SUSTAINABLE DIETS AND POSITIVE SHIFT IN FOOD SECURITY – LITERATURE REVIEW

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Abstract: *Sustainable development is a complex organizing principle, and nowadays, sustainable practices are extended to every segment of economic and social life. The concept of sustainable diets covers all the aspects related to food: production, transportation, storage, consumption, human health, and present and future food security. The average diet from today usually fails to meet the dietary requirements for a healthy life. In 2010, FAO defined the term "sustainable diet" and outlined the aim of the practice, including the promotion of biodiversity and planetary health. The aim of the present study is to outline the potential benefits of sustainable diets in regard to global food security, by reviewing and analyzing the existing literature and studies of the subject.*

Key words*: sustainable development, healthy diets, food security*

INTRODUCTION

The working definition of food security, as stated at the World Food Summit in 1996, is: "Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life." Focusing on the phrasing "all people, at all times" it can be concluded that the definition of food security encompasses a factor of sustainability, in attempting to ensure said "access to sufficient, safe and nutritious food" for present and future generations. Therefore, food security is a sustainability matter, and the approach we as human species have towards achieving global food security must also be sustainable. [1]

In the span of centuries, multiple generations of rural dwellers (farmers, herders, foresters), as part of human communities, have participated in the development of complex, diverse and locally suited systems of agriculture and forestry. Managing said systems trough practices and techniques tested over generations, they ensured the food security of the community, resource conservation and biodiversity promotion. [2] Starting with the late years of the 18th century, once the industrial revolution took hold of Europe, these systems of agriculture started to disappear. More and more villagers transitioned to the expanding cities, to work in ever-growing industrial factories. Alongside this shift in residence, multiple subtle shifts happened: changing in workload, lifestyle, habits, and among them, a changing of the dietary pattern. The enormous advances that shaped the food chain, as the transition to mechanized agriculture, the invention of the refrigerator, development of preservation methods, international and global trade, have enabled population growth and for some, resulted in an improved diet. But they (enormous advances) also caused multiple alterations in human diet, which became one of the risk factors for human health. It is intriguing how the means of ensuring an active and healthy life turned in the span of few decades in one of the ten leading causes for non-communicable diseases (NCD), as hearth conditions, diabetes and some cancers, causing 4 million deaths per year, globally. [3, 4, 14]

Beside the risk posed to human health, these developments carry severe environmental costs. It's not novel information anymore that the present means of food production are destroying the environment, causing great harm to present and future food

security. Food production causes roughly 20-30% of anthropogenic greenhouse gas (GHG) emissions, is the main driver of massive deforestation, biodiversity loss and land use change, and is a great contributor to water pollution while accounting for 70% of the total anthropogenic water use. In terms of aquaculture, extensive fishing practices causes disruptions in the marine environment and deplete the stock of species consumed by humans. All these agricultural practices negatively impact the environment, being most visible in changes of climate, which in turn determines an increased difficulty of food production, by unpredictable and unstable weather behavior in many regions. [4]

In the last decades, policy makers and food industry focused on making the production more environmentally efficient, in order to increase the quantity of food produced and decrease the negative impact. Recently, this perspective has been challenged, numerous analysts stating that "production-side" approaches are not sufficient to efficiently address the environmental concerns and to diminish the occurrence of dietary disparity. In order to improve the environmental efficiency of the food chain, the issue must be approached from three additional perspectives:

1. Addressing the imbalances in the food system, related to affordability and access,
2. reducing the enormous quantity of food lost or wasted along the food chain, and
3. strongly emphasizing the urgent need for a change in dietary habits. [4]

Although the advice to consume sustainably is not new, being present since 1971 in numerous books and scientific publications, [5, 6, 7] there is still intensive debate on what can be considered a sustainable diet and how can it be implemented globally, while respecting the regional food culture of each human being. [4, 8, 9, 10]

MATERIALS AND METHODS

In order to determine the major characteristics of a sustainable diet and to identify the potential it poses to a positive shift in global food security, we analyzed numerous publications on the subject, comprised of reports from international organizations (FAO, UN, UNEP, WFP, WHO) from the last 10 years, and studies on the subject, from the scientific community, published in world renowned journals (Taylor&Francis, The Lancet, Multidisciplinary Digital Publishing Institute- MDPI), comparing the guidelines regarding healthy sustainable diets and the predicted impact on food security and environment.

