A Dynamic Study of Independent Living Life Expectancy among Very Old Chinese

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Percent of those 65+ living in four arrangements, 2005 CLHLS data

Arrangement	Percent
Independent	31.2
Co-residing with children	64.1
Other family	1.9
Institutions	2.7

Table 1 from Sereny, M. (2011). Living arrangements of older adults in China: the interplay among preferences, realities, and health. *Research on Aging, 33*(2), 172-204

A selection of papers exploring causes and consequences of independent living

Author(s)	Year	*Journal*
Beydoun & Popkin	2005	*Social Science & Medicine*
Chen	2005	*Population Research and Policy Review*
Chen, Liu & Mair	2011	*Social Forces*
Chen & Short	2008	*Journal of Family Issues*
Cong & Silverstein	2010	*Family Science*
Korinek, Zimmer & Gu	2010	*Journal of Gerontology: Social Sciences*
Li, Zhang & Liang	2009	*Social Science & Medicine*
Logan & Bian	1999	*Social Forces*
Silverstein	1995	*Demography*
Silverstein & Angelelli	1998	*Journal of Gerontology: Social Sciences*
Silverstein, Cong & Li,	2006	*Journal of Gerontology: Social Sciences*
Zeng & Wang	2003	*The China Review*
Zimmer & Korinek	2010	*Demography*
Zimmer & Kwong	2003	*Demography*

Macro-level forces can trigger changes in living arrangements

- Demographic
- Socioeconomic
- Globalization
- Nature of labour
- Shifts in values and norms

As a result, older persons in China are more likely to be living independently.

https://www.aarp.org/home-family/friends-family/info-2018/adults-live-with-children-fd.html

Micro-level forces can trigger shifts in living arrangement

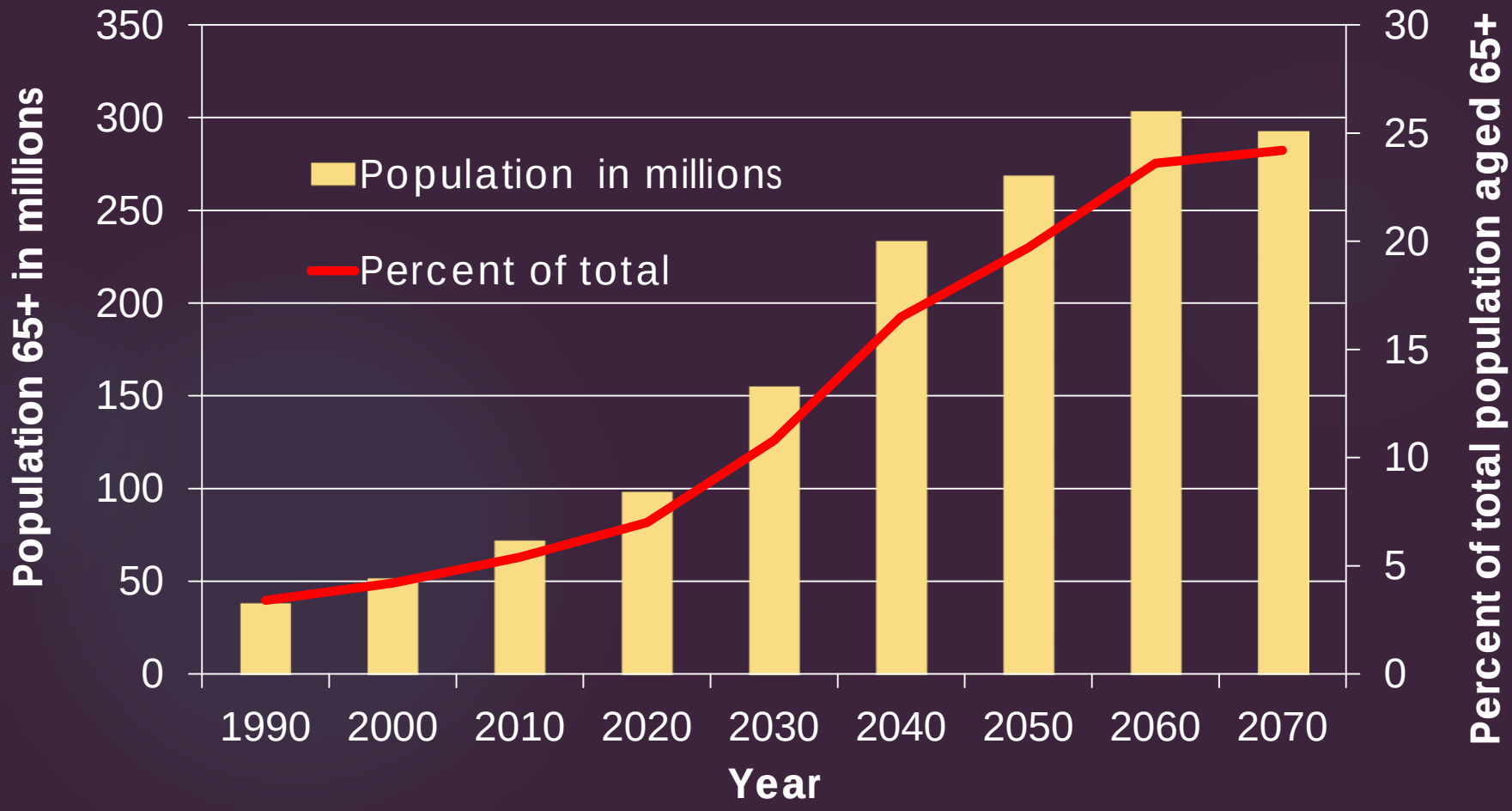
Zimmer and Korinek (2010) suggest among those living independently in poor health, over 35% move to coresidence within one year.

Predictors of shift include: age, sex, marital status, disability

Very old (80+) especially vulnerable to shifts.

