Are there education differentials in disability and mortality transitions and active life expectancy among older Japanese adults?

Findings from 1999-2009 NUJLSOA

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22nd Annual REVES Meeting
19-21 May 2010, Havana, Cuba

Previous Research

- Mainly in Western countries
  - Consistent evidence for a strong association between education and health and mortality
  - Better educated people have:
    - better health; fewer disabilities
    - less likely to transit to worse health; more likely to recover
    - longer lives; more years of active life
  - Regardless of data sets, health measures, analytical methods used; time periods, age groups studied

Few Studies on Asia

- Unclear or mixed findings
  - Japan (Liu et al. 1995)
  - Taiwan (Zimmer et al. 1998)
  - China (Gu & Zeng 2004; Liang et al. 2001)
  - Indonesia (Hidajat et al. 2006; Kaneda & Zimmer 2007)
  - the Philippines (Cruz et al. 2007)
- Mostly did not compute ALE by educational levels

Asian Studies

Educational effects on transition from:	Active-Inactive	Active-Dead	Inactive-Active	Inactive-Dead
Japan	*	*	ns	ns
Taiwan	*	ns	ns	ns
China	ns	ns	*/ns	ns
Indonesia	*/ns	*/ns	ns	ns
Philippines	ns	ns	ns	ns

* significantly different

ns not significantly different

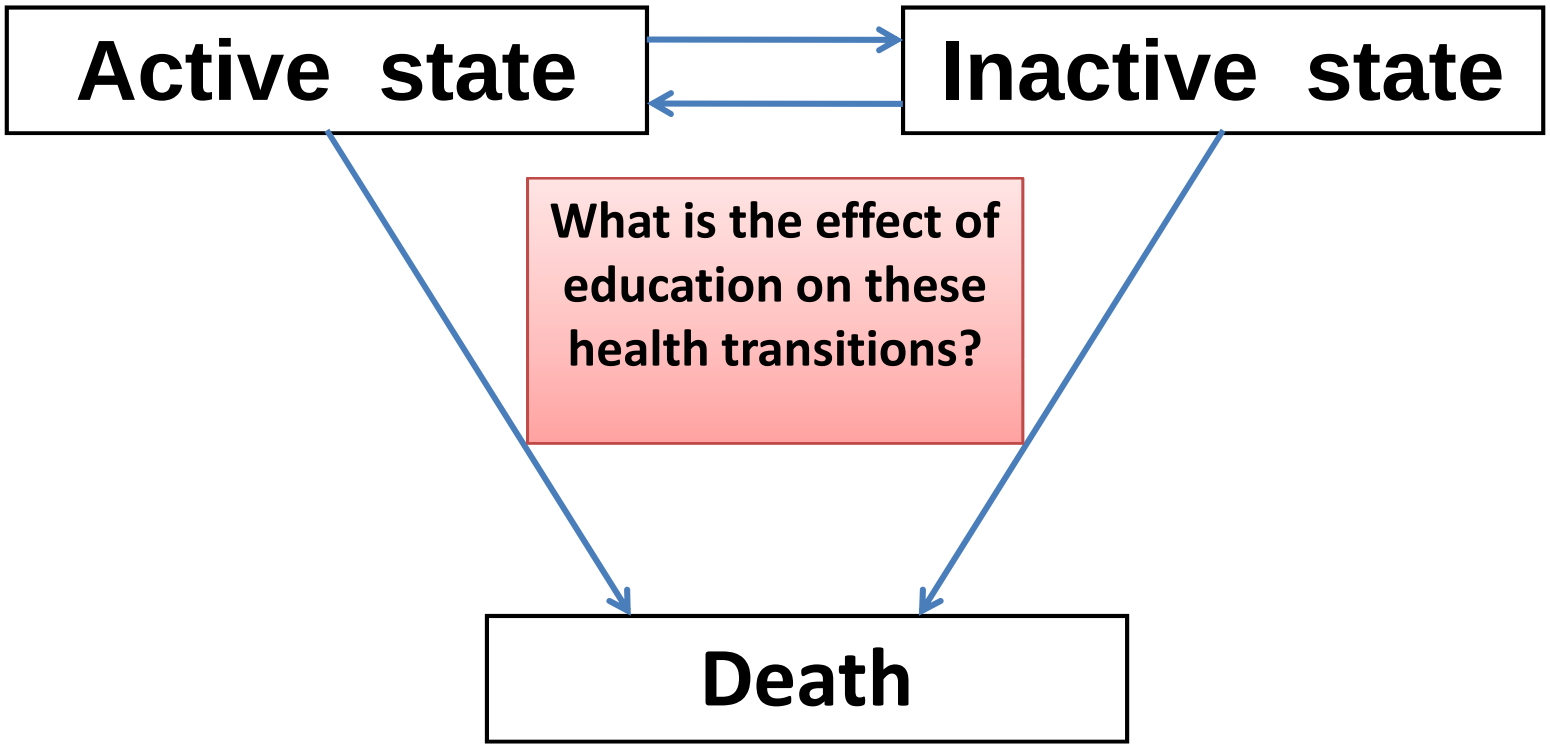
Aims of Study

- To examine the effects of education on disability and mortality transitions; and
- To compute active life expectancy by education for older Japanese men and women

Some Causal Pathways

- Behavioral-related Factors
  - Smoking, dietary habits, physical activities, knowledge of and access to health information
- Material-related Factors
  - Housing conditions, employment status, occupation, income, access to health care
- Life course effects; cohort effects

