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Obesity and the Loss of Life: A Comparison between the US and Mexico

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CDE Working Paper No. 2007-12

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* This study was supported by grants from the National Institute of Aging (R01 AG016209 and R37 AG025216) and Fogarty International Center (FIC) training program (5D43TW001586) to the Center for Demography and Ecology (CDE) and the Center for Demography of Health and Aging (CDHA), University of Wisconsin-Madison. CDE is funded by the NICHD Center Grant 5R24HD04783; CDHA by the NIA Center Grant 5P30AG017266.

ABSTRACT (max: 200 words)

High and increasing levels of obesity in the US and Mexico could compromise future gains in life expectancy for these populations. Excess mortality due to obesity has been investigated in the US but not in Latin America where high prevalence and the rapid growth of obesity are frequently combined with frail socio-economic conditions. The aim of this study is to measure loss in life expectancy due to obesity in Mexico and the US, taking advantage of the existence of comparable databases for both countries (HRS 2000 & 2004 for the US and MHAS 2000 & 2003 for Mexico). Our results show larger losses in life expectancy due to excess body fat among older people in Mexico (more than four years of life expectancy at age 60) than in the US (around 2 years). However, when analyzing differences in the effect among different socio-economic strata, we observe greater gaps between low-educated and high-educated people in the US than in Mexico. Remarkably, despite the fact that the relative probability of suffering obesity-related disease among individuals with highest BMI is larger for the US elderly, the relative risk of dying conditional on experiencing these diseases is higher in Mexico.

INTRODUCTION

In developing countries, particularly in Latin America and the Caribbean, obesity rates are growing steadily and reaching levels similar to, or even greater than, those of the US. According to the World Health Organization (WHO 2006), prevalence of obesity in Mexico for people over 15 years old was 28% for women and 19% for men (in 2000). In Chile and the US, obesity prevalence for people of the same age group was 25% and 21% for women and 19% and 20% for men respectively (in 2003). The trends for Mexico show large increments in the prevalence of obesity among adult women from 9% in 1988 to 24% in 1999 (Kain, Vio and Albala 2003). In Santiago de Chile the prevalence of obesity increased from 6% to 11% for men, and from 14% to 24% for women in only four years (between 1988 and 1992) (Kain et al. 2003). In the case of the US, the statistics are not less impressive: prevalence among people over 20 years old increased from 20% to 27% for men and from 25% to 33% for women in the 1990s (Flegal et al. 2002). The increasing trend in the prevalence of obesity and overweight in Latin America and the Caribbean may be the result of lifestyles and diets that are becoming more like those that are commonplace in industrialized countries (Popkin 1994; Uauy, Albala and Kain 2001; Caballero 2001).

In general, the association between socioeconomic status and obesity in LAC countries is negative (Drewnowski and Specter 2004; PAHO/OPS 2006; Zhang and Wang 2004). Monteiro, Conde and Popkin (2004) showed differentials in the prevalence of obesity by socioeconomic status for Brazil, with less-advantaged groups having greater obesity risks. Particularly for Mexico, obesity and overweight are concentrated in the poorest sectors of the population, and this phenomenon is stronger than for other Latin American countries (Ferald et al. 2004). Some authors (Valiente et al. 1988; Palloni et al. 2006) state that in Latin American cities the interaction of early childhood substandard nutrition and adult sedentary life styles and excessive consumption of fat and cheap food is responsible for diseases like obesity, diabetes, and atherosclerosis. Changes in the environment that produced the metabolic adaptation of the body to work under conditions of low energy intake and low fat diets (early in life) may result in higher sensitivity to obesity and overweight at adult ages (Caballero 2001; Baschetti 1998, 1999). Obesity among the poorest strata of a population is of a different nature than obesity among the highest strata of the same population. In the latter case, it may be result from excessive intake of animal fats and refined sugars accompanied by a low intake of fibers, while among the former it appears together with a lack of essential nutrients, particularly proteins obtained from meat consumption.

