Special contribution

Exporting obesity: US farm and trade policy and the transformation of the Mexican consumer food environment

Sarah E. Clark[1], Corinna Hawkes[2], Sophia M. E. Murphy[1], Karen A. Hansen-Kuhn[1], David Wallinga[1]

[1]Institute for Agriculture and Trade Policy, Minneapolis, Minnesota, USA, [2]City University, London, UK

Obesity has reached epidemic proportions, in the United States as well as among its trade partners such as Mexico. It has been established that an "obesogenic" (obesity-causing) food environment is one influence on obesity prevalence. To isolate the particular role of NAFTA, the North American Free Trade Agreement, in changing Mexico's food environment, we plotted the flow of several key products between the United States and Mexico over the 14-year NAFTA period (1994-2008) and situated them in a broader historical context. Key sources of USDA data include the Foreign Agricultural Service's Global Agricultural Trade System, its official repository for current and historical data on imports, exports and re-exports, and its Production, Supply, and Distribution online database. US export data were queried for agricultural products linked to shifting diet patterns including: corn, soybeans, sugar and sweeteners, consumer-oriented products, and livestock products. The Bureau of Economic Analysis' Balance of Payments and Direct Investment Position Data in their web-based International Economic Accounts system also helped determine changes in US direct investment abroad from 1982 to 2009. Directly and indirectly, the United States has exported increasing amounts of corn, soybeans, sugar, snack foods, and meat products into Mexico over the last two decades. Facilitated by NAFTA, these exports are one important way in which US agriculture and trade policy influences Mexico's food system. Because of significant US agribusiness investment in Mexico across the full spectrum of the latter's food supply chain, from production and processing to distribution and retail, the Mexican food system increasingly looks like the industrialized food system of the United States.

Keywords: Obesity, Food systems, Food environment, Agricultural trade, NAFTA, Trade policy

Introduction

Obesity is an epidemic in the United States. The problem affects 68% of American adults,[2] and increasingly, the young as well: 17% of Americans age 2–19 are obese.[3] The problem is serious, especially from a health standpoint: To be overweight or obese greatly increases one's risk of chronic diseases such as cardiovascular disease, high blood pressure, diabetes, cancer, and stroke.[4] The problem is also expensive—medical costs associated with obesity alone are estimated to be $147 billion per year in the United States.[5]

According to USDA researchers, the primary reason for America's soaring rates of obesity and Type 2 diabetes was a big jump in average caloric intake between 1985 and 2000, without a corresponding increase in the level of physical activity.[6] USDA data show that, in 2007, Americans' average daily caloric intake was 400 calories higher than in 1985, and 600 calories higher than in 1970.[7]

This obesity problem is now also common in other countries. As stated by the World Health Organization (WHO), 'Contrary to conventional wisdom, the obesity epidemic is not restricted to industrialized societies; in developing countries, it is estimated that over 115 million people suffer from obesity-related problems.'[8] Neighboring Mexico ranks second behind the United States in a 2010 OECD report ranking 40 countries according to the proportion of their population who is obese.[9] The most recent (2006) data show that 39.7 % of adults are overweight and 29.9% are obese, totaling 69.6% of the population at an unhealthy weight. Between 2000 and 2006, the combined prevalence of overweight and obesity in Mexican adults increased approximately 12%.[10,11] Among children age 2–18 years, the overall prevalence of overweight and obesity, in 2006, was

Correspondence to: David Wallinga, Institute for Agriculture and Trade Policy, 2105 First Avenue South, Minneapolis, Minnesota, USA. Email: dWallinga@iatp.org

DOI 10.1179/1077352512Z.0000000007

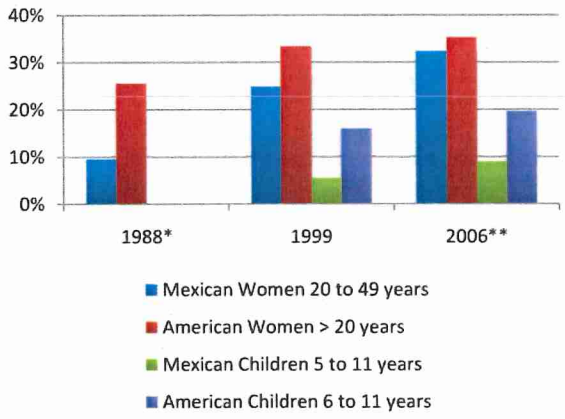

Figure 1 Obesity in Women and Children, Mexico and United States, 1988–2006.
Sources: Data for Mexican women and children are from the 1988 and 1999 Mexican National Nutrition Surveys (ENN88 and ENN99), and the 2006 Mexican National Health and Nutrition Survey (ENSANUT); Data for American women and children are from the 1988, 1999, and 2006–08 National Health and Nutrition Examination Surveys (NHANES). *No data was available for Mexican children in the 1988 Mexican National Nutrition Survey. **This data represents American childhood obesity rates collected from NHANES 2007–08.

26.3% and climbing.[12] As shown in Figure 1, these trends mirror those in the United States.

The rise in the incidence of overweight and obesity in Mexico has coincided with the period of implementation of the North American Free Trade Agreement (NAFTA), an agreement signed between Canada, Mexico, and the United States in 1994. NAFTA aimed to implement the process of trade liberalization between the three countries (see Box 1).

This paper asks whether the United States has been responsible in some way for 'exporting obesity' into Mexico through NAFTA. Our hypothesis is that NAFTA changed the food environment in Mexico. This hypothesis is based on the evidence that:

1. The food environment (i.e., what types of food are available where and for what price) affects diet quality and an individual's risk of becoming overweight or obese.[13–22]
2. Trade and trade policies influence the food environment. Specifically, evidence suggests that trade policy is one influence on food availability and prices.[23]

We recognize it is difficult to isolate the effects of globalization on diet and health.[24] Nevertheless, past literature has shown that the effects are real and important.[25–28] Furthermore, public health issues such as obesity 'can be understood accurately only by examining the complex and dynamic part-and-whole interactions that make up systems.'[29] We, therefore, aim to describe changes in trade flows as one component of a *system of factors* that contributes to unhealthy food environments, and consequently, poor dietary choices, overweight, and obesity. It is not possible at this level of analysis—nor is it reasonable—to try and examine cause and effect between trade flows and obesity. Using a public health 'lens' about systems, we emphasize that the interrelationships between the various parts of the food system as drivers of obesity are at least as important as the contributions of any individual factor.

Box 1: What Is Trade Liberalization?
Trade liberalization is the process of reducing or eliminating barriers to trade; it allows for the easier and more rapid transfer of goods and services across borders. Potential barriers to trade include government laws and regulations such as tariffs, import quotas, and certain kinds of government subsidies.[1] Reducing these barriers can be done unilaterally, bilaterally, or multilaterally. Since the 1990s and 2000s, investment policies have also been liberalized. Proponents of trade liberalization, or 'free trade,' contend that increased trade increases economic growth and prosperity, thereby reducing poverty, creating jobs, and improving living conditions. Critics of trade liberalization point to the uneven distribution of economic benefits and adverse impacts on the environment and local communities and cultures.

The Industrialization and Globalization of Food and Agriculture

The paper begins by providing the background to the globalization of the food system in the United States, why this led to an emphasis on trade, and the adoption of a similar model in Mexico through the adoption of NAFTA.

United States

The 20th century witnessed an unprecedented increase in the production of agricultural commodities in the United States, especially grains and oilseeds such as wheat, corn, and soybeans. Calories from these foods had never before been so abundant. In large part, this abundance stemmed from public policy choices. One important component was public spending on research and development to increase crop yields and productivity of livestock. A second component was the US government's decision to implement programs that managed supply, production, and farmgate prices. These policies included publicly held grain reserves and, later, land set-aside policies that pulled land out of production. The dominance of US production as a share of global trade in a number of cereals meant the US support price became the *de facto* price in world markets (for example, in corn, wheat, and soy).

