

## **PIMSA POLICY REPORT FOR THE STUDY:**

### **Risk factors for liver disease among adults of Mexican descent in the United States and Mexico**

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#### **EXECUTIVE SUMMARY**

Our aim was to compare risk factors for chronic liver disease (CLD) in a cohort of Mexican health workers with nationally representative samples of US- and Mexico-born Mexican-Americans living in the US. We used data from the 1999-2014 National Health and Nutrition Examination Survey (NHANES) VIII, which includes persons of Mexican origin living in the US (n=4,313), and data from the 2006-2013 Health Worker Cohort Study (HWCS) in Cuernavaca, Mexico (n= 9,485). Regression analyses were used to investigate CLD risk factors. Our adjusted analyses indicate that Mexican-Americans in the U.S. are more likely to have diabetes, obesity, abdominal obesity, and be heavy/binge drinkers than their counterparts in Mexico. US-born Mexican-Americans have a greater risk of metabolic syndrome, while Mexico-born Mexican-Americans have a higher risk of elevated cholesterol. In this binational study, Mexican-Americans in the U.S. had more risk factors for CLD than the HWCS participants in Mexico. These findings can be used to design and implement more effective health promotion programs to address the specific factors that put Mexicans at higher risk of developing CLD in both countries.

Latinos in the United States (US) have disproportionately higher rates of chronic liver disease (CLD). Since 2002, CLD has consistently been the sixth leading cause of overall mortality for Latinos,<sup>1</sup> and the third cause of death among Latino males, ages 55-64.<sup>2</sup> Latino men and women are twice as likely to have CLD and are 1.7 and 1.8 times more likely to die from liver cancer, respectively, than non-Hispanic whites (NHW).<sup>3</sup> From 2006-2010, Latinos in the US had the highest incidence of and mortality from liver cancer, after Asians and Pacific Islanders.<sup>4</sup> The frequency earlier stage liver disease, such as steatohepatitis, also varies by race/ethnicity in the US: 45% among Latinos, 33% among NHW, and 24% among Blacks.<sup>5</sup> In Mexico, cirrhosis and other forms of CLD were the fifth leading cause of general mortality in 2015, and the third among males between the ages of 45 and 65 years.<sup>6</sup> By 2050, an estimated 90% of cases of CLD in Mexico will be attributable to obesity and excessive alcohol consumption, as compared to other populations that have high rates of CLD due to infection with hepatitis B (HBV) or hepatitis C (HCV).<sup>7</sup>

The aim of this study was to compare the prevalence of CLD risk factors in a representative sample of Mexican-Americans who were born in the US or Mexico, to a sample of adults in Mexico. We hypothesized that US Mexican-Americans would be at greater risk for CLD than their counterparts in Mexico. This hypothesis was based on studies suggesting that immigrant Mexican-Americans have better health outcomes than more acculturated, US-born Mexican-Americans.<sup>8-10</sup>

## **METHODS**

Data for Mexican-Americans in the US was obtained from the National Health and Nutrition Examination Survey (NHANES) VIII, a cross-sectional, representative, examination survey of the total civilian non-institutionalized population. This continuous survey is conducted by the National Center for Health Statistics to assess and track the health and nutritional status of Americans over time. The survey collects health data through standardized questionnaires and by physical examinations and a series of laboratory tests. The design for NHANES over-samples Mexican-Americans to allow for analyses of this subgroup. The 1999-2014 NHANES data includes a total of 3,929 male and 4,182 female Mexican-Americans, for a total sample size of 8,111.<sup>11</sup>

The data in Mexico came from the Health Worker Cohort Study (HWCS), a longitudinal study of workers and their immediate family members from two large health care institutions in Cuernavaca, Mexico: the Mexican Institute of Social Security (IMSS) and the National Institute of Public Health (INSP). Briefly, the HWCS collects information using physical examinations, self-reported questionnaires, and laboratory tests in order to prospectively evaluate risk factors and the incidence of chronic diseases, including heart disease, diabetes, and CLD. From 2004 to 2006 (Wave 1), approximately 9,000 health workers enrolled in the HWCS. During 2011 to 2013 (Wave 2), a total of 1,855 participants were followed-up. Details about the design and methods of the HWCS are described in prior publications.<sup>10,12</sup> The clinical and anthropometric procedures that were used for the HWCS are comparable to those used for the NHANES surveys.

The 1999-2014 NHANES sample was restricted to Mexican-American participants who were 20 years and older, born in the US or Mexico, reside in the US, and had medical insurance. The final NHANES sample consisted of 2,097 males and 2,216 females with complete questionnaire and laboratory data. The HWCS sample was limited to participants 20 years and older who reside and were born in Mexico, and had medical insurance. The final HWCS sample consisted of 3,010 men and 6,475 women with complete questionnaire and laboratory data. The total study sample of 13,798 individuals consisted of 9,485 Mexican subjects who currently reside in Mexico, 2,324 US-born Mexican-Americans who live in the US, and 1,989 Mexican-Americans who were born in Mexico and now live in the US.