Conceptual Framework



Data

- Nihon University Japanese Longitudinal Study of Aging (NUJLSOA)
- 5 waves of panel data: 1999, 2001, 2003, 2006, and 2009
- Nationally representative sample of age 65+ in 1999
- Oversampled for age 75+

Data (cont.)

Waves Year	W1 1999	W2 2001	W3 2003	W4 2006	W5 2009
Sample size*	4997	3992	3418	2520	1861
Deaths	--	327	370	450	287
Response rate	74.6%	86.4%	82.1%	82.3%	85.2%

* For panel data only. Refreshed samples in 2001 and 2003 were omitted from the analyses. About 10% at each wave is by proxy-interviews with family members.

**Response rate includes deaths and some of those who didn't answer previous interviews.

Data (cont.)

- Sample size for analyses (n=4,968)
  - Men= 2,107 - Women= 2,861
- Excluded:
  - Missing education variable (24 cases)
  - Missing initial functioning state (5 cases)
- Date of death (DOD) were obtained from family members and municipal records
- Missing DOD were coded as at mid-point of the survey interval (40 cases)

Health Measure

- **Inactive**: difficulty performing at least one of 7 ADLs or 7 IADLs

- **Active**: otherwise

  – 7 ADLs: bathing, dressing, eating, getting in/out of bed, walking, going outside, toileting

  – 7 IADLs: preparing for own meal, shopping, managing money, making phone calls, doing light housework, using transportation, taking medication

Education Measure

- Dichotomized by level of education based on observed distribution
  - **Less than High School** (≤ 9 years of schooling) *
  - **High School and above** (10+ years of schooling)

* less than 1% had < 6 years of schooling

Sample distribution by education and sex

	Less than HS	**HS and above**	Total
Men	1325 (60.2%)	782 (39.8%)	2107 (44.0%)
Women	1966 (65.5%)	895 (34.5%)	2861 (56.0%)
Total	3291 (63.2%)	1677 (36.8%)	4968 (100.0%)

