

Original Article

Longitudinal study of body mass index in Asian men who immigrate to the US

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Background and Objectives: Cross-sectional studies indicate that adaptation to Western norms, especially at a younger age, might explain the higher average body mass index (BMI) among Asians living in the United States (US) compared to Asians living in Asia. However, migrants differ from non-migrants in sociocultural factors that are difficult to measure and, thus, longitudinal studies on the same individuals prior to and after immigration are needed. The objective of this study was to determine differences in changes in BMI across age by residence (US or Asia) and age at immigration using longitudinal data on BMI prior to and after immigration. **Methods and Study Design:** The California Men's Health Study includes 1,549 foreign-born Asian men who were aged 44-71 at baseline in 2002-03. BMI at ages 30, 40, 50 and 60 was calculated using self-reported weight history and current height. Residence at each age decade and age at immigration were determined. Data were analyzed using generalized estimating equations. **Results:** Ten-year BMI increases were smaller among Asians who lived in Asia prior to migrating to the US compared to those who already lived in the US. This effect was most evident between ages 30-40 when Asians in Asia had a 0.69 kg/m² (95% CI: -1.08, -0.30) smaller increase in BMI. Immigrants who moved to the US before age 40 experienced greater increases in BMI than immigrants who moved to the US at an older age. **Conclusion:** This study is the first to support the hypothesis that living in the US and younger age at immigration results in larger BMI increases in Asian men.

Key Words: Asians, immigration, acculturation, body mass index, residence

INTRODUCTION

The Asian population in the United States (US; here: Asian Americans) is rapidly expanding with 15 million Asian Americans currently living in the US.¹ Asian Americans in general as well as key subpopulations represent understudied ethnic groups in relation to disease risk.² Most research on immigration and acculturation (i.e. transition from a traditional to a Western lifestyle) focuses on Hispanics,³ although new Asian immigrants to the US outnumbered new Hispanic immigrants in 2010 (430,000 vs 390,000)⁴ and the literature on Hispanics cannot be applied to Asians as diverse immigrant groups experience different acculturation processes.^{5,6} In addition, previous research on Asian Americans combines all Asians into one group and ignores heterogeneity.^{2,7}

Asian Americans have, on average, a higher body mass index (BMI) compared to Asians living in their ancestral

countries.^{8,9} This difference may be due to exposure to a Western environment in the US. Extant literature is limited to small, cross-sectional studies and does not fully explore critical aspects of the migration experience. The lack of longitudinal studies is especially troubling because immigrants to Western countries differ from their native counterparts who do not migrate in many environmental and cultural factors that are difficult to meas-

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ure.^{10,11} For example, immigrants in general are healthier and wealthier than their native counterparts who do not migrate, but this health advantage tends to diminish with increasing time spent in a Western country.¹² Previous, cross-sectional studies among Asians in Asia versus Asians in the US were not able to control for these differences in the types of people who choose to immigrate versus those who do not.^{8,9} Thus, the role of immigration to the US on the higher levels of BMI observed among Asians living in the US remains uncertain. To answer this question, data on the same individuals before and after immigration are required.

Once immigrants move to the US, they are exposed to a Western obesogenic environment, which is characterized by increased access to energy dense, palatable foods and lifestyles conducive to physical inactivity. This obesogenic environment has been suggested as cause for the excess increase in BMI in Asian immigrants to the US.¹³ However, Westernization might also contribute to the increasing BMI levels within Asian countries that were observed in the last three decades.¹³ The rates of increasing BMI levels vary across countries.¹⁴⁻¹⁶ Men living in Japan, for example, had an age-adjusted mean BMI of 22.1 kg/m² in 1980, which increased to 23.5 kg/m² in 2008, while among men living in the Philippines BMI increased from 21.2 kg/m² in 1980 to 22.9 kg/m² in 2008.⁹ Although the mean BMI levels remain in the normal range, the overweight prevalence (≥ 25 kg/m²) increased from 16.8% and 11.1% in 1980 to 30.1% and 24.5% in 2008 among Japanese and Filipino men, respectively.¹⁷ These trends in immigrants' home countries can influence BMI patterns observed after immigration to the US. It is likely that recent immigrants and those from more developed countries arrive in the US with higher BMI levels that are more similar to levels observed in the US. Thus, exposure to the US environment might be less influential among these immigrants.^{16,18} To confirm these assumptions and to control for these differential exposures, studies examining the association between immigration to the US and BMI need to carefully examine their results by Asian subgroups and by year of immigration. Additionally, age at immigration contributes to the degree of an immigrant's exposure to the obesogenic Western environment. Younger age at immigration has been shown to increase later overweight and obesity risk.^{19,20}

