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Race/Ethnicity, Nativity, and Trends in Body Mass Index among U.S. Adults

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Abstract

Objective—The average body mass index (BMI) is rising even as the U.S. population grows increasingly diverse. We extend prior research by examining BMI trends in diverse groups including whites, blacks, Chinese, Filipinos, Asian Indians, Mexicans, Puerto Ricans, and Cubans who are U.S. born, recent immigrants, or long-term immigrants.

Methods—We pool cross-sectional data from the 1989 to 2011 waves of the National Health Interview Survey (N=989,273) and use linear regression models to examine trends in BMI among U.S. adults.

Results—Annual increases in BMI are greatest among U.S. born Puerto Ricans and Mexicans and slowest among foreign born Chinese. Among the U.S. born in 2011, Chinese adults have an average BMI below the threshold for overweight, whereas blacks, Mexicans, and Puerto Ricans have average BMIs in the obese range. Foreign born adults average lower BMIs than U.S. born adults in most race/ethnic groups, and nativity disparities generally widen over time. BMI increases across calendar periods rather than birth cohorts.

Conclusion—Our results suggest that calendar period interventions may be particularly useful in reversing rising BMIs in the U.S. However, interventions must be tailored to different race/ethnic and nativity groups in order to reduce disparities in body mass.

Keywords

body mass; nativity; race/ethnicity; trends

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INTRODUCTION

The prevalence of obesity (i.e, a body mass index [BMI] of 30 kg/m^2 or higher) among U.S. adults increased from 13% to 35% between 1960 and 2011 (1). There are substantial race/ethnic disparities in BMI, and immigrants average lower BMIs than their U.S. born counterparts (2–4). The growing diversity of the U.S. population, coupled with high rates of immigration, may result in substantial race/ethnic and nativity disparities in body mass in the coming decades. In turn, race/ethnic and nativity disparities in BMI presage disparities in related outcomes including cardiovascular disease, some cancers, diabetes, morbidity, disability, premature mortality, and medical expenditures (5–7).

Our first aim is to examine disparities in BMI among U.S. adults in eight race/ethnic groups, by nativity. We focus on groups for whom limited research exists (3, 4, 8, 9), including Hispanic subgroups (i.e., Mexicans, Puerto Ricans, and Cubans) and Asian subgroups (i.e., Chinese, Filipinos, and Asian Indians), in addition to non-Hispanic whites and blacks. Race/ethnic diversity in the U.S. is increasing, in part due to high rates of immigration; in 2009, foreign born individuals comprised 12.5% of the U.S. population (10). (Although Puerto Ricans are U.S. citizens at birth, we refer to island born Puerto Ricans as foreign born to simplify our discussion.) Immigrants often have better health, lower mortality, and lower BMIs than their U.S. born counterparts, even after adjusting for the lower socioeconomic status (SES) of many immigrants (2–4, 11, 12). But health benefits associated with being an immigrant wane as immigrants spend more time in the U.S., with advantages becoming quite modest for those immigrants living in the U.S. for more than 15 years (2, 3, 12, 13).

Our second aim is to examine calendar period trends in BMI by race/ethnicity and nativity over the past two decades. Most studies that examine race/ethnic and nativity differences in BMI do not consider temporal trends (2–4, 14, 15) nor distinguish among period and cohort trends (16). But the relative importance of period or cohort forces for shaping BMI trends has important public health implications (17). If we find that successively heavier birth cohorts drive increases in BMI, then interventions may be most successful if they identify critical moments that set cohort members on lifelong body mass trajectories (e.g., early life exposure to high-sugar or high-fat nutritional environments). Alternately, if we find that calendar period drives increases in BMI, then public health interventions may be most successful if they target members of all ages and birth cohorts simultaneously.

Several studies have emphasized the importance of birth cohorts (18, 19), another emphasized period trends (20), and others remain agnostic about whether birth cohort or period effects are more important drivers of BMI (21, 22). To our knowledge, Reither et al. (20) is the only prior study to employ advanced methods that allow the simultaneous adjustment of age, period, and cohort. They examined U.S. blacks and whites and found that calendar period trends had a strong linear association with BMI between 1976 and 2002, whereas birth cohort had a more modest association with BMI. We extend prior research by examining trends in BMI over the past two decades in a large, nationally representative sample of non-Hispanic whites and blacks, and detailed Hispanic and Asian subgroups, by nativity.