These policies came under increasing attack in the 1980s and 1990s, in particular from food processors and firms that traded in food commodities. Processors wanted to reduce the cost of their inputs by eliminating the government's minimum price policies while grain traders had an interest in reintroducing price volatility, which increased the potential profits in the trading of commodity futures markets. Between 1986 and the mid-1990s, the government ended price supports and liquidated much of the stock held in public grain storage. Lower grain prices became the norm. Farmers responded to lower prices by *increasing* production, trying to get better overall returns by having more volume to sell. Under the newer policies, in fact, US farmers often sell their commodities at market prices *lower* than it actually costs the farmers to produce these crops.[30] Since 1996, direct federal payments in the form of income support to farmers have made this possible.

Livestock and dairy producers started to use the cheaper grain as feed as well, moving livestock production away from more traditional (and arguably healthier) grass-based diets.[31] Today, domestic meat and dairy producers are the largest end-users of corn and soybeans.[32,33] Most corn and soybeans are sold domestically or exported for animal feed and biofuels, not for human consumption. Lower market prices for these commodity crops also prompted a proliferation of novel processed foods that depend on highly processed forms of corn and soybeans, such as high fructose corn syrup (HFCS) and hydrogenated vegetable oils.

This glut of US grains and oilseeds created an additional incentive for the US government to actively pursue the creation of new export markets. In the 1980s, liberalizing export and import markets became a central goal of US agricultural policy.[34] Successive US governments pursued the policy of opening foreign markets for American products by pushing for an agreement on agriculture as part of the World Trade Organization (WTO), as well as for regional and bilateral trade agreements. The push for exports was accompanied by a push to encourage other countries to relax foreign investment laws. The new investment rules made it easier for US food companies to buy companies in other countries, thus increasing their global reach and power. To pursue this policy objective, the United States used its political weight as a deciding voice in the international financial institutions and donor programs that have shaped the structure of most developing country economies since the 1980s. For 30 years, almost all channels of public finance for development have encouraged developing country governments to increase the role of the private sector, increase their reliance on exports (and thereby on imports as well), and cut public spending across the entire economy. Most developing country governments abandoned any public policy priority for food self-sufficiency. Investment in agriculture by developing country governments and aid donors also declined dramatically, to the detriment of food production and rural development.[35]

The US policy of supporting increased commodity production even when market prices fail to provide a return to farmers has important effects on US trade as well. The sale overseas of US commodities at prices less than the cost of domestic production—i.e., 'dumping'—has been tied to the loss of economic value from agriculture in developing countries, resulting in hunger and depressed production in rural communities there.[30] Meanwhile, US agriculture and trade policies have given rise to an increasingly global trade of grains, meat, and other food products, which in turn, have been an important driver in the spread of the 'industrial food system.'[a],[36] Even as the situation continues to evolve (for example, US government support for the biofuels sector has created an important new domestic demand for US grains), US commodity programs continue to distort production and markets.

Mexico

Mexican agriculture underwent its own process of modernization over the 20th century. Mexico had its share of publicly funded research, development, and extension, and was an important center of Green Revolution technology development as well. Mexico's relatively closed markets and historical policy of import-substitution (in which they attempted to reduce foreign dependency by promoting local production) had the effect of decreasing agricultural prices. Public spending strongly favored the largest growers with irrigated lands. In the 1980s and into the 1990s, the Mexican government presided over a period of deregulation that substantially liberalized trade and shifted the land ownership system from collective ownership under the traditional '*ejido*' system to one in which individuals hold ownership and title to the land.

When negotiations began in 1991, NAFTA was the first proposed trade agreement among partners of such unequal size and levels of development in which governments chose to ignore those differences. Rather than include concessions for the poorer partner (Mexico), NAFTA instead presumed relative equality. These concessions—known as special and differential treatment—had been the basis for trading arrangements between developed and developing countries in the past. At no point were peasants—the

[a] An "industrial food system" is characterized by ever fewer and larger farms that specialize in one or two crops and rely on energy-intensive off-farm resources such as fossil fuels, chemical pesticides and fertilizers.

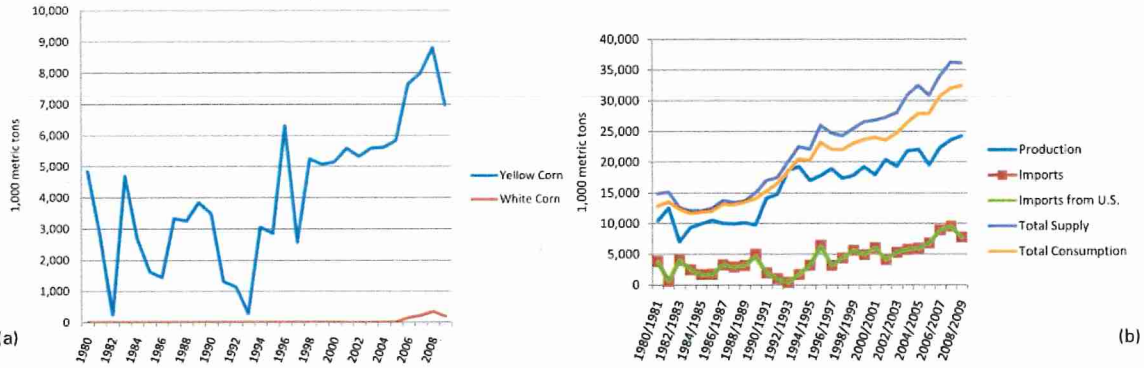

Figure 2 a Corn Exported to Mexico, 1980–2009; b Mexican Production, Import, and Consumption of Corn, 1980–2009. Source: a USDA FAS Global Agricultural Trade System (GATS); b Source: USDA FAS Production, Supply, and Distribution (PSD).

majority of Mexico's food growers—given priority. By the time NAFTA passed into force, the Mexican government had abandoned domestic policies that had supported a minimum or 'floor' price, very high interest rates were choking off credit to rural producers, and commodity prices in world markets were depressed, favoring imports and reducing the potential gains from increasing exports.

Agriculture was also the only sector within NAFTA to be the subject of separate bilateral agreements among the three partners, instead of a three-way negotiation to establish one set of rules for all three countries. Although the United States and Canada are the two NAFTA members with the most equal standard of living, the Canada–US agricultural trade rules allowed higher levels of protection to remain in place than did the US–Mexico agreement, where differences between the two models of agriculture were vast. For trade between Canada and the United States, existing barriers for sugar, dairy, and poultry products were kept in place. In contrast, the US–Mexico agriculture agreement pushed deeper integration across the board. For example, barriers to imports of corn and beans, key products in the Mexican diet and rural economy, were scheduled for phase-out over 14 years (along with similar phase-outs of barriers to US imports of sugar, peanuts, and asparagus). All remaining tariffs and quotas on these goods were removed on schedule,[b] in 2008.[37]

NAFTA also broke new ground with the range of issues it addressed. Chapters on investment, intellectual property rights, and government procurement went beyond existing proposals made during the WTO Uruguay Round negotiations, which were concluded at much the same time as NAFTA. NAFTA established particularly favorable conditions for private foreign investors. Mexico had already begun to open up to foreign investment in the 1980s with the elimination of rules that limited foreign ownership of stock in Mexican companies to a maximum of 49%. Other changes that predated NAFTA include the abolishment of laws requiring that cattle be fed grass rather than corn and changes in the *ejido* system of collective landholding mentioned earlier so as to allow foreigners to own land. NAFTA added provisions for the equal treatment of foreign and domestic investors, and prohibited certain performance standards for foreign investments.