Concern over increments in obesity rates in developing countries is amplified by the overall rise in the rates of non-communicable diseases for which, in many cases, obesity is a major risk factor (Caballero and Wang 2006). Because obesity and overweight are related to an increase in the risk of hypertension, diabetes, heart disease, and some kinds of cancer, among other diseases (WHO 2000), it is possible that the observed trend of obesity may be also influencing current and future mortality patterns.

While in the US excess mortality due to obesity has been acknowledged and investigated (Allison et al. 1999; Mokdad et al. 2004; Olshansky et al. 2005; Flegal et al. 2005), the phenomenon has been understudied in Latin America. And it is here that the phenomenon may acquire especially worrisome dimensions, precisely because the high prevalence and the rapid growth of obesity and diabetes in the region occurs in combination with other conditions that increase the vulnerability of these populations.

The aim of this paper is to assess differentials in mortality due to obesity in Mexico and compare these differentials with those observed in the US. The novelty of this study is that we evaluate the effect of obesity on mortality in these two countries taking advantage of the existence of nationally representative databases for Mexico and the US that are comparable. In addition, we use a decomposition technique that enables us to decompose mortality risks to address the following question: is the intercountry difference in excess mortality among the obese due to differences in probabilities of suffering obesity-related diseases or it is a consequence of differences in the lethality of these chronic diseases?

METHODS AND DATA

Subjects and Data

We use data from the Mexican Health and Aging Study (MHAS) and the Health and Retirement Study (HRS). The MHAS was designed to be comparable with the HRS and both are nationally representative surveys of older people. To take into account people who died at 60 years or more, we consider people 59 years and older for MHAS and over 58 years for HRS and we assume that deaths occurs in the middle of the interval. The MHAS baseline (2001) includes 7,880 targets and spouses aged 59 or more, of whom a total of 465 died during 2001-2003. MHAS includes self-reported data regarding height and weight, as well as on chronic conditions (self-reported or physician-diagnosed). Anthropometric measures were obtained for a selected subsample. Comparing self-reports with the anthropometric measures we observe close correspondence for height and weight. We use self-reported data in order to calculate the body mass index (BMI = weight in kg/(height in meters)$^{\wedge 2}$) but the corresponding anthropometric values were used in cases where self-reports were missing.

The HRS consists of a total of seven waves with interviews conducted every two years since 1992 and includes individuals aged between 51 and 61. In order to have comparable reference periods for both countries, we analyze mortality differentials taking as a baseline the fifth wave (2000) of the survey. For this wave the sample size of people 58 years and older includes 15,203 individuals, of whom a total of 2,481 died between 2000 and 2004. In the HRS height and weight, as well as the rest of the variables, are all based on self-reports.

The proportion of overweight ($25 \leq$ BMI < 30) and obese (BMI ≥ 30) people over 59 years old is higher in the US (42% and 26% compared with 40% and 20% in Mexico, respectively), whereas the proportion of individuals who had normal body weight ($18.5 \leq$BMI<25) is slightly higher in Mexico (37%, versus 32% in US). With regard to obesity-related non-communicable diseases we find that, even though the prevalence of diabetes among individuals over 59 years old is the same in both countries (17%), the prevalence of hypertension and heart attack is higher in US, 53% and 12% respectively, against 42% and 4% in Mexico (HRS, 2000; MHAS, 2001).

The Model

To study the effect of obesity on mortality we estimate loss in life expectancy and carry out a decomposition analysis of the risk of dying based on Kitagawa's method (Kitagawa 1955) adapted for the purposes of this paper. To measure the effect of obesity on loss in life expectancy we construct period life tables for obese and non obese individuals using the observed probabilities of dying between age x and x +1 ($q_x(n)$). The life expectancy losses due to obesity will be the result of subtracting the life expectancy for obese individuals from the life expectancy for individuals with normal weight.

