Cognitive Health of Older Indians: Individual & Geographic Determinants of Female Disadvantages

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RIETI-RAND Symposium:

What Have We Learned from the Panel Data of the Elderly?: For better life and health

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Agenda

- Study motivation
- Gender difference in cognitive function
- Geographic variations in gender difference
- What contributes to gender difference in cognitive function?
- Conclusions and implications

Why study India?

- India is the second most populous country in the world with the population of 1.2 billion (GoI, 2011).
- India has the world's 4th largest economy in purchasing power parity terms (World Bank, 2010).
- India is a union of 35 states and Union territories, each with local government with varying policies.

Why study cognitive function?

- Population aging has shifted disease profile of India
  - non-communicable chronic diseases, such as dementia, are increasingly prevalent.
- Poor cognitive function is a risk factor for and may result from these chronic health conditions.
- Cognitive function affects various aspects of life and wellbeing.
- Yet, cognitive function among older developing populations is understudied, particularly in India.

Gender difference in cognition

- What have we learned from developed countries?

Cognitive health of women is as good or better than that of men, even after adjusting for socioeconomic, medical, and behavioral risk factors and demographic characteristics.

  - Specifically, **women perform better than men on episodic memory and verbal fluency** (Langa, Larson et al., 2009; Hertlitz et al., 1997; De Frias et al., 2006; VanHooren et al., 2007), and **women are as good as men on orientation** (i.e., date naming, naming prime minister/president) (Langa, Llewellyn et al, 2009).

  - Some even argue **women have an inherently higher cognitive aptitude than men in episodic memory and verbal skills** (Lewin et al., 2001; Hertlitz et al., 2002).

Gender difference in cognition

- How about developing countries?
  - Some evidence suggest that **women often perform worse than men** in China (Yao et al., 2009), Egypt (Yount, 2008), Latin America and Caribbean (Maurer, 2011), even after adjusting for social, economic, and clinical risk factors.

Gender difference in cognition

- How about in India?

  The results from single-city population studies yield mixed, geographically varying results and therefore, no conclusive evidence exists.

  - In northern India, women perform worse than men (Ganguli et al., 1996).
  - In southern India, no gender difference is found (Mathuranath et al., 2003, 2007).

What is different in northern vs. southern India?

Geographic variability in female discrimination

- **Missing women**
  - Son preference is particularly high in northern India (Das Gupta, 1987, 2005).
  - Northern states tend to have more imbalanced gender ratios compared to southern Indian states (Sen, 1992, 2003).

Geographic variability in female discrimination

- **Gender inequity**
  - Gender inequity in the investment of household resources (food, education, health care), both in childhood and in older ages (Oster, 2009; Zunzunegui et al., 2009).
  - Girls in northern India were less likely to be vaccinated and more likely to have poor nutritional health than girls in southern India (Mishra et al., 2004).

IS THERE GENDER DIFFERENCE IN COGNITIVE FUNCTION IN INDIA?

DOES IT VARY ACROSS GEOGRAPHIC REGIONS?

Data

- 2010 pilot survey of the Longitudinal Aging Study in India (LASI)

- LASI pilot sample:
  - PSUs stratified across urban/rural districts within 4 states, Karnataka, Kerala, Punjab, and Rajasthan
  - Random selection of 1,546 households (HH response rate = 88.6%)
  - Interview 1,686 individuals at least 45 yrs of age and their spouses regardless of age (Individual response rate = 91.7%)

- Analysis sample:
  - 1,486 individuals at least 45 yrs of age

Geographic variations in gender difference in India

	South		North	
	Karnataka	Kerala	Punjab	Rajasthan
Sex ratio, female per male [a]	0.96	1.09	**0.87**	**0.91**
Life expectancy [b]:				
men	62.6	70.8	67.2	60.3
women	66	76.2	69.3	61.3
Gender difference	**3.4**	**6.6**	2.1	1.0

a. Census of India, 2011, b. 2005 RGI

Gender difference in life expectancy is greater in southern India

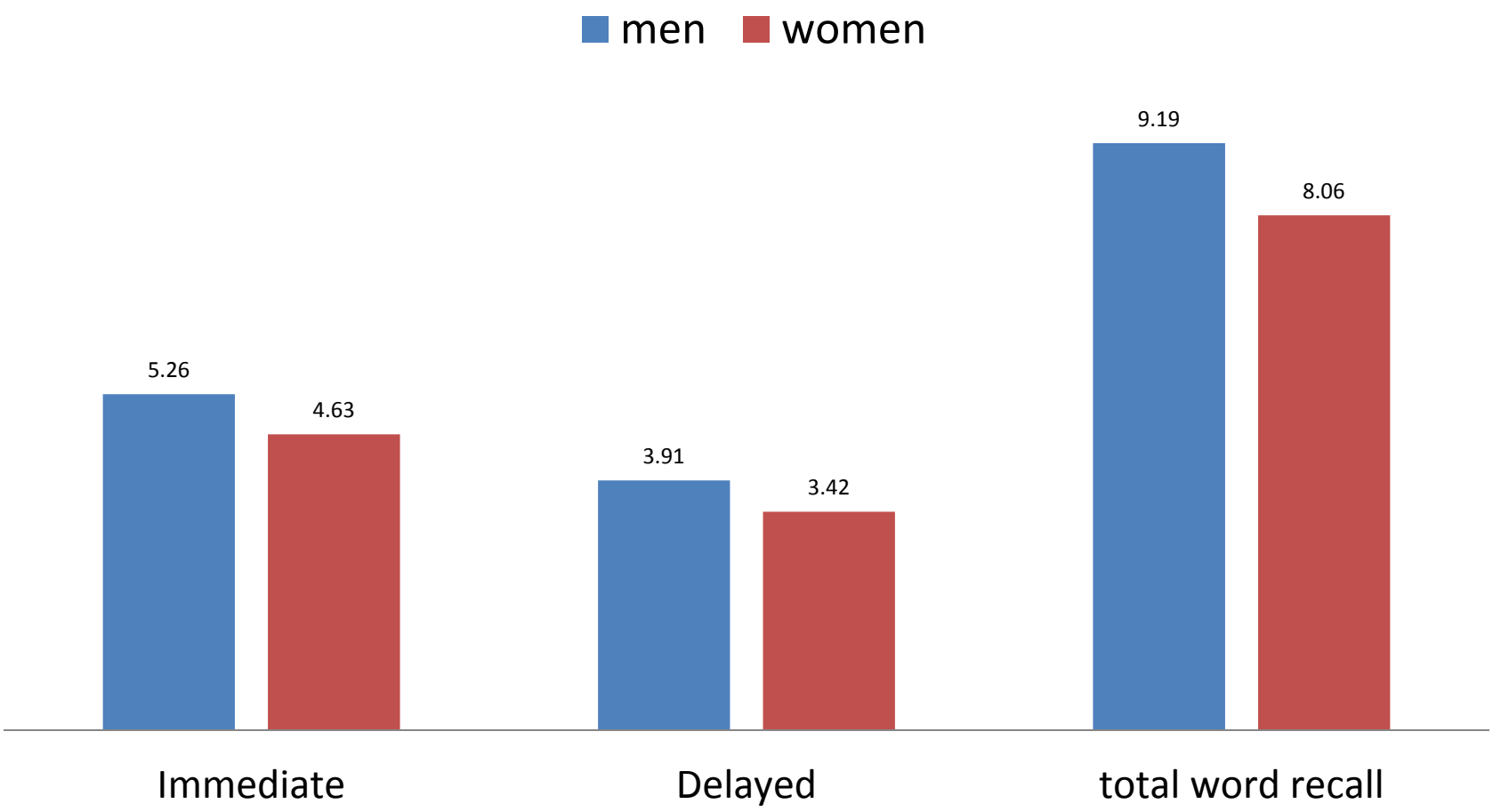
Cognitive tests

- episodic memory:
  - 10-words immediate and delayed recall

- global cognitive function:
  - Naming dates
  - Naming prime minister
  - Count backward
  - Serial 7s

