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BSG-WP-2016/012

March 2016

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Are Ethnic Fast Casual Restaurants Healthy?

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March 10, 2016

Abstract

The recent growth of ethnic restaurants throughout the country has contributed to a fast casual restaurant boom in the US. This paper studies the effects of proximity to a Mexican restaurant – the dominant type of ethnic fast casual restaurant – on maternal and child health. I use data on the complete residential addresses of all mothers who gave birth in the Miami metropolitan area between 1989 and 2009 and match them to a time series of all establishments – restaurants and stores – selling food and drink. This unique dataset allows me to use mother fixed effects and to exploit over-time variation in the food environment to identify effects on maternal weight gain and child birth outcomes. The results show that living in proximity to a Mexican restaurant is associated with a lower likelihood of excessive weight gain among US-born mothers. These effects are concentrated in low-income neighborhoods and among members of disadvantaged groups (e.g., low-skilled, young, and African-American individuals). No protective effect was found for foreign-born mothers. I find no evidence of significant effects on either other maternal outcomes or various child health metrics at birth. Overall, these results provide some support for policy programs promoting ethnic restaurants and ethnic food as a strategy to increase access to healthy options and healthy eating in low-income

Keywords: Weight gain, restaurants, food deserts

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1 Introduction

More than one-third of the U.S. adult population is obese (35.7%).[1] Obesity is associated with higher risks of heart disease, stroke, type II diabetes, and certain types of cancer. Obesity is particularly high among non-Hispanic blacks (47.8%) and Hispanics (42.5%). Limited access to healthy food, an increase in the away-from-home share of daily caloric intake, differences in preferences toward healthy food, and the affordability of healthy food are considered important factors that explain disparities in obesity rates. Despite scant evidence that access to healthy food promotes healthier diets, several policy interventions have been introduced to improve access to healthy food. Community interventions in low-income neighborhoods have tried to favor supermarket entry and to promote healthy food offerings among retailers and restaurants. In areas characterized by high immigrant density, a few programs (e.g., "Salud Tiene Sabor" and "Steps to a Healthier Salinas") have explicitly focused on helping ethnic restaurants promote healthy menus and reduce fats, while increasing the availability of fruit and vegetables. (Hanni et al., 2010; Nevarez et al., 2013).[2]

A few studies have attempted to analyze the causal effects of the food environment on weight gain by exploiting the entry of fast food restaurants or large chain retailers, such as Walmart. While previous evidence suggests that fast food is less healthy and may be an important contributor to obesity (Rosenheck, 2008), there is little evidence that exposure to fast food restaurants and food deserts have causal effects on health. Although different strategies have led to slightly different conclusions about the magnitudes and significance of the effects on weight gain and obesity rates (Anderson and Matsa, 2011; Currie et al., 2010; Lhila, 2011), there is a growing consensus that food deserts and proximity to fast food restaurants play a minimal role in explaining observed disparities in nutritional consumption (Handbury et al., 2015). On the contrary, we know relatively little about the roles played by different types of restaurants or variety in the food environment. The goal of this study is to analyze the effects of proximity to Mexican restaurants, the dominant type of ethnic fast casual restaurant, on weight gain.

Over the last few years, fast casual restaurants (e.g., Chipotle, Shake Shack, Freshii), promising "fresh food" but offering some dishes at the same prices as those of major burger joints, have been the only source of growth in the restaurant sector. Since 1999, the sector has grown by 550 percent, approximately ten times the growth of the fast food industry over the same period (source: Euromonitor). In 2014, Americans spent $21 billion at fast casual restaurants, accounting for more than one-quarter of total food service sales (source: National Restaurant Association). Within this segment, Mexican and, more generally, Latin and Caribbean-inspired fast casual chains have cropped up, with Chipotle and Qdoba leading the segment.[3] The popularity of these restaurants is driven by the rapid growth of the Hispanic population. Indeed, Schiff (2014) and Mazzolari and Neumark (2012) show that

[1] Source: NCHS Data Brief, January 2012, http://www.cdc.gov/obesity/data/adult.html

[2] See also, http://www.salud-america.org/sites/www.salud-america.org

[3] http://www.economist.com/news/business/21638120-why-slightly-more-upmarket-outlets-are-eating-fast foods-lunch-better-burgers-choicer-chicken.

immigration is associated with increased restaurant diversity and restaurant choice for natives.

As first-generation immigrants, especially first-generation Hispanics, tend to have healthier dietary habits than their US-born counterparts (Vargas, 2012; Guendelman and Abrams, 1995), immigration may increase the demand for healthier menus and, thus, the availability of healthy options in food deserts. In particular, the entry of immigrants with similar tastes to a subgroup of locals (the "healthy types") may increase the provision of products preferred by those natives, hence increasing their access to healthy options, particularly in low-income neighborhoods that are characterized by less diversity and a higher proportion of "unhealthy" restaurants (Schiff, 2014; Meltzer and Schuetz, 2011). This may in turn increase healthy consumption by reducing disparities in access to healthy food.

Consistent with this hypothesis, previous studies have found that ethnic restaurants are more likely to offer non-fried carbohydrate offerings, fruits and vegetables (Hanni et al., 2010) and to play an important role in improving access to healthy food in low-income, Latino communities (Nevarez et al., 2013; Emond et al., 2012). Furthermore, using survey data, Duerksen et al. (2007) show that child and parent body mass index (BMI) values are lowest among Mexican-American families who select Mexican restaurants. This evidence provides partial support for programs promoting ethnic restaurants as channels for increasing access to healthy food. However, to the best of my knowledge, the effects of fast casual ethnic restaurants and of increased diversity in the food environment on weight gain have not yet been studied.