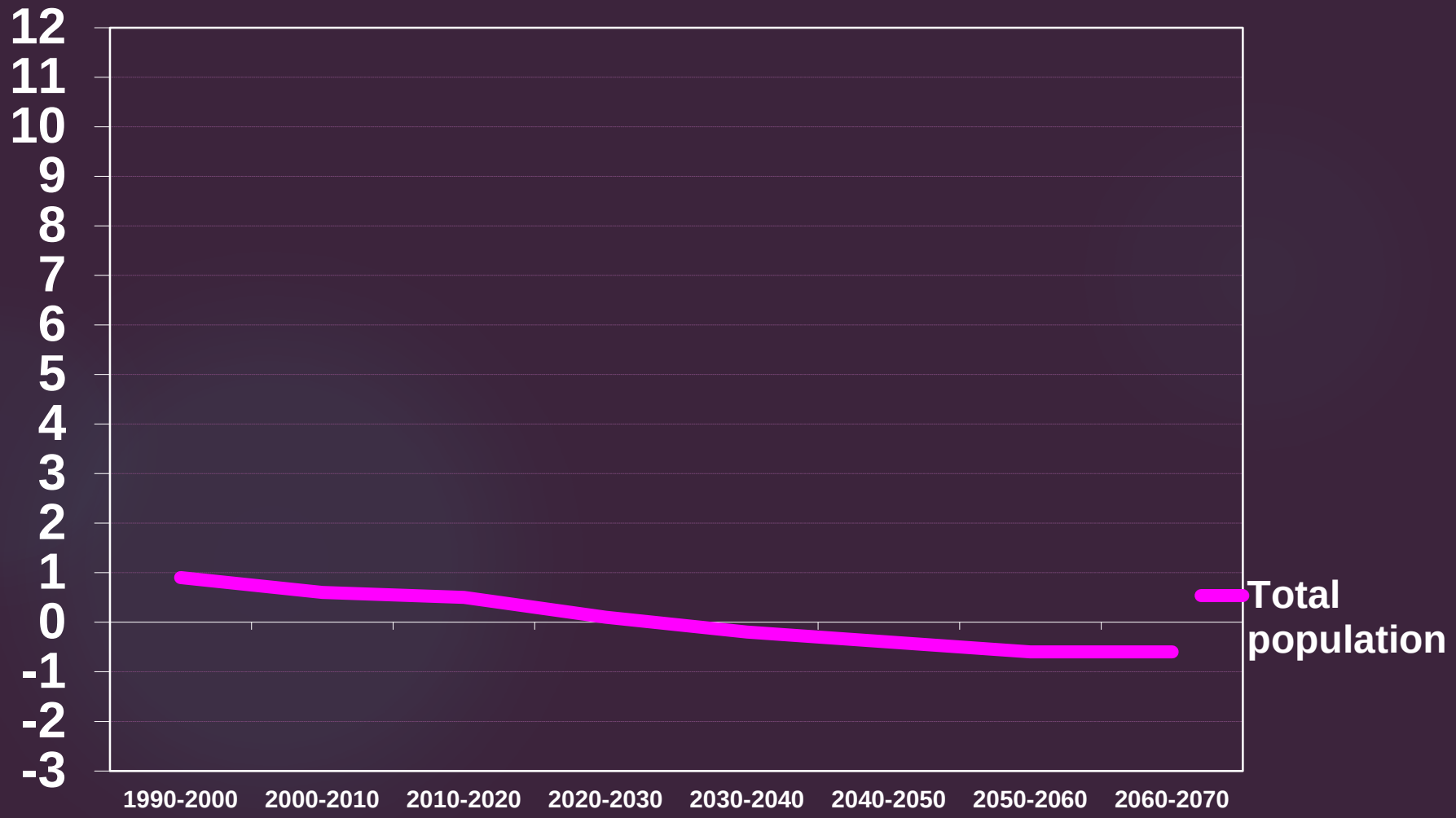
China's demographic transformation

Population aged 70+ in China, 1990 to 2070



China's demographic transformation

Average annual percent growth of China's population, 1990-2070



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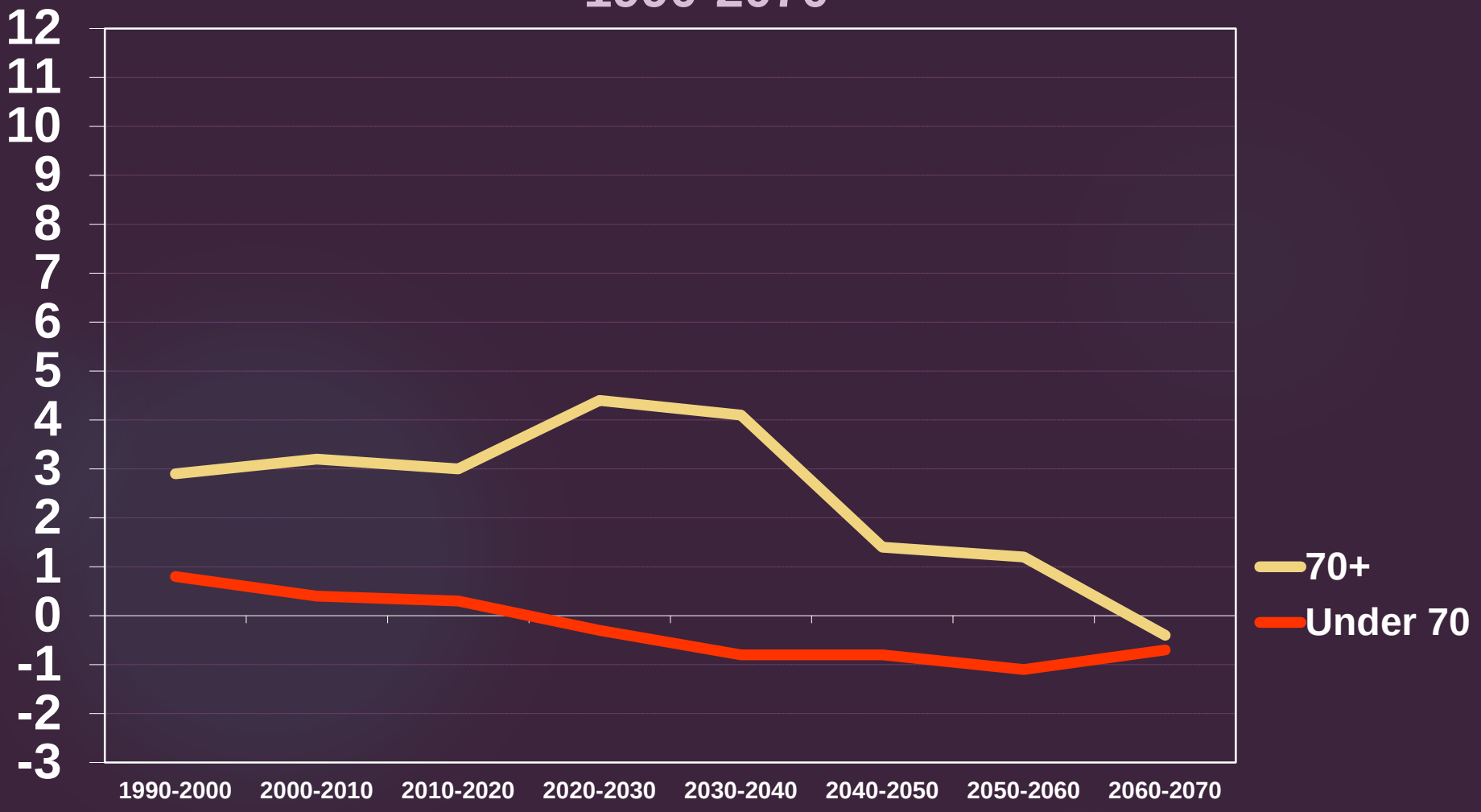

