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The Fragile U.S. Industrial Food System

Michelle L. Kaiser and Michael J. Kelly

Introduction

The Green Revolution was a promise to feed the world. This movement gained momentum in the early1950s and dominated agricultural production through the mid-1970s. The U.S. now produces more than 21% of the global grain supply, 50% of soybeans (United States Department of Agriculture [USDA], 2003), and 43% of corn (Environmental Protection Agency [EPA], 2012). The Green Revolution was based on using energy from fossil fuels for fertilizer, pesticides, and irrigation. By 1984, this energy use, along with new hybridized, genetically modified (GMO) food plants, raised world grain production by 250% (Pfeiffer, 2004). Globally, the end of world hunger looked to be within reach. Many developing countries experienced widespread increases in caloric intake while grain prices simultaneously decreased (International Food Policy Research Institute, 2002), but an ominous shadow was looming. The Green Revolution's modern agricultural system has resulted in an increase in energy demand 50 times greater than the energy requirements for traditional agricultural methods (Giampietro & Pimentel, 1994). In the most extreme cases, energy consumption by agriculture has increased 100 fold or more. In the U.S., the equivalent of 400 gallons of oil is expended annually to feed each American (Pimentel & Giampietro, 1994). We estimate that 125 billion gallons of oil are used annually to feed Americans, the equivalent of around 3 billion barrels of oil.

Cuba provides an example of the how moving from a smaller traditional agricultural system to an expansive industrial food system (IFS) may introduce vulnerabilities beyond localized control. Cuba had followed Soviet requirements by concentrating on sugar cane, a single export crop heavily dependent on energy and machinery imports to produce high yields. At the same time, Cuba imported food to feed its population (Food First, 2000). The fall of the Soviet Empire, circa 1990, suddenly deprived Cuba of fuel, chemical fertilizers, farm machinery, and repair parts, along with a loss of the technical assistance upon which its food system depended (Buncombe, 2006). With the sudden loss of imports vital to its industrial era monoculture export crop, food security quickly reached a crisis and the country experienced widespread reduction in caloric intake per person (Food First, 2000). Cuba's major challenge was how to return to a sustainable agricultural food system. It discovered that along with its vulnerability to energy, the country no longer had a farming community that knew how to return to organic farming (Wright, 2009; Kaiser, 2010).

Surely, the U.S. is not as vulnerable as was Cuba. America's diversified food production research, agricultural technology, sophisticated processing and distribution networks, and domestic energy production renders it less vulnerable to a single Cuba-style shock. Yet there are some food shortage problems in the midst of plenty. The U.S. has 'food deserts' where pockets of economically poor, isolated communities cannot access affordable, healthy food (Apparicio, Cloutier, & Shearmur, 2007; Cummins & MacIntyre, 2002; VerPloeg et al., 2009; Wright Morton, & Blanchard, 2007; Wrigley, 2002). These community food needs are addressed through food pantries and commodity distribution programs, extensive supplemental nutrition programs, and economic transfer payments (Conrey, Frongillo, Dol-

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lahite, & Griffin, 2003; Kozikowski & Wiliamson, 2009; Tolma, John, & Garner, 2007; Trenkamp & Wiseman, 2007; USDA Food and Nutrition Service, 2010; VerPloeg et al., 2009). Numerous citizen groups are seeking alternatives largely out of concern for food quality, safety, and nutrition. Widespread food nonavailability remains unthinkable, but as we write this the U.S. is experiencing the worst drought in 56 years (Pesek, 2012). Consumer price indexes are expected in increase between 2.5-5% over the next year for U.S. consumers (USDA, 2012b). Global soybean, wheat, and corn prices have shown great volatility, rising between 30-50% during the summer of 2012 (World Bank, 2012). This single shock will increase hunger. Could the sophisticated, technologically advanced IFS be vulnerable to combined system "shocks?"

