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Research Article

# Medical Conditions and Obesity on Lower Body Function in Mexican Americans Age 75 and Older*

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**Abstract**

Lower body function was highly associated with some medical conditions and obesity. The objective of this research was to examine the effects of medical conditions and obesity on the lower body function in older Mexican-American aged 75 and over. Data from the baseline to Wave 5 (2004-2005) and Wave 6 (2007) of the Hispanic Established Population for the Epidemiological Study of the Elderly (Hispanic EPESE) were used in the analyses. The Ordinary Least Square (OLS) regression model analyses were used for assessing the association between lower body function and the selected medical conditions (arthritis, cancer, diabetes, stroke, heart attack, hip fracture) and obesity. Gender, age, and education among socio-demographic variables are effective with lower body function. As expected, less educated, older women have much lower body function disability. Moreover, adding medical conditions and obesity (BMI) in the regression model, subjects who have arthritis, heart attack, or more obese are likely to have much disability of lower body function. However, cancer, diabetes, stroke, and hip fracture are not effective on lower body function.

**Keywords:** Lower Body Function; Medical Conditions; Obesity; Older Mexican Americans

## Introduction

Lower body function has been shown to be a key factor in allowing older adults to maintain independence and well-being and to be highly associated with certain medical conditions and [1-3]. Although some research has examined the relationship between lower body function, medical conditions, and obesity [4-12], few studies have addressed the older Hispanic population. The objective of this study was to examine the effects of medical conditions and obesity on lower body function in Mexican-Americans age 75 and over, focusing particularly on selected medical conditions (arthritis, cancer, diabetes, stroke, heart attack, hip fracture) and obesity.

## Methods

### Study population

Data from baseline to Wave 5 (2004–2005) and Wave 6 (2007) of the Hispanic Established Population for the Epidemiological Study of the Elderly (Hispanic EPESE) were used in the analyses. The Hispanic EPESE was originally a longitudinal study of 3,050 Mexican Americans age 65 and older residing in southwestern states (Texas, New Mexico, Colorado, Arizona and California). The sample population was selected beginning in 1993 using area probability sampling to allow for generalizability to approximately 500,000 older Mexican Americans residing in the southwest. Wave 5 of the Hispanic EPESE data was collected from 2004–2005 (N=2,069), and Wave 6 data in 2007 (N=1,542).

### Measures

Socio-demographic variables in the Hispanic EPESE Wave 5 (2004–2005) included age, sex, years of formal education, nativity, and language of interview, marital status, household income, and living arrangements. Six common prevalent medical conditions were self-reported in that study, with participants reporting whether they had ever been told by a physician that they had any of the following: arthritis, cancer, diabetes, stroke, heart attack, or hip fracture. Obesity was measured in terms of standard BMI, calculated by dividing weight in kilograms by height in meters squared (km/m2).

The dependent variable was lower body function, measured via a Short Physical Performance Battery (SPPB) at Wave 6 (2007). The SPPB included a balance test, a short walk speed test, and five repetitive chair stand tests, each of which was scored on a scale from 0 (unable) to 4 (best performance). The SPPB score was a sum of these three categories, thus ranging from 0 to 12, with higher scores representing better lower body function.

Residual analysis revealed a few outliers based on cook's D and leverage values. However, for clinical investigation of the Hispanic EPESE data, I did not exclude these outliers. No normality problems emerged in the residual plots.

## Statistical Analysis

The Statistical Analysis System (SAS: SAS Institute Inc., Cary, NC) version 9.2 was used in this analysis, and the selected alpha level for statistical significance was 0.05. Ordinary Least Square (OLS) regression model analyses were used to assess the association between lower body function and the selected medical conditions (arthritis, cancer, diabetes, stroke, heart attack, hip fracture) and obesity.

## Scientific Models and Research Hypotheses

1. Model 1: SPPB = Socio-demographic variables

For Model 1, I investigated whether and to what extent lower




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body function was impacted by socio-demographic factors. It was expected that women participants would experience much worse lower body function disability than their male counterparts.

