The Food Industry Center
University of Minnesota
Printed Copy $25.50

Emerging Research and Public Policy Issues for a Sustainable, Global Food Network[1]

Jean Kinsey

July 2005

Jean Kinsey is a Professor of Applied Economics and Co-Director of The Food Industry Center at the University of Minnesota. The work was sponsored by The Food Industry Center, University of Minnesota, 317 Classroom Office Building, 1994 Buford Avenue, St. Paul, Minnesota 55108-6040, USA. The Food Industry Center is an Alfred P. Sloan Foundation Industry Study Center.

[1] This paper was originally prepared for a conference of the OECD in Rome, Italy, May 18-20, 2005. the purpose of the conference was help OECD set their research agenda for their Cooperative Research Program. Power Point slides of the accompanying presentation are available in a separate file with this working paper.

Emerging Research and Public Policy Issues for a Sustainable, Global Food Network

Jean Kinsey

Abstract

This paper presents research questions and policy issues related to three emerging issues pertinent to developments in the global food and agricultural supply network. Developments in the production and delivery of food to consumers are rapid, prolific, and extreme. We have gone from a farmer-centric to a consumer-centric food system. The changes are forcing us to revise our thinking about the organization and operation of the food supply chain one-hundred and eighty degrees, to challenge old assumptions about who sets standards and who decides what will be produced. Public policies, which typically lag the world of commerce, will need to learn their relevance and catch-up with dramatic changes in the way business is being conducted. Three examples come to mind: 1. In a world of efficient food delivery the network of companies that makes that happen takes on a global importance that often exceeds the impact of publicly negotiated trade agreements. In a world where supermarkets create the quality and safety standards (specifications) for food purchased within a country and for export, the role of public standard setting agencies wanes but does not stop. 2. Issues related to hunger exist in tandem with issues related to obesity. Both are a challenge to public policies designed to foster healthy diets and healthy people. Meanwhile, in the quest healthy solutions we see the ability to design and target foods and diets for various human geno-types. New public health and ethics policies will need to be addressed as these technologies are commercialized. 3. In some circles "food security" now means defending food and food systems from deliberate contamination by terrorists. Tightening access to food production, processing and transportation routes presents new challenges to domestic tranquility and to international trade.

Key words: supermarketization, private standards, diet transition, obesity, food defense, terrorism

Working Paper 05-04
The Food Industry Center
University of Minnesota

Emerging Research and Public Policy Issues for a Sustainable, Global Food Network

Jean Kinsey

For information on other titles in this series, write The Food Industry Center, University of Minnesota, Department of Applied Economics, 1994 Buford Avenue, 317 Classroom Office Building, St. Paul, MN 55108-6040, USA; phone (612) 625-7019; or E-mail tfic@apec.umn.edu. Also, for more information about the Center and for full text of working papers, check our World Wide Web site [http://foodindustrycenter.umn.edu].

Emerging Research and Public Policy Issues for a Sustainable, Global Food Network

Table of Contents

Introduction……..……6

1. The Rise of Supermarkets and a Global Food Network……...…...7
   1.1 Impetus for Supermarket Development.……...8
   1.2 Ramifications for Supermarket Development……..…….……9
   1.3 Impact on Global Trade……..……11

2. Hunger and Obesity: Enemies of Healthy Lives……...12
   2.1 Public Policies and Research on Hunger and Obesity….…….……..14

3. Food Security (Defense Against Terrorism)…….…….…….. 16

Summary…….……...20

References……..22

Tables

Table 1……...24

Emerging Research and Public Policy Issues for a Sustainable, Global Food Network