METHODS

The National Health Interview Survey (NHIS) is a nationally representative survey of the non-institutionalized civilian U.S. population, with a response rate of over 89% among eligible households, that conducts face-to-face interviews with all members of sampled families or their proxy respondents (23). We use data from 1989 to 2011 when examining non-Hispanic whites (N=724,740), non-Hispanic blacks (N=142,887), and Hispanic subgroups including Mexicans (N=82,834), Puerto Ricans (N=14,830), and Cubans (N=7,973), because 1989 is the first year that the NHIS collects information about nativity and 2011 is the most recent year of data available. Data on Asian subgroups were only available from 1992 to 2011, including Chinese (N=6,164), Filipino (N=5,525), and Asian Indians (N=4,320). We exclude other Asian and Hispanic subgroups due to small sample sizes and the inconsistent identification of those groups over time in the NHIS. We also exclude Native Americans due to the small numbers of foreign born Native Americans (i.e., native peoples from Canada, or South or Central America). This research was approved by the ethics review board at the University of Colorado Denver.

Variables

We calculated BMI as kg/m^2. Height and weight are typically self-reported. But from 1989 to 1996 about 38% of respondents' heights and weights are reported by proxy respondents, between 1997 and 2000 the NHIS did not allow proxy reports, and between 2001 and 2011 just 0.8% of the height and weight values come from proxy reports. Because proxy reports often understate weight, the greater prevalence of proxy reports in earlier waves could lead to biased trends in BMI. We follow the method outlined by Reither and Utz (24) to correct for biases in proxy reported weights.

Age in single years ranges from 18 to 84; we divide age by 10 so that our coefficients reflect decades of age. We drop those aged 85 or older because age is top-coded and we cannot calculate birth cohorts for those adults. We include age squared in our models because prior research demonstrates a concave relationship between age and body mass among adults (18, 20). Calendar year ranges from 0 (in 1989) to 23 (in 2011) for all groups except Asians, for whom survey year ranges from 0 (in 1992) to 20 (in 2011). Prior research (20) and our own ancillary analyses (not shown) find a linear relationship between calendar year and body mass over the period examined here. Five-year birth cohort indicators range from 1909 and earlier to 1990 to 1994 for all groups except Asians. Given later survey dates and smaller numbers of Asians in earlier birth cohorts, we combine the 1910 and earlier cohorts among Chinese and Filipinos and the 1915 and earlier cohorts among Asian Indians. Nativity is categorical and includes those born in the U.S., foreign born adults who have lived in the U.S. for less than 15 years, and foreign born adults who have lived in the U.S. for 15 or more years (16). Sex is coded dichotomously.

All models adjust for socioeconomic status (SES) variables. We set family income in each wave to 2011 dollars, adjust for the purchasing power of different sized families, divide income by $1,000, and take the log to account for diminishing returns to health with incremental increases in income (25). Education is coded as years of education completed. Employment status is coded as employed, unemployed, or not in the labor force.

Analysis

Age, period, and cohort exhibit linear dependence; knowledge of any two allows identification of the third. Our first model uses linear regression to predict BMI separately for each race/ethnic group with variables for calendar year, nativity, and interactions between calendar year and nativity, while adjusting for age, age squared, sex, and SES. The interaction terms allow calendar trends in BMI to vary by nativity. Models that exclude birth cohort variables risk overstating the effect of period trends in body mass, but limit issues of multicollinearity (and, thus, inefficient estimates) that result from including age, period, and cohort variables in the same model. Our first model is equivalent to models in prior research that examine age-adjusted calendar period trends in BMI, while excluding cohort variables (16, 18).

Our second model for each race/ethnic group further includes the birth cohort variables. These models break the linear dependence among age, period, and cohort by including continuous terms for age (i.e., age and age squared) and period, but 5-year categories for birth cohort. Notably, the cohort variables may capture any unmeasured variation in BMI by age and period because cohort is assessed more flexibly with dummy variables. Further, our estimates may be inefficient due to multicollinearity among the age, period, and cohort variables (26). Thus, our second model provides a stringent test of period trends.