Proportions shown are for the weighted sample

Method

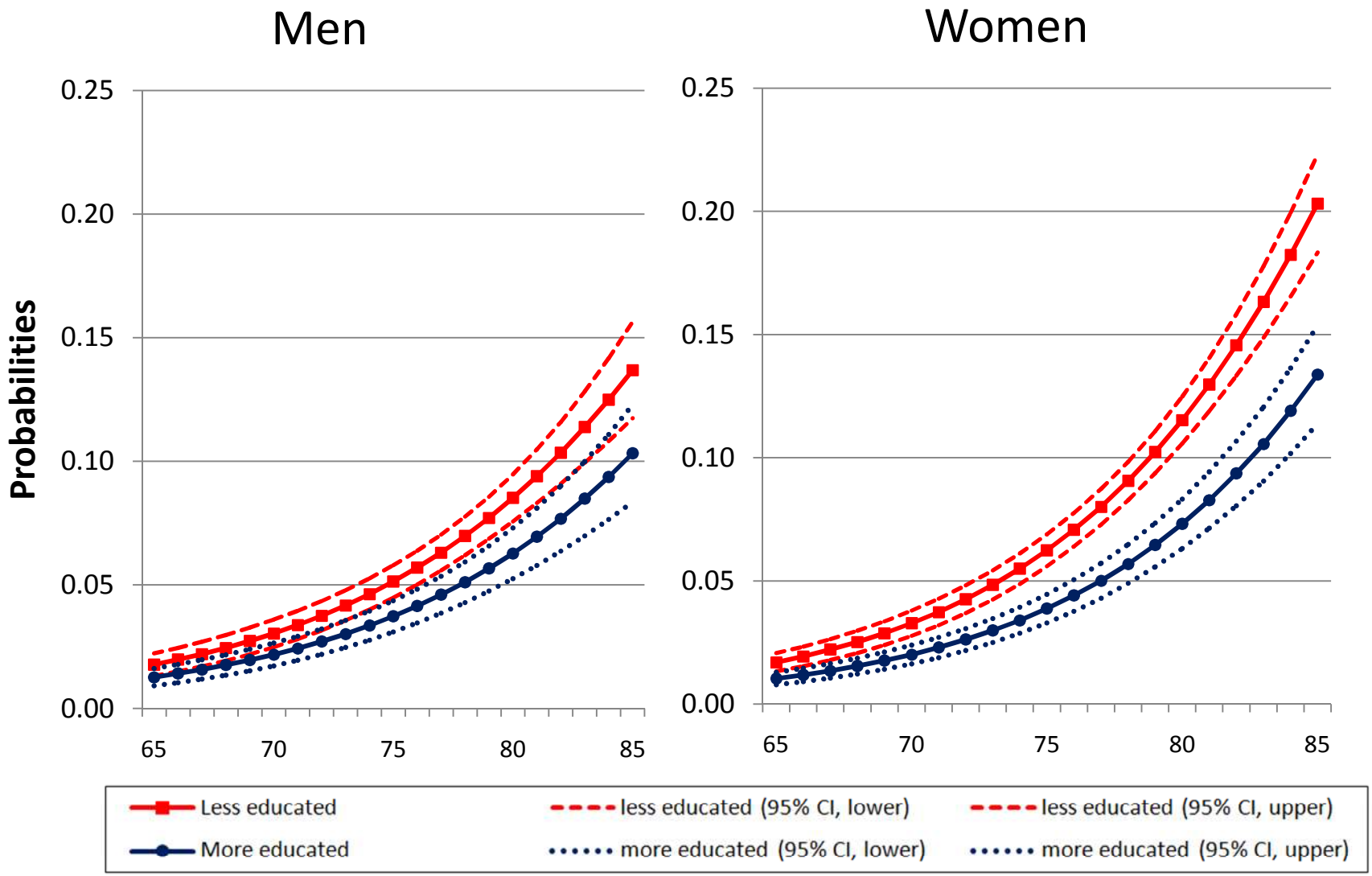
- Multi-state life table (MSLT) method by sex
  - Population-based and Status-based estimates by educational level
- IMaCh used to obtain transition probabilities and compute active life expectancies
  - To handle different interval lengths between surveys (1999, 2001, 2003, 2006, 2009)
  - Annual probabilities were estimated (stepm=12)