Introduction

Developments in the production and delivery of food to consumers are rapid, prolific, and extreme. We have gone from a farmer-centric to a consumer-centric food system. The changes are forcing us to revise our thinking about the organization and operation of the food supply chain one-hundred and eighty degrees, to challenge old assumptions about who sets standards and who decides what will be produced. Public policies, which typically lag the world of commerce, will need to learn their relevance and catch-up with dramatic changes in the way business is being conducted. Three examples come to mind: 1. In a world of efficient food delivery where suppliers depend on moving large quantities of food around the world and across the country every day, the network of companies that makes that happen takes on a global importance that often exceeds the impact of publicly negotiated trade agreements. In a world where supermarkets create the quality and safety standards (specifications) for food purchased within a country and for export, the role of public standard setting agencies wanes, but does not stop. Adjusting public policies to both accommodate and regulate the new industrial global food sector will command the best research, the most creative minds, and cooperative partners in both the private and public sectors. 2. Issues related to hunger exist in tandem with issues related to obesity. Both are a challenge to public policies designed to foster healthy diets and healthy people. Meanwhile, in the quest healthy solutions we see the ability to design and target foods and diets for various human geno-types. New public health and ethics policies will need to be addressed as these technologies are commercialized. 3. In some circles, "food security" now means defending food and food systems from deliberate contamination by terrorists. Tightening

access to food production, processing and transportation routes presents new challenges to domestic tranquility and to international trade. This paper will discuss research and policy issues related to these three developments in the global food and agricultural supply network.

1. The Rise of Supermarkets and a Global Food Network

In the end, food and agri-food research and public policy is all about providing high quality, safe foods to the consumers at affordable prices. It is the quest for affordable prices that drives abundant production and efficient distribution of food in a competitive environment. In OECD countries and in several newly developed countries the single largest source of food for consumers is the supermarket followed by commercial foodservice establishments including quick service restaurants. Wet markets, farmers markets, and households' self-sufficiency have gone the way of the proverbial buggy whip. As Reardon (2005) has instructed us, the share of retail food now sold through supermarkets in the largest Latin America countries rose to 50-60 percent during the nineties; in Central America it rose to 30-40 percent. Five to seven years later, supermarket development took off in Asia where the share of retail food sold in supermarkets in China went from zero to 30 percent in urban areas in ten years (Reardon, 2005). The documentation of this phenomenon has been very important and opened many eyes to the "supermarketization" of the food and agriculture industry. The traditional supply chain model of food production and consumption has been replaced by a network of large and small food companies, logistics firms, and software suppliers. Three research questions arise around this phenomenon:

1. What was the impetus for this growth in supermarket sales and retail store power in the supply chain?

2. What have been the ramifications for consumers and domestic food and agricultural companies in newly developed countries when supermarkets rise to dominance in a very short time?
3. What is the impact on global trade, food quality, and safety standards?

1.1 Impetus for Supermarket Development:

In newly developed economies one of the most influential factors leading to the growth of supermarkets is rising household incomes and the development of a middle class. In a study of supermarket growth in Peru, Senauer and Goetz (2003) found that 20 percent of the population in Lima could be classified as middle class. Incomes that supported their purchasing power translated into $6,000 U.S. per capita Gross National Income (GNI) in 2000. At this stage of economic development and middle class achievement, supermarkets can be expected to emerge and become viable sources of food for people, at least in urban areas. At this level of per capita GNI, the number of people who have achieved middle class status in China is around 300 million, with 100 million in India and 45 million in Mexico (Senauer and Goetz). In addition to having higher incomes, consumers find that supermarkets are attractive sources of food. Supermarkets are clean and reliable and the food offered in them is safer, more predictable, easier to shop for, and often cheaper than they can find in traditional markets. In addition, the excitement and novelty of a supermarket attracts shoppers of all ages (Conversation with graduate student from Shanghai).

Public policies that allow capital investment in the retail end of the food supply chain, namely foreign direct investment (FDI), are a second major influence on the growth of supermarkets

chains. Those countries that have allowed FDI in retail and distribution have seen much faster growth in supermarkets and a shift in FDI from agriculture to high value-added food industries. As Reardon (2005) points out, liberalizing FDI in the mid 1990's in Asia and Latin America resulted in investment flows rising 9000% between 1980 and 2003. Most importantly this investment generated *in-country sales* of processed foods in the countries outside the U.S. that is 500% greater than processed food exports from the U.S. to the rest of the world. These changes in domestic food production and processing in countries receiving FDI are more important than changes in international markets for global trade. The convergence of capital investments in the down-stream, value added food firms, and the rise of a middle class bodes well for the development of a large supermarket sector which brings dramatic changes in the domestic supply chain populated by local framers, processors, manufacturers, and distributors.