We also present Tukey mean-difference plots to examine changes in the shape of the BMI distribution over time (3, 27). For each race/ethnic and nativity group, we calculate 20 quantiles when pooling BMI in the latest three waves (2009–2011) and then again when pooling BMI in the earliest three waves (1992–1994 among Asians and 1989–1991 for all others). Then we plot the difference in BMI between the corresponding quantiles in the latest and earliest waves against the mean of the combined quantiles.

About 18% of respondents are missing data on family income, but less than 3% are missing data on any other single variable. We use Stata to create ten multiply impute data sets with chained equation methods, and to conduct all other analyses (28). Multiple imputation assumes that data are missing at random conditional on observed covariates, a more plausible assumption than is made by listwise deletion (29). Chained equation methods allow us to multiply impute nominal variables that are not readily imputed with multivariate normal methods. Our standard errors account for the complex sampling frame used by the NHIS. Comparisons of weighted and unweighted regression estimates yield virtually identical coefficients, but larger standard errors in weighted models due to random error introduced in the construction of the sample weights over time (30). Because our models already adjust for variables that are used in the construction of the weights (e.g., age, gender) and are stratified by race/ethnicity, our final models exclude sample weights.

RESULTS

Table 1 shows means and percentages for our study variables by race/ethnicity. Blacks have the highest average BMIs at 27.9 kg/m^2, although all race/ethnic groups except for Asian subgroups average BMIs that are over 25 kg/m^2, the threshold for overweight. Nativity also varies by race/ethnicity; only 1.3% of whites and 3.6 % of blacks immigrated to the U.S. in the 15 years prior to interview, compared to 62% of Asian Indians, 47% of Chinese, and 27% of Mexicans.

Table 2 presents unstandardized linear regression coefficients for nativity, calendar period, interactions between calendar period and nativity, age, and age squared; all models adjust for, but do not show coefficients for sex and SES. To aid the interpretation of interaction terms, Figure 1 graphs the expected BMI values (from Table 2, Panel A), while holding all other covariates at their means. Solid lines show period trends for the U.S. born, dashed lines show trends for immigrants who have been in the U.S. for 15 or more years, and dotted lines show trends for immigrants who have been in the U.S. for less than 15 years. All graphs have the same scale on the vertical axis to facilitate comparisons across race/ethnic groups. The horizontal axis ranges from 1989 to 2011 for all groups except for Asians, which ranges from 1992 to 2011.

Three major findings emerge. First, BMI increases for all race/ethnic and nativity groups over the study period. Among U.S. born adults, coefficients for calendar year show that BMI increases most quickly among Puerto Ricans (b=0.20 kg/m^2), followed by Mexicans (b=0.17 kg/m^2), Cubans (b=0.16 kg/m^2), blacks (b=0.15 kg/m^2), whites (b=0.14 kg/m^2), Asian Indians (b=0.09 kg/m^2), Filipinos (b=0.08 kg/m^2), and Chinese (b=0.05 kg/m^2). The annual increase in BMI is significantly slower among short and long-term immigrants than among U.S. born whites, blacks, and Mexicans. Among Cubans and Puerto Ricans, the annual increase in BMI is significantly slower for immigrants who have been in the U.S. for 15 or more years than for those who are U.S. born, but is not significantly slower for immigrants who have been in the U.S. for fewer than 15 years. The annual rate of increase in BMI is similar across nativity for all three Asian groups examined.

Second, for most race/ethnic groups we find a nativity gradient in BMI—where the U.S. born have the highest BMIs, followed by immigrants who have been in the U.S. for 15 or more years and immigrants who have been in the U.S. for fewer than 15 years. In the earliest calendar period, short and long-term immigrants who are white, black, Chinese, Filipino, and Mexican average lower BMIs than their U.S. born counterparts. Also in the earliest calendar period, Chinese, Cuban, Mexican, Puerto Rican, and white immigrants who have been in the U.S. for less than 15 years have significantly ($p<0.05$) lower BMIs than immigrants who have been in the U.S. for 15 or more years.

Third, the nativity gradient in BMI generally widens over time for all non-Asian race/ethnic groups. U.S. born whites, blacks, Mexicans, Puerto Ricans, and Cubans experience faster increases in BMI than recent immigrants, long-term immigrants, or both, resulting in a growing disparity between the U.S. born and foreign born. However, rates of increase in BMI are not significantly different across nativity statuses for any of the Asian subgroups.