The goal of this study was to determine if changes in BMI across age differ among Asian men who already immigrated to the US compared to those still residing in their country of origin at the same age prior to their migration to the US. Additionally, differences in these changes by age at immigration and year at immigration were determined to examine potential secular trends. The focus of this study was on BMI between the ages 30 and 60 in three Asian subgroups (Chinese, Southeast Asians and Other East Asians). To our knowledge this is the first longitudinal study to examine the effect of moving to the US on BMI changes among Asians.

METHODS

Study population

Kaiser Permanente Northern and Southern California

health plans initiated the California Men's Health Study in 2002-2003.²¹ Eligible participants were 44-71 years old men who had been Kaiser Permanente members for at least one year. The baseline questionnaire collected information on demographics, health status and lifestyle behaviours and was completed by 8,634 men of Chinese, Filipino, Japanese, Vietnamese or Korean ancestry. The following participants were excluded: Asians who were US-born or had missing information on place of birth (n=2,531), those who had lived in the US for >25 years or had missing information on length of US residence (n=3,199) since age at immigration could not be calculated for these participants, those with missing information on weight history (n=1,317), outliers (outside mean \pm 3SD) for recalled weight (n=6) and those who had missing information on height (n=6) or covariates (n=26). The final dataset included 757 Chinese, 18 Japanese, 51 Korean, 519 Filipino and 204 Vietnamese. Vietnamese and Filipinos were combined into a category of "Southeast Asians" (n=723) and Japanese and Koreans into a category of "Other East Asians" (n=69) to increase statistical power. These subgroups were chosen because the groups included in each category have similar cardiovascular disease risk²² and their countries of origin have similar economic status (gross domestic product per capita in Japan: \$33 632, South Korea: \$24 801; Vietnam: \$2 600, Philippines: \$3 406).^{18,23} Chinese were examined as a separate category. This study was approved by the Institutional Review Boards of Kaiser Permanente Northern and Southern California and this secondary analysis was approved by Kaiser Permanente and University of North Carolina at Chapel Hill Non-Biomedical Institutional Review Boards on research involving human subjects.

Measures

Participants recalled their weight at ages 30, 40, 50 and 60 in a follow-up questionnaire in 2006 and BMI at these four age decades was calculated using height reported at the baseline questionnaire in 2002-03. BMI was analyzed as a continuous variable. The correlation coefficients between clinically measured weight at age 50 (n=91) and at age 60 (n=318) from participants' Kaiser Permanente electronic health records compared to recalled weight at these ages at baseline were 0.95 and 0.93, respectively. The correlation coefficient between clinically measured height and self-reported height at baseline was 0.87.

Years of US residence was assessed in the baseline questionnaire and was used to calculate age at immigration (age at baseline minus length of US residence), which was categorized into 19-30, >30-40, >40-50, >50-60 and >60-68. Year at immigration (date of baseline completion minus length of US residence) was categorized into immigration between 1977-1986, 1987-1991, 1992-1996 and 1997-2003. Participants were assigned to residence in Asia or the US at each recalled weight based on their age at immigration. Specific time points, not entire participants, for which country of residence was uncertain were excluded to avoid misclassification. In sensitivity analyses observations with missing country of residence were first assigned to living in Asia and then to living in the US. This did not change the conclusions and, thus, excluding these observations did not seem to have

biased the results.