Gender difference in episodic memory

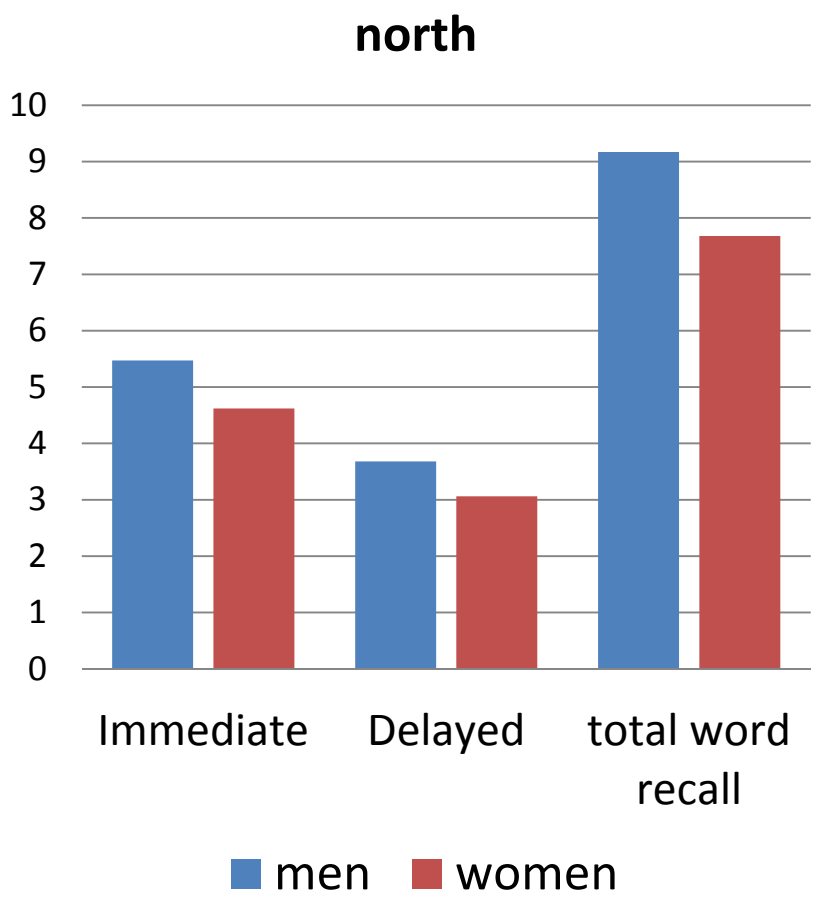
Immediate, Delayed = [0, 10], Total = [0, 20]

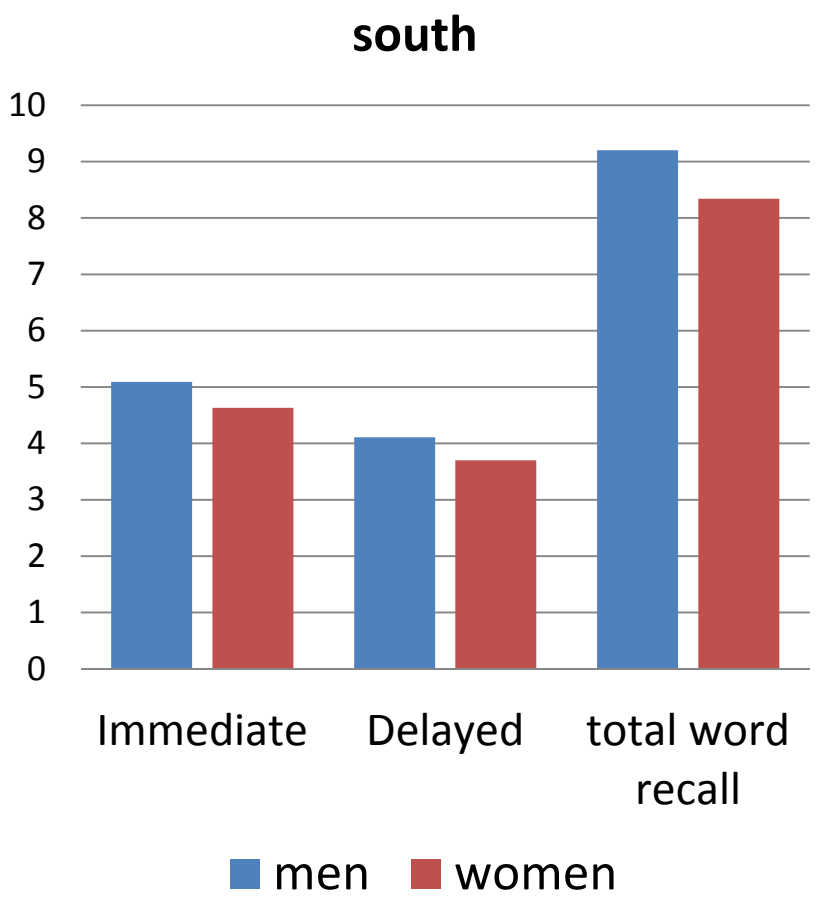


Women perform worse than men in episodic memory.

