LONGITUDINAL RESEARCH ON AGING: SELECTED EXAMPLES FROM THE HISPANIC ESTABLISHED POPULATION FOR THE EPIDEMIOLOGIC STUDY OF THE ELDERLY (H-EPESE)

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Montreal, February 14, 2008
University of Texas Medical Branch

Where is UTMB?

Galveston, TX
Academic Health Sciences Center
5 hospitals, 796 beds, 41 clinics
Academic Programs:

School of Medicine, School of Nursing, School of Allied Health Sciences, and Graduate School of Biomedical Sciences
Areas of Research: Aging, Tropical/Infectious Disease, Structural Biology, Minority (Hispanic) Health, Neuroscience, (4 WHO Collaborating Centers)
Much research on Aging is based on cross-sectional study designs with all data collected at the same time. Longitudinal studies are more appropriate for establishing causality, measuring change in the same individuals (decline in health, recovery, mortality, etc.) and separating aging, cohort and period effects.
Types of Longitudinal Studies

• Repeated cross-sectional studies of different samples from the same population at two or more points in time. For example, the National Long Term Care Survey in the United States has enabled the investigation of trends in the health of older people since 1982. (Recent declines in disability rates).

• Panel studies collect data on the same subjects over time. Examples are the Health and Retirement Study, the Established Populations for the Epidemiologic Study of the Elderly (EPESE) and the Canadian Longitudinal Study of Aging.
Benefits of Longitudinal Studies

- Multiple waves (more than two) are increasingly common. They allow the study of the rate of change over time and the estimation of trajectories of change. It can allow estimation of the influence of change in one variable on change in an outcome variable. For example, weight loss from Time 1 to Time 2 predicting disability from Time 2 to Time 3. Techniques include latent growth curves, event history, and hierarchical linear modeling.
Challenges

• Decide on an appropriate time lag. Some relationships require many years to be manifested, e.g. the influence of obesity on disability. Others require short time lags, e.g. the influence of death of spouse on depressive symptoms.

• Non random attrition including selective mortality. (Death can be incorporated in analysis of change in health). Older people are more residentially stable than middle-aged or younger people.
BACKGROUND TO HISPANIC HEALTH AND AGING
U.S. Hispanic Population Growth, 1940…2003

Millions

Source: U.S. Bureau of the Census
Hispanics as % of U.S. Population

Source: U.S. Bureau of the Census
FIGURE 1.
Hispanics by Origin: 2002
(In percent)

- Mexican American 66.9
- Central and South American 14.3
- Puerto Rican 8.6
- Cuban 3.7
- Other Hispanic 6.5

POPULATION PROJECTIONS TO 2050

- Non-Hispanic Whites: 210 million
- Hispanics: 103 million (25%)
- African Americans (Blacks): 61 million
- Asian Origin: 33 million

An Epidemiologic Paradox

- Hispanics (except Cuban Americans) are socioeconomically disadvantaged, but have favorable overall mortality

Risk factor profiles
- High rates of DIABETES
- High rates of OBESITY
- Similar rates of hypertension, cholesterol
- High SMOKING rates among men, lower among women (fewer cigarettes). Cuban American males smoke the most
- High ALCOHOL (binge) drinking rates among men, low among women. Alcohol consumption in women increases with acculturation
- Low rates of physical ACTIVITY
- Strong families
- Migration selection

Markides and Coreil (1986)
Data based on Vital Statistics show the greatest mortality advantage compared to Non-Hispanic Whites for all Hispanics combined. The advantage is greatest among older people.

National Community Surveys linked to the National Death Index show a narrowing of the advantage and one study suggests that the Mexican origin mortality advantage (Palloni & Arias, 2004) can be attributed to selective return migration of less healthy immigrants to Mexico.

The Medicare – NUDIMENT data show a much lower advantage of Hispanic elders than the Vital Statistics Method.