RESULTS

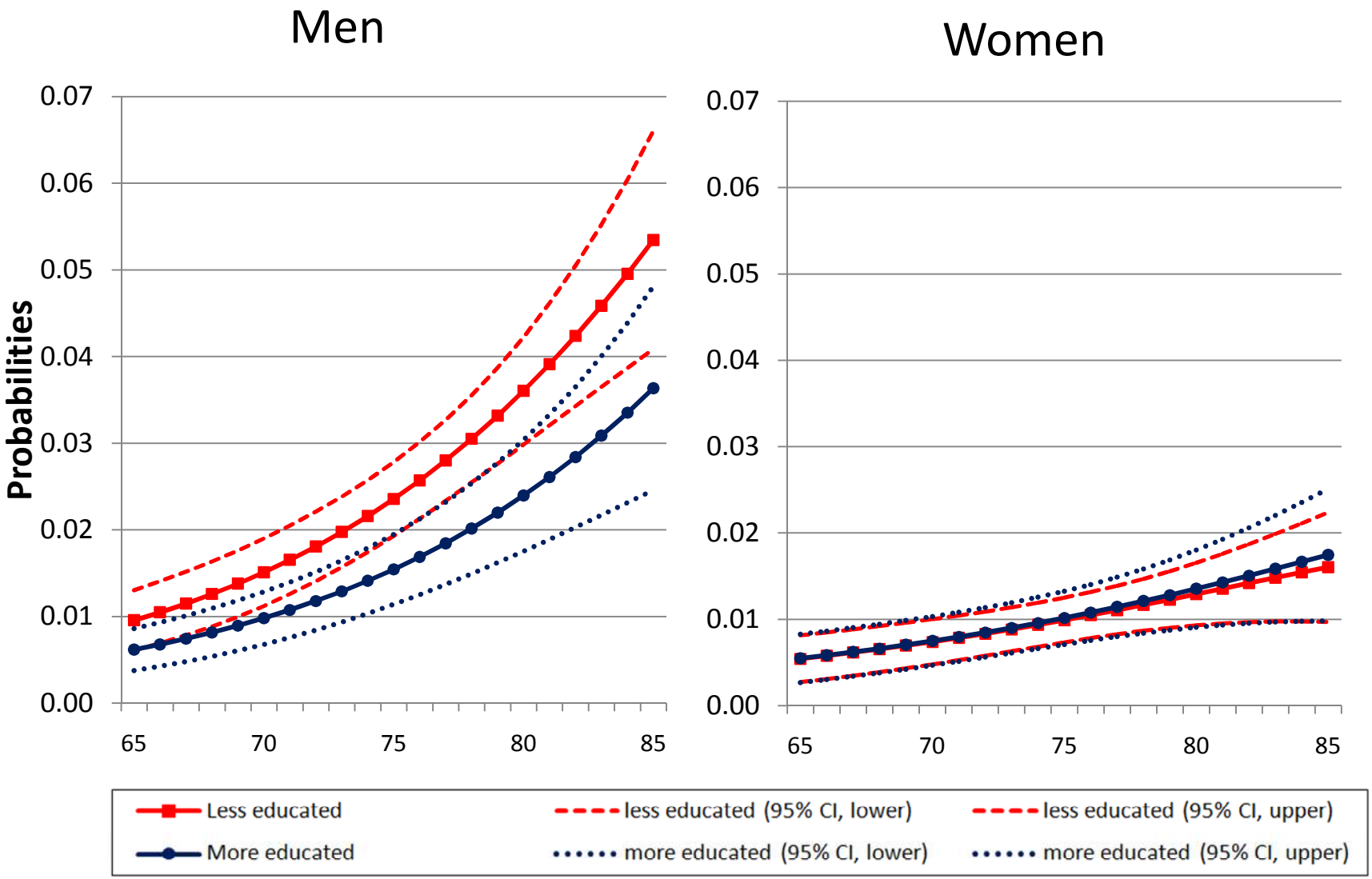
Distribution of health transitions

	End state			
	Active	Inactive	Dead	Total
Initial state	**Less than high school**			
Active	4751	1011	391	6153
Inactive	415	1415	652	2482
Total	5166	2426	1043	8635
	High school and above			
Active	3125	390	181	3696
Inactive	164	452	195	811
Total	3289	842	376	4507