Gender difference in episodic memory

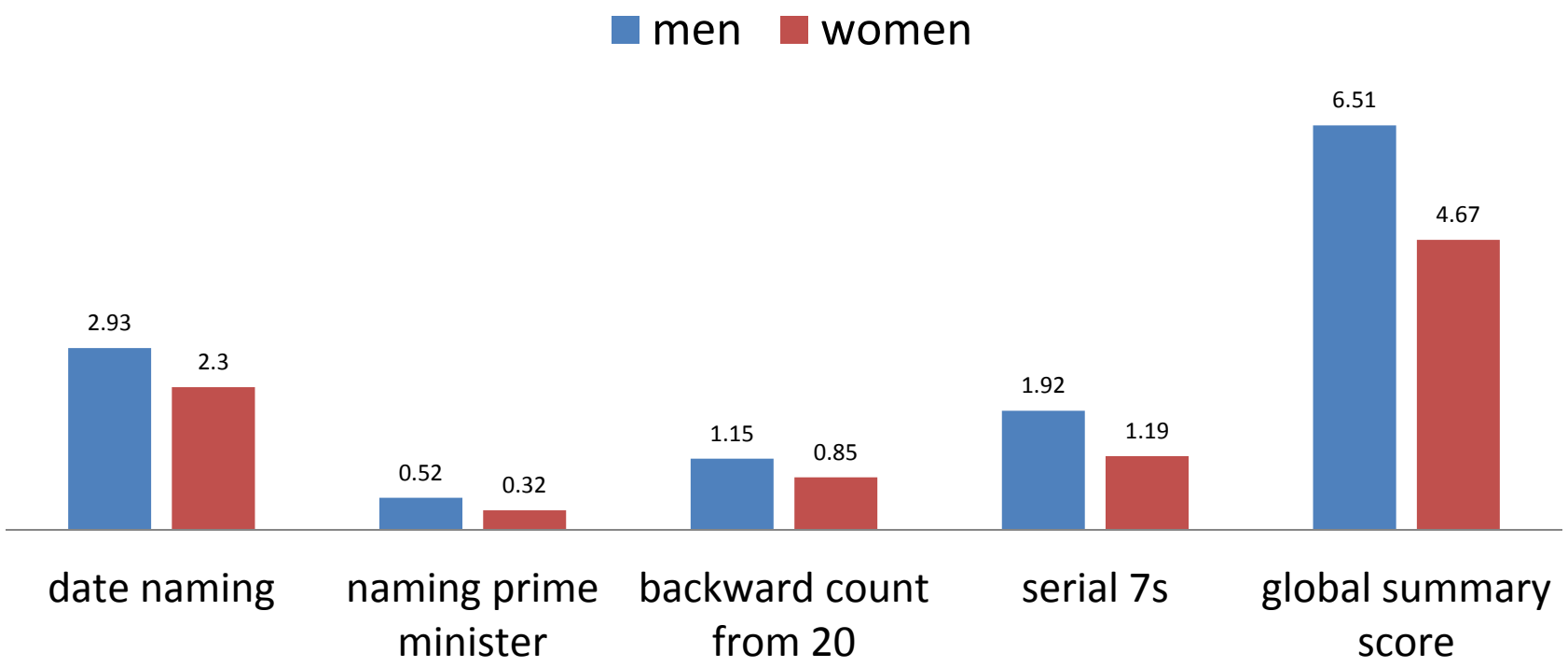
Immediate, Delayed = [0, 10], Total = [0, 20]





Gender gap is greater in northern than southern states

Gender difference in global cognitive functioning

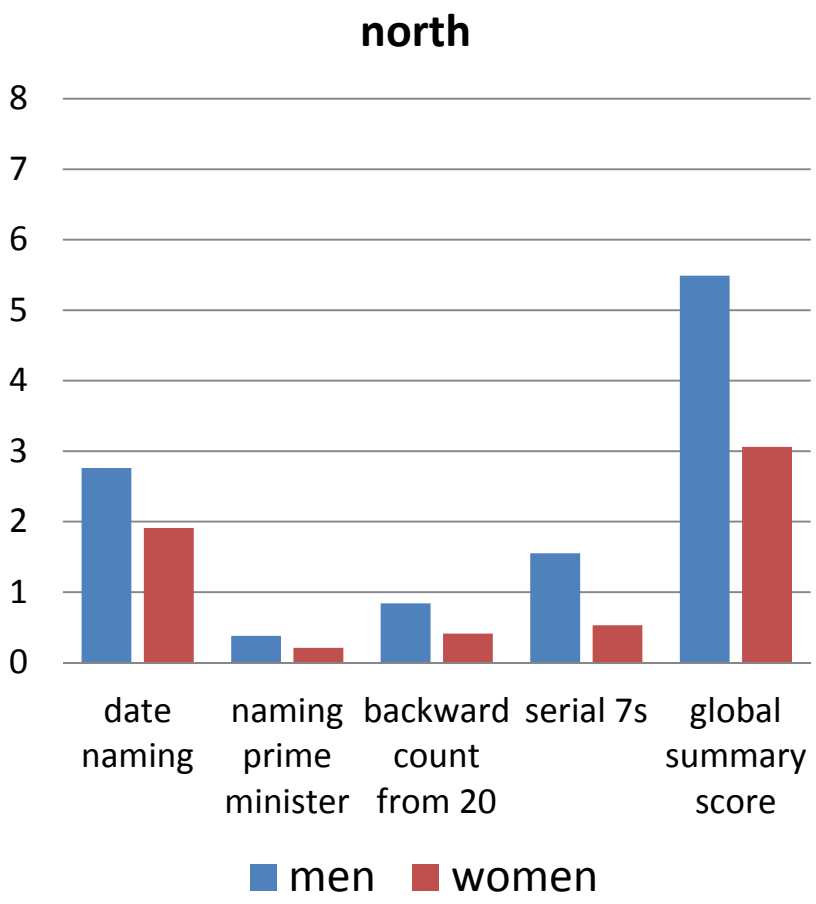


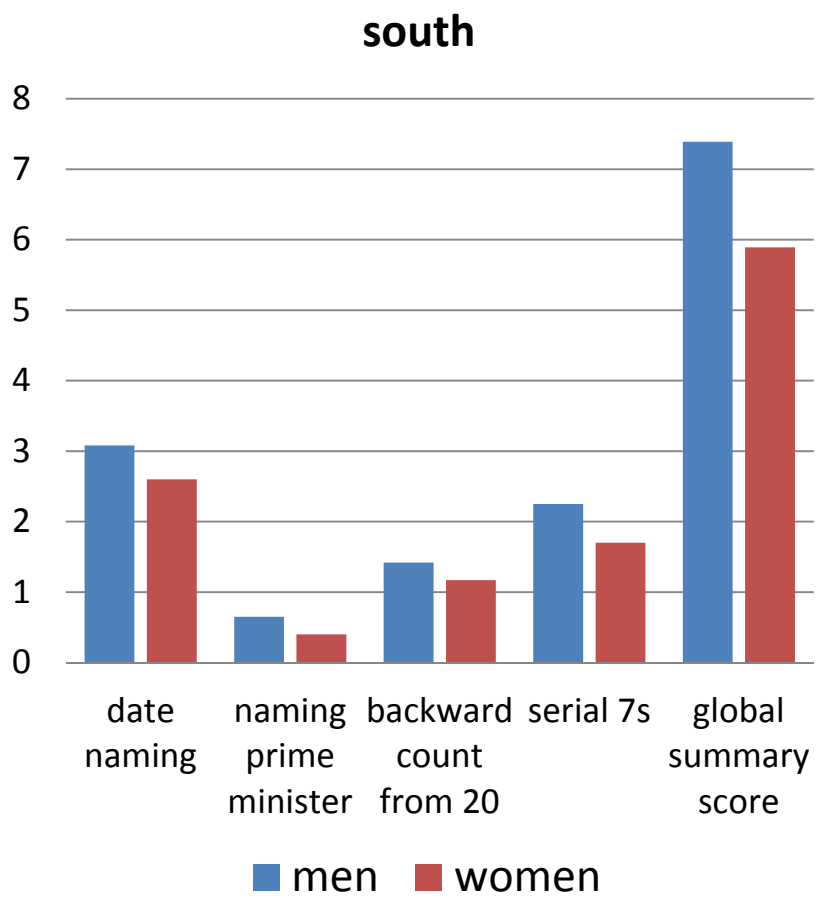
Date naming =[0,4], naming minister = [0,1], backward count = [0, 2], serial 7s = [0, 5], summary score = [0, 12]

Women perform worse in all tasks than men

Gender difference in global cognitive functioning

Date naming =[0,4], naming minister = [0,1], backward count = [0, 2], serial 7s = [0, 5], summary score = [0, 12]





Gender gap is greater in northern than southern states

WHAT CAN EXPLAIN GENDER DISPARITIES IN COGNITION?