Panel B on Table 2 examines whether our estimated calendar period trends are sensitive to adjustment for birth cohort. Although adjusting for birth cohort variables offers a stringent test of our period trends, the regression coefficients for nativity, calendar year, and the calendar year by nativity interactions are all substantively identical to those shown in Panel A. Table S1 (see the supplemental materials) shows the birth cohort coefficients. Notably, only one cohort term across all eight models attains statistical significance—a finding that might arise due to chance.

Figure S1 (see the supplemental materials) presents Tukey mean-difference plots for each of the three race/ethnic and nativity groups. The dots for each race/ethnic and nativity group are generally above zero, indicating the BMI has increased over time. Further, for each race/ethnic and nativity group, the dots are generally highest on the vertical axis if they also have high values on the horizontal axis, demonstrating that BMI has increased the most over time in the highest quantiles of the BMI distribution.

DISCUSSION

Persistent increases in BMI are a pressing public health problem. Over 112,000 excess deaths resulted from obesity in 2000 (5) and 9% of medical spending in 2008 was associated with obesity (6). The average BMI in the U.S. continues to rise, even as the population becomes more diverse. Between the mid-1970s and 2010, the Hispanic population increased by over 300%, and the Asian population increased by over 660% (10).

We find substantial race/ethnic and nativity disparities in BMI. Among the U.S. born in 2011, Chinese adults are the only group to have an average BMI below the threshold for overweight. U.S. born Filipinos, Asian Indians, whites, and Cubans average BMIs in the overweight range ($25 \leq kg/m^2 < 30$). Consistent with prior research (8, 9) U.S. born blacks, Mexicans, and Puerto Ricans are the heaviest and average BMIs in the obese range ($kg/m^2 \geq 30$). Our Tukey mean-difference plots show that although the average BMI generally increased at all points in the BMI distribution for all race/ethnic and nativity groups, increases in BMI were often greatest at the higher ends of the BMI distribution. However, the upper tail of the BMI distribution is much lower for some race/ethnic groups (e.g., Asians), than for others (e.g., blacks and Mexicans).

Although BMI increased over time for all groups in our analyses, the strength of the annual increase varies by race/ethnicity and nativity. Asians generally had the slowest annual increases in BMI of any race/ethnic group examined, and did not experience widening disparities in BMI by nativity over time. Chinese of all nativities have the lowest average BMIs. Asian Indians also have very low BMIs and show minimal variability by nativity. U.S. born Filipinos had the highest average BMIs of the Asian subgroups examined, although foreign born Filipinos who have been in the U.S. for less than 15 years have BMI levels that are similar to U.S. born Chinese and Asian Indians of all nativities. But, despite their low average BMIs, prior research shows that Asians have a higher prevalence of type 2 diabetes relative to whites (31).

In contrast to Asians, Hispanics generally had the fastest annual increases in BMI of all the race/ethnic groups examined. Among U.S. born Hispanics, Mexicans have the highest average BMIs and Cubans have the lowest average BMIs. Further, Mexicans exhibit the greatest BMI disparities between U.S. born and foreign born adults, whereas nativity disparities in BMI are more modest and widened more slowly among Puerto Ricans and Cubans.

Although U.S. born blacks had the highest average BMIs in 2011, both blacks and whites had annual increases in BMI that fell between Asians and Hispanics. Both whites and blacks also exhibit clear nativity gradients in BMI, with U.S. born adults having the highest body masses, followed by foreign born adults who have lived in the U.S. for 15 or more years, and foreign born adults who have lived in the U.S. for less than 15 years. Blacks and whites also show the clearest evidence of widening nativity disparities in BMI over time of the groups examined. Wang and Beydoun (9) report that most studies find similar increases in BMI across race/ethnic groups; our results may differ because we consider annual increases in body mass separately by nativity.

Prior research has documented that U.S. born adults generally average higher BMIs than their foreign born counterparts (2–4, 11, 15), although our results suggest that those disparities vary across race/ethnic groups and over time. Better health among immigrants may arise from multiple factors including the selective in-migration of healthy individuals into the U.S., selective out-migration of unhealthy migrants out of the U.S., and protective diets or physical activity practices that some migrants bring from their countries of origin (2, 11, 12, 32–35). Our finding that BMI is increasing among even recent immigrants is consistent with evidence that body mass is increasing throughout the globe (33, 36, 37). Although immigrants reduce the average BMI in the U.S., even recent immigrants are not immune to increasing trends in BMI globally.

