



Salud Pública de México

ISSN: 0036-3634

spm@insp.mx

Instituto Nacional de Salud Pública
México

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Salud Pública de México, vol. 55, núm. 4, 2013, pp. S451-S458

Instituto Nacional de Salud Pública
Cuernavaca, México

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A population-based comparison of weight and weight perceptions among overweight and obese Mexican and Mexican-American men

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Guendelman S, Ritterman-Weintraub ML, Fernald LCH, Kaufer-Horwitz M.
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Salud Publica Mex 2013;55 suppl 4:S451-S458.

Abstract

Objective. To examine actual and perceived weight in national cohorts of Mexican-origin adult men in Mexico and the United States (US). **Materials and methods.** We used the 2001-06 National Health and Nutrition Examination Survey and the 2006 Mexican National Health and Nutrition Survey. **Results.** The prevalence of overweight or obesity (OO) in Mexicans was 65% and in Mexican-Americans was 72%. OO Mexican-American men were more likely than OO Mexican men (56 vs. 49%) to perceive themselves as "overweight". Among OO men from both populations, those who had been screened for OO by a health provider were almost seven times more likely to have accurate weight perceptions. Only 9% of OO men in Mexico and 25% in the US recalled having been screened for weight. **Conclusion.** Weight misperceptions were common in both populations but more prevalent in Mexico; low screening by providers may contribute to poor weight control in both countries.

Key words: overweight; obesity; BMI; weight; perceptions; Mexican-American

Guendelman S, Ritterman-Weintraub ML, Fernald LCH, Kaufer-Horwitz M.
Comparación de base poblacional sobre el peso y percepciones sobre el peso entre hombres mexicanos y mexicano-americanos con sobrepeso y obesidad.
Salud Publica Mex 2013;55 supl 4:S451-S458.

Resumen

Objetivo. Examinar el peso real y percibido en cohortes nacionales de hombres adultos en México y mexicano-americanos en EUA. **Material y métodos.** Se utilizaron datos de la Encuesta Nacional de Salud y Nutrición (EUA 2001-06) y la Encuesta Nacional de Salud y Nutrición (México 2006). **Resultados.** La prevalencia de sobrepeso u obesidad (SO) en mexicanos fue 65 y 72% en mexicano-americanos. Los hombres mexicano-americanos SO tuvieron mayor tendencia que los mexicanos SO a percibirse con sobrepeso (56 vs 49%). Los hombres con SO que habían sido informados por un proveedor de salud que tenían SO tuvieron casi siete veces más probabilidades de percibir correctamente su peso. Sólo 9% de los hombres SO en México y 25% en EUA recordó haber sido detectado. **Conclusión.** Las percepciones erróneas de peso fueron más prevalentes en México. La baja detección por proveedores de salud puede contribuir al pobre control de peso en ambos países.

Palabras clave: sobrepeso; obesidad; IMC; peso; percepción; mexicanos; mexicano-americanos

Disclosure: This study was funded in part by the Programa de Investigación de Migración y Salud (PIMSA), Health Initiative of the Americas. The study sponsor had no role in the design and conduct of the study, the collection, analysis, and interpretation of the data; or the preparation, review, or approval of the study. The authors report no relevant financial associations or interests in relation to the submitted work.

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Received on: April 18, 2012 • Accepted on: Septiembre 21, 2012

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Rates of overweight and obesity are alarmingly high among adults of Mexican origin living in the United States (US) and Mexico.¹⁻³ Within the US, the prevalence of overweight defined as a body mass index (BMI) of ≥ 25 kg/m² and obesity (BMI of 30 or greater) in 2010 were 33% and 36% respectively in the adult population, but even higher among Mexican-American adults.³ With 80% of Mexican-American adults considered overweight or obese, this prevalence stands out as among the highest for any given ethnic group.^{3,4} Trend analyses show that over a twelve year period between 1999 through 2010, the prevalence of BMI-defined obesity increased significantly for US men. Among Mexican-American men, rates of obesity increased from 28.9% in 1999 to 35.6% in 2010, with 11.1% of men categorized as obese class II or III (BMI ≥ 35 kg/m²).³

