

# THE SECURITY OF FOOD PRODUCTION: WHAT DOES THE FUTURE HOLD?

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## ABSTRACT

This paper examines the threats and vulnerabilities of the emerging network of global food systems to characterize present challenges to food security. Over the past few decades, local, regional, and national food and agricultural systems have increasingly become intertwined in an emerging global food network, a complex web of relations that include the production, harvest, processing, transport, and consumption of food. The emerging shape of this global food network does not map onto many of the traditional political science models of the world such as developed and developing countries. By analyzing the issues of nutrition, food safety, and global environmental change as they relate to this global food network, I explore how processes of globalization are reshaping food systems in ways that have significant impacts for human and national security. These changing relationships and challenges have broad implications for all those involved in food production, distribution and consumption, but particularly for those who live and work in areas such as California which are closely connected to other parts of the world.

**Key words: food security, food safety, human security, global change**

## INTRODUCTION

The ways human populations gain access to food has long been a defining feature of human civilizations. Throughout history, changing methods of food cultivation have marked important shifts in the character of human societies. Over the past few decades, local, regional, and national food and agricultural systems have increasingly become intertwined in an emerging global food network, a complex web of relations that include the production, harvest, processing, transport, and consumption of food. The emerging shape of this global food network does not map onto many of the traditional models of the world, such as a model that divided the countries of the world into two groups made up of “developed” and “developing” nations. Today, however, there are still malnourished people in both developed and developing countries, and all over the globe there are pockets of both abundance and scarcity.

One of the major goals of efforts to optimize the food system over previous decades has been to ensure food security. Many definitions of food security exist—by one count there are close to two hundred—but definitions tend to emphasize that food security exists when all people at all times have access to the sufficient, safe and nutritious food necessary for people to lead active and healthy lives (Shaw 2007). Food is a vital and necessary component of human livelihoods, and agriculture and food production (including farming, fishing and gathering) remain key components of national and global economies. For example, in the United States, food

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production makes up ten percent of the United States gross domestic product, generates nearly one trillion dollars each year, and employs one in eight American workers (Flynn 2004).

This paper examines the threats and vulnerabilities of the emerging network of global food systems to characterize present challenges to food security. A globalized food network provides a variety of new opportunities for improving health and well-being by connecting humans around the world through one of their most basic needs. But a full investigation of the globalized food network also reveals the significant risks increased interconnection poses to individual and social health and safety, personal and national economies, and local, regional, and global environments. By analyzing the issues of nutrition, food safety, and global environmental change as they relate to this global food network, I explore how processes of globalization are reshaping food systems in ways that have significant impacts for human and national security.

## **GLOBAL CHANGE AND THE CHANGING SECURITY LANDSCAPE**

Since the 1970s, and especially in the past fifteen years, processes of economic, political, and social globalization have brought increased interconnectedness, mobility, and access for transnational flows of people, information, and goods. Changes brought by globalization—combined with the reduced capacity of governments to address pressing issues, and the increasing role of non-state actors from NGOs to terrorist organizations in national and international politics—have produced a considerable amount of turbulence in world affairs (Rosenau 1990). There is also a growing sense that some contemporary security challenges—such as infectious disease, terrorism, and trafficking in drugs, people, or illegal goods—operate in different ways than traditional challenges in that they are transnational, meaning they cross borders but generally cannot be directly linked to foreign policies and state behaviors (Matthew and Shambaugh 1998).

In response to recognitions of new forms of threat from the growing turbulence in world affairs, a number of scholars, journalists, and policymakers have called for broadening conceptualizations of security to encompass these new types of threats including: health, urbanization, information technology, the proliferation of nuclear technology, the development of advanced biological, and the security implications of environmental degradation. Global turbulence and transnational threats do impact the national security of states, but most often their impacts are felt in the daily lives of individuals and communities. The current global network of food systems fit this pattern as well; many food security challenges transcend national boundaries. As a result, ensuring food security remains a significant global priority and has been the subject of extensive attention and effort in global affairs.

## **FOOD SECURITY IN A TIME OF GLOBAL CHANGE**

Food insecurity impacts billions of people on a daily basis. According to the Food and Agriculture Organization of the United Nations (FAO), in 2001-2003 there were “854 million undernourished people worldwide: 820 million in the developing countries, 25 million in the transition countries and 9 million in the industrialized countries” (FAO 2006, 8). Food insecurity also impacts some two billion people who do not receive sufficient vitamins and minerals from their diets and over one billion people who are overweight (World Bank 2006). Lack of food

security contributes to significant human insecurities: “hunger and malnutrition kill more people every year than AIDS, malaria, and tuberculosis combined, and more people die from hunger than in wars” (Shaw 2007, x). Concerns about food insecurity have motivated a tremendous amount of effort to increase global food supplies and reduce poverty (such as the goals of the World Food Summit to halve the number of undernourished by 2015 or the Millennium Development Goal to reduce by half the proportion of people who suffer from hunger). While these efforts have led to significant increases in the productivity of food and agricultural systems, improvements in standards of living, and considerable gains in human health, well-being and security, they have not led to universal food security and therefore food security remains a key challenge in the twenty-first century.

