

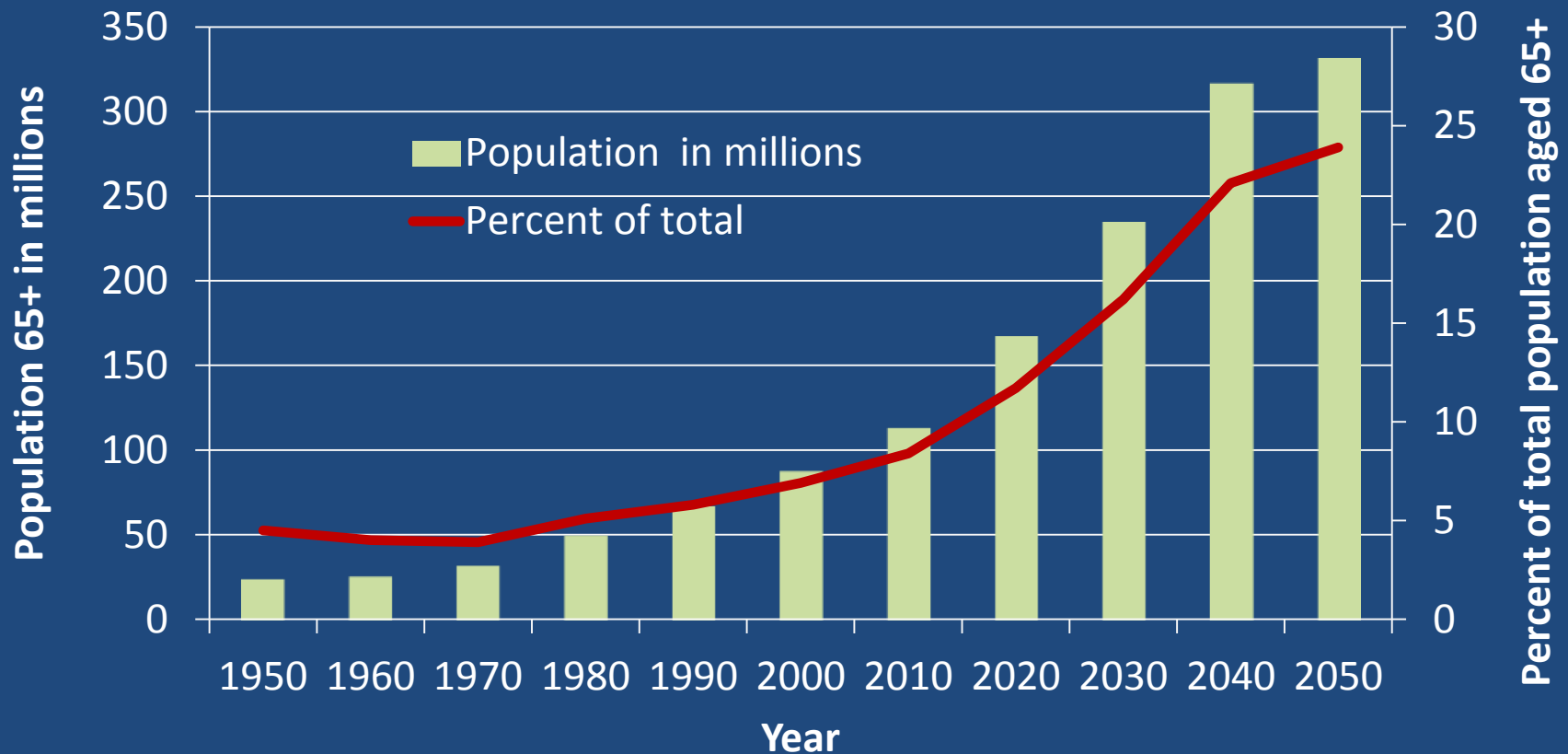
**Recent Changes in Life and Disability-Free  
Life Expectancy in China:  
Do They Vary by Residence and Education?**

Zachary Zimmer (University of California San Francisco)  
Mira Hidajat (Texas Department of State Health Services)  
Yasuhiko Saito (Nihon University)

# China's demographic transformation

China is among the world's most rapidly ageing countries both in terms of numbers of aged and percent of total.

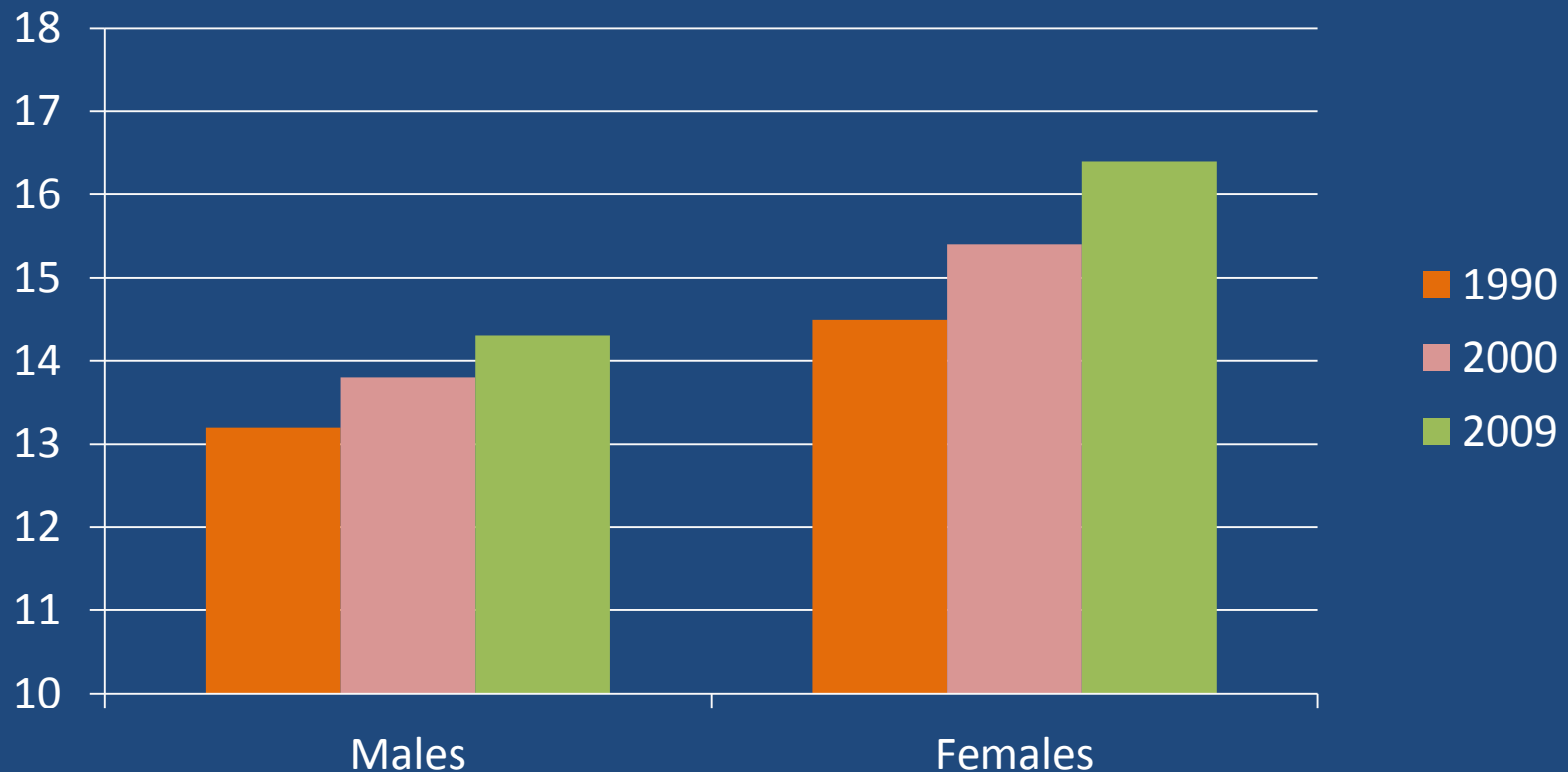
Population aged 65+ in China, 1950 to 2050



# China's demographic transformation

Not only is China ageing, but it's elderly population is living longer. Recent life expectancy increases at age 65 are about 1/2 year per decade for males and 1 year per decade for females.