This paper attempts to fill this gap in the literature on food deserts and proximity to fast food restaurants by analyzing the relationship between proximity to Mexican restaurants and weight gain. I focus on a sample of pregnant women and examine the effects of excessive maternal weight gain, which has been linked to postpartum obesity and adverse health outcomes (Derbyshire, 2009). In addition, I examine the effects on other other pregnancy outcomes, including several metrics of child fitness at birth.

I obtained data on all pregnancies that occurred in the Miami metropolitan area between 1990 and 2009 and matched them to a directory of all the eating and drinking establishments and food stores that were open in the metropolitan area over the same period. One reason to focus on this area is that in the Miami metropolitan area, the growth of ethnic restaurants has been particularly rapid over the last twenty years.[4] The main advantages of analyzing weight gain during pregnancy is that it allows me to exploit a large sample of administrative records drawn from the Vital Statistics of Florida and to use variation in the food environment across the same mother's pregnancies. Mother fixed effects account for time-invariant individual heterogeneity that may be correlated with individual location and the likelihood of gaining excessive weight. Similarly to Currie et al. (2010), I use data on the exact geographic location of restaurants and analyze how the availability of fast food and ethnically defined restaurants is related to maternal weight gain, pregnancy outcomes and child health at birth.

[4]See, for instance, http://smartblogs.com/food-and-beverage/2012/03/08/why-fast casual-connects-so-well-with-the-social-consumer/

The results of this paper suggest that the availability of a Mexican restaurant within half a mile of the maternal residential address is associated with a lower likelihood of excessive weight gain among US-born mothers during pregnancy. The effects appear to be larger among minority, low-skilled, and young mothers, although these differences are not precisely estimated. No protective effect of proximity to Mexican restaurants was found for foreign-born mothers. I find no evidence of significant effects on other maternal or child health outcomes (e.g., hypertension, diabetes, child birth weight). Finally, I find no evidence of significant effects of fast food proximity.

A natural concern with the identification strategy is that while I am trying to estimate the effects of changes in the supply of casual restaurants, the estimates may capture unobservable shifts in the demand for fast casual restaurants or ethnic foods. In particular, these chains are likely to open in areas in which there are higher chances of market success and demand is expected to be strong. Thus, one may be concerned that unobserved determinants of health and eating behavior may be correlated with changes in the availability of ethnic restaurants. If the density of ethnic restaurants is correlated with a lower risk of weight gain, I may overestimate the positive effects of proximity to fast casual ethnic restaurants. As in Currie et al. (2010), I am not able to rule out this possibility. However, it is worth noting that because of maternal fixed effects, the key identifying assumption is that the maternal behavior/weight gain of the same mother should not change in the absence of a change in the local food environment across pregnancies. Furthermore, to strengthen the credibility of the identification strategy and the causal interpretation of the results, I present some sensitivity analyses and unconfoundedness tests. In particular, I show that proximity to future fast casual restaurants has no effect on maternal weight gain. Furthermore, changes in the proximity to ethnic restaurants are not correlated with other important determinants of weight gain. Finally, the results are robust to the inclusion of a wide set of time-varying neighborhood characteristics.

This paper is organized as follows. Section 2 presents the background. Section 3 provides a discussion of the data, the empirical specification, and the identification strategy. Section 4 presents the main results of the paper. Concluding remarks are reported in section 5.

2 Background and Theoretical Framework

2.1 Background

Several papers have examined the causes of the obesity epidemic in the US. Changes in agriculture, food production and distribution technology have played an important role in the observed rise in obesity rates (Lakdawalla and Philipson, 2002; Philipson and Posner, 2003; Cutler et al., 2003; Courtemanche and Carden, 2011). At the same time, there is evidence that the declining relative cost of eating out versus at home has favored the increase in adult obesity (Chou et al., 2004). Despite the evidence that both fast food and eating out are associated with negative

health outcomes, there is debate about whether variation in the exposure to fast food (or other types of restaurants) or food deserts affects health. Powell and Bao (2009) and Beydoun et al. (2008) show that the supply of supermarkets and restaurants, as well as grocery prices, are importantly related to healthier behaviors and better health outcomes. The causal interpretation of these correlations has been questioned by Anderson and Matsa (2011), who exploit interstate highways to instrument for the availability of restaurants and find no evidence of significant effects on obesity. Currie et al. (2010) find different results providing evidence of modest but significant effects on maternal weight gain. The difference in the findings is likely explained by the larger sample size and more precise measures of proximity to fast food restaurants used in the latter study. Using the NCHS' Vital Statistics Natality Birth Data, Lhila (2011) provides evidence of a positive association between greater access to fast food restaurants and excessive weight gain during pregnancy but finds no significant effects on birth outcomes.

This study is closely related to the literature analyzing the causal effects of the food environment on weight gain (Anderson and Matsa, 2011; Currie et al., 2010; Lhila, 2011), but it also speaks to other strands of the economic literature. First, as I am interested in examining the effects of increased variety on individuals' health, this paper relates to the extensive trade literature examining the consumer gains from an increased variety of goods (Broda and Weinstein, 2004; Feenstra, 1994). Second, as I exploit changes in the food environment that respond to demographic changes, this paper speaks to the literature in industrial and urban economics analyzing preference externalities and the relationships between population demographics and private goods provision (Waldfogel, 2008), as well as the relationship between urban agglomeration and product variety (Schiff, 2014; Couture, 2013). Because of its focus on ethnic restaurants, this paper is closely related to previous research analyzing the effects of immigration on diversity and product variety (Ottaviano and Peri, 2006; Mazzolari and Neumark, 2012).