The probability of dying for obese individuals can be decomposed as follows:

$$q(x, o, z_i) = \sum_j q(x, o, z_i, d_j) * prd_j(x, o, z_i) \quad \textbf{(1)}$$

where:

$q(x, o, z_i)$ = probability of dying between age x and x +1, conditional on being obese (o) and controlling for z_i vector of factors;

$q(x, o, z_i, d_j)$ = probability of dying between age x and x +1, conditional on being obese (o) and suffering from disease j (d_j) and controlling for z_i vector of factors; and

$prd_j(x, o, z_i)$ = probability of suffering from disease j (prd_j) at age x, conditional on being obese (o) and controlling for z_i vector of factors.

The subscript j refers not only to obesity-related chronic conditions such as diabetes and hypertension but also to all possible combinations of those diseases (co-morbidities), including not suffering any of them.

By the same token, we can decompose the probability of dying for normal weight individuals as:

$$q(x, n, z_i) = \sum_j q(x, n, z_i, d_j) * prd_j(x, n, z_i) \quad \textbf{(2)}$$

The total difference in the probabilities of death between obese and normal weight individuals is defined in expression (3) below:

$$q(x, o, z_i) - q(x, n, z_i) = \sum_j \left[\left(\alpha_j^o - \alpha_j^n\right) \times \left(\frac{1}{2}\right) \times \left(\beta_j^o + \beta_j^n\right) + \left(\beta_j^o - \beta_j^n\right) \times \left(\frac{1}{2}\right) \times \left(\alpha_j^o + \alpha_j^n\right) \right] \quad \textbf{(3)}$$

where:

$\alpha_j^o = q(x, o, z_i, d_j)$

$\alpha_j^n = \mathrm{q(x, n, z_i, d_j)}$

$\beta_j^o = \mathrm{prd_j(x, o, z_i)}$

$\beta_j^n = \mathrm{prd_j(x, n, z_i)}$, and

$\mathrm{d_j}$ = groups of obesity-related chronic conditions including not suffering any of them.

This decomposition analysis enables us to evaluate the contribution of the **"mortality"** and **"chronic disease"** components to the total difference between obese and normal weight mortality levels and, in addition, permits us to estimate the contribution associated with each obesity-related disease. The first product on the right side of expression (3) yields the contribution of the **"mortality component,"** whereas the second product yields the contribution of the **"chronic disease component."**

Statistical Analysis

The conditional probabilities are estimated by two groups of regressions. The first one (logistic regression) evaluates the probabilities of dying conditional on suffering each disease by weight status (obese or normal weight). The dependent variable is a dummy equal to 1 if the individual died during the period analyzed. The second group (multinomial logistic regression) evaluates the probabilities of experiencing each disease conditional on weight status. The dependent variable is constructed through the interaction of the variables indicating if the individual suffers from any of the obesity-related chronic diseases or any of their possible combinations. These regressions are adjusted for demographic factors (age and sex), behavioral factors (smoking status), and the presence of other confounding effects.

The chronic diseases were included in the analysis when the effect of obesity on the probability of suffering the obesity-related disease was statistically significant. The following conditions were examined: heart disease (only available for the US), heart attack, stroke, hypertension, respiratory disease, and diabetes. Heart disease was not included here for comparability reasons (it was not available for Mexico), but it was used for the US though its importance was fairly small (less than one percent). We also found non-significant effects for stroke and respiratory diseases. Since the effect of obesity on the probability of suffering heart attack disappears after controlling for hypertension (for both countries), we only consider diabetes and hypertension in the decomposition analysis. Based on the interaction of these two variables, we get the following groups: suffering neither hypertension nor diabetes; suffering hypertension but not diabetes; suffering diabetes and but not hypertension; and suffering both conditions.