Steep increases in prevalence of overweight and obesity are also seen in Mexico as a result of a shift from a situation characterized by a high prevalence of infectious disease, underweight and stunting to one with a high prevalence of overweight, obesity and associated non-communicable diseases.^{5,6} In only six years between 2000 and 2006, the prevalence of overweight and obesity combined in men rose from 62.8% (21.0% obese) to 68.2% (24.3% obese).⁷ Almost 6% of men were considered obese class II or III in 2006.⁷

Notably, for the Mexican origin population, regardless of whether they live in Mexico or the US, prevalence of overweight is higher for men than for women while prevalence of obesity is lower for men compared to women.^{3,7} Furthermore, in both countries, the relationship between socioeconomic status and obesity varies by gender. While obesity in Mexico is higher among women of low socioeconomic status,⁶⁻¹¹ previous studies have shown that men, with a socioeconomic status (as defined by household material conditions, appliances and number of household members) and education ranked in the lowest tertile have significantly less overweight and obesity than men with higher socioeconomic status and more education.^{7,12} In the US, a recent population study showed a significant inverse relationship between education and obesity for Mexican-American women, while the association was not statistically significant for Mexican-American men, after controlling for other covariates.¹³ These gender variations point to the need to evaluate the determinants of overweight and obesity separately in men and women.

Studies have shown that overweight adults who do not perceive themselves to be overweight are unlikely to engage in weight control behaviors.^{14,15} Recent evidence from a binational study indicates that among the overweight and obese, women living in Mexico are

more likely than Mexican-American women living in the US to incorrectly perceive themselves as being in the "normal" weight range.¹⁶ Whether such differentials in weight perception found among women are also present among men of Mexican origin, is not known. Lack of perception of obesity by men residing in both the US and Mexico may be a contributing factor to the prevalence of obesity. It is plausible that more overweight and obese Mexican men underestimate their weight in Mexico compared with Mexican-American men due to different cultural norms about body size or limited exposure to nutrition education or screening by health providers. Lack of screening for obesity and lack of counseling by physicians and other healthcare professionals relating to prevention of obesity are both associated with increased risk for obesity.^{14,17} Physician counseling has been associated with increases in physical activity and improvement in nutrition, which may help patients lose or control weight.^{14,18}

The aims of this study were to investigate differentials in actual and perceived weight within and between national cohorts of Mexican-American men residing in the US and men living in Mexico; and to specifically examine these differentials among overweight and obese men.

Materials and methods

We used data on 979 Mexican-American adult men ages 20-59 who participated in the National Health and Nutrition Examination Survey (NHANES) waves 2001-2006, and 5 257 men living in Mexico of the same age who were part of the Mexican National Health and Nutrition Survey (ENSANUT) in 2006. The NHANES includes a series of cross-sectional, nationally representative health examination surveys released every two years. For the 2001-2006 waves, Mexican-Americans who comprise both Mexico-born immigrants and US-born men of Mexican origin were oversampled. ENSANUT 2006, a cross-sectional survey was designed to ascertain information on the health and nutritional status of the Mexican population using a nationally representative sample. Both surveys used a complex, stratified, multistage probability cluster sampling design to select participants of civilian, non-institutionalized populations. The detailed sampling procedures for NHANES and ENSANUT have been described elsewhere.^{1,19} For this study, men who had incomplete sample weight data and/or had implausible values for BMI (<13 or >60) were excluded. Power size calculations were performed showing that the sample sizes were sufficient to detect effect sizes of less than 0.75 and great than 1.3 for all multivariable analyses.