What can explain gender disparities in cognition?

- Indian women are not given equal access to **food, education,** and **health services**.
- More traditional gender roles mean more confinement to home for women, restricting **social engagement**.
- Persistent disadvantage can lead to **psychological distress**.

- **Geographic variability in female discrimination** may also contribute to gender disparities.

What may contribute to gender differences in cognition?

- Under-nutrition
- Education
- Health
- Social engagement
- Psychological distress

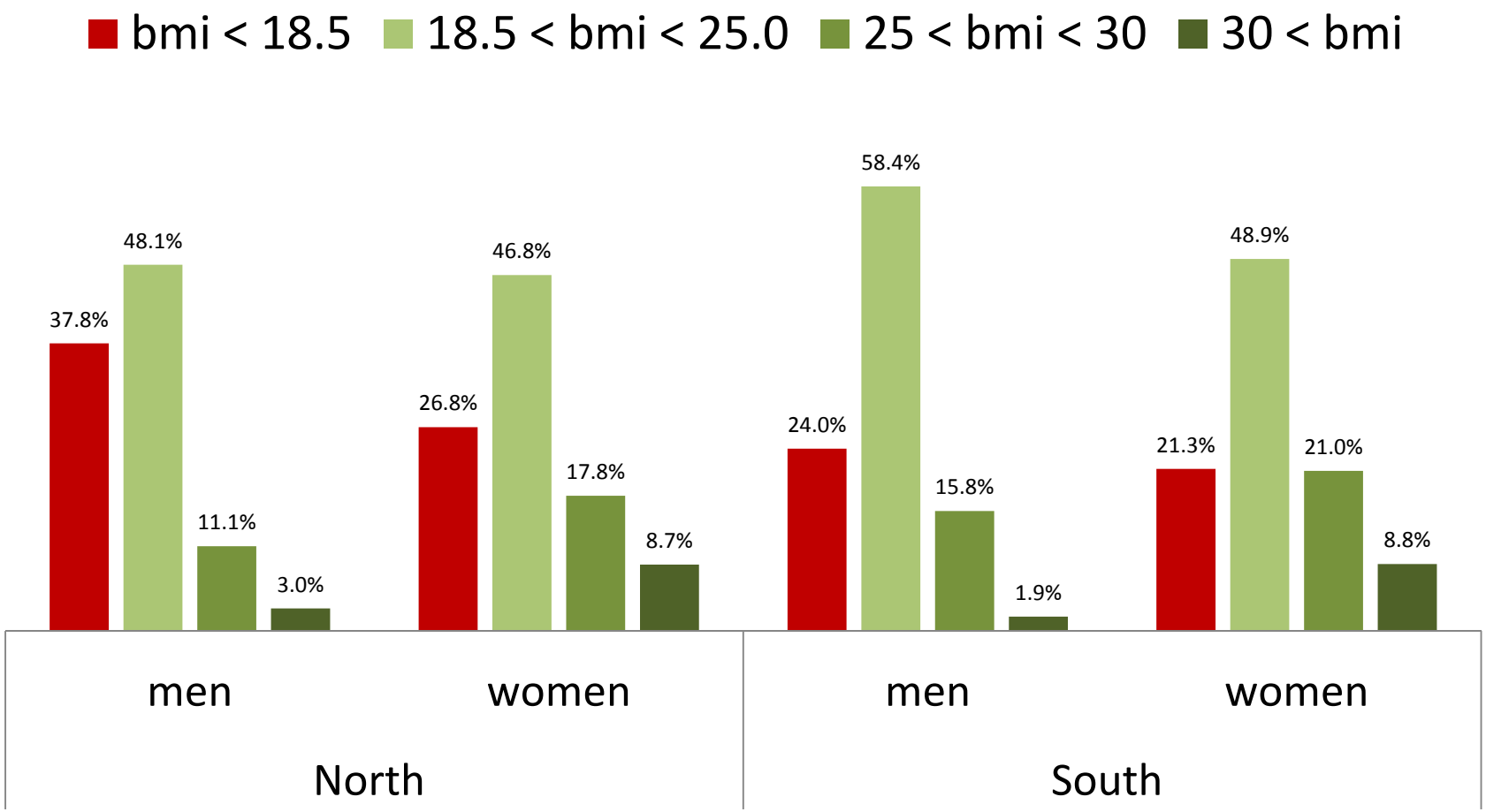
- Underweight, food insecurity
- Schooling, literacy
- Infectious diseases, chronic diseases, ADL
- Social activities, paid work
- CESD

Analytic approach

1. Is there gender difference in risk factor of cognition, namely under-nutrition, education, health, social engagement, and psychological distress?

