Is Obesity Contagious? A Case Study of International Graduate Students.

Bhagyashree Katare
Department of Applied Economics
University of Minnesota, Twin Cities
bkatare@umn.edu

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Abstract

International students offer an unique opportunity to study the extent to which environment causes obesity. Because international students have an imperfect ability to choose their destination and are less aware of the social and cultural conditions in and around the university campus we argue that the prevalence of obesity in the surrounding area is plausibly exogenous to international students' choice of university. In this study, we survey international students studying at 43 public universities across the United States. We use this data to study the effect of prevalence of obesity in a particular region on the BMI levels of the international students. We find statistically significant effects on the changes in BMI levels of the students. Students studying in areas with lower prevalence of obesity show a significantly lower increase in their BMI compared to those studying in areas with higher prevalence of obesity. Evidence suggests that the environmental characteristics of a region have a direct effect on the BMI levels of individuals.

Key Words: Obesity, Immigrants.

JEL Classification: I12, J15

Introduction

Almost two-thirds of adults in the United States are obese or overweight (Hedley, et. al., 2004). Obesity accounts for 5% to 10% of health care costs in the United States, obese men

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incur $1,152 and obese women incur $3,613 more in health care expenditures than does a person of normal weight (Cawley and Meyerhoefer, 2012). Further, obesity is the leading cause of premature death in the United States. Understanding the drivers of obesity is important.

Recent work has sought mechanisms to explain the rise in obesity. These include: changes in environmental factors that influence people's lifestyle (Jeffery and Utter, 2003); reduction in fruit and vegetable intake; increased food from fast-food restaurants (Briefel and Johnson, 2004); physical activity (or inactivity) patterns (Frank et. al., 2004). Obesity may also spread through induction from one person to another connected through social and geographical networks (Christakis and Fowler 2007).

There is considerable regional variation in obesity (Wang et. al., 2007) across the United States. Obesity rates range from 20.5% in Colorado to 34.7 % in Louisiana (CDC, 2012). Variation in the prevalence of obesity suggests that environmental factors such as socio-economic characteristics, and food and physical characteristics affect to the local obesity rate (Hendrickson, Smith,and Eikenberry, 2006; Gordon-Larsen, Nelson, Page, and Popkin, 2006; Morland et. al., 2006; Holsten,2009; Larsen and Gilliland, 2009; Ford et. al., 2010; Russell et. al., 2011). In this paper we treat the local obesity rate as the outcome of the social, cultural, physical and dietary environment of a region. Using this premise we ask the question: if two otherwise similar individuals were assigned to environments with different obesity rates, would their BMI diverge?

Immigrants afford a unique opportunity to study the role environmental mechanisms – written broadly – that drive obesity. Up to the point they arrive in a new country, an immigrant's health has been affected only by the environment in their country of origin and not by environment of their destination country. Upon arrival, immigrants undergo a process of assimilation while being exposed to a new environment and social habits that induces them to adopt the life-style and habits of the natives. In turn this has an effect on their health. On arrival, immigrants are typically healthier than the native population, but over time their health status converges to that of the native population (Antecol and Bedard, 2006; Malmusi et. al., 2010).

We collect data from international graduate students who come to study the United States. International students provide an novel perspective for studying the effect of environment on obesity because of the limited control they have in choosing their environment. While applying to universities in the United States, international students may be less aware of the social and cultural conditions in and around university campuses. Moreover, international students have imperfect control over their eventual destination – students may not be offered admission or funding everywhere they apply. Because of this, environmental factors that drive obesity are plausibly unrelated to a student's choice of university. As a result, by studying this group we are able to offer novel credible evidence on how environment drives obesity. Put differently, if two otherwise similar international students arrive in the United

States but wind up in environments where prevailing obesity rates differ would their BMI diverge? For instance, does studying at a university in Mississippi with more than 32 percent obesity rate have a different effect on the students' health than studying at a university in Colorado where the obesity rate is 20 percent?

This paper makes two main contributions. First, it offers unique insight into the obesity epidemic by studying the effect of different environments on a unique population: international students. We attempt to answer the question: Does the prevailing rate of obesity in a given region affect the BMI of international students? Second, to the best of our knowledge this paper is the first to study how international students acculturate. We collect primary data from a large sample of international graduates students spread across the United States. The unique data for this study was collected through an on line survey of international graduate students currently studying at various public research universities across the United States. The survey asked students about their biometric information, food habits and other life style changes they have undergone since coming to the United States.