Actual weight was based on weight and height measurements obtained by trained health technicians to ensure measurement accuracy. BMI was calculated as weight in kilograms divided by height in meters squared and standard weight categories were constructed based on WHO (World Health Organization) cutoff points: underweight $<18.5 \text{ kg/m}^2$; normal weight $18.5\text{--}24.9 \text{ kg/m}^2$; overweight $25\text{--}29.9 \text{ kg/m}^2$; and obese $\geq 30 \text{ kg/m}^2$. Obesity was further subdivided into class I (BMI $30\text{--}<35$), class II (BMI $35\text{--}<40$) and class III (BMI ≥ 40).²⁰ Prior to being weighed, study participants in both surveys were asked whether they considered themselves to be “underweight”, “overweight” or “just about right”, which was interpreted as “normal” weight, and these questions were virtually identical in both surveys. Previous US studies using these questions indicate discrepancies between measured and self-perceived weight, especially among adults with BMIs considered normal or overweight.^{14,21} Concordance between the actual and perceived weight categories was categorized as an “accurate” perception whereas a discrepancy between the actual and perceived weight categories was categorized as an “inaccurate” perception. These differentials were examined only among the overweight and obese.

Covariates included age (categorized as 20-29, 30-39, 40-49 and 50-59 years), educational attainment (stratified into less than nine years of schooling, 9 to 11 years, high school graduate or equivalent and at least some college education) and having received a health provider screen for overweight or obesity (a dichotomous variable defined as having ever been told by a physician or other health professional that the respondent was overweight or obese).

All statistical analyses were performed using STATA version 10 with survey commands to account for the complex sampling designs and differential probabilities of selection in both surveys and to incorporate sample weights. Chi-square tests and analysis of variance (ANOVA) were used for bivariate comparisons of socio-demographic characteristics and having received a health provider screen in each country. Two-sample tests of proportions were used to compare the proportion of men in each country according to actual and perceived weight categories.

Further analyses were restricted to overweight and obese men. First, actual and perceived weight prevalence was assessed using two-sample tests of proportion, and stratified analyses were conducted to assess age and education-adjusted proportions of overweight and obese men in each country. For the stratified analyses we used the four-category age variable and education was dichotomized into less than

high school versus high school equivalent or beyond. Subsequently, logistic regression models were used to examine the associations between self-perceived weight status and country of residence, controlling for age, education, and having received a health provider screen for overweight/obesity. We ran logistic regression models with all overweight and obese men and with obese sub-classes II and III excluded to assess whether accuracy of weight perceptions was altered by larger body sizes.

Since the study protocol uses public data files, it was exempted from review by the Committee for the Protection of Human Subjects at the University of California Berkeley (ID number: 2009-11-370).

Results

Compared to Mexican-American men, those residing in Mexico were older, had fewer years of formal education and were less likely to report that they had received a doctor screen of overweight or obesity (table I). Men in Mexico were less likely to be overweight or obese compared to Mexican-American men ($65.4 \text{ vs } 72.1\%$; $p<0.05$); however, there were no statistically significant differences in prevalence of overweight, obesity or obesity subclasses (figure 1). After adjusting for age and education, the proportion of overweight and obese combined was similar for men in Mexico and Mexican-Americans, except for the 20-29 year olds (data not shown). Among the 20-29 year old group, men in Mexico had lower prevalence of overweight and obesity than Mexican-Americans, regardless of whether or not they had completed high school ($p<0.05$). Men in Mexico were less likely than those in the US to perceive themselves as overweight or obese ($33.8 \text{ vs } 41.1\%$; $p<0.01$) (figure 1). Further, although the prevalence of “normal weight” (BMI $>18.5\text{--}<25$) was similar for men in Mexico and for Mexican-Americans ($\sim 30\%$), more Mexican than Mexican-American men perceived themselves to be in this category ($58.9 \text{ vs } 52.7\%$; $p<0.01$) (data not shown).

