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## Exporting Diabetes to Asia: The Impact of Western-Style Fast Food

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One of the most profound results of globalization has been the rapid rise in the number of Western-style fast food outlets around the world, particularly in Asian countries. The world's largest fast food restaurant company, Yum! Brands Inc., operates nearly 38,000 restaurants (including KFC and Pizza Hut) around the world in more than 110 countries and territories, with over 4,650 fast food outlets in China.<sup>1</sup> Globally, there are more than 33,000 McDonald's outlets in 119 countries and territories, serving around 68 million customers daily.<sup>2</sup> In China alone, the number of McDonald's outlets grew from 1 in 1990 to 1,000 in 2006, and the company has plans to double this figure by 2013.<sup>3</sup> Meanwhile, daily per capita sales of carbonated soft drinks in China increased 145% and 127% for Coca Cola and PepsiCo, respectively, between 2000 and 2010.<sup>4</sup> In India, the average annual growth rate of all soft drink sales was 12.6% between 1997 and 2007.<sup>5</sup>

In parallel with the increasing consumption of fast food and soft drinks around the world, obesity and type 2 diabetes have truly become global problems, afflicting countries wealthy and poor. Worldwide, an estimated 1.5 billion adults are overweight or obese.<sup>6</sup> The most recent data from the International Diabetes Federation indicate that in 2011, 366 million people had diabetes, with 80% of those individuals living in low- and middle-income countries, Asia was home to 60% of the worldwide total.<sup>7</sup> The number of people with diabetes is projected to rise to 552 million by 2030, with the greatest increases occurring in China (from 90 million to 130 million) and India (from 61 million to 101 million).<sup>7</sup> Currently, cardiovascular disease (CVD) remains the number one cause of death worldwide, accounting for an estimated 17.3 million (or 30%) of global deaths in 2008.<sup>8</sup> Of these deaths, 80% occurred in low- and middle-income countries.<sup>8</sup> If measures are not taken to abate these trends, the twin epidemics of obesity and diabetes in Asian countries could have the potential to overwhelm fragile health care systems and counteract remarkable achievements in economic growth.

The concomitant spread of Western-style fast food and the diabetes epidemic has raised an important public health question: Does the increased consumption of these foods contribute

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to cardio-metabolic diseases, particularly in Asian populations? In this issue of *Circulation*, Odegaard et al.<sup>9</sup> aimed to answer this question by analyzing the association between Western-style fast food intake and risk of type 2 diabetes and coronary heart disease (CHD) mortality. The investigators used data from the Singapore Chinese Health Study, which included more than 43,000 Chinese adults in Singapore and followed them for 5 years. They found that Chinese Singaporeans who ate Western-style fast foods more than twice a week had a 27% increased risk of developing type 2 diabetes and a 56% increased risk of dying from CHD, compared to their peers who reported little or no intake. The Western-style fast food items included in this study were hamburgers, cheeseburgers, French fries, pizza, other sandwiches, deep fried chicken, and hot dogs. Various items on this list have repeatedly been associated with an increased risk of type 2 diabetes and CHD mortality in prospective studies among Western populations. For example, red meat, particularly processed red meat, has been associated with an elevated risk of type 2 diabetes<sup>10</sup> and CHD death.<sup>11</sup> The Nurses' Health Study found that frequent consumption of French fries was associated with a modestly increased risk of type 2 diabetes.<sup>12</sup> The Black Women's Health Study reported a positive association between frequent burger and fried chicken meals in restaurants and risk of type 2 diabetes.<sup>13</sup> Results from the CARDIA study directly showed that habitual fast food consumption was positively associated with weight gain and risk of insulin resistance over 15 years.<sup>14</sup>

The study by Odegaard et al.<sup>9</sup> has a number of strengths, including the large sample size, high-quality follow-up data, and prospective design. One concern however, is that habitual fast food consumption could simply be a marker for an overall unhealthy lifestyle (e.g., sedentary behavior, taste preference for fried and sweet foods, lower consumption of fiber, fruit, and vegetables, and higher intake of sugary beverages). Among studies in the U.S., fast food consumption tends to be higher among people with lower education levels and lower socioeconomic status. In the study by Odegaard et al.,<sup>9</sup> however, participants who reported more frequent intake of Western-style fast food were more educated, smoked less, and were more likely to be physically active. Thus, the confounding effects associated with Western-style fast food consumption are likely to be different between U.S. and Asian populations. In fact, controlling for diet and lifestyle confounders actually strengthened the association between fast-food consumption and risk of CHD mortality in the present study.<sup>9</sup> Another potential concern of this study is the use of self-reported dietary and lifestyle assessments, which inevitably include some degree of measurement error that may attenuate true associations in prospective cohort studies.