Estimating the causal effects of the surrounding area environmental characteristics on the individual's BMI level and health is challenging. Following Manski (1993), this type of empirical analysis potentially confounds two different effects: contextual effects and self-selection. We are interested in the contextual effect of the exposure of the international students to the common environmental factors faced by the native population in a given area. In this context, the international students may adjust their behavior to that of the native population because they face the same physical or environmental factors. A threat to identifying these effects is self-selection, i.e. that people select a group that consists of individuals similar to them. In this context if international students with higher BMI levels tend to select universities because they are located in regions with higher prevalence of obesity, then it will be difficult to distinguish the effect of the exposed obesity rate on their BMI.

We address this identification challenge by collecting data on international graduate students studying at public universities. The key identifying assumption, examined in greater detail below, is that the environmental factors that might lead to obesity are unrelated to the factors that affect the students' choice of universities. When applying to universities in the United States, international students may be less aware of the social and cultural conditions inside and outside the university campus than the native population. While students may choose to apply to universities with desirable environmental characteristics, acceptance and funding at any one university is uncertain, and is exogenous to the student's desire. For example, students aspiring to pursue graduate degree in Chemical Engineering, may apply to MIT. But the MIT graduate school acceptance rate is only 16% (MIT Annual Report, 2007) and is not a function of the student's desire to attend MIT. Hence, for students it is a constrained choice when they choose amongst prospective universities to which they have been omitted. Thus, it can be reasonably argued that international students in universities are nearly randomized with regard to the prevalence of obesity in that surrounding area.

The international graduate students are in the same age range, have similar educational qualifications, income level, and arrive in the United States considerably more physically fit than the native population. This population offers three advantages with respect to estimating peer effects. First, as the students were exogenously distributed in a population with whom they are required to spend the majority of their time interacting, the study could estimate peer effects without the self-selection bias. Second, as international students are a foreign population, they do not share the same initial environmental conditions as the pre-exiting population in the university area. Third, as we collected data on the health characteristics of students at the time of arrival in the country, this allows examining the effect of extrinsic physical factors and intrinsic environmental factors on the change in their health characteristics. Because of this, the self-selection bias will be less of a factor driving the BMI trajectory of international students, thereby isolating the contextual or the shared environmental factor. The study evaluates whether being introduced to an environment with a more obese population affects the BMI levels of the international graduate student population as they assimilate into the new environment. The study also examines whether this effect differs across the regions of residence of the students in the United States. Results indicate that students who were introduced into a population with high obesity prevalence had a significant increase in their BMI levels compared to those introduced into a population with lower obesity prevalence.

The paper proceeds as follows. First, we describe our survey methodology. We then motivate our research design and fully describe the variables of interest. We then describe our empirical approach and subsequently discus results. The final section concludes.

Research Design and Methods

Normally measuring the effect of environmental and social factors on health would require conducting randomized controlled trial, where specific individuals are assigned to different environments. Conducting such experiment may mean altering natural behavior of individuals. This type of experiment is unethical and not feasible. As a result, we adopt a natural experiment research design. The study of foreign students can be thought of as a natural experiment. It allows for the comparison of a population with similar characteristics, who are very nearly randomly exposed to different environments; specifically different obesity rate when they study at different public universities in the United States.

Currently there are 311,204 international graduates students enrolled in universities across the United States (Open Doors, 2013). According to the survey of international students, 45 percent of students choose their universities based on the recommendation from their friends, while 41 percent students make their decision based on the information provided on the university website (I-Graduate, 2009). This evidence supports our earlier claim that the

surrounding area obesity rate or the percentage of population who are obese or overweight is exogenous of the international students choice of university.

Survey Data Collection and Sample Characteristics

We used an online (web-based) survey for collecting data from international graduate students at public universities in 48 contiguous states of the United States. A web-based survey compared to their other counterparts (paper-based surveys, telephone surveys and face-to-face surveys) are relatively inexpensive, faster and can cover a wide range of geographical area. Research has shown that web-based surveys have a higher completion rate and the data collected from such surveys is equivalent to the data collected from other modes (Denscombe, 2006). The survey questionnaire was made available online and a link to the survey was sent to the students to their official email addresses by officials at their respective universities (typically the International Students Office).