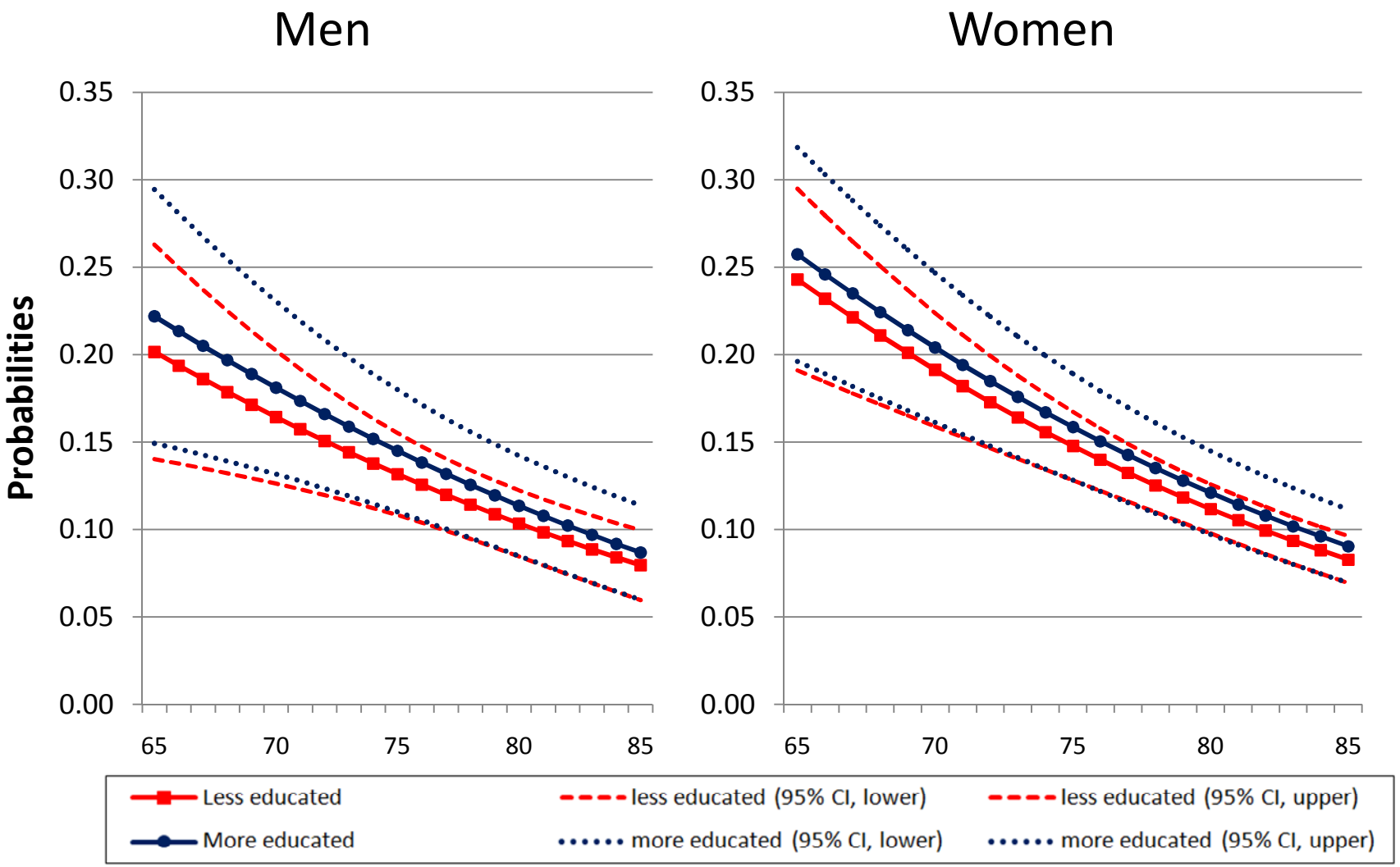
Active to Inactive (worsening health)