Consistent with Reither et al. (20) we find that BMI is more closely associated with calendar periods than with birth cohorts. In contrast, several studies (18, 19) find calendar period to be less important than birth cohort for driving obesity prevalence, and Reither et al. (20) find modest evidence of increasing obesity in recent birth cohorts. The lack of support for birth cohort variations in BMI in our data may result from our disaggregation of detailed race/ethnic and nativity groups.

Evidence that calendar period trends are more strongly associated with increases in BMI than birth cohort trends can aid public health intervention planning. Our findings suggest that interventions targeting all ages and all birth cohorts may be appropriate for slowing the rate of increase in BMI in the U.S. Brownell et al. (38) and Popkin et al. (33) also suggest that public health policies target all people (regardless of age or birth cohort), perhaps by taxing sugary drinks, improving food labeling, or regulating the marketing of processed foods. However, substantial race/ethnic and nativity differences in BMI suggest the need for policies that mitigate those disparities, such as improving the built and nutritional environments in disadvantaged communities (39, 40).

Strengths and Limitations

The strengths of our analyses include a large and diverse sample allowing us to examine eight distinct and understudied race/ethnic groups; compare U.S. born adults to short and long-term immigrants; and examine BMI trends for over two decades. Our finding of the importance of period trends in BMI has been documented previously with Hierarchical Age Period Cohort-Cross Classified Random Effects methods (20). But that research provides estimates for blacks and whites, and does not incorporate information about nativity or other race/ethnic groups. Unfortunately, advanced Age-Period-Cohort methods were not feasible in our sample given the relatively small numbers in our smallest race/ethnic and nativity groups. Inspection of influence statistics and residuals do not indicate problems with model specification, although variance inflation factors suggest that models including cohort variables have modestly inflated confidence intervals. Notably, we find similar results when modeling overweight status; obesity was too rare in some Asian subgroups to provide stable estimates.

Several limitations of our analyses warrant mention. First, our data do not have adequate sample sizes to disaggregate other Hispanics and other Asians into meaningful subgroups. Second, weight and height are based on self-reports. Self-reported weight and height show some misreporting, but BMIs from self-reported data nevertheless show similar relationships with all-cause mortality as objectively measured height and weight (7). Third, our data do not allow us to account for confounders of the association between migration and BMI.

Conclusion

Despite the social and health consequences of the global obesity epidemic, public health interventions that can reduce body masses at the population level are lacking (34). Our findings demonstrate significant race/ethnic and nativity differences in the level and rate of increase in body mass in recent decades. Interventions that target all ages and birth cohorts in the current U.S. population may be most able to reduce the burden of obesity. Indeed, obesity experts suggest the importance of period based public health policies such as restrictions on calorically dense foods, advertising campaigns that promote healthy eating, improved food labeling, and taxing sugary drinks (33, 34, 38). Nevertheless, policies that ignore race/ethnic and nativity differences may allow disparities to persist.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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What is already known about this subject

- The average body mass index (BMI) of U.S. adults has increased throughout the past five decades.
- Black and Hispanic adults have higher BMIs than white adults, who in turn have higher BMIs than Asian adults.
- Foreign born adults average lower BMIs than their U.S. born counterparts.

What this study adds

- In the U.S., there are substantial differences in BMI within Hispanic and Asian subpopulations. Cubans have lower average BMIs than Mexicans and Puerto Ricans, and Chinese have lower average BMIs than Filipinos or Asian Indians.
- The annual increase in BMI varies across race/ethnic and nativity groups. Among the U.S. born, Hispanics (i.e., Mexicans, Puerto Ricans, Cubans) have the fastest annual increases in BMI, whereas Asians (i.e., Chinese, Asian Indians, Filipinos) have the slowest annual increases. Foreign born adults generally have lower BMIs than their U.S. counterparts, and nativity disparities in BMI widen over time for all groups except Asians.
- Trends in increasing BMI are linked more closely to calendar periods than to birth cohorts.

