



Resolving Food Security Problem with an Interdisciplinary Approach

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ARTICLE INFO	ABSTRACT
<p><i>Article type:</i> Review Article</p> <hr/> <p><i>Article History:</i> Received: 15 Aug 2018 Accepted: 22 Dec 2018 Published: 28 Jan 2019</p> <hr/> <p><i>Keywords:</i> Food security Interdisciplinary approach Sustainable Challenges</p>	<p>Food is one of the basic human needs and its sufficient fulfillment is directly related to food security. The concept of food security in its historical process has been debated from various aspects, such as physical and economical access to healthy and nutritious foods, at all times. Food insecurity is considered as a complex policy problem with different aspects. This problem requires a network of communication among different specialties to respond to fundamental questions in various dimensions. Interdisciplinary approach is an effective solution to such problems by eliminating the gap between the sciences and providing a more practical response. When discourses change from disciplinary to interdisciplinary, it will lead to an increase in innovation, as well as potential and creative entrepreneurship. By recognizing the multidimensional problems of the world, we understand that the sustainability of the achievements depends on our approaches. The food insecurity needs interdisciplinary approaches with social sciences, economics, and humanities, which all play critical role the in the issue in addition to health sciences. Any policy addressing food security needs to include expert evidence obtained from many different areas, which nevertheless interlock and interact.</p>

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Introduction

The history of food concerns goes back to the beginning of the human life. Probably one of the main aspects of the life of the early human was to provide food to survive. Even the human societies can be distinguished in different areas in terms of the severity of their specific food concerns. How to provide enough food has always been a necessity throughout the human history and undergone several changes. The term “food security” has been used over time to describe food concerns in household and national level (1). According to

the Integrated Food Security Phase Classification, food insecurity was classified to five subclasses (Figure1). The world has tried to solve this problem during the years, but it was unsuccessful given the complexity of the matter. It looks that new research concepts, tools, and methods are needed to understand and improve food insecurity. In this brief article, firstly we present the development of food security concept in the recent century. Then, we suggest that new measurements could be more efficient if we consider an

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interdisciplinary approach.