Life expectancy at age 65 by sex, 1990, 2000 and 2009



# Increased longevity and disability-free life expectancy in China

Are increases in old-age longevity accompanied by comparable increases in morbidity free longevity in China, i.e., a compression of morbidity?

Thus far, the answer to this question has largely been examined by investigating 'trends' in ADL disability. Results have been mixed e.g.,:

	Gu et al. 2009	Feng et al. 2013	Zimmer et al. 2014
Journal	<i>Social Science and Medicine</i>	<i>Journal of Gerontology: Social Sciences</i>	<i>Research on Aging</i>
Study years	1992 to 2002	1998 to 2008	1992 to 2007
Coverage	Nation wide	Shanghai	Beijing
Main finding	Non-significant ADL declines	Significant ADL declines	ADL declines differed by sex. Increased for men; was stable for women

## Current study

Do recent changes in disability-free life expectancy in China indicate a compression of morbidity?

Is a compression of morbidity consistent across key socio-demographic characteristics?

1. Where you live? Urban population in China is rapidly increasing. Hit the 50% mark in 2010.
2. How much education do you have? Percent educated rapidly increasing, even among elderly populations.

# Data

## China Longitudinal Healthy Longevity Study

(Zeng et al. 2002, Zeng and Gu 2008).

Collected in 22 provinces representing 85% of China's population

Oversampling at older ages

We use two baseline and follow-up waves and compare results across those two waves.

- i. 2002 to 2005 (N=10,818)
- ii. 2008 to 2011 (N=15,629)

Sample is aged 65+

# Measures

## At baseline (2002 and 2008)

**Has a disability**

**yes/no**

bathing, continence, dressing, feeding,  
getting up from a bed or chair, toileting

**Sex**

**male/female**

**Education**

**primary or less/more than primary**

**Residence**

**rural/urban**

## At Follow-up (2005 and 2011)

**Status at follow-up**

**disability**

**no disability**

**deceased**

**lost to follow-up**

## Sample characteristics at baseline and follow-up rate

	MALES			FEMALES		
Baseline year	2002		2008	2002		2008
<b>N</b>	<b>4519</b>		<b>6626</b>	<b>6299</b>		<b>9003</b>
<b>Mean age</b>	<b>72.0</b>		<b>72.8</b>	<b>73.1</b>		<b>73.7</b>
<b>% primary + education</b>	<b>40.7</b>		<b>52.1</b>	<b>11.5</b>		<b>20.3</b>
<b>% urban residents</b>	<b>35.4</b>		<b>44.2</b>	<b>35.0</b>		<b>44.2</b>
<b>Follow-up rate</b>	<b>87.8</b>		<b>86.0</b>	<b>85.8</b>		<b>85.0</b>



# Analytical strategy

1. Examine disability prevalence and mortality across two periods: 2002-05 and 2008-11.
2. Compute TLE and DFLE for the two periods.
3. Compression of morbidity indicated by:
  - a. greater positive increase in DFLE versus TLE between the two period, and;
  - b. higher ratio of DFLE to TLE in the second period

# Estimation

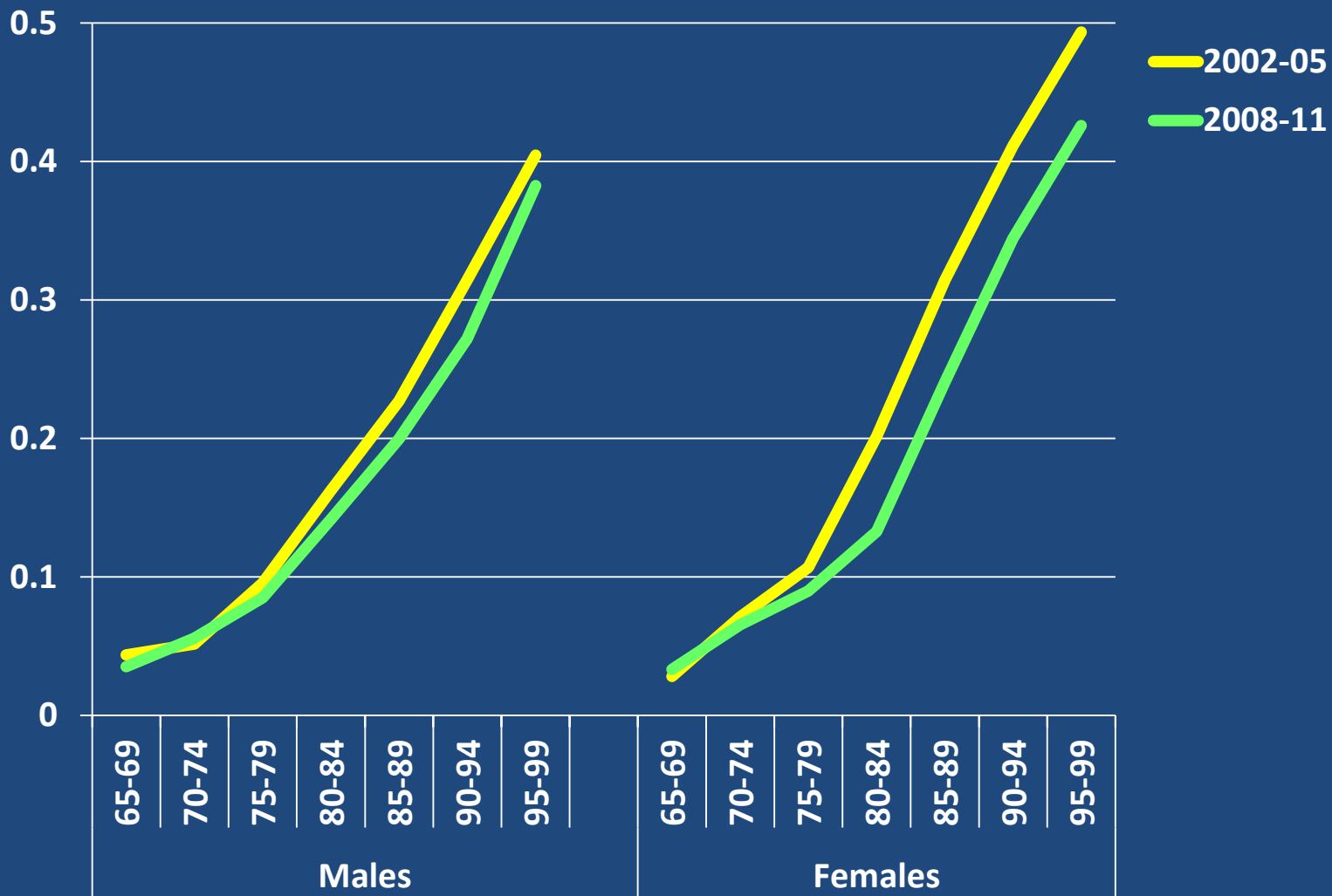
1. Survival models estimated using an exponential distribution.
2. Covariates transformed into life table values.
3. Standard errors for  $e_x$  calculated (Chiang 1984).
4. Disability prevalence determined as average of baseline and follow-up rates in five year age groups.
5. Disability life expectancy computed using Sullivan method as in Jagger et al., 2006.