In the next sections, we look at aspects of the U.S. IFS and review possible vulnerabilities. Some susceptibilities have been noted in long-range economic forecasts and by health, environment, and social justice groups (Food and Agricultural Organization of the United Nations [FAO], 2008). Conditions such as environmental pollution, loss of farmland, and loss of family farm vitality could be circumvented if there was adequate public opinion or political will to overcome the powerful economic interests of corporate agriculture. Other conditions could occur with sudden and far reaching effects, just as they did in Cuba 30 years ago. We look first at the global public and scientific reaction to the IFS, which has begun to influence public opinion. Then we turn to other potential system 'vulnerabilities' of equal importance.

Possible Vulnerabilities of the U.S. IFS

Worldwide Public Opinion and Scientific Concerns

The global food situation has garnered a great deal of attention (Food and Agricultural Organization of the United Nations [FAO], 2011; von Braun, 2007). Hunger severe enough to lead to widespread death among the young and very old is often featured in news reports. It is important that the U.S. food producers be cognizant that much of the world suffers while we prosper. For example, over 13 million Ethiopians, Somalians, and Kenyans have been impacted by droughts and stark poverty (Oxfam International, 2012). These egregious instances call forth our sympathy and, hopefully, our economic response.

It is possible that the U.S. IFS may have helped create these situations. World opinion has begun to condemn efforts and programs that help feed poor nations but may be potential threats to food sovereignty (Holt-Gimenez, 2010; Sharma, 2011). With entry into developing nations coupled with high powered marketing (Nestle, 2002; Schlosser, 2002) and cheap prices for processed foods, the IFS may be helping create a worldwide epidemic of obesity and diet-related diabetes among children and the poor (Wallinga, Schoonover, & Muller, 2009). The U.S. public's reaction to food issues has also created similar unfavorable responses. Multiple groups have begun to protest the intrusion of processed foods into the lives of children and families (e.g., National Farm to School Network, Center for Science in the Public Interest, Food Democracy Now, The Food Trust).

Land experts, agricultural scientists, and the public have also become aware that the IFS is leading to widespread pollution of the water supply and the air (Wallinga, 2009). Many scientists believe that the land is being depleted through overfarming with chemical fertilizers and may not recover (Pimentel, 2006). People are now being exposed to diseases to which the pathogens have become antibiotic resistant due to extensive use of the drugs in animals destined for food products (U.S. Food and Drug Administration, 2009; Wallinga, 2009).

Fossil Fuels and Energy Dependence

The IFS is very energy dependent in its attempts to "maximiz[e] crop yields while minimizing consumer prices" (Neff, Parker, Kirschenmann, Tinch, & Lawrence, 2011, p. 1588). Energy inputs are used in every aspect of the food system. Petroleum is also used (Neff et al., 2011) in farm equipment, pesticides, waste management, processing, packaging, and transportation. The processes within the food system (i.e., agricultural production, processing, distribution, transportation, retailing) account for between 12% (Cleveland, 2009) and 17% of total U.S. energy consumption (Pimentel & Giampietro, 1994) Consumers and retailers rely on oil for transportation, cooking, refrigeration, and food waste processes (Neff et al., 2011).

The modern 'locavore' movement has been spawned by concern about the distance food, especially fresh produce, travels from the field to the plate. Pirog and Benjamin (2003) developed the most recognized method for calculating 'food miles,' the distances traveled and the amount of food transported from production to point of sale. Non-locally grown produce traveled 27 times further than locally-grown produce (about 1500 miles). The food system is likely to be disturbed and shift to an unstable state in the event of increases in fuel prices because of its dependency upon fossil fuels (Polack, Wood, & Bradley, 2008). Farmers will be greatly impacted since 5-7% of their budget is spent on electricity and fuel for direct energy costs and 10% is expended for indirect energy costs from fertilizers and chemicals (Cleveland, 2009). The concerns about a 'peak oil scenario,' when oil reserves will reach their maximum level, production will decrease, and oil will become more expensive, has intensified as economic and population booms in countries like China and India require more fossil fuels (McBeath & McBeath, 2009). Some have suggested that biofuel production could replace petroleum (Cleveland, 2009; Neff et al., 2011). Debate surrounds the use of corn acreage for ethanol production because of its potential impacts on food production and prices (Neff et al., 2011). Vulnerability to an 'oil supply shock' could raise prices beyond many consumers' ability to pay.