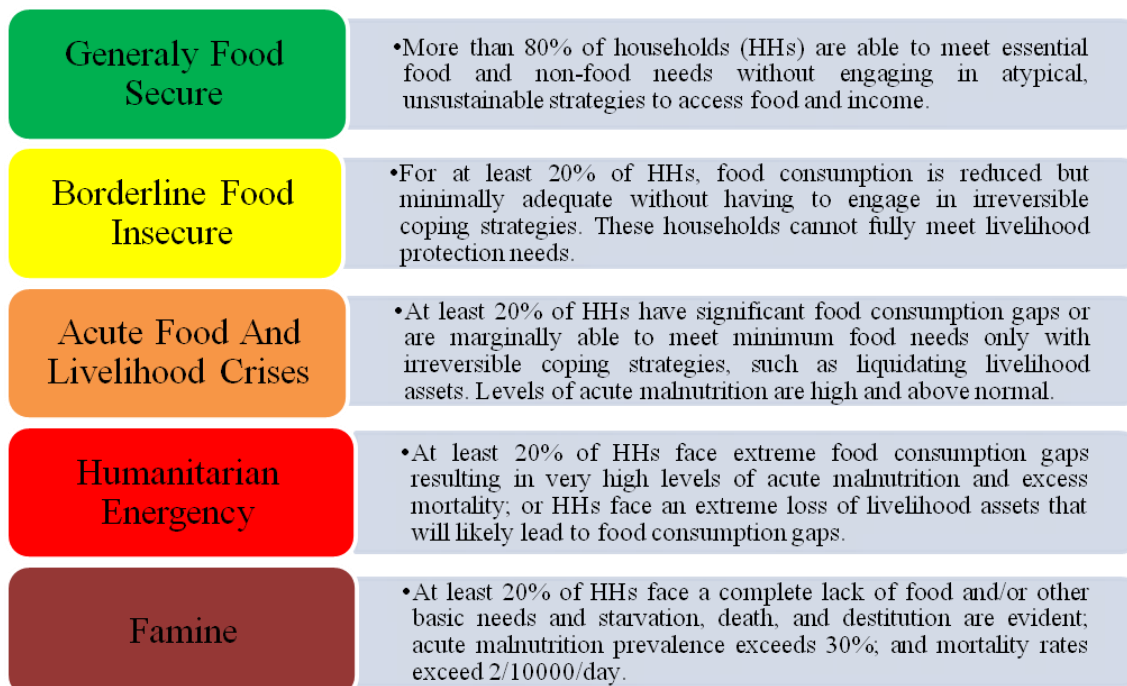


Figure 1. Integrated Food Security Phase Classification

Development of food security concept

The issue of food security at global level was first introduced in 1930s when Stalin's policies on the confiscation of wheat and other foods were the main causes of famine between 1932 and 1934. By the beginning of World War II, national food insecurity became a great concern. In the writings of John Shaw, this is also referred to as the origin of modern food security. About 10 years later, at the end of World War II, some countries decided to establish World Food and Agriculture Organization (FAO) to improve worldwide nutrition, the distribution of food across the world, and food security. After the war, food crisis was a global issue, and it was the origin of structural changes in order to ensure food security by focusing on industrial agriculture development (1, 2).

In 1961, World Health Organization in partnership with FAO set up Codex Alimentarius Commission to ensure food safety and security through stabilizing international food standards in terms of food processors, labels, and food hygiene (3). In 1974, the World Food Conference, under the slogan "within 10 years no child would go to bed hungry" began

to pass basic resolutions to eradicate global hunger and malnutrition. At the conference, they discussed the supply of basic food products to continuously improve food consumption and counteract the effects of fluctuations in production and prices and tried to find sustainable solutions for the food security crisis. They also mentioned that supply management, as a systematic process, can be a solution to hunger and malnutrition (4, 5).

Less than two decades after the second World War, food production increased by more than 50%, and per capita production increased by more than 20%. However, Nobel laureate Amartya Sen wrote that increased food supply alone does not guarantee food security (1981) (6). Two years later, in 1983, the FAO (Food and Agriculture Organization) proposed the following definition: "ensure that all people at all times have both physical and economic access to the basic food that they need". The World Bank also defined food security in 1986 as everybody's access to enough food at all times in order to have a healthy and active life. For a decade, the definition of the World Bank was accepted as a functional definition. The two

recent definitions point out the importance of economic access, along with physical access, as essential elements in the development of food security (4).

Between 1990 and 2005, food security passed its golden years with a series of international conferences focusing on the issues of children, environment, water resources, nutrition, human rights, global hunger, population, social development, food, agriculture and the environment, women, food security, and agricultural trade. During this period, the approach to food security has been growingly characterized by its multidisciplinary dimension (7). In The World Declaration on Nutrition (Rome, Italy, 1992), paragraph five

and eleven present a new perspective on the problem and suggest that there is a vicious cycle between hunger and underdevelopment (Figure 2). Furthermore, in paragraph five it was stated that "we recognize that poverty and the lack of education, which are often the effects of underdevelopment, are the primary causes of hunger and under nutrition". In paragraph eleven it was pointed out that, "were cognize that the nutritional wellbeing of all people is a precondition for the development of societies and that it should be a key objective of the progress in human development. It must be at the center of our socio-economic development plans and strategies" (8).

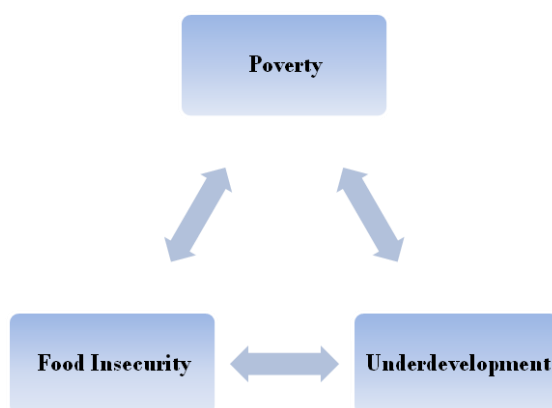


Figure 2. Hunger and underdevelopment vicious cycle

The World Food Summit in 1996 described food security as it follows: All people at all times should have physical and economical access to adequate, healthy, and nutritious food to provide nutritional needs for a healthy and active life(9). At a gathering of World Summit of Peace (Rome, Italy, 1996), 186 countries emphasized that access to adequate, healthy and nutritious food is every person's right. These series of conferences ended in the United Nations Millennium Summit in 2000, where the world leaders planned to reduce the number of hungry people to half by 2015 in order to achieve Millennium Development Goals (MDGs).