An initial inquiry email was sent to the International Students Office or another equivalent office at the university. The International Students Office is primarily responsible for communicating with the international students at a university and it typically maintains a database of all the international students studying at the university. If the international students office did not reply then we contacted other offices such as Office of Students Affairs, the Registrar's office or the Office of Graduate Studies at the university. Consent form, invitation letter for participation in the survey and a link to access the survey were distributed to the students through an email by an official at the university. The survey participation was voluntary and the students could access the survey by clicking on the link provided in the email. The invitation letter of the survey also mentioned the incentive of being entered into a lottery[1] to win one of the five hundred $10 Amazon gift card[2]. The lottery incentive was adopted to increase, both the completion rate and the participation rate of the survey.

[1]A lottery incentive is a chance of winning a postpaid reward (Gift Cards are one such examples) offered to the survey participants for completing a survey. Every survey participant was automatically entered into a lottery. Findings from a survey of institutional researchers indicate that lottery incentives are common and effective method of improving students' response to surveys (Porter and Whitcomb, 2003).

[2]On completion of the survey, participants were directed to an external webpage, where they were asked to enter their email addresses. These email addresses were entered into the drawing for Amazon gift cards. The information about the incentive on the first page of the survey was intended to increase the participation rate of the survey. The provision to enter the email addresses at the end of the survey was intended to increase the completion rate of the survey. We have given away more than 540 Amazon gift cards to the survey participants.

Sample

We contacted 129 public universities, in the contiguous 48 states, which offered graduate degrees and had an International Students Office. Out of the 61 universities that gave us the permission, the survey was conducted in 52 universities between March 2013 and December 2013. In total we used survey data from 44 universities. In all, 3719 students completed the survey, of these 232 were non-graduate students and were dropped from the data set. Table 1 summarizes the details of the data collected from all the universities. Almost 46 percent of the sample consists of male students with an average age of 27 years. Students have spent an average of 2 years at their respective universities and 70 percent of them have some source of university funding available to support their studies. Almost 60 percent of the international graduate students came from India, China and other Asian countries.

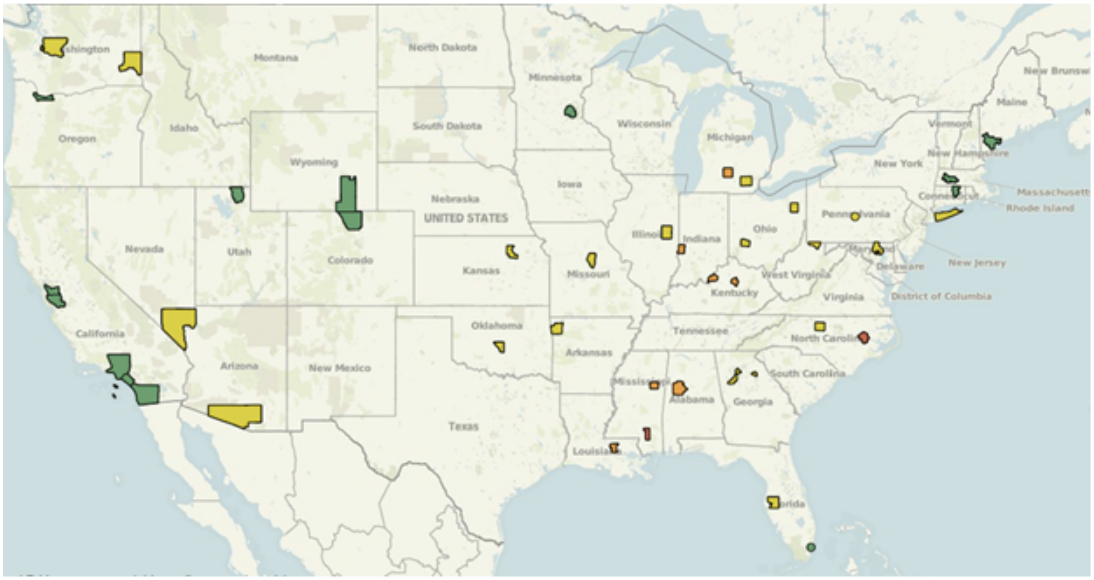
Table 1: Summary statistics of Survey participants socio-demographic background variables (n=3487)