Restricting the analysis to only overweight and obese men, Mexican men were less likely to categorize themselves accurately ($48.5 \text{ vs } 55.8\%$; $p<0.01$) (figure 2). These differences persisted after excluding obese subclasses II-III men from the analysis ($44.9 \text{ vs } 51.7\%$; respectively $p<0.01$), but became non-significant after controlling for socio-demographic and weight-related variables (table II). Among overweight and obese men, Mexican-Americans were much more likely to have been told by a health care provider that they were overweight or obese ($24.9 \text{ vs } 9.40\%$; $p<0.0001$) (figure 2). Compared to men who had attained less than a ninth grade education, those who had more education were one and a half

Table I
CHARACTERISTICS OF MEN OF MEXICAN ORIGIN IN MEXICO (ENSANUT 2006) AND THE US (NHANES 2001-2006)

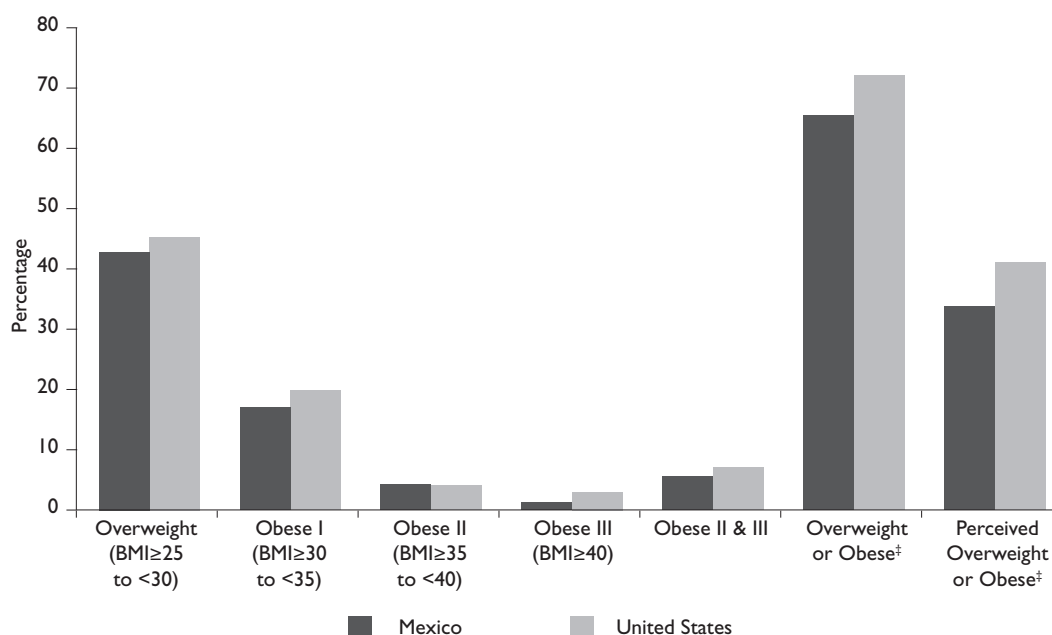
Characteristic	Mexico (n= 5 257)	United States (n= 979)	p-value*
Socio-demographic variables			
Age in years, mean (SD) [‡]	38.43 (10.58)	36.15 (10.63)	<0.001
Age n (w %) [§]			<0.001
20-29 years old	1 228 (26.63%)	337 (38.44%)	
30-39 years old	1 629 (27.89%)	247 (30.27%)	
40-49 years old	1 432 (26.03%)	270 (21.22%)	
50-59 years old	968 (19.45%)	125 (10.08%)	
Education n (w %)			
<9 th grade	2 846 (50.53%)	324 (31.44%)	<0.001
9-11 th grade	1 299 (25.25%)	226 (23.70%)	
High school graduate or equivalent	628 (12.73%)	201 (21.63%)	
Some college-college graduate	484 (11.49%)	228 (23.22%)	
Provider screen for overweight or obese n (w%) [#]			
No	4 959 (93.52%)	797 (81.71%)	<0.001
Yes	298 (6.48%)	182 (18.29%)	

* Statistical tests adjust for the sampling methods of ENSANUT and NHANES. ANOVAs were used for continuous variables and all F-tests have one degree of freedom. Chi-square tests were used for categorical variables and weighted proportions are reported. Not all cell percentages may add up to zero, as percentages were rounded to the nearest 10th decimal place

