Does Immigration Help or Harm Children's Health? The Mayan Case*

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Objective. We explore how the health, as measured by physical growth, of children in Guatemalan Maya families is impacted by immigration to the United States. *Methods*. We analyze anthropometric data on Maya children in Guatemala and in the United States. In addition, we use survey data from the Maya-American children and their parents about lifestyle and SES to examine the factors associated with overweight and obesity. *Results*. The Maya-American children are on average 10 centimeters taller, indicating better health. However, nearly half the Maya-American children are overweight and 42 percent are obese. Children who report watching TV or playing computer games as one of their favorite leisure time activities face a higher chance of being overweight. *Conclusion*. Immigration from Guatemala to the United States improves the health of children in that they generally grow taller. However, immigration also raises the risk of weight problems, increasing the likelihood of health problems such as hypertension and diabetes.

Immigration from developing countries to the United States may increase access to health care and clean water, but it also introduces some unhealthy lifestyle patterns, such as diets dense in energy, especially fat, and little regular physical activity. Indeed, Popkin and Udry (1998) report that second-generation Asian-American and Hispanic adolescents are over twice as likely to be obese as first-generation immigrants. Obesity is a risk factor for childhood hypertension and diabetes and can foreshadow health problems in adulthood.

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The Maya of Guatemala began migrating to the United States, mostly from rural villages, in record numbers in the 1980s (Burns, 1993). Researchers estimate that since the onset of Guatemala's civil war in 1978, as many as half a million Guatemalan Maya have come to the United States (Loucky and Moors, 2000). The health of Maya children in the United States is likely to improve if the immigrants have access to a clean water supply, modern sanitation, and better health care services. However, the Maya-American children are also exposed to some unhealthy American lifestyle patterns (e.g., watching lots of TV) and many remain poor, so it is not clear how immigration to the United States impacts their health. This article uses anthropometric measures of physical growth as indicators of child health and examines how immigration impacts the health of children in Maya immigrant families.

Literature Review

Height, weight, and body composition are widely used indicators of nutritional and health status for individuals and the community. The physical growth and development of children, in particular, are sensitive indicators of the quality of the social, economic, and political environment in which they live (Bogin, 1999; Fogel, 1986; Komlos, 1994; Tanner, 1986). Poor environments result in poor growth, and growth-retarded children are more likely to become adults handicapped by poor health, impaired intellectual capacity, and reduced earning potential (Bogin, 1999; Brown and Pollitt, 1996). Height, weight, and body proportions may not only affect actual physical capacities, but may influence perceptions of one's capacities. Studies indicate that part of the economic consequences of obesity results from discrimination in the labor and marriage markets (Loh, 1993; Pagan and Davila, 1997).

Theory

Since the human phenotype is highly malleable and responds quickly to environmental changes, anthropometry is a good indicator of environmental quality (Mascie-Taylor and Bogin, 1995). Specifically, better environments tend to produce heavier, taller, longer-legged children, all of which indicate better health (Bogin, 1999; Brown and Pollitt, 1996). In contrast, when faced with a poor environment, the human body tends to conserve energy and protect internal organs by concentrating growth and development in the trunk area. Children growing up in these circumstances tend to be shorter and lighter, and have relatively shorter legs. Since socioeconomic status and access to public services tend to improve with immigration from less-developed nations to the United States, anthropological

theory predicts that on average the Maya-American children will be taller, heavier, and longer-legged than the Maya children remaining in Guatemala.

Self-selection is another possible explanation of why immigrants might be taller than nonmovers. Few studies, however, find evidence of selective migration from rural to urban areas (Bogin, 1988). Furthermore, since war pushed many Maya out of Guatemala, we expect less selectivity here than in strictly voluntary migrations.