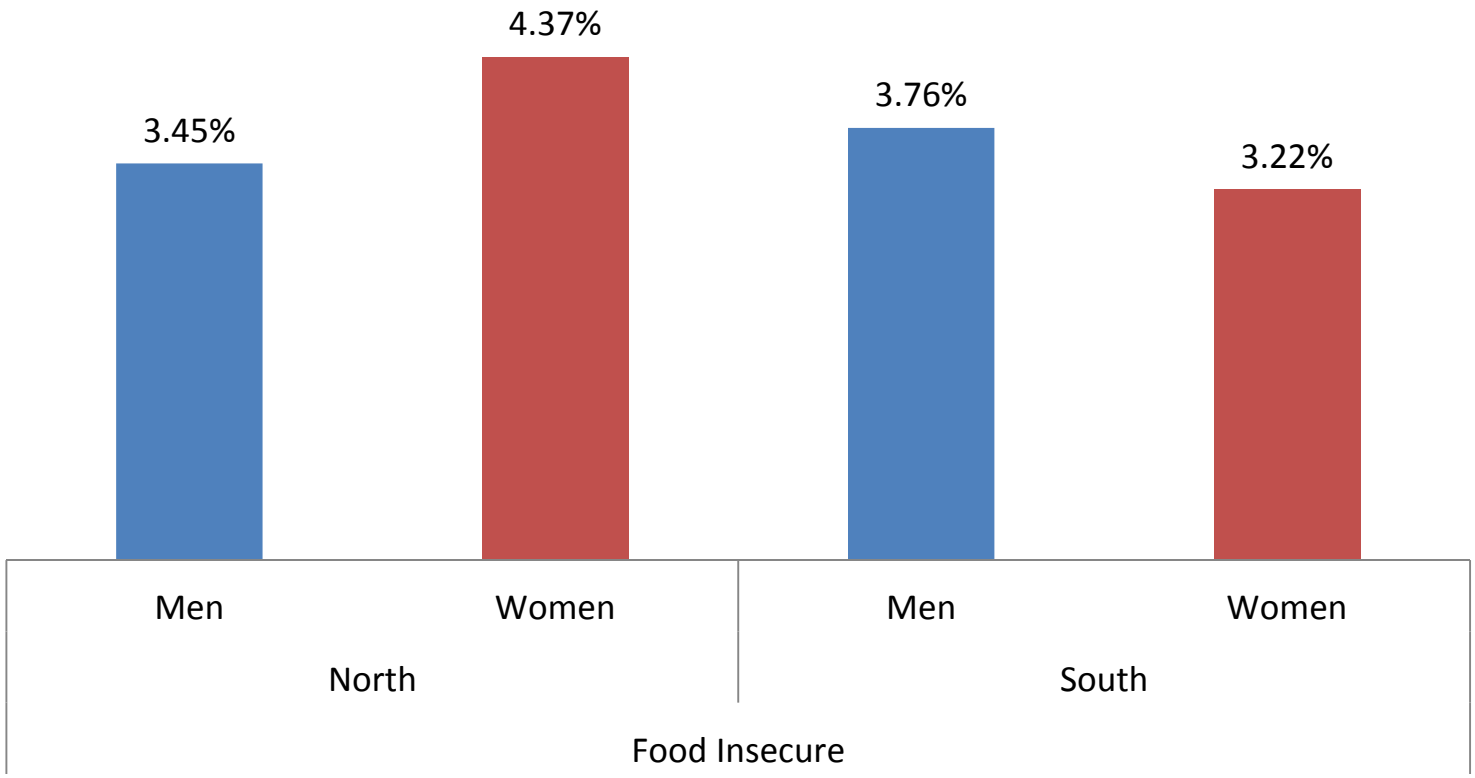
2. Does female disadvantage persists after controlling for risk factors?

Gender differences in risk factors of cognition: under-nutrition



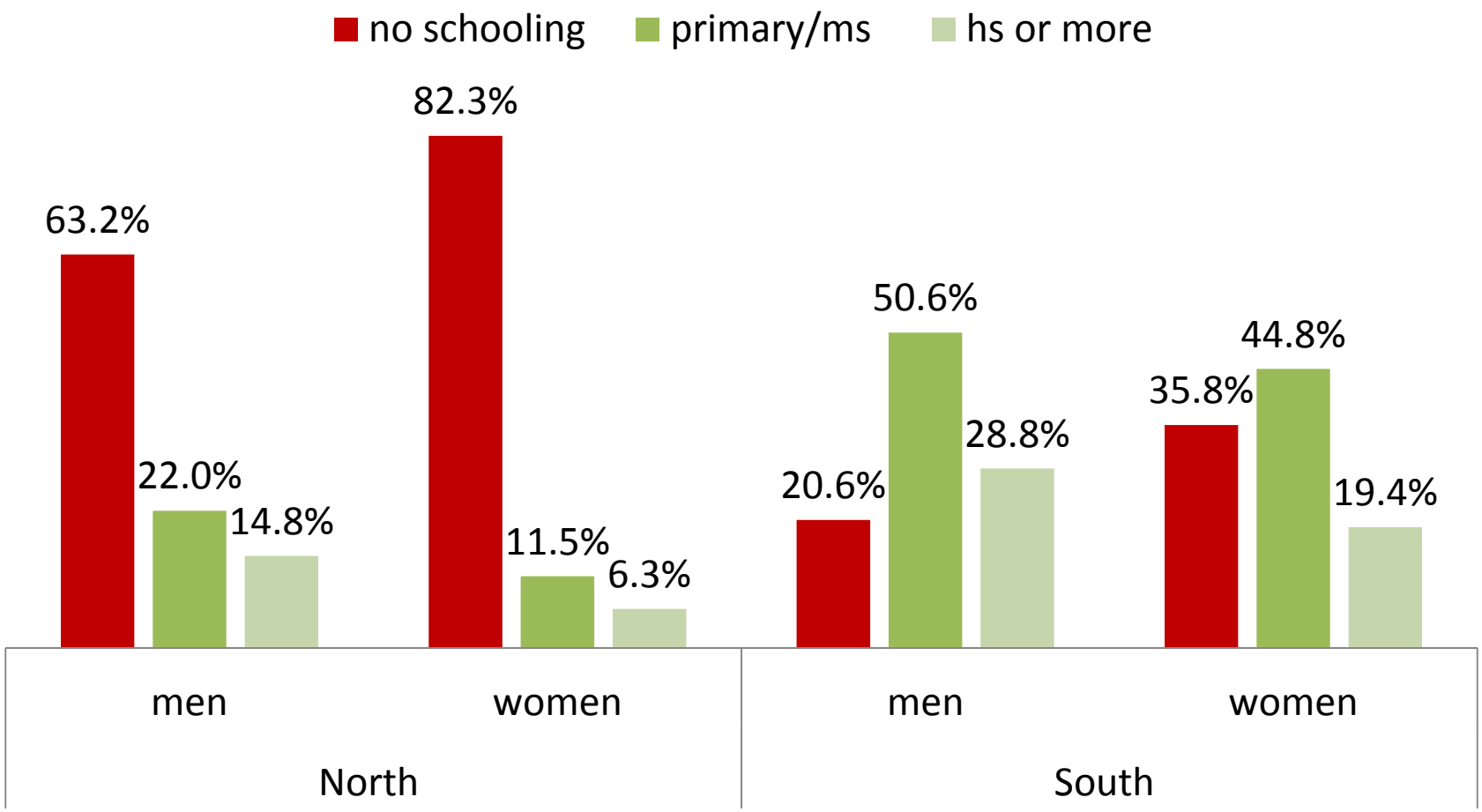
Female disadvantage in under-nutrition is NOT observed