2. Model 2: Model1 + Medical Conditions and obesity (BMI)

For Model 2, I assessed the relationship between lower body function, medical conditions, and BMI, having controlled for socio-demographic factors. People with arthritis, cancer, diabetes, stroke, heart attack, hip fracture, or obesity were expected to have relatively more diminished lower body function.

## Results

Table 1 presents the descriptive characteristics of the studied population of Mexican Americans 75 and over. Participants had a mean age of 81.9, (standard deviation 5.2), and a majority were women (61.5%). Over half (56.3%) had been born in the US, and about 80 % were interviewed in Spanish. Participants had had 4.9 years of education; on average, 42.5 % were married; and 28.2 % reported living alone. The participants were relatively poor, with 66% earning less than $15,000 a year.

**Table 1:** Socio demographic characteristics of Hispanic EPESE participants at Wave 5, 2004–2005 (N=2,069).

| | **Total** % (N=2,069) |
|---|---|
| **Female** | 61.5% (1,273) |
| **Age** (mean±SD) | 81.9 ± 5.2 |
| **Country of Birth** | |
| US-born | 56.0% (1,158) |
| Foreign-born | 44.0% (911) |
| **Language of Interview** | |
| English | 19.7% (408) |
| Spanish | 80.3% (1,661) |
| **Marital Status** | |
| Married | 42.5% (879) |
| Not Married | 57.5% (1,190) |
| **Years of Education** (mean±SD) | 4.9 ± 4.0 |
| **Living Alone** | |
| Yes | 28.2% (583) |
| No | 71.8% (1486) |
| **Household Income** | |
| < 15,000 | 1,318 (66.0) |
| ≥ 15,000 | 469 (44.0) |

'N' varies due to missing data. SD=standard deviation

Table 2 presents the prevalence of the six medical conditions and the obesity rates (BMI) of the participants. Arthritis was the most prevalent condition (59.3%), followed by diabetes (34.3%), heart attack (16.6%), stroke (13.7%), hip fracture (7.5%), and cancer (7.2%). The mean BMI of participants was 27.5 Kg/m2, standard deviation 4.9 Kg/m2.

Table 3 presents the distribution of participant performance on the Short Physical Performance Battery (SPPB), mean 7.0, standard deviation 2.8. The analysis excluded the score 0 category given that it revealed the inability of those participants to perform the studied tasks.

**Table 2:** Prevalence of chronic diseases and BMI of Hispanic EPESE participants at Wave 5, 2004–2005 (N=2,069).

| | **N** | **%** |
|---|---|---|
| **Arthritis** | 1,225 | 59.3 |
| **Cancer** | 149 | 7.2 |
| **Diabetes** | 690 | 33.3 |
| **Stroke** | 282 | 13.7 |
| **Heart Attack** | 341 | 16.6 |
| **Hip Fracture** | 155 | 7.5 |
| **BMI** (mean±SD) | 27.5±4.9 Kg/m$^2$ | |

BMI=Body Mass Index

**Table 3:** The short physical performance battery (SPPB) at Wave 6 of the Hispanic EPESE, 2007 (N=1,542).

| **Score** | **N** | **%** |
|---|---|---|
| **Mean±SD** | 7.0±2.8 | |
| **0*** | 454 | 30.7 |
| **1** | 39 | 2.6 |
| **2** | 57 | 3.9 |
| **3** | 31 | 2.1 |
| **4** | 78 | 5.3 |
| **5** | 91 | 6.1 |
| **6** | 131 | 8.9 |
| **7** | 128 | 8.6 |
| **8** | 136 | 9.2 |
| **9** | 104 | 7.0 |
| **10** | 100 | 6.7 |
| **11** | 108 | 7.3 |
| **12** | 24 | 1.6 |
| **Total** | 1481 | 100 |
| **Missing** | 61 | |

**Note:** The score 0 category (N=454) was excluded from analysis given that it meant participants were unable to perform the tests.