Findings

Implementation of NAFTA: Effects on the Flow of Commodities, Consumer Foods, and Investment Trends

Data from the USDA's Global Agricultural Trade System (GATS) describe a change in trade of agricultural commodities and consumer products between the United States and Mexico over a 14-year period (1994-2008) since the passage of NAFTA. To situate these changes within a broader historical time frame, we also assessed the quantity (in 1,000 metric tons) exported from the United States to Mexico over the 30-year period from 1980 to 2009 for the products in question. To illustrate the relationship between US exports and the Mexican production and consumption of the key commodities previously idenfitied and the proportion of total Mexican imports that originate from the United States, we also consulted the USDA Foreign Agricultural Service's Production, Supply, and Distribution (PSD) online database. Changes in US-direct investment abroad from 1982 to 2009 were assessed using the Bureau of Economic Analysis' Balance of Payments and Direct Investment Position Data in their web-based International Economic Accounts system.

The general trend in trade flows between the United States and Mexico under NAFTA has been an increase in the amount of seasonal fruits and

[b] Subsequent agreements negotiated between the United States and Central American countries, the Dominican Republic, Panama, Peru, Colombia, and South Korea all proceeded with the clear expectation that all productive sectors, particularly agriculture, would be liberalized without the safeguard mechanisms that came to dominate discussion on agriculture in the WTO talks.

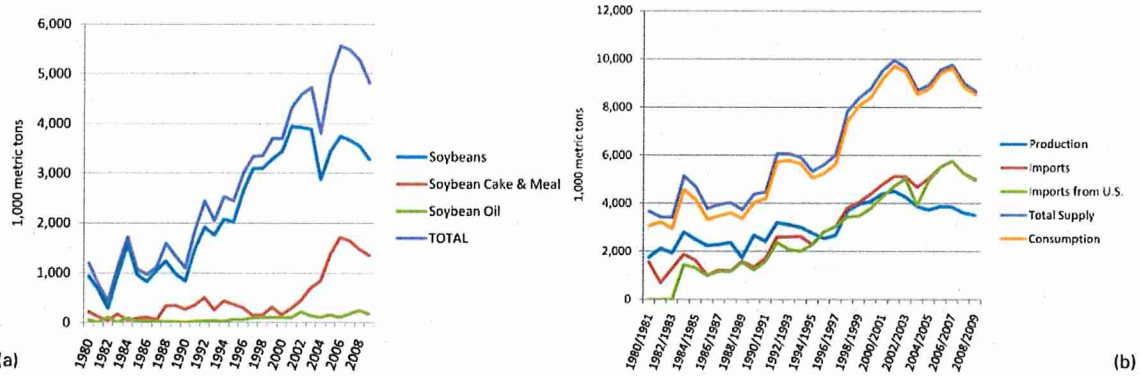

Figure 3 a Soybeans Exported to Mexico, 1980–2009; b Mexican Production, Import, and Consumption of Soybeans,* 1980–2009. Source: a USDA FAS Global Agricultural Trade System (GATS); b Source: USDA FAS Production, Supply, and Distribution (PSD); *Includes soybeans, soybean oil, and soybean cake and meal.

vegetables flowing north and an increase in the amount of staple commodity crops and livestock products flowing south.[38]

Corn

Corn is a particularly sensitive crop in Mexico because of its cultural, political, and economic importance. This fact, combined with projections that suggested NAFTA's adoption would disrupt the Mexican corn market and domestic corn production, meant Mexico insisted the final negotiated language in NAFTA allow for a more gradual reduction of Mexican corn tariffs than for tariffs on other commodities.[37] Yet the Mexican government chose not to enforce the transitional tariff-rate quota system. Although the last Mexican trade restrictions on corn were not removed until 2008, tariffs were reduced more quickly than the schedule defined by NAFTA required.[38]

The amount of corn exported to Mexico has increased dramatically since the passage of NAFTA (Fig. 2a).[c] Compared to the average annual level of corn exports from the United States to Mexico during the decade before NAFTA was signed (1984–93), corn exports nearly quadrupled.[39] At its highest point in 2008, the United States export of corn to Mexico totalled 9.3 million metric tons, equivalent to about 40% of Mexican production (compared to 15% during 1984–93).[39]

The bulk of US corn exports to Mexico is comprised of yellow corn, which is used primarily for animal feed (see 'Livestock, Meat and Feedgrains'). Yellow corn is also incorporated into processed foods for human consumption. White corn, which Mexican peasants have traditionally grown and which has been used primarily to make tortillas and other corn-based foods, accounts for less than 5% of the United States corn exports to Mexico (Fig. 2a). Importantly, yellow and white corn are treated as the same commodity under NAFTA, which has brough serious consequences for Mexican farmers who are unable to maintain a difference in price between yellow corn and historically more expensive white corn.[40]

The domestic production and consumption of corn in Mexico increased over the 30-year period from 1980 to 2009, and the rate of increase rose after the passage of NAFTA in 1994 (Fig. 2b). The import of corn from the United States into Mexico has been rising and currently represents about one-quarter of total corn consumption in Mexico (Fig. 2b). The passage of NAFTA has not diverted trade in corn with Mexico away from other countries and toward the United States. As shown in Figure 2b, essentially all imports of corn into Mexico originated in the United States from 1980 to 2009.

Soybeans

Soybeans are not a traditional part of the Mexican diet, but are used as an ingredient in processed foods, and increasingly as animal feed (see Fig. 5 below). The United States supplies roughly half the world market and Mexico already imported a large share of its soybeans from the United States before the implementation of NAFTA.[38] This trade was intensified by the removal of Mexican tariffs on US soybeans and related products in 2003 as part of NAFTA, along with domestic reforms of crop-support programs. Soybean exports from the United States to Mexico have more than tripled since 1993 (Fig. 3a).

Essentially all imports of soybeans into Mexico originate in the United States, and US imports of soybeans have largely displaced domestic soybean production (Fig. 3b).[41] Total consumption of soybeans and soybean products in Mexico has been rising from 1980 to 2009, but the rate of increase has

[c] The drop in exports in 2009 (to 7 million metric tons from 9 million metric tons in 2008) may be accounted for by the increase in biofuel production in the United States, which created a significant new domestic market for US cornmodities.

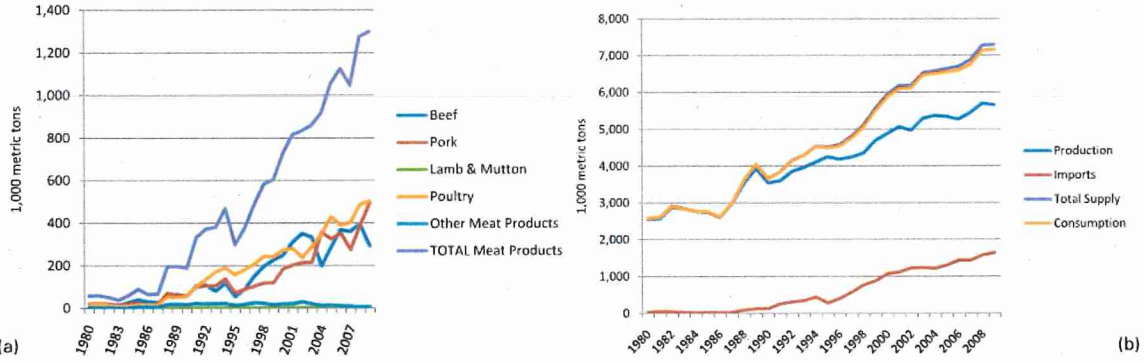

Figure 4 a Livestock Products Exported to Mexico, 1980–2009; b Mexican Production, Import, and Consumption of Livestock Products,* 1980–2009. Source: a USDA FAS Global Agricultural Trade System (GATS); b Source: USDA FAS Production, Supply, and Distribution (PSD); *Includes beef, veal, swine, and poultry; data regarding imports from the United States were unavailable.

hightened since the passage of NAFTA in 1994 (Fig. 3b).