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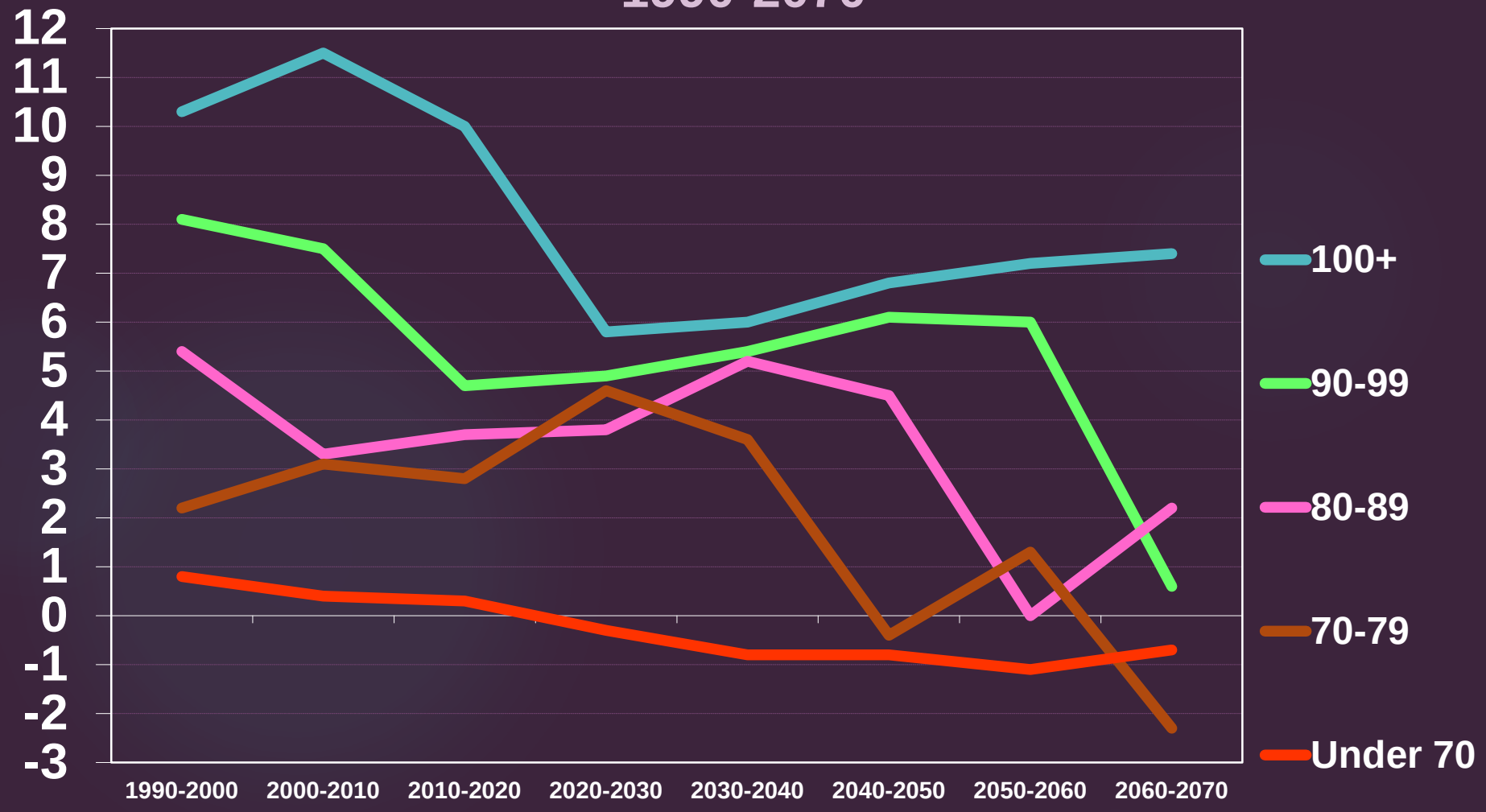
