THE OTHER SIDE OF THE FENCE:

Existing Obesity Rates
&
Predatory Location Choice of Fast Food Chain Franchisees

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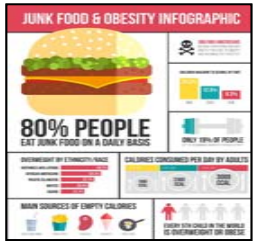
INTRODUCTION

Obesity if the second leading cause of death in the United States. NIH reports that more than 300,000 annual deaths in the United States can be attributed to obesity related ailments. According to the World Health Organization, obesity causes about 17.9 million or 32% of all annual deaths. Medical research conclusively established a link between fast food consumption and obesity.



Source: https://www.nfpt.com/wp-content/uploads/teen_obesity_junk-food-infographic.jpg

Government policies like the Let's Move initiative has attempted to tackle the problem by encouraging healthier school meal options and exercise, yet success has been elusive.

What is the missing piece of the puzzle?

QUESTION

- Fast food consumption leads to obesity.
- Fast food market has a demand side determined by consumer preferences, and a supply side determined by business decisions of fast food chains.
- Policies targeting the demand side by modifying consumer behavior has met with limited success.
- Missing piece – investigating the supply side behavior.

Research Question

Do fast food chains follow a predatory location practice and intentionally target obesity clusters when deciding to open new branches, thereby perpetuating the vicious cycle of obesity and fast food availability?

HYPOTHESES

Proximity to obesity clusters is a strategic consideration in fast food business decision-making process on location of new branches.

- **H1**: Obesity rates have a **positively significant** impact on the location choice of fast food branches.
- **H2**: The geographical scope is **non-linear**. Most fast food chains are found within a certain radii of the most populous regions with high obesity rates, decreasing as the radii increases.

BACKGROUND LITERATURE

Main Question in the existing Literature

What causes obesity?

- Environmental Factors
  - Fast food is high in energy density and glycemic index, which leads to weight gain (Rosenheck 2008).
  - A fast food chain within 0.1 mile radius of a school increases obesity among students by 5.2% (Curie, DellaVigna, Moretti, and Pathania 2009).
  - Population with limited income and education are particularly vulnerable to fast food related obesity (Burgoine, Forouhi, Griffin, Brage, Wareham, and Monsivais 2016).
- Economic Factors
  - Decline in food prices and increase in time cost as more women enter the labor force, increases demand of fast food (Lakdawalla and Philipson 2009).

DATA & STUDY DESIGN

PRIMARY DATA SOURCES

- **Fast Food Branch Level Data** – We use the American Heritage Dictionary definition of a fast food restaurant as "inexpensive food, such as hamburgers and fried chicken, prepared and served quickly." The data comes from multiple sources including the Scrapehero Subscription Database supplemented with websites of fast food chains. The top 10 fast food chains included in the study are Subway, McDonald's, Burger King, Taco Bell, Pizza Hut, Wendy's, Domino's Pizza, KFC, Dairy Queen, and Arby's. The final sample includes branches between 2019-2020 spread across 17,206 US cities.
- **Obesity Rates** – Each US county is compared with other counties in the state on the basis of two measures including body mass index (BMI) and food environment index and then classified into four quartiles. The data comes from the County Health Rankings. The final sample includes average obesity rates from 2016-2018 of 2017 US counties.
- Other Data Sources – Bureau of Economic Analysis (data on county level income), IBIS World (average revenue of fast food chains by location), American Community Survey (average commute time), USDA (average county level literacy rates).

STUDY DESIGN

- **Lagged Time Framework** - Since the purpose of this study is to examine the impact that existing obesity rates have on future location of fast food branches, we use a lagged time framework to establish causality. The obesity rates are taken as the county level average over 2016-2018 and the net changes in fast food branch locations are measured over 2019-2020.
- **Distance from the City Center** - Each fast food branch is mapped to their city and county using latitudinal and longitudinal coordinates and Python geocoding. The distance from the city center is measured as the Euclidean distance and different radii from the city center is considered to study clustering.