2.2 Conceptual Framework

Surveys of restaurant operators suggest that restaurants and food retailers are reluctant to offer healthy products in certain neighborhoods due to a lack of demand. A likely explanation is that in a sector such as the restaurant industry, which faces relatively high fixed costs and markedly heterogeneous preferences, a product will be made available only if there is sufficient demand for it (George and Waldfogel, 2003; Waldfogel, 2003). As suggested by Waldfogel (2008), the provision of public goods responds to the preferences of the median voter, while the supply of local private goods responds to the preferences of the median consumer; thus, it is importantly related to the demographic composition of the market. Consistent with this hypothesis, Schiff (2014) shows that the presence of ethnic neighborhoods increases the likelihood that a market supports a particular cuisine. The provision of private goods is therefore lumpy and sensitive to the distribution of preferences. This is particularly true for products that are perishable and need to be consumed locally.

As the agglomeration of individuals with a given set of tastes results in the provision of certain products, Waldfogel (2008) suggests that immigration may have positive externalities on the subgroup of locals with similar tastes, eventually shifting the median consumer's equilibrium. Consistent with this conjecture, he shows that the mix of locally available restaurants is sensitive to zip code demographics such as race and education. Mazzolari and Neumark (2012) provide further evidence that immigration affects product variety by testing directly the relationship between immigrant inflows and the composition of products in the retail and restaurant sectors. Duerksen et al. (2007) and Hanni et al. (2010) provide evidence that Mexican restaurants may promote access to healthier options, supporting policy interventions such as "Salud Tiene Sabor". I extend these studies by examining whether the growth of fast casual ethnic restaurants, particularly of Mexican restaurants, affected weight gain.

From a theoretical perspective, immigration may affect the provision of healthy food in a neighborhood by affecting both demand and supply. If immigrants have healthier diets than natives, as the public health literature suggests (Guendelman and Abrams, 1995), then the demand for healthy products may increase in the neighborhoods immigrants move into. If the population is composed of two types, healthy and unhealthy, one might expect that immigration would benefit the healthy types by increasing the availability of healthy products in a given neighborhood.

Even if tastes are stable in the population and preferences are not affected by supply over the short run, food variety may favor the consumption of healthy products among healthy types. Proximity to healthy options may not only reduce the cost of healthy food but also reduce self-control problems typical of obesogenic environments (O'Donoghue and Rabin, 2000; Laibson, 2001; O'Donoghue and Rabin, 2000; DellaVigna, 2009). Demand may also be affected by peer effects. Finally, immigrants may increase the supply of ethnic food because of their comparative advantage in its production (Mazzolari and Neumark, 2012). However, whether increased access to food variety, particularly to fast casual ethnic restaurants, promotes the consumption of healthy food and positively affects the health of a community is ultimately an empirical question.

3 Data and Empirical Specification

3.1 Data

The main data used in this paper are drawn from the Vital Statistics Natality Data for Florida and the National Establishment Time Series Database (NETS, Dun and Bradstreet). Specifically, the data on maternal and child outcomes are drawn from the birth certificates of all children born in the Miami metropolitan area between 1990 and 2009. I obtained confidential information on the names of both the mother and child, the exact date of birth, and the complete residential address, and I used this information to link births to the same mother. These administrative

records include information on maternal age, education, race, ethnicity, and country of birth; whether the mother smoked during the pregnancy; child's gender, birth order, and type of birth; and maternal weight gain. Following Currie et al. (2010), I restricted the sample to singleton births and to mothers with at least two births in the sample and records which are not missing information on weight gain.[5] The final sample consists of 565,871 observations.

The NETS dataset provides time series information on establishment mobility patterns, sales growth performance, job creation and destruction, changes in primary markets, and historical D&B ratings. I obtained a panel of virtually all the establishments in SIC codes 58 ("Eating and Drinking Places") and 54 ("Food Stores") from 1990 to 2009, with addresses, names and categorical classification allowing me to identify different types of restaurants and their exact geographical locations. These data have been often used in previous studies on the restaurant industry. They are considered more precise than the yellow pages or business directories (Mazzolari and Neumark, 2012; Currie et al., 2010) and are considered the best for studying business locations (Kolko et al., 2007). In addition, the NETS data contain information on the primary standard industrial classification of each establishment. Through letter surveys, phone surveys or internet updates, the establishment chooses (or Dun and Bradstreet assigns) its primary (and secondary) SICs from a list of over 18,750 8-digit SICs developed by Dun and Bradstreet.

To identify Mexican restaurants, which represent the largest category of ethnic fast casual restaurants in the US, I use a narrower indicator: SIC 58120112 ("Mexican restaurants"). Note that Mexican-American fast food restaurants, such as Taco Bell, are classified as fast food restaurants and are not included in the Mexican restaurant definition used in this study. Additionally, I use the company name to identify Mexican restaurants that may have been misreported as generic eating places—but were not classified as fast food restaurants— searching for words in the business names that suggest a Mexican restaurant (e.g., "Mexican", "Mexico","Burrito"). Following Mazzolari and Neumark (2012), I use this procedure for all types of ethnic restaurants (e.g., American, Cajun, Chinese, French, German, Greek, Indian, Italian, Japanese, Korean, Lebanese, Mexican, Spanish, Thai, Vietnamese). I considered only the top 10 fast food chains as fast food restaurants (Currie et al., 2010). The fast food list includes McDonalds, Subway, Burger King, Taco Bell, Pizza Hut, Little Caesars, KFC, Wendy's, Domino's Pizza, and Jack in the Box.[6] I also identify cafeterias, pizza places, and family restaurants. Finally, I include data on the availability of food stores, which are classified separately as supermarkets, grocery stores, and convenience stores (Meltzer and Schuetz, 2011; Emond et al., 2012).