[‡] Standard deviation

[§] Weighted percentages are based on sampling method

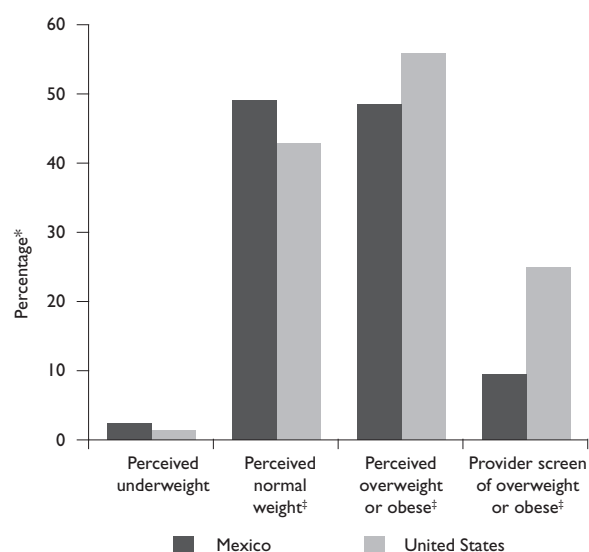
[#] In ENSANUT, men are asked if they were ever told by a doctor, dietitian or diet technician if they were or are obese ("¿Alguna vez le ha dicho un médico/dietista/nutriólogo que tiene o tuvo obesidad?") In NHANES, men are asked if they were ever told by a doctor or other health professional if they were overweight (NHANES: "Has a doctor or other health professional ever told you that you were overweight?")



* Proportions are weighted for sampling designs of ENSANUT 2006 and NHANES 2001-2006.

[‡] Proportions are significantly different ($p < 0.05$)

FIGURE 1. PROPORTION OF OVERWEIGHT OR OBESE ACCORDING TO ACTUAL AND PERCEIVED WEIGHT AMONG MEN OF MEXICAN ORIGIN IN MEXICO (N=5 257) AND THE UNITED STATES (N= 979)*



* Proportions are weighted for sampling designs of ENSANUT 2006 and NHANES 2001-2006.

† Proportions are significantly different ($p < 0.05$)

FIGURE 2. PERCEIVED WEIGHT AND PROVIDER SCREEN AMONG OVERWEIGHT OR OBESE MEXICAN-ORIGIN MEN WITH A BMI \geq 25 WITHIN MEXICO (N=3 526) AND THE US (N=716)*

to over two times more likely to perceive their weight accurately; furthermore, men who had been told by a health care provider that they were overweight or obese were much more likely to perceive their weight accurately (OR= 6.7; 95% CI= 4.6-9.9) (table II).

Discussion

This study compared weight differentials among Mexican origin men between 20 and 59 years of age living in Mexico and the US. Although high in both groups, the prevalence of BMI-defined overweight and obesity among Mexican-American men was higher than that of Mexican men (72 vs 65%). These differentials appear to be largely explained by different distributions in age and education in the two populations; after adjusting for age and education, differentials in overweight and obesity prevalence were no longer significant in most age and educational subgroups. In 20-29 year old men living in Mexico, however, there was still a lower prevalence of overweight and obesity compared to Mexican-Americans of the same age group in the US. The higher adjusted rate of overweight and obesity among young Mexican-American men suggests that there may be important and complex environmental (ie. cultural, social and behavioral) risk factors causing excess weight among Mexican origin men once they settle or are born in the US. A recent study based on NHANES found that Mexican men who are newcomers in the US have lower BMI than US-born Mexican-American men and, after controlling for age, each additional year in the US is associated with an increase in BMI in immigrants.¹³ Findings from the Mexican Migration Project based on a representative sample of communities in the main migrant-sending regions in Mexico indicate that the first migration experience among men occurs at age 26.²² It is possible that given increased purchasing power in the US, but little nutrition education or access to quality

Table II

ACCURATE VERSUS INACCURATE WEIGHT PERCEPTIONS CONTROLLING FOR SOCIO-DEMOGRAPHIC AND WEIGHT-RELATED VARIABLES AMONG OVERWEIGHT OR OBESE MEN OF MEXICAN ORIGIN LIVING IN MEXICO AND THE US: ODDS RATIOS (OR) AND 95% CONFIDENCE INTERVALS (CI) FROM THREE LOGISTIC REGRESSION MODELS. A COMPARISON OF ENSANUT 2006 AND NHANES WAVES 2001-06.