Markides & Eschbach, J. Gerontology: Social Sciences (2005)
A LONGITUDINAL STUDY OF THE HEALTH OF MEXICAN AMERICAN ELDERLY 1992-2008 FUNDED BY NIA (HISPANIC EPESE)

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  • Jacqueline Angel, Ph.D.
SAMPLING PROCEDURES

Area probability multi-stage sample of Mexican Americans aged 65 and over residing in the five Southwestern states (Texas, New Mexico, Colorado, Arizona, and California) (Non-institutionalized population).


N = 3,050
Figure 1. Conceptual Model
# Hispanic EPESE Summary: Baseline, Wave 2 through Wave 5 and Projected Wave 6

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>Proxy+</th>
<th>Deceased</th>
<th>Refused</th>
<th>Not Located</th>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993-4</td>
<td>3050</td>
<td>177</td>
<td></td>
<td></td>
<td></td>
<td>65+</td>
</tr>
<tr>
<td>1995-6</td>
<td>2438</td>
<td>143</td>
<td>238</td>
<td>110</td>
<td>264</td>
<td>67+</td>
</tr>
<tr>
<td>1998-9</td>
<td>1980</td>
<td>145</td>
<td>423</td>
<td>124</td>
<td>285</td>
<td>70+</td>
</tr>
<tr>
<td>2000-1</td>
<td>1683</td>
<td>101</td>
<td>282</td>
<td>137</td>
<td>288</td>
<td>72+</td>
</tr>
<tr>
<td>2004-5</td>
<td>1167</td>
<td>93</td>
<td>467</td>
<td>145</td>
<td>328</td>
<td>75+</td>
</tr>
</tbody>
</table>

## Added Sample

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>Proxy+</th>
<th>Deceased</th>
<th>Refused</th>
<th>Not Located</th>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004-5</td>
<td>902</td>
<td>49</td>
<td></td>
<td></td>
<td></td>
<td>75+</td>
</tr>
</tbody>
</table>

## Both samples combined

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>Proxy+</th>
<th>Deceased</th>
<th>Refused</th>
<th>Not Located</th>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>1402*</td>
<td>129</td>
<td>379</td>
<td>54</td>
<td>136</td>
<td>77+</td>
</tr>
</tbody>
</table>

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Cumulative deceased=1410 at end of 5th wave

+ Included in Total

Updated 12/05/2007
### SELECTED SAMPLE CHARACTERISTICS

**N = 3,050 (1993-94)**

<table>
<thead>
<tr>
<th><strong>AGE</strong></th>
<th><strong>MARITAL STATUS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>RANGE 65-99</td>
<td>MARRIED 55.3%</td>
</tr>
<tr>
<td>MEAN 73.0 yrs.</td>
<td>DIV/SEP 7.9%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>GENDER</strong></th>
<th><strong>PLACE OF BIRTH</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>MALE 43.3%</td>
<td>MEXICO 46.8%</td>
</tr>
<tr>
<td>FEMALE 56.7%</td>
<td>U.S.A. 53.2%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>YEARS of SCHOOL</strong></th>
<th><strong>LIVING ARRANGEMENTS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>MEAN 5.1 yrs.</td>
<td>ALONE 20.9%</td>
</tr>
</tbody>
</table>

**Continued on next slide**
## SELECTED SAMPLE CHARACTERISTICS

### SPEAKS ENGLISH
- **NOT AT ALL**: 30.1%
- **NOT TOO WELL**: 27.0%
- **PRETTY WELL**: 17.0%
- **VERY WELL**: 24.6%

### SOURCES OF INCOME
- **SOCIAL SECURITY**: 96.1%
- **PRIVATE PENSION**: 17.1%
- **SSI**: 25.4%
- **CHILDREN**: 7.0%
- **RENT/STOCKS/BONDS, ETC.**: 4.4%

### HOUSEHOLD INCOME
- **$0-4,999**: 13.2%
- **$5,000-9,999**: 37.7%
- **$10,000-14,999**: 25.8%
- **$15,000-19,999**: 11.7%
- **$20,000-29,999**: 6.2%
- **$30,000 +**: 5.4%