Using $ArcInfo$, I merged these data with the information drawn from the universe of Florida births using the latitude and longitude of the maternal residential address and of the restaurant locations. In particular, following Currie et al. (2010), I matched the data on weight gain during pregnancy and child birth outcomes with the proximity

[5] This information is missing for 7.7% of the sample.

[6] In an alternative classifications for fast food restaurants, I considered all the establishment in the 8-digit SIC for fast food and all the chains listed as fast food restaurants by Wikipedia. The main results are not substantially affected by this definition, as the 10 top fast food chains cover most of the market.

to fast food, Mexican restaurants, other types of restaurants, and supermarkets in the year that overlaps the most with the gestation period.

3.2 Summary Statistics

Table 1 shows the summary statistics for the main variables used in the analysis. Using restaurant data and mothers' residential addresses, I constructed indicators for the presence of fast food, Mexican restaurants, other restaurants, supermarkets or grocery stores within 0.5 miles of the addresses, a distance that a person could walk in approximately 10 minutes. This is a measure of proximity that has been previously used in the literature (Davis and Carpenter, 2009; Rundle et al., 2009; Currie et al., 2010).

Column 1 includes the data on all births. Column 2 presents the same statistics for the restricted sample of mothers who had at least two children, while in column 3 (4), I restrict the sample to mothers who reside within 0.5 miles of a fast food (Mexican) restaurant. Approximately 40.3% of pregnant mothers in the sample live within 0.5 miles of a fast food restaurants and 12.5% are within 0.5 miles of a Mexican restaurant. Mothers who live near fast food and Mexican restaurants have slightly different characteristics than the average mothers. Mothers who live in proximity to Mexican restaurants tend to be younger, are less likely to be black, more likely to be Hispanic, and less likely to smoke. There are 135,068 mothers with at least two children in the sample. There are 101,469 mothers who experience a change in fast food availability within 0.5 miles, and 47,046 mothers experience a change in Mexican restaurant availability within 0.5 miles.

3.3 Empirical Specification

The baseline specification is:

$$Y_{izt} = \beta_1 F5_{izt} + \beta_2 MX5_{izt} + \beta_4 3Other5_{izt} + \beta_4 SPM5_{izt} + \delta X_{izt} + Z_{zt} + d_i + \epsilon_{izt} \quad (1)$$

where Y_{it} is an indicator equal to 1 if mother i living in zip code z at time t gains more than 20 kg during pregnancy; $F5$ is an indicator equal to one if there is a fast food restaurant within 0.5 miles of the mother's residential address; $MX5$ is an indicator equal to one if there is a Mexican restaurant within 0.5 miles of the mother's residential address; $Other5$ is an indicator equal to one if other types of restaurants (not classified as Mexican or fast food) are available within 0.5 miles of the mother's residential address; $SPM5$ is a vector of three indicators for whether the mother lived within 0.5 miles from a supermarket, a grocery store, or a convenience store; and X_{izt} is a vector of time-varying maternal characteristics, including age dummies, four dummies for education (high school dropout, high school graduate, some college, college or more), tobacco use during pregnancy, child's gender, parity, marital status

and year dummies, and race and ethnicity dummies. Moreover, Z_{zt} is a set of time-varying zip code characteristics, including the share of high school dropouts, high school, college graduates, and those with more than a college degree; the share of Hispanics and blacks; the share of Cuban, Puerto Rican and Mexican mothers; the share of the female population; income per capita; and income per capita among Hispanics. Finally, d_i is a mother fixed effect. Standard errors are clustered by mother. In alternative specifications, I include zip code fixed effects, which capture time-invariant characteristics at the zip code level.

As variation in restaurant supply across pregnancies could be induced by either changes in the local food environment or mothers relocating, I also consider an alternative model focusing on mothers who resided in the same place, thus limiting the source of variation to openings and closings of different types of nearby restaurants between pregnancies. This within-mother analysis allows me to control for individual unobservables that might affect both her own locational choices and the likelihood of negative health outcomes. It is worth noting that measurement error may cause attenuation bias in the main estimates of the paper.

4 Main Results

Table 2 analyzes the relationship between the food environment and excessive maternal weight gain. Following previous studies, I use a dummy whose value equals 1 if weight gain is above 20 kg as the dependent variable. This threshold has been previously used in the literature, as the incidence of low Apgar[7] scores is shown to increase significantly with weight gain above 20 kg (Currie et al., 2010). When analyzing all mothers with at least two pregnancies in the sample, I find no evidence of significant effects of proximity to fast food or Mexican restaurants (column 1).[8] It is worth noting that differences in the sample sizes and populations analyzed can explain the differences with respect to the findings of Currie et al. (2010).

Interestingly, when focusing on US-born mothers, the availability of a Mexican restaurant within 0.5 miles is associated with a 1.2 percentage point reduction in the likelihood of gaining excessive weight during the pregnancy (column 2). This corresponds to an effect of 8.5% with respect to the incidence of excessive weight gain in the sample. The fact that the sign of the coefficient changes when analyzing foreign-born mothers (column 3) can be explained by the fact that immigrants tend to be healthier than US natives (the healthy immigrant effect), and first-generation Hispanics, in particular, are less likely to eat out and more likely to have healthier diets (Vargas, 2012; Guendelman and Abrams, 1995). Thus, proximity to Mexican restaurants may actually promote less healthy choices in this population. It is also worth noting that focusing on US-born mothers also mitigates possible endogeneity

[7] The Apgar scale is determined by evaluating the newborn using five simple criteria: appearance, pulse, grimace, activity, respiration.

