

Measuring Frailty across the Age Spectrum in the Canadian Longitudinal Study on Aging

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Canadian Longitudinal Study on Aging
Étude longitudinale canadienne sur le vieillissement

What is Frailty?

- State of increased vulnerability to declining health status and adverse health outcomes, including mortality and institutionalization
- Complex, involves multiple systems, and changes over time
- Lack of resilience, or impaired ability to rebound from stressors
- Becomes more common with aging

Objective

- To assess frailty from a population health perspective using data from the Canadian Longitudinal Study on Aging (CLSA)

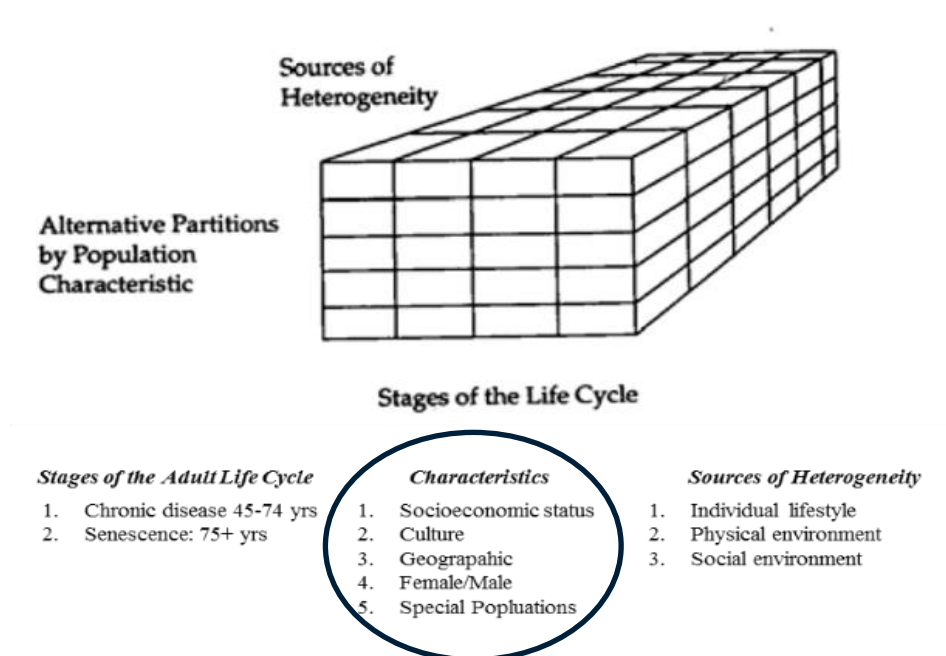


Fig. 1. Model for investigation of heterogeneities in population health status
Adapted from: C. Hertzman, J. Frank, and R. G. Evans, Heterogeneities in Health Status⁶

Health Inequalities Considered

SOCIAL STRATIFIERS	SOCIOECONOMIC STATUS <ul style="list-style-type: none">• Income• Education• Employment• Occupation• Material and social deprivation	INDIGENOUS PEOPLES <ul style="list-style-type: none">• First Nations• Inuit• Métis	PLACE OF RESIDENCE <ul style="list-style-type: none">• Rural/Urban	POPULATION GROUP <ul style="list-style-type: none">• Age• Immigrant status• Sexual orientation• Functional health• Cultural/racial background
	SEX: Male or Female			
	JURISDICTION: National or Provincial/Territorial			

From: Pan-Canadian Health Inequalities Reporting Initiative: Key Health Inequalities in Canada - A National Portrait

Health Inequalities Available in CLSA

- Sex
- Age
- Income
- Education
- Retirement
- Population density (urban vs. rural)
- Marital status
- Pampalon Index – Material Factor Score
- Pampalon Index – Social Factor Score
- Social isolation
- Loneliness/living alone
- Nutrition
- Smoking

How is Frailty Measured?