Statistical analysis

Differences in mean BMI at each age decade and differences in BMI changes between age decades by country of residence, age at immigration and year at immigration were determined. The estimates and the associated 95% confidence intervals (CI) were calculated using generalized estimating equation models with an autoregressive order 1 covariance structure to account for the correlation between repeated BMI measures.^{24,25} We regressed continuous BMI on categorical age (30, 40, 50 and 60 years), country of residence (binary) and an interaction between age and country of residence. Including this interaction allowed us to calculate the difference in the change in BMI for participants residing in their country of origin compared to those residing in the US during each specific age decade (i.e. the estimated effect of US residence on the age-BMI association). We also regressed continuous BMI on categorical age (30, 40, 50 and 60 years), categories of age at immigration (19-30, 30-40, 40-50, 50-60 and >60 years) and an interaction between age at reported BMI and age at immigration. This analysis allowed us to determine the effect of age at immigration on BMI changes after immigration to the US and the potential for detecting acculturation effects. Finally, we repeated this analysis by replacing age at immigration with calendar years at immigration (1977-1986, 1987-1991, 1992-1997 and after 1997) to determine a potential effect of secular trend on BMI change.

Estimates were determined for all Asians combined and by Asian subgroups (Chinese, Southeast Asians and Other East Asians). All models were adjusted for age at baseline, annual household income (<\$40,000, \$40,000-

59,999, \$60,000-79,999 or ≥\$80,000) and education (high school or less, vocational/some college, college graduate or graduate degree), which were reported in the baseline questionnaire. The analyses were performed using SAS Statistical Software, version 9.3 (Cary, NC). All tests and *p*-values were two-sided and considered statistically significant at $\alpha=0.05$.

RESULTS

Participants were on average 56 years old at baseline (Table 1). Approximately 30% of Chinese were in the lowest and in the highest income categories. In contrast, most Southeast Asians (55.1%) and Other East Asians (66.6%) had at least a college degree but 55.1% and 52.2% reported <\$60,000 annual household income, respectively. Overweight prevalence (≥ 25.0 kg/m²) was heterogeneous between the Asian subgroups (Table 1). Among all Asians combined, the overweight prevalence ranged from 9.3% at age 30 when participants lived in Asia to 42.0% at age 50 when participants lived in the US. When living in Asia, Other East Asians had the highest overweight prevalence at ages 30 and 40 and Southeast Asians had the highest prevalence at age 50. When living in the US, Southeast Asians had the highest overweight prevalence at all age decades, except at age 30 where Chinese had the largest proportion of overweight individuals.

BMI increased with age irrespective of country of residence (Figure 1). For all Asian men combined, the adjusted mean BMI at age 30 was significantly higher for those who lived in Asia compared to those who lived in the US, while mean BMI at ages 40, 50 and 60 was significantly lower for those who lived in Asia compared to those who lived in the US at the respective age. Similar results were

Table 1. Characteristics of study sample, California Men's Health Study

Characteristics	All Asians (n=1,549)	Chinese (n=757)	Southeast Asians (n=723)	Other East Asians (n=69)
Age at baseline in years [mean (SD)]	56.4 (6.9)	56.3 (7.2)	56.5 (6.5)	56.6 (7.2)
Education [%]				
≤High school	21.6	27.9	15.2	20.3
Vocational/some college	27.1	25.9	29.7	13.0
College graduate	33.7	23.9	43.2	42.0
Graduate degree	17.6	22.3	11.9	24.6
Annual household income [%]				
<\$40,000	29.7	29.6	30.2	26.1
\$40,000-59,999	23.6	22.1	24.9	26.1
\$60,000-79,999	17.3	15.5	18.8	21.7
≥\$80,000	29.4	32.9	26.1	26.1
Proportion overweight (≥ 25 kg/m ²) [% (n of all participants in particular category)]				
Residence in Asia				
At age 30	9.3 (787)	5.7 (436)	12.4 (323)	28.6 (28)
At age 40	19.4 (417)	14.0 (215)	23.7 (190)	50.0 (12)
At age 50	24.4 (86)	17.3 (52)	35.5 (31)	33.3 (3)
At age 60	0 (6)	0 (5)	0 (1)	-- (0)
Residence in the US				
At age 30	16.7 (54)	19.2 (26)	16.7 (24)	0 (4)
At age 40	32.4 (641)	24.2 (310)	41.4 (297)	29.4 (34)
At age 50	42.0 (1,126)	34.3 (569)	50.9 (507)	40.0 (50)
At age 60	40.7 (727)	32.2 (366)	49.7 (332)	44.8 (29)

