



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

Oxidative stress

Inflammation
"Inflamm-aging"



Calorie restriction
Antioxidants (fruits/vegetables)
Omega-3 FAs (fatty fishes)
Folate (green leafy vegetables)

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Cell damage
Neurodegeneration

Vascular diseases
CVD risk

Cebu Longitudinal Health & Nutrition Survey (CLHNS)

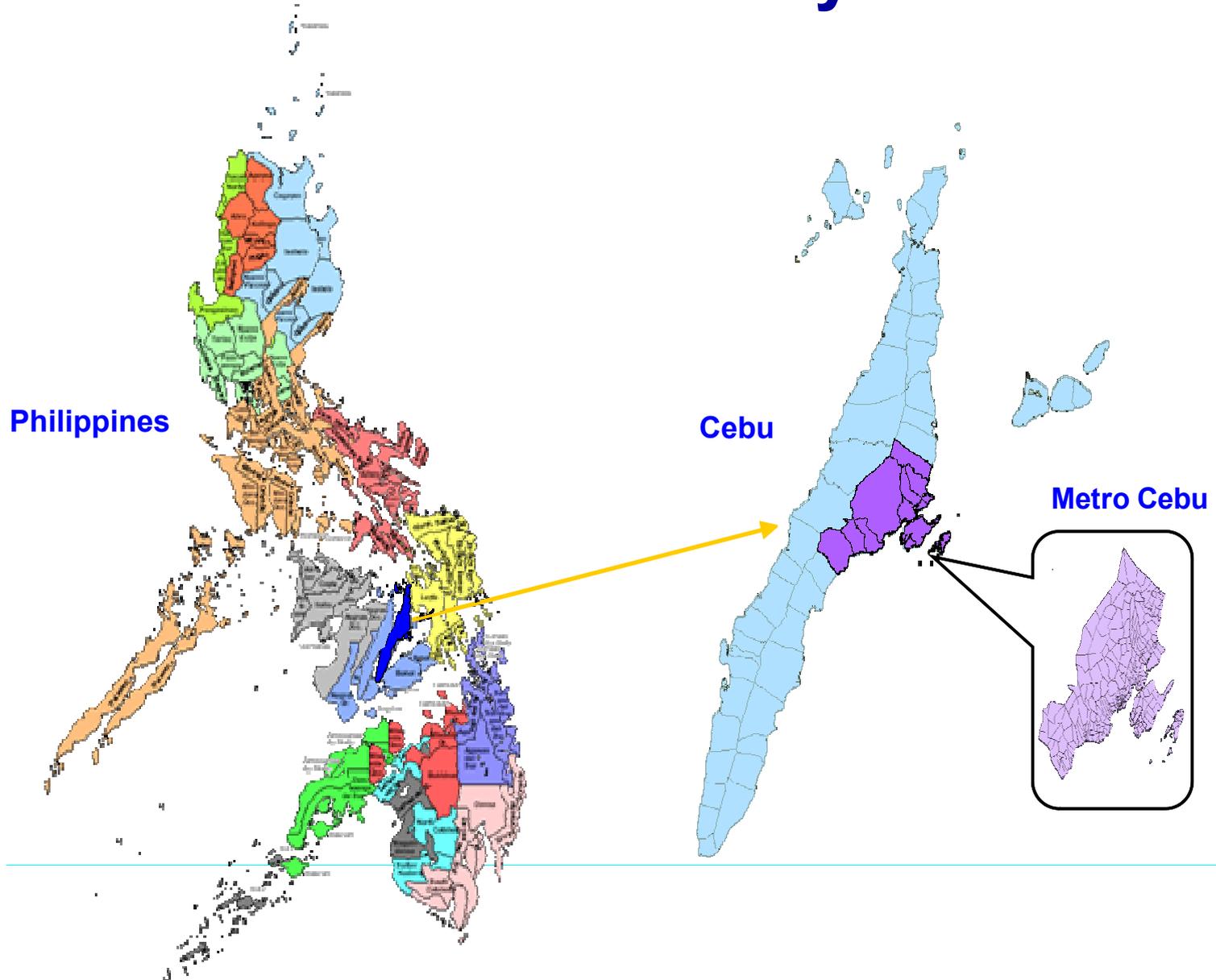
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University of San Carlos, Cebu
Philippines



Carolina Population Center
University of North Carolina at Chapel Hill
USA



The CLHNS Study Area



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 \pm SD: 50.86 \pm 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)

| | < 50 | 50-59 | > 59 |
|-------------------------------------|-------|--------|--------|
| Mean asset score (2005)* | 5.17 | 5.4 | 5.06 |
| Mean yrs. in school (2005)* | 7.34 | 7.58 | 6.13 |
| % widowed (2007) | 6.75% | 11.77% | 36.62% |
| Mean no. pregnancies (2007) | 6 | 6 | 9 |
| Mean urbanicity index (2005) | 41.55 | 40.15 | 39.37 |

* Age category differences significant at $p < 0.05$ based on analysis of variance or chi-square tests

Selected Health Characteristics (2007) (by age categories)

| | < 50 | 50-59 | > 59 |
|---|-------|-------|-------|
| Mean morbidity score (range: 0-6) * | 1.03 | 1.29 | 1.64 |
| Mean depression score (range: 16-39) | 22.17 | 21.94 | 22.42 |
| Mean BMI (range: 11-44)* | 24.45 | 23.85 | 21.88 |
| Ever smoked regularly* | 23% | 20% | 33% |