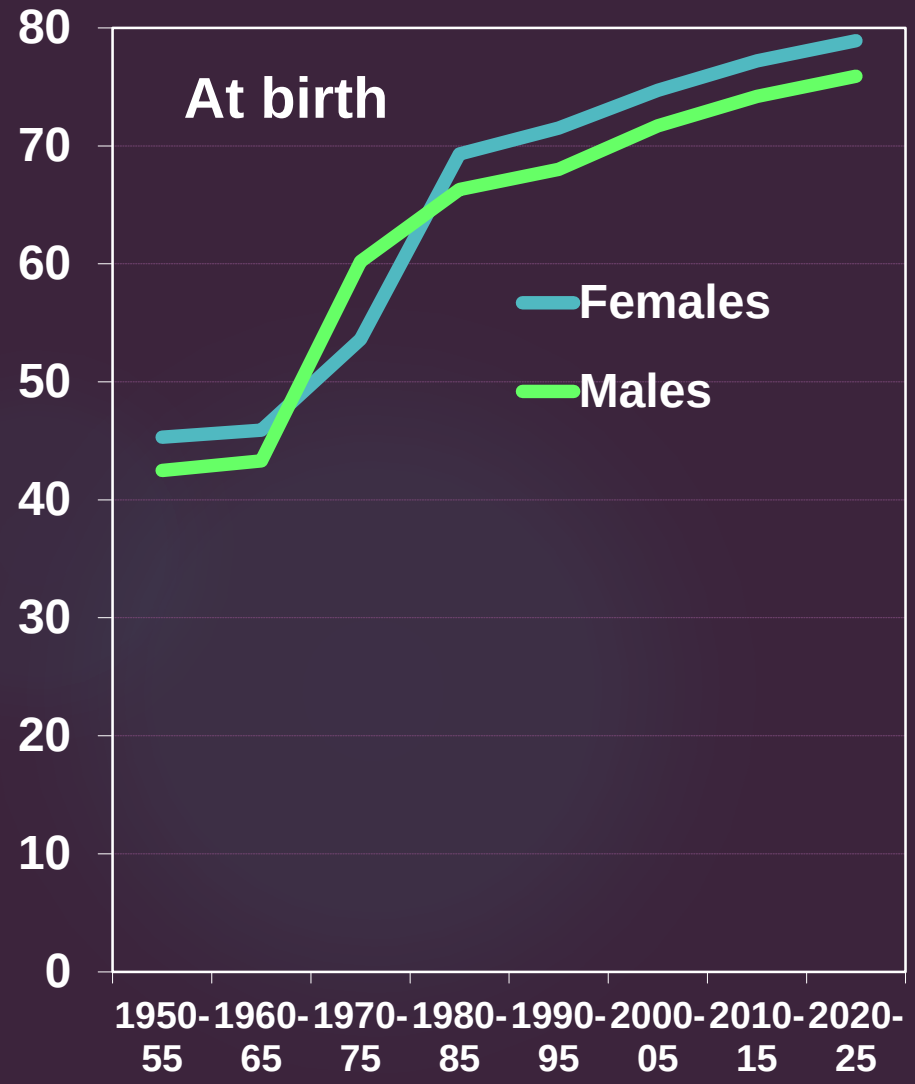
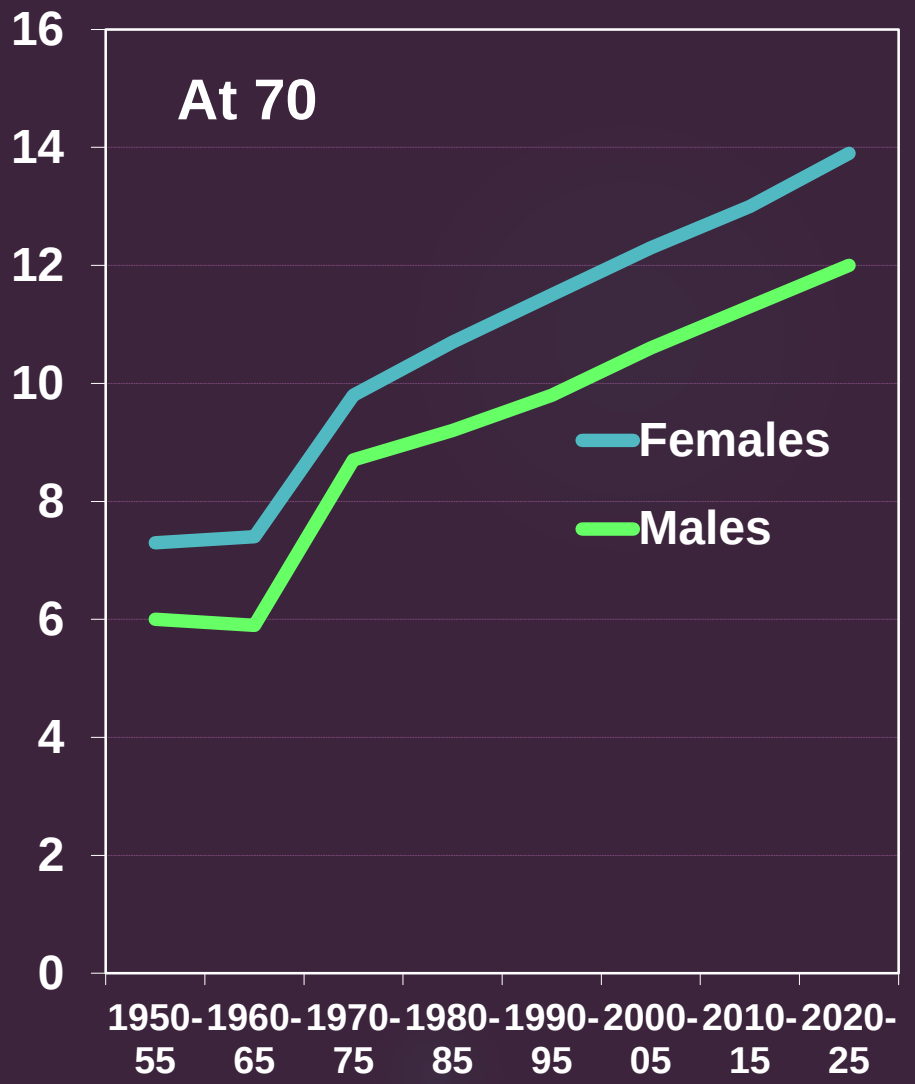