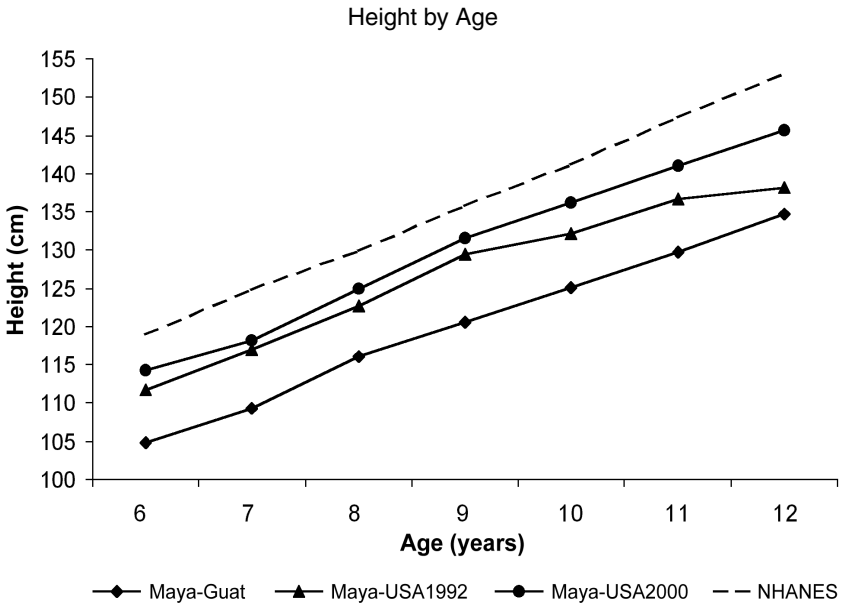
The economic model of parental investment assumes that parents benefit from the successful development of their children and thus will invest resources in children's well-being, by purchasing, for example, health care (Becker, 1981). Parental income constrains this investment, so children in lower SES families will receive less parental monetary investment and will face a higher risk of poor health, *ceteris paribus*. Consequently, we expect children in Maya immigrant families, most of whom are poor, to be shorter on average than the typical American child, but taller than Maya children remaining in rural Guatemala. The parental investment model also predicts that less will be invested per child in larger families, *ceteris paribus*, so we also predict that children with more siblings will face a higher risk of poor health.

Immigration exposes newcomers to some unhealthy American lifestyle patterns, such as eating more fat and engaging in less physical activity. If Maya immigrant families adopt these American lifestyle patterns their children will face a higher risk of weight problems. Thus, we predict that Maya children who assimilate to an American lifestyle are more likely to be overweight or obese. The likelihood of weight problems will be even stronger if immigrants hold the belief that being heavier indicates prosperity and health, as is common in developing countries (Reddy, 1998; Stebor, 1992).

Descriptive Analysis

First we compare height and BMI (weight kg/height^2 m) measurements for Maya children living in Guatemala and Maya children living in the United States. All measurements were collected following standard procedures (Cameron, 1984). Luis Rios of the Universidad Autónoma de Madrid provided height and weight data gathered from school-aged children in Guatemala in 1998 (n = 1,297), named the "Maya-Guat" data set. Anthropometric measures were collected from 128 Maya children in Los Angeles and 105 in Indiantown, Florida in the early 1990s (Bogin and Loucky, 1997). In both locations children have access to Women, Infants, and Children (WIC, a government-sponsored health and nutrition program), school lunches, and public health clinics. The Los Angeles and Indiantown children were similar in terms of age, height, and weight distributions so we combined their data, creating the "USA1992" data set. We measured 90 Maya children, 6 to 12 years old, in Los Angeles in 1999 and 690 children

FIGURE 1



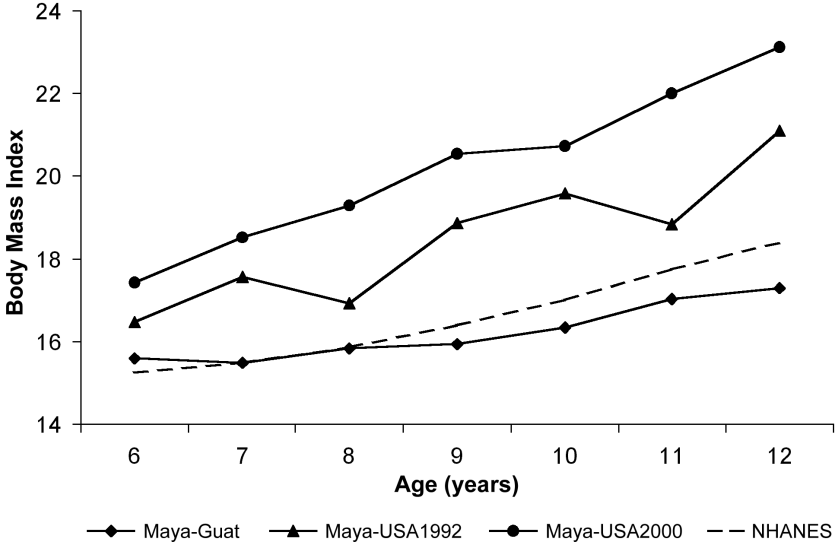
attending the public and private elementary schools in Indiantown the following year, 296 of whom are Maya. We combine the Maya information from these two sources to create the "USA2000" data set.