* 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

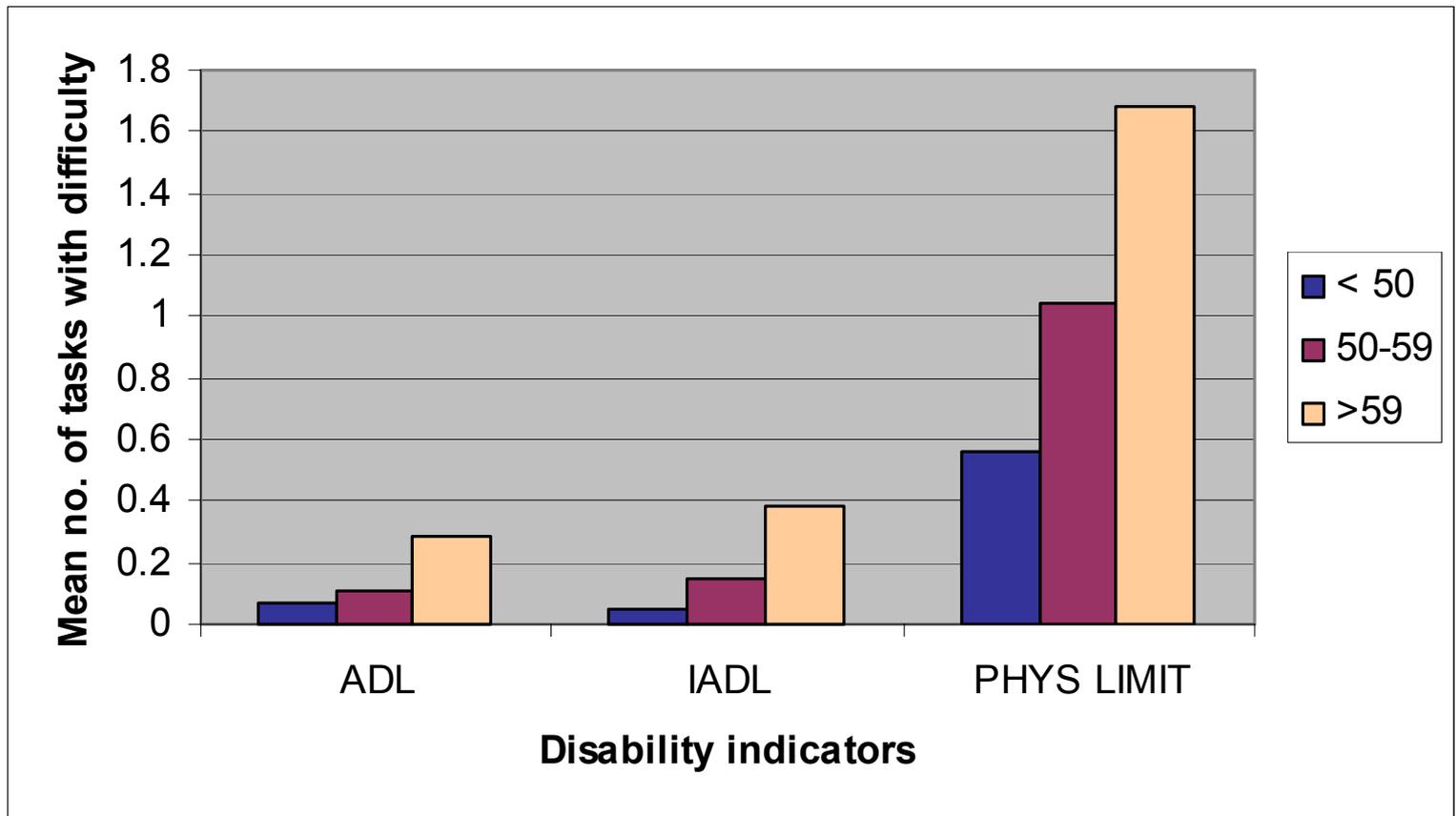
ADL/IADL/physical limitations:

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

Word recall test:

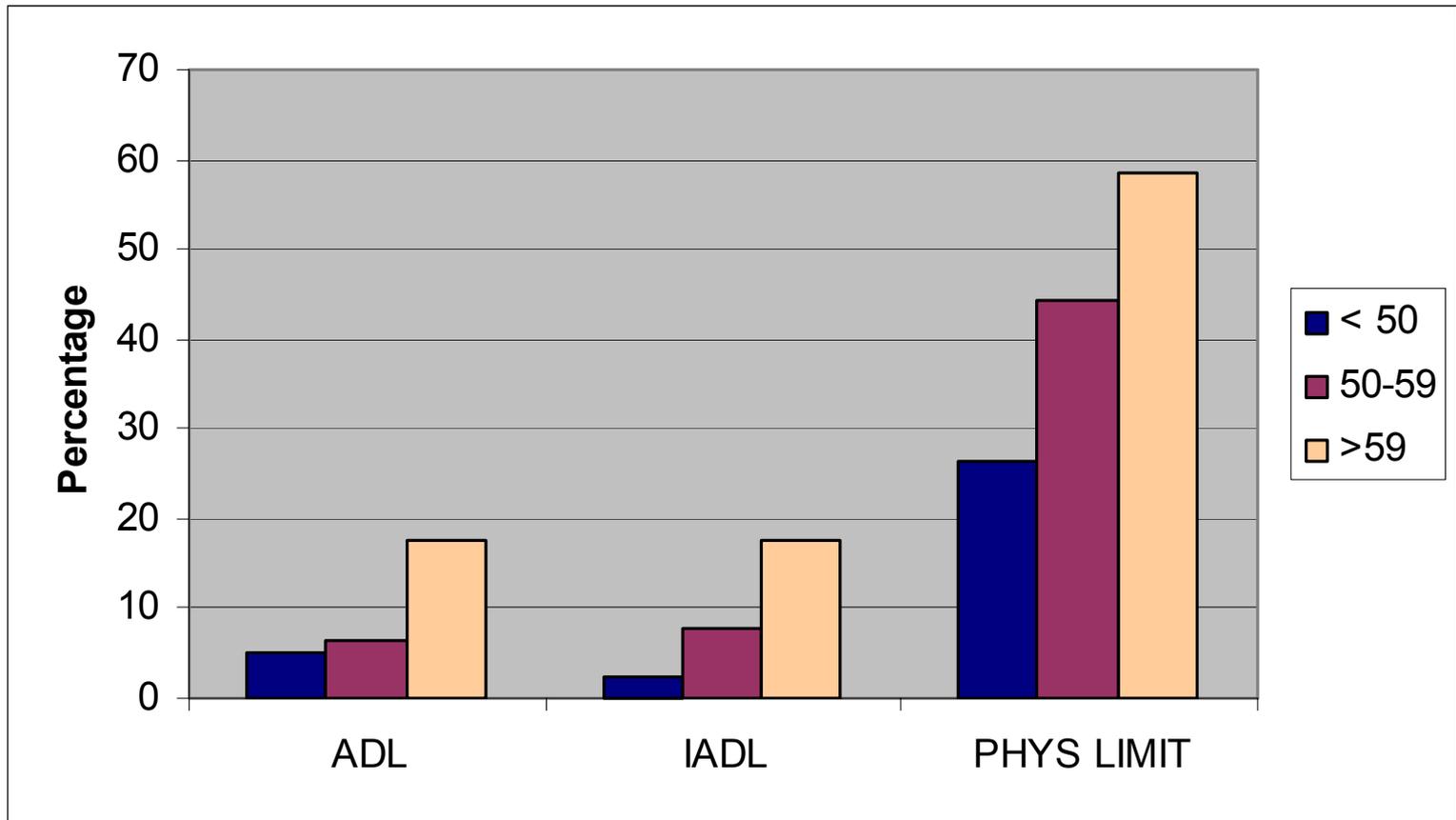
“poor memory” = recalled words < 25th pctile