SD: standard deviation.

found for Southeast Asians. For Chinese and Other East Asians none of the comparisons were statistically significant.

Comparing BMI changes between age decades by country of residence (Table 2) showed that BMI increases over time were less for those who still resided in Asia than those who had immigrated to the US. Yet only the difference in BMI change between ages 30-40 achieved statistical significance with those living in Asia having a 0.69 kg/m^2 (95% CI: -1.08, -0.30) smaller increase in BMI compared to Asians who already immigrated to the US during this time period. A similar trend was observed in each Asian subgroup. For Chinese and Other East Asians none of these comparisons were statistically significant. Among Southeast Asians, differences in BMI changes between ages 30-40 were particularly striking (Asia-US: -1.20 kg/m^2 ; 95% CI: -1.81, -0.59).

Examining age-related BMI levels by age at immigration showed that Asians who immigrated at an earlier age tended to have larger BMI levels than those who immigrated at a later age (Figure 2). Among all Asians combined, participants who immigrated to the US between

ages 19-30 or 30-40 had a higher adjusted mean BMI at ages 40 and 50 years compared to other groups. Interestingly, among participants who immigrated between ages 40-50 the mean BMI was lower at ages 40 and 50 compared to those who immigrated earlier, but at age 60 (once they lived in the US) the mean BMI assumed a similar value as participants who immigrated earlier. A similar trend was observed among Chinese. Those who immigrated between ages 19-30 had a higher mean BMI compared to other groups at ages 40 and 50. Finally, among Southeast Asians those who immigrated between ages 30-40 had a higher mean BMI than other groups at age 50. Results for Other East Asians are not shown due to small sample size.

Comparing slopes of BMI across groups of immigrants who moved to the US at different ages (Table 3) showed that participants who immigrated at a younger age had a significantly greater increase in BMI over time until age 50 compared to those who immigrated at older ages. Additionally, the increase in BMI between ages 30-40 and 40-50 years was lower among Asians who immigrated after these time intervals compared to those