Figure 1 shows the average height by age for the three data sets and the National Health and Nutrition Examination Survey (NHANES) reference standards. The latter represents the average height by age for American children. All three Maya samples fall below the NHANES standards, indicating that the Maya children are shorter than U.S. children on average. However, both samples of Maya children in immigrant families are, on average, much taller than the Maya children in Guatemala (Maya-Guat). These results are consistent with the prediction that the United States offers a better environment than rural Guatemala and suggests that chronic undernutrition is less of a problem for the immigrant children. The Maya children living in the United States also exhibit longer legs on average than the Guatemalan children, suggesting that part of their gain in stature results from better leg growth (Bogin et al., in press).

Figure 2 compares average BMI across the samples and the NHANES reference standards. BMI measures weight relative to height and indicates the amount of body fat. The Maya-American children exhibit higher average BMIs than do the Maya children in Guatemala and they generally are heavier than the NHANES standards.

FIGURE 2

BMI by Age



Inferential Analysis

Data availability restricts inferential analysis to the Indiantown 2000 sample. We focus on three anthropometric measures of health: low weight for age, stunting, and overweight. Low weight for age is defined as having a weight for age (standardized by gender) below the third percentile on the Centers for Disease Control (CDC) growth charts (Kuczmarski, 2000) and indicates current undernutrition and poor health. Stunting is defined as having a height for age (standardized by gender) below the third percentile of the CDC growth charts and indicates chronic undernutrition and poor health. Overweight means a child has a body mass index, standardized by age and gender, above the 85th percentile on the CDC growth charts. Among the overweight, those with a BMI exceeding the 90th percentile are considered obese.

None of the children observed recently in Indiantown exhibit low weight for age, indicating that current undernutrition is not a major health concern. Table 1 presents the rates of stunting, overweight, and obesity observed in this sample. About 12 percent of the Maya-American children are stunted, suggesting that the effects of chronic undernutrition are still a concern for this particular immigrant group. European-American and African-American children exhibit much lower rates of stunting, 0 percent and 0.7 percent respectively. The Maya-American children display the highest rates

TABLE 1

Prevalence of Stunting, Overweight, and Obesity: Indiantown 2000

	Stunted	Overweight	Obese	n
Maya Amer.	11.5%	48.6%	42.2%	296
Mexican Amer.	3.8	35.0	28.0	157
Haitian	7.7	30.8	23.1	13
Euro. Amer.	0.0	24.5	18.4	49
African Amer.	0.7	31.7	25.9	139
Others	0.0	41.7	38.9	36
Total	6.1	39.7	33.5	690

of overweight and obesity; nearly half are overweight and 42 percent are obese. Children in the other ethnic groups also exhibit levels of overweight and obesity that raise concern.

What explains the incidence of stunting, overweight, and obesity among these children? We interviewed 290 of the children measured regarding their diets and patterns of physical activity. The children reported whether they had eaten in a restaurant the week of the interview (Eatout, yes = 1) and the number of glasses of milk they usually drink each day (Milk). We suspect that children in immigrant families who reported eating out have adopted some unhealthy American eating habits, such as eating higher fat "fast" foods, and are thus more likely to be overweight or obese. The nutrients in milk, particularly calcium, are associated with healthy physical development. Thus, we expect that children who drink more milk will be taller on average.