ADL, IADL, and Physical Limitations (no. of tasks reported with difficulty)



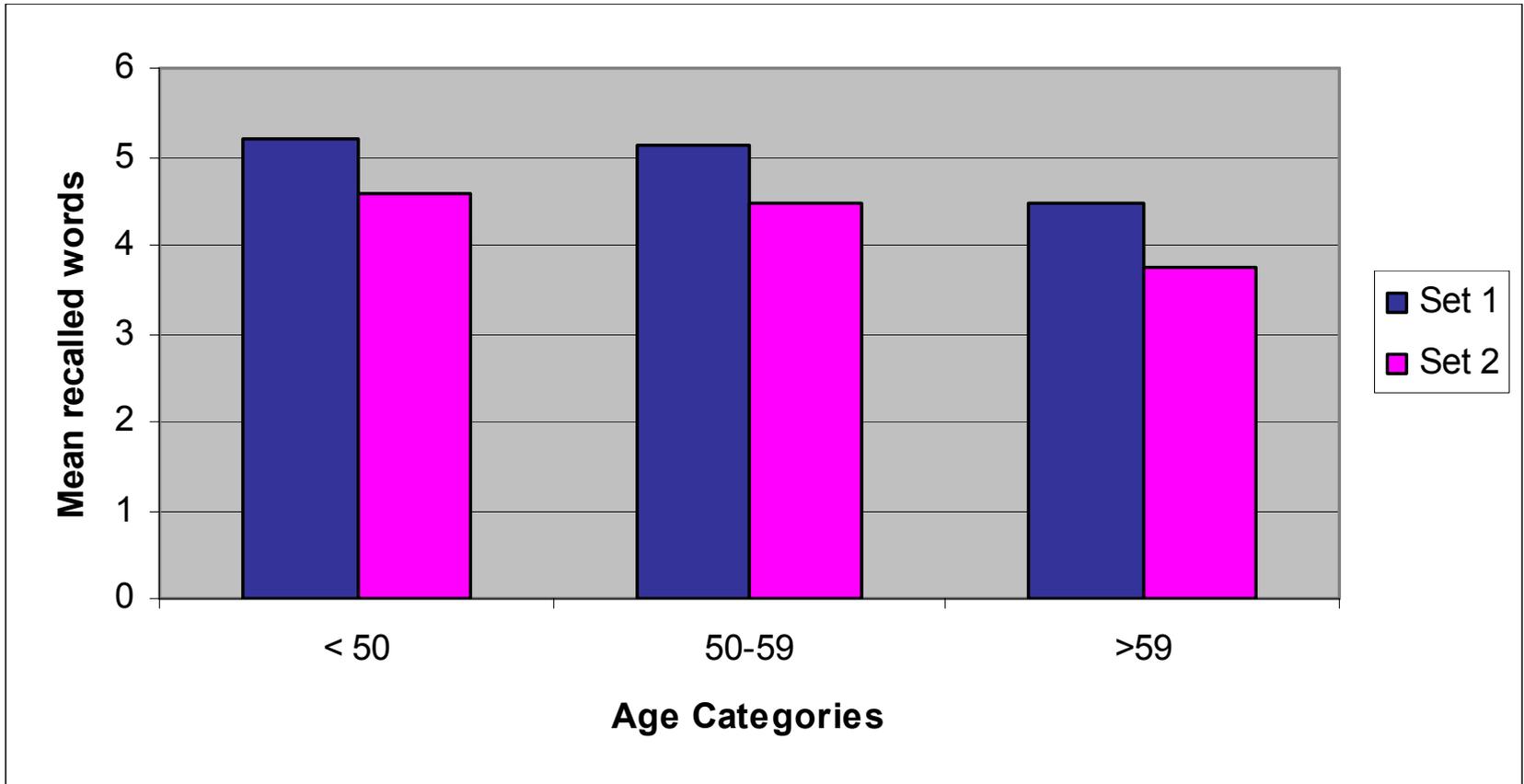
Age category differences significant at $p < 0.05$ based on analysis of variance