- Despite widespread use of the term, no agreement on how to measure frailty or identify adults as frail
 - High heterogeneity between estimates of frailty and identification of frail individuals
- Three main approaches:
 - Frailty as the accumulation of deficits across different health domains (Rockwood & Mitnitski 2007)
 - Phenotype model of frailty as a decline in physical functioning (Fried et al, 2001)
 - Physician's subjective assessment in a clinical setting



Cumulative Deficits

Creating a Frailty Index of accumulated deficits involves 3 steps:

1. Deciding on the list of deficits (Searle et al, 2008)
 - Relating to age and health status
 - Do not saturate too early
 - Cover a range of systems
2. Code the variables as deficits from 0 (no deficit) to 1 (deficit)
 1. Binary variables are 0 or 1
 2. Ordinal variables assigned weights
e.g. for self-rated health:
0=Excellent 0.25=Very good 0.5=Good 0.75=Fair 1=Poor
 3. Continuous variables are transformed or cut-offs are used to define deficits
3. Calculating the Frailty Index (0=No deficits, 1=All possible deficits)
 - **Sum of deficits in the individual, divided by the number of potential deficits**

Deficits in the CLSA

- Deficits were selected based on literature and discussion with an expert panel to form the index of 90 items*

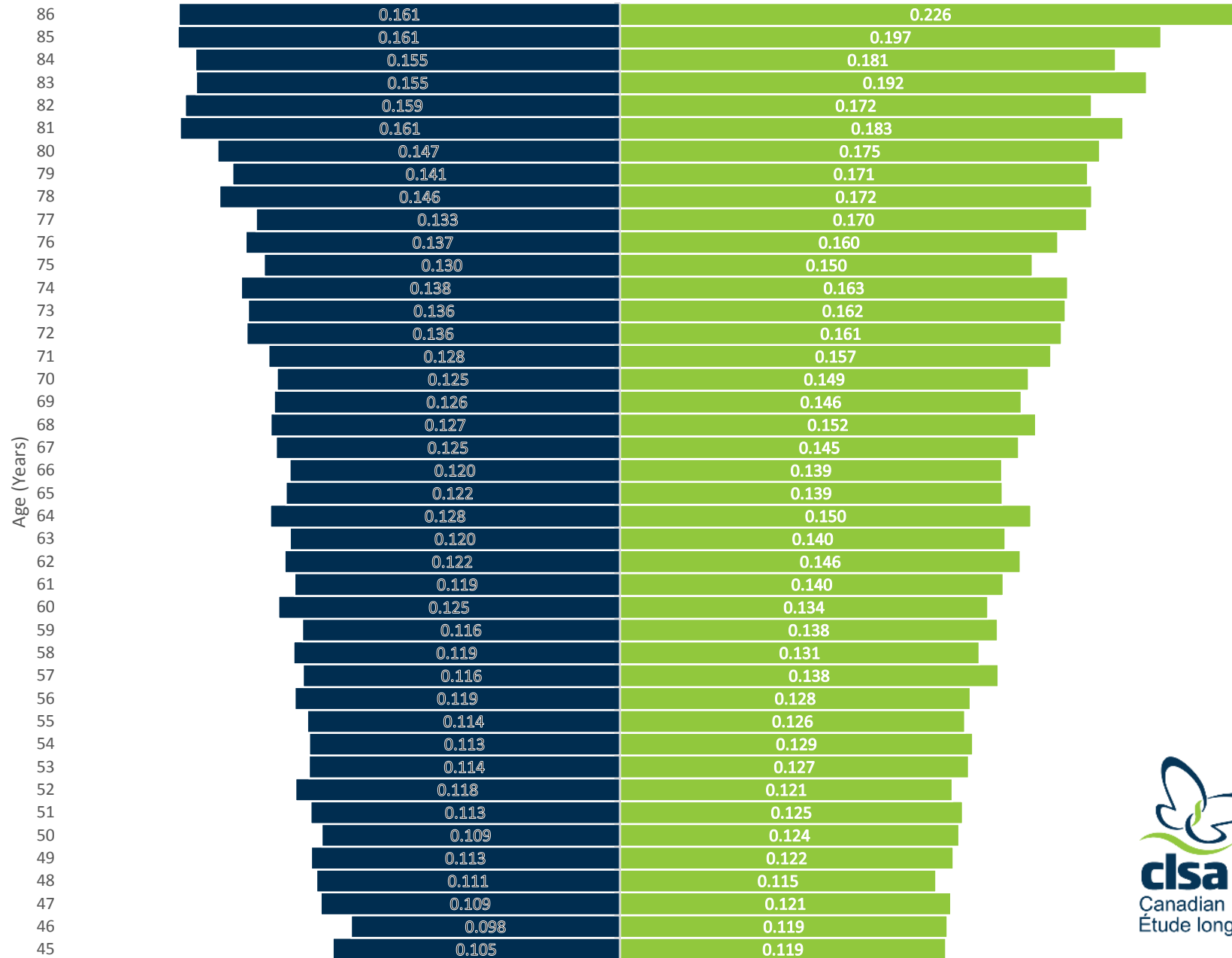
- Physical function tests (5 items)
(Comprehensive only)
- Self-reported functional status (14 items)
(Tracking only)
- Self-rated general health
- Self-rated mental health
- Eyesight rating
- Hearing rating
- Satisfaction with Life Scale (SWLS) (5 items)
- Depressive symptoms (CES-D 10) (10 items)
- Cognitive function tests (4 items)
- Activities of daily living (OARS scale) (14 items)
- Social participation prevented by health
- Body mass index
- Chronic conditions (32 items)