Gender differences in risk factors of cognition: food Insecurity



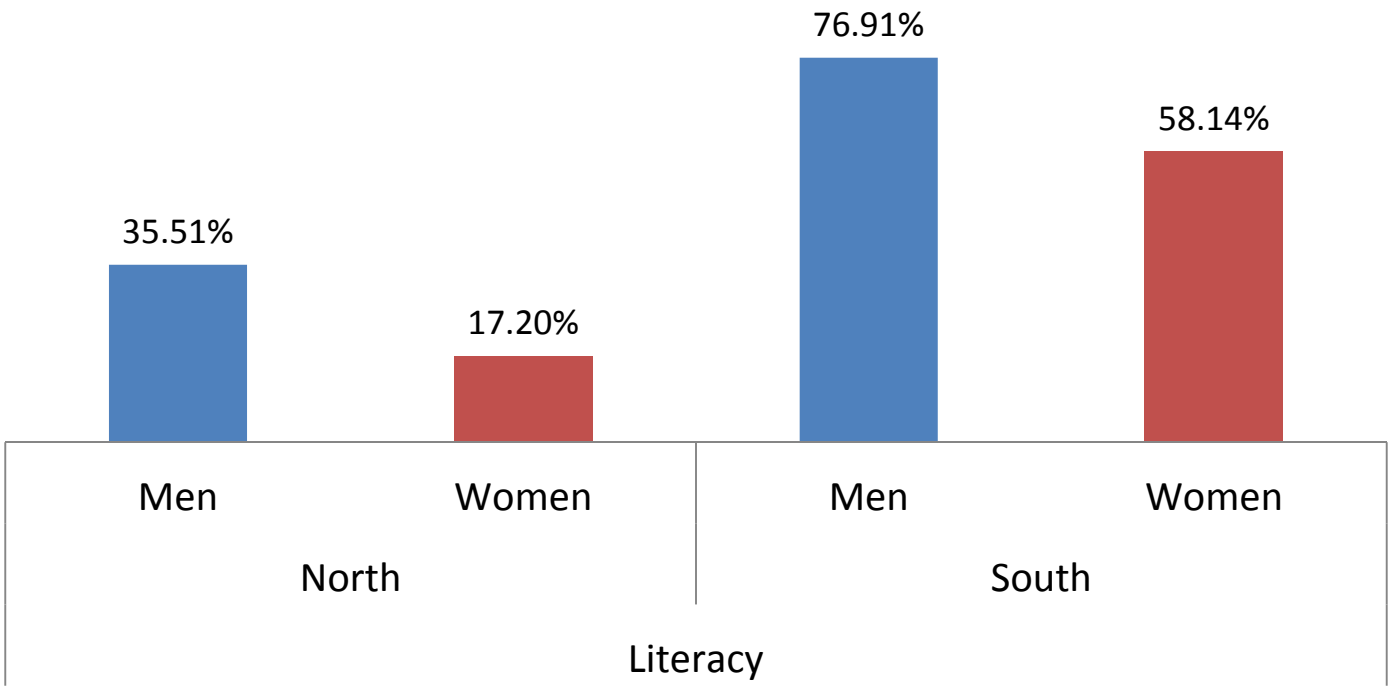
Female disadvantage in food insecurity is NOT significant

Gender differences in risk factors of cognition: education



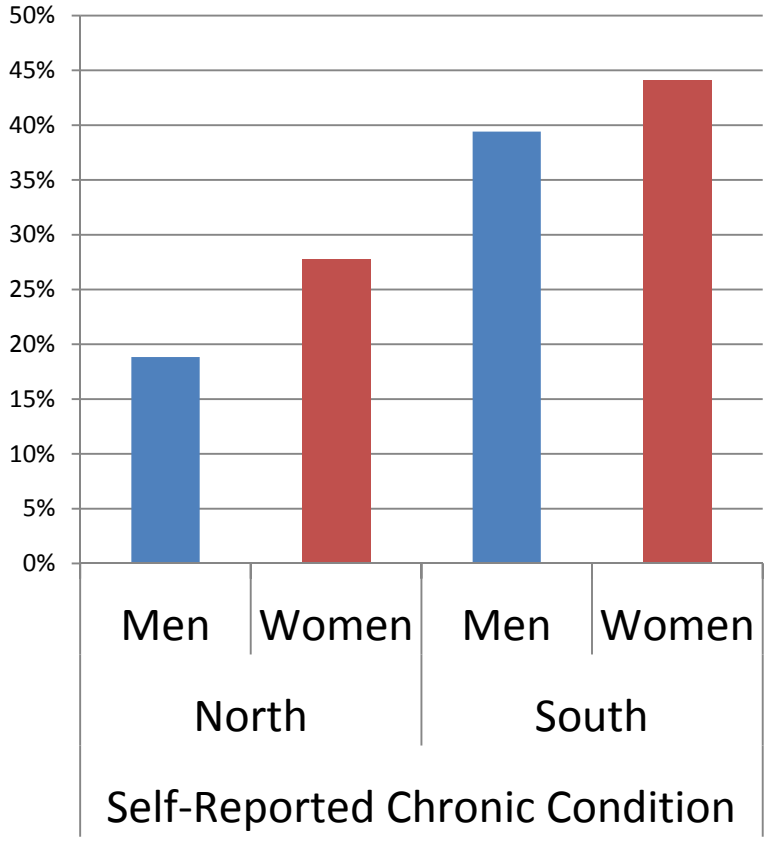
Female disadvantage in education is observed

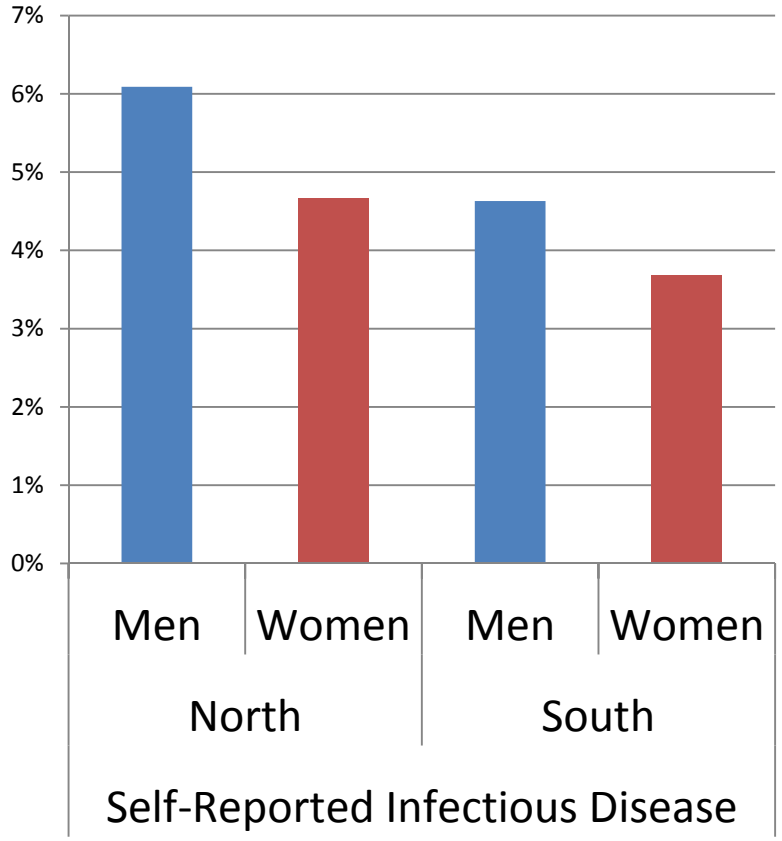
Gender differences in risk factors of cognition: literacy