China's demographic transformation

Change in life expectancy at birth and at age 70





Current study

- Investigate years of life old and extremely old expect to live independently.
- Looking at years of life has advantages, e.g., juxtapose changes in longevity with changes in living arrangements.
- Life expected is a good strategy for dealing with outcomes that are subject to frequent shifting.

Research questions

- Are older people in China living more years independently?
- Are older people living a greater proportion of life independently?
- Among who is independent living increasing? That is, is the change sensitive to age, sex, marital status and disability?

Independent Living Life Expectancy

*** Total Life Expectancy (TLE): Total years a person of a given age can expect to live.**

*** Independent Living Life Expectancy (ILLE): Total years a person of a given age can expect to live *alone or with spouse only.***

*** These numbers calculated using a multistate life table technique.**

Data

China Longitudinal Healthy Longevity Study

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

Longitudinal panel data

Baseline (T1) → **Follow-up (T2)**

Two times periods:

Independent living

Survival status

Ag

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	Baseline	Follow-up
1st Wave	2002	2005
2nd Wave	2011	2014

Sample

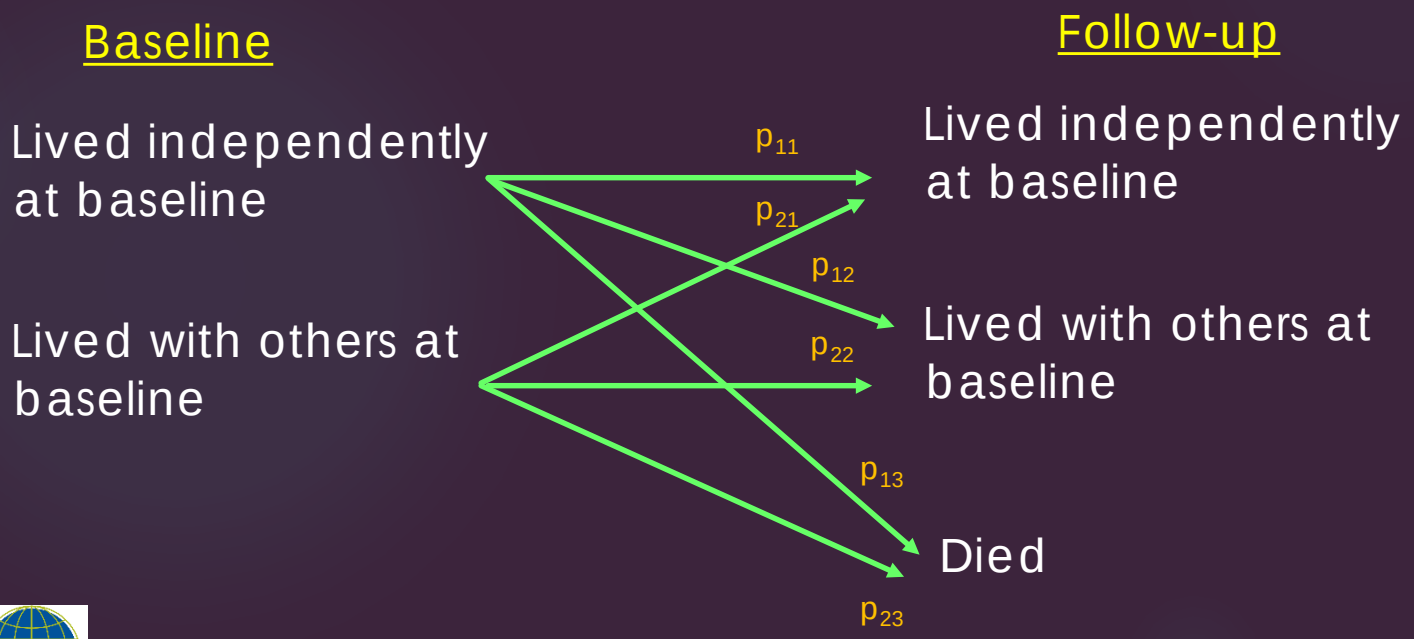
Total sample size =19,967

	2002-05		2011-14	
	Female	Male	Female	Male
Septuagenarians	1,372	1,415	1,066	1,186
Octogenarians	1,849	1,868	1,198	1,205
Nonagenarians	1,909	1,383	1,280	939
Centenarians	1,964	544	609	180

- **Estimation technique: Stochastic Population Analysis of Complex Events (SPACE)**

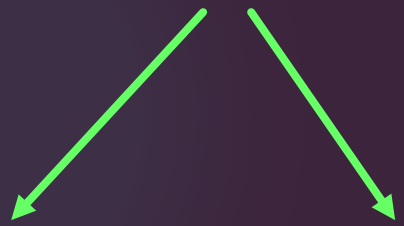
- **2-step procedure:**

1st step = Multinomial logistic regression derives transition probabilities



Model

$LN\theta_{a \rightarrow z}$=
a+ age + married + disabled
+ (age X disabled) + (age X married) + (disabled X married)
+ rural/urban + # children + education



Males Females

Estimation step 2

Estimated transition probabilities become input into multistate life tables that divide TLE into living arrangement states