**76 items in the Comprehensive cohort, 85 in Tracking*



Mean Frailty Index by Age and Sex

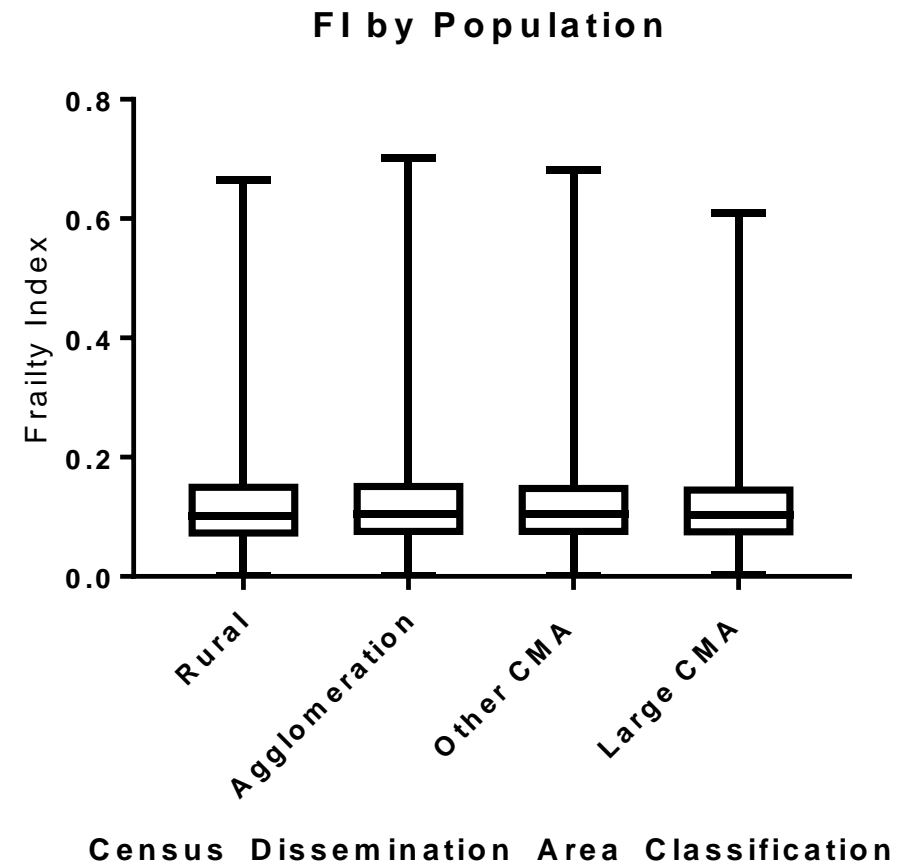
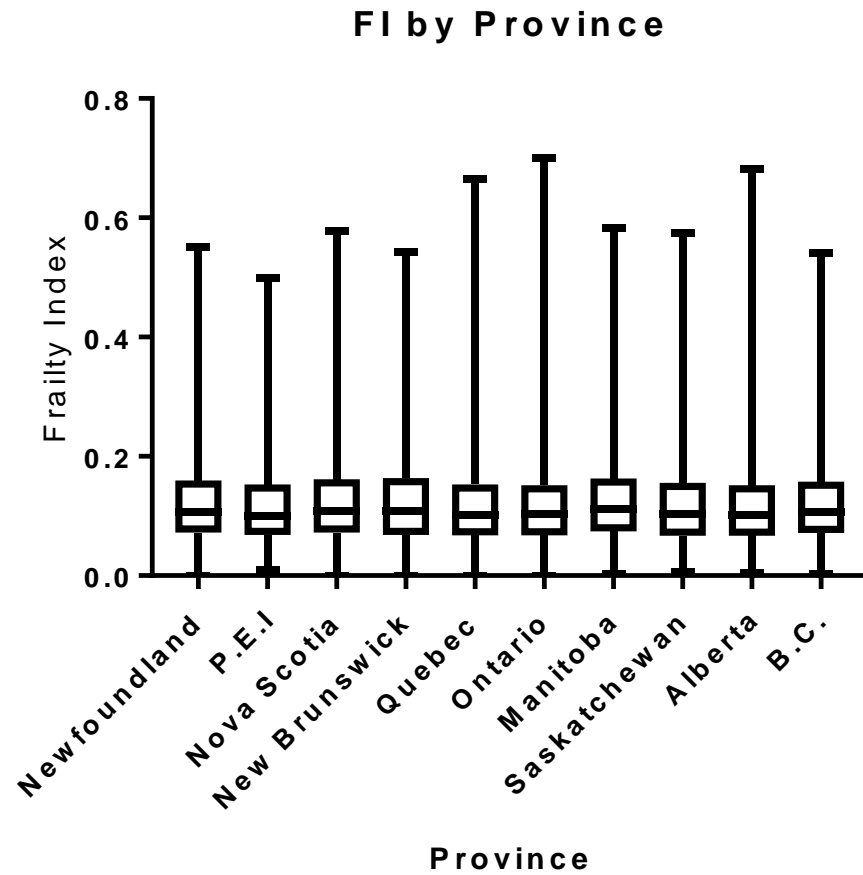
■ Males ■ Females