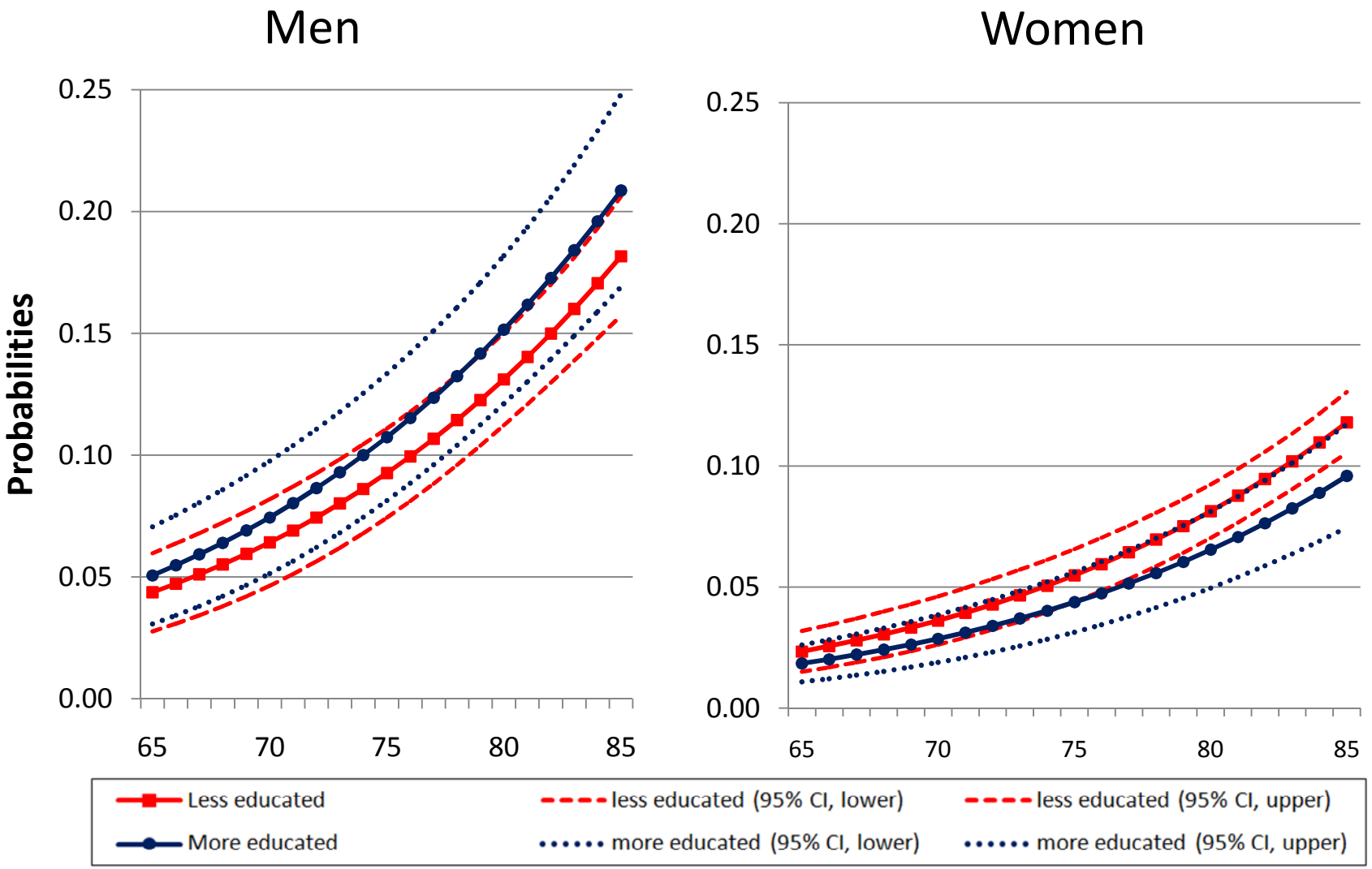
Active to Dead (mortality)



Inactive to Active (improving health)



Inactive to Dead (mortality)