[8] While OLS estimates confirm a positive correlation between fast food exposure and maternal weight gain, when controlling for sociodemographic variables, the coefficient shrinks and becomes non-significant. Among US-born mothers, the positive correlation remains robust to the addition of individual sociodemographic controls and zip code time-varying characteristics, but it becomes non-significant once zip code (mother) fixed effects are included. These results are available upon request.

bias caused by the correlation between immigrants' location choices and neighborhood changes in the supply of food environment.

In Table 3, I show that when including both mother and zip code fixed effects (column 2), the coefficient remains significant and substantially unchanged with respect to the baseline regression reported in column 1. When restricting the sample to mothers who did not change zip codes across their pregnancies (column 3), the point estimate remains relatively stable – if anything, it increases in absolute value. However, the coefficient is only marginally significant, as I reduce the identification power by excluding from the analysis mothers who changed neighborhoods across pregnancies.

Table 4, illustrates the heterogeneity of the results across sociodemographic groups. The coefficient on proximity to Mexican restaurants is larger among mothers who are minorities, less educated and younger.[9] While the differences are not precisely estimated, the point estimates reported in columns 2–4 are smaller for US-born white mothers than for US-born black mothers. Columns 5 and 6 show that the coefficient is significantly smaller among mothers with at least some college education (column 6) compared to mothers with a high school degree or less (column 5). Finally, in column 7, I restrict the analysis to mothers who gave birth at a relatively young age (below the median age in the sample, 28). Again, though the differences across groups are not statistically significant, the point estimate is larger than among mothers who gave birth at a later age (column 8).[10]

4.1 Robustness Checks

Table 5 presents an unconfoundedness test examining the effects of future restaurant openings and analyzing the effects of weight gain determinants that should not be affected by the food environment.

Column 1 shows that, consistent with the identification assumption, future openings of Mexican restaurant have no effect on maternal weight gain. It is worth noting that the coefficient is not only non-statistically different from zero but also very small in magnitude.

Columns 2–4 present a placebo test analyzing the relationship between the availability of different types of restaurants and time-varying individual characteristics, controlling for mother fixed effects. I examine maternal smoking, marital status, and an indicator for quality of care. These variables are time-varying within mothers. If the identification assumption is correctly specified, then these variables should not be correlated with changes in the food environment, in particular, with proximity to Mexican restaurants. Consistent with this prior, I find no evidence that these individual time-varying characteristics are correlated with the availability of a Mexican

[9] The results are similar when including zip code fixed effects and when focusing on stayers.

[10] Interestingly, the effects are larger among women who were not overweight before the pregnancy and those who already had children and are likely more time constrained. Table A.1 shows that the coefficient is larger among women who already had a child. This may be explained by the fact that pregnant women who have older children may be particularly pressed for time and more inclined to dine out. However, the results reported in Table A.1 are not statistically significant and should be interpreted with caution given the size of the standard errors and the lack of identification power.

restaurant within 0.5 miles. This result does not allow us to rule out the possibility that the results presented thus far capture unobserved shifts in the demand that are correlated with the opening and closing of restaurants across areas. However, the result shows that the coefficients reported in Tables 2–7 are not confounded by observable individual characteristics that are known to affect maternal weight gain during pregnancy, mitigating concerns that other unobservables may confound the main estimates.

4.2 Other Results

Since 2004, the birth records have included information on pre-pregnancy BMI. Using this information, the results suggest that – if anything – proximity to a Mexican restaurant seems to have a larger protective effect (in terms of a lower likelihood of excessive weight gain) among mothers who were not overweight at the beginning of the pregnancy (BMI $\geq$ 25) (columns 4–5). However, as this analysis is restricted to 2004 onward, the sample of pregnancies for mothers with at least two singleton births is substantially smaller. Thus, these coefficients are not precisely estimated and should be interpreted with caution.

Using the 2004–2009 sample, I can also analyze the effects of proximity to different types of restaurants on weight gain across pregnancies. While I do not have enough power to identify a statistically significant effect, the point estimates reported in columns 1–3 of Table A.2 suggest that the availability of a Mexican restaurant reduces the risk of weight gain across pregnancies and the likelihood of becoming obese or overweight. There is no evidence of significant effects on gestational hypertension or diabetes.

Table A.3 shows no evidence of significant effects of proximity to either fast food or Mexican restaurants on various metrics, such as birth weight in grams, incidence of low birth weight (birth weight below 2,500 grams), and likelihood of reporting a low 5-minute Apgar score (Apgar $<$ 8) score.[11]

5 Conclusion

This paper extends previous studies by analyzing the role of Mexican restaurants and examining a broad set of maternal and pregnancy outcomes. I exploit changes in restaurant availability within half a mile of the mother's residential address across births of the same mother. I find that mothers living within half a mile of a Mexican restaurant are less likely to gain excessive weight during pregnancy. The results suggest that this relationship might be stronger among those at higher risk of unhealthy behaviors and characterized by low socioeconomic status: less educated, young and black women. Interestingly, foreign-born mothers are not affected by proximity to fast food or Mexican restaurants. Finally, there is no evidence of significant effects on other maternal and child health outcomes.