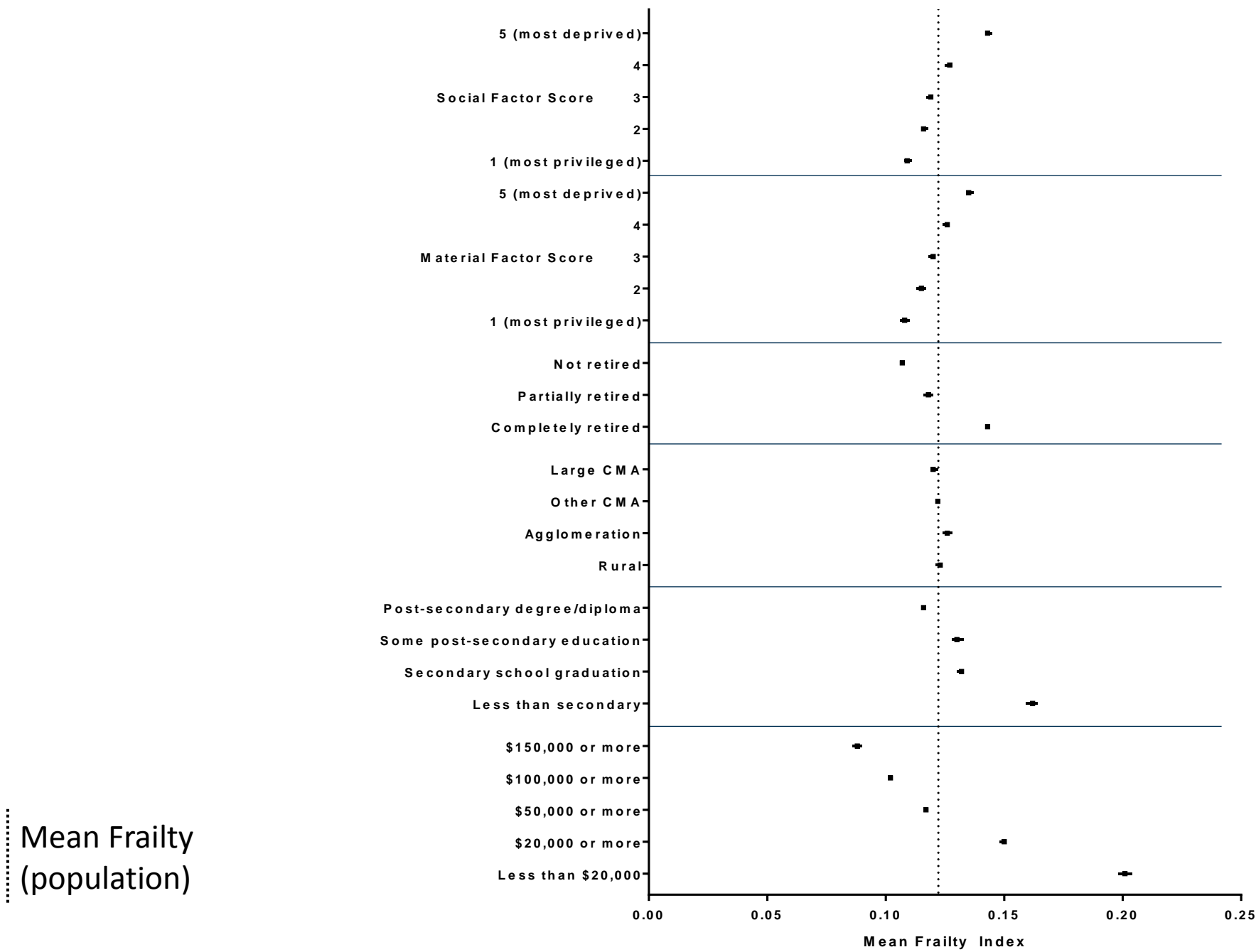
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