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

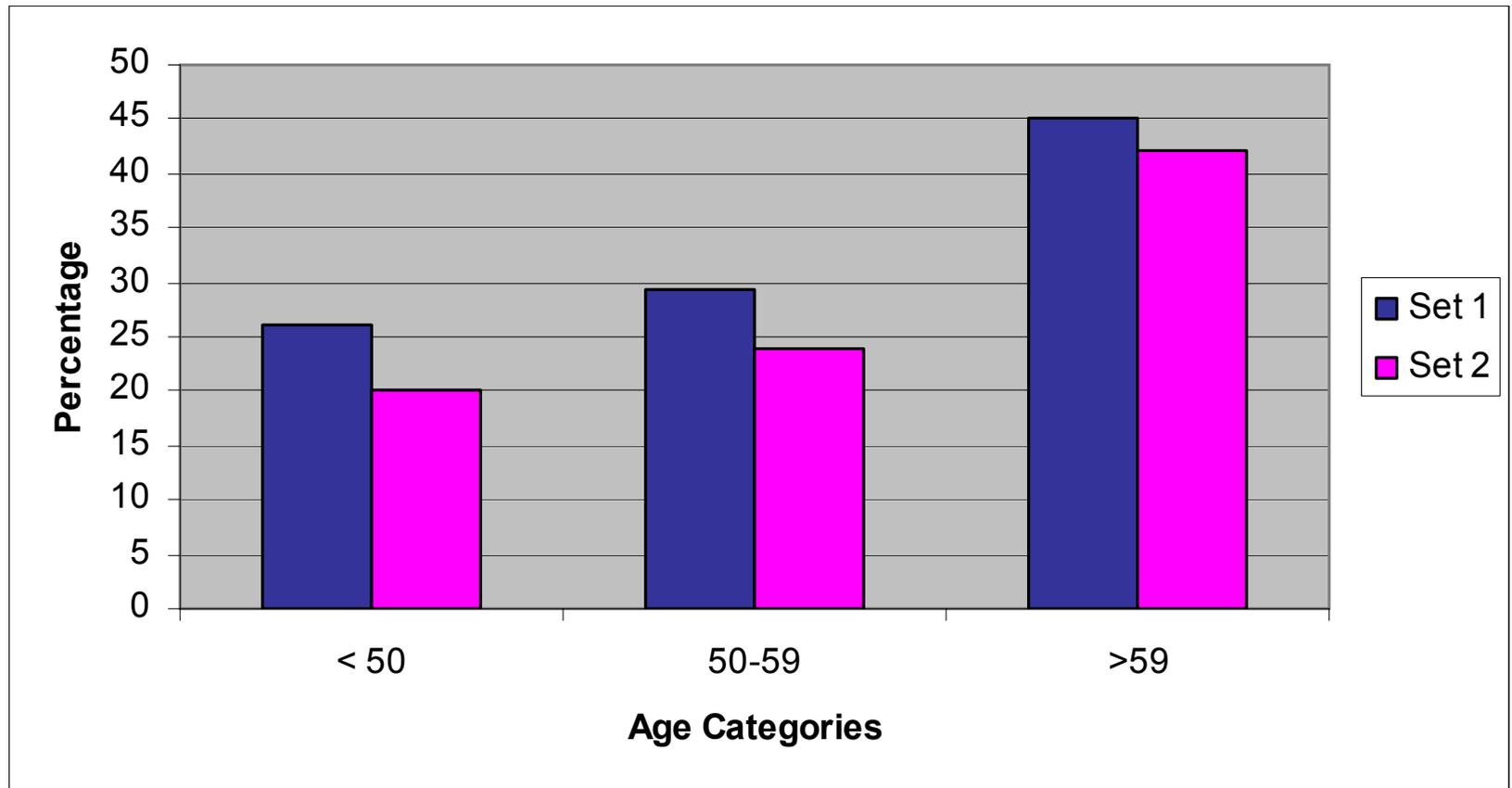
Word Recall Test (no. of recalled words)



Age category differences significant at $p < 0.05$ based on analysis of variance

Word Recall Test

(% “Poor Memory” : recalled words < 25th pctile)



