



Temporal growth and spatial distribution of the fast food industry and its relationship with economic development in China – 2005–2012



Hong Xue^{a,b}, Xi Cheng^c, Qi Zhang^d, Huijun Wang^e, Bing Zhang^e, Weidong Qu^f, Youfa Wang^{a,g,*}

^a Systems-Oriented Global Childhood Obesity Intervention Program, Fisher Institute of Health and Well-being, College of Health, Ball State University, Muncie, IN, 47306, USA

^b Department of Health Behavior and Policy, School of Medicine, Virginia Commonwealth University, Richmond, VA 23219, USA

^c Department of Geography, University at Buffalo, The State University of New York, NY 14261, USA

^d School of Community and Environmental Health, Old Dominion University, Norfolk, VA 23529, USA

^e National Institute for Nutrition and Health, Chinese Center for Disease Control and Prevention, Beijing 100053, China

^f Key Laboratory of Public Health Safety, Ministry of Education, Department of Environmental Health, School of Public Health, Fudan University, Shanghai 200433, China

^g Department of Nutrition and Health Sciences, College of Health, Ball State University, Muncie, IN 47306, USA

ARTICLE INFO

Article history:

Received 31 December 2016

Received in revised form 30 June 2017

Accepted 5 July 2017

Available online 8 July 2017

Keywords:

Fast foods

Diet

Policy

Public health

Economic development

China

ABSTRACT

The fast food (FF) industry has expanded rapidly in China during the past two decades, in parallel with an increase in the prevalence of obesity. Using government-reported longitudinal data from 21 provinces and cities in China, this study examined the growth over time and the spatial distribution patterns of the FF industry as well as the key social economic factors involved. We visualized the temporal and geographic distributions of FF industry development and conducted cross-sectional and longitudinal spatial analysis to assess associations between macroeconomic conditions, population dynamics, and the growth and distributional changes of the industry. It grew faster in the southeast coastal (more economically developed) areas since 2005 than in other regions. The industry was: 1) highly correlated with Gross Domestic Product; 2) highly correlated with per capita disposable income for urban residents; 3) moderately correlated with urban population; and 4) not correlated with an increase of population size. The mean center of the FF industry shifted westward as the mean center of the GDP moved in the same direction, while the mean center of the population shifted eastward. The results suggest that the rapid FF industry expansion in China was closely associated with economic growth and that improving the food environment should be a major component in local economic development planning.

© 2017 Elsevier Inc. All rights reserved.

1. Introduction

There is a growing body of literature reporting on studies of the impact of fast-food consumption (FFC) on health outcomes, and the concerns are growing, in particular regarding its adverse impact on risks of obesity and other chronic diseases (Rosenheck, 2008; Jaworowska et al., 2013; Odegaard et al., 2012). Research indicates a significant association between FFC and obesity (Bowman and Vinyard, 2004; Boutelle et al., 2007). Close proximity to fast food (FF) restaurants or a high-FF-density environment has also been linked to higher risks of overweight and obesity (Currie et al., 2009; Davis and Carpenter, 2009; Crawford et al., 2008).

FF has become an important part of people's diet worldwide; the FF industry has been spreading and growing steadily over the past three decades (Jaworowska et al., 2013). China provides a unique opportunity for studying the growth of the FF industry and its impact on people's food consumption and health outcomes as the industry has increased rapidly in China during a relatively short period compared to other countries (Kaiman, 2013; Wang et al., 2016). For example, KFC is the largest, fastest growing FF chain. It opened its first restaurant in China in 1987 (Kaiman, 2013; Wang et al., 2016); by early 2015, it had approximately 4800 restaurants in over 850 cities throughout the country (Wang et al., 2016). From 2000 to 2013, the volume of FF business in China has increased dramatically from 8.5 billion to 80.2 billion RMB, a 9.5-fold increase (Bureau, C.S., 2014; Bureau, C.S., 2001). Nevertheless, there were large regional disparities in FF industry development. For example, in 2012, Beijing had as many as 14 times the FF outlets in total, or 68 times the FF outlets per capita, or 152 times the FF outlets per square kilometer as the entire Henan province (Statistics, D.o.T.a.E.E.R., and Department, C.G.C.o.C.I., 2014). The population of China's 21 provinces and its largest cities ranged from 10.4 million to 93.8 million (49.7 million on average) in 2005, and increased from 14.1 million to 106.0

Abbreviations: FF, Fast food; FFC, Fast food consumption; USD, United States dollar; RMB, Chinese yuan renminbi; CPI, Consumer price index; GDP, Gross domestic product.

* Corresponding author at: Systems-oriented Global Childhood Obesity Intervention Program, Fisher Institute of Health and Well-being, College of Health, Ball State University, Health and Physical Activity Building (HP), Room 302E, Muncie, IN 47306, USA.

E-mail address: ywang26@bsu.edu (Y. Wang).

million (52.4 million on average) by 2012 (Bureau, C.S, 2014). Local GDP increased from between 260.4 billion to 2236.6 billion RMB in 2005 to between 750.5 billion to 5706.8 billion RMB in 2012 (Bureau, C.S, 2014). The prevalence of childhood obesity has also been heterogeneously distributed. In 2005, the highest prevalence of combined overweight and obesity for children from 7 to 18 years old appeared in the northern coastal areas (32.5% for boys and 17.6% for girls), while the prevalence was as low as less than 5% in some western areas (Ji and Cheng, 2008).