The need to consider the full range of factors impacting food security has been made increasingly clear in recent years. By early 2008, the world was again turning its attention to focus on food security and insecurity. Media organizations, policymakers, international agencies, and nongovernmental organizations were again confronted by the complex causes of food insecurity including: rising demands for resource-intensive products like meat; growing consumer purchasing power in countries such as China and India; changes and variability in climate and severe weather events that devastated harvests in many parts of the world; high oil prices that increased the costs of producing and transporting food and raised costs of inputs like fertilizers and pesticides; speculation in commodity markets as investors seek safe harbor from volatile credit and real estate markets, and impacts from efforts to expand the production of biofuels (Ban 2008). Furthermore, high-profile cases of food system contamination have raised questions about the advantages and disadvantages of an increasingly global network of food systems that rapidly transfers food from producers to consumers. In addition to these challenges, growing awareness of the contributions of food and agricultural production systems to climate change and the likely impacts that climate change will have on food and agricultural production systems have raised attention for the need to mitigate or reduce the magnitude of impacts, and adapt or reduce the vulnerability of human and natural systems to climate change.

This paper seeks to provide a deeper, richer, and broader discussion of food security challenges by adopting a human security perspective. According to the most influential formulation, the concept of human security has two main aspects: “It means, first, safety from such chronic threats as hunger, disease and repression. And second, it means protection from sudden and harmful disruptions in the patterns of daily life” (UNDP 1994, 23). Adopting a human security perspective requires us to consider both chronic and sudden challenges to food security. As in other policy areas, too often food security discussions focus on sudden and hurtful disruptions to human security—issues such as wars, famines, and natural disasters—which attract considerable media, humanitarian, and policy attention. The chronic aspects of food insecurity—issues like insufficient nutrition from the lack of a balanced diet or over-consumption of food, ill-health, and lack of clean water—receive less attention but nevertheless impact many billions of people in their daily lives. When we examine the challenge of food security from the perspective of human security, we find that a lack of food security manifests as more than just hunger and that malnutrition is caused by more than just lack of food. Instead, we find three primary sets of challenges that act as disruptors, or unexpected destabilizing factors, of food security: optimizing nutrition, ensuring food safety, and managing global environmental change.

## **OPTIMIZING NUTRITION**

Food insecurity is often discussed as malnutrition, or the lack of a proper and sufficient diet. Malnutrition remains a significant threat to human health and well-being. However, malnutrition is not simply a lack of sufficient food, but also includes many people whose diets do not provide sufficient vitamins and minerals (micronutrient deficiency), as well as people who are overweight or obese (overnourishment). Processes of global change have rendered efforts to optimize nutrition and ensure food security more complex, such that addressing malnutrition must involve not just ending hunger, but addressing all three dimensions of malnutrition.

Understanding the complex and multi-causal nature of the challenges of malnutrition is essential to developing solutions to address a pressing source of human insecurity. Conventional explanations of food insecurity tend to focus on the undernutrition aspect of malnutrition. This focus is certainly well deserved, as the pain, suffering, and death caused by undernutrition are considerable and the pressing need to address this challenge cannot be given too much attention. However, discussions of undernutrition too frequently tend to oversimplify the causal factors involved in undernutrition. Rather than resulting purely from a lack of food, undernutrition is a result of a complex and interactive variety of factors that include food, but also ill-health, education, the role of women, poverty, and lack of clean water and sanitation systems. Solutions to undernutrition can only be solved in part through increasing food availability, especially with regards to staple crops whose availability and prices have been significantly impacted in recent years; they must also be linked into broader global health and human security efforts that address the other causes of undernutrition.