The Impact of the Green Revolution

Besides mechanization, biological and chemical advances were major factors in increased agricultural productivity. The Green Revolution following World War II replaced "human knowledge about growing food in balance with nature" (Bedford, 2006, p. 18) with scientific knowledge. The use of fertilizers, herbicides, fungicides, insecticides, GMOs, and pesticides doubled crop yields and increased livestock production with a reduction in global starvation (Bedford, 2006; Fite, 1964). By 1960, farmers who adopted technological innovations "could produce four times as much for each hour of work as a farmer" before World War I (Fite, 1964).

Chemical Advances. While increases in agricultural production proved beneficial to the food supply, the introduction of chemicals, additives, factory livestock farming, and cheap processed and widely available fast foods is now being considered detrimental to environmental and human health. Processed foods are a major contributing factor to the obesity epidemic, partially because processing foods strips natural ingredients (Winne, 2008). Agricultural chemical pesticides used to control pests and weeds have been linked to "cancer, birth defects, infant mortality, and respiratory illness" (Hoff & Polack, 1993, p. 205), with a disproportionate risk to "farmworkers, almost all of who are ethnic minorities" (Worldwatch, 1987, as cited in Hoff & Polack, 1993, p. 205). Synthetic nitrogen, developed during World War I, became widely used when Justus von Liebig showed that nitrogen, along with phosphate and potash, were critical chemicals needed to grow plants (Paarlberg & Paarlberg, 2002). Fertilizer application quickly became widespread along with pesticides to kill undesired plant and animal infestations (Paarlberg & Paarlberg, 2002). In 1935, Paul Muller discovered the insecticidal properties of dichlorodiphenyltrichloroethane (DDT), a lifesaving chemical which protected World War II combatants against insect-borne diseases (Paarlberg & Paarlberg, 2002). Between 1930 and 1954, pesticide shipments increased by $160 million, and DDT was widely used until it was banned in 1972, after Rachel Carson's *Silent Spring* provided evidence that DDT was detrimental to environmental and human health (Paarlberg & Paarlberg, 2002).

Herbicides. E. J. Kraus, a botanist from the University of Chicago, developed 2,4-Dichlorophenooxyacetic acid (2,4D), an herbicide used to control many of the 18,000 weed species that forty years ago caused as much damage and crop losses as did insects and diseases combined (Paarlberg & Paarlberg, 2002). By 1998, 90% of croplands devoted to corn, soybeans, spring wheat, and fall potatoes used herbicides, which applied correctly can reduce soil erosion by 80% (Paarlberg & Paarlberg, 2002). Biologists created ready-Roundup soybeans that were able to survive herbicide use, creating a niche market for herbicide companies to control both weeds and seed production. Once seeds were introduced that had been developed through "cross-breeding varieties" (Kasturi, 2009), farmers no longer saved their seeds, relying upon purchasing technically-advanced seeds with the ability to yield maximum crop outputs (Kasturi, 2009).

Pharmaceuticals and Genetics. America's love affair with chemicals did not stop with DDT. Pharmaceuticals were introduced into livestock operations to achieve faster growth in animals and increase milk production (Bedford, 2006; Paarlberg & Paarlberg, 2002). These innovations were adopted broadly, and by the 1990s, 33% of dairy cattle were injected with growth hormones, 20% of corn was genetically enhanced, and 57% of soybeans were genetically enhanced (Paarlberg & Paarlberg, 2002). Hightower (1973) notes that artificial hormones, such as diethylstilbestrol (DES), and confined animal feeding operations (CAFOs) that produce massive amounts of pollution, are a product of research conducted through the land-grant university extension programs (Clugston & Calder, 2007; FitzSimmons, 1986). The Green Revolution also ushered in crop monocultures, overtaking croplands, which decreases biodiversity and increases vulnerability to plant diseases such that a single virulent plant virus could destroy nearly the entire corn or wheat supply (Bedford, 2006; Kasturi, 2009). An example is the Southern Corn Blight of 1970 (Prowledge, 2004) in which a lack of biodiversity allowed a fungus moving from a developing country to devastate the U.S. corn crop.