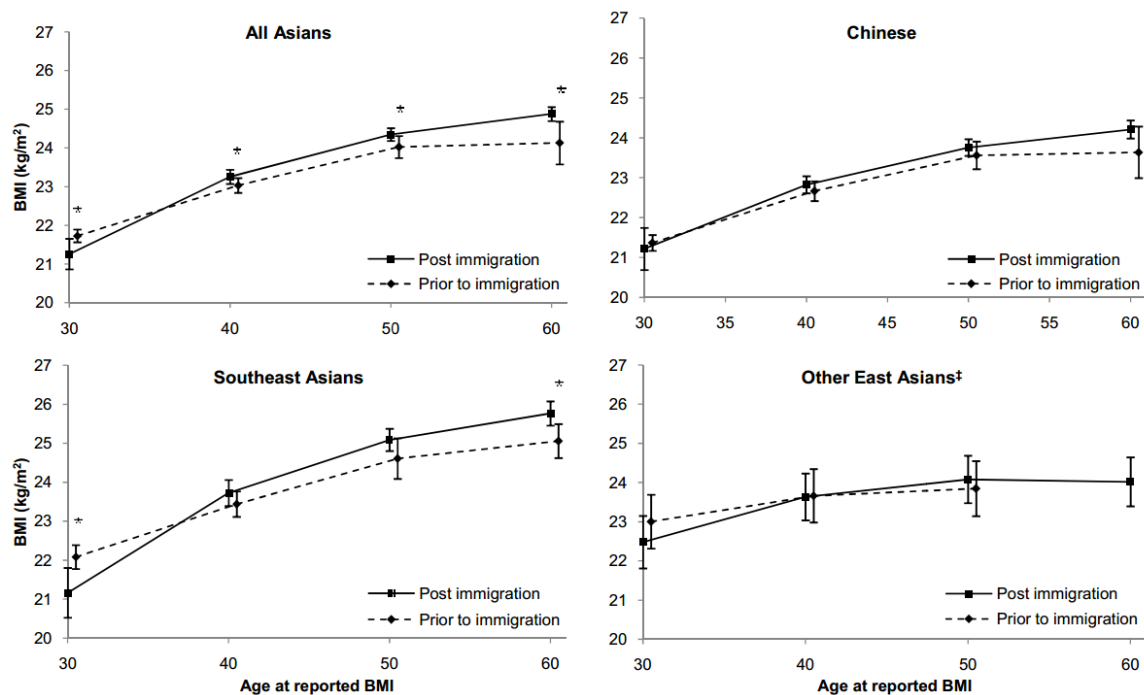


Figure 1. Adjusted[†] mean BMI at age decades comparing Asians prior to immigration and post immigration. *Significantly different with $p < 0.05$; [†]Adjusted for age at baseline, income and education; [‡]No participant with BMI information at age 60 when living in Asia. Point estimates for Asian residence are shifted to the right for display.

Table 2. Differences (95% CI) in BMI change among Asian men living in Asia compared to those living in the US[†]

	BMI change between ages 30 & 40		BMI change between ages 40 & 50		BMI change between ages 50 & 60	
	Difference (Asia-US)	95% CI	Difference (Asia-US)	95% CI	Difference (Asia-US)	95% CI
All Asians	-0.69*	-1.08, -0.30	-0.10	-0.39, 0.19	-0.43	-0.94, 0.09
Chinese	-0.31	-0.84, 0.21	-0.04	-0.41, 0.33	-0.38	-0.98, 0.23
Southeast Asians	-1.20*	-1.81, -0.59	-0.19	-0.69, 0.31	-0.23	-0.49, 0.03
Other East Asians	-0.49	-1.23, 0.24	-0.27	-0.89, 0.36	-- [‡]	--

CI: confidence interval.

[†]Adjusted for age at baseline, education and income; [‡]Sample size was too small to calculate estimate.

*Result different from 0 at $p < 0.05$.