Female disadvantage in literacy is also observed

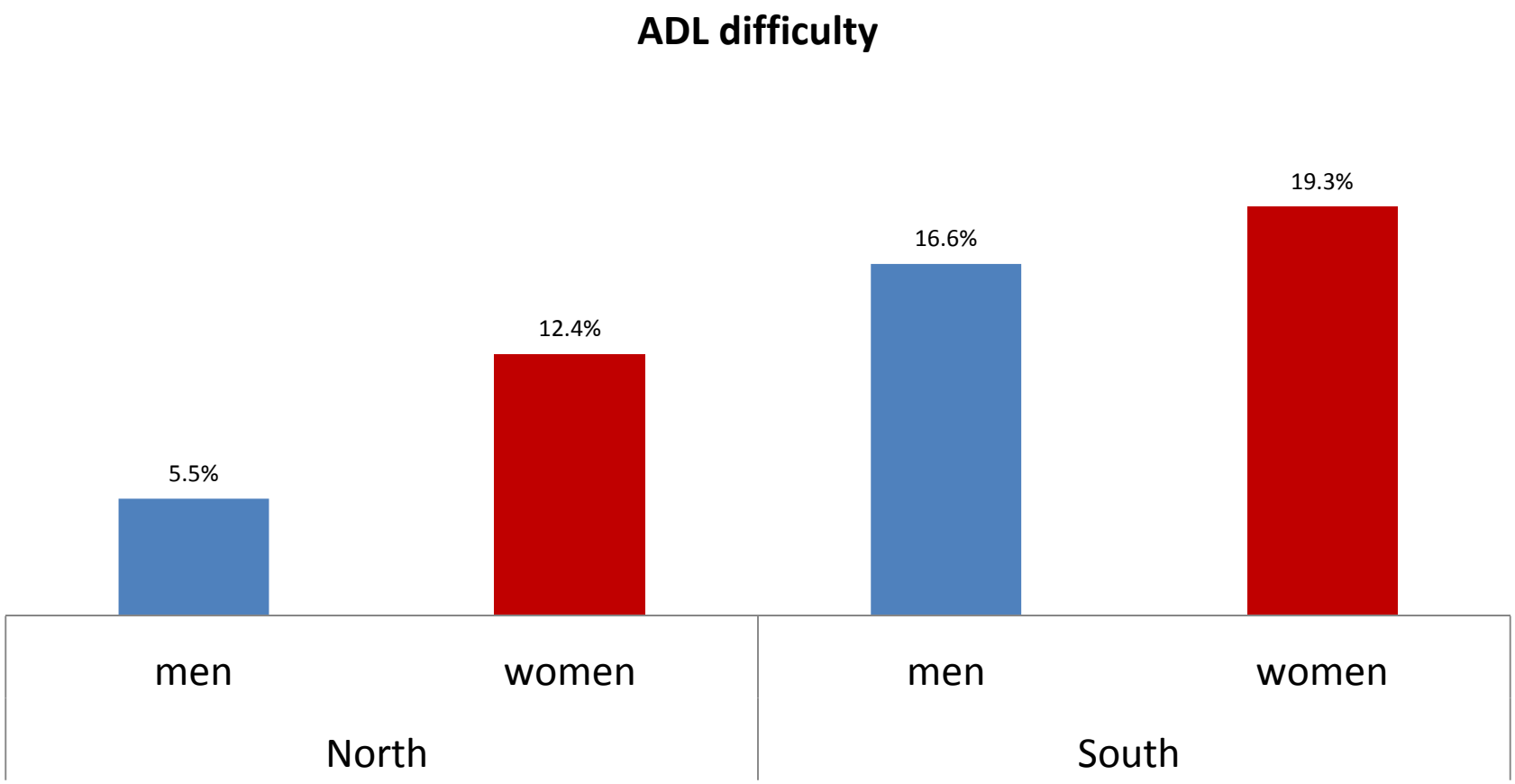
Gender difference in risk factors of cognition: health





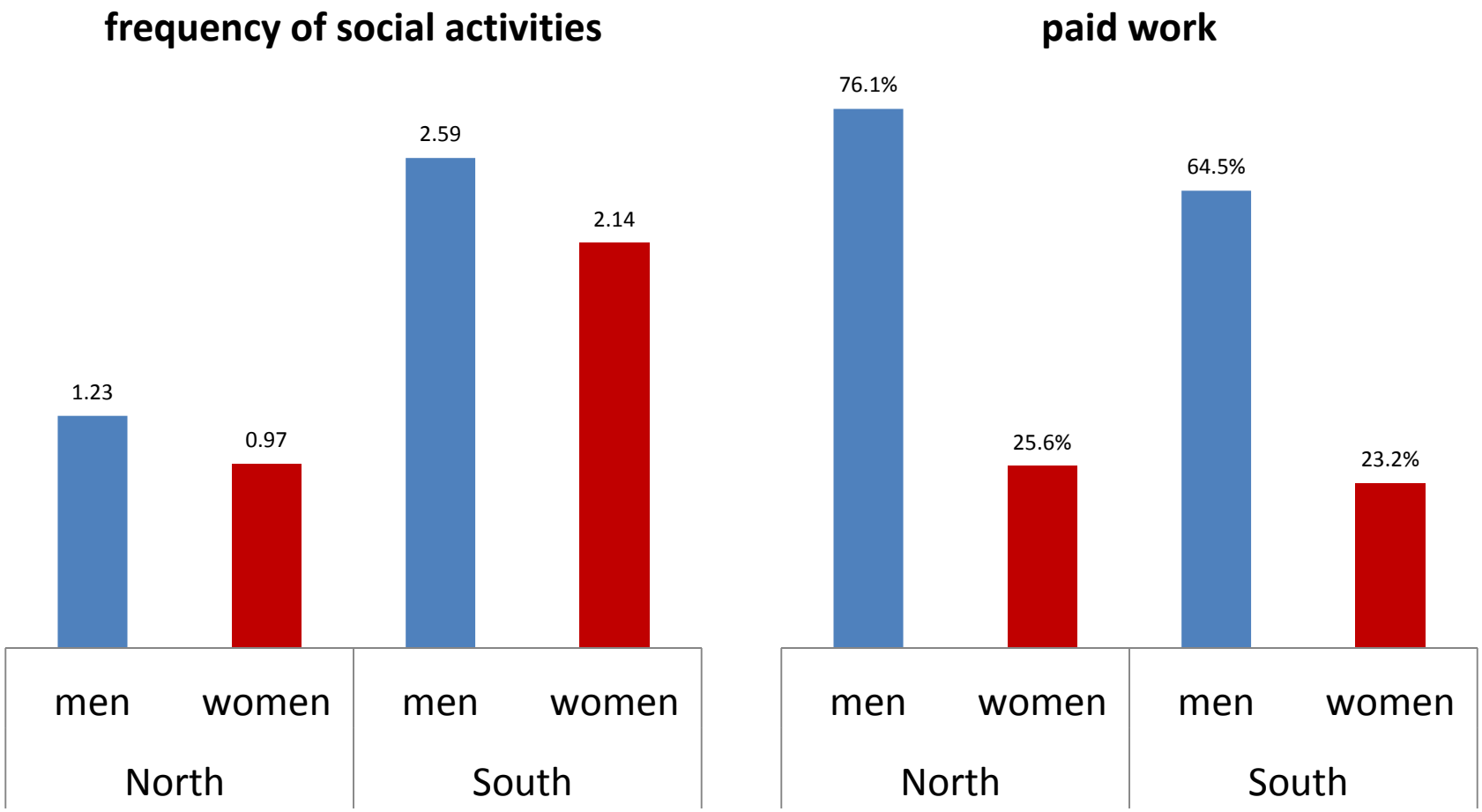
Female disadvantage is observed in chronic diseases but not infectious diseases

