Chronic Diet Patterns That Influence Cognitive, Physical, And Functional Limitations Associated With Aging

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REVES @ 20: Assessing the Past, Looking to the Future
May 7-9, 2008
Calorie restriction
Antioxidants (fruits/vegetables)
Omega-3 FAs (fatty fishes)
Folate (green leafy vegetables)

Oxidative stress
Inflammation “Inflamm-aging”

Cell damage
Neurodegeneration
Vascular diseases
CVD risk
Cebu Longitudinal Health & Nutrition Survey (CLHNS)

Office of Population Studies Foundation
University of San Carlos, Cebu
Philippines

Carolina Population Center
University of North Carolina at Chapel Hill
USA
Study Design

- Single stage cluster sampling used to randomly select 17 urban and 16 rural Metro Cebu barangays (villages)

- Recruited women who gave birth between May 1983 and April 1984

- Baseline sample consisted of 3,327 women in their 6th or 7th month of pregnancy.

- Maternal age: ranged from 14-47 (mean: 26.56)
Data Collection

- Data on mother and index children collected during in-home interviews using structured questionnaires.

- Each survey included the same core modules (socioeconomic, demographic, environmental, diet, and anthropometric data) for comparability across surveys.

- Blood samples for analysis of key biomarkers and DNA were collected in recent surveys.
Data Collection Schedule

- Baseline survey (1983-1984) (n=3327)
- Birth survey (within a week of birth) (n=3080)
- Bimonthly surveys for 24 months following birth
- Follow-up surveys (year/no. of mothers in sample):
  - 1991 (n=2395)
  - 1994 (n=2279)
  - 1998 (n=1989)
  - 2002 (n=2102)
  - 2005 (n=2018)
  - 2007 (n=1977)
Objectives of this analysis

- Examine the development of disability (physical and cognitive limitations) among mothers in this longitudinal sample
- Identify food intake patterns that track over time
- Determine how these patterns influence physical and cognitive limitations that occur with aging
Analysis Sample
(n=1590)

- Included women interviewed in 2007 (key outcome vars derived from latest survey)
- Had data on covariates and diet data for:
  - 1983-84 (after index birth)
  - 1998
  - 2005
- Compared to women NOT in sample (attrited):
  - less educated, poorer, more rural, higher parity, lower BMI
Maternal Age (2007)

Range: 38 – 71
Mean±SD: 50.86 ± 5.97

Age categories:
- Middle-aged (<50) 45.66%
- Elderly (50-59) 45.41%
- Near-elderly (>59) 8.93%
### Selected SES Characteristics  
(by age categories)

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<tr>
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<th>&lt; 50</th>
<th>50-59</th>
<th>&gt; 59</th>
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<tbody>
<tr>
<td><strong>Mean asset score (2005)</strong>*</td>
<td>5.17</td>
<td>5.4</td>
<td>5.06</td>
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<td><strong>Mean yrs. in school (2005)</strong>*</td>
<td>7.34</td>
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<td><strong>% widowed (2007)</strong></td>
<td>6.75%</td>
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<td><strong>Mean no. pregnancies (2007)</strong></td>
<td>6</td>
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<td><strong>Mean urbanicity index (2005)</strong></td>
<td>41.55</td>
<td>40.15</td>
<td>39.37</td>
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* Age category differences significant at p<0.05 based on analysis of variance or chi-square tests
### Selected Health Characteristics (2007) (by age categories)

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<tr>
<td>Mean morbidity score (range: 0-6) *</td>
<td>1.03</td>
<td>1.29</td>
<td>1.64</td>
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<tr>
<td>Mean depression score (range: 16-39)</td>
<td>22.17</td>
<td>21.94</td>
<td>22.42</td>
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<td>Mean BMI (range: 11-44)*</td>
<td>24.45</td>
<td>23.85</td>
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<td>Ever smoked regularly*</td>
<td>23%</td>
<td>20%</td>
<td>33%</td>
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* Age category differences significant at p<0.05 based on analysis of variance or chi-square tests
Outcome Variables
Activities of Daily Living

HOW DIFFICULT IS IT FOR MOTHER TO:

1. STAND UP AFTER SHE HAD BEEN SITTING IN A CHAIR FOR AN EXTENDED PERIOD OF TIME
2. LIE DOWN AND GET UP FROM BED UNASSISTED
3. TAKE A SHOWER OR BATH UNASSISTED?
4. EAT UNASSISTED
5. DRESS UNASSISTED
6. USE THE TOILET UNASSISTED

Response categories:
1 - Can do it herself
2 - Have some difficulty doing but can still do it herself
3 - Need help to do it
4 - Cannot do it at all
Instrumental Activities of Daily Living

HOW PHYSICALLY DIFFICULT IS IT FOR MOTHER TO:

1. SHOP UNASSISTED: TO BUY PRODUCTS AND OTHER ESSENTIAL ITEMS?
2. PREPARE FOOD FOR HERSELF UNASSISTED
3. USE PUBLIC TRANSPORTATION UNASSISTED
4. ACCOUNT FOR MONEY COMING IN AND GOING OUT WITHOUT HELP FROM SOMEONE

Response categories:
1 - Can do it herself
2 - Have some difficulty doing but can still do it herself
3 - Need help to do it
4 - Cannot do it at all
Limitations to Physical Activity

CAN MOTHER STILL:

1. PERFORM HOUSEHOLD TASKS LIKE: COOKING OR WASHING OF CLOTHES?
2. CAN MOTHER STILL TAKE CARE OF THE CHILDREN
3. STAND UP FOR TWO HOURS
4. WALK A DISTANCE OF ONE HUNDRED METERS
5. WALK A DISTANCE OF ONE KILOMETER
6. CLIMB A HILL, CLIMB UP THE STAIRS
7. STILL CARRY A WEIGHT OF FIVE KILOS

Response categories:
1 - Yes, no limitations; can do task easily
2 - Yes, but with a little difficulty; has to do it slowly
3 - Yes, but only with severe difficulties
4 - No, health does not permit to do it at all
Word Recall Test

- Interviewer reads out the ff. 10 words (approximately two seconds apart):
  
  *House, Wood, Cat, Table, Night, Needle, Cake, Ringing, Bridge, Cross*

- Mother (respondent) asked to recall as many words as possible in any order.

- After about 10 minutes, respondent once again asked to recall words (without the interviewer repeating the words)
Current Disability Status (2007 survey):

- Continuous variable (sum of tasks reported done with some difficulty)
- Dichotomous variable

ADL/IADL/physical limitations:

“disabled” = reporting at least 1 task/activity as difficult

Word recall test:

“poor memory” = recalled words < 25th percentile
ADL, IADL, and Physical Limitations (no. of tasks reported with difficulty)

Age category differences significant at p<0.05 based on analysis of variance
ADL, IADL, and Physical Limitations (reporting at least 1 task with difficulty)

Age category differences significant at p<0.05 based on chi-square tests
Word Recall Test
(no. of recalled words)

Age category differences significant at p<0.05 based on analysis of variance
Word Recall Test
(% “Poor Memory” : recalled words < 25\textsuperscript{th} pctile)

Age category differences significant at p<0.05 based on chi-square tests
Chronic disability patterns

- Tracked disability patterns over time (1998 to 2007)
  
  a) Dichotomous variable (1=recent and chronic)
## Tracking ADL “disabled” patterns (1998 to 2007)

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Chronic disability patterns (1998-2007)

Age category differences significant at p<0.05 based on chi-square tests
Explanatory variables
Chronic Food Group Consumption

- used single day 24-hr food recall data at in 1983/84, 1998, and 2005
- calculated total weight in grams for each food group
- defined high intake as weight in grams >= 75th pctile
- tracked high food group intake across time
- chronic consumption defined as: high intake in 1983-84 and/or 1998 AND 2005
Calorie Intake

- Chronic over consumption:
  > required energy requirement*
  in 1983/84 and/or 1998 AND 2005

- Chronic under consumption:

  below 20% of required energy requirement*
  in 1983/84 and/or 1998 AND 2005

(for specific age group, pregnancy, and lactating status)
Food group consumption over time

Food groups

- All vege
- Greens
- Yellow
- Proc seafoods
- Fresh seafoods
- Meat

Mean wt (grams)

- 1983-84
- 1998
- 2005
High Food Group INTAKE over time

Food groups

- All vege
- Greens
- Yellow
- Proc seafoods
- Fresh seafoods
- Meats

% high intake

- 1983-84
- 1998
- 2005
Model specification

- Model included variables known to be associated with ADL, IADL, and memory scores (age, income, education, parity, BMI, physical activity, smoking status, and depression).

- Adjusted for energy intake given high correlation between food group consumption and calories.

- Controlled for morbidity status given that the goal was to determine diet effects on outcome independent of disease.
Results
Limitations to Physical Activity
(1= with chronic disability)

Food groups with chronic high intakes
IADL
(1=currently disabled)

Food groups with chronic high intakes
Word Recall Test (Set 2)  
(1= with chronic disability)
Challenges in assessing chronic food intake and disability status:

- Endogeneity (persons with disability may change diets in response to disability status)
- Need to factor in other behaviors associated with high food group intakes
- Capturing “usual” intake
Next research agenda:

- Understand the pathways through which diet influences aging (morbidity? Inflammation?)
- Identify food group clusters (i.e. rice-fish diet) that may be more sensitive to disability patterns
Acknowledgements

Data collection and analyses for this paper were funded by the National Institute of Aging through the Demographics and Economics of Aging Research Program at the Carolina Population Center, University of North Carolina at Chapel Hill