# Two models examined

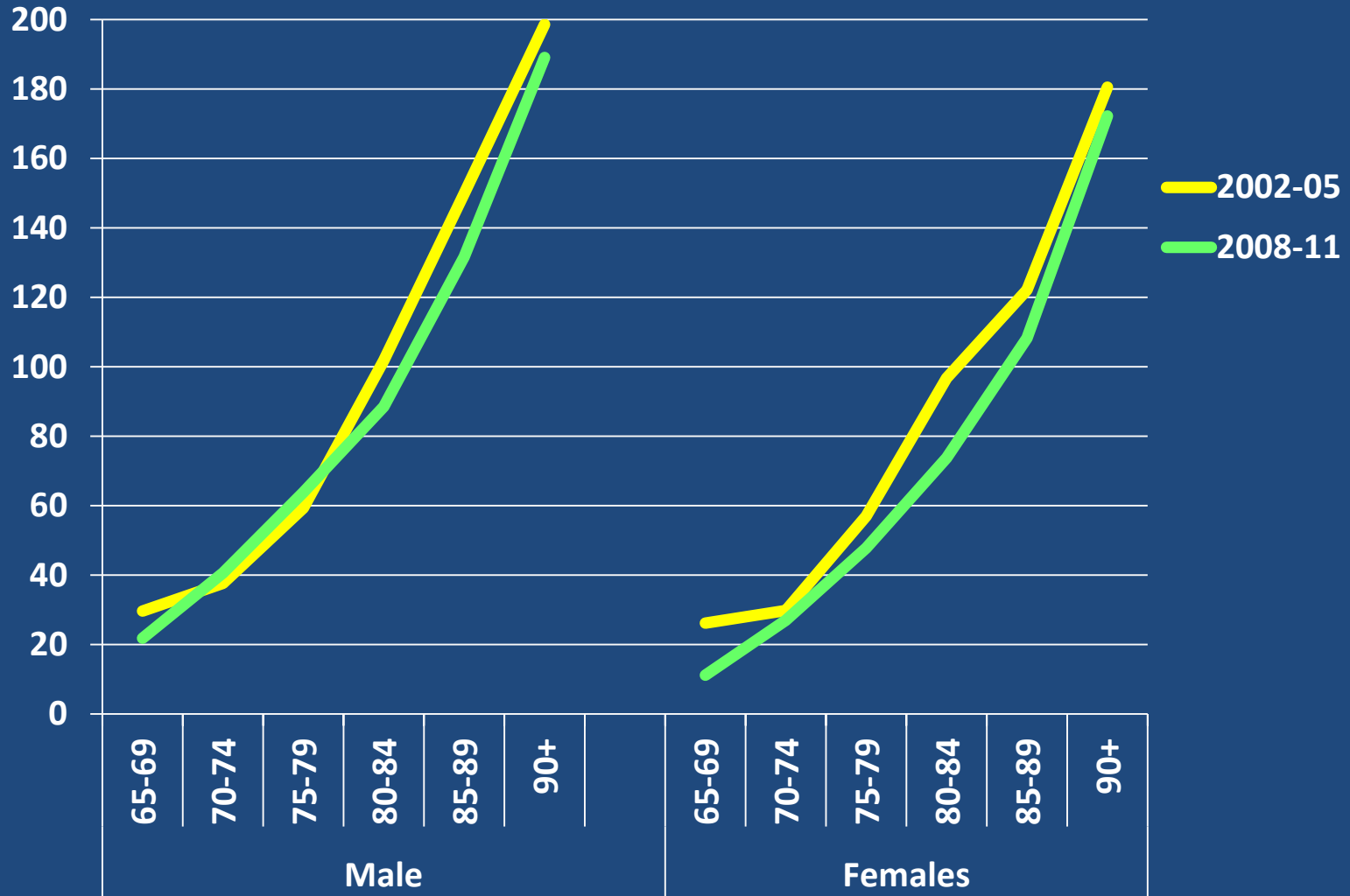
1. By age and sex
2. By age and sex across four baseline sub-group:
  - I. lower educated rural residents
  - II. higher educated rural residents
  - III. lower educated urban residents
  - IV. higher educated urban residents

**Disability prevalence, mortality rates, total life expectancy and disability-free life expectancy by age and sex, comparing 2002-05 to 2008-11**

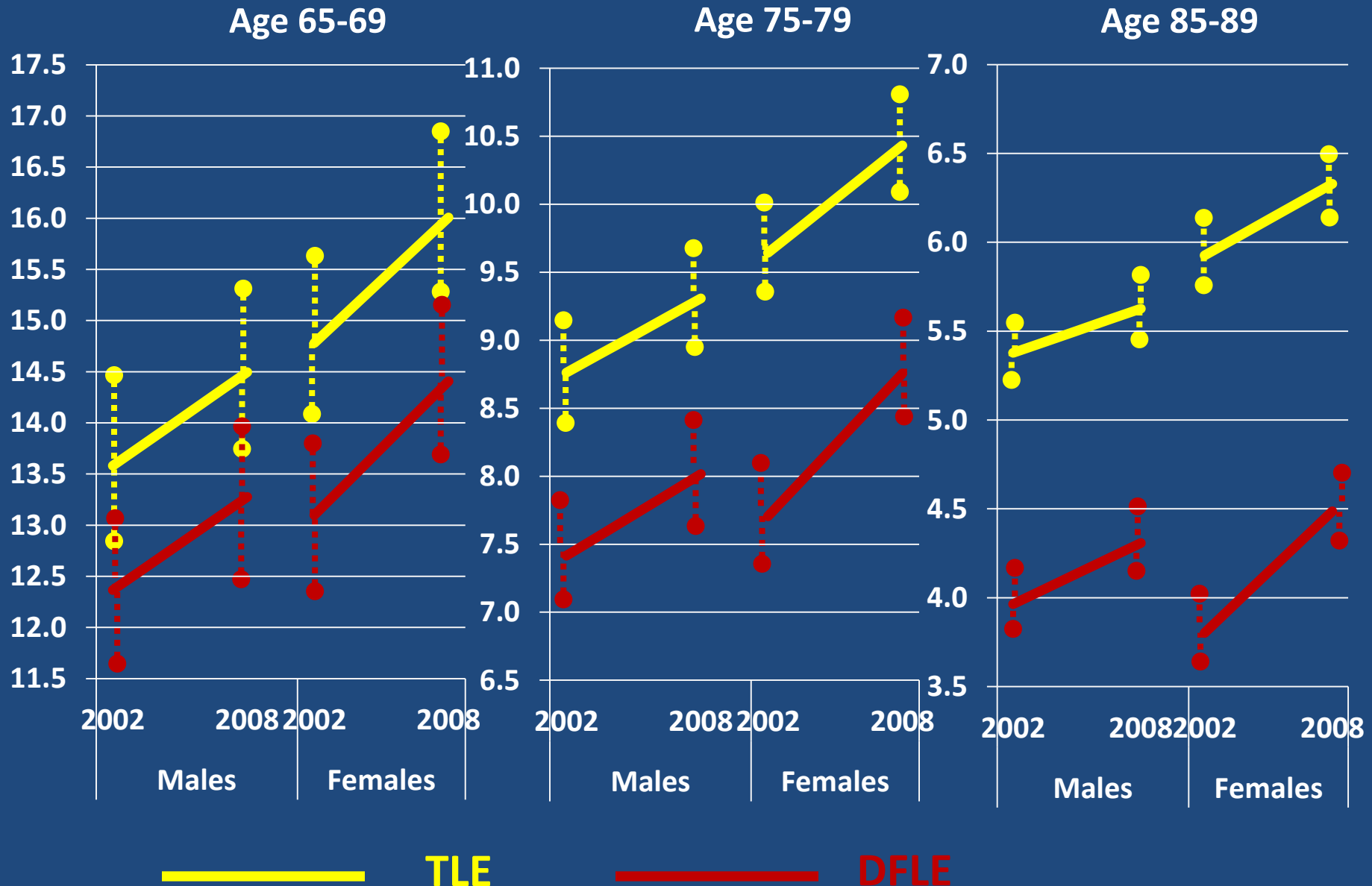
# Disability prevalence by year, sex and age