Livestock, Meat, and Feedgrains

Since NAFTA came into effect, there have been huge increases in the amount of livestock products exported to Mexico from the United States (Fig. 4a). According to the USDA Foreign Agricultural Service, the quantities of beef/veal, chicken, and pork exported increased 234%, 307%, and 687%, respectively, from 1991–93 to 2007–09.[39] There are also interesting patterns within the meat category, with poultry products used for the creation of processed meats and fast food (e.g., chicken leg quarters, turkey cuts, and other poultry products that have been mechanically deboned) rising markedly since NAFTA came into effect.[42]

Both imports of livestock products into Mexico and Mexican production rose between 1980 to 2009, and Figure 4b illustrates the increasing rate of imports since the passage of NAFTA in 1994. Unfotunately, data regarding the proportion of total Mexican imports from the United States were unavailable.

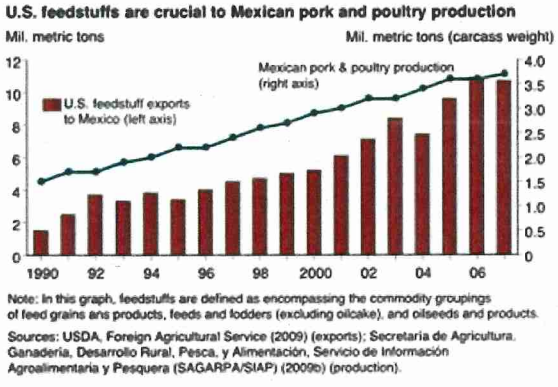

Figure 5 Export of US Feedstuffs and Mexican Livestock Production, 1990–2007. Source: Zahniser (2009). NAFTA AT 15: Building On Free Trade, USDA Economic Research Service WRS-09-03, pp. 15.

In addition, US exports to Mexico of feed grains, oilseeds, and related products have increased by roughly 150% since NAFTA passed, approaching 20 million metric tons in 2008.[39] This has had a particularly strong influence on the poultry sector. Figure 5 illustrates how rising exports of feed from the United States have also supported increased Mexican poultry and pork production. This has been done mostly under the aegis of US investors and US firms that have taken advantage of the more liberal investment regime enacted under NAFTA (see 'Foreign Direct Investment'). By enabling them to buy feed grains from the United States at market costs often less than the cost of production, Mexican meat producers (both US- and Mexican-owned) have benefited financially—albeit indirectly—from US subsidies to its own corn and soybean producers.[43]

Sugar and Sweeteners

Mexico is a major producer of cane sugar, but not of the yellow corn used to make high fructose corn syrup. In July 2006, the United States and Mexico announced they had resolved the latest in a series of disputes regarding the interpretation of NAFTA's sugar and sweetener provisions.[44] The dispute concerned Mexico imposing a sales tax on soft drinks and other beverages that contained any sweetener other than cane sugar.[45] The tax virtually stopped all US exports of high fructose corn syrup (HFCS) to Mexico between 2002 and 2004. Since the resolution of this dispute, the quantity of HFCS exported to Mexico has increased rapidly (Fig. 6a). Since January 2008, there have been no duties or quantitative restrictions between the United States and Mexico on sugar and HFCS trade.[44]

Between 1980 and 2009, the production and consumption of cane sugar in Mexico has been rising, and the import of cane sugar into Mexico has

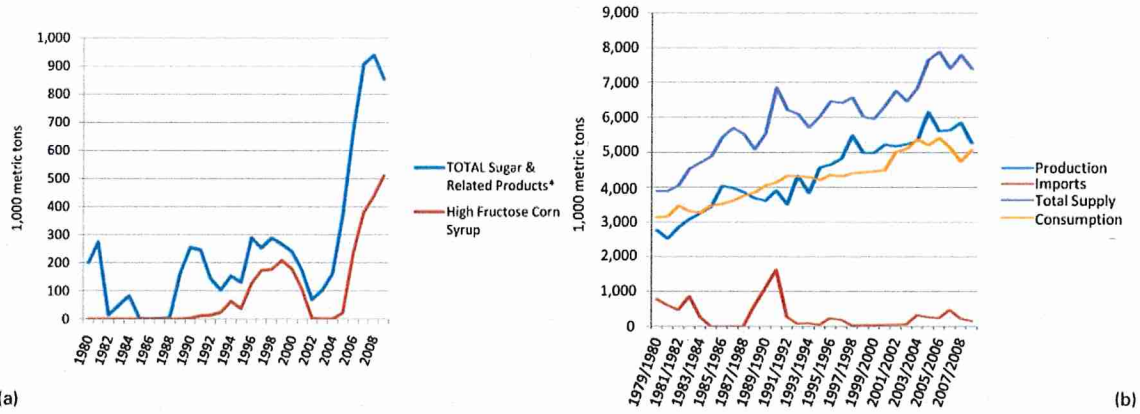

Figure 6 a Sugar and Related Products* Exported to Mexico, 1980–2009; b Mexican Production, Import, and Consumption of Cane Sugar,* 1980–2009. Source: a USDA FAS Global Agricultural Trade System (GATS); *Includes high fructose corn syrup and excludes honey; b Source: USDA FAS Production, Supply, and Distribution (PSD); *Data for non-cane sugar (i.e., sugar derived from corn) were unavailable; data regarding imports from the United States were also unavailable.

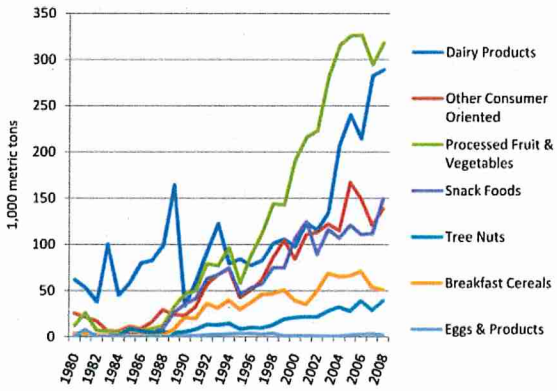

Figure 7 Consumer-Oriented Products Exported to Mexico, 1980–2009. Source: USDA FAS Global Agricultural Trade System (GATS).

been consistently low (Fig. 6b). The significant rise in US exports to Mexico of sugar derived from corn, therefore, represents a notable change in the type of sugar products available in Mexico.

Consumer Foods

NAFTA has also allowed for the increased flow of 'consumer-oriented'[d] (ready-to-eat) products from the United States to Mexico. Excluding meat products and fresh fruits and vegetables, the largest volume increases in traded consumer foods over the NAFTA period have been in dairy products and processed fruits and vegetables, followed by snack foods and other consumer-oriented products (Fig. 7).

Mexico has been one of the largest and fastest-growing markets for US dairy products including nonfat dry milk, fluid milk, cheese, yogurt, and ice cream.[46] US exports of most dairy products to Mexico were made duty-free in 2003, and the final duty on a US dairy product (nonfat dry milk) was lifted in 2008. While Mexican milk production has been growing as well, the growth has not been sufficient to meet rising Mexican industry and consumer demand for dairy products. In 2008, Mexico imported 24% of its dairy products and 76% of raw materials for dairy products (i.e., milk).[47]

Growth in the Mexican import market for snack foods has also remained strong.[48] The United States has more than a 98% share of the import market for snack foods in Mexico, and increases such as the average annual sales of 38% from 1999 to 2001 are illustrative of the rising domestic demand for snack foods in Mexico.[48] There are also many domestic

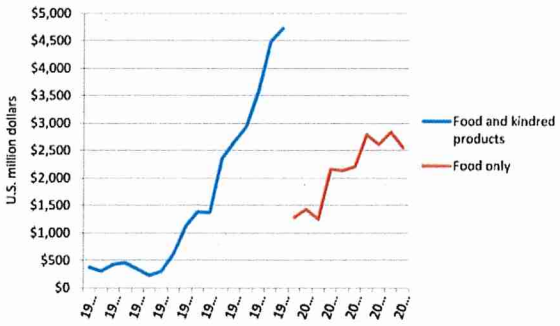

Figure 8 US Foreign Direct Investment in Mexican Food Manufacturing, 1982–2009. Source: US Dept of Commerce Bureau of Economic Analysis (BEA) International Economic Accounts; Note: There is a discontinuity in the time series at 1999 where the estimates change from industry classifications based on the Standard Industrial Classification (SIC) to industry classifications based on North American Industry Classification System (NAICS). NAICS can be viewed online at http://www.bea.gov/scb/pdf/national/niparel/2001/0501naics.pdf; *Food and kindred products includes beverages.