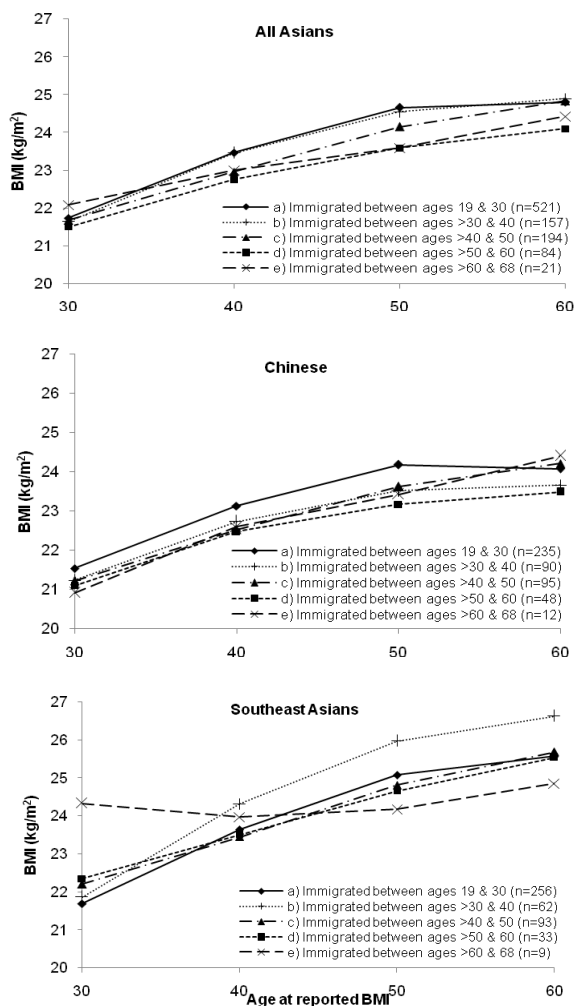


Figure 2. Adjusted[†] mean BMI at age decades by age at immigration. [†]Adjusted for age at baseline, income and education. Superscripts indicate statistically significant BMI differences between groups.

who immigrated before the respective interval, indicating a potential acculturation effect. Similar patterns were observed among the Asian subgroups, but findings were more pronounced among Southeast Asians.

The analyses of year at immigration did not indicate an effect of secular trend on BMI change among Asian immigrant men to the US (data not shown). Compared to Asian men who immigrated during 1997-2003, those who immigrated prior to 1997 had similar BMI changes between age decades. The results were consistent across Asian subgroups.

DISCUSSION

This study was uniquely able to compare BMI levels and BMI changes associated with exposure to a Western environment and confirmed the hypothesis that the BMI of Asians will increase upon migration to the US. Asian men living in Asia prior to immigrating to the US experienced smaller increases in BMI over time than those who already lived in the US. Asian men who immigrated prior to age 40 were particularly susceptible to larger increases in BMI than Asian men who immigrated later in life. These results demonstrate that early and middle-adulthood might be a vulnerable time period for excess increases in BMI among Asian immigrant men to the US.

To our knowledge, only one previous cross-sectional study has examined the association between age at immigration and BMI among Asian immigrants to the US.⁷ This study combined Central Asians into one category (Chinese, Japanese, Mongolian, North and South Korean) and compared the odds of being overweight among Central Asian immigrants to European immigrants to the US within each category of age at immigration (<18, 18-24, 25-44 and 45-74 years). Within each category of age at immigration Central Asians had lower odds of overweight compared to Europeans. This study did not provide any insight if different ages at immigration might have differential effects on BMI among Asians. Additionally, the authors examined each participant's BMI at only one time point (after immigration to the US) and did not have data on participants' BMI prior to immigration. Two previous cross-sectional studies among immigrants to the US from all continents combined showed that younger age at immigration increased likelihood of being overweight.^{19,20} These studies found that those <20 years or <22 years at immigration, respectively, had higher odds compared to those arriving at older ages. This suggests that environmental exposures during childhood or adolescence have substantial influence on adult BMI. The present study adds to this conclusion that immigration during early and mid-adulthood (ages 19-40) may also substantially influence BMI changes later in life, at least in Asian men. In contrast, the hypothesis that exposure to the US environment might be less influential among recent immigrants^{16,18} was not confirmed in this study.

In the present study generally similar results were found among the Asian subgroups examined, however, the results were more pronounced among Southeast Asians than the other groups, suggesting that this group might be particularly susceptible to excess increases in BMI after immigration to the US than Asians from other subgroups. This is consistent with the hypothesis of Van Hook and Balistreri who speculated that the effect of exposure to a Western environment on health may differ by the level of economic development of an immigrant's country of origin, with those migrating from countries with low gross domestic product (such as Vietnam or the Philippines) being more affected by acculturation experienced in the US.¹⁸

Changes in diet and physical activity after immigration to the US are likely responsible for the observed excess increases in BMI among Asian immigrants. After immigration to the US Asians consume more sweets and fast foods and fruits, but less meat, meat alternatives and vegetables than when living in their home countries.²⁶ In addition, levels of physical activity tend to decrease upon migration to the West.²⁷ It is a limitation of the present study that changes in diet and physical activity associated with immigration could not be determined.

