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The Human and Environmental Health Impacts of Food Quality

Among Emergency Food Providers

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Abstract

Human health and environmental health are inextricably entwined, and the ways in which we grow, process, package, transport, market, and consume food are critical factors for both human and environmental health. The current industrial food system in the United States has numerous adverse effects on environmental and human health, which significantly impact the millions of food insecure Americans who receive their nutritional needs from emergency food providers (American Public Health Association, 2007). The widespread food insecurity in the United States and the increasing prevalence of obesity among adults and children have drawn attention to the role that emergency food services should play in providing healthful foods to vulnerable populations. These trends led Ceres Community Project, an organization based in Sebastopol, California that provides organic meals to low-income people facing serious illness, to begin researching the impact of the industrial food system on food insecurity in the United States. Ceres research highlighted the need for the organization to take on a leadership role in a national campaign to address hunger and food insecurity by promoting organic and sustainably raised food as the “Best Practice” model for emergency food providers. This paper represents the findings from the culmination of a 300-hour research-based fieldwork experience performed at Ceres Community Project, which emphasizes the need for further research on the harmful effects of industrial agriculture on human and environmental health, and the necessity for policies to improve the quality of food offered by emergency food providers.

Human and Environmental Health Impacts of Food Quality
Among Emergency Food Providers

Introduction

Mounting data and research shows that human health and environmental health are inextricably entwined, and the ways in which we grow, process, package, transport, market, and consume food are key factors for both human and environmental health. The current industrial food system in the United States is highly dependent on the use of pesticides. More than 1.1 billion pounds of pesticide active ingredients are used on conventionally grown food crops each year in the United States (Grube, Donaldson, Keily, & Wu, 2011). A study performed by the United States Department of Agriculture (USDA) in 2006 measured pesticide residues and found pesticide residues in 62.1 percent of fruits and vegetables, 30 percent of peanut butter samples, and 19 percent of bottled water samples (USDA, 2007). Typical U.S. food consumption patterns can result in potentially high exposures to pesticides that accumulate in our bodies and cause a number of diseases (Sutton, Perron, Guidice, & Woodruff, 2011).

The widespread use of pesticides has been linked to a number of cancers, including childhood cancers from prenatal and early life exposure to pesticides (Infante-Rivard & Weichenthal, 2008). While the link between pesticides and cancer has long been a concern, a report released in April 2010 for the President's Cancer Panel finds that the true burden of environmentally induced cancer is greatly underestimated (Reuben, 2010).

In addition, pesticide exposures have adverse effects on reproductive health. Studies have shown that pesticides can alter semen quality and fertility in men (Hauser, 2006) as well as increase the rates of prostate cancer (Diamanti-Kandarakis et al., 2009). Pesticides have been shown to affect puberty in women, menstrual and ovarian function, fertility and fecundity, and

menopause (Mendola, Messer, & Rappazzo, 2008). A prospective study, which measured exposure to DDT and toxaphene several years prior to breast cancer diagnosis showed a positive link between exposure to the two pesticides and breast cancer (Cohn, Wolff, Cirillo, & Sholtz, 2007).

Finally, studies from both The National Academy of Sciences and the University of California, Irvine also showed brain anomalies in children exposed to pesticides. It has been estimated that 40% of U.S. children have enough cumulative exposure to pesticides to potentially impact their brains and nervous systems (Payne-Sturges, Cohen, Castorina, Axelrad, & Woodruff, 2009).

In addition to conventional agriculture's detrimental effects to human health are numerous adverse effects to the environment. Pesticides contaminate soil, groundwater, and streams (American Public Health Association, 2007). U.S. farm policy incentives for producing specific, high-yield plants like corn have led to industrial agricultural practices such as monocropping, which decreases plant biodiversity and depletes soil. Calculations of current rates of soil degradation estimate that 70 percent of the world's topsoil is gone and if current farming methods, which strip carbon continue, there are about 60 years of topsoil left (Crawford, 2015). Current agriculture methods, which strip the soil of carbon and make it less robust, cause soil to be lost at between 10 and 40 times the rate at which it can be naturally replenished (Crawford, 2015).