### HEALTH INSURANCE
- **MEDICARE**: 87.4% (92%)
- **MEDICAID**: 34.1%
- **PRIVATE**: 23.5%
<table>
<thead>
<tr>
<th>Condition</th>
<th>MALES 65-74 (n=863)</th>
<th>MALES 75+ (n=431)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HYPERTENSION</td>
<td>34.5</td>
<td>31.4</td>
</tr>
<tr>
<td>ARTHRITIS</td>
<td>28.4</td>
<td>28.2</td>
</tr>
<tr>
<td>DIABETES</td>
<td>25.0</td>
<td>17.6</td>
</tr>
<tr>
<td>HEART DISEASE</td>
<td>19.2</td>
<td>22.9</td>
</tr>
<tr>
<td>STROKE</td>
<td>5.9</td>
<td>6.7</td>
</tr>
<tr>
<td>CANCER</td>
<td>4.4</td>
<td>6.7</td>
</tr>
<tr>
<td>HIP FRACTURE</td>
<td>1.6</td>
<td>3.5</td>
</tr>
<tr>
<td>Condition</td>
<td>65-74</td>
<td>75+</td>
</tr>
<tr>
<td>-------------------------</td>
<td>--------</td>
<td>--------</td>
</tr>
<tr>
<td><strong>FEMALES</strong></td>
<td>(n=1139)</td>
<td>(n=615)</td>
</tr>
<tr>
<td>HYPERTENSION</td>
<td>45.6</td>
<td>49.3</td>
</tr>
<tr>
<td>ARTHRITIS</td>
<td>47.3</td>
<td>50.5</td>
</tr>
<tr>
<td>DIABETES</td>
<td>24.6</td>
<td>19.5</td>
</tr>
<tr>
<td>HEART DISEASE</td>
<td>21.9</td>
<td>23.2</td>
</tr>
<tr>
<td>STROKE</td>
<td>3.5</td>
<td>9.8</td>
</tr>
<tr>
<td>CANCER</td>
<td>4.7</td>
<td>6.7</td>
</tr>
<tr>
<td>HIP FRACTURE</td>
<td>2.4</td>
<td>7.5</td>
</tr>
</tbody>
</table>
### Percent of Persons 65 and Over Who Report Difficulty Performing Selected Activities of Daily Living by Ethnicity

<table>
<thead>
<tr>
<th>Activity</th>
<th>Whites (n=24,753)</th>
<th>Non-Whites (n=2,784)</th>
<th>Mexican Americans (n=3,050)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eating</td>
<td>1.9</td>
<td>1.3</td>
<td>5.4</td>
</tr>
<tr>
<td>Toileting</td>
<td>4.4</td>
<td>7.0</td>
<td>7.5</td>
</tr>
<tr>
<td>Dressing</td>
<td>5.7</td>
<td>8.6</td>
<td>9.6</td>
</tr>
<tr>
<td>Bathing</td>
<td>9.5</td>
<td>14.0</td>
<td>11.8</td>
</tr>
<tr>
<td>Transferring</td>
<td>8.2</td>
<td>11.6</td>
<td>8.9</td>
</tr>
</tbody>
</table>

**Note:** Data on Whites and Non-Whites are from the 1986 National Health Survey (NCHS, 1993). Data on Mexican Americans are from the 1993-94 Hispanic EPESE.
Changes in Blood Pressure and Risk Factors for Cardiovascular Disease among Older Mexican Americans from 1982-1984 to 1993-1994

Stroup-Benham, C.A., Markides, K.S., Espino, D.V. & Goodwin, J. S.

- Prevalence of obesity and diabetes rose significantly
- Mean diastolic pressure increased significantly

Journal of the American Geriatric Society, 1999
Lower Body Functioning as a Predictor of Subsequent Disability among Older Mexican Americans

Ostir, G.V., Markides, K.S., Black, S.A. and Goodwin, J.S.