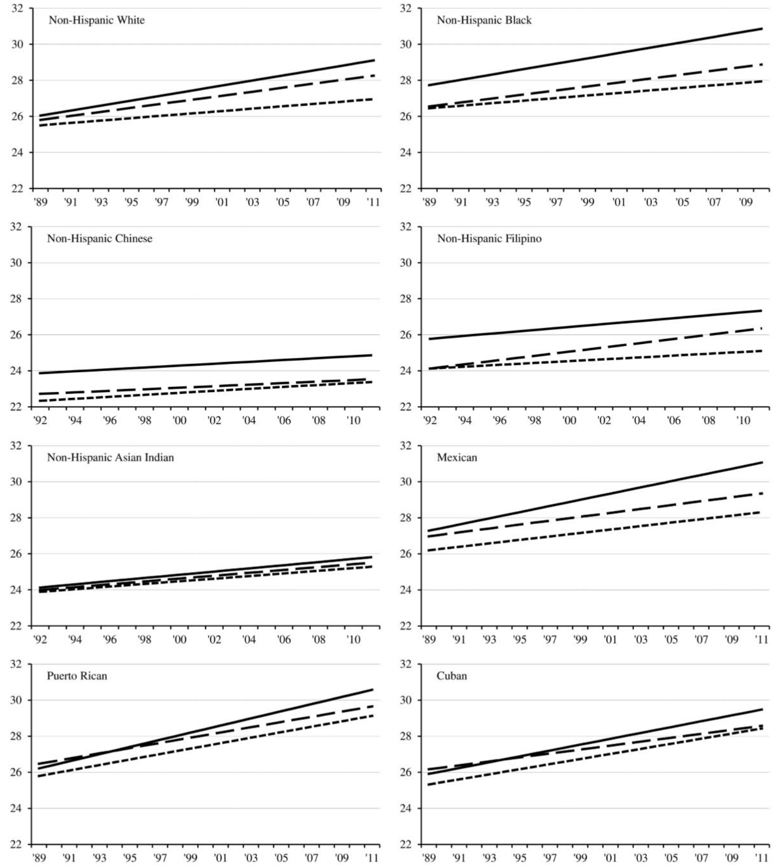

Figure 1.
Predicted trends in body mass by race/ethnicity for adults aged 18 to 84 who are U.S. born (solid lines), foreign born and have lived in the U.S. for 15 or more years (dashed lines), and foreign born who have lived in the U.S. for less than 15 years (dotted lines), NHIS 1989–2011. Derived from Table 2, Panel A.

Table 1

Means (standard deviations) and percentages of variables by race/ethnicity, adults aged 18 to 84, NHIS 1989–2011.

	Non-Hispanic					Hispanic Origin		
			Asian					
	White	Black	Chinese	Filipino	Indian	Mexican	Puerto Rican	Cuban
BMI (kg/m^2), mean	26.0 (5.2)	27.9 (6.2)	22.8 (3.8)	24.8 (4.2)	24.1 (3.8)	27.3 (5.4)	27.1 (5.7)	26.4 (4.9)
Overweight (kg/m^2 ≥ 25), %	52.3	65.5	23.4	42.0	37.3	64.3	61.2	58.0
Obese (kg/m2 ≥ 30), %	18.2	30.0	3.1	10.1	6.6	25.7	25.3	19.1
Nativity, %								
U.S. born	95.5	92.6	18.1	22.7	6.6	47.2	45.5	22.3
Foreign born, <15 years in U.S.	1.3	3.6	47.0	36.2	62.3	27.3	14.7	22.0
Foreign born, 15+ years in U.S.	3.0	3.5	34.6	40.7	31.0	24.9	39.1	55.4
Calendar year, mean	1996.4 (6.3)	1997.4 (6.8)	2000.5 (6.7)	2000.9 (6.7)	2002.1 (6.5)	1999.0 (6.4)	1998.6 (6.6)	1998.3 (6.3)
Age, mean	46.3 (17.3)	43.4 (16.7)	42.0 (1.6)	43.9 (1.6)	37.5 (1.3)	38.1 (14.9)	40.6 (15.7)	48.6 (17.9)
Cohort, %								
≤1909	0.6	0.4	--	--	--	0.1	0.1	0.5
1910–1914	1.9	1.1	0.5	0.4	--	0.3	0.5	1.3
1915–1919	3.2	2.0	1.0	1.0	0.3	0.7	0.7	2.8
1920–1924	4.9	3.3	2.0	2.0	0.4	1.5	1.6	5.0
1925–1929	5.7	4.3	3.0	3.3	0.8	2.3	2.9	7.2
1930–1934	5.8	4.9	4.0	3.8	1.7	2.8	3.9	7.9
1935–1939	6.2	5.6	4.6	4.9	2.7	3.5	4.9	8.2
1940–1944	7.4	6.6	4.9	7.0	4.8	4.4	6.3	7.6
1945–1949	9.3	8.1	7.5	9.7	6.3	5.9	7.8	7.1
1950–1954	10.3	10.1	9.8	9.8	7.2	8.1	9.2	8.4
1955–1959	11.1	11.3	10.1	11.6	8.6	10.6	10.4	8.7
1960–1964	10.7	11.5	12.9	10.8	11.3	12.6	12.6	10.5
1965–1969	8.9	10.6	11.9	10.7	13.2	14.0	13.1	9.2
1970–1974	7.2	9.6	11.7	9.9	14.4	14.3	11.8	7.8
1975–1979	3.6	5.4	7.3	7.5	13.0	9.6	7.5	4.0
1980–1984	2.1	3.0	4.9	4.4	9.7	5.7	4.0	2.5