Variable	Mean/Frequency	Min	Max
Male	0.464 (0.498)	0	1
Age (years)	27.22 (4.24)	22	52
Years spent at the current university	1.97 (1.70)	1	7
Unmarried	54.07%	0	1
Number of Adults in the household	2.69 (1.46)	1	9
Funded by University	71.04%	0	1
From India	24.83 %	0	1
From China	24.67%	0	1
From SE Asia	13.25%	0	1
From SW Asia	10.33%	0	1
From Latin America and Carribbean	8.48%	0	1
From Africa	6.34%	0	1
From Europe and Canada	11.13%	0	1

Table 7 shows the geographical distribution of the sample. It details the number of students who voluntarily participated in the survey at each university. The universities are linked to their respective counties and the health and demographic information for that county. The county level data is obtained from the County Health Rankings and Roadmaps program (County Health Rankings Nationals Data, 2013). Figure 1 shows the universities/counties in which the survey was conducted.

We divided the international students into three groups depending on the time they have spent at their current university. The three groups are 1) time spent $<= 1$ year, 2) 1 year $<$ time spent $<= 3$ years 3) time spent < 3 years. Table 2 shows descriptive statistics for weight

Figure 1: :Geographical Distribution of the Survey Participants



and BMI characteristics of the sample. The change in average BMI of the students is the lowest for the students with lowest time spent at the university, while it is the highest for those who have spent more time. This is the same case for change in weight. Average change in weight of the respondents is the lowest for the students who have spent the least time and the highest for those who have spent the more time at the university. The BMI is calculated from the measures of weight and height that are self-reported by the students. We acknowledge that there might be a reporting bias due the self-reported height and weight. We are unable to adjust the self-reported BMI measures as there in no reference data with measured height and weight available for international students or even for a broader immigrant population (Cawley et. al., 2009).

Empirical Analysis and Results

Our maintained assumption in this paper is that the international graduate students' choice of university is exogenous of the local obesity rate. In this section we will first proceed by empirical support of our assumption followed by the model and data analysis.

Table 2: Descriptive Statistics for BMI and Health Variables

Variable	All 1	Time <= 1 year	1<Time <= 3 years	Time > 3 years
Sample Size	3526	1697	984	845
Initial Avg BMI	21.91 (3.61)	21.94 (3.54)	21.99 (3.94)	21.73 (3.37)
Current Avg BMI	22.56 (3.74)	22.20 (3.51)	22.74 (3.99)	23.06 (3.82)
Change in Avg BMI	0.65 (1.93)	0.26 (1.56)	0.74 (2.08)	1.33 (2.28)
Desried Avg BMI	21.30 (2.66)	21.13 (2.58)	21.35 (2.83)	21.58 (2.60)
Initial Weight (kgs)	64.77(13.08)	65.00 (13.77)	64.93 (14.34)	64.08 (13.22)
Current Weight (kgs)	66.67 (14.03)	65.74 (13.54)	67.14 (14.38)	68.01 (14.45)
Avg Change in Weight	1.89 (5.75)	0.73 (4.59)	2.15 (5.96)	3.92 (6.89)

Selection Bias

In our survey the students ranked funding from the university and the ranking at the university as the two main reasons for selecting the university for pursuing their degree. This supports our exogenous distribution of international students. To empirically support this claim, we follow the method mentioned in Guryan, Kroft, and Notowidigo (2009) to test the baseline (initial) values for weight, BMI and other student characteristics of the international students. If the exogenous distribution assumption is false and our data has selection bias then the the baseline variables will be positively correlated to the exposed obesity rate. Specifically we are estimating the following equation

$$(1) \qquad (\text{Initial BMI})_i = \beta_0 + \beta_1 (\text{Current BMI})_i + \beta_2 (\text{Exposed Obesity Rate})_{ig} + \theta_i + \epsilon_{ig}$$

where θ is a vector of individual control variables. The control variables are age, time spent at the university, gender, number of adults in the household, county population and weather. Table 3 shows the estimation results for various measures defining the initial behavior of the international students. We find no statistical evidence that any of the international graduate student variables are positively correlated at baseline values with the obesity rate. The initial BMI and initial weight of the internationals students is negatively correlated to the obesity rate. As a robustness check, we estimated equation 2 for the country of origin of the international students as well as their GRE score. We find no statistical evidence between the country of origin and the local obesity rate.