Current Age	survivors	deaths	% survivors	% deaths	Midpoint		Expectancy	Age + expectancy
X	n	d	l	q	L	T	e	
0	101	3	1.00	0.03	0.99	8.78	8.78	8.78
1	98	0	0.97	0.00	0.97	7.79	8.03	9.03
2	98	1	0.97	0.01	0.97	6.82	7.03	9.03
3	97	3	0.96	0.03	0.95	5.86	6.10	9.10
4	94	3	0.93	0.03	0.92	4.91	5.28	9.28
5	91	4	0.90	0.04	0.88	4.00	4.43	9.43
6	87	6	0.86	0.07	0.83	3.11	3.61	9.61
7	81	5	0.80	0.06	0.78	2.28	2.85	9.85
8	76	20	0.75	0.26	0.65	1.50	2.00	10.00
9	56	20	0.55	0.36	0.46	0.85	1.54	10.54
10	36	24	0.36	0.67	0.24	0.40	1.11	11.11
11	12	6	0.12	0.50	0.09	0.16	1.33	12.33
12	6	3	0.06	0.50	0.04	0.07	1.17	13.17
13	3	2	0.03	0.67	0.02	0.02	0.83	13.83
14	1	1	0.01	1.00	0.00	0.00	0.50	14.50
15	0	0	0.00		0.00	0.00		
		101						

Analytical strategy

Define an expansion of independent living which occurs if:

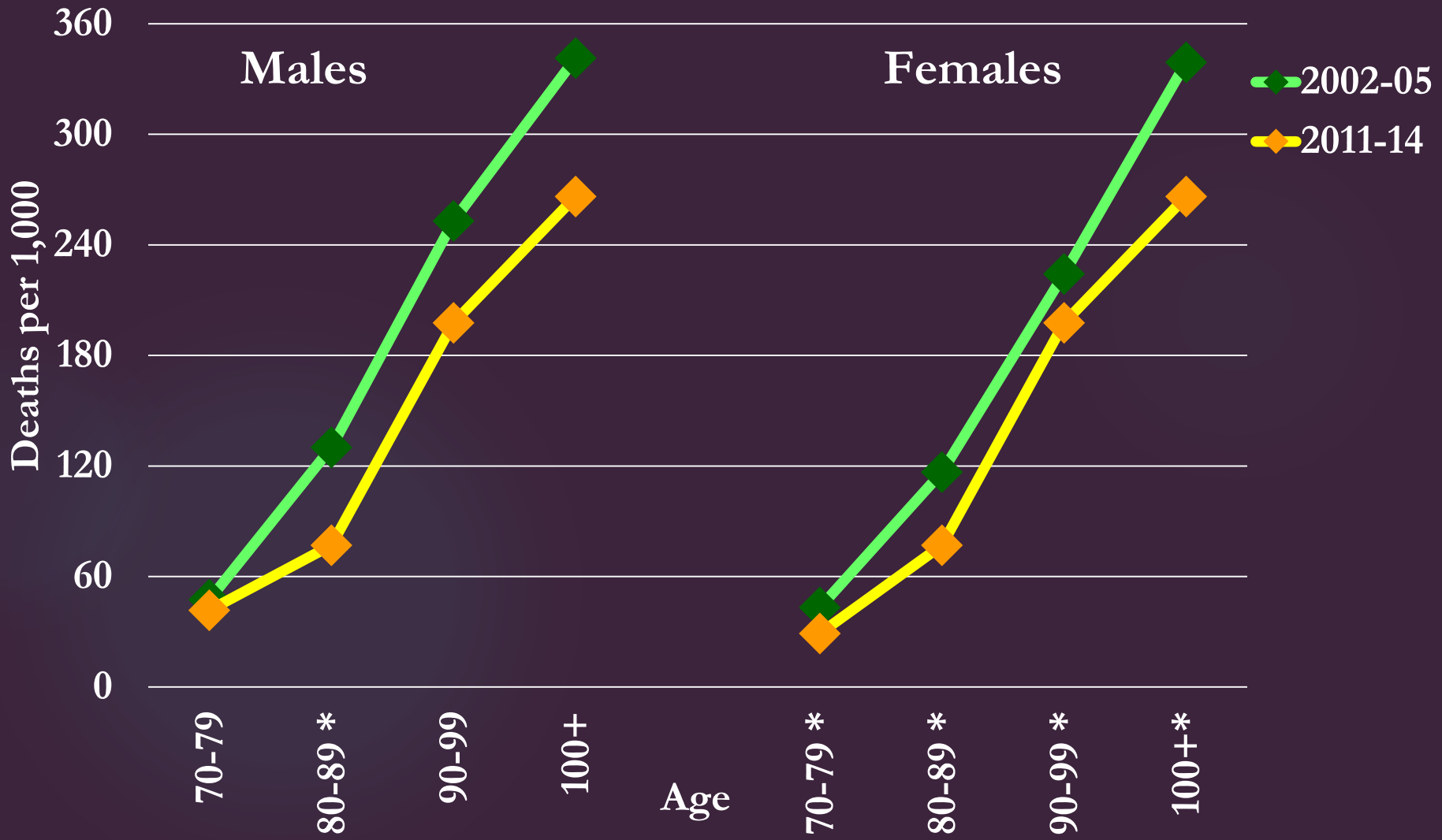
a. There is an increase in ILLE
b. The ratio ILLE / TLE increases over time

First analysis is by age and sex.

Second analysis adds disability and marital status.