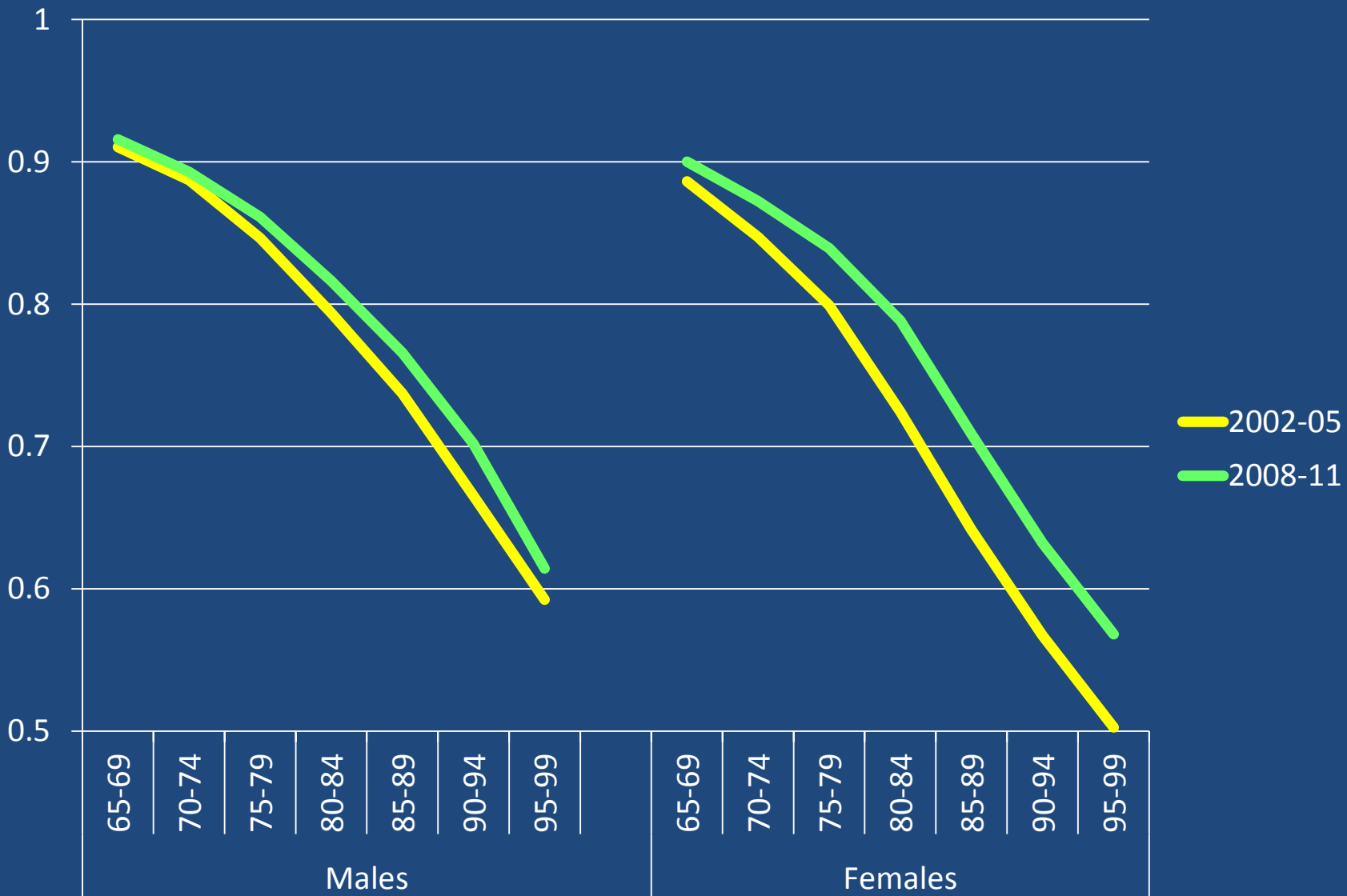
# Average annual mortality rate per 1,000 by baseline year, sex and age



# Total and disability free life expectancy estimates, and 95% CI's, for three age groups, year and sex:

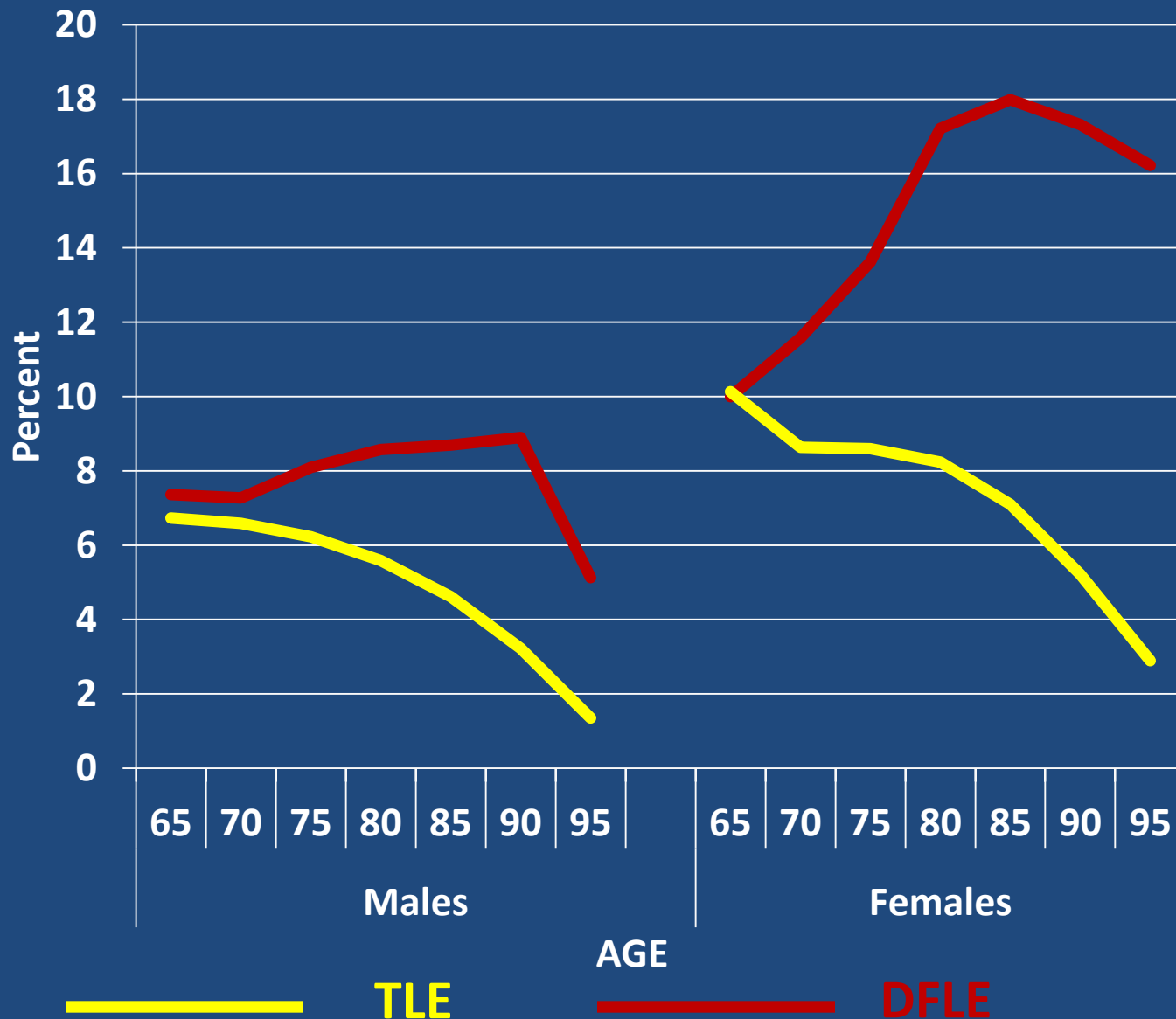


# DFLE/TLE by year, age and sex





# Percent change in TLE and DFLE, 2002-05 to 2008-11, by age and sex



**Disability prevalence, mortality, total life expectancy and disability-free life expectancy by age and sex, comparing 2002-05 to 2008-11, across four groups**

- I. Low educated / rural**
- II. High educated / rural**
- III. Low educated /urban**
- IV. High educated /urban**