Age category differences significant at $p < 0.05$ based on chi-square tests

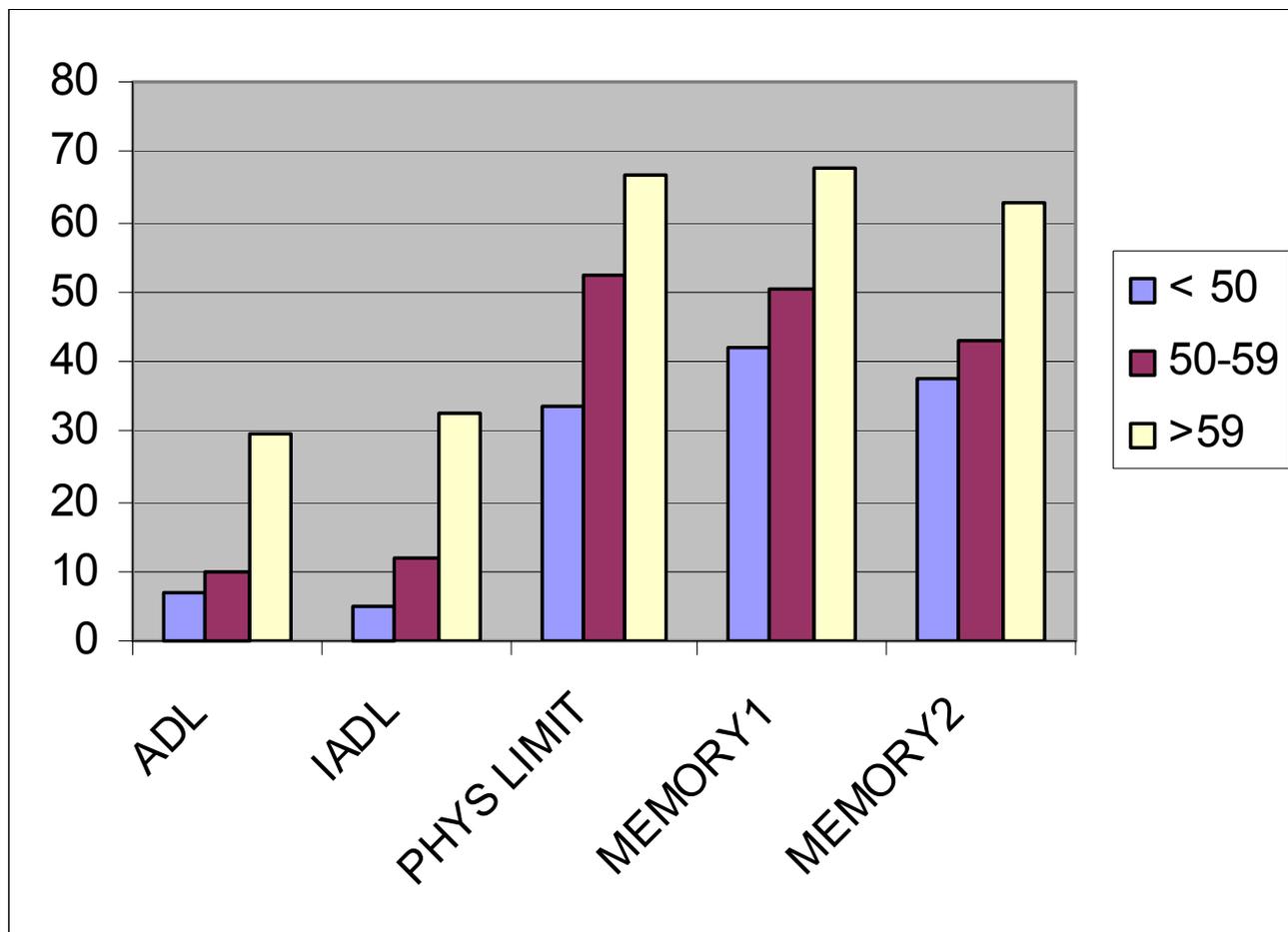
Chronic disability patterns

- Tracked disability patterns over time (1998 to 2007)
 - a) Dichotomous variable (1=recent and chronic)

Tracking ADL “disabled” patterns (1998 to 2007)

| 1998 | 2002 | 2005 | 2007 | Freq. | Percent |
|------|------|------|------|-------|---------|
| 0 | 0 | 0 | 0 | 1,307 | 82.62 |
| 0 | 0 | 0 | 1 | 68 | 4.3 |
| 0 | 0 | 1 | 0 | 40 | 2.53 |
| 0 | 0 | 1 | 1 | 11 | 0.7 |
| 0 | 1 | 0 | 0 | 48 | 3.03 |
| 0 | 1 | 0 | 1 | 6 | 0.38 |
| 0 | 1 | 1 | 0 | 8 | 0.51 |
| 0 | 1 | 1 | 1 | 9 | 0.57 |
| 1 | 0 | 0 | 0 | 53 | 3.35 |
| 1 | 0 | 0 | 1 | 5 | 0.32 |
| 1 | 0 | 1 | 0 | 4 | 0.25 |
| 1 | 0 | 1 | 1 | 2 | 0.13 |
| 1 | 1 | 0 | 0 | 11 | 0.7 |
| 1 | 1 | 0 | 1 | 3 | 0.19 |
| 1 | 1 | 1 | 0 | 3 | 0.19 |
| 1 | 1 | 1 | 1 | 4 | 0.25 |
| | | | | 1,582 | 100 |

Chronic disability patterns (1998-2007)



Age category differences significant at $p < 0.05$ based on chi-square tests

Explanatory variables

Chronic Food Group Consumption

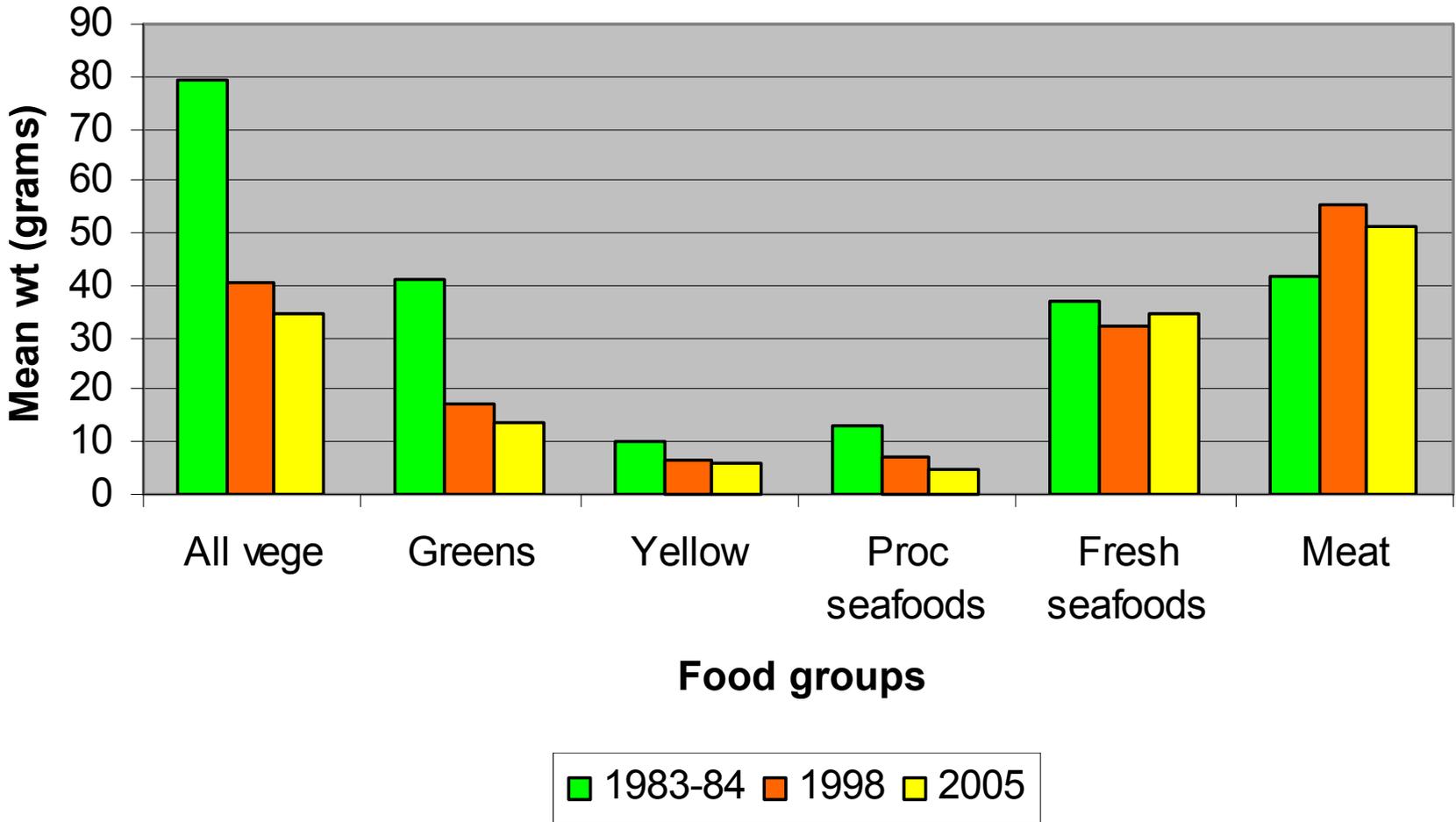
- used single day 24-hr food recall data at in 1983/84, 1998, and 2005
- calculated total weight in grams for each food group
- defined high intake as weight in grams \geq 75th pctile
- tracked high food group intake across time
- chronic consumption defined as:
 - high intake in 1983-84 and/or 1998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