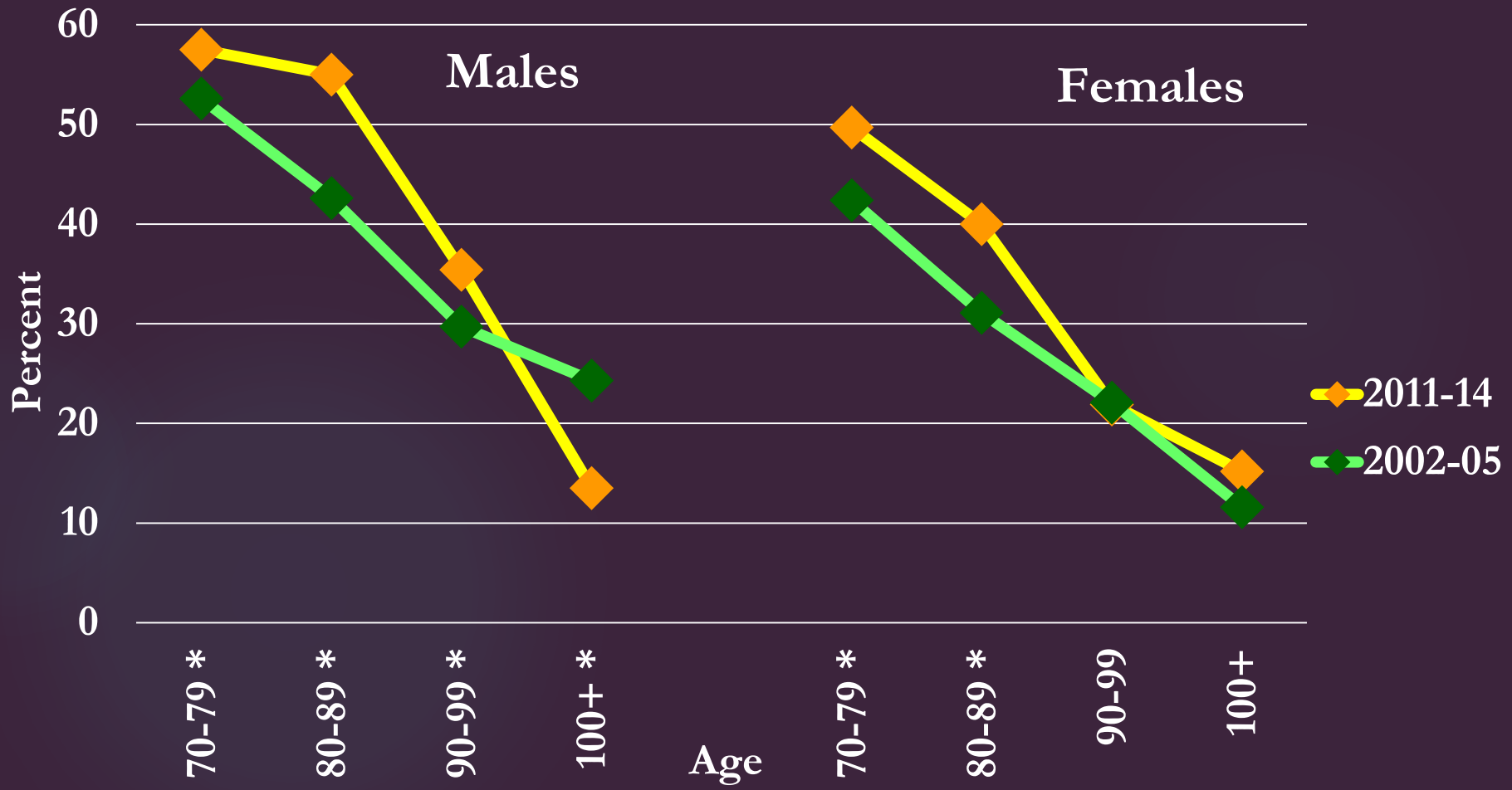
Descriptive results

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



* Change over time statistically significant

Percent living independently by period, age and sex



* Change over time statistically significant

Summarizing

1. Mortality in China has declined.

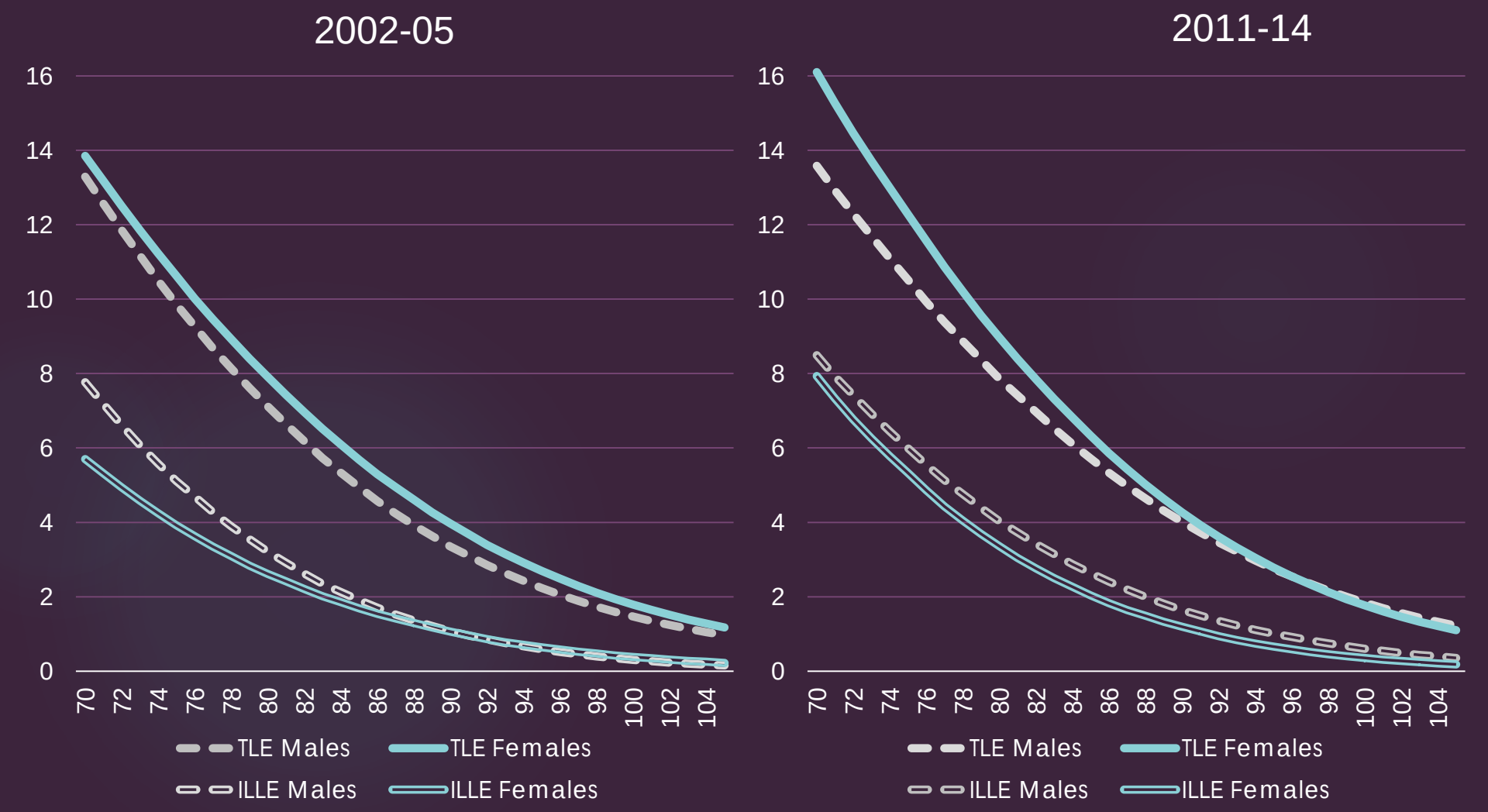
2. The proportion living independently has increased.