[d]The "consumer-oriented product" classification is according to the BICO HS-10 Product Group in the USDA FAS GATS database. This category contains products that have either undergone substantial transformation or have been prepared in a way that makes them ready for final consumption. These products are generally ready for final consumption at the food service or food retail level, however in some cases they may be used by food processors as ingredients in other foods. For more information, please see http://www.ats.agr.gc.ca/stats/3988-eng.htm

snack manufacturers in Mexico and competition with US exports has increased the aggressiveness of the sector.[49]

Foreign Direct Investment

By liberalizing investment rules, NAFTA accelerated the trend of rising levels of foreign direct investment (FDI) in Mexican agri-food industries that began in the 1980s (Fig. 8). FDI from the United States has occurred all along the Mexican food supply chain, from production and processing to restaurants and retail.

Although the exact amount of US FDI invested in Mexican crop and livestock production is not reported (in the name of protecting the confidentiality of individual companies), the United States's direct investment in Mexico is estimated to be in the hundreds of millions of dollars.[50,51] Mexican livestock production is highly integrated, due in large part to the heavy investment of US firms in industrial livestock operations, particularly in poultry and pork.[38] For example, transnational firms control an estimated 35% of Mexico's pork industry.[43]

Mexico is the third largest recipient of US FDI in processed food and beverage industries. The total stock of investments was $8.2 billion in 2007.[50] US FDI in Mexico's food and beverage industries covers a wide array of products—from snack foods and processed meats, to sodas—but investments in beverages (both soft drinks and malt beverages), oilseed processing, and highly processed foods are the largest.[52] Indeed, nearly 75% of the US FDI in Mexico's food-processing sector is in firms that make a variety of highly processed foods including snack foods, meat and poultry, and confectionary products.[53]

US-based fast-food companies have also expanded into Mexico. McDonald's opened their first restaurant in Mexico in 1985, and today has more than 500 points of sale (e.g., fast food restaurants, McCafés) located in 57 cities in 31 states in Mexico.[54] Mexico is Yum! Brand Inc.'s (the owner of KFC, Pizza Hut, Taco Bell, and Long John Silver's) largest regional market.[55] In 2001, Yum! invested US$65 million and, in 2002, a further US$60 million to open new outlets, aiming to open 1,000 outlets in several Mexican cities by 2007. Fast-food restaurants are also adapting menus to suit local tastes, such as the 'McMuffin a la Mexicana' served at McDonald's: a chili omelette served with bacon on a muffin.[55]

Liberalized FDI has also facilitated the entry of large food retailers into Mexico, affecting the food environment at the point of interface with end consumers. Although Mexican supermarket chains existed in large cities for several decades before NAFTA, the supermarkets served a national market with mostly national products. Before NAFTA, the average tariff on imports was 17.5% and it was not, therefore, advantageous for Mexican supermarkets to offer foreign products in competition with their national products.[56] Nevertheless, a rapid expansion and consolidation of the food retail environment (starting in the 1980s and accelerating during the 1990s) was propelled by the entry of giant multinational retail companies, which found that Mexico offered a favorable investment climate.[56,57] Merger and acquisition activity between multinational and Mexican companies steadily increased the level of concentration, with the US market share of the five largest firms doubling from 24% to 48% between 1997 and 2006.[58]

One example of the rapid expansion of food retailing comes from WalMart: The number of WalMart stores grew from 114 to 561 (265 of these stores contain supermarkets) between 1993 and 2001.[56] In 2005, WalMart controlled about 20% of the total Mexican food retail sector.[58] Other major US-owned retailers in Mexico include HEB, Safeway (Casa Ley), Costco (Comercial Mexicana), Pricemart, Fleming (Gigante), Kmart, Oxxo, 7-Eleven, and Circle K.[57,59] There has been nothing short of a 'supermarket revolution' in Mexico—nearly half of all food retailing is now dominated by supermarkets and convenience stores.[57]

The liberalization and deregulation of FDI has not only facilitated trade between the United States and Mexico, it has also paved the way for an increasingly integrated regional food system.[52,53] It is possible that the surge in exports of key commodities and foods (such as corn, soybeans, livestock products, and snack foods), coupled with US FDI across virtually all aspects of the Mexican food supply system has affected the dietary choices made by Mexicans. We have seen changes in food consumption patterns in Mexico over the NAFTA period.

Changing Food Consumption in Mexico

Mexican food consumption patterns have changed dramatically over the last two decades. Mexican diets have shifted away from traditional food staples toward energy-dense, processed foods and animal-source foods—foods that tend to be high in fats and/or sweeteners.[10,60]

Over the period in which NAFTA was negotiated, signed, and put into effect (1988–1999), the average national percentage of total food energy from fat in Mexico increased from 23.5% to 30.3% (a 28.9% increase).[61] While greatest in wealthier regions, the poorest southern region still experienced a 22% increase in total calories from fat during this time.[61] In the same period, consumption

of total carbohydrates declined (59.7% to 57.5%).[61] Yet consumption of *refined* carbohydrates increased, rising by 6.3% between 1984 and 1998 (soda consumption also increased 37.2%).[62]

More recent data from 2006 estimate that 34.8% of the Mexican population is at risk of excessive carbohydrate intake and 12.7% of excessive fat intake.[11] Rural areas had the highest risk of excessive carbohydrate intake (54.8% of the population) and the lowest risk of excessive fat intake (7.6% of the population). The most industrialized region, in the north, had the highest percentage of the population at risk of excessive fat intake (20.7%).[11]

Analysis of data from 2006 also show that specific dietary patterns are associated with overweight and obesity. In this analysis, three dietary patterns were identified: a 'refined foods and sweets' pattern in which alcohol, soft drinks, white bread, fast food, sweets and candies, and salty snacks contribute significantly to the total level of energy intake; a 'traditional' pattern in which maize and maize foods account for almost 50% of energy intake (this pattern, which includes the consumption of beans and legumes, is the least diverse mix of food groups of the three patterns); and a 'diverse' dietary pattern, in which maize is least important and dairy consumption (whole-fat and low-fat) is higher than in the other two patterns, together with rice and pasta, meat, poultry, eggs, saturated fat, fruits, and vegetables.[63]

The analysis found that the 'refined foods and sweets' pattern was associated with significantly higher energy intake than the other two dietary patterns, with the 'diverse' pattern showing the lowest energy intake (1,992 kcal per day, relative to 1,813 kcal and 1,577 kcal, respectively). Both the 'refined foods and sweets' and 'diverse' patterns were associated with higher levels of overweight and obesity.[63]

Our analysis suggests that NAFTA has contributed to some of these dietary trends and consumption patterns. Four are particularly notable:

- *Soft drinks:* One of the major contributors to increased sugar and sweetener intake in Mexico has been the consumption of soft drinks. US-based soft drink companies, whose investments in Mexico rose significantly in the 1990s, dominate this sector. Between 1999 and 2006, the consumption of high-energy beverages more than doubled for adolescents and tripled for adult women. The net effect was to more than double the total energy consumed for adolescents and adult women.[64] In 2006, an estimated 20.1% of the total energy intake per capita among adolescents came from beverages; high-sugar energy beverages were consumed by 97.4 % of adolescents, while 80.1% of adolescents consumed soft drinks.[64] A total of 94.4% of the adults reported consumption of high-energy beverages (representing 15.2% of the per capita energy intake), and 70.7% of adults consumed soft drinks.[64]