1.2 Ramifications of Supermarket Development:

One of the most noticeable ramifications of supermarket dominance is the demise of local retail food vendors, street markets, farmers markets, and small farmer suppliers. In the presence of supermarket networks, these small, traditional vendors can no longer compete on price, quality, or quantity. Supermarkets rather than consumers become the customers of local food producers and they demand consistent quality, quantity, and delivery. Supermarket buyers offering contacts for future supplies most often leads to the consolidation of many small producers into a few large cooperatives or companies who can meet the strict contract specifications. By consolidating and investing in knowledge, equipment, and technology, these food suppliers can adopt the good agricultural and good manufacturing practices demanded by their supermarket customers. By competing for contracts in the new domestic market which demands high quality,

differentiated products, these companies are also preparing themselves to compete in the world market. They become a conduit for exports increasing the supply of food on the global market. Often specifications being met for the new domestic market exceeds the public standards for export/import. Even with high private quality and safety standards for value-added foods from various countries throughout the world, it is unlikely that an importer in an OECD country could import products that did not meet sanitary and phyto-sanitary standards stipulated in international trade agreements. Fresh produce that may carry insects and diseases potentially harmful to plants and animals in the importing country would still need special import permission. Trade barriers still exist even with high private safety and quality specifications.

Research for public policies related to this dramatic change in the organization and financing of global food networks could well focus on the social and economic impacts on displaced farmers and vendors. Have they profited by joining cooperatives or by selling out to larger companies? Have there been any public funds or programs to help them join cooperatives and meet the higher quality and sanitation standards? Have they lost their markets altogether and been left destitute? The economic transition of these people will be important for economic and social stability and for urban migration. It will spill over into employment and wage policies.

Research for public policies related to the availability of food in supermarkets could well focus on the impact on consumer welfare, food choice, and lifestyle. Is food in supermarkets less expensive, more attractive, easier to purchase and store cleaner and more desirable to local consumers than their traditional shops? How has it affected their diets and health status? How has it changed their shopping patterns, travel patterns, intra-household relationships, and

command of resources? What public infrastructure and policies were needed to foster supermarket location, food delivery, garbage disposal, shopping? What does it mean for local transportation services and other public investments?

1.3 Impact on Global Trade

There is a debate about whether private specifications for food quality, sanitation, and safety are taking over the role of public food safety standards, rendering them impotent and irrelevant. It is a researchable question. Surely, public global standards as set in CODEX are cumbersome, political, and quite general in nature, but they do form a solid base upon which higher and more specific standards can be set by either public or private parties. They provide an irrefutable standard that nations and companies can rely on. They also provide a sense of equity and mutual respect in the global market as they protect the integrity of products that claim to be unique to a region. Likewise countries, states, and cities set standards for food safety and quality that are consistent with their cultures and markets. The extent to which private company standards (called specification in the private sector) exceed the public standards would seem to be a good thing for consumers, but one might investigate whether it raises the price of food unnecessarily and whether it creates barriers to entry for perfectly good food from certain vendors. Does it actually limit choice in the food market? Does it result in healthier consumers and lower health care costs?

Do the high standards set in a competitive retail food market render international trade negotiations irrelevant? Are the protective stipulations that regularly appear in trade negotiations

less meaningful when agricultural producers are engaged in value-added processing? Are these two worlds talking past each other or are they co-dependent?

In this new brave world of "supermarketization" of the food industry, supermarkets have become the buying agent for consumers. They set the standards and have the buying power to enforce these standards on a very large scale. Are they really acting in the best interest of consumers in the same way that public regulatory agencies are charged to do? Public policies to protect consumers from their buying agents may be needed in the future.