We also estimate the number of responses obtained from each university using the above equation 1. We do this to rule out the possibility of bias because of obtaining a higher survey response from students from universities in regions with higher obesity rates. Result of this estimation is displayed in the last row of table 3. The result is not significant thus ruling out the selection bias due to higher number of responses from higher obesity rate

regions.

The above results support our main assumption of exogeneity between the international students' choice of university and the local obesity rate.

Table 3: Test for Exogenous Distribution of the Students

Variable	Correaltion Co-efficient	Standard Deviation
Initial BMI	-0.016	0.009
Intiail Weight	-0.048	0.305
From India	-0.003	0.003
From China	0.001	0.004
From Asia	-0.004	0.005
From Africa	0.004	0.003
From Europe	-0.001	0.001
From Latin America	0.001	0.002
[1ex] Number of responses	-6.49	4.748

Empirical Model

Having established that the international students are distributed exogenous of the local obesity rate, now we concentrate on the exposed environmental effect or contextual effect. We estimate the environmental or contextual effects using a simple linear model where the current weight (BMI) of the students is a function of the students weight (BMI) on arrival to the university and the local obesity rate. The specification is as follows

(2)
$$(\text{Current Weight})_i = \beta_0 + \beta_1 (\text{Initial Weight})_i + \beta_2 (\text{Exposed Obesity Rate})_{ig} + \beta_3 \text{Height}_i + \epsilon_{ig}$$

where i is the individual student at university g. Equation 2 is also estimated with current BMI as the independent variable and initial BMI as the explanatory variable. BMI has a non-linear structure and hence is prone to produce measurement bias (Yakusheva et. al., 2014). So we also use weight conditioned on height as a robustness check.

As we are measuring the effect of exposed local obesity rate on the change in weight (BMI) of the international graduate students, hence the above equation can also be written as

(3) $$(\text{Change in Weight})_i = \beta_0 + \beta_1 (\text{Exposed Obesity Rate})_{ig} + \beta_2 (\text{height})_i + \epsilon_{ig}$$

There are several possible explanations why the coefficient on the exposed obesity rate is

different from zero in this model. When international students arrive at the university, they not only interact with the students from their own country but also with the native population. This interaction with the native population transmits information about the social, cultural and physical environment. These contextual effects have an influence on the behaviour of the international students, also referred to as acculturation in the social science literature. Numerous studies have shown a positive effect of acculturation on the BMI levels of the foreign population (Antecol and Bedard, 2004; Basu and Insler, forthcoming). Within the context of the neighbourhood of where an international student performs his/her daily activities, the native population in that neighbourhood may influence the students behaviour. This influence can have a positive or negative effect on student's health. For instance consider the case of physical activity comparison between the states of Minnesota and Arkansas. According to America's Health Rankings (2013), 83 percent of Minnesota's population involves in some kind of physical activity or exercise as compared to 69 percent of Arkansas's population. So it can be claimed that a physically fit environment of Minnesota influences a foreign individual to adopt a physically fit lifestyle as compared to a not so physically fit environment of Arkansas. Similarly if obesity rate, that is the percentage of obese people, is higher in a region, it might have a positive influence on the international student's weight as compared to a region with lower obesity rate. In sum it seems strongly plausible that the local obesity rate has a causal effect on the weight of international graduate students.

Finally we estimate equation 4, which contains the interaction between the exposed/local obesity rate and the time spent by the students at the university. This is done in order to investigate the effect of exposed or local obesity rate with respect to time.

$$(4)\quad (\text{Change in Weight})_i = \beta_0 + \beta_1 (\text{Exposed Obesity Rate})_{ig} * Time_{ig} + \beta_2 (\text{height})_i + \epsilon_{ig}$$

We estimate three specifications of equation 3 using ordinary least squares. Table 4 displays the results for all the specifications. In the first specification, we estimate the influence of exposed obesity rate on the change in weight (BMI) of international students. Results show that the obesity rate has a significant positive effect (0.106) on the change in weight of the students. This implies that students who are exposed to a higher obesity rate have a higher increase in their weight.