Agricultural Chemical Pollution. The animal agriculture sector emits more greenhouse gas than the transportation sector (Steinfeld et al., 2006). Runoff from CAFOs includes mass quantities of animal feces and urine invading local ecosystems and contaminating domestic wells with high levels of nitrates from fertilizers and manure spills or leaks (Marks, 2001). Hightower (1972) states that consumers may be reaping the benefits of cheap food, but the environmental and health costs are of grave concern, as chemicals like diethylstilbestrol (DES) used to effectively reduce labor costs and "rush nature" (Hightower, 1972, p. 64) are now being reevaluated because of their carcinogenic (cancer-causing) properties.

Private Ownership of Food Production. Monocultures mentioned above in relationship to biodiversity vulnerabilities have another side. This innovative use of biotechnology brought together farmers, seed, and fertilizer suppliers (Paarlberg & Paarlberg, 2002) while also causing unequal conditions within the social system of farming (Rogers, 1983). While miracle wheat and rice varieties reduced global food insecurity in places like India, it led to "fewer farmers, migration to urban slums, higher unemployment rates, and political instability" (Rogers, 1983, p. 381). Relatedly, even though agricultural genetics has produced crops that can resist insects and other plant harms, most of these 'crops' are owned by the developing firms and are not available to farmers without fees and licenses. A series of Supreme Court decisions (*Plant Variety Protection Act*, 1970; *Diamond v. Chakrabarty*, 1980; *ex parte Hibberd Patent and Trademark Office* decision; *ex parte Allen* decision) allowed patenting of seeds leading to "chemical-seed multinational corporations" (MNCs; Buttel, 2005, p. 279). The specialization and planting of homogenous crops decreased the availability of diverse foods at local markets while also placing ownership of food production in private hands – hands that may have little incentive to allow production without due compensation.

Loss of small farms, farmers, and farming knowledge. Although only 1.5% of the United

States (U.S.) population (5 million) are farmers (Paarlberg & Paarlberg, 2002), the agricultural history of the U.S. is reflected in school calendars that follow planting and harvesting schedules and in pastoral images of rural farm life adorning packaged food products. While the roots of U.S. agriculture remain firmly intact, they have become entangled with agricultural policies, consolidated mechanized production, and supply chain management of the IFS that has shifted a once diverse agricultural landscape to a monoculture concentrated on a select few commodity crops. This shift, along with a globalized food system, has contributed to the disintegration of producer and consumer knowledge about the overall ecological-social connection between people and their food.

Bestselling author Barbara Kingsolver stated that this "absence of knowledge has rendered us a nation of wary label-readers oddly uneasy in our obligate relationships with the things we eat" (Kingsolver, Hopp, & Kingsolver, 2007, p. 10). In the epistemological debate of agricultural development, specifically as it relates to food production, knowledge based in scientific methodology used to increase productivity and efficiency has overpowered the knowledge and skills acquired through years of experience by older farmers, hunters, and gatherers (Stevens & Jabara, 1988). The top four beef packers, pork packers, flour milling, and soybean companies control 81% of the beef, 59% of the pork, 61% of the flour, and 80% of the soybean markets (Hendrickson, 2003). Hamm (2004) stressed the importance of transferring sustainable agricultural knowledge and skills to future farmers. Will the needed knowledge to produce a sustainable, safe food supply be available in a crisis situation?

Land and Water Resources

Two of the most fundamental aspects of growing food crops are clean, abundant water supplies and quality arable land. Both are now threatened. One major culprit in land loss is urban sprawl. Over 23 million acres of farmland were lost to development between 1982 and 2007, 38% of which was considered the best agricultural land for growing produce (American Farmland Trust, 2008). California and Florida both experienced major land loss of greater than 1.5 million acres; a concern as 47% of U.S. vegetables and 71% of fruits are grown there (American Farmland Trust, 2008).