2. Hunger and Obesity: Enemies of Healthy Lives

Obesity is being documented around the world and, ironically, it exists side by side with poverty and undernourishment. Haddad points out that in seventy-eight developing countries under and over-nutrition coexist with 5% of the population being obese and seven percent being underweight. Often this condition exists in the same household (Garrett and Ruel). Around the world it is estimated that 53% of children and 18% of the total population are undernourished, while in Australia 20% of children are overweight or obese, as are 17% of Malaysian boys, eight percent of Malaysian girls, and 7% of urban Chinese children (IFIC). Most of the undernourished in 1998 were in India, China, and Sub-Saharan Africa (FAO). The magnitude of these dual food and diet issues clearly poses new challenges for global food policy and food security.

Even in the United States, almost 11%, or 11.5 million households, were not food secure in 2001. One-third of them were hungry at some time. They spent an average of 15% of their income on food per year compared to 5.5% for food secure households (Nord). Several studies have shown

that people, especially women, in these food insecure households are also overweight (Olson; Townsend). Women between ages 19 and 55 who were in food insecure households were found to be significantly more likely to be overweight, and they consumed ninety-one calories more per day that women in food secure households (Bastiotis & Lino). Based on the standard conversion of calories to body weight of 100 calories per day leading to 10 pounds of weight gained (or lost) per year, it is easy to see how those who are food insecure are more likely to be overweight. It begs the question of whether cheaper food has more calories and fat than more expensive foods, but it is a common observation that inexpensive and fast food is often higher in calories. The point is that poverty, hunger, and being overweight exist simultaneously, and that being overweight jeopardizes health, which jeopardizes the ability to work and be productive, which in turn jeopardizes the ability to earn income to buy healthy food.

The developing world is undergoing a diet transition that appears to lead to increased incidents of chronic disease. It is increasing human costs and the economic costs in terms of lower productivity. Whether it is tied to the increase in supermarkets or to fast food establishments in not known, but research into this questions is certainly called for to inform new public policies related to the food supply and consumption habits. There may be a need for public investment in efforts to influence the diet transition towards increasingly healthy outcomes.

Obesity is a public policy issue because it affects the health of people and therefore the health care costs for everyone. Type 2 diabetes (Knowler et.al.) and 20-40% of cancers in U.S. adults (Calle, et al) are said to be linked to obesity and are rising at a near epidemic rate. Eight percent of U.S. adults (Knowler et al.) and about 4% of children in America have Type 2 diabetes. The rise in this

non-inherited, Type 2 diabetes in children is of great concern, since diabetes is a chronic disease that absorbs over 10% of all health care dollars. It is growing along with obesity in children; it is a *health care disaster in slow motion*. Obese children with diabetes will absorb an increasing amount of our health care dollars for as long as they live (Kinsey, 2003).

In 1999, an estimated 61% of adults and 13% of children and adolescents in the U.S. were overweight. Adult obesity has doubled since 1980 to 24% of the population and overweight adolescents have tripled since 1980 to 15% (FDAa; CDC). Overweight children ages 2-5 have increased from 7-10% since 1994. One study estimated that health care for overweight and obese people costs an average of 37% more than for people of normal weight, adding an average of $732 to the annual medical bills of every American (Connolly). This places the problem of obesity squarely in the realm of a public good (bad) and one that will take a concerted effort on the part of many agents in society to correct.

Table 1 compares the costs of microbial related food-borne illnesses to health care costs related to obesity. By any comparison you want to select, the cost of obesity is much larger than the costs of microbial pathogen contamination. Using the conservative estimate of $93 billion a year for obesity related diseases, and comparing it to the low and high estimates for the costs of microbial contamination reveals that obesity related diseases are between 2.5 and 13.5 times as expensive as microbial-caused food-borne illness (Kinsey 2005).

2.1 Public Policies and Research on Hunger and Obesity:

This places the issue of obesity and health on the agenda of public policy makers and analysts.

Examining food and agricultural subsidy policies for their impact on eating patterns and obesity is clearly called for. For years, some have suggested that we should have a nutrition based agricultural policy, a suggestion that has been largely scoffed at by politicians and business. But as the food and agricultural sector becomes more consumer-centric and as food consumption and health care become more tightly linked with new scientific knowledge about the linkages between food and health, new approaches to food and agricultural policy are needed. Research into the impact of farm subsidies, school lunch programs, commodity distribution programs, and marketing orders on human health could be quite enlightening.