Calorie Intake

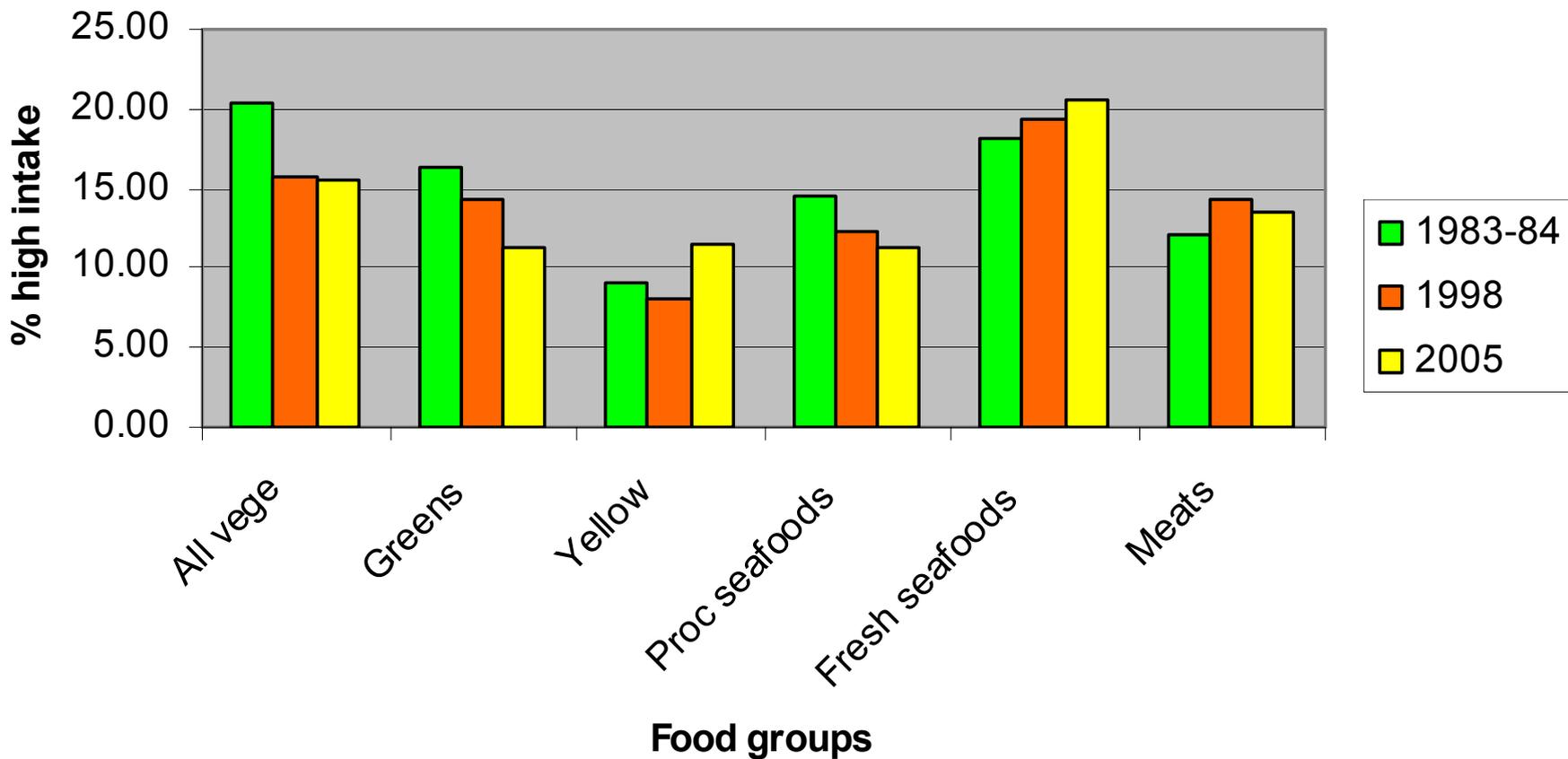
- Chronic over consumption:
 - > required energy requirement*
 - in 1983/84 and/or 1998 AND 2005