The following known risk factors for chronic liver disease were examined:

1. Elevated alanine aminotransferase (ALT) and aspartate aminotransferase (AST)
2. Hepatitis B or hepatitis C infection
3. Metabolic syndrome
4. High total cholesterol
5. Diabetes
6. Obesity
7. Abdominal obesity
8. Alcohol consumption

Individuals were classified by country of residence (i.e., Mexico versus the US) and place of birth (i.e., US-born versus Mexico-born). The HWCS participants represent Mexicans who were born and currently live in Mexico. Mexican-Americans from the NHANES VIII sample were further classified by birthplace (US-born versus Mexico-born).

Age-adjusted means and prevalence rates were calculated for each CLD risk factor stratified by sex and country of birth/residence. Separate multiple logistic regression models were estimated for males and females to evaluate the independent associations of each liver disease risk factor to country of birth/residence.

## **RESULTS**

We observed that the HWCS participants in Mexico have fewer CLD risk factors than their Mexico- and US-born counterparts residing in the US. Specifically, we found that Mexican-American males who were born in the US had the highest rates of HBV or HCV infection, metabolic syndrome, diabetes, obesity, and abdominal obesity. Immigrant Mexican-American males had a greater prevalence of elevated total cholesterol and heavy/binge drinking than their US-born counterparts and the HWCS participants in Mexico. Males in Mexico had higher rates of low HDL cholesterol, elevated triglycerides, and smoking. Similar trends were observed among females, with US-born Mexican-American women presenting the highest prevalence of various risk factors, including a higher mean ALT and AST, obesity, and heavy/binge drinking. Mexican-American females who were born in Mexico had a greater prevalence of elevated total cholesterol, diabetes, and abdominal obesity than those born in the US or the HWCS participants in Mexico. We found higher rates of HBV or HCV infection, metabolic syndrome, low HDL cholesterol, elevated triglycerides, and smoking among the females in Mexico, than among their Mexican-American counterparts in the US. The direction of these trends did not change in the adjusted analyses.

## **DISCUSSION**

For this study, we compared the risk factors for CLD in a cohort of Mexican health workers with nationally representative samples of US- and Mexico-born Mexican-Americans living in the US. Our results suggest that adults in Mexico have less CLD risk

factors than their Mexico- and U.S.-born counterparts residing in the U.S. Of particular concern are the very high rates of obesity, diabetes, as well as heavy/binge drinking observed among Mexicans in both countries. Having a combination of risk factors for liver disease, such as obesity and excessive drinking, or diabetes and HCV, has been shown to increase risk of elevated aminotransferase levels and liver cancer.<sup>13,14</sup> More studies are needed to evaluate how the accumulation of specific risk factors may be contributing to the increased risk of CLD among Mexican-Americans.

As the Mexican-American population continues to grow, the challenges to address the high rates of CLD in this group will also increase. In 2014, an estimated 55 million Americans identified as Hispanic or Latino, representing 17% of the US population.<sup>15</sup> By 2060, the number of Latinos is projected to increase to 119 million and make up 29% of the population. Mexican-Americans are the largest group of Latinos in the US (64%).<sup>15</sup> Identifying ways to prevent CLD in this rapidly growing population is very important. A keener awareness and deeper understanding of CLD risk factors among Mexicans in both countries is needed to help policy makers anticipate how changes in immigration policy, coupled with health trends in Mexico, are likely to affect the health and health care needs of the growing number of Mexican-Americans in the US.

As in all observational studies, this study was limited by our ability to control for confounding variables in the comparisons between the Mexico and US samples. To address confounding, we stratified all analyses by sex and controlled for age, marital status, and educational level in the regression analyses. We also limited the US sample to individuals with health insurance since all the HWCS participants have health insurance. Our ability to control for potential confounding was limited by the available data and there may be other unobserved differences between the two samples that confound our results. Despite its limitations, to the best of our knowledge, the HWCS is the only longitudinal study in Mexico that includes ALT and AST measures as well as HBV and HCV results for a large number of Mexican adults.

The results of this study can be used to design and implement more effective health promotion programs to address the specific factors that put Mexicans at higher risk of developing CLD in both countries. This work adds to the relatively scarce literature on binational research, and provides preliminary data for future studies of migrant health

in the US and Mexico. Other binational primary data collection projects with representative samples and comparable demographic, socioeconomic and health status measures are needed to further investigate the growing problem of CDL among Mexicans in both countries.

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