In addition, public policies around truth in labeling and advertising will be important. Consumers claim they have been badly misled by quasi health claims such as "no fat" or "no carbs" on food labels. They are confused by conflicting scientific studies about cholesterol, the dangers of being overweight, and what types of fat are the most dangerous to eat. Public policy may be needed to help consumers regain trust in the companies that provide their food and in the public institutions that are charged with protecting their health and safety. Loss of trust by consumers is a serious issue for both private and public organizations.

Finally, the emerging issues around intimate knowledge about individual geno-types and the foods that are most compatible with a particular genetic makeup are sometimes too frightening to contemplate. Public regulation of the efficacy of the tests and the interpretation of what it means for healthy eating is important first of all. Then the potential use of that information by parties other than an individual such as doctors, insurance companies, and employers raises issues of discrimination and exploitation. Clear public guidelines will be needed soon and needed on a

global basis, given the nature of our trading economies.

3. Food Security (Defense Against Food Terrorism)

There are now two distinct definitions of food security. The traditional, well-known definition refers to having enough food to maintain growth and health. It was addressed above. The new definition of food security refers to defending the food production, processing, and distribution chain from bioterrorists who might ***deliberately*** contaminate food with an agent that could make people ill, cause death, or economic chaos. United States government agencies such as the Food and Drug Administration (FDA), the Department of Agriculture (USDA), and the Department of Homeland Security (DHS) are actively studying this new hazard, developing educational programs, and taking precautionary measures to minimize the possibility of an event and the impact if any such event should occur. There are billions of dollars being spent by private companies, public agencies, and universities to learn more about how food and the food system in the U.S. might be used as a destructive weapon by terrorists. Two Department of Homeland Security Centers of Excellence have been established to focus research and education on the issue of food defense. 1. The National Center for Food Protection and Defense lead by the University of Minnesota (http://www.ncfpd.umn.edu) and 2. the National Center for Animal and Zoonotic Disease Defense lead by Texas A&M (http://fazd.tamu.edu). The collaborative efforts of these and other centers with their many partners will be instrumental in designing programs and policies that will help to defend the food system. They are helping private companies learn about vulnerable locations and practices. It is vital that a generally safe food supply not be deliberately contaminated with known and unknown substances that could potentially harm or kill thousands of people in a very short time.

However, terrorism does not necessarily have to kill people to succeed. It only needs to create a crisis of confidence in the safety or availability of food from a particular source (a brand or a region). This would mean large economic losses to private food companies as they shut down, clean up, and re-establish their credibility. Terrorism only needs to cause consumers/citizens to loose confidence in their government agencies. These consequences are serious and would be a victory for terrorists. Once confidence is lost, in brands, companies or governments, it is hard to regain.

Public policy makers and institutions need to figure out how to reduce the likelihood of a terrorist attack on food and also how to communicate their efforts so the public will know about the steps being taken. In the case of an event, new knowledge about how to contain, decontaminate, and recover is needed. When dealing with both unknown and unlikely but catastrophic events, public policies need to find a way to maximize the return on expenditures. Trying to protect every food at all times becomes a bottomless pit for money and an inhibition on lifestyles. Research about where to invest in order to defend the food system will be most valuable.

One of the measures being encouraged by government agencies is systems of traceability for food products. The possibility of accidental mishandling or deliberate contamination around an extensive global food network is real. The FDA has new regulations to be in force in December 2005 that mandate all domestic food companies, who buy and sell food, be able to trace that food to the party they bought it from and the party they sold it to. (Retail stores and restaurants

obviously need to not trace food they sell to consumers (FDAb). Finding the most efficient ways to trace product "one-up, one-down" could involve considerable research and testing as well as learning how to access and use the data if and when it is needed. This type of traceability will lead to the adoption of new information technologies such as radio frequency identification (RFID) tags and readers and it will add some costs. Compared to the potential losses in the case of a serious food-borne illness outbreak or a terrorist attack, this investment is likely to have a high and positive benefit-cost ratio just as the investments in food safety practices have had in the past (Kinsey, 2005).