However, in addition to the challenge of undernutrition, malnutrition also includes challenges from micronutrient deficiency, caused by food choices and scarcity of necessary foods for a healthy diet, as well as overnourishment, which is primarily caused by food choice and food availability. Each of these challenges, while less severe and time sensitive than undernutrition, are equally important dimensions of addressing human security challenges from food insecurity. Though less immediate, today greater attention is being given to the negative health effects of micronutrient deficiency and overnutrition. Some solutions to these types of malnutrition are distinct from other categories. For example, with regards to micronutrient deficiency, provision of dietary supplements such as vitamins and salt with added iron and iodine can have significant impacts. For problems of overweight and obesity, personal and household food choices play a key role in these problems, especially when combined with individual level genetic and physiological differences. Thus, many solutions to these problems will be based on changes in individual behaviors that will require improvements in food choices and increasing the nutritional value of foods people do eat, but also changes in lifestyle such as eating and exercise behaviors.

## **ENSURING FOOD SAFETY**

Our increasingly networked world provides tremendous advantages for the exchange of information, capital, goods, and people, and increased global interconnectedness has also resulted in a closer connection between the world's populations, economies, and ecologies. Where human populations once interacted at the speed of travel by foot or animal, they now

move on ships, railroads, automobiles, and airplanes. Linking local, national, and global food systems has provided tremendous benefits to consumers in terms of availability, variety, and pricing of food. However, the impacts of greater interconnectedness have not been all positive; the increasingly global nature of food production and consumption systems have also created an evolving set of challenges related to ensuring that food supplies remain free from threats to human health. Providing food security requires ensuring food safety and connecting food safety efforts with broader efforts to improve global health across a range of indicators.

It is worth stressing that the global food system largely provides safe and nutritious foods. To a certain extent, concerns about safety in the food systems reflect the development of better disease surveillance, reporting, and tracking systems. However, there is general agreement that the globalization of the food system, combined with changing preferences for foods that are fresher and less prepared, has resulted in amplification of food safety threats. Despite efforts to improve food safety, foodborne illness remains a significant source of sickness and death and it is worth briefly examining the systems that have developed to promote safety and security in the food system.

The current food safety system in the United States is heavily influenced by the history of its development. Prior to the late 1800s, the U.S. government took no responsibility for food safety. Reporting by journalists such as Upton Sinclair and resulting public concern prompted the 1906 passage of the Pure Food and Drugs Act and the Meat Inspection Act. By passing these acts, Congress accepted that food safety was an appropriate area for federal oversight and made the United States Department of Agriculture (USDA) responsible for keeping sick animals out of the food system. In the decades to come, the Pure Food and Drugs Act would be revised and amended and USDA would undergo a number of reorganizations. In 1930, the Food and Drug Administration was created within USDA but it would eventually be transferred out of USDA and into the Department of Health and Human Services. Federal oversight of food safety has continued to evolve, though it often lacked a grand vision of a comprehensive and coordinated effort to ensure food safety. The result of a gradual evolution of responsibility for food safety is that oversight responsibility is dispersed among different agencies, often without a logical division. For example, USDA regulates corn dogs while the FDA regulates bagel dogs; USDA regulates pepperoni pizza while the FDA regulates cheese pizza (Nestle 2003).

A number of studies have discussed the flaws in such as system and outline the need for a more streamlined system that could protect the interests of consumers and ease the burden of regulation on food producers. To date, such calls have been ineffective at prompting changes in the structure of the U.S.'s food safety system. By early 2008, the web of federal agencies with responsibilities for food safety had grown to fifteen agencies, administering at least thirty laws related to food safety (GAO 2008). The food safety system grows even more complex when one considers that many responsibilities for food safety rest with local and state agencies that must also coordinate activities with the federal food safety web.

Recent high-profile experiences with food safety contamination demonstrate the continued danger of food system contamination and the need for concrete steps to enhance coordination of food safety efforts. It would be unfortunate if, as with the case of homeland security, repeated calls to enhance safety systems went unheeded until some sort of large scale food safety disaster

occurred. The creation of a unified food safety system would be an incredibly complex task that would perhaps be less likely to succeed if done rapidly and in an environment of political crisis. Estimates indicate that every year approximately one out of every four Americans (or 76 million cases) will develop a foodborne illness and that these cases will result in 325,000 hospitalizations and 5,000 deaths with a cost to the nation of at least \$6.9 billion each year (Mead 1999). These estimates underscore that food safety remains a persistent and significant threat to human health and security in the United States.

## **MANAGING GLOBAL ENVIRONMENTAL CHANGE**

In recent decades, greater attention to the environmental impacts of agriculture have revealed that food production activities both contribute to processes of global change and will experience significant impacts as a result of those processes. Throughout history, the ways in which people satisfy their need for food—including farming, fishing, and raising livestock—have contributed greatly to the impacts that human populations have on the environment. Managing global environmental change will require developing agricultural and food production systems that provide for human needs but also assist in efforts to mitigate and adapt to processes of global change.