At a time when the United Nations' main agenda was to eradicate poverty and hunger, the world faces numerous food insecurity

challenges. The first one is the growth in global food prices (i.e., food prices increased by 40% between March 2007 and March 2008). This has reduced the accessibility of more than 100 million people to food. According to FAO, the 30% increase of the global food price was due to the production of ethanol from food products, such as corn, which was the impact of the increase in oil prices in that year. The second challenge was the climate changes and global warming, which were other reasons that greatly influenced agricultural processes with a decline in the production of most products.

The third problem was the destruction of natural resources. In the last half century, about 2 billion out of the 7.8 billion hectares of agricultural lands, permanent pastures, and

forests have been destroyed affecting more than 80 countries and more than 30 countries had experienced desertification (10). In 2010, based on the experience, FAO retrieved a concept called "Sustainable Diets", which Clancy had first mentioned it in 1984(11). Diets contribute to the food and nutrition security with the least environmental impacts and guarantee healthy lifestyles for the present and future generations. Sustainable diets, which protect and care for biodiversity and ecosystems, are culturally acceptable, economically affordable, easily accessible, and nutritionally adequate. They are also safe and healthy with the optimal and efficient uses of natural resources (12).

Eventually in 2015, following the presentation of the results of MDG actions, the principle of sustainability became very important. While the United Nations had passed MDGs to Sustainable Development Goals, putting an end to hunger and improving nutrition were the main priorities of the international development; however, the experience has shown that food security is a complex multifaceted problem, in which every small factor greatly matters.

The inclusion of sustainability in the United Nations new goals was considered as the underlying principle, because achieving food security at any cost has great environmental impacts, which would later lead to another cycle of food insecurity. On the other hand, collective

problems require collective solutions. Food aid from rich countries to the poor ones not only does not provide food security but also has a more negative effect. These countries would always depend on such short-term aids and lose their independency. Therefore, in order to guarantee food security, the communities must be empowered to provide food based on their culture, environment, and the available resources (13).

Consideration of an interdisciplinary approach in food security

Food insecurity has been called "wicked problem" due to the complex nature. Such problems mostly require interdisciplinary cooperation. In actuality, due to involvement of various stakeholders, interests and perspectives in food security there is no agreement on what the problem is or what should be done about it. (14). Therefore, we have to entail all stakeholders in proposed solutions and alternatives in order to achieve consensus for the final solution. This problem, because of multidimensional and complex nature requires close collaboration between many different specialized disciplines, such as economics, statistics, sociology, environmental science, nutrition, and it must always be prepared to include new perspectives due to the influence of a large variety of stakeholders and the structural developments (Figure 3).