Another limitation is that height was self-reported and weight earlier in life was recalled. Compared to men in other race/ethnic groups, Asian males living in the US have been shown to overestimate their height less and to underestimate their weight more.²⁸ Nevertheless, self-reported weight does provide a reasonable proxy of measured weight and the correlations between clinically measured weight and recalled weight at ages 50 and 60

Table 3. Differences (95% CI) in BMI change by age groups at immigration[†]

	BMI change between ages 30 & 40		BMI change between ages 40 & 50		BMI change between ages 50 & 60	
	Difference	95% CI	Difference	95% CI	Difference	95% CI
All Asians						
Immigration between ages 19 & 30	REF		REF		REF	
Immigration between ages 30 & 40	0.08	-0.32, 0.49	-0.10	-0.45, 0.26	0.21	-0.53, 0.95
Immigration between ages 40 & 50	-0.45* [§]	-0.74, -0.15	0.01	-0.31, 0.32	0.55	0.02, 1.07
Immigration between ages 50 & 60	-0.48* [§]	-0.85, -0.11	-0.35 [§]	-0.81, 0.12	0.36	-0.19, 0.92
Immigration between ages 60 & 68	-0.81 [§]	-1.74, 0.13	-0.60* [§]	-1.03, -0.18	0.70 [§]	-0.06, 1.47
Chinese						
Immigration between ages 19 & 30	REF		REF		REF	
Immigration between ages 30 & 40	-0.08	-0.50, 0.33	-0.26	-0.66, 0.13	0.24	-0.80, 1.29
Immigration between ages 40 & 50	-0.29 [§]	-0.71, 0.14	0.06	-0.33, 0.45	0.68	0.12, 1.24
Immigration between ages 50 & 60	-0.22 [§]	-0.77, 0.33	-0.35 [§]	-1.03, 0.33	0.42	-0.12, 0.95
Immigration between ages 60 & 68	-0.09 [§]	-1.00, 1.18	-0.22 [§]	-0.78, 0.33	1.09* [§]	0.18, 2.00
Southeast Asians						
Immigration between ages 19 & 30	REF		REF		REF	
Immigration between ages 30 & 40	0.50	-0.32, 1.31	0.21	-0.44, 0.86	0.17	-0.90, 1.25
Immigration between ages 40 & 50	-0.71* [§]	-1.13, -0.28	-0.08	-0.60, 0.44	0.39	-0.52, 1.31
Immigration between ages 50 & 60	-0.80* [§]	-1.24, -0.36	-0.28 [§]	-0.89, 0.32	0.39	-0.69, 1.46
Immigration between ages 60 & 68	-2.31* [§]	-3.42, -1.20	-1.22* [§]	-1.65, -0.80	0.18 [§]	-0.80, 1.17
Other East Asians						
Immigration between ages 19 & 30	REF		REF		REF	
Immigration between ages 30 & 40	-0.34	-1.82, 1.14	0.72	-0.56, 2.02	--	--
Immigration between ages 40 & 50	0.38 [§]	-1.16, 1.92	0.42	-0.44, 1.28	0.83	-0.51, 2.16
Immigration between ages 50 & 60	-0.65 [§]	-1.23, 0.06	-0.02 [§]	-0.77, 0.74	1.86	0.79, 2.93
Immigration between ages 60 & 68	-- ^{‡,§}	--	-- ^{‡,§}	--	-- ^{‡,§}	--

CI: confidence interval; [†]Adjusted for age at baseline, education and income; [‡]Sample size was too small to calculate estimate; [§]Statistically significantly different from reference group at $p < 0.05$; [§]At these time points participants resided in Asia.