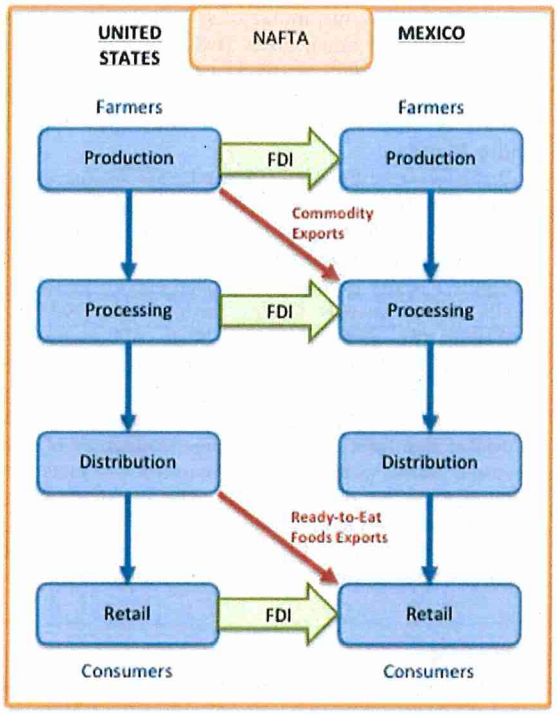

Figure 9 The Integrated United States-Mexico Food System.

- *Snack foods:* The evidence presented here shows that snack food exports from the United States into Mexico increased after NAFTA was passed. Mexico's consumption of snack foods, both salty (mainly potato and corn chips) and sweet, also increased. The amount Mexicans spent on snacks increased from $1.154 billion in 1999 to an estimated $1.750 billion in 2001.[48] These products comprise a high proportion of the 'refined sweets and sugars' dietary pattern now associated with high energy intake and obesity in Mexico. Mexican per capita consumption of snacks was calculated at 2.1 kilos per person (4.6 lbs per person) in 1999 and 2.6 kilos per person (5.7 lbs per person) in 2001.[48]
- *Meat:* During the NAFTA period, fresh meat consumption increased from 92.7 to 98.7 grams per household between 1989–2002, or 6.5%, with the increase coming mainly from lower socioeconomic groups.[65] There were significant differences between bovine meat and poultry: Between 1994 and 2003, chicken consumption increased by 50%, whereas beef and pork increased by just 14%.[66] According to FAO data, the amount of calories per capita per day available from chicken meat increased from 41 to 90 kcal between 1990–1992 and 2000–2002, but from 50 to 64 kcal for beef.[23] This directly reflects the disproportionately large impact feed (yellow corn and soybean) imports has had on the poultry sector in Mexico. Chicken is also used by the food-service and fast-food industries (in which investment has been encouraged as a result of the more liberal investment environment) and in prepared meals. While still a relatively small market, the number of households consuming prepared meals almost doubled between 1989 and 2002.[65] There has also been a disproportionate increase in consumption of processed meats.

In percentage terms, intake of sausages and prepared meat increased much faster (from 15 to 25.4 grams between 1989–2002, or 69.3%) than intake of other kinds of meat.[65] Again, this reflects the significant share of meat for processing in total meat imports into Mexico.

- *Dairy products:* Between 1989 and 2002 the quantity of dairy products consumed increased significantly in Mexico, and the proportion of households consuming ice cream and frozen desserts tripled.[65] As shown in Figure 7, dairy products have been one of the leading US export success stories arising from NAFTA. Within the dairy sector, exports of cheese and powdered milk are especially high, both of which are used as ingredients in processed foods. Commercial cheese processors, particularly those using imported nonfat dry milk, are increasing production of processed cheese products and restaurant products containing cheese (e.g., pizza).[67] The consumption of processed products containing cheese has gone up while consumption of traditional foods prepared with cheese, such as tortas and tortillas, has declined.[68]

Discussion

The United States has exported, both directly and indirectly, increasing amounts of corn, soybeans, sugar, snack foods, and meat products into Mexico over the last two decades. These exports, facilitated by NAFTA, are one important way in which US agriculture and trade policy is influencing the Mexican food system. In addition, Mexico has received significant amounts of cross-border investment from US agribusinesses across the spectrum of Mexico's food supply chain, from production and processing to distribution and retail. As a result, the Mexican food system looks increasingly like the industrialized food system of the United States. These channels of influence and exchange are illustrated in Figure 9, which shows that in many respects, food systems are not discrete national entities. In practice, there are many cross-border connections, with trade, investment, and other policies playing a role in creating conditions under which national and subnational food environments are established, evolve, and are maintained.

Thus, NAFTA has contributed to the increased availability of soft drinks, refined and processed foods, meat, and dairy products derived from cheap, imported commodity grains as well as the increased investments by US-based companies that manufacture foods and drinks for sale in Mexico.

Given Mexico's increasing rates of obesity, one further question is whether this change is more a function of rising prosperity rather than trade policy. In other words, would Mexico have experienced a 'nutrition transition'[e] on its own, absent NAFTA? There is no way to know for sure, but it can be contended that trade at a minimum 'speeds up' the rate of change.[23] Moreover, NAFTA is *not* associated with rising prosperity in Mexico. While OECD statistics show that real mean income in Mexico grew significantly between the mid-1980s and mid-1990s, from roughly US$39,500 to $52,000, average income dropped sharply after NAFTA was signed in 1994. Since 2000, it has recovered somewhat, but currently at about US$50,000, Mexico's real mean income is still lower than the pre-NAFTA average.[69] Moreover, Mexico continues to face relatively high levels of income inequality, with a Gini coefficient[f] that hovers around 0.5.[69] Further, analysis shows that the increased consumption of obesogenic foods in Mexico, much as in the United States, is a trend among *all* socioeconomic groups (both urban and rural), not only the wealthy living in cities.[11]

Conclusions and recommendations

It is encouraging to note the recent evidence that officials are paying more attention to the role the public health community can play in ensuring that trade agreements support healthy food systems and public health. In 2002, the WHO and WTO secretariats undertook a joint study, 'to examine the linkages between trade and health policies, so as to enable both trade and health officials to better understand and monitor the effects of these linkages.'[70] In 2006, member states at the WHO World Health Assembly adopted a Resolution on International Trade and Health to urge members 'to address the potential challenges that trade and trade agreements may have for health.'[71]

The American Public Health Association, American Medical Association, and American Dietetic Association have also published statements in support of healthy food systems and trade agreements.[72–76] This follows from the successful engagement by the public health community in negotiations under the framework of the WTO Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) to ensure it did not prevent access to affordable drugs.[77] The health community has also been engaged in trade-related issues concerning trade in health services, trade in harmful products, trade and social determinants of health, and food safety.[78] The Public Health Trade Advisory Committee Act (HR 2293 and S 1664), if passed, would establish public health guidance to the Office of the United States Trade Representative (USTR).[79] These efforts illustrate the role effective engagement of the public health community in trade

[e] A "nutrition transition" is characterized by an increase in the consumption of unhealthy foods and the consequent rise in the rate of overweight and obesity in low- and middle-income countries.

[f] The Gini coefficient is a measure of the inequality of a distribution, most commonly income, from a value of 0 (equality) to a value of 1 (inequality).

negotiations can play in protecting public health concerns.

We hope this paper will generate further discussion on the relationship between trade liberalization and public health outcomes, especially as they relate to the North American experience. Indeed, more in-depth analysis must be conducted to build upon and better understand the correlation we have identified between trade flows and shifting consumption patterns and obesity in Mexico.