In the last 200 years, nearly one third of U.S. soil has been lost to grain production (Horrigan, Lawrence, & Walker, 2002). Globally, 75% of soil erosion is due to agricultural production (Pimentel, 2006). Since the 1970s, global soil erosion has resulted in 30% of arable land becoming barren and disturbances in various ecosystems that support biodiversity (Heller & Keoleian, 2003; Kendall & Pimentel, 1994; Pimentel et al., 1995; Pimentel & Kounang, 1998). Agricultural soil's exposure to wind and rain increases erosion; even more so when "intensive agriculture is employed and [along with] mono-cultural plantings" (Pimentel, 2006, p. 124). Soil erosion means less water is absorbed by the soil and is not available for vegetation take-up (Pimentel, 2006), thus reducing nutrients, lowering crop yields, and diminishing the capacity for global food production (Evans, Cassel, & Sneed, 1996; Pimentel, 2006). Fertilizer is used as a financially costly "replacement strategy" (Pimentel, 2006, p. 126) that creates a dependency on fossil fuels and potentially creates public and environmental health hazards.

Global land grabbing or *agricultural investment* (World Bank, 2010) includes a range of acquisitions intended for food production and fuel sources (Borras, Hall, Scoones, White, & Wolford, 2011; von Braun & Meinzen-Dick, 2009). Borras et al. (2011) describe land grabs as being reflective of "both colonialism and imperialism" (p. 209) since much of the land that is *grabbed* is in developing countries by "powerful transnational and national economic actors" (p. 209). In the U.S., corporate food groups, banks, and nonfarming investors are engaging in this low risk investment (AEW Research, 2011), grabbing valuable farmland at a time when small scale farmers are aging and struggling financially. Investors can "pick up" farmland should a farmer go bankrupt (National Family Farm Coalition, 2012).

Water is another vital component. Water quality and shortages threaten the biodiversity that is needed to adequately support food production and human health (Pimentel et al., 2004a; Wallinga, 2009). Agriculture production by-products are leading water contaminants in the U.S., accounting for over 40% of contaminated rivers and streams and over 15% of lake degradation (EPA, 2009). Agricultural irrigation is partially responsible for groundwater depletion threatening the water supply and the ability to refill aquifers (Pimentel et al., 2004b).

The USDA (2010a) Agricultural Census reports energy expenses for on-farm irrigation pumping. Of the 546, 308 pumps on 155,252 farms, 69% used electricity, 6.6% used natural gas, and 21% used diesel fuel. The greatest increase in energy use between 2003 and 2008 was the use of electricity used to fuel water irrigation systems. U.S. farms spent nearly $2.7 million on energy expenses in 2008 (USDA, 2010a). Farms using renewable resources increased in 2008 (USDA, 2010b), accounting for 25,854 total acres. Over 21 million acres are irrigated by well water and eight million acres are irrigated by surface water using electricity (USDA, 2010a).

Mekonnen & Hoekstra (2010) defined a 'water footprint of animal production' as the total volume of freshwater used to produce a good or service and noted that "feed conversion efficiency" (p. 5) is a primary factor impacting water usage. Animals needing more feed use more water. The composition of the feed (i.e., the feed components like oils and grains) that require water inputs contribute to the water footprint. The distance the feed travels may impact the water footprint as well as whether the animal production system relies on grazing methods and industrial systems. Beef cattle have the highest water footprint (15400 cubic meters/ton). Generally, water footprints of animal products are greater than other crops when calculated per ton and per calories. For example, the beef water footprint is "20 times larger than for cereals and starchy roots" (Mekonnen & Hoekstra, 2010, p.5) and "6 times larger than" (p.5) legumes. The increase in global animal production for consumption is a major threat to water resources (Stockholm International Water Institute & the International Water Management Institute, 2005) as the industry continues to increase production and world demand rises (USDA, 2012a).