A 2013 report issued by the United Nations concluded that organic farming, which preserves topsoil, protects water supplies, and favorably impacts climate change, is the only way to feed the growing population and sustain the environment (United Nations Human Rights Council, 2011). The report called for the urgent need to return to, and develop, a more

sustainable, natural and organic system over one that favors genetically modified organisms (GMOs) and monocropping.

The American Public Health Association (2007) defines a sustainable food system as “one that provides healthy food to meet current food needs while maintaining healthy ecosystems that can also provide food for generations to come with minimal negative impact to the environment.” A sustainable food system should also encourage local production and distribution infrastructures and make nutritious food available, accessible, and affordable to all, while protecting farmers and other workers, consumers, and communities (American Public Health Association, 2007).

The current industrial food system in the United States provides plentiful, relatively inexpensive food for most, however, much of it is unhealthy to individuals and the environment, is produced unsustainably, and millions of Americans still experience food insecurity (American Public Health Association, 2007). In 2013, 14.3 percent (17.5 million) of U.S. households or 49.1 million Americans were food insecure (USDA, 2015). These rates were even higher among households with children and racial and ethnic minorities. Over 8 million children lived in households in which children, along with adults, were food insecure (USDA, 2015). The prevalence of food insecurity varied among different types of households. The following households had rates of food insecurity that were higher than the national average of 14.3 percent: All households with children (19.5 percent), households with children under age 6 (20.9 percent), households with children headed by a single woman (34.4 percent), households with children headed by a single man (23.1 percent), Black, non-Hispanic households (26.1 percent), Hispanic households (23.7 percent), and low-income households with incomes below 185

percent of the poverty threshold (34.8 percent; the Federal poverty line was \$23,624 for a family of four in 2013) (USDA, 2015).

Numerous studies have shown a connection between food insecurity and obesity risk, as those who are food insecure lack access to healthy, affordable foods (Food Research and Action Center, 2011). Data from the Centers Disease Control in 2013 showed dietary risk as the leading risk factor for mortality in the United States; with almost 2 million deaths linked to poor diet annually. Across the nation, the prevalence of overweight, obesity, and type 2 diabetes are at all time highs and are most striking among low-income families and communities, many who depend on charitable foods for their meals. Adults who experience food insecurity have poorer diets than the general population, and are more likely to be overweight or obese (Food Research and Action Center, 2010). Children who are raised in food insecure households are more likely to become overweight and/or obese by the time they are adults and are therefore more vulnerable to diet-related illnesses, such as type 2 diabetes, cardiovascular disease, and some types of cancer (Webb, Campbell, Ross, & Crawford, 2012).

However, despite this evidence, the 46 million Americans who are served by food banks, food pantries, and other meal programs that serve the poor, ill, and elderly continue to receive food that is of little or no nutritional value. The widespread food insecurity among families and the increasing prevalence of obesity among adults and children have drawn attention to the role that emergency food services can and/or should play in providing healthful foods to vulnerable populations. Some emergency food providers have created policies to encourage or mandate the improvement of the nutritional quality of food they offer; however, these policies need further guidance and are currently insufficient to alleviate the heavy burden of obesity-related diseases that afflict low-income households. A study of the Feeding America emergency food network

performed by the Atkins Center for Weight & Health at UC Berkeley found that many emergency food providers want to serve healthier foods but lack the knowledge or resources to do so (Webb, Campbell, Ross, & Crawford, 2012).

Creating policies and a curriculum for nutrition education could facilitate many emergency food providers in their desire to serve healthier foods. A number of organizations that were surveyed cited cost as a major barrier to change (Webb, Campbell, Ross, & Crawford, 2012). Using case studies from organizations that have already made positive nutrition changes could provide solutions to monetary barriers that would further assist in the transition. Community participation, stakeholder engagement and partnerships with local grocery stores could help offset some of the initial costs that emergency food providers would incur during the transition. Despite the costs, it is imperative that emergency food providers take human and environmental health into account when procuring, purchasing and serving food. Making the shift now will save billions of dollars in health care costs from obesity-related illness, slow climate change and prevent damage to the environment.