Table 4 presents the results of the OLS regression analyses predicting lower body function (SBBP). Model 1 revealed significant coefficients for gender (female -0.65, SE=0.21), age (-0.13, SE=0/02), and education (0.09, SE=0.03), with male, younger, and more educated participants showing better lower body function than their female, older, and less educated counterparts. The R square was 0.08, and no multicollinearity problems emerged, with all Variation Inflation Factors (VIF) around 2 or less. When medical conditions and obesity (BMI) were added to this analyses under Model 2, the coefficients of arthritis (-0.66, SE=0.20), heart attack (-0.58, SE=0.29), and BMI (-0.04, SE=0.02) emerged as significant, with participants who had reported arthritis, heart attack, or obesity being more likely to experience diminished lower body function. The R square under Model 2 was 0.11, more than 0.08, and no multicollinearity problems emerged, given that all Variation Inflation Factors (VIF) were around 2 or less. One interesting change from Model 1 to Model 2 was in nativity, which was not significant in Model 1 but was significant in Model 2.

**Table 4:** OLS Regression Models for Lower Body Function (SPPB) (N=804).

| | **Model 1** Coefficient (SE) | **Model 2** Coefficient (SE) |
|---|---|---|
| **Constant** | 17.60 (1.90)*** | 19.00 (2.19)*** |
| **Female** (Male) | -0.65 (0.21)** | -0.54 (0.22)* |
| **Age, years** | -0.13 (0.02)*** | -0.13 (0.02)*** |
| **Nativity (**US-born) | 0.34 (0.20) | 0.51 (0.21)* |
| **Language of Interview (**English) | 0.21 (0.25) | 0.08 (0.25) |
| **Marital Status (**Married) | -0.09 (0.25) | -0.03 (0.26) |
| **Education, years** | 0.09 (0.03)*** | 0.09 (0.03)*** |
| **Living Alone (**Yes) | -0.22 (0.25) | -0.25 (0.26) |
| **Household Income (**≥ $15,000) | -0.33 (0.23) | -0.38 (0.23) |
| | | |
| **Arthritis**(No Arthritis**)** | | -0.66 (0.20)*** |
| **Cancer**(No Cancer) | | -0.04 (0.38) |
| **Diabetes**(No Diabetes) | | 0.04 (0.21) |
| **Stroke**(No Stroke) | | -0.41 (0.32) |
| **Heart Attack**(No Heart Attack) | | -0.58 (0.29)* |
| **Hip Fracture**(No Hip Fracture**)** | | -0.57 (0.44) |
| **BMI, kg/m²** | | -0.04 (0.02)* |
| **$R^2$** | 0.08 | 0.11 |

## Discussion

The objective of this study was to investigate causative links between lower body function and socio-demographic factors (Hypothesis 1) and the causal relationship between lower body function and medical conditions and obesity adjusting for socio-demographic factors (Hypothesis 2). The OLS regressions revealed that both hypotheses were partially supported. The socio-demographic variables of age, gender, and education demonstrated an effect on lower body function. As expected, younger, male, and more educated participants demonstrated better lower body function than their older, female, and less educated counterparts. Moreover, when medical conditions and obesity (BMI) were added to the regression model, it emerged that participants who had reported arthritis or heart attack or who were more obese were much more likely to experience lower body function disability. However, the analysis did not reveal an effect of cancer, diabetes, stroke, or hip fracture on lower body function.

This study was subject to several limitations. First, the data for the 2,069 participants was missing many values, especially for BMI (N=426; 20.6%). Moreover, the dependent variable of the SPPB score could be considered a categorical variable, including participants who were unable to demonstrate lower body function. Thus, in that case, a logistic regression could be applied given that the SPPB score variable would then be considered a dichotomous dependent variable (able vs. unable). Second, this longitudinal study considered a relatively short time period (only two and half years), making it difficult to definitively conclude a causative link between diminished lower body function and medical conditions and obesity. Thus, future studies should investigate a longer time period to assess that causal relationship more effectively.

In conclusion, this study has demonstrated a causal relationship between medical conditions and obesity and lower body function among Mexican Americans age 75 and over. Age, gender, and education were important determinants of lower body function disability. Moreover, arthritis, heart attack, and obesity were predictors of lower body function, at least in the short term.

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