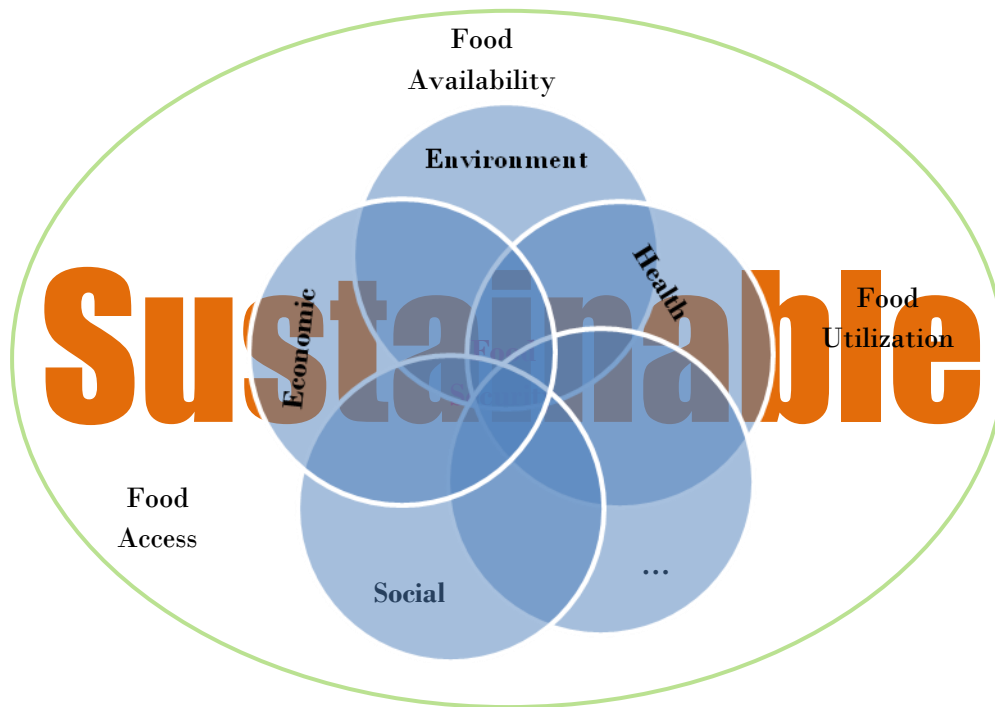


Figure3. The collaboration of different disciplines to sustainable food security.

By studying food security evolution through history, we would discover that important changes happen whenever the concerns and problems in the society are the same (15). In post-world wars periods, the establishment of food-related organizations, along with the developments in the field of agriculture and industry, with the aim of mass food production was of great importance achieved by the help and cooperation of all the sectors of society and individuals. Although mass food production using recent technologies with the purpose of providing the requirements of the growing population had increased food accessibility worldwide this increase failed to eradicate world hunger. The reason is that eradicating world hunger does not have an equal priority for the governments, economists, and nutritionists; therefore, we have to find solutions for the food insecurity crisis by taking every individual into account and using interdisciplinary discourse approaches, where

we can convert a problem to a common concern for all people (16).

In the past, the boundaries among disciplines were emphasized to promote specialization, while today's understanding of new issues requires specialists of different disciplines to the boundaries of methodology and epistemology of other disciplines. Promoting interdisciplinary research is important to find answers to complex and multi-sectoral issues, such as food security. In fact, interdisciplinary studies are against the existing university culture, because there is a clear distinction between various academic fields, and some critics might declare that different disciplines should act independently. As Klein's discussed the interdisciplinary interactions are the base of future researches and the key to massive transformations in science (17).

Interdisciplinary discourses appear to be important in some subjects, such as food security, because of the complexity, diversity,

and comprehensiveness, since single-threaded approach is not possible (18). For example, when a rise in food prices occurred in 2008, it was not possible to design a corn-based nutrition program without a proper understanding of the economy and the fact that how the price of oil could affect food prices.

No problem can be attributed to just one field; each field has its own approaches and methodologies. Sometimes, research studies in a discipline reject the findings of other disciplines. We are not generally dealing with simple and monotonous problems. Each problem has different dimensions, and if we only consider the approaches in one field, we will not see other aspects of that problem. As a result, the solutions we provide will not be sufficiently comprehensive. When the process of research changes from disciplinary to interdisciplinary, we would observe an increase in innovation, as well as potential and creative entrepreneurship, which can compensate for the gap between the sciences. The aim of the present study was to collect partial knowledge, along with finding the best solution (16).

Results

Repko has presented ten steps for performing an interdisciplinary research (19). According to the Repko's method, we suggested four steps to achieve an interdisciplinary approach to investigate food security problem. In the first step, we need to reach a common definition of the issues; for instance, when a nutritionist speaks about food security what a sociologist's opinion of this phenomenon is. In fact, comprehensive definitions are effective factors in interdisciplinary studies. The next step is creating motivation in different disciplines to solve a social problem, and that would happen when a common problem has been defined, Then we would be able to create a collective action problem for a variety of disciplines and succeed in solving the problem. Health issues do not just affect individuals regardless of their environment. In other words, it is unlikely for an individual to follow a healthy life style in an unhealthy environment.

The balance between the humans, living organisms, and natural environments, such as plants, animals, lands, and the seas, is a subject that cannot be investigated from one point of

view (20). In order to achieve a holistic approach in food and nutrition, we should consider the concept of health as a collective issue with its biological, social, and environmental dimensions. The third step is identifying conflicts between insights and locating their sources. It is natural that specialist insights from different disciplinary perspectives also conflict. These conflicts cause problems in creating common ground and achieving integration. Identifying these conflicts and locating their sources is a key step to create a common ground regarding interdisciplinary approaches. Finally, addressing and developing the intersection of different disciplines enables us to make comprehensive solutions.