Ceres Community Project

Ceres Community Project is an organization based in Sebastopol, California that engages youth in growing organic food and preparing organic meals delivered free to low-income people facing serious illness. Since 2007, Ceres has engaged 1,400 youth in the preparation of 325,000 meals delivered to 1,600 clients and their families throughout the region north of San Francisco.

Ceres Community Project is committed to serving organic food because of the human and environmental health benefits, which accompany an organic diet over a conventional diet. Ceres does not see organic food as an elitist option but as a basic human right and an essential solution to addressing the environmental challenges and food insecurity that face the planet.

Research shows organic foods maximize nutritional value while decreasing toxic exposures to harmful pesticides and other dangerous chemicals that have been linked to a broad range of health issues including cancer, neurological problems and developmental issues (Sutton, Perron, Guidice, & Woodruff, 2011). Furthermore, organic farming preserves topsoil, protects water supplies, and favorably impacts climate change (United Nations Conference on Trade and Development, 2013). A 2013 report issued by the United Nations concluded that organic farming is the only way to feed the growing population and sustain the environment.

Ceres Community Project prepares and provides organic meals by teaching youth how to grow and cook organic foods for low-income individuals facing serious illness, thereby empowering youth and teaching future generations about the role organic foods play in human and environmental health. Ceres' model has been so successful that it has been replicated and now operates independently in nine communities across the country. As Ceres' relationships with emergency food providers across the nation grew, another opportunity arose to become a leader in a national campaign to address hunger and food insecurity by promoting organic and sustainably raised food as the "Best Practice" model for emergency food providers, serving vulnerable populations who wish to transition their programs to more nutritious and sustainably raised foods.

To be a leader in the campaign to address hunger and food insecurity, and assist other emergency food providers in the transition to a healthier and more sustainable model, Ceres recognized the need to research the data and connect with relevant stakeholders. This paper represents the findings from the culmination of a 300-hour fieldwork experience performed at Ceres Community Project with research, guidance and feedback from key individuals in the food systems community. This fieldwork reflects the beginning steps of a broader conversation to

create policy, which will improve the quality of food offered by emergency food providers. In addition, it describes the competencies that were fulfilled throughout the fieldwork project, including the University of San Francisco Master of Public Health program competencies as well as the core and interdisciplinary competencies defined by the Council on Education for Public Health.

Project Implementation

Ceres' decision to develop and replicate its model throughout the country created an opportunity to create healthier individuals and a healthier environment by building awareness of the benefits of organic foods and increasing access among vulnerable populations. In early 2015 Ceres began exploring ways to leverage its direct service work to have a larger field/policy impact. After discussions with relevant stakeholders and leaders in the sustainable agriculture and food as medicine fields, the organization decided to focus on promoting a conversation about food quality among nutritional meal service and emergency food providers. A formal work plan was developed in April 2015, right before the fieldwork began.

Hunger and food insecurity are intricately linked to the way we grow, produce, market and distribute food. However, the conversation about hunger is mostly separate from the conversation about the health and sustainability of our food system. Many organizations addressing hunger and food insecurity are inadvertently contributing to the very problem they want to solve in their food procurement and distribution practices. Shifting food procurement and distribution policies to improve human and environmental health for these organizations would:

1. Improve the nutritional quality of the food provided to our most vulnerable populations, thereby improving their quality of life and reducing the health care burden on our society from diet-related illnesses.
2. Reduce toxic exposures to food system workers, many of whom are also poor, improving their health quality, reducing infant mortality, developmental, reproductive and neurological illnesses, and various forms of cancer that are more prevalent among food system workers (Sutton, Perron, Guidice, & Woodruff, 2011).
3. Be a stand that access to high quality food free of toxins is a human right.
4. Shift the current view about organics from being considered an elitist privilege to organics being seen as critical to the long-term sustainability of our food system.

