



International Conference of Sabaragamuwa University of Sri Lanka 2015 (ICSUSL 2015)

## Challenges of food security – need for interdisciplinary collaboration

Indrani Karunasagar<sup>a,\*</sup>, Iddya Karunasagar<sup>b</sup>

<sup>a</sup>Director (R&D), UNESCO MIRCEN for Marine Biotechnology,  
Nitte University, Mangalore, India

<sup>b</sup>International Consultant, FAO, Rome, Italy

---

### Abstract

A peep into the ways global systems have impacted food security and the scientific processes to enhance food productivity is being outlined. Challenges such as food safety, global environmental changes and malnutrition need a multidisciplinary approach to tackle the issues associated with them. Multidisciplinary research in diverse areas related to crop production, public health, biological, physical and mathematical sciences, predictive modeling, statistical approaches etc. is the need of the hour. The coming together of all stake holders involved in science, technology and social sciences is required to implement progressive approaches to maximize production for feeding the ever increasing population and involves studies related to storage, manufacture, retail, food supply and value chain, reducing waste by preventing post harvest losses, recycling, making food safe by eliminating food related illness due to biological and chemical hazards, adopt best measures of preservation of quality, micronutrient addition to food for enhancing nutrition etc. All of the above needs to be addressed for sustaining global food security.

© 2016 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Peer-review under responsibility of International Conference of Sabaragamuwa University of Sri Lanka 2015 (ICSUSL 2015).

**Keywords:** Food security; challenges; food productivity; maximize production; feeding

---

\* Corresponding author. Tel.: +91 824 2204300  
E-mail address: [karuna8sagar@yahoo.com](mailto:karuna8sagar@yahoo.com)

## 1. Main text

Food security refers to “people having physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and preferences for an active and healthy life”<sup>1</sup>(FAO, 2010). Thus food security is addressed invariably with focus on nutritional security, food safety and global environmental change. All the above factors are important since they have potential impact on productivity and public health. Though right to food is the most basic right of a human, it is a universal observation especially in developing and the least developed countries that hunger is widespread with many food production systems being unsustainable.<sup>2</sup> (McDonald, 2010)

Challenges in food security is being oft discussed since the world’s population is expected to touch over 9 billion by 2050 and with so many mouths to feed , it is of paramount importance that the concerns are recognized and addressed<sup>3</sup>( Godfray et al, 2010) . It is predicted that to meet this demand, food production will need to see an upward trend by at least 70% in agricultural production. In this context it is dismal to observe that globalization and global environmental change has resulted in the most significant impacts to global food systems.

Climate change is a major challenge wherein all kinds of environmental vagaries such as rainfall, drought, flood, seasonal ambiguities, natural disasters, land degradation, water scarcity etc is likely to impact production systems. With right to food for all, organizations the world over are striving to maximize production and to make it refractory to impacts of climate change through scientific management. This is necessary the way forward for making it available for the poor and underprivileged in all countries of the world and to have food produced in a sustainable way and distributed equitably. Global food systems are highly complex and involve a range of activities that bring food from ‘farm to fork’ comprising production to harvest, processing, transportation, preparation to consumption. Beginning with good agricultural practices that include inputs in farming, identification of critical control points, risk assessment, risk analysis and hygienic handling etc form the basis of final product quality.

### 1.1. Major challenges to food security

**Nutrition security:** There is an increasing focus globally to improve food production and betterment of the quality for improving life expectancy, decrease in neonatal and child mortality rates, health of women and quality of life of the geriatric population . However the issue that still comes in the way and would amount to food insecurity affecting millions of people world over is Malnutrition. Malnutrition is one of the contributing factors for not only infant mortality but a significant number of new borns are underweight, and a large percentage of women and young children are anemic. This generally victimizes the economically and the socially backward and could be a consequence of hunger due to insufficient food, not enough energy , lack of vitamins, minerals and nutrients in the diet. At the other end of the spectrum is the problem of obesity due to more energy and less expenditure of it. Together these three states viz protein energy deficiency, mineral and micronutrient (vitamin A, D, C, D, iodine and iron) deficiency, and obesity due to excessive energy intake is designated the triple burden of malnutrition