In the second specification we estimate a model using the students individual characteristics as control variable. Obesity rate has a significant and a positive effect (0.119) on the change in weight of the international students. In the third specification we perform a robustness check by adding the environmental variables such as access to parks, recreations facilities, rural areas which may be correlated to the exposed obesity rate. The effect of obesity rate is positive and significant in this case as well.

We estimate the same three specifications for equation 4. We divided the international students into three groups depending on the time they have spent at their current university. The three groups are 1) time spent <= 1 year, 2) 1 year < time spent <= 3 years 3) time spent < 3 years. Results provide a validity check for the earlier results. From table 5, the results show that the students who have spent longer time at the university gained more weight. This result is similar to previous research which has found that the BMI of the immigrants increases with the increase in the time of their residence (Antecol and Bedard, 2006; Kaushal, 2009). Also, those students who are at universities in regions with higher obesity rates gained more weight as compared to the students who are at universities in regions with lower obesity rates. This results supports our hypothesis of students placed in higher obesity regions gaining more weight as compared to students in lower obesity region.

Table 4: Results

	(1)	(2)	(3)
Dependent Variable: Change in BMI			
Exposed Obesity Rate	0.0362***	0.0392***	0.0298**
	(0.009)	(0.010)	(0.014)
Dependent Variable: Change in Weight			
Exposed Obesity Rate	0.106***	0.116***	0.0917**
	(0.028)	(0.032)	(2.09)
Height	-0.431	0.141	0.0148
	(1.028)	(1.098)	(1.131)
Individual Control Variables	No	Yes	Yes
Environmental Variables	No	No	Yes
Observations	3526	3526	3526

Standard Errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ [3]

The estimates in all the columns of the tables 4 and 5 are consistent with the idea that students who are exposed to an environment with higher obesity rate gain more weight that the students who are exposed to an environment with lower obesity rate. In table 4 we see that the individual demographic control variables do a mildly better job of explaining the unobserved heterogeneity between the students.

[3]The individual control variables are gender, age, marital status, region of origin, years spent at the current university and number of adults in household. The environmental variables are, if the county is rural, per capita recreational facilities, per capita parks and number of sunny days in the region.

Table 5: Results

	(1)	(2)	(3)
Dependent Variable: Change in BMI			
Obesity Rate * Time <= 1 year	0.0168*	0.0206**	0.0206**
	(0.008)	(0.007)	(0.009)
Obesity Rate * 1<Time <= 3 years	0.0331***	0.0322***	0.0322***
	(0.007)	(0.008)	(0.010)
Obesity Rate * Time > 3 years	0.0553***	0.0525***	0.0524***
	(0.008)	(0.008)	()
Dependent Variable: Change in Weight			
Obesity Rate * Time <= 1 year	0.0480*	0.0612**	0.0638**
	(0.025)	(0.023)	(0.029)
Obesity Rate * 1<Time <= 3 years	0.0962***	0.0950***	0.0975***
	(0.023)	(0.023)	(0.031)
Obesity Rate * Time > 3 years	0.163***	0.156***	0.158***
	(0.024)	(0.025)	(0.030)
Individual Control Variables	No	Yes	Yes
Environmental Variables	No	No	Yes
Observations	3526	3526	3526

Standard Errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Robustness Check

In this section we try to understand if the change in weight or BMI levels is due to a behaviour change of the students since coming to their respective universities. We use relevant behavioural characteristics such as change in amount of exercise, change in dietary habits such as increase in consumption of meat, sweats, fast food or restaurant food and change in values and cultural beliefs. These variables are based on the questions asked in the survey about the change in habits and lifestyle after coming to the United States. All the variables are binary measures for change or increase in a particular behaviour after arriving at the universities. Results from table 6 indicate that the behaviour change variables enhance the impact of local obesity rate on the increase in BMI and weight of the international students. The co-efficients for increase in consumption of meat and sweets are positive and significant. It implies that increase in consumption of sweets and meat was influential in the increase in weight of the students after coming to the university. Similarly for students who had increased level of physical activity or exercise, they had a decrease in their BMI levels or weight after coming to the United States. Both the results are according to our expectations.