Obesity measurement

Measurement of overweight and obesity, especially among the elderly, has been and continues to be a controversial issue. Some studies have shown that the waist-to-hip ratio (WHR) is a better anthropometric predictor of total mortality among older people (Folsom et al. 2000), or of the risk of experiencing chronic diseases (Lapidus et al. 1984). However, other studies indicate that waist circumference is a better predictor of visceral fat in older persons compared with WHR (Snijder, van Dam and Seidell 2005; Visscher et al. 2001). On the other hand, a high correlation between BMI and more direct measures of adiposity has been found, whereas correlations between WHR and visceral adipose tissue volume (as measured by computed tomography) have been shown to be less than acceptable (Solomon and Manson 1997). After a careful review of the epidemiological literature, Solomon and Manson (1997) concluded that the relative influence of BMI and WHR on mortality risk remains controversial. Since the databases used in the present study do not provide waist or hip measures assessments, it was not possible to perform a sensitivity test to compare results from other measurement methods with those obtained using only BMI. We resort to using only BMI as an indicator of fat adiposity.

Another issue of some importance has to do with the appropriate cut-off points of BMI distribution to classify individuals according to weight status. Fixed cut points, as a general measure of adiposity, have been criticized due to differences in body composition among different populations and age groups (Hubbard 2000; Villareal et al. 2005; Snijder et al. 2005). For specific populations it has been found that the cut points reflecting higher risk of suffering obesity-related diseases are different than the ones proposed by the WHO. For example, among some Asiatic populations those cutoff points were found to be lower than the fixed ones, while for Asian-Pacific Islanders they were higher (Hubbard 2000). It has also been shown that populations with short stature may be considered "obese" at lower levels of BMI because those with short stature have higher levels of body fat at each level of BMI (López-Alvarenga et al. 2003). Several papers show that, given fixed cutoff points, the effect of overweight and obesity on mortality decrease at older ages (Flegal et al. 2005; Bender et al. 1999) or that the effect on mortality at older ages is only observed for higher levels of BMI (Stevens et al. 1998). However, in addition to the selective survival that could be operating or the protective effect of higher levels of weight at older ages that some authors have invoked (Grabowski and Ellis 2001; Mazza et al. 2007), the lower effect could also be due simply to the fact that fixed cutoff points measure different phenomena for different age groups. For example, among the elderly we may find higher levels of BMI (that do not reflect higher levels of adiposity) due to changes in height because of vertebral compression, lost of muscular tone and postural changes (Villareal et al. 2005; WHO 1995). In order to evaluate the sensitivity of our results according to the criteria used to measure excess weight based on BMI, we estimated models using the standard definition given by WHO and relative values of BMI (quintiles). Table 1 shows the cut-off points for each definition.

TABLE 1 ABOUT HERE

RESULTS

The results of the regression analysis show that conditional probabilities of dying are highly sensitive to variations in the cut points used to define obesity and overweight (Table 2 and Table 3). For both Mexico and the US, we observe that the effect of higher levels of obesity is not statistically significant when using the WHO cut points for BMI even when we are controlling for confounding effects such as low weight and smoker status. Also, the sign of the coefficients for obesity and overweight are not in the expected direction.

However, using relative cut point criteria we observe that for the highest BMI quintiles (4th and 5th quintiles), compared with people with BMI in the 3rd quintile (individuals belonging to the middle group of weight), the effect of excess of weight on mortality is not only in the expected direction, but also statically significant for both Mexico and the US. Note that for the US the cut points are slightly higher than for Mexico. We also performed estimation using the US cut points for both countries. Since the results were almost the same, we use the country-specific cut points.

TABLES 2 AND 3 ABOUT HERE

To compare differentials in mortality due to obesity in the US and Mexico, we calculate the annualized probabilities of dying (by BMI group) using the previously estimated coefficients. We then estimate life expectancies for people belonging to the 3^{rd}, 4^{th} and 5^{th} quintiles of BMI.

The graph on the left side of Figure 2 shows life expectancies for the Mexican and the US populations. As there are sharp differences between the level of education for elderly Mexicans and those in the US, we also selected several sub-samples for different levels of education in search of the most "homogeneous" (in terms of education) sub-populations for comparing the US and Mexico. Mean years of education for elderly cohorts in Mexico is 3.6 years (with 4 years of standard deviation) whereas in the US this value is 11.8 years (3.5 sd).