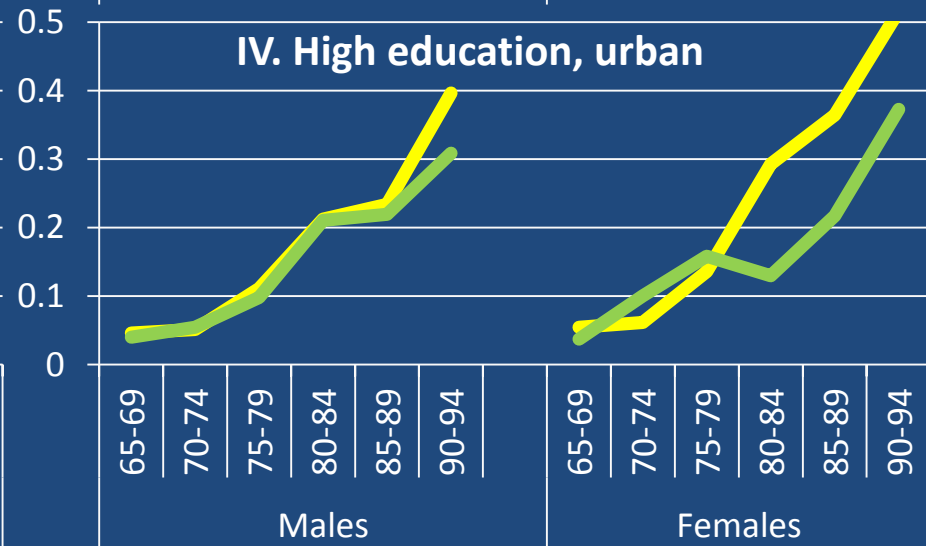
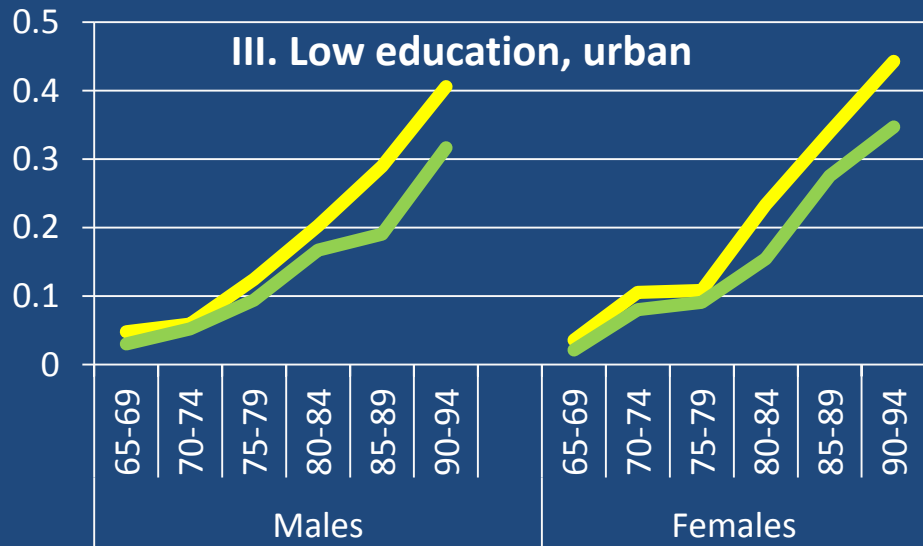
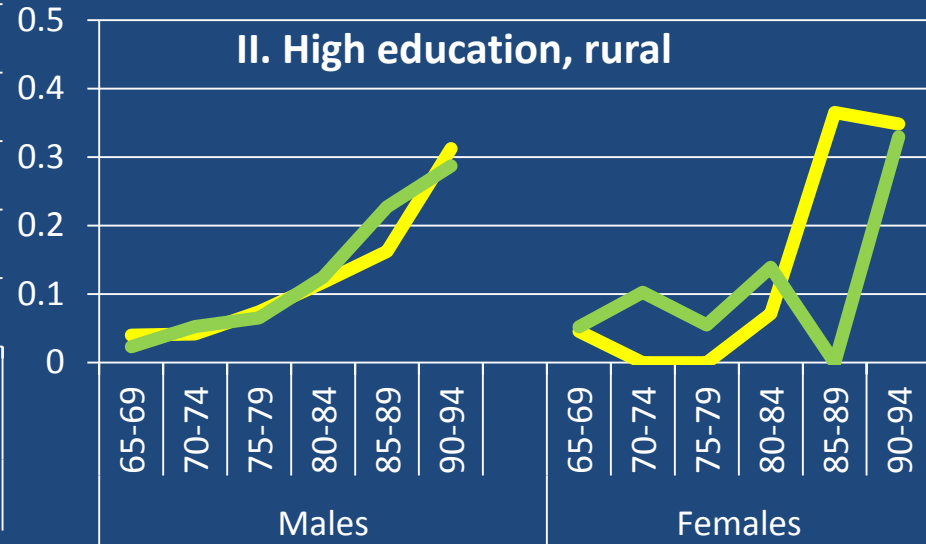
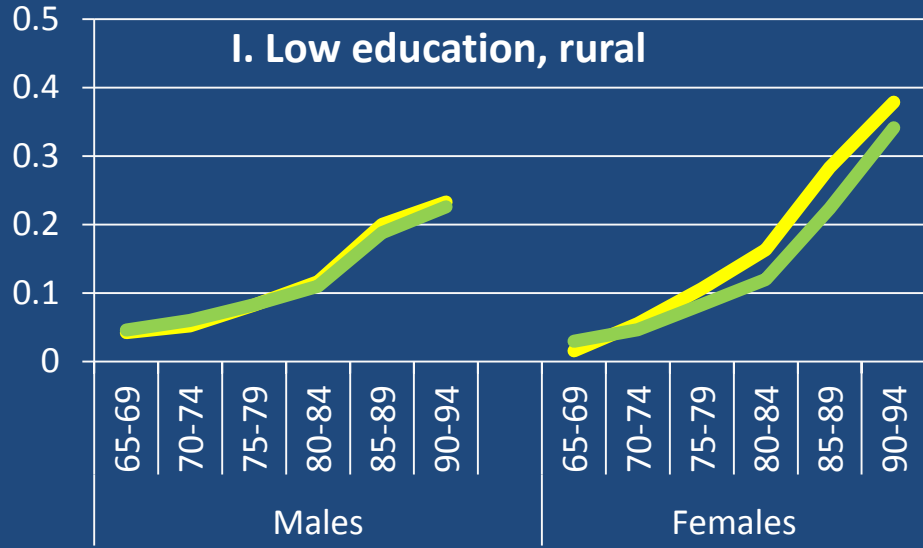
# Disability prevalence by year, sex, age, education and residence