- Eight foot walk, repeated chair stands, and standing balance are strong predictors of the development of disability among initially non-disabled persons

J. of Gerontology: Medical Sciences, 1998
Lower Body Function and Mortality in Mexican American Elderly People


• Physical performance tests are strong independent predictors of mortality over a two-year period

J. of Gerontology: Medical Sciences, 2001
Handgrip Strength and Mortality in Older Mexican Americans


- Handgrip strength is an independent predictor of mortality over a five year period

Journal of the American Geriatrics Society, 2002
Emotional Well-Being Predicts Subsequent Functional Independence and Survival

Ostir, G.V., Markides, K.S., Black, S.A. and Goodwin, J.S.

- Independently of depressive symptoms, positive affect predicts independence and survival over a two-year period

Journal of the American Geriatrics Society, 2000
Near Vision Impairment Predicts Cognitive Decline: Data from the Hispanic EPESE

Reyes-Ortiz, C. et. al.

- MMSE-blind score of subjects with near vision impairment declined steadily two, five, and seven years later controlling for other predictors.

*General Linear Mixed Model

Journal of the American Geriatrics Society, 2005
Diabetes Mellitus as a Risk Factor for Hip Fracture in Mexican American Older Adults

Ottenbacher, K., Ostir, G.V., Peek, M.K., Goodwin, J.S. and Markides, K.S.

- Cox Proportional Hazard Regression revealed an increased hazard ratio for hip fracture in diabetics compared to non-diabetics over four points of observation (baseline, two, five, and seven year). Hazard was highest among subjects taking insulin.

Journal of Gerontology: Medical Sciences, 2002
Onset of Frailty in Older Adults and the Protective Role of Positive Affect

Ostir, G.V., Ottenbacher, K. and Markides, K.S.

- High positive affect reduced the onset of frailty over a seven-year period controlling for other risk factors.


Psychology and Aging, 2004
Using a partial sample from the Hispanic EPESE. Analyses over a ten-year period (n=777). Multivariate Linear Regression revealed that baseline age, diabetes, arthritis, ever smoked, high BMI, MMSE, negative affect, and number of comorbid conditions were significant predictors of Frailty Status.

*Frailty Index: Weight loss, exhaustion, grip strength, walking speed, and physical activity.

Under review
Weight Change and Lower Body Disability in Older Mexican Americans

Al Snih, S. et. Al.

- Over a two-year period 21.7% of subjects lost 5% of their weight, 20.6% gained 5%+. Both weight loss and weight gain were associated with ADL disability and walking limitation over a five-year period.

Neither systolic nor diastolic blood pressure at baseline predicted cognitive decline. However, the mean slope of SBP showed an increase from Time 1 to Time 2 (two years) and was associated with subsequent cognitive decline over a five-year period.

*Latent Growth Curve Analysis
Experimental Aging Research, 2005.
Religious Attendance and Cognitive Functioning Among Older Mexican Americans

Hill, T.D., Burdette, A.M., Angel, J.L. and Angel, R.J.

- Linear Growth Curve models were employed and showed that religious attendance was associated with slower rates of cognitive decline.

Baseline Prevalence of 6 Medical Conditions, Disability, and 7-Year Mortality by Mexican Americans Population Share in Local Environments (Hispanic EPESE)

Eschbach, K., Markides, K.S., Patel, K., Goodwin, J.S.

• Neighborhood Percentage Mexican American is associated with lower prevalence of stroke, cancer, hip fracture, and seven-year mortality.

American Journal of Public Health, 2004
Using SEER and Census data Eschbach et al (2005) found that the incidence of breast, colorectal, and lung carcinoma among Hispanics increased as the percentage of Hispanics in the census tract decreased.

The lower cancer rates among Hispanics relative to non-Hispanic Whites may dissipate as Hispanics become more assimilated into the mainstream society.
Figure 1. Conceptual Model
COLLABORATIONS

• Mexican Health and Aging Study (MHAS)
• Puerto Rican Health Conditions Study (PREHCO)
• SABE Studies (Chile, Mexico, Uruguay, Brazil, Cuba, Argentina, Barbados)
• Colombia, Frailty and Cognitive Function (Carlos Cano)
• Mexico, Frailty and Cognitive Function (L.M. Gutierrez)