The graphs on the right side of Figure 2 show the loss in life expectancy for populations with the lowest levels of education in the US and Mexico (the parameters for the logistic regression for different sub-groups of education are not shown here). For the US we select individuals with 6 years of education or lower (elementary school or less). For Mexico we consider individuals with no formal education (zero years of school). Selecting exactly the same number of years of education for both countries was not possible due to the great difference in levels of education. For example, considering people with no education in the US reduces the sample from 10,032 individuals to 90 individuals. On the other hand, working with people from 0 to 6 years of education in Mexico leads us to include nearly the entire population (people in this range of education represent around 85% of the total sample of elderly Mexicans in MHAS).

Considering the entire samples we observe that the lost of life expectancy due to obesity in Mexico is much higher than for the US (Figure 2) despite the fact that the prevalence of obesity and chronic diseases among the elderly are much higher in the United States. For a 60 year-old individual in Mexico, the loss in life expectancy due to obesity is 4.4 years whereas in the US it would be 2.1 years (graphs on the left side). But when we evaluate this effect among individuals with the lowest levels of education we obtain the reverse result: for 60 year-old individuals with no formal education in Mexico the loss of life expectancy due to obesity would be 5 years whereas in the US for individuals from 0 to 6 years of formal education the loss is as high as 6.75 years.

FIGURE 1 ABOUT HERE

Other calculations (not shown here) were performed to evaluate the role of interactions with other characteristics. These calculations show larger effects of obesity on mortality among females in Mexico and males in the US (among males in Mexico and females in the US the effect is not significant). We also found a larger effect for Mexican Americans (than for the whole HRS sample) and for people who live in urban areas in Mexico (relative to those who live in rural areas).

In order to investigate the mechanism underlying the differences in excess mortality between Mexico and US we carried out a decomposition analysis of the probability of dying due to obesity-related chronic disease. Such an analysis allows us to answer the questions previously raised: is the difference in excess mortality observed between countries due to differences in probabilities of suffering obesity-related diseases or is it a consequence of differences in mortality conditional on having these chronic diseases?

To perform the decomposition analysis we first estimate the effect of excess weight on the probability of suffering selected obesity-related chronic diseases mentioned before. The results of the multinomial logistic regression are shown in Table 4.

TABLE 4 ABOUT HERE

Figure 2 shows the contribution of the mortality and chronic disease components to the total difference in the risk of dying between individuals in the highest quintiles of the BMI distribution (4th and 5th) and those in the third quintile. This analysis was carried out for predicted probabilities evaluated at the mean value of all variables included in the model. As shown on the right side of figure 2, the contribution of the chronic disease component is higher in the US, as it explains around 56% of the total difference, whereas in Mexico this percentage is only 9% (two last black bars on the right side of figure 2). The larger importance of the chronic disease component observed in the US is mainly due to the higher probability among obese people of suffering both hypertension and diabetes. The reverse results are observed when we analyze the contribution of the mortality component (two last black bars on the left side of figure 2): in Mexico the mortality component explains 91% of the total difference in the probability of dying and in the US this percentage is equal to 44%. Examining the results by chronic disease, we observe that in Mexico the mortality component associated with hypertension (second bar on the left side of figure 2) is the main mechanism explaining the total difference in the probability of dying, followed by the mortality component associated with experiencing none of those diseases (first bar on the left side of figure 2).