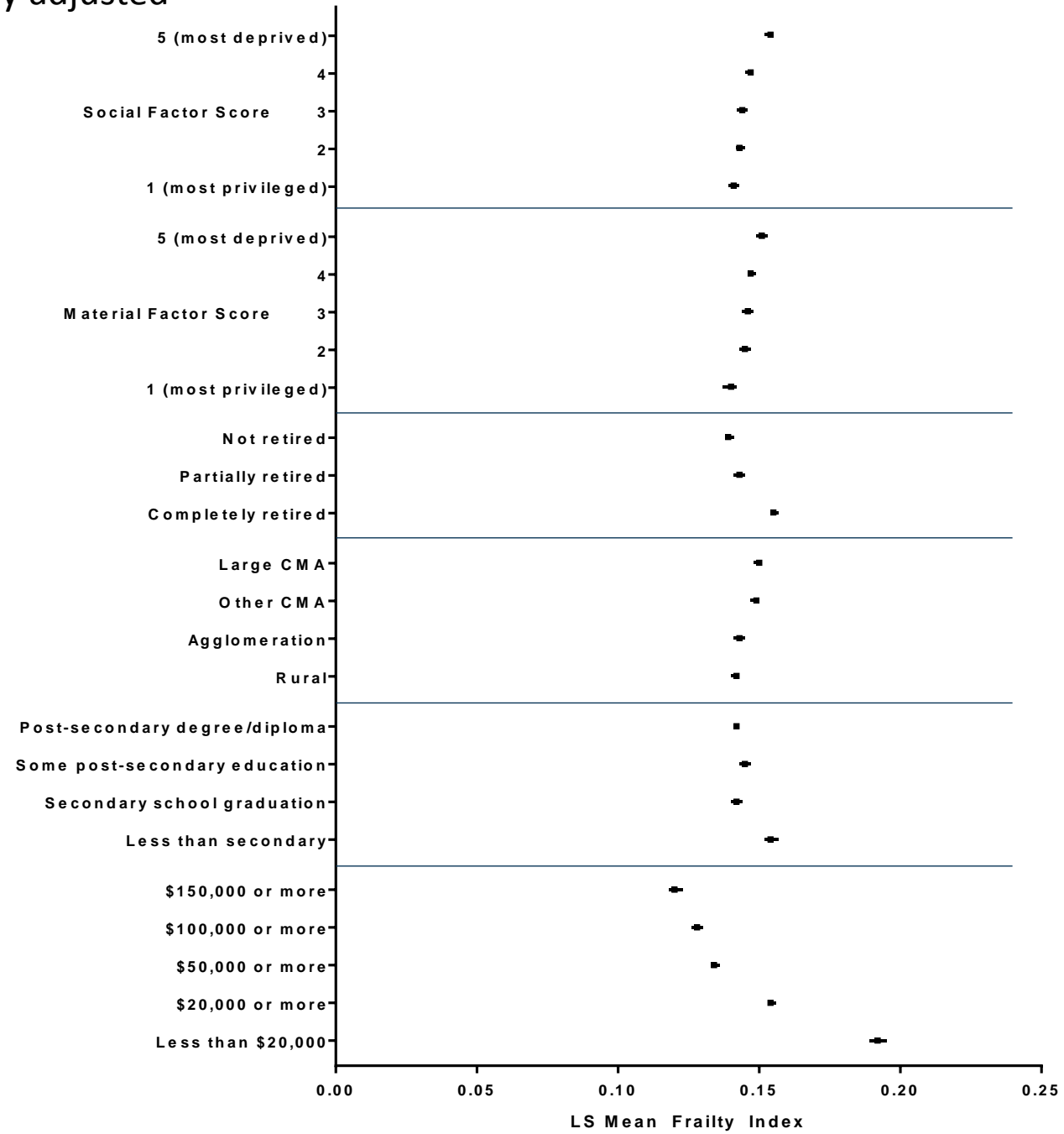
Geography