Water is further polluted from nitrogen and phosphorus in agricultural waste, fertilizers, and pesticides. (Walker, Rhubert-Berg, McKenzie, Kelling, & Lawrence, 2005). Animal waste from CAFOs spread on fields, waste disposal leaks, and inadequate waste capacity can create environmental problems in the surface and groundwater (Burkholder et al., 1997; Edwards & Daniel, 1992; Mallin, 2000; Mallin & Cahoon, 2003). Humans living near or working in CAFOs are exposed to pollutants through many pathways (e.g., water, air, soil, crops, meat products) and exposure routes (e.g., inhalation, ingestion, dermal, secondary) leading to respiratory, gastrointestinal, mental, immunological, and dermal health effects (Walker et al., 2005).

What Could Be Done in A Crisis

Climate change. Fossil fuel dependence. Widespread pollution. Water usage. The cards are overwhelmingly stacked against the U.S. IFS. It remains to be seen whether the U.S. can respond to a potential food crisis threatening production and availability. Communities have begun to develop and redevelop sustainable localized food production and distribution systems as a subset of the existing globalized IFS. However, more consideration should be made for environmental concerns, human health, and equitable food access.

Kaiser (2012) provides an extensive overview of actions necessary to assure that, in a systems crisis, community food systems would provide resiliency. Seeking sustainable community food security and food justice, Kaiser (2010) suggests that social work has a major role in helping communities to act. Noting that the food systems of the world depend upon appropriate use of an ecological-social systems approach, Kaiser (2010, 2012) adds that community food security interventions can be used to increase resiliency to absorb the shocks and perturbations of the ecological-social systems related to economic, environmental, or social issues.

Over 15% of the U.S. population was living below the poverty line in 2010, which is the highest poverty rate since 1959 (DeNavas, Proctor, & Smith, 2009). Poverty is the greatest predictor of food insecurity (Nord, Andrews, & Carlson, 2008). Domestic food insecurity is at the highest level in 14 years (Nord, Coleman-Jensen, Andrews, & Carlson, 2010). Social workers are concerned with poverty rate increases and economic disparities that have far-reaching community implications (Kaiser, 2012). Vulnerable populations experiencing food security are at risk for poor dietary intake (Lawrence & Barker, 2009; McGranahan, 2008; Rose, 1999). Kaiser (2010) notes this is even more troubling since 15% of Americans are not covered by health insurance (DeNavas-Walt et al., 2009).

Kaiser (2010, 2012) suggests that social workers adopt a social development framework to intervene in communities as it most closely fits with the interdisciplinary community food security (CFS) strategies. CFS strategies focus on the interconnections of sustainable food systems, public health, and social justice within communities (Lang, 2009; Story, Hamm, & Wallinga, 2009). Social development has been used internationally, particularly in the formerly colonized global South nations, as a way to address human needs (Midgley, 1993). It is a process of planned social change that promotes social and economic well-being (Midgley, 1995).

Social workers using a social development model promote social equity. They can facilitate community participation from diverse groups and advocate for "structural changes to improve underlying economic and institutional problems" (Kaiser, 2010, p. 73). Midgley (1993) describes social development changes that include individual, collectivist, and populist strategies. This moves from individuals focusing on how they contribute to both problems and solutions to coalition-building and community-based work (Midgley, 1993). Social work can intervene using this social development framework that promotes sustainable economic, environmental, and social justice interactions in some of the following ways.

Community Food Security Intervention Strategies

CFS models are long-term strategies developed through multidisciplinary partnerships and community planning processes. CFS goals include building community assets, empowering individuals, and supporting local agriculture production to develop healthy, food secure communities. These strategies are directed to geographically-bound areas where poverty levels are higher than average (Winne, Joseph, & Fisher, 2000). WhyHunger (2010) outlines myriad goals using the community food security model. These emphasize nutrition and health, community self-reliance, localized economic development partnerships, localized agricultural production, farm-worker justice, and environmental sustainability. These lofty and comprehensive goals provide a long-term approach to resiliency and form the backbone of actions now being undertaken and proposed future actions. Meanwhile, individual actions/programs can have immediate impact. Here are a few.