Variables	(1) Mexico & United States (n=4,139) OR (95% CI)	(2) Mexico (n=3 432) OR (95% CI)	(3) United States (n=707) OR (95% CI)
Socio-demographic variables			
Country (reference=Mexico)	0.94 (0.76-1.15)		
Age (continuous)	1.01 (1.00-1.02)	1.01 (0.99-1.02)	1.01 (1.00-1.03)
Education (reference<9th grade)			
9-11th grade	1.41 (1.10-1.80)*	1.43 (1.10-1.85)*	1.37 (0.87-2.17)
High school/equivalent	2.12 (1.57-2.88)*	1.97 (1.40-2.77)*	2.23 (1.37-3.65)*
Some college/graduate	1.97 (1.46-2.66)*	2.11 (1.48-3.02)*	1.86 (1.17-2.95)*
Weight-related Variable			
Provider screen of overweight or obese	6.71 (4.55-9.89)*	7.07 (4.16-12.04)*	6.55 (3.94-10.87)*

* $p < 0.01$

foods, young adult immigrants adopt unhealthy diets based on cheaper energy dense foods, and consume larger portion sizes.²²⁻²³ Evidence also suggests that Mexican-American boys in the US have very high rates of obesity²⁴ and childhood obesity has been shown to be a strong predictor of obesity in adulthood.²⁵

With respect to weight perceptions, men categorized as overweight and obese in Mexico were significantly more likely than Mexican-American men categorized as overweight and obese to perceive their weight as being in the "normal" or underweight range. The higher prevalence of misperceptions among overweight and obese men in Mexico appear to be associated with their lower levels of educational attainment and with the lack of provider screens of overweight. In fact, the multivariable models show that differentials in weight perception were no longer significant after adjusting for age, education and having received a provider screen. Previous research has shown that being exposed to obesity is associated with greater misperceptions of weight,²⁶ but after controlling for the above mentioned covariates, overweight and obese men in Mexico were no more likely to misperceive their weight compared to their counterparts living in the US, despite lower rates of obesity in Mexico. Gender, appears to also be associated with accuracy of weight perceptions among the overweight and obese. Whereas only 48.5% of men in Mexico perceived their body weight accurately, findings from our previous study on women showed that 60% of women in Mexico did so.¹⁶ In our study we cannot determine what reference point was used by respondents to assess their weight status. Respondents might have used medical standards of weight and height, their own ideal body size, which could be based on cultural ideals, or some other reference.^{21,27} The influence of socio-cultural determinants on weight perception has important public health and clinical implications and needs to be researched further. Perhaps there is less social pressure to be thin exerted on men in Mexico. It has been suggested that higher weight may be culturally valued as a positive sign of health, especially among the less educated groups in Mexico and that overeating may be more acceptable among those who have experienced food insecurity.^{28,29} US society is considered to have a strong preoccupation with the body and in comparison to Mexicans in Mexico, Mexican-Americans may have different standards of beauty, fitness and health.^{21,30} Understanding these relationships is important since weight misperceptions among the overweight and obese are associated with less weight control behaviors.^{14,15,26,27} Only 9% of overweight and obese men in Mexico reported that they had ever been told by their health providers that they were overweight or obese. These

rates are extremely low, suggesting missed opportunities for intervention. According to our findings, overweight and obese men who were told by their health provider that they were overweight were almost seven times more likely to accurately perceive themselves as having excess weight. Although medicalization of obesity leads to a conceptualization of obese individuals as "sick" or "at risk of chronic disease" and in "need of treatment" and these labels carry stigma and create dependency on medical expertise,^{31,32} evidence shows that a health provider screening and counseling exerts important influence on behavior. Lack of screening and counseling has been directly associated with poor weight control.^{14,17,18}

Although health providers in Mexico who deliver care in the Social Security system are expected to screen and advise patients about weight loss and healthy behaviors through their integrated health programs PREVENIMSS (launched in 2001) and PREVENISSTE (launched in 2010), there is no evidence that this guidance systematically occurs.³² The Mexican National Agreement for Healthy Nutrition that was launched in 2010 aims to provide an organized response to slow down the increasing prevalence of overweight and obesity through concerted actions such as screening and greater access to education and information about excess weight gain and its health consequences.³³ Future studies need to monitor whether provider screenings increase as a result of this federal policy while also assessing how screening, counseling and education influences people's narratives about their body and their weight.