FIGURE 2 ABOUT HERE

DISCUSSION

Using a relative measure of excess body fat, we find a strong effect of obesity on loss in life expectancy. This effect is markedly larger in Mexico than in the US. Our findings point to higher mortality among elderly people with BMI equal to 28 and over in the US and to 27.3 and over in Mexico (these are the cutoff points for the 4th quintiles of BMI for each country, respectively) compared to people in the middle of the distribution of BMI (25.8 - 28 for the US and 24.7 - 27.3 for Mexico). Despite the fact that obesity and related chronic diseases are more prevalent among US elderly, the effect of obesity on losses of life expectancy is much sharper in Mexico (over twice than for the US). The patterns among different socio-economic strata show larger effects among lower-educated individuals compared to the population as a whole. These differences are higher in the US than they are in Mexico. In the US, the loss in life expectancy due to obesity at age 60 amounts to 2.1 years for the entire population and to 6.75 years for individuals with 0 to 6 years of formal education. In Mexico, the loss among all obese individuals is on the order of 4.4 years whereas for individuals with no formal education it hovers around 5 years. It follows that differences in losses of life expectancy for the total population favor the US only because the educational composition of the older population is more favorable in the US that in Mexico.

Is the higher relative risk of mortality observed in Mexico due to the higher probability of suffering obesity-related diseases or, alternatively, is it a consequence of the higher relative risk of mortality associated with these chronic diseases? According to the results of our decomposition analysis, despite the fact that the probability of suffering obesity-related chronic diseases among obese individuals (as compared to people of normal weight) is much higher among the elderly in the US, the relative risk of dying conditional on experiencing these diseases is vastly higher in Mexico.

Higher probabilities of experiencing chronic conditions in the US could be associated with mortality selection effects in Mexico that truncate the experience of obese individuals with chronic conditions of higher severity. But, and equally likely, it could be due to higher levels of accuracy on self reported conditions in the US, possibly associated with better access to medical care. Finally, it could reflect a naturally occurring phenomenon whereby obese people in high income countries are more likely to experience a host of chronic conditions than those in low income countries (Burke et al., 2001) simply as a result of the different stages these countries occupy in the health transition.

Higher mortality among obese Mexicans could be due to a combination of factors. First, inferior access to health services would proportionally affect people who suffer chronic conditions more often (obese more than non–obese individuals). Second, it could be the result of a double exposure to infectious and parasitic diseases that could aggravate the standard course of chronic afflictions (Palloni et al. 2006; Monteverde, Noronha and Palloni 2007).

According to projections from the World Health Organization, prevalence of obesity in Mexico between the year 2002 and 2010 is expected to increase 52% among men and 24% among women over 30 years old (WHO, 2005). If this is true and the patterns of relations between obesity, chronic illnesses and their lethality uncovered here remain unchanged, the future outlook on longevity among older individuals is severely compromised.

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Table 1
Classification of people according weight status
WHO and BMI quintiles

WHO Definition		Quintiles	MHAS	HRS
Low weight	BMI<18.5	**1st quintile**	BMI<21.9	BMI<23.42
Normal	25>BMI≥18.5	**2nd quintile**	24.7>BMI≥21.9	25.77>BMI≥23.42
Overweight	30>BMI≥25	**3rd quintile**	27.3>BMI≥24.7	28>BMI≥25.77
Obese	35>BMI≥30	**4th quintile**	30.5>BMI≥27.3	31.12>BMI≥28
Morbid Obesity	BMI≥35	**5th quintile**	BMI≥30.5	BMI≥31.12

Table 2
Logistic Regression – Independent Variable: Death between 2001 and 2003 (MHAS 2001, MHAS 2003)

	WHO		Quintiles (1)	
Variable	**Coeff.**	**P value**	**Coeff.**	**P value**
Age	0.08**	0.000	0.08**	0.000
Sex	-0.28**	0.016	-0.32**	0.007
Education	-0.02	0.218	-0.01	0.354
Obese_high (or 5th quintile)	0.21	0.392	0.47**	0.028
Obese (or 4th quintile)	-0.44**	0.023	0.54**	0.009
Overweight (or 2nd quintile)	-0.34**	0.011	0.40*	0.050
Low Weight (or 1st quintile)	0.23	0.346	0.99**	0.000
Smoker	0.17	0.269	0.13	0.394
Constant	-7.81**	0.000	-8.34**	0.000

* p-value < 0.10 ** p-value < 0.05

(1) 1st quintile: BMI<21.9; 2nd quintile: 21.9≤BMI<24.7; 3rd quintile 24.7≤BMI<27.3; 4th quintile: 27.3≤BMI<30.5 and 5th quintile: BMI≥30.5.