Community Supported Agriculture (CSAs). In CSAs, consumers buy a share of the harvest before the growing season, share in any risks with farmers, and receive weekly seasonal products (Winne, 2008). Members are often requested to work with others at the farm. Over 2,000 CSAs are estimated to be operated in North America (Lass, Stevenson, Hendrickson, & Ruhf, 2003). CSAs increase civic engagement and community cohesion, increase access to fresh produce, and promote positive health and ecological benefits (Brehm & Eisenhauer, 2008; Feenstra, 1997). Social workers may improve access to CSAs for low-income households since those receiving governmental assistance (i.e., Supplemental Nutrition Assistance Program [SNAP], Women, Infants and Children [WIC]) cannot use vouchers to purchase shares.

Farmers' Markets. Farmers' markets bring producers into direct contact with consumers. Consumers benefit from having access to fresh, affordable food, pollution associated with long distance transportation of food is reduced, and local economies are strengthened as a result of money being spent and reinvested locally (LaTrobe, 2001). Innovative programs that allow

SNAP and WIC vouchers to be used at farmers' markets and often doubled in value are important in providing access to affordable produce (Kaiser, Bethurem, & Neville, 2012). Social workers can use their skills to encourage the development of community and producer partnerships and educate consumers about programs targeting low-income populations (Kaiser, 2010).

Community Gardens. Community gardens have been proposed as a method to produce fresh produce, strengthen social relationships, encourage sustainable development practices, and promote entrepreneurship (Pothukuchi & Kaufman, 1999). Ferris, Norman, & Sempik's (2001) survey of community gardens revealed various outcomes related to the implementation of gardens. This included the creation of green and open spaces to revitalize communities, as well as a way to provide affordable produce for schools, institutions, and neighborhoods.

Community Food Assessments (CFA). CFAs are intended to include a variety of community perspectives in the systematic evaluation of food systems. CFAs are "solution oriented" and identify "assets and resources" and areas of growth (Pothukuchi, Joseph, Burton, & Fisher, 2002, p. 6). Social workers can conduct CFAs to build coalitions, sustainable community development planning, research, advocacy, and policy development.

Conclusion

The future is now. The IFS's susceptibilities are too patent to be ignored. The answer to vulnerability may lie in local food systems that can provide adequate levels of nutritious, naturally grown, nonprocessed foods based in community support and local farming methods. Social work must direct the profession's attention to food at the community level. The extreme susceptibilities of the IFS suggest a "when will it happen" scenario, but we need a target to move toward in coordinated actions.

What would a community based, sustainable food system look like? The University of California-Davis Agriculture Sustainability Institute (ASI, 2012) has advanced a comprehensive definition against which coordinated efforts might be judged. Their definition states:

> "A sustainable community food system is a collaborative network that integrates sustainable food production, processing, distribution, consumption and waste management in order to enhance the environmental, economic and social health of a particular place. Farmers, consumers and communities partner to create a more locally based, self-reliant food economy. One of the most important aspects of sustainable community food system projects is that they increase resident participation to achieve the following goals:
>
> A stable base of family farms that use sustainable production practices and emphasizes local inputs; marketing and processing practices that create more direct links between farmers and consumers; improved access by all community members to an adequate, affordable, nutritious diet; food and agriculture-related businesses that create jobs and recirculate financial capital within the community; improved living and working conditions for farm and food system labor; creation of food and agriculture policies that promote local or sustainable food production, processing and consumption; and adoption of dietary behaviors that reflect concern about individual, environmental and community health" (http://www.sarep.ucdavis.edu/sfs/def)

Reaching this laudable food system requires a massive transition from the current culturally accepted, politically embraced system of industrial style mass production of food. Nevertheless, U.S. society may have no alternatives considering the large number of vulnerabilities in the industrial food system; the likelihood of natural, human, malevolent, or mistaken benevolent intervention could create a crisis. Cheap high-calorie, low-nutrition foods are proving to be nonsustainable for the public's health and for the environment. We should act now to intervene and to extend community based, sustainable, socially just systems through knowledge of natural food production and consumption.

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