The project team created the following initial steps to begin the conversation with emergency food providers about shifting food procurement and distribution policies:

1. Compile, summarize, and create compelling communications about the data through work with Ceres' National Ambassador Council members and organizations such as the Organic Consumers Association, Collaborative on Health & the Environment, Health Care without Harm, Why Hunger, as well as others to gather the data about the effects of our current food system and how it impacts the health and hunger of those who are food insecure.
2. Partner with colleague organizations such as Sonoma County Council on Aging and Project Open Hand in San Francisco to create pilots and case studies demonstrating the viability of transitioning to more sustainably sourced food.
3. Create additional case studies of organizations that have transitioned to an organic, sustainable food-sourcing model.

4. Develop and implement communications strategies to inspire meal programs to learn about and begin to take action on moving towards more sustainable models.
5. Provide technical assistance to organizations interested in change and document successes. Assistance tools would include building new procurement relationships, documenting the extent of added food costs, and making the case to funders about the value of the added investment of an organic, whole foods menu.

The project team developed these initial steps based on the Transtheoretical model of behavior change, which assesses an individual's, or in this case an organization's readiness to act on a new behavior and make change (Prochaska & Velicer, 1997). Ceres will evaluate the willingness of pilot organizations to adopt new behaviors and make change. Ceres will then provide strategies to guide organizations through the stages of change to the stages known as Action and Maintenance.

Ceres recognizes that shifting food procurement and distribution policies to improve human and environmental health requires many stages of change, which may seem daunting or impossible to organizations lacking strategies or processes of change. Using the Transtheoretical model will allow Ceres to determine what stage of change the organization is in, and provide them with the necessary tools to adapt a new behavior and make effective change.

The fieldwork project was designed to use the Transtheoretical model of change to guide interventions to shift food procurement and distribution policies among the emergency food provider network. Making this shift would result in the availability and access of organic, sustainable whole foods for low-income individuals who suffer from food insecurity and are at a disproportionate risk for diet related illness such as obesity, cardiovascular disease and type 2

diabetes. To develop effective interventions for this population the following goals and objectives were created:

Goal 1: Determine how our current food system is contributing to the environmental crisis, increased hunger, chronic disease, and food insecurity.

Objective 1: Conduct a systematic review of peer-reviewed literature that supports relevant data.

Background: A literature review of relevant data is imperative to prove the effects that shifting food procurement and distribution policies will have on human and environmental health. Amassing data that demonstrates how the current industrial food system in the United States contributes to hunger and the environmental crisis will provide concrete evidence to engage emergency food providers to make change.

Goal 2: Investigate issues with access to foods that support nutritional and environmental health within low-income communities.

Objective 2a: Speak with relevant stakeholders to determine barriers.

Objective 2b: Analyze peer-reviewed literature covering system-wide studies that have been conducted.

Background: Speaking with relevant stakeholders will allow the project team to determine community assets and establish allies in the sustainable agriculture and food as medicine fields. Analyzing data will allow the project team to identify barriers to access.

Goal 3: Determine the cost of providing meals without harmful foods to those who receive their meals from Meals on Wheels programs and other nutritional meal providers such as Project Open Hand in San Francisco, California.

Objective 3: Review data from similar projects that have transitioned from a standard American diet to a sustainably raised (at least some local and organic food) whole food diet.

Background: Determining the cost of providing organic, sustainable whole foods to the food insecure is a necessary piece of data for organizations who wish to shift their food procurement and distribution methods. While determining the exact cost is likely not possible, using similar projects to estimate costs will help guide the transition process.

Results

This fieldwork project is part of an ongoing process; therefore, the success of the overall project cannot be fully ascertained at this point. However, the initial goals and objectives have been met with success and contain valuable research and data; which are beneficial steps in laying the foundation for the project.