Table 6: Test for Influence of Change in Behaviour on Weight and BMI

Dependent Variable:	Change in Weight	Change in BMI
Obesity Rate	0.127***	0.042***
	(0.031)	(0.010)
Increase in Exercise	-0.765***	-0.269***
	(0.193)	(0.064)
Learn New Values	0.031	0.013
	(0.132)	(0.064)
Increase in consumption of sweets	1.939***	0.658***
	(0.239)	(0.080)
Increase in consumption of meat	1.253***	0.410***
	(0.220)	(0.074)
Change in Eating Habits	0.230	0.081
	(0.244)	(0.081)

Standard Errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Conclusion

Understanding the causes of spread of obesity is important for developing appropriate policies to curb the spread of obesity. In this paper we see that obesity rate of a region has a positive effect on the BMI level of the exposed individual. When an individual is introduced into an obese environment, the individual adopts the behavior of the peers in the environment which results in a positive influence on the individual's weight or BMI.

We collected primary data from the international graduate students studying at public universities across the United States. We assume that the students choice of university is exogenous of the existing obesity rate in neighbourhood of the university. As international students acculturate to the new environment they adopt the lifestyle of the people of the environment, with whom they interact, directly or indirectly. We find statistically strong evidence that a higher obesity rate or the presence of higher percentage of obese individuals in the surroundings has a positive effect on the weight/BMI of the international students. We also find that students who spend more time in region with higher obesity rate gain higher weight as compared to students in regions with lower obesity rate.

Most of the current research have studied the effect of roommates or close peers on the BMI levels of the individuals. The findings from our study suggests that there is a social and surrounding environment effect on the BMI levels of weight of the individuals. International students interact with the surroundings in the form of local food consumption, adopting social and cultural habits or communicating with the native population.

The result suggests that though obesity spreads through the interaction of the individuals with an obese environment. , we do not reject the findings from the previous literature about the spread of obesity on a person-to-person basis. Rather we want to add to the results, that an individual who is exposed to an environment with higher percent of obese population, will have a positive effect on his or her weight. In conclusion if two similar individuals are placed in two different environments; one in higher obese environment and another in a lower obese environment, their weight and BMI will diverge.

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Table 7: Geographical Distribution of the Survey Respondents.

State	Sample	Obesity Rate	Avg Initial BMI	Avg Current BMI
Alabama	72	35	21.91	23.02
Arizona	179	26	22.29	22.59
California I	150	21	21.88	22.27
California II	115	23	22.05	22.38
California III	91	21	22.02	22.62
California IV	39	21	21.23	21.82
Colorado	58	18.6	21.58	22.29
Connecticut	53	23	22.50	22.68
Florida I	77	26	22.22	23.99
Florida II	73	24	22.02	22.57
Georgia I	103	28	20.94	22.43
Georgia II	103	28	22.68	23.21
Illinois	278	27	21.48	21.92
Indiana	29	33	23.36	24.67
Kansas	60	27	21.86	22.82
Kentucky I	29	34	22.01	23.74
Kentucky II	75	31	22.06	22.84
Louisiana	104	32	22.08	23.20
Maine	32	22	22.09	23.15
Maryland	29	27	21.16	21.87
Massachusetts	108	22	22.29	22.96
Michigan I	139	25	21.87	22.08
Michigan II	85	31	21.46	22.20
Minnesota	327	21	21.58	22.18
Mississippi I	75	36	22.01	23.22
Mississippi II	52	32	22.40	23.01
Missouri	264	28	22.07	22.54
Nevada	37	26	20.97	21.82
New York	84	26	21.99	22.25
North Carolina I	29	28	21.22	21.64
Ohio I	189	29.7	21.16	21.83
Ohio II	50	30	22.12	23.15
Oklahoma	61	30	21.16	22.98
Oregon	28	24	22.80	23.12
Pennsylvania	199	27	22.47	23.11
Texas	39	30	21.17	22.18
Utah	42	23	23.88	24.06
Washington I	100	28	21.28	22.20
Washington II	31	28	21.09	21.46
West Virginia	103	28	21.92	22.41
Wyoming	61	22	21.90	22.66