 - 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



High Food Group INTAKE over time

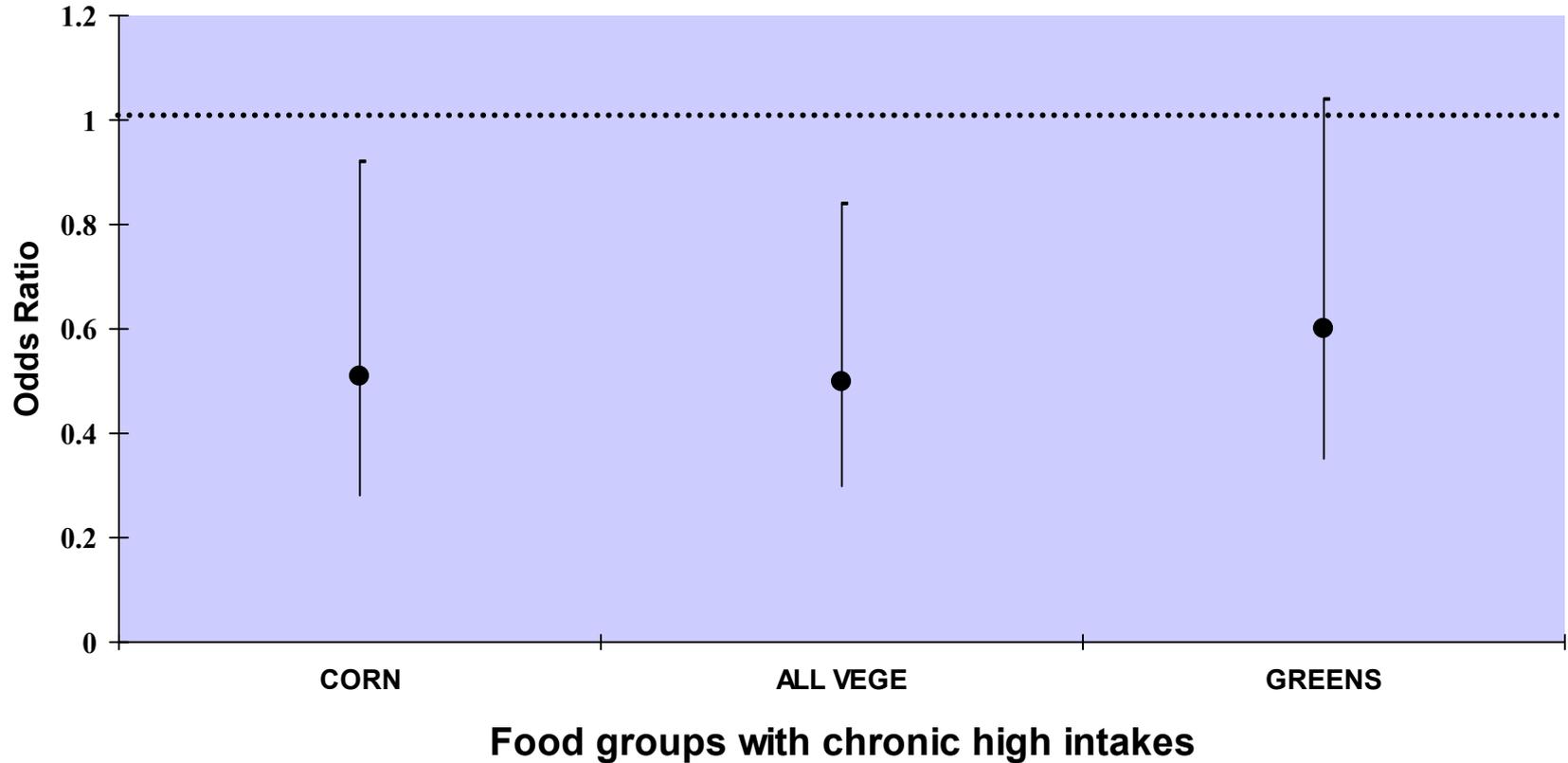


Model specification

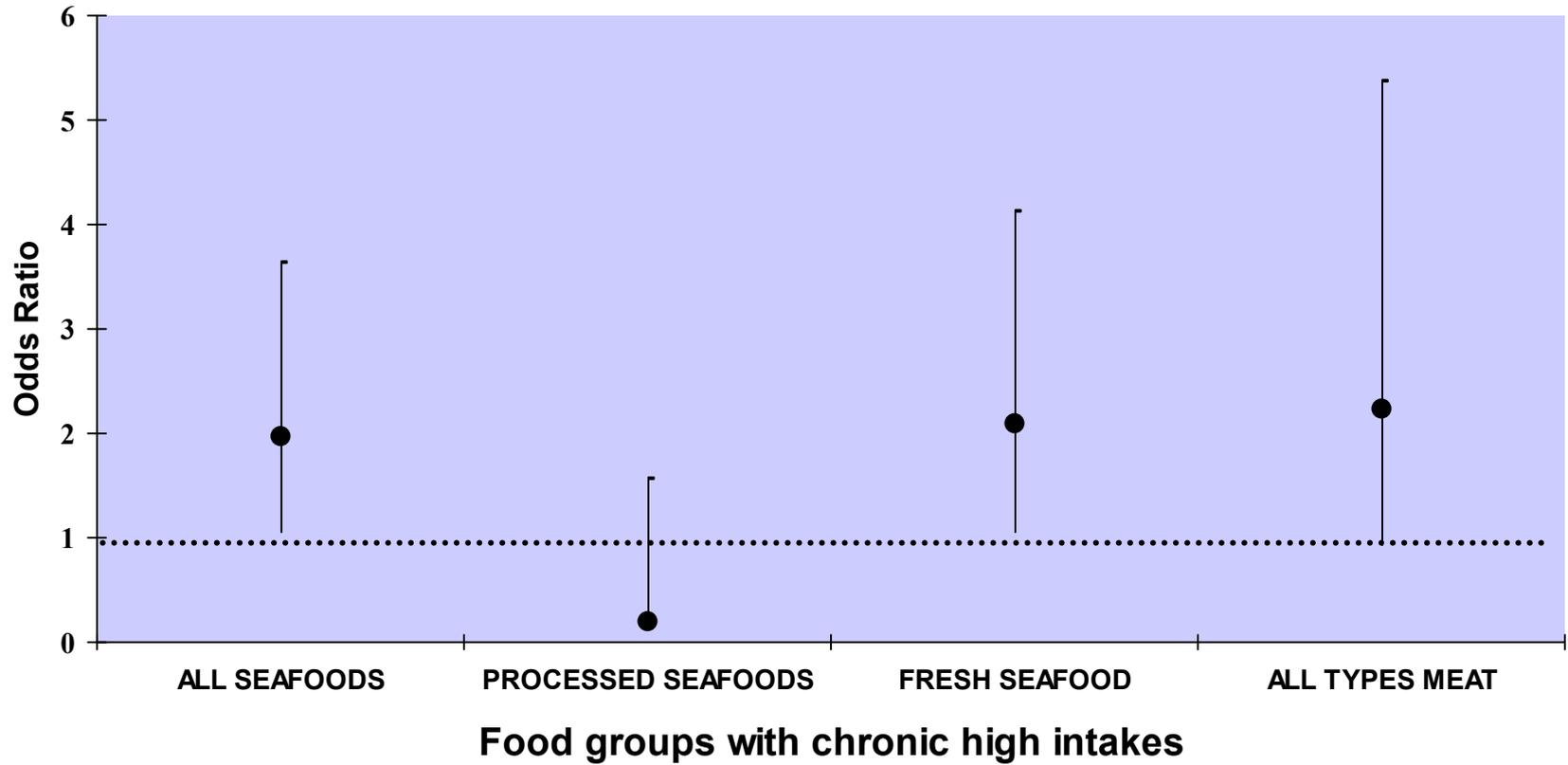
- Model included variables known to be associated with ADL, IADL, and memory scores (age, income, education, parity, BMI, physical activity, smoking status, and depression).