A literature review of peer-reviewed articles on food security, sustainability, human health and environmental health has fueled the project with important data, and also highlighted gaps in research. The research collected during the fieldwork was used to write a White Paper, which will be used to facilitate the next steps of the project. The White Paper will be shared with key partners on Ceres' Ambassador Council, key organizational leaders in the Food is Medicine Coalition and the Meals on Wheels California board to foster a conversation about the issue of food quality among nutritional meal providers. It will also be shared at the Food is Medicine Coalition symposium in Washington D.C. in September. Ceres Community Project will use the case studies and research thus far to see if Project Open Hand has the capacity to partner as a pilot project. Finally, gaps in research will be brought to the attention of the Institute of

Medicine to highlight the need for further research on the impact that food quality among the emergency provider network has on food insecurity and human and environmental health.

Public Health Significance

The findings from this fieldwork project validate data and research that demonstrate the ways in which our current industrial food system in the United States contributes to food insecurity, hunger, and the environmental crisis. The research gathered from this fieldwork project can be used to foster a conversation with emergency food providers about the importance of shifting food procurement and distribution policies to take into account the effect that conventional agriculture and highly processed foods have on human and environmental health.

Shifting the nutritional quality of food provided to those who are food insecure has a significant impact on the healthcare system in the United States as low-income populations are at a higher risk of diet-related illnesses, which currently account for billions of dollars in health care expenditures. The estimated medical cost of obesity in the United States in 2008 was 147 billion dollars (CDC, 2015).

Serving food that is local, organic, and sustainable also has a significant impact on the environment. Current industrial farming practices strip the soil of nutrients, which contributes to food insecurity and will continue to do so in the future. Conventional farming methods are harmful to farmworkers health and leave pesticide residues on produce, which are detrimental to human health.

Competencies Addressed

The learning objectives and goals accomplished during this 300-hour fieldwork project demonstrate a number of the University of San Francisco Master of Public Health program

competencies, cross-cutting/interdisciplinary values and core knowledge areas defined by the Council on Education for Public Health (CEPH).

The Master of Public Health competencies that were achieved include *assessing, monitoring, and reviewing the health status of populations and their related determinants of health and illness*. This was accomplished by conducting a systematic examination and evaluation of peer-reviewed literature on food security, food systems, sustainability and the environment, and how they affect human health, specifically those who are food insecure. This objective also allowed for the *identification and prioritization of key dimensions of a public health problem by critically assessing public health literature utilizing both quantitative and qualitative methods*.

Performing an assessment of peer-reviewed literature elucidated the adverse effects of the industrial food system in the United States. Once research was gathered and relevant data analyzed, it was possible to *specify approaches for assessing, preventing, and controlling environmental hazards that pose risks to human health and safety*, which are recommendations to change the ways in which food is grown, transported and consumed in the United States.

Another competency that was achieved through the fieldwork project was the *articulation of the relationship between health care delivery and financing, public health systems, and public policy*. An examination of the food system in the United States and its impact on human health revealed how the industrial food system contributes to food insecurity and diet-related illnesses, particularly among low-income families. The need for policies to advocate for more nutritious food among the emergency food network became readily apparent.

Throughout the fieldwork project, there was a strong commitment to *identify and apply ethical, moral, and legal principles in all aspects of public health practice*. This competency

was carried out through all objectives and interactions with the project team and relevant stakeholders. During the fieldwork experience, the opportunity to *effectively communicate public health messages to a variety of audiences from professionals to the general public* presented itself through case studies and meetings with key individuals and organizations in the food systems community. Finally, the *mission and core values of the University of San Francisco* were advanced throughout all aspects of learning during the fieldwork project.

The core knowledge areas addressed during the fieldwork project included *epidemiology, social and behavioral sciences, environmental health, and public health administration and leadership*. *Epidemiology* was used during the review of health statuses of food insecure individuals through the principles of data collection, analysis and dissemination. During the project both qualitative and quantitative research methods were used to gather relevant data, which would allow the project team to specify areas for intervention.

The project used *social and behavioral sciences* to understand the psychosocial, behavioral, community, and societal influences on health among those who are food insecure and in creating multilevel interventions that eliminate barriers to healthy food. The study of *environmental health* was a large piece of the fieldwork experience as one of the key tenets of the project was to examine the ways in which the current industrial food system in the United States causes environmental harm. The last CEPH core knowledge area that was applied was *public health administration and leadership*. Throughout the fieldwork project, skills in leadership, project management, community engagement, and interactions with key stakeholders were utilized.