2002-05



2008-11



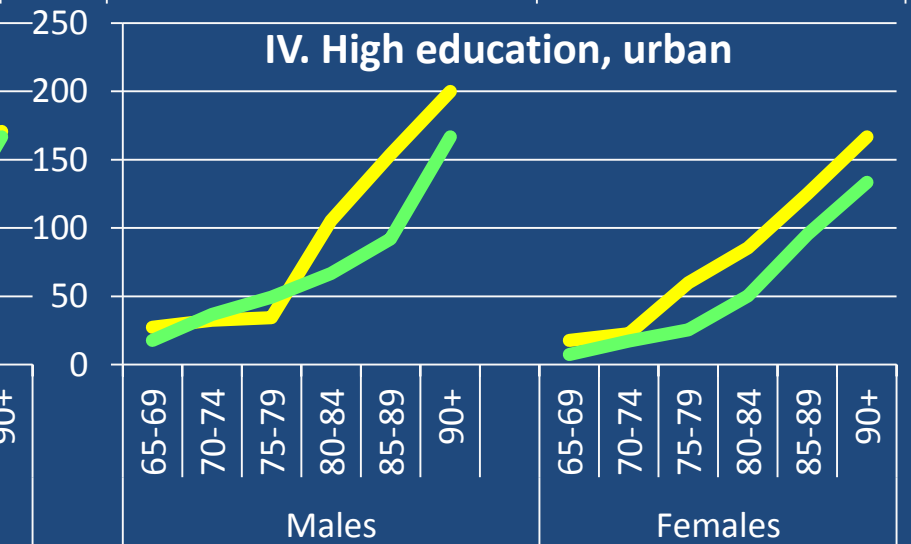
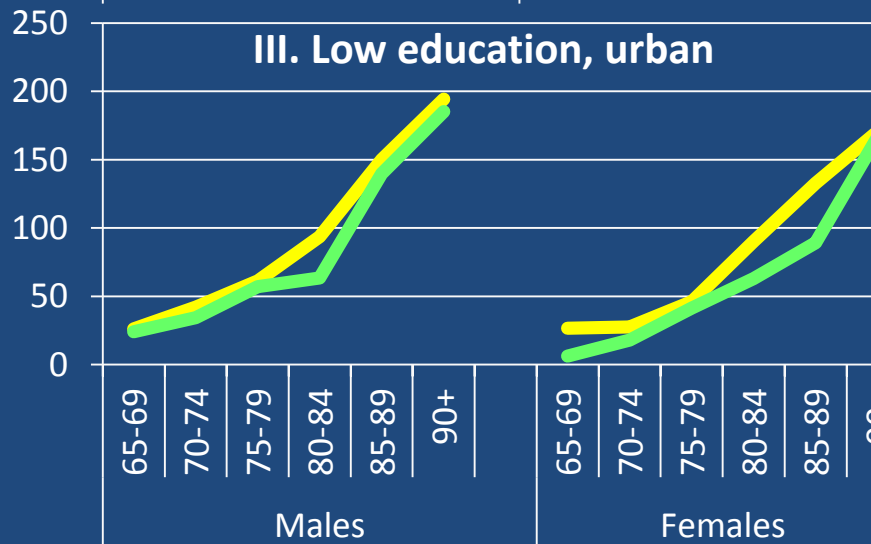
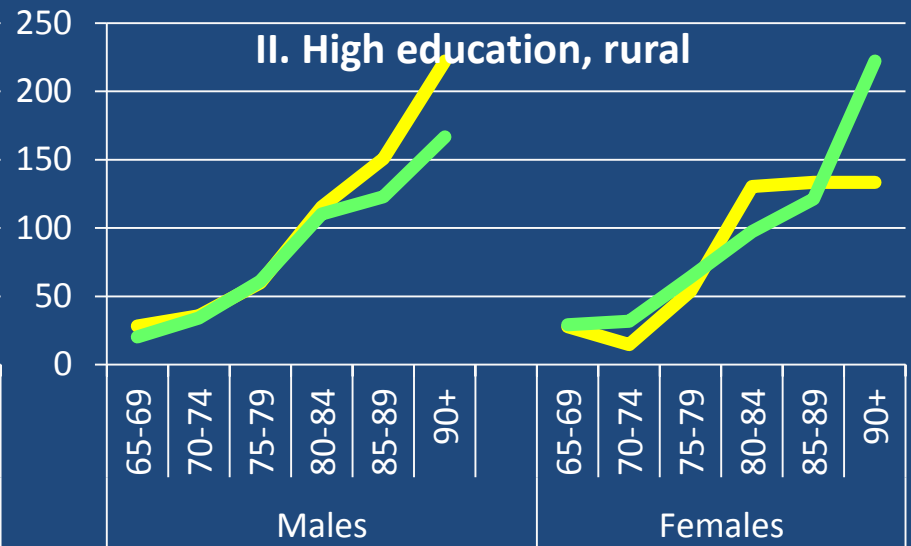
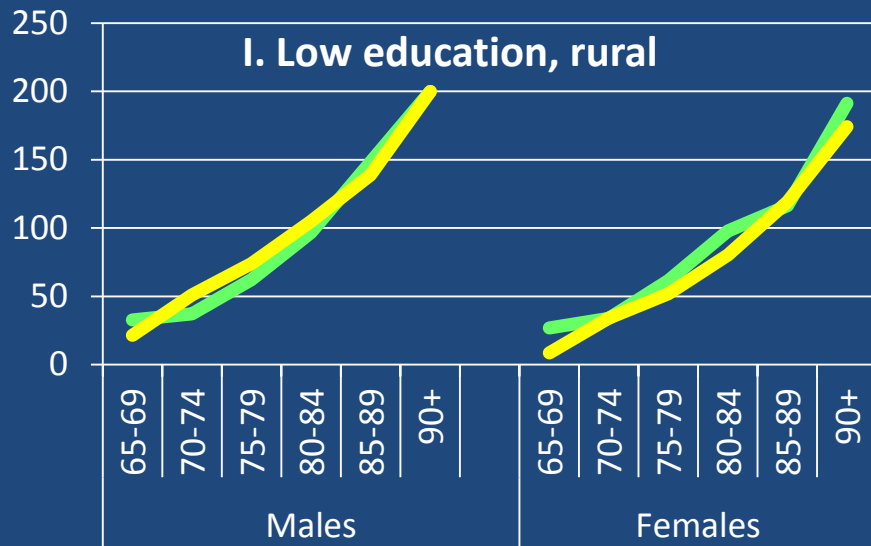
# Average annual mortality rate by year, sex, age, education and residence