- Adjusted for energy intake given high correlation between food group consumption and calories
- Controlled for morbidity status given that the goal was to determine diet effects on outcome independent of disease

Results

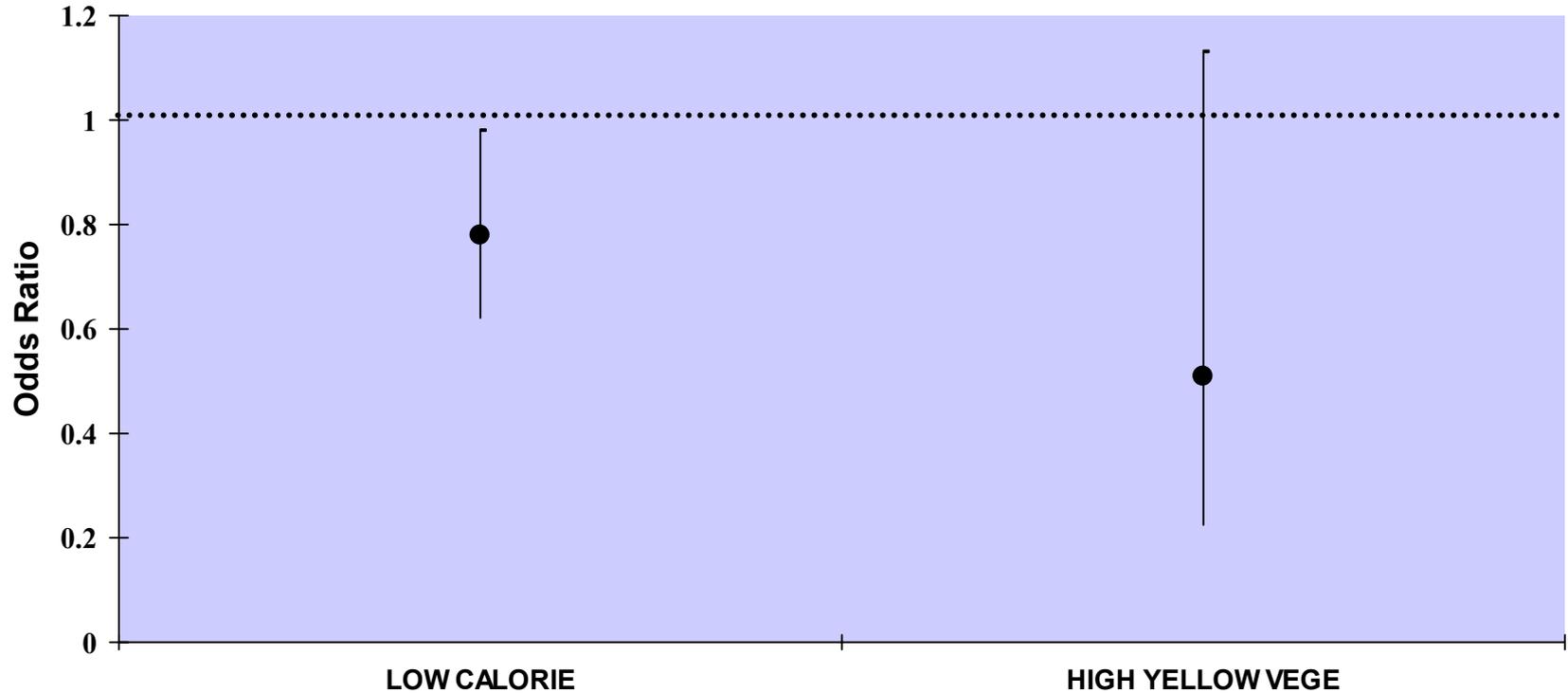
Limitations to Physical Activity (1= with chronic disability)



IADL (1=current disabled)



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

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