Traceability helps with both prevention and rapid containment and therefore becomes a desirable technology for bio-security. Assessing the benefit/cost ratios and the optimum methods and degree of aggregation in traceability will be the subject of much research. For instance, questions are being asked as to whether it is desirable to trace every unit item, every case, or every pallet. What are the mechanisms by which these products will be efficiently traced? How does it vary by type of food? Does it jeopardize consumer privacy if the tags remain "live' after items are purchased?

Although bio-security brings complexity to the traceability debate, it should help to clarify the objectives of prevention and containment. A Panel study in the Farm Foundation concluded that prevention should be the objective when the probability of an event is high, measurable, and the technology exists to prevent it. Containment should be the objective if the probability of an event is low and there is no viable way to prevent it. Traceability will help with both tasks and also reinforce food safety protocols (Farm Foundation).

In 2003, the FDA and the Bureau of Customs and Border Protection (CBP) jointly issued interim final rules requiring prior notification of imported food beginning December 12, 2003 (FDAc). Several revisions and new timelines have been issued since, but this rule essentially asks for an electronic notification of all food coming into the U.S. one hour before arrival by land, 2 hours before arrival by rail and by "wheels up" for flights originating in North, Central, and South America, the Caribbean and Bermuda; four hours before arrival by air for other origins. These rules emphasize the importance of tracking products inbound and re-enforce attempts to build a traceable food supply. Concern about imported food reflects rapid increases in the global food market. In 2005, the U.S. is expected to import $58 billion of food, up 41% in the last four years.

Research related to bio-security is both highly technical and blatantly personal. Decontamination chemicals and rapid detection tests command the highest of scientific skill. Communicating the nature of the threats and reassuring consumers at the same time requires the most skilled psychologists and communicators. Public policy in this case has to deal with not only the harshest of possibilities, but sensitivities of the voting pubic and the trust of consumers. Maintaining a balanced approach while building an effective defense system will involve public policies from all government sectors.

One positive outcome of all the research and policy around food defense is that it reinforces food safety. It will enhance good manufacturing practices and vigilance around the food supply network. It will improve consumers' confidence in the food system and in their personal futures.

People who believe they live in a secure environment are more likely to invest in themselves, in their health, and perhaps even be more likely to eat healthier diets.

Summary

Research agendas blossom in the light of these developments. We need to understand how private food quality and safety standards affect world trade, world health, and the distribution of wealth. Will scientific methods provide irresistible new technologies that will benefit selected groups at the expense of supplying adequate nutrition to the many? How does health care merge with the design of better diets and nutrient-medicines? All of these questions have great impact on public policies.

It will take knowledge and courage for policy makers to allow the development of new food technologies in the face of citizens who mistrust both private companies and governments. Economic and political benefits of the supermarketization of the world will need to be identified where they exist. We must be able to show that new markets and new technologies do not harm the earth's environment and that they do not disadvantage the poor both domestically and in foreign lands.

One of the larger questions is when should public policies override or control the rapid development of private global markets in food supply networks? The efficiency and equity tradeoffs will get larger, not smaller, with global commerce. Sustaining food networks (production and marketing), defending food networks, and ensuring healthier diets around the

world are the great challenges for researchers and public policy makers in this twenty-first century.

References:

Basiotis, P. and M. Lino (2002) "Food Insufficiency and Prevalence of Overweight Among Adult Women," *Nutrition Insights*, Washington D.C., USDA, Center for Nutrition Policy and Promotion. July 2002.

Calle, E.E., C. Rodriguez, K. Walker-Thurmond, and M. J. Thun, (2003) "Overweight, Obesity, and Mortality from Cancer in a Prospectively Studied Cohort of U.S. Adults," *The New England Journal of Medicine*, 348:17, April 24, 2003, 1625-1638.

CDC, Centers for Disease Control, (2005) http://www.cdc.gov/nchs/about/major/hhis/released200306.htm Accessed May 10, 2005.