2002-05

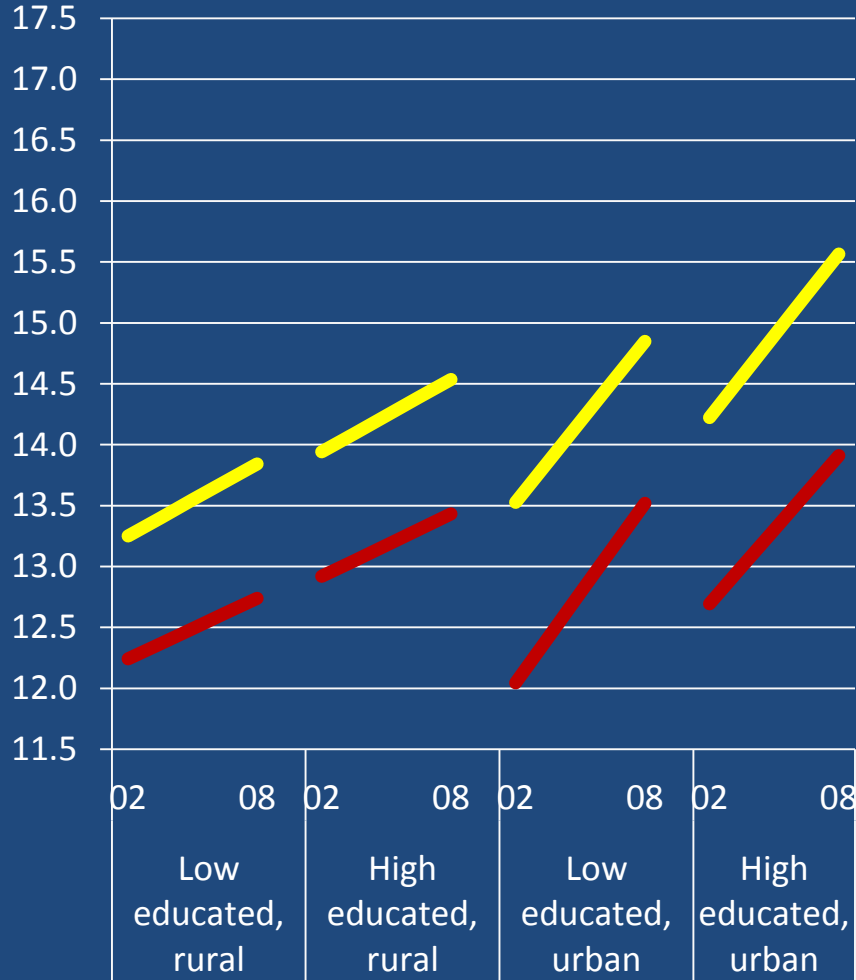


2008-11

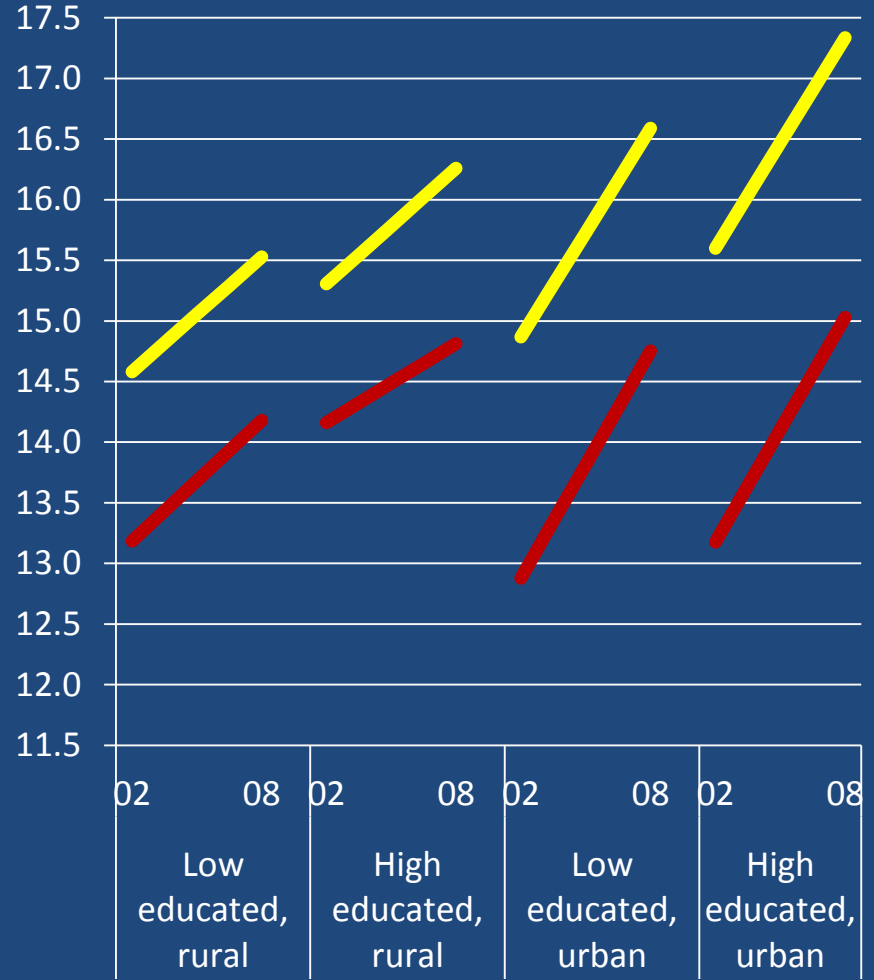


# TLE and DFLE estimates at age 65

## Males



## Females



**TLE**



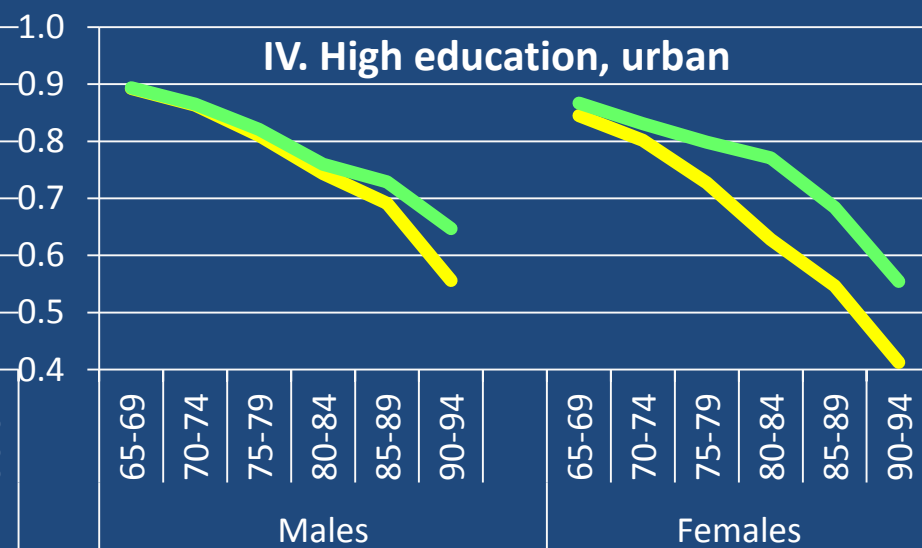
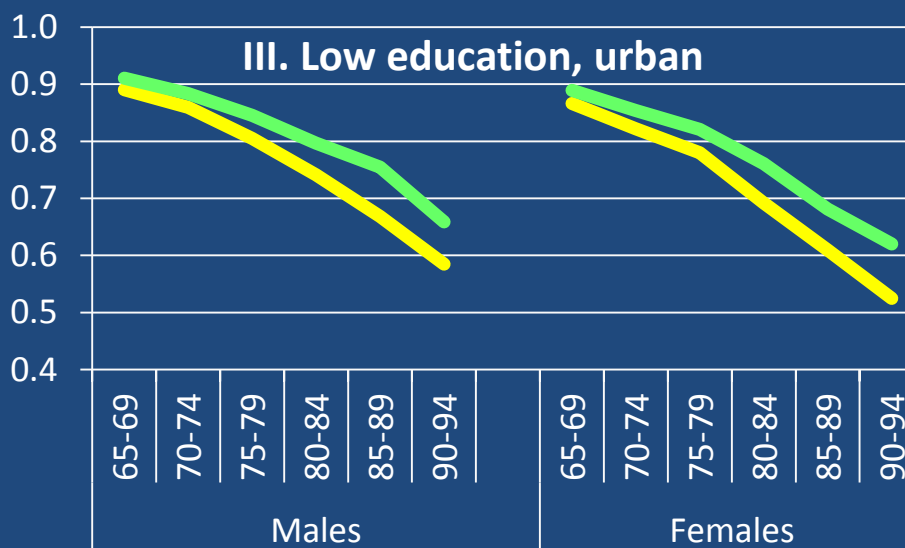
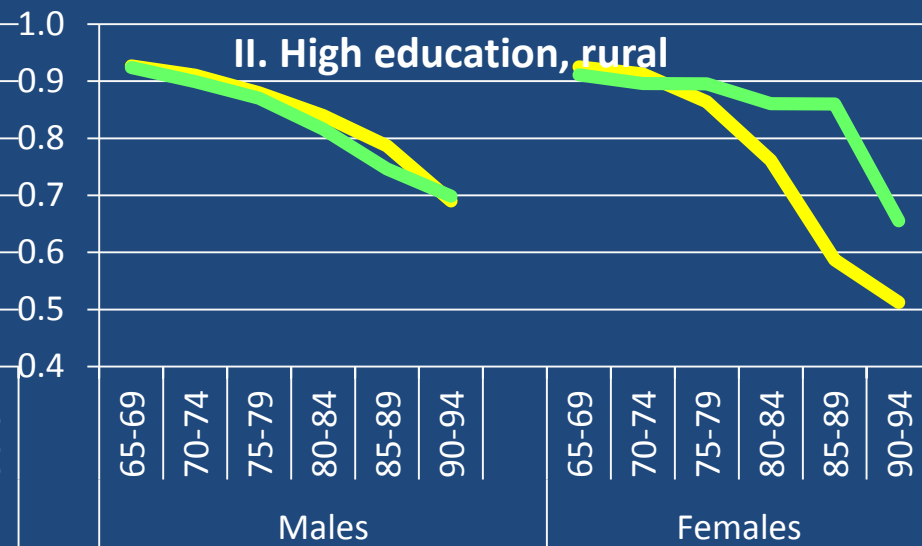
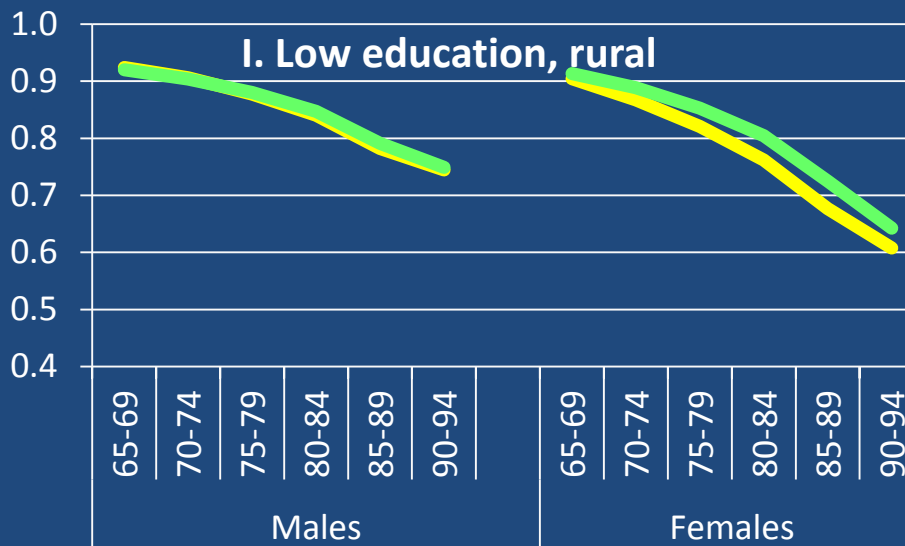
**DFLE**