Population-based estimates

	Age	TLE	95% CI	ALE	95% CI	IALE	95% CI	ALE/TLE(%)
Men								
less than high school	65	**18.4**	(17.6-19.2)	**14.7**	(14.0-15.4)	**3.7**	(3.3-4.1)	80.0
	85	**5.9**	(5.3-6.4)	**2.9**	(2.5-3.3)	**3.0**	(2.5-3.4)	49.5
high school & above	65	**20.5**	(19.4-21.5)	**17.3**	(16.3-18.2)	**3.2**	(2.7-3.6)	84.6
	85	**6.6**	(5.9-7.4)	**4.1**	(3.5-4.8)	**2.5**	(2.0-3.0)	61.9
Women								
less than high school	65	**22.3**	(21.6-23.1)	**15.9**	(15.3-16.5)	**6.4**	(5.9-6.9)	71.2
	85	**7.4**	(6.8-8.0)	**2.4**	(2.1-2.7)	**5.0**	(4.5-5.5)	32.4
high school & above	65	**24.5**	(23.2-25.8)	**18.4**	(17.6-19.3)	**6.1**	(5.1-7.0)	75.3
	85	**9.1**	(8.0-10.1)	**3.7**	(3.2-4.3)	**5.3**	(4.4-6.3)	41.2

Totals may not add up exactly due to rounding

Status-based estimates: Active at age 65

	TLE	95% CI	ALE	95% CI	IALE	95% CI	ALE/TLE(%)
Men							
< HS	**18.5**	(17.8-19.3)	**15.0**	(14.3-15.6)	**3.6**	(3.2-4.0)	80.8
HS+	**20.6**	(19.5-21.6)	**17.5**	(16.6-18.4)	**3.1**	(2.6-3.6)	85.0
Women							
< HS	**22.4**	(21.6-23.1)	**16.1**	(15.5-16.6)	**6.3**	(5.8-6.8)	71.7
HS+	**24.5**	(23.2-25.8)	**18.5**	(17.7-19.4)	**6.0**	(5.1-6.9)	75.6

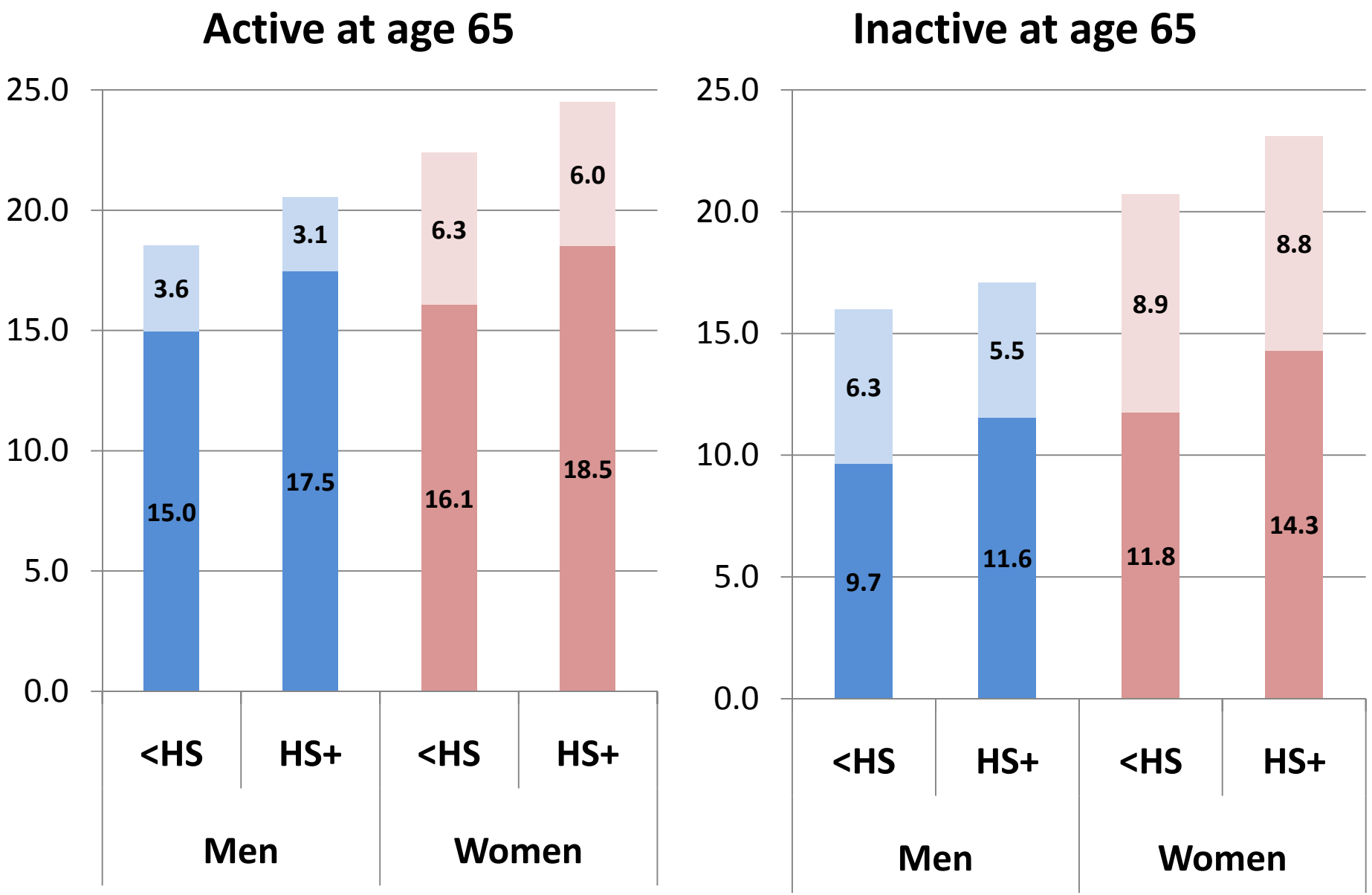
Totals may not add up exactly due to rounding