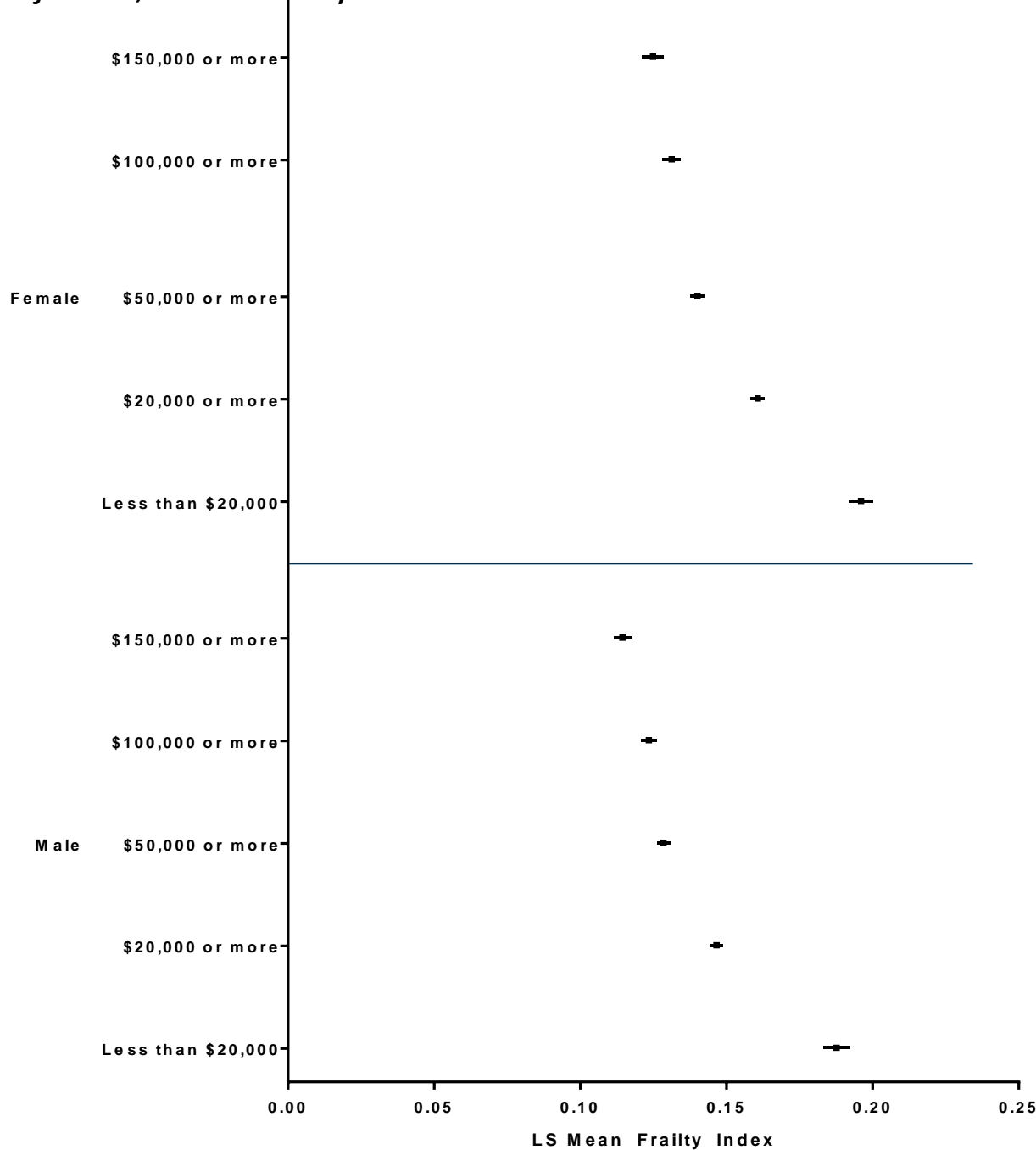
Sources of Heterogeneity unadjusted



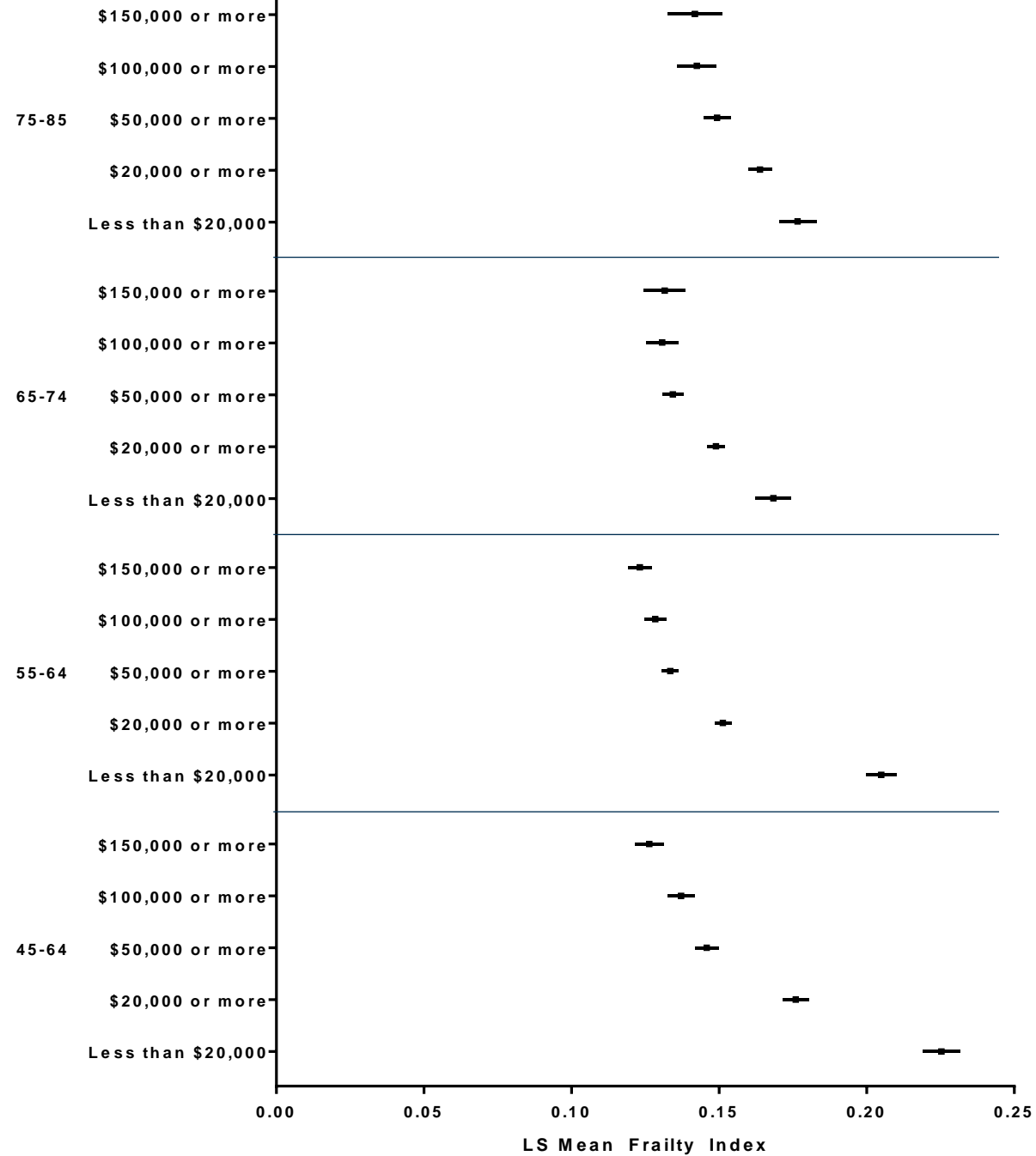
Sources of Heterogeneity fully adjusted



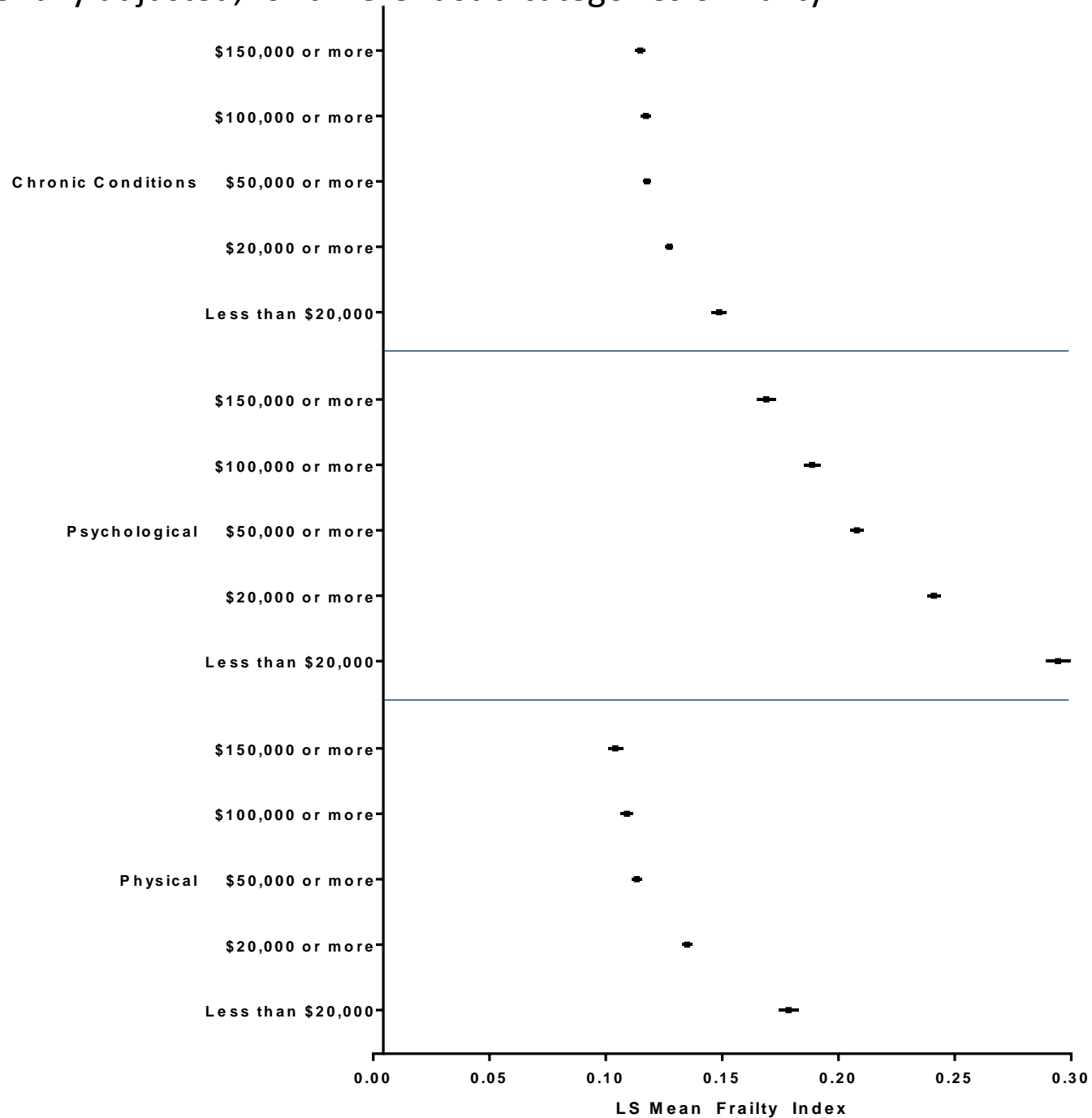
Annual household income fully adjusted, stratified by sex



Annual household income fully adjusted, stratified by age



Annual household income fully adjusted, for different sub-categories of frailty



Summary

- Most “important” sources of heterogeneity
 - Frailty is different across population partitions associated with health inequality.
 - Once other factors are adjusted for, frailty is different across income levels
 - This disparity is similar in both sexes, and more pronounced in younger participants
 - Pattern is seen in all domains of frailty but most acute in psychosocial factors

Summary

- Next steps
 - Digging down into income, exploring real and perceived wealth, perceived social inequality, and other associated variables
 - Examine heterogeneity in the association between frailty and healthcare utilization