The fieldwork project allowed for the interdisciplinary values of *communication and informatics, diversity and culture, leadership, professionalism, program planning, public health biology and systems thinking*. Performing numerous literature reviews and disseminating information to the project team allowed for *communication and informatics*. Interactions between the project team and research around access to foods in low-income communities brought *diversity and culture* into the project. The values of *leadership and professionalism* were exemplified in all aspects of the project including the development of the project, team meetings, communication with key players in the food system community and when performing case studies. Examining the industrial food system in the United States and how it affects human and environmental health required an understanding of *public health biology and systems thinking*. Finally, competence in *program planning* was essential to complete objectives and advance project goals.

Personal Reflection

My fieldwork experience at Ceres Community Project provided me with the opportunity to further explore my interests in food security and sustainability, and how they affect human and environmental health. Before the fieldwork project, I had an interest in nutrition and a commitment to eating organic and local foods. My fieldwork took my passion for food security, human health, and environmental health and how they are connected to a new level. I gained a greater understanding of the environmental impacts of our food choices and how our current food system contributes to climate change. I learned about the relationship between food insecurity and obesity and what some of the barriers to healthy foods are among the emergency food providers that serve low-income communities.

My internship allowed me to make connections with individuals in food systems organizations and I was able to learn which government agencies play a role in food production, distribution, and consumption. I hope that the knowledge I acquired during my fieldwork project will allow me to pursue a career in environmental health, sustainability, food security and increasing access to healthy foods in low-income communities.

Conclusion

The fieldwork experience accurately represented the culmination of the Master of Public Health program at the University of San Francisco. The fieldwork project provided opportunities to demonstrate leadership and program planning, engage and mobilize stakeholders, build relationships with key individuals and organizations in the sustainable agriculture and food as medicine communities and advance public health knowledge about industrial agriculture's impact on environmental and human health. A number of competencies were achieved during the fieldwork experience, which required critical thinking and reflection on key concepts learned throughout the program coursework.

The goals and objectives of the project were met with success and the research generated from the fieldwork project highlighted the public health significance of the adverse health effects of the current food system in the United States. It also emphasized the need for further research regarding the connection between industrial agriculture and food insecurity. The findings of this project can be used to foster a conversation about the need for improved nutritional quality and policies among emergency food providers, and the skills and knowledge that were gained will be key to a career in public health.

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Appendix A: Supervised Field Training in Public Health
Student Scope of Work



UNIVERSITY OF
SAN FRANCISCO

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Goal 1: Determine how our current food system is contributing to the environmental crisis, increased hunger, chronic disease, and food insecurity

Objectives	Activities	Start/End Date	Who is Responsible	Tracking measures
Conduct a systematic review of peer-reviewed literature that supports relevant data	Perform literature reviews	April 2015- July 2015	Alexina Cather	Submit reviews to Cathryn Couch and Thais Harris for feedback

Goal 2: Investigate issues with access to foods that support nutritional and environmental health within low-income communities

Objectives	Activities	Start/End Date	Who is Responsible	Tracking measures
Speak with relevant stakeholders to determine barriers	Perform case studies and reach out to stakeholders	May 2015- July 2015	Alexina Cather	Submit case studies and notes from calls to relevant stakeholders
Analyze peer-reviewed literature covering system-wide studies that have been conducted	Perform literature reviews	June 2015- August 2015	Alexina Cather	Submit reviews to Cathryn Couch and Thais Harris for feedback

Goal 3: Determine the cost of providing meals without harmful foods to those who receive their meals from Meals on Wheels programs and other nutritional meal providers such as Project Open Hand

Objectives	Activities	Start/End Date	Who is Responsible	Tracking measures
Review data from similar projects that have transitioned from a standard American diet to a sustainably raised (at least some local and organic food) whole food diet	Reach out to local organizations and review transition data	July 2015- August 2015	Alexina Cather Cathryn Couch Thais Harris	