RESEARCH RESULTS

The first agreed definition of sustainable diets was formulated at the International Scientific Symposium from 2010, "Biodiversity and Sustainable Diets: United Against Hunger", organized by FAO together with Bioversity International. According to that definition, sustainable diets are "those diets with low environmental impacts which contribute to food and nutrition security and to healthy life for present and future generations. Sustainable diets are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy; while optimizing natural and human resources." [4]

According to the mentioned definition, the main features of a sustainable diet are as the following:

1. protective and respectful of biodiversity and ecosystems,
2. culturally acceptable,
3. accessible,
4. economically fair and affordable,
5. nutritionally adequate, and
6. safe and healthy. [4]

Taking each of these characteristics individually, we further analyze how each of them impacts food security, in order to determine if a sustainable diet can produce a positive shift in food security.

Protective and respectful of biodiversity and ecosystems

The main concern with the actual trend of diets, raises from the heavy burden they apply on the environment: climate change due to massive amounts of GHG emissions generated by food production (between 8.5 and 13.7 Gt per year of carbon dioxide equivalent), freshwater use (70% of the total global water withdrawals being used for irrigation), land-system change (massive deforestation in tropical areas- 2.7million ha/year from Brazil; 1.3 million ha/year in Indonesia; 0.57 million ha/year in Republic of Congo), biodiversity loss (habitat fragmentation, unsustainable harvesting practices of wild species, terrestrial or aquatic habitat loss, invasive species), inefficient use of nitrogen and phosphorus leading to flows in nature. [11] All these anthropogenic interventions on natural ecosystems determined an increase in the risk associated with food production, as increases in the occurrence of extreme weather events, disturbances in the rain/drought cycle and extreme temperatures that reduce the productivity to mention only some of them. By association, any risk to the food production chain translate to a risk in food security.

In order for a diet to be considered sustainable, it must come from agricultural practices that protect the biodiversity and the ecosystem as a whole. To transform the food production system in a sustainable one, certain science-based targets must be reached, following a set of strategic directions that include the decarbonisation of the entire food chain, increased efficiency of nutrient use, rapid steps towards zero biodiversity loss, ecological conservation of existing agricultural land, halting the deforestation and expansion of agricultural land, drastically reduce food waste and loss. [11] If these targets are reached in time, they can stop and, in a positive scenario, even reverse the degradation of environment, therefore the risks to food security. [10] Unfortunately, the last UN Convention on Sustainable Development Goals revealed that we are not on the right track, and will most likely miss both the targets for 2025 and 2030, as well as the Paris Agreement goal, to limit the average temperature rise globally at 1.5°C above pre-industrial levels. Regarding the end of world hunger and malnutrition, not only are we not on track, we are actually moving in the opposite direction. [10]

Culturally acceptable

In order for a diet to be sustainable on the long run, it is of utmost importance to be culturally appropriate and respectful of the food traditions and the cultural identity in the area on implementation. It also needs to take in regard the personal preferences, schedules and food availability. This raises multiple issues when trying to define the concrete aspects, food groups and recommended nutrient intake at global level. Nevertheless, attempts have been made, the most successful being the healthy reference diet, proposed by the EAT-Lancet Commission. [11] The EAT-Lancet reference diet aims to address the unavoidable need of a healthy diet that can feed a growing population, while minimizing the damage to the environment by defining sustainable food system. [9] The total calorie intake is set at 2500 kcal/day, with possible ranges, being adaptable to individual body size and level of activity. The reference diet groups food in 8 categories: whole grains, tubers or starchy vegetables, vegetables, fruits, dairy foods, protein sources, added fats and added sugars. Inside the proposed categories, each individual can consume foods that are culturally appropriate, appeal to their personal preference and are available in their area. [11] Based on the reference diet, FAO proposed 4 possible variation, in order to exemplify the possible variations and the degree of adaptability presented by the reference diet: flexitarian, pescatarian, vegetarian and vegan. [9] Each of these diets propose a decrease or total avoidance in consumption of meat, specifically red meat, and other animal derived

food (dairy and eggs) and an increase in consumption of plant based protein sources. A decrease in global consumption of meats and animal derived foods has a great potential of positive shift in climate change (reduction in GHG emission), land use (80% of the total agricultural land is used for pasture and production of feed), individual health (excessive meat consumption is correlated with increased risk for coronary hearth disease, type 2 diabetes, overweight and obesity), food safety (antibiotic resistance, hormonal imbalances, infection with campylobacter and salmonella), risk of zoonotic diseases (Avian influenza, African Swine Fever). [9, 15]