	Non-Hispanic					Hispanic Origin		
			Asian					
	White	**Black**	**Chinese**	**Filipino**	**Indian**	**Mexican**	**Puerto Rican**	**Cuban**
1985–1989	1.0	1.6	3.2	2.6	5.1	2.8	2.1	1.1
1990–1994	0.2	0.5	0.8	0.6	0.6	0.8	0.6	0.3
Female (=1), %	53.4	60.0	52.4	58.4	44.8	52.8	59.5	53.9
Family income, $, mean	35,407 (26,951)	24,412 (23,109)	42,214 (35,327)	43,650 (31,059)	48,567 (36,349)	22,779 (20,497)	25,279 (23,473)	30,285 (25,550)
Education, mean	13.2 (2.7)	12.2 (2.9)	14.2 (3.8)	14.2 (2.8)	15.3 (3.1)	10.0 (4.0)	11.5 (3.5)	12.0 (3.8)
Employment status, %								
Employed	65.0	59.1	64.5	71.7	69.7	63.5	54.9	58.7
Unemployed	2.6	5.7	3.1	3.3	3.7	4.7	4.7	3.7
Not in the labor force	32.4	35.3	32.4	25.0	26.5	31.8	40.4	37.7
N (unweighted)	724,740	142,887	6,164	5,525	4,320	82,834	14,830	7,973

Table 2

Unstandardized linear regression coefficients and 95% confidence intervals for trends in BMI (kg/m^2), adults aged 18 to 84, NHIS 1989–2011.[a]