Micronutrient deficiencies are also taking their toll. Prominent among them are the protein, vitamin A, folic acid, iodine and iron deficiency all of which also lead to impaired immune system resulting in susceptibility to many chronic ailments. In most parts of the world, the poor have an availability of calories through starch rich food with other micronutrients being compromised<sup>4</sup>(UNICEF, 2004). This leads to unhealthy population and consequent loss of productivity in a nation. Likewise, in rich countries, populations feeding on food fads which are nutrient poor but energy rich foods and with physical activity being very less, the new age disease called over weight or obesity is the result. <sup>5</sup>(WHO, 2006). This leads to many other health problems and also needs to be addressed as a food security issue. This problem is increasing by the year due to life style modification and alterations in food habits with people moving away from physical activity to more and more remote controlled life style. Life style disease such as diabetes, heart ailments, hypertension, osteoporosis , asthma and other chronic ailments are taking over and are affecting all populations of developed , developing and poor countries.

### 1.2. Environmental change and its impact:

While different types of food producing activity impacts environment, global changes in climate also have a major role in food production from sectors such as Agri- farming, livestock farming, poultry, capture fisheries,

aquaculture etc. Impacts are seen in land and water, usually as changes in soil and water quality, carbon footprint and production of greenhouse gases and consequent effect on bio-geochemical cycles. Changes due to agricultural and aquacultural practices bring about land clearances, land degradation, soil salinization stress on water resources, impact on water quality from agricultural runoff and aquaculture inputs, development of antibiotic resistance among human, plant and animal pathogens due to indiscriminate use of antibiotics ,killing of innocuous bacteria, loss of biodiversity etc. Scientific management of soil fertility, water quality, pests by ecofriendly approaches using bioremediation, biocontrol strategies, probiotics, prebiotics, removal of greenhouse gases from atmosphere and ways to mitigate climate change effects needs to be researched as it is continuously evolving.

### *1.3. Food Safety issues*

Establishments of global networks for managing the quality of food and their transnational movements and moving them within a country efficiently are paramount to managing the safety. Foods need to remain safe from natural or deliberate contamination and consumers health and food safety are intimately related. Several outbreaks or isolated incidents related to consumption of meat, poultry, vegetables, fish, shellfish, eggs, milk, shellfish etc have been recorded in history. Therefore contamination by chemicals, toxicants, infectious agents or any other hazard like radioactivity leak can have significant impact. This need not necessarily be at the final stage of consumption. Agriculture, aquaculture and other farming practices can present threats due to biomagnification of hazardous chemicals through the trophic levels. Animals affected by disease agents can become a source of transmission to humans which could be due to accidental contamination by organisms associated with the food growing environment, antibiotic residues in aquacultured animals, spread of resistance to human pathogens in the aquatic environment from aquatic animal pathogens etc. Thus global networks can lead to spread of many plant, animal and human pathogens and chemical hazards from the environment as also what is accumulated by biomagnifications.

## **2. Conclusion**

To address these global issues, it is necessary to have interdisciplinary approach in developing any food security policy. All involved must discuss science and technology research frontiers specific to augmenting food production, maintaining its quality and safety ( freedom from food pathogens and chemical hazards), issues in supply chain, environmental and social sustainability, nutrition and public health keeping in mind tools for decision making in each case.

## **References**

1. FAO (Food and Agriculture Organization of the United Nations). 2010. The state of food insecurity in the world 2010: Addressing food insecurity in protracted crisis. Rome.FAO.
2. McDonald, Bryan.L.2010. Food security. Cambridge: Polity press.
- Pinstrup-Andersen,Per. 2007. "Agricultural research and policy for better health and nutrition in developing countries: A food systems approach." *Agricultural economics* 37: 187-98
3. Godgray,H.et al. 2010. "Food security: The challenge of feeding 9 billion people". *Science*. 327 ( 5967): 812-18
4. UNICEF. 2004. "Vitamin and mineral deficiency: A global progress report".
5. WHO (World Health Organization) 2006. "Obesity and overweight".