Using available national data, this study examined the growth over time and the spatial distribution patterns of the FF industry in China during 2005–2012, focusing on the key social and economic factors that might have contributed to the growth. Specially, we examined: a) the development of the FF industry in China across time; b) the spatial distribution and temporal changes in the distribution of the industry; and c) the factors that might contribute to the growth and disparities of the FF industry, in particular, local economic development.

2. Experimental section

2.1. Data and measurements

2.1.1. FF industry measurements

We used the longitudinal regional FF data (2005–2012) collected by the National Bureau of Statistics of China for 21 provinces and major cities. The FF legal person enterprises and individual enterprises that had a revenue beyond 2,000,000 RMB (roughly 300,000 USD) were completely investigated, and those with a revenue below 2,000,000 RMB randomly sampled yearly (NBSC, 2005–2012).

The key measures included: (a) Total number of FF outlets. A FF outlet was defined as a restaurant where food is picked up by the customers rather than served by the waiters. Chinese FF and western FF outlets are both included (Statistics, D.o.T.a.E.E.R., et al., 2007); western FF outlets include chain stores such as KFC and McDonald's, and Chinese FF outlets sell Chinese-style food that can be delivered in a quick manner, for example, hefan (a lunch box filled with combinations of Chinese dishes with rice), noodles, dumplings, etc. The unit of measure was the number of FF outlets in each province or city at the end of each year; and (b) FF industry revenue, meaning the total income of all the FF outlets in each province or city in a given one-year period.

2.1.2. Demographic data

The demographic data in the study period were collected by the National Bureau of Statistics of China. The population of a province or city was defined as the total number of residents in that province or city at the end of a given year. Urban population refers to the residential population in urban areas, and rural population refers to the population residing outside of urban areas. The demographic statistics for the year 2010 were from that year's census; the data for other years were estimated based on the results of a yearly population-based survey (Statistics, D.o.T.a.E.E.R., and Department, C.G.C.o.C.I, 2014).

2.1.3. Macro-economic data

The Consumer Price Index (CPI), Gross Domestic Product (GDP), per capita GDP, per capita household income for urban residents, and Engel coefficient for each of the provinces and cities were included in the study to adjust for the impact of currency inflation. The data were collected by the National Bureau of Statistics of China (Statistics, D.o.T.a.E.E.R., and Department, C.G.C.o.C.I, 2014). The CPI measures the changes in the price level of a market basket of consumer goods and services purchased by households relative to their costs in the previous year (OECD, 2005–2012). GDP is defined as “an aggregate measure of production equal to the sum of the gross values added of all resident institutional units engaged in production (plus any taxes, and minus any subsidies, on products not included in the value of their outputs)”

(OECD, 2005–2012). The Engel coefficient in this study is defined as the average proportion of household income spent on food.

Derived variables based on these data include revenue per FF outlet and per capita FF purchase. Revenue per FF outlet is the average annual income of FF outlets (10,000 RMB/FF outlet); per capita FF purchase is the average value of the annual purchases of FF per urban resident (RMB/person).

2.2. Data analysis

We conducted both cross-sectional and longitudinal analyses, traditional statistical analysis and spatial analysis to answer our research questions. We calculated the Spearman correlation coefficients to examine the association between the growth of the FF industry and economic and demographic factors, and estimated the average annual increase in FF industry growth measures. Linear regression models were fit to assess the factors that might have contributed to FF industry growth in China.

In our spatial analysis, we visualized temporal and geographic distributions of FF outlets and FF revenue from 2005 to 2012. FF revenue and the economic indicators were adjusted using the CPI data to the currency at the baseline year of 2005. We also estimated the shift in the “mean center” of FF outlets, FF revenue, GDP, total population, and urban population in China. A “mean center” is the point at which an imaginary, weightless, rigid, and flat surface representation of the 21 provinces and cities would balance if the measure of interest were placed as a weight on the surface. The latitude and longitude satisfies the following equations:

$$\text{Latitude} = \frac{\sum w_i \Phi_i}{\sum w_i}$$

$$\text{Longitude} = \frac{\sum w_i \lambda_i \cos(\Phi_i(\pi/180))}{\sum w_i \cos(\Phi_i(\pi/180))}$$

where w_i is the measure of interest, e.g., outlets, revenue, etc. (Bureau, U.S.C., 2011), and Φ_i and λ_i are the latitude and longitude of the measure of interest.

All analysis was conducted using R 3.2.1 (Team, 2015) and ArcGIS 10.2 (ArcGIS, 2011).

3. Results

3.1. The overall growth of the FF industry in China

Fig. 1 shows the temporal growth of the FF industry measures in China during 2005–2012 with corresponding fitted regression lines. FF outlets and FF revenue both increased rapidly over time and were significantly linearly related to time.

3.2. Spatial distribution of the FF industry and FF purchases in China and its temporal change

Overall our results show that neither the FF industry nor FF purchases were homogeneously distributed. The FF industry and the related growth were auto-correlated.

Fig. 2 shows the spatial patterns and related temporal changes in FF industry measures (namely number of FF outlets in provinces or cities, FF revenue, and per capita FF purchases). FF outlets were more common in the southeast coastal areas than in other regions. However, there was a remarkable increase in some inland areas such as Sichuan and Yunnan (340% increase of outlets and 322% increase of revenue for Sichuan province; 314% increase of outlets and 224% increase of revenue for Yunnan province). In remote areas in the north and west, the FF industry was poorly developed, and its growth was slow. The per capita FF purchases for urban residents (RMB/person) showed a similar pattern in that the southeast coastal areas had a higher value than that in inland

Download English Version:

<https://daneshyari.com/en/article/5635572>

Download Persian Version:

<https://daneshyari.com/article/5635572>

[Daneshyari.com](https://daneshyari.com)