	Non-Hispanic		Asian			Hispanic Origin		
	White	Black	Chinese	Filipino	Indian	Mexican	Puerto Rican	Cuban
Panel A: Calendar Period, Nativity, and Age								
Nativity								
U.S. born	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Foreign born <15 yrs	−0.587*** (−0.755,−0.418)	−1.368*** (−1.566,−1.170)	−1.526*** (−2.025,−1.027)	−1.648*** (−2.281,−1.014)	−0.268 (−1.179,0.643)	−1.018*** (−1.205,−0.832)	−0.388 (−0.965,0.189)	−0.510 (−1.033,0.013)
Foreign born ≥ 15 yrs	−0.332*** (−0.432,−0.232)	−1.148*** (−1.400,−0.897)	−1.152*** (−1.663,−0.642)	−1.641*** (−2.378,−0.903)	−0.171 (−1.117,0.775)	−0.368*** (−0.557,−0.179)	0.255 (−0.126,0.635)	0.232 (−0.259,0.724)
Calendar year	0.139*** (0.136,0.142)	0.149*** (0.142,0.156)	0.053** (0.018,0.087)	0.082*** (0.035,0.129)	0.086* (0.008,0.164)	0.171*** (0.159,0.183)	0.198*** (0.175,0.221)	0.162*** (0.117,0.206)
Calendar year by:								
Foreign born <15 yrs	−0.073*** (−0.089,−0.057)	−0.078*** (−0.097,−0.058)	0.002 (−0.044,0.048)	−0.030 (−0.081,0.020)	−0.013 (−0.092,0.067)	−0.075*** (−0.090,−0.060)	−0.045 (−0.098,0.008)	−0.021 (−0.076,0.034)
Foreign born ≥ 15 yrs	−0.028*** (−0.038,−0.017)	−0.039*** (−0.059,−0.019)	−0.009 (−0.052,0.033)	0.034 (−0.021,0.090)	−0.006 (−0.089,0.077)	−0.063*** (−0.078,−0.049)	−0.053** (−0.084,−0.021)	−0.052* (−0.098,−0.007)
Age	3.425*** (3.380,3.469)	3.576*** (3.456,3.696)	1.764*** (1.334,2.193)	2.203*** (1.802,2.604)	3.472*** (2.935,4.008)	3.859*** (3.704,4.015)	3.395*** (3.116,3.674)	3.104*** (2.738,3.469)
Age squared	−0.322*** (−0.327,−0.318)	−0.352*** (−0.365,−0.339)	−0.156*** (−0.202,−0.110)	−0.213*** (−0.256,−0.170)	−0.339*** (−0.401,−0.277)	−0.393*** (−0.410,−0.376)	−0.341*** (−0.371,−0.310)	−0.296*** (−0.334,−0.258)
Panel B: Calendar Period, Nativity, Age, and Birth Cohort[b]								
Nativity								
U.S. born	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Foreign born <15 yrs	−0.593*** (−0.762,−0.424)	−1.265*** (−1.464,−1.067)	−1.500*** (−2.007,−0.992)	−1.586*** (−2.235,−0.937)	−0.252 (−1.204,0.700)	−1.030*** (−1.216,−0.844)	−0.370 (−0.948,0.207)	−0.448 (−0.973,0.078)
Foreign born ≥15 yrs	−0.318*** (−0.419,−0.218)	−1.125*** (−1.381,−0.870)	−1.074*** (−1.590,−0.557)	−1.546*** (−2.305,−0.787)	−0.101 (−1.112,0.911)	−0.306** (−0.502,−0.110)	0.259 (−0.147,0.665)	0.435 (−0.070,0.940)
Calendar year	0.140*** (0.131,0.149)	0.153*** (0.130,0.175)	0.066 (−0.010,0.143)	0.094* (0.003,0.185)	0.082 (−0.034,0.197)	0.195*** (0.165,0.224)	0.202*** (0.137,0.267)	0.136** (0.042,0.229)
Calendar year by:								
Foreign born <15 yrs	−0.072*** (−0.088,−0.056)	−0.090*** (−0.110,−0.071)	0.000 (−0.047,0.047)	−0.038 (−0.090,0.014)	−0.018 (−0.102,0.067)	−0.078*** (−0.093,−0.063)	−0.047 (−0.100,0.005)	−0.035 (−0.088,0.018)
Foreign born ≥ 15 yrs	−0.029*** (−0.040,−0.018)	−0.041*** (−0.061,−0.020)	−0.019 (−0.063,0.025)	0.025 (−0.033,0.084)	−0.014 (−0.106,0.078)	−0.071*** (−0.086,−0.056)	−0.048** (−0.083,−0.012)	−0.082** (−0.132,−0.033)
Age	3.391*** (3.282,3.501)	4.119*** (3.836,4.403)	1.533** (0.605,2.461)	2.228*** (1.225,3.230)	3.679*** (2.630,4.728)	3.709*** (3.363,4.056)	3.735*** (2.965,4.505)	3.136*** (2.107,4.165)
Age Squared	−0.318*** (−0.325,−0.310)	−0.413*** (−0.431,−0.394)	−0.138*** (−0.211,−0.066)	−0.217*** (−0.286,−0.149)	−0.351*** (−0.437,−0.264)	−0.393*** (−0.421,−0.365)	−0.382*** (−0.440,−0.325)	−0.245*** (−0.307,−0.183)

Notes:

*** $p<0.001$;

** $p<0.01$;

* $p<0.05$

[a] All models also adjust for gender, employment status, logged family income equivalence, and years of education.

[b] Coefficients for the birth cohort variables are shown in Table S1.