When the children reported their favorite leisure activities we noted whether they reported watching TV or playing on the computer (TVComp = 1). We hypothesize that the children who like to watch TV or play computer games are likely to be more sedentary than the children who do not. TV watching may also reflect greater exposure to American culture, as well as exposure to advertisements for higher fat foods.

We were able to survey parents of only 42 of the private school children regarding their family's socioeconomic status. The vast majority of respondents were Maya whose child was born in the United States. One of the child's parents, typically the mother, reported annual parental income (FamInc), number of children (Nkids), and whether money was sent to relatives living elsewhere (Send$, yes = 1). We offered the survey in both Spanish and English and noted which version the parent chose (Language, Spanish = 1). The choice of language proxies the degree of assimilation to the United States.

Only five children in this subsample fell below the third percentile in the CDC height distribution, precluding estimation the determinants of stunting. Table 2 presents the logistic regression results for the determinants of overweight and obesity. There is evidence that children with more siblings

TABLE 2

Logistic Analysis of Probability of Overweight and Obesity

	Overweight			Obesity		
Independent Variable	B	χ^2	*p*	B	χ^2	*p*
Eatout	–1.312	1.612	0.204	–0.514	0.265	0.607
FamInc	0.00	1.439	0.230	0.000	3.549	0.060
Language	**–2.526***	5.436	0.020	**–2.648****	6.707	0.010
Milk	0.147	0.117	0.732	–0.029	0.005	0.942
Nkids	**1.373****	12.996	0.000	**1.127****	10.350	0.001
Send$	–0.799	0.743	0.389	0.567	0.443	0.506
TVComp	**2.095***	5.981	0.014	0.842	1.104	0.293
Constant	–7.109			–5.695		

Cox & Snell R^2 = 0.404 (Overweight); = 0.296 (Obesity).

Nagelkerke R^2 = 0.540 (Overweight); = 0.402 (Obesity).

*Denotes statistical significance at the 5 percent level.

**Denotes statistical significance at the 1 percent level.

face a higher probability of overweight ($p = 0.00$) and obesity ($p = 0.001$). This seems to contradict the parental investment hypothesis. Perhaps the number of children in a family is correlated with some other factor positively related to BMI, such as type of food served or amount of physical activity.

Children who report that one of their favorite leisure activities is watching TV or playing on the computer also face an increased risk of being overweight ($p = 0.014$), but not for obesity ($p = 0.293$). This partially supports the hypothesis that children who adopt a more American, sedentary lifestyle are more likely to become overweight. This result is consistent with the medical literature (e.g., Dietz and Gortmaker, 1985).

Children whose parents responded to our questionnaire in Spanish face a lower risk of being overweight ($p = 0.02$) and obesity ($p = 0.01$). If parents who prefer Spanish tend to retain more Guatemalan traditions and lifestyle patterns, then this result supports the hypothesis that children in families that are less assimilated to an American lifestyle are less likely to face weight problems.

Discussion

Our descriptive analysis suggests that immigration from rural Guatemala to the United States improves the health of Maya children in that they are taller and have longer legs than children remaining in Guatemala. Furthermore, low weight for age is much less a problem among the immigrant children than among their counterparts in Guatemala. The Maya-American

children, however, present higher rates of overweight and obesity than both their Guatemalan counterparts and U.S. reference standards. Such weight problems raise significant health, social, and economic concerns.

Logistic analysis using a small subsample of Maya children living in Florida suggests that children whose families retain more of their native traditions face a lower risk of weight problems. Furthermore, there is evidence that children who report that watching TV or playing computer games is a favorite pastime face a higher risk of overweight. These results must be considered tentative since they are based on a small sample. However, we do identify some family and lifestyle factors that may contribute to overweight and obesity among Maya immigrant children that merit further investigation. Whether these results hold for other ethnic groups is a matter for further research. Nevertheless, the alarming rates of overweight and obesity among the large sample of children we measured suggest that schools and parents would be well advised to encourage regular physical activity and the consumption of well-balanced diets for their children. Parents may benefit from instruction regarding the healthy ranges of weight for children and the adverse consequences of excess weight in childhood.

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