In the meantime, we invite consideration of the following recommendations:

I. National trade policy debates need to include discussion of how to ensure that trade policy also promotes public health and nutrition goals. Recent bilateral trade agreements, such as the United States-Peru accord, include some limited exceptions for public health, safety, and environment measures that could reduce the reach of trade liberalization objectives. This kind of provision could increase Mexican or other governments' 'policy space' to determine the best mix of public policies without the threat of trade or investment disputes.

II. Trade policymakers ought to seek routinely the expertise and involvement of the public health community in the formation of these same policies. For example, Health Impact Assessments might be required of proposed agricultural trade policies. Improved health has not been an explicit goal of the US effort to liberalize trade policies over recent decades, and especially since NAFTA.

III. US trade policy ought not to undercut other federal policies and programs that aim to strengthen food security. President Obama's National Export Initiative sets an explicit goal to double US exports, including those of agricultural goods, over the next five years. At the same time, the administration's Feed the Future initiative on global hunger supports increases in local production of nutritious foods in developing countries, with an emphasis on small-scale farmers. It also promotes greater coordination on food security, so that policies and decisions by USAID, State Department, USDA and other agencies, including USTR, are mutually reinforcing. The Mexican experience under NAFTA suggests that officials need to pay more attention to the nutritional outcomes of US agricultural export expansion in developing countries.

Acknowledgements

Funding for this research was provided by Healthy Eating Research, a National Program of the Robert Wood Johnson Foundation.

Disclosure: The authors report no conflicts of interest.

References

1 Labonte R, Sanger M. Glossary of the World Trade Organisation and public health: part 1. J Epidemiol Community Health. 2006;60:655–61.
2 Flegal KM, Carroll MD, Ogden CL, Curtin LR. Prevalence and trends in obesity among US adults, 1999–2008. JAMA. 2010;303:235–41.
3 Ogden CL, Carroll MD, Curtin LR, Lamb MM, Flegal KM. Prevalence of high body mass index in US children and adolescents, 2007–2008. JAMA. 2010;303:242–9.
4 Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults: The Evidence Report: National Institutes of Health: National Heart, Lung, and Blood Institute; September 1998.
5 Finkelstein EA, Trogdon JG, Cohen JW, Dietz W. Annual medical spending attributable to obesity: payer-and service-specific estimates. Health Aff (Millwood). 2009;28:w822–31.
6 Putnam J, Allshouse J, Scott Kantor L. U.S. Per Capita Food Supply Trends: More Calories, Refined Carbohydrates, and Fats. FoodReview. 2002;25:2–15.
7 Wallinga D. Agricultural policy and childhood obesity: A food systems and public health commentary. Health Aff (Millwood). 2010;29:405–10.
8 WHO. Controlling the global obesity epidemic. [Feburary 10, 2011]; Available from: http://www.who.int/nutrition/topics/obesity/en/index.html
9 OECD. Health: OECD says governments must fight fat. [February 10, 2011]; Available from: http://www.oecd.org/document/35/0,3343,en_21571361_44315115_46064099_1_1_1_1,00.html
10 Rivera JA, Irizarry LM, Gonzalez-de Cossio T. Overview of the nutritional status of the Mexican population in the last two decades. Salud Publica Mex. 2009;51Suppl 4: S645–56.
11 Barquera S, Hernandez-Barrera L, Campos-Nonato I, *et al.* Energy and nutrient consumption in adults: analysis of the Mexican National Health and Nutrition Survey 2006. Salud Publica Mex. 2009;51Suppl 4: S562–73.
12 Bonvecchio A, Safdie M, Monterrubio EA, Gust T, Villalpando S, Rivera JA. Overweight and obesity trends in Mexican children 2 to 18 years of age from 1988 to 2006. Salud Publica Mex. 2009;51Suppl 4: S586–94.
13 Brownell KD, Schwartz MB, Puhl RM, Henderson KE, Harris JL. The need for bold action to prevent adolescent obesity. J Adolesc Health. 2009;45:S8–17.
14 Zick CD, Smith KR, Fan JX, Brown BB, Yamada I, Kowaleski-Jones L. Running to the store? The relationship between neighborhood environments and the risk of obesity. Soc Sci Med. 2009;69:1493–500.
15 Rose D, Hutchinson PL, Bodor JN, *et al.* Neighborhood food environments and Body Mass Index: the importance of in-store contents. Am J Prev Med. 2009;37:214–9.
16 Spence JC, Cutumisu N, Edwards J, Raine KD, Smoyer-Tomic K. Relation between local food environments and obesity among adults. BMC Public Health. 2009;9:192.
17 Story M, Kaphingst KM, Robinson-O'Brien R, Glanz K. Creating healthy food and eating environments: policy and environmental approaches. Annu Rev Public Health. 2008;29:253–72.
18 Wang MC, Kim S, Gonzalez AA, MacLeod KE, Winkleby MA. Socioeconomic and food-related physical characteristics of the neighbourhood environment are associated with body mass index. J Epidemiol Community Health. 2007;61:491–8.
19 Liu GC, Wilson JS, Qi R, Ying J. Green neighborhoods, food retail and childhood overweight: differences by population density. Am J Health Promot. 2007;21:317–25.
20 French SA, Story M, Jeffery RW. Environmental influences on eating and physical activity. Annu Rev Public Health. 2001;22:309–35.
21 IOM. Food Marketing to Children and Youth: Threat or Opportunity. Washington DC: National Academies Press; 2005.
22 Drewnowski A, Popkin BM. The nutrition transition: new trends in the global diet. Nutr Rev. 1997;55:31–43.
23 Hawkes C, Blouin C, Henson S, Drager N, Dube L. Trade, Food, Diet, and Health: Perspectives and Policy Options. Chichester, United Kingdom: Wiley-Blackwell; 2010.
24 Mendez MA, Popkin B. Globalization, Urbanization and Nutritional Change in the Developing World. electronic J Agri and Devel Econ. 2005;1:220–41.
25 Popkin B. Technology, transport, globalization and the nutrition transition. Food Policy. 2006;31:554–69.
26 Hawkes C. Uneven dietary development: linking the policies and processes of globalization with the nutrition transition,