Farm Foundation. (2004) "Food Traceability and Assurance in the Global Food System: Farm Foundations Traceability and Assurance Panel Report." Executive Summary, July 2004, http://www.farmfoundation.org, Accessed May 10, 2005.

FDA(a) Food and Drug Administration (2002) *Consumer*, March –April, 2002. p. 8.

FDA(b) Food and Drug Administration (2005) ttp://www.fda.gpv/oc/bioterrorism/bioact.html; http://www.cfsan.fda.gov/~dms/fsbttr4b.html; http://www.cfsan.fda.gov/~dms/fsbtac25.html; Accessed May 10, 2005.

FDA(c) Food and Drug Administration (2005) http://www.cfsan.fda.gov/~pn/pnplan2.html Accessed May 10, 2005.

FAO (2003) State of Food Insecurity in the World, http://www.fao.org/DOCCREP/x8200E/x8200e03.htm#P0_0 Accessed August 2003.

Garrett, J. and J.C. Ruel (2001) "Stunted child-overweight mother pairs: an emerging policy concern?" *17th International Congress of Nutrition: Annals of Nutrition and Metabolism*, 45(Suppl 1), 2001, pp. 404.

Haddad, L. (2003) "Redirecting the Diet Transition: what Can Food Policy Do?" Presented At OEDC Conference, Amsterdam, Netherlands, January 2003. (1.haddad@cigar.org)

IFIC: International Food Information council Foundation. (2001) "Childhood 'Globesity'," *Food Insight* January/February, 2001.

Knowler, C. W., E. Barret-Connor, S. E. Fowler, R. Hamman, J. Machin, E. A. Walker, and D.M. Nathan, (2002) "Reduction in the Incidence of Type 2 Diabetes with Lifestyle Intervention or Metformin," *The New England Journal of Medicine*, 346:6, February 7, 2002, pp. 393-403.

Kinsey, J. (2003) "Will Food Safety Jeopardize Food Security?" Paper presented at the 25th International Conference of the International Association of Agricultural Economists,

Durbin, SouthAfrica, August 16-33, 2003.

Kinsey, J. (2005 forthcoming) "Food Safety in Three Dimensions: Safety, Diet Quality and Bio-Security," CHOICES MAGAZINE, June, 2005. http://www.choicesmagazine.org

Nord, M. (2002) "Household Food Security in the United States," *ERS Information*, November, 2002, p. 1,3. (http://ers.usda.gov/publications/fanrr29/)

Olson, C.M. (1999) "Nutrition and Health Outcomes Associated with Food Insecurity and Hunger," *Journal of Nutrition*, 131, 1999, pp. 521S-524S.

Reardon, T. (2005) "Customizing Market Development Strategies: New Paths to Rural Development in Central America" Staff Paper #2005-01, Department of Agricultural Economics, Michigan State University.

Senauer, B. and L. Goetz (2003) " A Growing Middle Class in Developing Countries and the Market for High Value Food Products," Working Paper 03-02, The Food Industry Center, University of Minnesota. http://foodindustrycenter.umn.edu

Townsend, M.S., J. Peerson, B. Love, Achterberg, C. and S.P. Murphy (2001) "Food Insecurity is Positively Related to Overweight Women," *Journal of Nutrition*, 131, 2001, pp 2880-2884.

Table 1 Costs Associated with the Unsafe Food Consumption in the U.S., 2000

Type of Health Care Problem	Health Care Costs	Deaths
Microbial Food-borne Illness	$6.9* - $37 billion (includes losses due to death)	2,654-5,000
Obesity Related Diseases	$93 - $117 billion (direct and indirect costs)	26,000
Ratio of Obesity Costs to Microbial Costs	Low: 93/6.9 = **13.5** High: 93/37 = **2.5**	26/5 = 5.2

*Estimated cost based on four types of microbes: Campylobactor, Salmonella, E.-coli, Listeria http://www.ers.usda.gov Source (Kinsey. Choices Magazine, forthcoming, June 2005)