Table 3
Logistic Regression – Independent Variable: Deaths between 2000 and 2004 (HRS 2000, HRS 2004)

	WHO		Quintiles (1)	
Variable	**Coeff.**	**P value**	**Coeff.**	**P value**
Age	0.10**	0.000	0.10**	0.000
Sex	- 0.57**	0.000	- 0.54**	0.000
Education	-0.05**	0.000	- 0.05**	0.000
Obese_high (or 5th quintile)	0.18	0.197	0.33**	0.007
Obese (or 4th quintile)	- 0.29**	0.009	0.19	0.108
Overweight (or 2nd quintile)	- 0.29**	0.001	0.23**	0.044
Low Weight (or 1st quintile)	1.69	0.000	0.72**	0.000
Smoker	0.65*	0.000	0.65**	0.000
Constant	-7.46**	0.000	-7.94**	0.000

* p-value < 0.10 ** p-value < 0.05

(1) 1st quintile: BMI<23.42; 2nd quintile: 23.42≤BMI<25.77; 3rd quintile 25.77≤BMI<28.00; 4th quintile: 28.00≤BMI<31.12 and 5th quintile: BMI≥31.12.

Table 3

Multinomial Logistic Regression

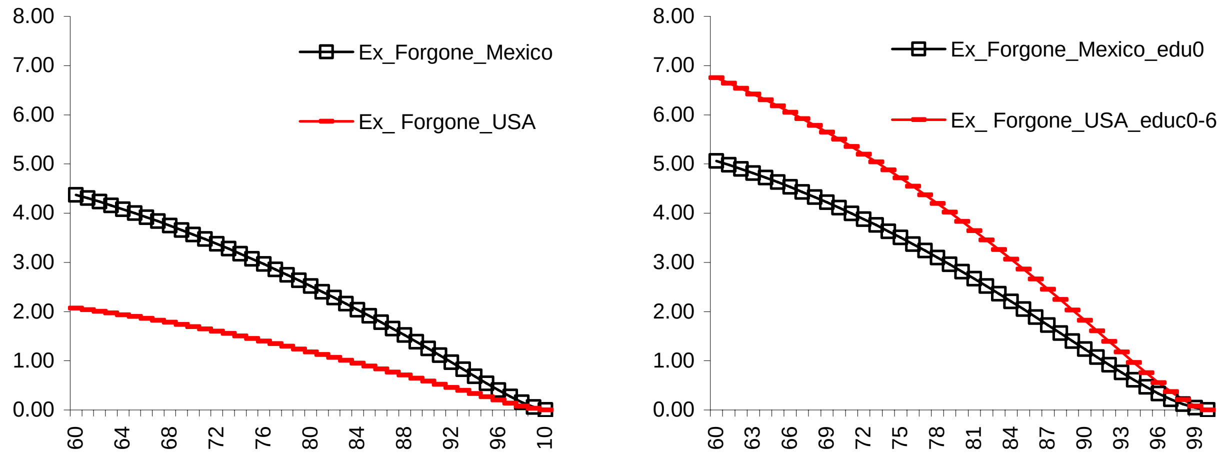
Independent Variable: Groups of diseases*

