dairy, and nutrient foods and beverages; consuming more fruits and vegetables; respecting the seasonality and variability of the food supply; and placing a premium on buying ecologically friendly products (UNEP, 2012).
- By 2050, projections show that there will be 9.2 billion people on the planet. It will take a significant increase in agricultural output to feed this expanding population. The term "genetically modified food," or "genetically modified organisms," describes the process of changing a crop's genetic composition by adding new genes from outside sources or removing existing ones. Both scientists and farmers concur that using biotechnology in the food sector has numerous benefits, such as the potential to end world hunger and create superfoods, all while helping farmers prosper financially (James C 2010). In the years to come, GMO technology will become more and more important to sustainable agriculture. With the use of this technology, it will be possible to create new crop types that are more resilient to pests and droughts, which will raise and improve productivity yields and help to reduce hunger and the global food insecurity issue.
- The main strategies for agriculture sustainability are as follows: techniques to recover energy from agricultural "waste" (like anaerobic digestion); methods to match inputs (like fertilizers, water, and pesticides) to outputs (plant or livestock requirements); and farming practices that sequester carbon in soils.
- After harvest, emissions can be decreased by developing more energy-efficient production, refrigeration, and transportation systems, or by using renewable energy sources. Improved inventory control, altered packaging and portion sizes, and other strategies that either extend food shelf life or assist customers in reducing food waste in various ways all contribute to minimizing waste.

## Conclusion

The role of humans and their consumption patterns have a significant impact on the production of food and the population set of beliefs and attitudes will dictate whether or not the long-term sustainability of the food supply chain can be achieved. Demand constraint and efficiency viewpoints are both subject to a critical analysis provided by the food system revolution. It emphasizes how unequal power relations affect the environment and human health by focusing on the structures, institutions, and relationships that support food production and consumption. It can, however, romanticize smallholder production at times, and although this viewpoint does a fantastic job of highlighting the complexity of the



relationships within the food system, it is challenging to pinpoint concrete solutions because of this complexity.

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