Conclusion

Throughout history, food security has always been a matter of interest for policy makers and begun to be a global concern. The concept of food security has evolved over the past 100 years to identify various dimensions of the problem. This problem, because of the multi-dimensional and complex nature requires close collaboration between many different specialized disciplines, such as economics, statistics, sociology, environmental science, and nutrition. In addition, it must always be prepared to include new perspectives due to the influence of a large variety of stakeholders and structural developments. The other important aspect is considering sustainability in all related activities. Sustainable approach leads to sustainable achievements.

When discourses change from disciplinary to interdisciplinary, it will lead to an increase in innovation, as well as potential and creative entrepreneurship. By recognizing the multidimensional problems of the world, such as food insecurity, we understand that the sustainability of the achievements depends on our approaches. Therefore, to overcome various problems in food security, it is necessary to develop interdisciplinary approaches to provide assurances in all the aspects considering the foundation of food security.

Acknowledgments

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References

1. Shaw D. World food security. A History since 1945. 1th edition. Palgrave Macmillan UK; 2007. P. XX, 510.
2. Watson H. FORESTS AND FOREST PRODUCTS: WORLD SITUATION 1937-1946. Empire Forestry Review. 1947; 26(1):20-3.
3. Forschbach E. The European Food Code Codex Alimentarius Europaeus. Food Drug Cosm LJ. 1961; 16: 317.
4. Maxwell S. Food security: a post-modern perspective. Food policy. 1996; 21(2): 155-170.
5. Thomas P. The Elusive Goal of Eliminating Global Hunger: Progress and Challenges. World Med Health Policy. 2014; 6(2): 158-65.
6. Sen A. Poverty and famines: an essay on entitlement and deprivation. Oxford university press; 1982.
7. Colonnelli E, Simon G-A. FOOD SECURITY GOVERNANCE. 2013.
8. Organization WH. World declaration and plan of action for nutrition: Food and Agriculture Organization of the United Nations; 1992.
9. Declaration R. Rome Declaration on World Food Security and World Food Summit Plan of Action. 1996.
10. Nelson GC, Rosegrant MW, Palazzo A, Gray I, Ingersoll C, Robertson R, et al. Food security, farming, and climate change to 2050. Scenarios, results, policy options: Intl Food Policy Res Inst; 2010. P. 140.
11. Clancy KL. Editor Can Sustainable Agriculture Engender a Sustainable Diet? Second Conference on Sustainable Agriculture, Pomona College, Pomona, CA April; 1984.
12. Macdiarmid JI ,Kyle J, Horgan GW, Loe J, Fyfe C, Johnstone A, et al. Sustainable diets for the future: can we contribute to reducing greenhouse gas emissions by eating a healthy diet?. American J Clin Nutr. 2012; 96(3): 632-9.
13. Acevedo MF, Harvey DR, Palis FG. Food security and the environment: Interdisciplinary research to increase productivity while exercising environmental conservation. Global food security. 2018; 16: 127-132.
14. Grochowska R. Specificity of food security concept as a wicked problem. Journal of Agricultural Science and Technology B. 2014; 4: 823-831.
15. Klein JT. Interdisciplinarity and complexity: An evolving relationship. Structure. 2004; 6(1-2): 2-10.
16. Alrøe H, Noe E. Second-order science of interdisciplinary research: A polyocular framework for wicked problems. Constructivist Foundations. 2014; 10(1): 65-95.
17. Klein JT. Evaluation of interdisciplinary and transdisciplinary research: a literature review. Am J Prev Med. 2008; 35(2 Suppl): S116-23.
18. Karunasagar I, Karunasagar I. Challenges of food security–need for interdisciplinary collaboration. Procedia food science. 2016; 6: 31-33.
19. Repko AF. Interdisciplinary research: Process and theory. 2th Edition. SAGE Publications, Inc; 2011. P. 544.
20. Goudie AS. Human impact on the natural environment. 8th Edition. Wiley-Blackwell; 2018. P. 472.