Status-based estimates: Inactive at age 65

	TLE	95% CI	ALE	95% CI	IALE	95% CI	ALE/TLE(%)
Men							
< HS	**16.0**	(14.7-17.3)	**9.7**	(8.2-11.1)	**6.3**	(5.5-7.1)	60.4
HS+	**17.1**	(15.3-18.9)	**11.6**	(9.6-13.5)	**5.5**	(4.7-6.4)	67.6
Women							
< HS	**20.7**	(19.7-21.7)	**11.8**	(10.7-12.8)	**8.9**	(8.2-9.7)	56.8
HS+	**23.1**	(21.6-24.6)	**14.3**	(12.9-15.7)	**8.8**	(7.6-10.0)	61.9

Totals may not add up exactly due to rounding

Comparison of status-based estimates



Summary: Transition Probabilities

Education Differentials in Health and Mortality Transitions	Men	Women
Active to Inactive (worsened health)	*/ns	*
Active to Dead (transit to death)	ns	ns
Inactive to Active (improved health)	ns	ns
Inactive to Dead (transit to death)	ns	ns

* $p<0.05$ ns: not significant

Summary: ALE at age 65

Education differentials in:	Men	Women
Population-based		
TLE	*	*
ALE	*	*
IALE	ns	ns
Status-based (initial active state)		
TLE	*	*
ALE	*	*
IALE	ns	ns
Status-based (initial inactive state)		
TLE	ns	ns
ALE	ns	*
IALE	ns	ns

Discussion

- Generally, little effect of education
- Possible reasons:
  - Universal access to health care in Japan
  - High health literacy and concern among Japanese regardless of educational levels
  - Annual health exams required by all …
  - Negligible migrant population; mostly homogeneous
  - Generally, lower inequality among this study population; emphasize on egalitarianism and cooperation
  - Diet and nutritional intake less differentiated

Limitations/Areas for further study

- unable to adjust for clustering of observations
- Attrition
- Missing values
- Definition of health
- Introduction of other covariates

Acknowledgement

- This study was supported by a grant obtained by the Nihon University Population Research Institute from the "Academic Frontier" Project for Private Universities: matching fund subsidy from MEXT (Ministry of Education, Culture, Sports, Science and Technology), 2006-2010.