# DFLE/TLE by year, sex, age, education and residence

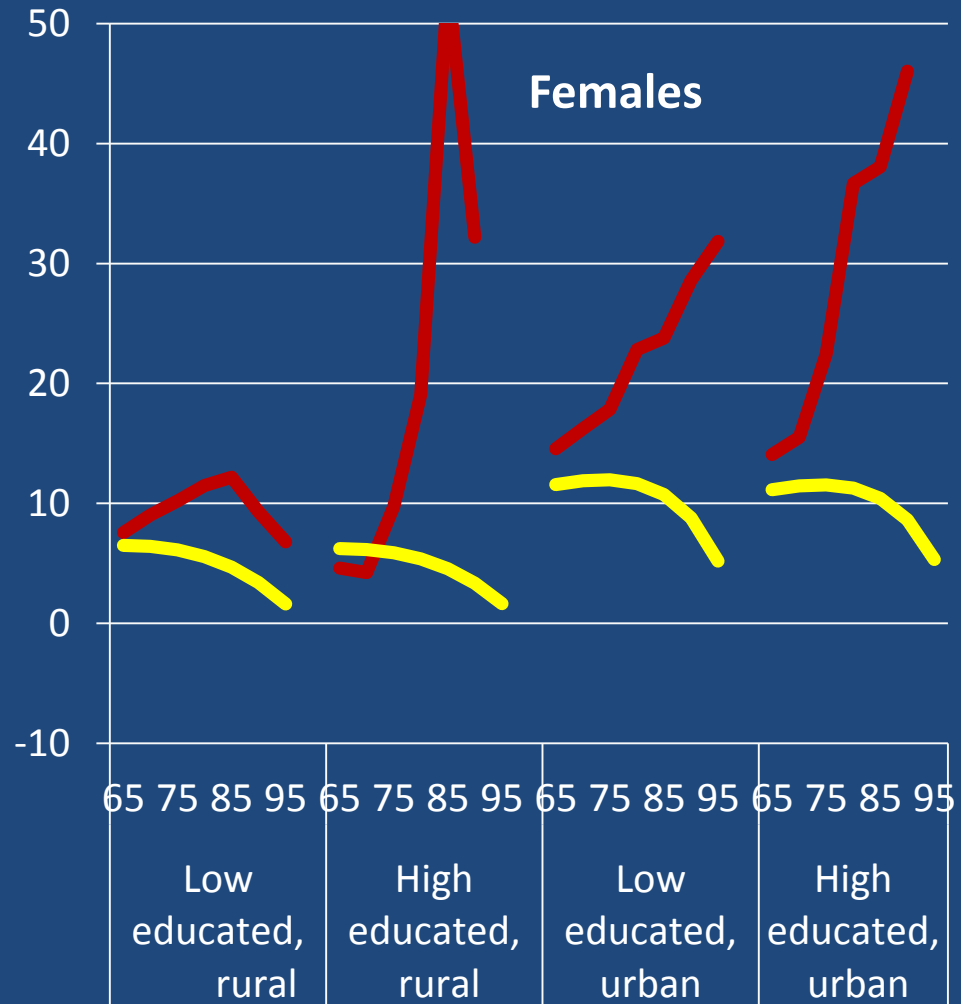
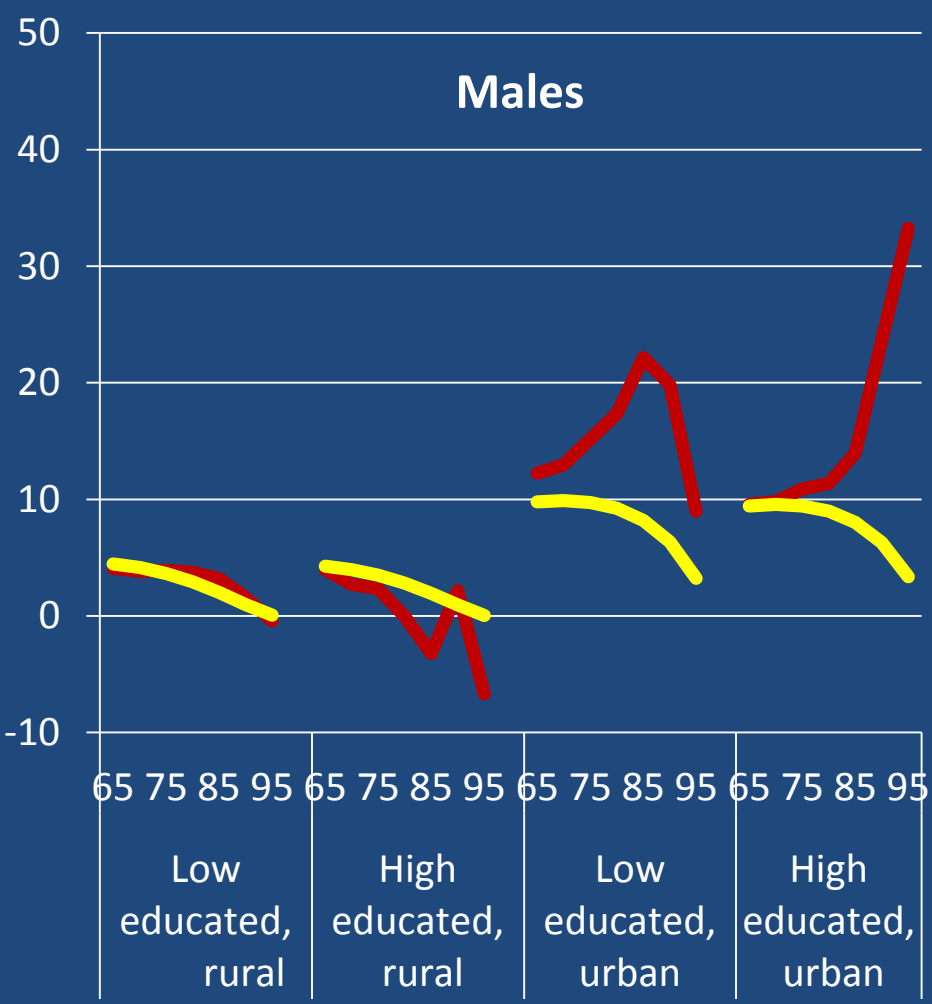
2002-05

2008-11

2008-11



# Percent change in total and disability free life expectancy from 2002 to 2008, by sex, age, education and residence



**TLE**



**DFLE**

# Conclusions

1. Overall, a compression of morbidity is seen among older persons in China.
2. The compression of morbidity is more robust for women versus men.
3. The compression of morbidity for men is concentrated among those in urban areas. For women, the compression is robust for urbanites as well.

Limitations to the study include:

- Short follow-up period
- Small N's for educated females
- Loss to follow up means mortality likely underestimated