obesity and diet-related chronic diseases. Global Health. 2006;2:4.
27 Hawkes C, Thow AM. Implications of the Central America-Dominican Republic-Free Trade Agreement for the nutrition transition in Central America. Rev Panam Salud Publica. 2008;24:345–60.
28 Thow AM, Hawkes C. The implications of trade liberalization for diet and health: a case study from Central America. Global Health. 2009;5:5.
29 Trochim WM, Cabrera DA, Milstein B, Gallagher RS, Leischow SJ. Practical challenges of systems thinking and modeling in public health. Amer J Public Health. 2006;96:538–46.
30 Murphy S, Lilliston B, Lake MB. WTO Agreement on Agriculture: A Decade of Dumping. Minneapolis, MN: Institute for Agriculture and Trade Policy; February 2005.
31 Wallinga D, Schoonover H, Muller M. Considering the Contribution of US Agricultural Policy to the Obesity Epidemic: Overview and Opportunities. J Hunger & Environ Nutrition. 2009;4:3–19.
32 USDA. Soybeans and Oil Crops: Market Outlook 2007 [cited 2010 July 26]; Available from: http://www.ers.usda.gov/briefing/soybeansoilcrops/2007baseline.htm
33 USDA. Corn: Market Outlook. 2009 [cited 2010 July 26]; Available from: http://www.ers.usda.gov/briefing/corn/2009baseline.htm
34 Ray DE, De La Torre Ugarte DG, Tiller KJ. Rethinking U.S. Agricultural Policy: Changing Course to Secure Farmer Livelihoods Worldwide. University of Tennessee: Agricultural Policy Analysis Center; 2003.
35 Murphy S, Santarius T. The World Bank's WDR 2008: Agriculture for Development: Response from a Slow Trade—Sound Farming Perspective. 2007; Available from: http://www.ecofair-trade.org/pics/en/EcoFair_Trade_Paper_No_10_Murphy_Santarius.pdf
36 Wallinga D. Today's Food System: How Healthy Is It? J Hunger & Environ Nutrition. 2009;4:251–81.
37 Zahniser S, Coyle W. US-Mexico Corn Trade During the NAFTA Era: New Twists to an Old Story: United States Department of Agriculture; May 2004.
38 Wise TA. Agricultural Dumping Under NAFTA: Estimating the Costs of US Agricultural Policies to Mexican Producers. Medford, MA: Global Development and Environment Institute; December 2009.
39 Zahniser S, Crago Z. NAFTA at 15: Building on Free Trade: United States Department of Agriculture; March 2009.
40 OCA. NAFTA: Truth and Consequences on Corn Dumping. In. Finland, MN: Organic Consumers Association [cited 2011 18]. Available from: http://www.organicconsumers.org/chiapas/nafta040504.cfm
41 Ash M. Soybeans and Oil Crops: Trade. 2010 [cited 2010 July 20]; Available from: http://www.ers.usda.gov/Briefing/Soybeansoilcrops/trade.htm
42 USDA. Quantity of Poultry and Products (Product Group: FAS (Agricultural)) Exported to Mexico, 1980–2009. 2010 [updated September 24, 2010]; Available from: http://www.fas.usda.gov/gats
43 Wise TA, Rakocy B. Hogging the Gains from Trade: The Real Winners from US Trade and Agricultural Policies. Medford, MA: Global Development and Environment Institute; January 1st, 2010.
44 Haley S. Sugar and Sweeteners Outlook: United States Department of Agriculture Economic Research Service; September 28, 2006.
45 WTO. Dispute DS308: Mexico - Tax Measures on Soft Drinks and Other Beverages. World Trade Organization; [cited 2010 July 21]; Available from: http://www.wto.org/english/tratop_e/dispu_e/cases_e/ds308_e.htm
46 Trejo S, Hernandez G. U.S. dairy products selling well in Mexico. AgExporter July 2003.
47 San Juan Z, Williams D. Mexico Dairy Products Annual 2008; USDA FAS GAIN Report 2008.
48 Hodgen DA. Mexico Candy and Confectionery Products (MX3315): US Dept of Commerce International Trade Administration; 2003.
49 USDA. The Mexican Market for Snack Foods: USDA Foreign Agriculture Service; 2009.
50 USDA. NAFTA, Canada, and Mexico: Mexico Foreign Direct Investment. 2009 [cited 2010 July 21]; Available from: http://www.ers.usda.gov/Briefing/NAFTA/MexicoFDI.htm
51 Doan D, Goldstein A, Zahniser S, Vollrath T, Bolling C. North American Integration in Agriculture: A Survey: North American Agrifood Market Integration Consortium; January, 2005.
52 Bolling C. Chapter 6: U.S. Foreign Direct Investment in the Western Hemisphere; 2004.
53 Bolling C, Elizalde JC, Handy C. U.S. Firms Invest in Mexico's Processed Food Industry. FoodReview. 1999;2:26–30.
54 McDonald's. McDonald's Mexico: Quienes Somos. 2010 [cited 2010 September 24, 2010]; Available from: http://www.mcdonalds.com.mx/NPC%253AInstitutional%25231List1
55 Hawkes C. Marketing Activities of Global Soft Drink and Fast Food Companies in Emerging Markets: a Review: World Health Organization; 2002.
56 Chavez M. The Transformation of Mexican Retailing with NAFTA. Devel Policy Rev. 2002;20:503–13.
57 Schwentesius R, Gomez MA. Supermarkets in Mexico: Impacts on Horticulture Systems. Devel Policy Rev. 2002;20:487–502.
58 Cervantes-Godoy D, Sparling D, Avendano B, Calvin L. North American Retailers and Their Impact on Food Chains: North American Agrifood Market Integration Consortium; July 2008.
59 Durand C. Externalities from foreign direct investment in the Mexican retailing sector. Cambridge Journal of Economics. 2007;31:393–411.
60 Barquera S, Hotz C, Rivera J, *et al.* Food consumption, food expenditure, anthropometric status and nutrition-related diseases in Mexico. FAO Food Nutr Paper: The double burden of malnutrition: Case studies from six developing countries. 2006;84:161–203.
61 Rivera JA, Barquera S, Gonzalez-Cossio T, Olaiz G, Sepulveda J. Nutrition transition in Mexico and in other Latin American countries. Nutr Rev. 2004;62:S149–57.
62 Rivera-Dommarco J, Shamah-Levy T, Villalpando-Hernandez S. Encuesta Nacional de Nutricion 1999. Estado Nutricional de Ninos y Mujeres en Mexico. Mexico; 2001.
63 Flores M, Macias N, Rivera M, *et al.* Dietary Patterns in Mexican Adults are Associated with Risk of Being Overweight or Obese. J Nutr. 2010;140:1869–73.
64 Barquera S, Hernandez-Barrera L, Tolentino ML, *et al.* Energy intake from beverages is increasing among Mexican adolescents and adults. J Nutr. 2008;138:2454–61.
65 Leroy JL, Tolentino L, Barquera S, Flores M. Food consumption and food expenditure in Mexico 1989–2002: IFPRI; 2006 November.
66 Salazar A, Mohanty S, Malaga J. 2025 Vision for Mexican Chicken Consumption. Inter J Poultry Sci. 2005;4:292–5.
67 Nawn J, Trejo S. Mexico Dairy and Products: Dairy Annual 2007: USDA Foreign Agricultural Service; 2007.
68 Frampton L. Pizza vs. Tacos: The Battle for Mexican Hearts and Stomachs. Playa Maya News 2010 [cited 2010 Sept 24]. Available from: http://www.playamayanews.com/living_in_mexico/pizza_vs._tacos_the_battle_for_mexican_hearts_and_stomachs.html
69 OECD.StatExtracts. Income distribution - Inequality. [cited 2011 Feb 10]. Available from: http://stats.oecd.org/Index.aspx?DatasetCode=INEQUALITY
70 WTO Agreements & Public Health: A Joint Study by the WHO and the WTO Secretariat. Geneva, Switzerland: World Trade Organization; 2002.
71 WHO. International Trade and Health. Geneva 2006; Available from: http://www.searo.who.int/en/Section1430/Section1439/Section1638/Section2234/Section2272_11907.htm - WHA59_26
72 Robinowitz CB. Report 8-A-09 of the Council on Science and Public Health: Sustainable Food (Resolution 405, A-08): American Medical Association; 2009.
73 Healthy Land, Healthy People: Building a Better Understanding of Sustainable Food Systems for Food and Nutrition Professionals. Chicago, IL: American Dietetic Association (ADA); 2007.
74 Toward a Healthy, Sustainable Food System: Policy Number: 200712. American Public Health Association; 2007 [cited 2010 June 21]; Available from: http://www.apha.org/advocacy/policy/policysearch/default.htm?id=1361
75 APHA Policy Statement 2001-2: Threats to Global Health and Equity: The General Agreement on Trade in Services (GATS) and the Free Trade Areas of the Americas (FTAA) American Public Health Association; 2001.

76 AMA Resolution 219-A-03: International Trade Agreements: American Medical Association; 2003.
77 Shaffer ER, Waitzkin H, Brenner J, Jasso-Aguilar R. Global trade and public health. Am J Public Health. 2005;95:23–34.
78 Blouin C, Hawkes C, Henson S, Drager N, Dube L. Trade, Health and Dietary Change. In: Trade, Food, Diet and Health: Perspectives and Policy Options. Chichester, United Kingdom: Wiley Blackwell; 2010.
79 Campaign for a Public Health Advisory Committee on Trade (PHACT). Center for Policy Analysis on Trade and Health (CPATH); [cited 2010 July 28]; Available from: http://www.cpath.org/id4.html