REGRESSION MODEL

HYPOTHESIS 1

$$\sum_i \frac{\Delta FF_{i,c,t}}{FF_{i,c,t-1}} = \beta_0 V_{ct-k} + \beta_1 XC_{ct-k} + \delta_c + \varepsilon_{c,t}$$

HYPOTHESIS 2

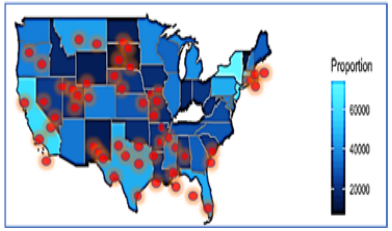
$$\sum_i \frac{\Delta FF_{i,j,city,t}}{FF_{i,j,city,t-1}} = \beta_0' I_c + \beta_1' XC_{ct-k} + \delta'_c + \varepsilon_{c,t}$$

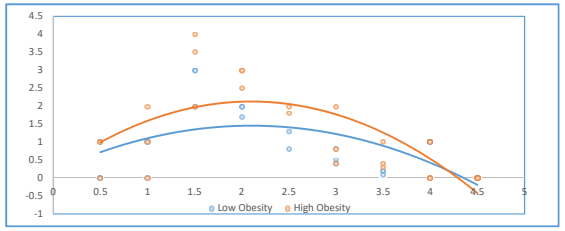
Top 5 Counties	Obesity Rates	Bottom 5 Counties	Obesity Rates	Fast Food Chains	Market Shares
Claiborne, MS	48%	Eagle, CO	12%	Subway	18.5%
Greene, AL	46%	Teton, WY	13%	McDonald's	11.3%
Holmes, MS	46%	Summit, CO	13%	Burger King	5.7%
Phillips, AR	46%	Boulder, CO	14%	Taco Bell	5.3%
Lowndes, AL	45%	Santa Fe, NM	14%	Wendy's	4.4%

RESULTS

HYPOTHESIS 1	Average Obesity Rates
Model 1	0.2017*** (0.0053)
Model 2	0.1572*** (0.0315)
Model 3 (Difference Analysis)	0.0056*** (0.0007)
Model 4	0.1718*** (0.0316)
Model 5	0.2219*** (0.0614)
N	2017

HYPOTHESIS 2	Indicator = 1 (City belongs to a county with obesity rates higher than mean obesity rate of the sample)
< 0.5 mile	0.0598 (0.0617)
< 1 mile	0.0733* (0.0501)
<2 miles	2.0178*** (0.3166)
2-3 miles	0.0084** (0.0037)
> 3 miles	-0.0008** (0.0003)
N	2017 Counties; 17,206 Cities





CONCLUSION & POLICY IMPLICATIONS

- Given a mean obesity rate of 31% in our sample, a one standard deviation increase in average obesity rate leads to about 3.8 – 4.3 additional fast food branch openings, controlling for other factors.
- Fast food branches cluster more in cities which belong to counties that have obesity rates higher than the sample mean, taking the shape of a parabola.
- Zoning ordinances and restrictions on locations of new fast food branches near schools or commute corridors.
- Fast food chains should be incentivized to provide healthier meal options at subsidized rates.

CONTRIBUTIONS

PAST LITERATURE	PRESENT STUDY
Focuses on the demand side of the fast food market.	Focuses on the supply side of the fast food market.
Studies consumption behavior in the fast food market.	Studies firm or producer behavior in the fast food market
Establishes a positive correlation between fast food consumption and obesity.	Shows that the existing obesity rates in a region are a non-trivial factor in location choice of new fast food branches.
Identifies environmental and economic factors that explain consumer demand for fast food.	Provides preliminary evidence of the existence of a vicious cycle of fast food availability and obesity rates in a region.
	Uses detailed data and geocoding techniques to identify patterns in fast food chain clustering in regions with high obesity rates.

FUTURE RESEARCH

- Extend study by using granular obesity rate data at the municipality or city level.
- Conduct randomized control experiments on efficacy of different policy initiatives, in particular the potential for success of zoning ordinances.
- Conduct randomized experiment on changes in demand side behavior by providing healthier meal options at a subsidized rate.
- Study advertising initiatives in fast food industry as compared to the tobacco industry.

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