Accessible, economically fair and affordable

In order for the proposed sustainable diet to be applicable, the food products must be accessible and affordable for the consumer, and at the same time the production of food must provide the farmers and other actors involved in food production with satisfactory income, in order to continue their activity and derive satisfaction from their work. Nowadays, the price of a healthy diet, as calculated by FAO, is globally 5 times more expensive than an energy sufficient diet (providing the required caloric intake, but lacking in diversity, micro- and macro-nutrients). At the same time, small and medium farm owners don't have the necessary means to attract reasonable income from their work. The current global dietary pattern is not healthy, and a healthy and sustainable diet is not accessible, economically fair and affordable. [9]

Nutritionally adequate

A nutritionally adequate diet is one that covers the energy expenditure of the individual, and provides the micro- and macro- nutrients required for maintaining a healthy and active life at any age. [4] According to FAO, WHO and WFP, the characteristics of a healthy diet are diversity, balance between the intake and expenditure of calories, is based on plant products (whole grains, tubers, vegetables and fruits), meat, eggs and dairy are eaten rarely and in moderation, integrates small quantities of fish and sea foods- sourced from sustainable fisheries, consumption of salts, sugars and fats is reduced to a minimum and fats are provided from foods rich in Omega 3 (nuts, olives). [4] As with the other features of a sustainable diet, this ones also imply a reduced consumption of meats and animal based foods, and an increase in grains and plant based foods. As stated before, a reduction in meat consumption poses incredible benefits for the environment, being therefore a sustainable approach to diet.

Safe and healthy

A safe diet is one that poses reduced risks for human health, by reducing the contamination of foods with harmful substances. The greatest threat to human health comes nowadays from animal derived food: campylobacter and salmonella are two of the harmful bacteria that is considered "inherent" to raw meat, and are the two most common causes of zoonotic diseases in Europe. [15] Another threat for food safety comes from antibiotic treatments applied to animals, that along time cause antibiotic resistances in humans, and the appearance of antibiotic-resistant bacteria. Last but not least, are the hormonal imbalances caused by consumption of meat coming from animals that have been administered growth promoting hormones. Related to human health, frequent consumption of meat causes health issues and can lead to numerous non-communicable diseases, such as high cholesterol, type 2 diabetes, coronary heart disease and some forms of cancers. [14] By reducing the intake of animal derived foods, a double positive impact can be achieved: first, to human health, and second to the environment. Therefore, a healthy diet from human perspective, is also sustainable and environmentally suited. [3, 4, 8, 9,10]

CONCLUSIONS

By analyzing all the features presented above, regarding a potential characterization of a sustainable diet, one thing is repeated in each of them: by reducing the consumption of meat and animal derived foods there would be numerous benefits, both for planetary health and for human health. Each of the six main features of a sustainable diet presents great potential for less environmental damage and increased human health over years, contributing to an increase in food security in the future. Each of the features touches the overconsumption of animal derived foods in a unique way, but all of them can be checked by a reduction in intake of meat, eggs and dairy. The environmental aspect is heavily connected with animal agriculture, and so is the affordability of a diet. Nowadays, the prices of animal foods are among the upper price level, and are predicted to increase in time. Related to how a sustainable diet can also be healthy, it is also connected with the moderate consumption of animal products, as overconsumption of meat negatively impacts human health over time.

By addressing the issue of affordability, a sustainable diet can have positive contribution on local and regional scale, by providing the consumers with locally produced, affordable foods, and the farmers with a viable income, so they continue their activity and derive satisfaction from their work.

By applying the guiding principles of the diet proposed by the EAT-Lancet Commission, each individual can adapt the quantities proposed from each food groups according to necessary energy intake to cover the expenditure, in relation to body size and activity level during the day. The reference diet can also be adapted to multiple dietary patterns, as exemplified above, it can be used by flexitarians and vegans and every other diet type in between, in order to satisfy both cultural traditions related to food and individual preferences.

After careful consideration in regard to the characteristics of a sustainable diet, it can certainly be affirmed that a global adoption of any variation of this diet can have a great positive environmental impact and an increase in food security in the decades to come.

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