[11]The Apgar scale is determined by evaluating the newborn baby on five simple criteria on a scale from zero to two and summing the five values obtained. The resulting Apgar score ranges from zero to 10.

More research is needed to identify the exact mechanisms underlying these results and to evaluate their external validity. Yet, these results provide some support for policy programs promoting ethnic restaurants and foods as a strategy to increase access to healthy options and encourage healthy eating in low-income neighborhoods.

Taken together, these findings are consistent with a model in which increased variety in the food environment reduces the cost of healthy options and alleviates self-control problems that may be exacerbated by a lack of variety and by the reduced ability of "healthy consumers" to find "healthy options" on menus (DellaVigna, 2009; Laibson, 2001).

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Table 1: Summary Statistics, Florida Birth Records (1989-2009), Miami CBSA

	All births	Siblings only	Siblings $\leq$0.5mile from a fast food rest.	Siblings $\leq$0.5mile from a Mexican rest.
Age of mother	27.813	27.194	27.082	27.362
Mother graduated from high school	0.358	0.344	0.361	0.346
Mother attended some college	0.191	0.187	0.185	0.164
Mother attended college or more	0.233	0.229	0.210	0.221
Mother is black	0.271	0.301	0.286	0.184
Mother is Hispanic	0.563	0.561	0.598	0.694
Mother smoked	0.023	0.020	0.019	0.016
Child is male	0.512	0.514	0.516	0.513
Parity	0.942	1.073	1.050	1.065
Mother is married	0.592	0.604	0.588	0.592
Weight gain grater than 20 kg	0.144	0.140	0.140	0.140
Observations	565,869	323,880	96,175	34,216

Notes - There are 135,068 mothers with two or more children in the sample. There are 101,469 mothers who experience a change in fast food availability within 0.5 miles and 47,046 mothers who experienced a change in Mexican restaurant availability within 0.5 miles.

Table 2: Food Environment and Excessive Weight Gain (greater than 20 kg), Florida Birth Records(1989–2009), Miami CBSA

Demographic Sub-samples:	(1) Overall	(2) US Born	(3) Foreign Born
Availability of a Mexican restaurant within 0.5 miles	0.0002 (0.003)	-0.0113** (0.005)	0.0090** (0.004)
Availability of a fast food restaurant within 0.5 miles	-0.0016 (0.002)	-0.0028 (0.004)	-0.0007 (0.003)
Availability of other eating places within 0.5 miles	0.0026 (0.003)	0.0046 (0.004)	0.0014 (0.005)
Availability of a convenience store within 0.5 miles	0.0031 (0.002)	0.0033 (0.003)	0.0025 (0.003)
Availability of a grocery store within 0.5 miles	0.0025 (0.002)	0.0029 (0.004)	0.0022 (0.003)
Availability of a supermarket within 0.5 miles	-0.0001 (0.002)	-0.0011 (0.004)	0.0002 (0.003)
Mother fixed effects	YES	YES	YES
Observations	512,436	213,541	298,895

Notes - The unit of observation is a pregnancy for mothers with at least two singleton births. The dependent variable is excessive maternal weight gain, defined as a dummy variable that equals 1 when the weight gain during pregnancy is greater than 20 kg. The entries reported in rows are the respective coefficients on dummies for the availability of a Mexican restaurant, a fast food restaurant, other eating places (not classified as Mexican or fast food), a convenience store, a grocery store, or a supermarket within 0.5 miles of the mother's residence. All estimates include controls for time-varying mother characteristics, including child's gender, mother's education (4 groups), mother's age dummies, parity, marital status, tobacco use during pregnancy, and child's year of birth dummies. The regressions also included a set of controls at the zip code level: share of adults (over 25) with a high school degree or less, some college, college or more; share of female, black, white and Hispanic population; share of Cuban, Mexican and Puerto Rican mothers; poverty rate; per capita income and per capita income in the Hispanic population. The zip-code level data are drawn from the 1990 US Census for all pregnancies that occurred before 2000 and from the 2000 US Census for pregnancies that occurred after the year 2000. Other controls include indicators for variables with missing information (tobacco use, parity, marital status, race). Finally, all estimates include mother fixed effects. Standard errors clustered by mother are reported in parentheses.

Table 3: Food Environment and Excessive Weight Gain (greater than 20 kg), Florida Birth Records (1989–2009), Miami CBSA: Alternative Specifications

Demographic Sub-samples:	(1) US Born Overall	(2) US Born Overall	(3) US Born Stayers
Availability of a Mexican restaurant within 0.5 miles	-0.0113** (0.005)	-0.0113** (0.005)	-0.0134 (0.008)
Availability of a fast food restaurant within 0.5 miles	-0.0028 (0.004)	-0.0028 (0.004)	-0.0030 (0.005)
Availability of other eating places within 0.5 miles	0.0046 (0.004)	0.0046 (0.004)	0.0096 (0.007)
Availability of a convenience store within 0.5 miles	0.0033 (0.003)	0.0033 (0.003)	-0.0031 (0.005)
Availability of a grocery store within 0.5 miles	0.0029 (0.004)	0.0029 (0.004)	0.0005 (0.006)
Availability of a supermarket within 0.5 miles	-0.0011 (0.004)	-0.0011 (0.004)	0.0028 (0.006)
Mother fixed effects	YES	YES	YES
Zip code fixed effects	NO	YES	NO
Observations	213,541	213,541	134,104