Activities intended to provide people with sufficient food have been, and continue to be, major drivers of environmental changes. These changes are often localized, such as cutting down or burning forests to create croplands. The impacts of such changes are often local as well, such as increased erosion of topsoil, loss of soil nutrients, and reducing water quality when siltation and agricultural run-off enter waterways. However, local changes can have regional and national impacts that contribute to problems such as toxic dead zones in rivers and oceans, desertification, and global climate change. Greater understanding of the impacts of agricultural practices make it clear that finding ecologically sustainable ways to meet human needs and ensure food security will be a fundamental challenge to the global food system but will also be a key project of human societies in years to come.

Unsustainable agricultural practices have had significant negative impacts on human security and the environment in the past, and are significant contributors to negative impacts on human security and the environment at the present time. These discussions also provide a foundational recognition that the ways in which humans have produced food have changed in the past, and will certainly change in the future. The imperative of sustainable development is to apply intentionality to changes that are certain to come such that the results of efforts over coming decades and centuries will move agricultural and food productions systems closer to the goals of human security and sustainable development rather than away from them. In particular, we see that efforts to develop a more sustainable global food system are central to developing ways to mitigate global climate change's effects and adapt to its expected impacts in a range of sectors.

Recognition of the need to improve the sustainability of the food system is clear. Jack Wilkinson, President of the International Federation of Agricultural Producers, comments “We’ve got enough land, we’ve got enough resources and we’ve got enough farmers. We just don’t have enough good agricultural policy or the political will to get on a path towards sustainable development” (IFAP 2008). The process of developing sustainable agricultural and food

production systems will require technical, methodological, scientific, economic and political components. Achieving the goals of sustainability might also require considerations of ways to strategically decouple local, regional and national food systems from global networks. Growing sustainable agricultural and food production systems is a key component of goals of human security, to address sudden and chronic sources of insecurity, and food security's goal of providing all people with sufficient, safe and nutritious food to enable them to lead a healthy life. The development of sustainable food systems will likely occur slowly and as a result of actions at multiple levels from the individual to the community to the national to the international.

## CONCLUSION

While each of these sets of challenges—optimizing nutrition, ensuring food safety, and managing global environmental change—is pressing, their complexity is enhanced even further by recognizing that these sets of challenges are also interactive and each challenge has feedback effects on the others. Efforts to reduce food prices by increasing food production could increase the environmental impacts of agricultural and food production systems. Efforts by the poor to gain access to needed food through hunting and fishing could amplify health and food safety challenges by exposing them to new diseases and increasing the environmental impact of informal strategies like poaching and over-fishing. Efforts to manage environmental change and address climate change could cause significant hardship if they are done without full consideration of impacts on food production. In a time when policy agendas are crowded with complex problems that have multiple causes, it is important to consider the ways interactions and feedback effects can complicate efforts to address challenges. In this way, we can identify win-win strategies wherein efforts in one area will lead to the enhancement of human livelihoods and well-being in other areas.

In response to recognitions of the many and varied ways processes of global change impact multiple aspects of human life, two powerful visions of the future have developed. One vision shows a world where globalization, technology and human ingenuity will lead to a better future where the benefits of increased interconnectedness are available to all people. In contrast, a competing vision reveals a future where the sources of threat and vulnerability that are amplified by processes of global change eventually overwhelm societies and lead to a global catastrophe of widespread social and ecological collapse. These two compelling visions, of a better world or a coming anarchy, turn on whether the capacity of societies to mitigate and adapt to processes of global change will be sufficient to address the challenges they face.

The world is at a critical moment where processes of global change have raised key questions about how and to what extent the world can govern networks and harness them to make progress on goals such as ensuring food security. To the extent that ways can be found to govern networked systems and harness their capacity while minimizing their vulnerability, the world will move closer to the better world envisioned by some thinkers. If ways cannot be found to govern these networks, the world could slip closer to the coming anarchy envisioned by other thinkers (a development perhaps foreshadowed by how quickly recent rises in global food prices contributed to rioting and unrest in a number of countries earlier this year, including Burkina Faso, Cameroon, Egypt, Ethiopia, Haiti, India, Indonesia, Italy, Ivory Coast, Mauritania, the Philippines, Senegal, Thailand, Uzbekistan, and Yemen).

The challenge of creating a sustainable food system is by no means simple. It must be mindful of human needs, sensitive to current and likely future ecological conditions, and manage to navigate complex global political, economic, and social systems. However, the ways in which humans rise to meet the challenge of creating a safe and sustainable global food system will be a significant factor in addressing persistent sources of human insecurity and determining the health and vitality of the world that is passed on to future generations.

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