In the US, almost 25% of overweight and obese Mexican-American men had been told by their health providers that they were overweight or obese. Although these rates are higher than those of men in Mexico, they still corroborate evidence that immigrants and patients with limited formal education have a low likelihood of receiving physician screening and advice that promotes healthy behaviors.^{34,35} A recent study on obese Mexican-American adults who participated in the Medical Expenditure Panel Survey reported that 45% of participants had never received advice from a doctor or health care professional to exercise more, and only 52% reported that they had received advice to eat fewer high fat/high cholesterol foods; and the advice rates were lower among males.³⁶ Since Mexican-Americans overall have low access to health care, and to educational, economic or informational resources,^{37,38} they may be showing delayed adoption of healthy dietary and lifestyle behaviors.

We were limited in our ability to make causal inferences, because our analyses are based on cross-sectional data. Further, we did not measure critical, within-country

contextual, community or environmental factors. The surveys asked respondents whether they had ever been told by a health provider that they were overweight or obese and these questions may have been subject to recall bias. Weight self-assessments were based on labels defining body size rather than visual silhouettes, which could have led to underestimation of weight. Furthermore, weight perceptions were compared to BMI; comparisons with other measures such as waist circumference could yield different results.¹⁴ In the NHANES nevertheless, BMI has been found to correlate highly with percentage body fat as measured by dual x-ray absorptiometry.³ Differences in population-based sampling and design can make comparisons between the US and Mexico challenging.³ We used a dichotomous educational variable that represents a broad range of educational attainment to adjust for national cohort differentials in overweight and obesity. To our study's benefit, we were able to use population-based estimates and relied on BMI measured by health technicians. BMI is considered a valuable tool to provide a standardized definition of obesity which allows for international comparisons.⁴

Recent evidence from a multi-country study indicates that counseling in primary care settings has favorable cost-effectiveness ratios.³⁹ No single intervention can address the complex web of factors implicated in obesity. Nonetheless, health providers are well positioned to screen and offer culturally-sensitive assistance to overweight and obese patients about weight loss, weight control and adoption of healthy lifestyles. Evidence indicates that provider encouragement, even brief advice, can promote modifiable, health behavior change.^{30,40} And, excess weight gain is the most important modifiable risk factor for chronic diseases associated with nutrition. We therefore conclude that provider screens and advice can encourage accurate weight perceptions and promote healthy behaviors and lifestyles among Mexican as well as Mexican-American men. Further research is needed to assess the role of weight perceptions and of health providers in tailoring interventions and curbing the alarmingly high rates of obesity among adult men living in Mexico and the US.

Acknowledgments

This study was funded in part by the Programa de Investigación de Migración y Salud (PIMSA), Health Initiative of the Americas. The study sponsor had no role in the design and conduct of the study, the collection, analysis, and interpretation of the data; or the preparation, review, or approval of the study. IRB approval was obtained from the University of California Berkeley Committee for the Protection of Human Subjects and

from the Instituto Nacional de Ciencias Médicas y Nutrición Salvador Zubirán (INCMNSZ).

We thank Dr. Héctor Ávila-Rosas (Department of Epidemiological Research, Instituto Nacional de Pediatría, Mexico) and Dr. Verónica Vázquez-Velázquez (Obesity and Eating Disorders Clinic, INCMNSZ) for their help in acquiring the Mexican data and for their valuable input in selecting variable categories to ensure comparability across surveys.

Declaration of conflict of interests. The authors declare that they have no conflict of interests.

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