Notes - The unit of observation is a pregnancy for mothers with at least two singleton births. The dependent variable is excessive maternal weight gain, defined as a dummy variable that equals 1 when the weight gain during pregnancy is greater than 20 kg. The entries reported in rows are the respective coefficients on dummies for the availability of a Mexican restaurant, a fast food restaurant, other eating places (not classified as Mexican or fast food), a convenience store, a grocery store, or a supermarket within 0.5 miles of the mother's residence. All estimates include controls for time-varying mother characteristics, including child's gender, mother's education (4 groups), mother's age dummies, parity, marital status, tobacco use during pregnancy, and child's year of birth dummies. The regressions also include a set of controls at the zip code level: share of adults (over 25) with a high school degree or less, some college, college or more; share of female, black, white and Hispanic population; share of Cuban, Mexican and Puerto Rican mothers; poverty rate; per capita income; and per capita income in the Hispanic population. The zip-code level data are drawn from the 1990 US Census for all pregnancies that occurred before 2000 and from the 2000 US Census for pregnancies that occurred after 2000. Other control variables include indicators for missing information (tobacco use, parity, marital status, race). All estimates include mother fixed effects. Column 2 includes zip code fixed effects. Column 3 restricts the analysis to mothers who lived in the same zip code across pregnancies. Standard errors clustered by mother are reported in parentheses.

Table 4: Food Environment and Excessive Weight Gain (greater than 20 kg) by Sociodemographic Groups, Florida Birth Records (1989–2009), Miami CBSA

	(1) Overall	(2) Whites	(3) Blacks & Hispanics	(4) Blacks	(5) Low Skilled	(6) High Skilled	(7) Age $<$ 28	(8) Age $\geq$ 28
Availability of a Mexican restaurant	-0.0113**	-0.0070	-0.0112*	-0.0103	-0.0180**	0.0002	-0.0105	-0.0073
within 0.5 miles	(0.005)	(0.007)	(0.006)	(0.009)	(0.007)	(0.009)	(0.008)	(0.010)
Availability of a fast food restaurant	-0.0028	-0.0022	-0.0051	-0.0024	-0.0047	0.0024	-0.0016	-0.0022
within 0.5 miles	(0.004)	(0.005)	(0.004)	(0.005)	(0.005)	(0.006)	(0.005)	(0.007)
Availability of another eating place	0.0046	-0.0006	0.0053	0.0079	-0.0003	0.0045	0.0082	0.0062
within 0.5 miles	(0.004)	(0.006)	(0.005)	(0.007)	(0.006)	(0.007)	(0.006)	(0.008)
Availability of a grocery store	0.0029	0.0024	0.0018	0.0031	0.0013	0.0048	-0.0014	0.0046
within 0.5 miles	(0.004)	(0.005)	(0.004)	(0.005)	(0.005)	(0.006)	(0.005)	(0.007)
Availability of a convenience store	0.0033	-0.0010	0.0046	0.0043	0.0047	0.0028	0.0017	0.0078
within 0.5 miles	(0.003)	(0.005)	(0.004)	(0.004)	(0.004)	(0.006)	(0.004)	(0.006)
Availability of a supermarket	-0.0011	-0.0107**	0.0016	0.0053	0.0002	-0.0056	0.0017	-0.0044
within 0.5 miles	(0.004)	(0.005)	(0.004)	(0.005)	(0.005)	(0.006)	(0.005)	(0.007)
Mother fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
Observations	213,541	129,267	153,418	84,274	114,437	99,104	123,658	89,883

Notes - The unit of observation is a pregnancy for mothers with at least two singleton births. The dependent variable is excessive maternal weight gain, defined as a dummy variable that equals 1 when the weight gain during pregnancy is greater than 20 kg. The entries reported in rows are the respective coefficients on dummies for the availability of a Mexican restaurant, a fast food restaurant, other eating places (not classified as Mexican or fast food), a convenience store, a grocery store, or a supermarket within 0.5 miles of the mother's residence. All estimates include controls for time-varying mother characteristics, including child's gender, mother's education (4 groups), mother's age dummies, parity, marital status, tobacco use during pregnancy, and child's year of birth dummies. The regressions also include a set of controls at the zip code level: share of adults (over 25) with high school degree or less, some college, college or more; share of female, black, white and Hispanic population; share of Cuban, Mexican and Puerto Rican mothers; poverty rate; per capita income; and per capita income in the Hispanic population. The zip-code level data are drawn from the 1990 US Census for all pregnancies that occurred before 2000 and from the 2000 US Census for pregnancies that occurred after 2000. Other control variables are indicators for missing information (tobacco use, parity, marital status, race). All estimates include mother fixed effects. Standard errors clustered by mother are reported in parentheses.

Table 5: Unconfoundedness and Placebo Tests: Florida Birth Records (1989–2009), Miami CBSA

Dependent variable:	(1) Excessive weight gain	(3) Mother smokes	(4) Adequate prenatal care	(5) Mother is married
Availability of a Mexican restaurant within 0.5 miles	-0.0125**	0.0007	-0.0021	0.0050
	(0.006)	(0.002)	(0.005)	(0.005)
Availability of a Mexican restaurant within 0.5 miles, 3 years later	0.0017			
	(0.006)			
Mother fixed effects	YES	YES	YES	YES
Observations	213,541	233,645	228,892	233,645

Notes - The unit of observation is a pregnancy for mothers with at least two singleton births. All estimates include controls for the availability of a fast food restaurant, other eating places (not classified as Mexican or fast food), a convenience store, a grocery store, or a supermarket within 0.5 miles of the mother's residence and time-varying mother characteristics, including child's gender, mother's education (4 groups), mother's age dummies, parity, marital status, child's year of birth dummies. The regressions also include a set of controls at the zip code level: share of adults (over 25) with high school degree or less, some college, college or more; share of female, black, white and Hispanic population; share of Cuban, Mexican and Puerto Rican mothers; poverty rate; per capita income; and per capita income in the Hispanic population. The zip-code level data are drawn from the 1990 US Census for all pregnancies that occurred before 2000 and from the 2000 US Census for pregnancies that occurred after 2000. All estimates include mother fixed effects. Standard errors clustered by mother are reported in parentheses.