($r=0.95$ and 0.93 , respectively) observed in our study were comparable to previous studies. Correlation coefficients ranged from 0.91 - 0.98 for concurrent measured and self-reported weight estimates in East Asian populations²⁹⁻³¹ and were 0.95 and 0.97 in men and women in a Southeast Asian developing country where weight is not routinely measured.³² A study in an American cohort showed that recall of weight much earlier in life (28 years prior) is also highly correlated ($r=0.82$) with weight measured at that time.³³ The Asians included in this present study might not be generalizable to all Asian immigrants to the US since they were members of Kaiser Permanente, had health insurance and lived in a region (California) with a large Asian population. Compared to the 2000 census, our sample was slightly more educated (20% vs 15% with less than a high school degree) and had a slightly higher income (37% vs 22% with annual household income of $< \$40,000$).³⁴ Additionally, given the strict exclusion criteria to answer this research question, the final dataset included only 18% of all Asian men in the California Men's Health Study. Given the small sample size we were not able to perform a comprehensive analysis of a potential age-period-cohort effect, but we examined age at immigration as well as year at immigration to determine potential age and secular effects. Despite these limitations, this study provided the unique opportunity to examine the effects of immigration on BMI change among Asian men.

Strengths of this study included the comparably large sample size of Asian Americans, an understudied population. Additionally, Chinese, Southeast Asians and Other East Asians were examined separately to determine dif-

ferential effects of acculturation by region of origin, and the same individuals were examined across different migration stages (pre- and post-migration) to reduce the potential for bias from healthy immigrant selection as discussed earlier. This bias potentially undermines estimates that solely compare the average BMI in Asian countries to the average BMI among Asians in the US.^{8,9} Additionally, the effects of year at immigration on BMI were examined to rule out potential bias of the age at immigration analyses by secular trends.

Recent analyses of the National Health and Nutrition Examination Survey showed that despite a much lower prevalence of overweight (≥ 25 kg/m²) among Asian adults (38.6%) compared to Caucasian adults (66.7%) and Hispanic adults (78.8%), Asians had a similar prevalence of hypertension as the other two ethnic groups (approximately 25%).³⁵⁻³⁷ Asians may be at greater risk of diabetes and cardiovascular disease at a lower BMI compared to Caucasian populations because they have more body fat and more abdominal fat at the same BMI level.³⁸⁻⁴¹ Our finding that Asian immigrants experience larger increases in BMI after immigration to the US is, therefore, troubling as these increases in BMI could lead to dramatic increases in chronic diseases in this minority population. Medical and public health practice for disease prevention need to focus on maintaining a healthy weight among Asian immigrant men.

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AUTHOR DISCLOSURES

The authors have no conflict of interest to report.

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Original Article

Longitudinal study of body mass index in Asian men who immigrate to the US

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移民美国亚裔男性的体质指数的纵向研究

背景与目的：横断面研究表明：适应西方的规范，尤其是在年轻的时候，或许可以解释生活在美国的亚洲人的平均体质指数（BMI）高于生活在亚洲的亚洲人。然而，移民和非移民之间社会文化因素难以测量，因此，需要对同一人群移民前后进行纵向研究。为确定不同年龄 BMI 因居住地（美国或亚洲）不同变化的差别，采用纵向数据记录移民时的年龄和移民前后的 BMI。**方法和研究设计：**加州男性健康研究包括 1549 位 2002-03 调查基线时年龄在 44-71 岁的亚裔男性。用自己报告的体重历史和当前的身高计算其 30、40、50 和 60 岁时的 BMI。确定每个年龄段的居住地和移民时的年龄。使用广义估计方程进行数据分析。**结果：**亚裔男性在移民美国之前，十年 BMI 增幅小于已经在美国生活的亚裔男性。年龄在 30-40 岁的人群中这种效果最明显，居住在亚洲的亚洲人群，其十年间 BMI 增幅比在美国生活的亚裔男性低 0.69 kg/m²（95% CI：-1.08，-0.30）。40 岁之前移民到美国其 BMI 增幅大于年龄较大时移民到美国的人群。**结论：**本研究是第一个支持生活在美国和年轻时移民导致亚裔男性较大的 BMI 增长这一假设的研究。

关键词：亚洲人、移民、文化适应、体质指数、居住地