Gender difference in risk factors of cognition: Activities of Daily Living Difficulty



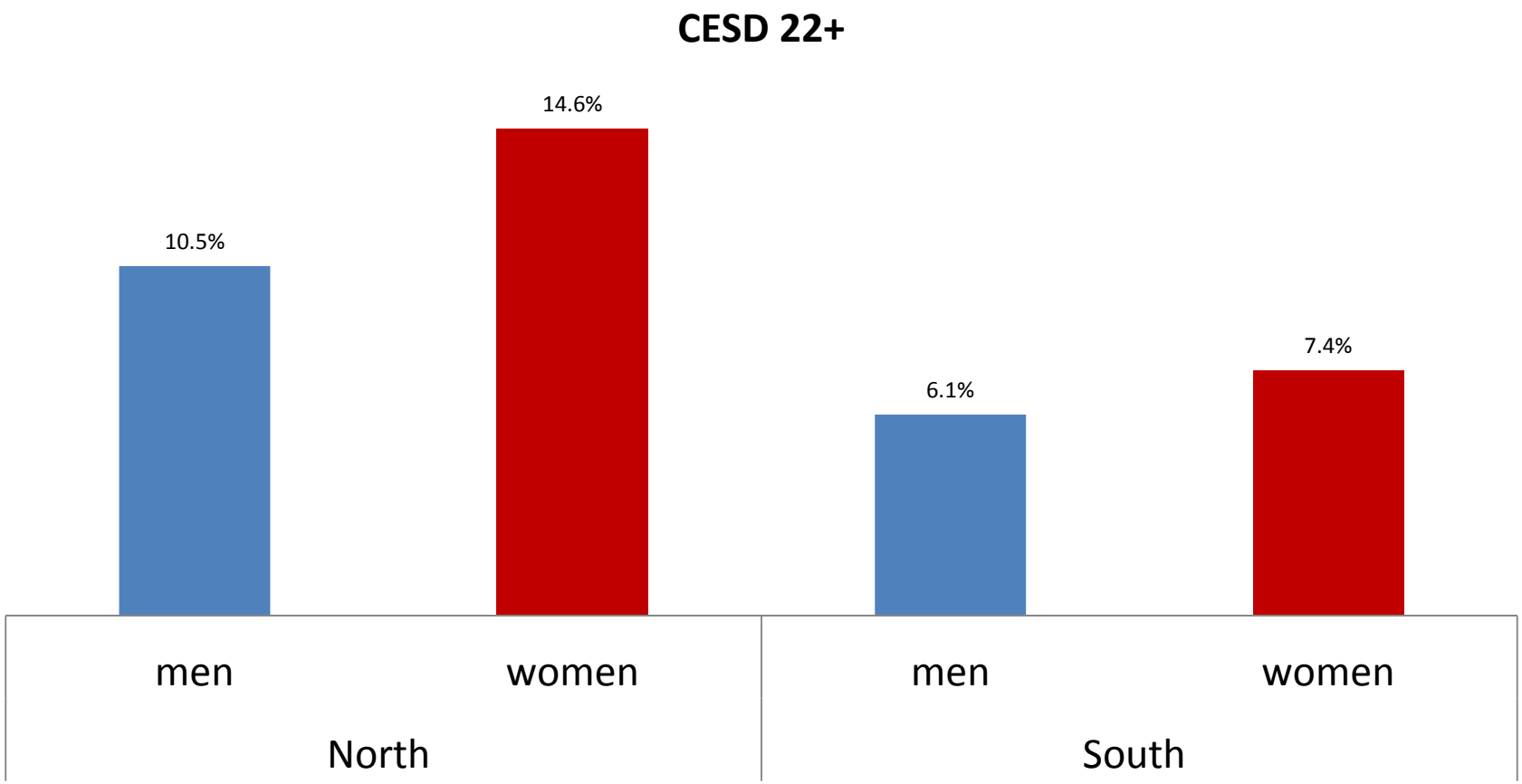
Female disadvantage in ADL is pronounced in northern states

Gender differences in risk factors of cognition: social engagement



Men are more socially engaged than women

Gender difference in risk factors of cognition: CESD



Women are more psychologically distressed than men in North

What contributes to gender differences in cognition?: Episodic memory

*p<.05; **p<.01; ***p<.001

Parameter coefficients (standard errors)	Female (base: male)	Female x north	Differences in female coefficients	Differences in female x north coefficients
Model A Controls: age, caste, rural, north	**-0.769***** (0.209)	**-0.749*** (0.320)		

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Model B Controls: age, caste, rural, north, and				
Education	**-0.463*** (0.181)	-0.660* (0.315)	**0.306*****	0.089

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Health	-0.730*** (-.198)	-0.715* (0.327)	0.039	0.034

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Social engagement	-0.765*** (0.259)	-0.757* (0.322)	0.004	-0.008

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Psychological distress	**-0.690**** (0.206)	-0.749* (0.324)	**0.079***	0.000

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Psychological distress	**-0.690**** (0.206)	-0.749* (0.324)	**0.079***	0.000
Model C Controls: all covariates	**-0.546*** (0.248)	**-0.581** (0.322)	**0.223***	0.168

What contributes to gender differences in cognition?: Global cognitive functioning

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Parameter coefficients (standard errors)	Female (base: male)	Female x north	Differences in female coefficients	Differences in female x north coefficients
Model A Controls: age, caste, rural, north	**-1.577***** (0.220)	**-0.995***** (-0.299)		

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Model B Controls: age, caste, rural, and				
Education	**-0.704**** (0.213)	-0.700* (0.280)	**0.873*****	0.295

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Health	-1.580*** (0.212)	-0.938*** (0.301)	-0.003	0.057

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Health	-1.580*** (0.212)	-0.938*** (0.301)	-0.003	0.057
Social engagement	**-1.322***** (0.266)	-0.966*** (0.299)	**0.255***	0.029

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Social engagement	**-1.322***** (0.266)	-0.966*** (0.299)	**0.255***	0.029
Psychological distress	-1.547*** (0.211)	-0.953*** (0.289)	0.030	0.042

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Psychological distress	-1.547*** (0.211)	-0.953*** (0.289)	0.030	0.042
Model C Controls: all covariates	**-0.311** (0.285)	**-0.744***** (0.295)	**1.266*****	0.251

Conclusions

- Women at age 45+ perform worse in cognitive tests than men at the same age, even after controlling for risk factors of cognition.
- Gender disparity in cognition is more pronounced in northern states than southern states, reflecting regional differences in gender discrimination.
- Education, social engagement, and psychological distress explain some of female disadvantage but not all.
- Education is the strongest contributor, accounting for 40 – 55% of the gender disparity in cognition.

Implications

- Education can reduce the burden of poor cognitive function among older adults.

- Greater access to education among girls and women has a potential to reduce gender disparities in cognition.

Longitudinal Aging Study in India

Data producing team

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