6 Appendix

Appendix A

Table A.1: Food Environment and Excessive Weight Gain (greater than 20 kg) by number of previous children and BMI before pregnancy, Florida Birth Records (1989–2009), Miami CBSA

	(1) No other children	(2) Has other children	(3) Was not Overweight (BMI≥25) before pregnancy	(4) Was Overweight(BMI≥25) before pregnancy
	1991–2009	1991–2009	2004–2009	2004–2009
Availability of a Mexican restaurant within 0.5 miles	0.0054 (0.048)	-0.0162** (0.008)	-0.0176 (0.016)	0.0152 (0.023)
Mother fixed effects	YES	YES	YES	YES
Observations	96,229	117,312	33,225	28,693

Notes - The unit of observation is a pregnancy for mothers with at least two singleton births. The dependent variable is excessive maternal weight gain, defined as a dummy variable that equals 1 when the weight gain during pregnancy is greater than 20 kg. All estimates include controls for the availability of a fast food restaurant, other eating places (not classified as Mexican or fast food), a convenience store, a grocery store, or a supermarket within 0.5 miles of the mother's residence and time-varying mother characteristics, including child's gender, mother's education (4 groups), mother's age dummies, parity, marital status, tobacco use during pregnancy, and child's year of birth dummies. The regressions also include a set of controls at the zip code level: share of adults (over 25) with high school degree or less, some college, college or more; share of female, black, white and Hispanic population; share of Cuban, Mexican and Puerto Rican mothers; poverty rate; per capita income; and per capita income in the Hispanic population. The zip-code level data are drawn from the 1990 US Census for all pregnancies that occurred before 2000 and from the 2000 US Census for pregnancies that occurred after 2000. Other control variables are indicators for missing information (tobacco use, parity, marital status, race). All estimates include mother fixed effects. Standard errors clustered by mother are reported in parentheses.

Table A.2: Food Environment and Other Maternal Outcomes, Florida Birth Records (2004–2009), Miami CBSA

Dependent Variable	(1) Weight Gain (in kg) Across Pregnancies	(2) Overweight (BMI≥25)	(3) Obese (BMI≥35)	(4) Hypertension	(5) Diabetes
Availability of a Mexican restaurant within 0.5 miles	-0.8762 (0.591)	-0.0157 (0.012)	-0.0006 (0.010)	0.0061 (0.005)	0.0007 (0.002)
Mother fixed effects	YES	YES	YES	YES	YES
Observations	63,872	63,436	63,436	71,790	71,790

Notes - The unit of observation is a pregnancy for mothers with at least two singleton births. All estimates include controls for the availability of a fast food restaurant, other eating places (not classified as Mexican or fast food), a convenience store, a grocery store, or a supermarket within 0.5 miles of the mother's residence and time-varying mother characteristics, including child's gender, mother's education (4 groups), mother's age dummies, parity, marital status, tobacco use during pregnancy, and child's year of birth dummies. The regressions also include a set of controls at the zip code level: share of adults (over 25) with high school degree or less, some college, college or more; share of female, black, white and Hispanic population; share of Cuban, Mexican and Puerto Rican mothers; poverty rate; per capita income; and per capita income in the Hispanic population. The zip-code level data are drawn from the 1990 US Census for all pregnancies that occurred before 2000 and from the 2000 US Census for pregnancies that occurred after 2000. Other control variables are indicators for missing information (tobacco use, parity, marital status, race). All estimates include mother fixed effects. Standard errors clustered by mother are reported in parentheses.

Table A.3: Food Environment and Birth Outcomes, Florida Birth Records (1989–2009), Miami CBSA

Dependent Variable:	(1) Birth weight (grams)	(2) Low birth weight	(3) Very low birth weight (< 2,500 grams)	(4) Low Apgar Score (< 1,500 grams)	(5) Birth weight > 4000 grams
Availability of a Mexican restaurant within 0.5 miles	2.8544	-0.0035	0.0004	0.0016	0.0006
	(6.805)	(0.004)	(0.002)	(0.002)	(0.003)
Mother fixed effects	YES	YES	YES	YES	YES
Observations	233,550	233,550	233,550	233,010	233,550

Notes - The unit of observation is a pregnancy for mothers with at least two singleton births. The estimates include controls for the availability of a fast food restaurant, other eating places (not classified as Mexican or fast food), a convenience store, a grocery store, or a supermarket within 0.5 miles of the mother's residence and time-varying mother characteristics, including child's gender, mother's education (4 groups), mother's age dummies, parity, marital status, tobacco use during pregnancy, and child's year of birth dummies. The regressions also included a set of controls at the zip code level: share of adults (over 25) with high school degree or less, some college, college or more; share of female, black, white and Hispanic population; share of Cuban, Mexican and Puerto Rican mothers; poverty rate; per capita income; and per capita income in the Hispanic population. The zip-code level data are drawn from the 1990 US Census for all pregnancies that occurred before 2000 and from the 2000 US Census for pregnancies that occurred after 2000. Other control variables are indicators for missing information (tobacco use, parity, marital status, race). All estimates include mother fixed effects. Standard errors clustered by mother are reported in parentheses.