There are several possible mechanisms behind the increased risk of cardio-metabolic outcomes associated with frequent fast food intake. Fast foods are usually high in unhealthy fats, salt, and sugar, which may contribute to central obesity, insulin resistance, and elevated blood pressure. In many countries, including those in Asia, governments have not yet seriously considered regulations that would limit or ban the use of partially hydrogenated oils, making fast food a major contributor to intake of *trans* fat. Many fast foods are high in calories, which may lead to overeating and excess calorie intake.<sup>15</sup> In addition, the portion sizes at many fast-food outlets have increased by 2–5 fold over the past several decades.<sup>16</sup>

Many Asian countries are undergoing rapid economic and social change, resulting in radical shifts in dietary patterns and lifestyle habits. For example, in China, traditional dietary patterns, characterized by high intake of vegetables and whole grains and limited consumption of animal products, are shifting towards Western dietary patterns, which feature higher intakes of fast food, processed meats, refined and highly-processed carbohydrates, and sugary beverages.<sup>17</sup> The popularity of fast food in Asian countries, such as China, exemplifies the vast influence of sophisticated food marketing, fueled by globalization and the region's increasing wealth. Food corporations have spent millions of

dollars to advertise Western-style food, with very little regulation from the government. Food marketing can have a substantial influence on food preferences and consumption habits, particularly among young people.<sup>18</sup> Marketing campaigns by food and drink multinationals have also successfully created the image that fast food is linked to health, strength, and fashion, through advertisements that feature popular entertainment and sports stars. To a large degree, fast-food companies use the same aggressive and misleading tactics that have been successfully used by tobacco companies to promote their products throughout the vast and rapidly emerging Asian market.

While globalization has undoubtedly resulted in some beneficial changes to society, its unintended consequences are driving the worldwide obesity epidemic. The study by Odegaard et al.<sup>9</sup> provides novel insights into the relationship between nutrition transitions and the risk of cardio-metabolic diseases in one of Asia's most booming economies. In order to address the rapidly expanding epidemic of cardio-metabolic diseases, global public health policies are needed across multiple levels to create healthy food environments and promote corporate social responsibility. This is of utmost importance in developing countries, especially in Asia, where wealth and urbanization are growing at exponential rates and the food landscape is changing just as rapidly. In addition to driving the worldwide spread of fast food, globalization has led to an increase in large multinational supermarkets, which are displacing fresh food markets and farms and increasing access to processed and packaged foods and sugary beverages.<sup>19,20</sup> Potential strategies to counteract these processes include nutrition and agricultural policies that favor the production and distribution of healthy foods, such as banning *trans* fat, taxing unhealthy foods and beverages, and instituting agricultural subsidies that increase accessibility and affordability of fruits, vegetables, legumes, and whole grains.<sup>19</sup>

At the same time, food and beverage companies should be accountable for their actions not only in the U.S., but also abroad. Voluntary actions by industry to reduce calories, sodium, and added sugar in manufactured foods can improve diet quality population-wide. But government regulation will be essential to transforming the food environment on a large scale, as will collaborative efforts across multiple sectors and levels of society.<sup>21,22</sup> Government policies and regulations can provide financial disincentives that discourage unhealthy eating behaviors, such as taxes on fast foods and sugary beverages, similar to those on tobacco. These mechanisms have the added benefit of generating revenue, which can help offset Asia's increasing obesity-related medical costs or be redirected to national prevention strategies. Governments can institute zoning laws that limit the number of fast-food restaurants in a given area and communications regulations that restrict fast-food marketing to children. Standardized front of package nutrition labeling on manufactured foods and calorie labeling on fast-food restaurant menus, in conjunction with public education campaigns, can help consumers make healthier and more informed food choices, something that will become increasingly important as the global food supply shifts even more towards convenience foods. Governments can work with non-profits and the media to harness positive aspects of globalization, such as the increased flow of information, to create social marketing campaigns that target healthy diet and lifestyle choices. Together, such efforts can shift socio-cultural norms around food, influence eating behaviors, and ultimately, help curb the growing global diabetes epidemic.

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