Variable	HRS (2000)		MHAS (2001)	
Hypertension	**Coeff.**	**P value**	**Coeff.**	**P value**
Age	0.02	0.000	0.01	0.029
Sex	0.08	0.079	0.59	0.000
Education	-0.02	0.001	0.01	0.062
Obese_high (or 5th quintile)	0.67	0.000	0.48	0.000
Obese (or 4th quintile)	0.34	0.000	0.26	0.007
Overweight (or 2nd quintile)	-0.17	0.010	-0.17	0.071
Low Weight (or 1st quintile)	-0.54	0.000	-0.31	0.002
Smoker	-0.18	0.005	-0.56	0.000
Constant	-1.45	0.000	-1.98	0.000
Diabetes	**Coeff.**	**P value**	**Coeff.**	**P value**
Age	0.01	0.197	-0.02	0.038
Sex	-0.44	0.000	0.23	0.027
Education	-0.07	0.000	0.00	0.857
Obese_high (or 5th quintile)	0.70	0.000	0.04	0.800
Obese (or 4th quintile)	0.25	0.085	0.00	0.976
Overweight (or 2nd quintile)	-0.37	0.017	-0.08	0.605
Low Weight (or 1st quintile)	-0.60	0.000	-0.36	0.035
Smoker	-0.29	0.052	-0.23	0.099
Constant	-1.60	0.037	-1.09	0.044
Hypertension and Diabetes	**Coeff.**	**P value**	**Coeff.**	**P value**
Age	0.04	0.000	0.00	0.804
Sex	-0.04	0.545	0.69	0.000
Education	-0.09	0.000	0.01	0.203
Obese_high (or 5th quintile)	1.38	0.000	0.53	0.000
Obese (or 4th quintile)	0.71	0.000	0.38	0.008
Overweight (or 2nd quintile)	-0.57	0.000	-0.20	0.199
Low Weight (or 1st quintile)	-1.04	0.000	-0.18	0.251
Smoker	-0.22	0.031	-0.82	0.000
Constant	-3.01	0.000	-2.83	0.000

*** Note: Reference Category: Suffer neither hypertension nor diabetes**

Source: MHAS (2001) and HRS (2000).

Figure 1
Life Expectancy Forgone Due to Obesity
For Elderly in Mexico and in the US*



All Levels of Education **Lowest Levels of Education**

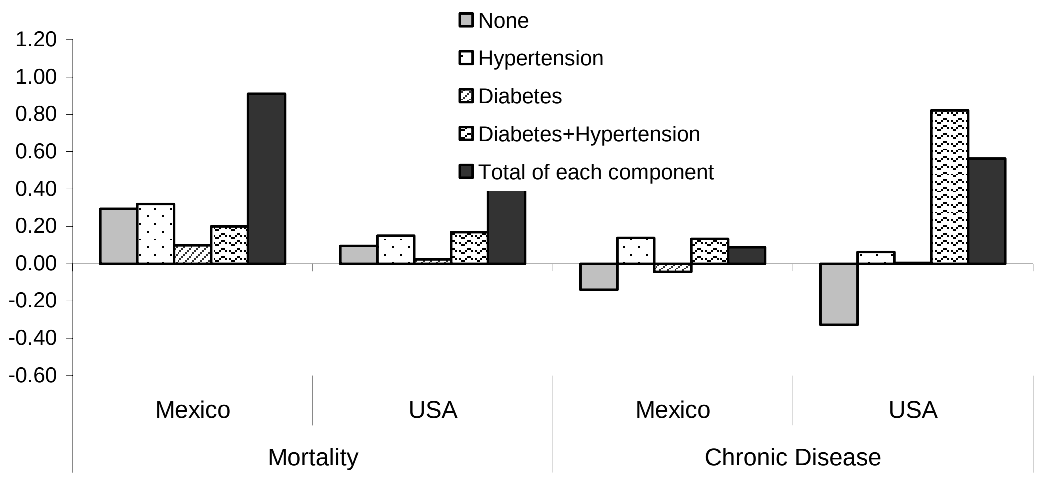
*** Note: Difference between Ex 5th - 4th quintile of BMI and Ex 3rd quintile.**
Source: MHAS (2001-2003) and HRS (2000-2004).

Figure 2

Decomposition Analysis by Chronic Disease and Total

Chronic Disease and Mortality Component

Comparison for Mexico and the US



Source: MHAS (2001-2003) and HRS (2000-2004).

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