3. Males are more likely to be living independently

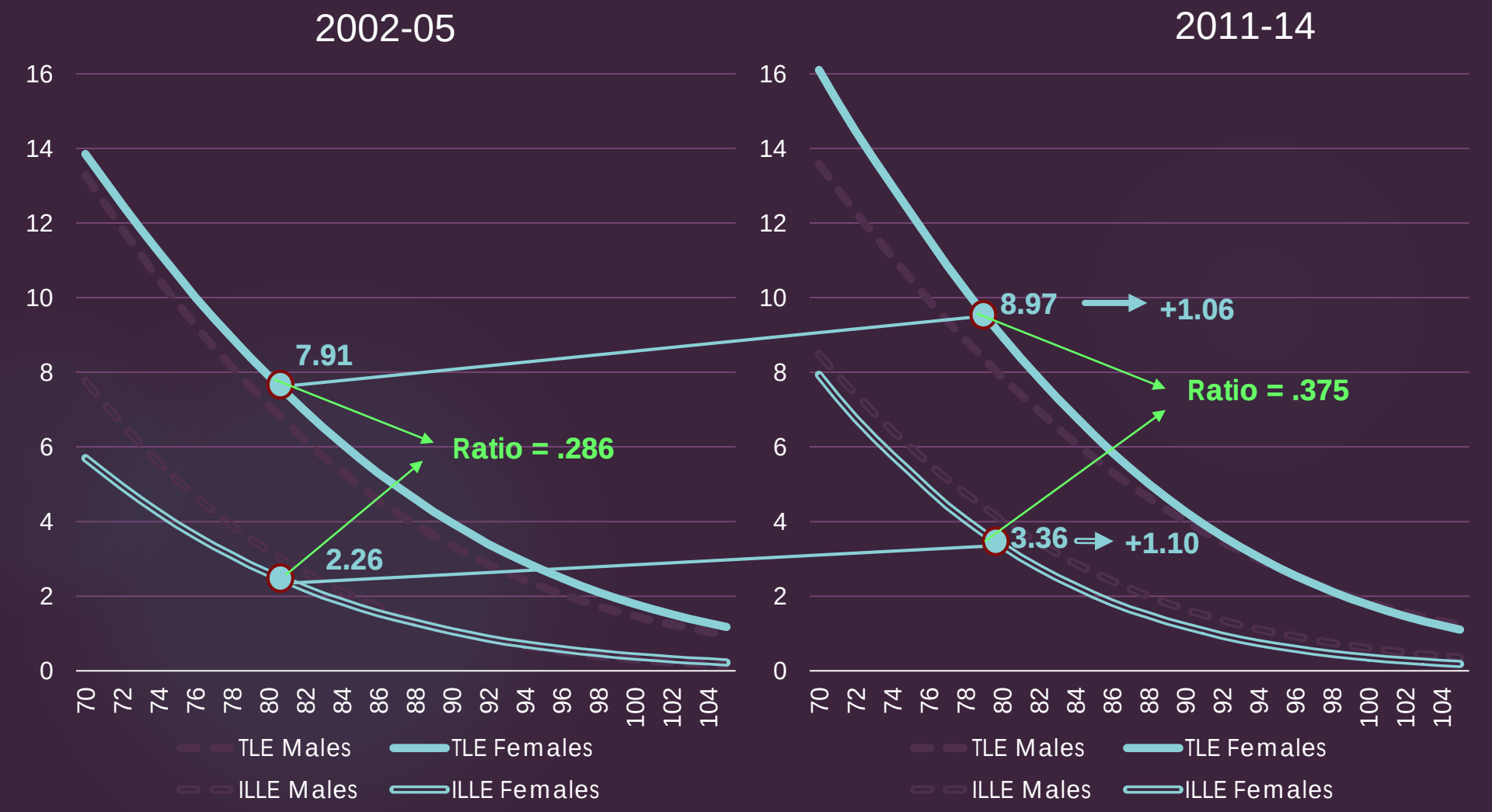
4. The oldest of the old are least likely to be living independently.

TLE and ILLE
by period, age and sex

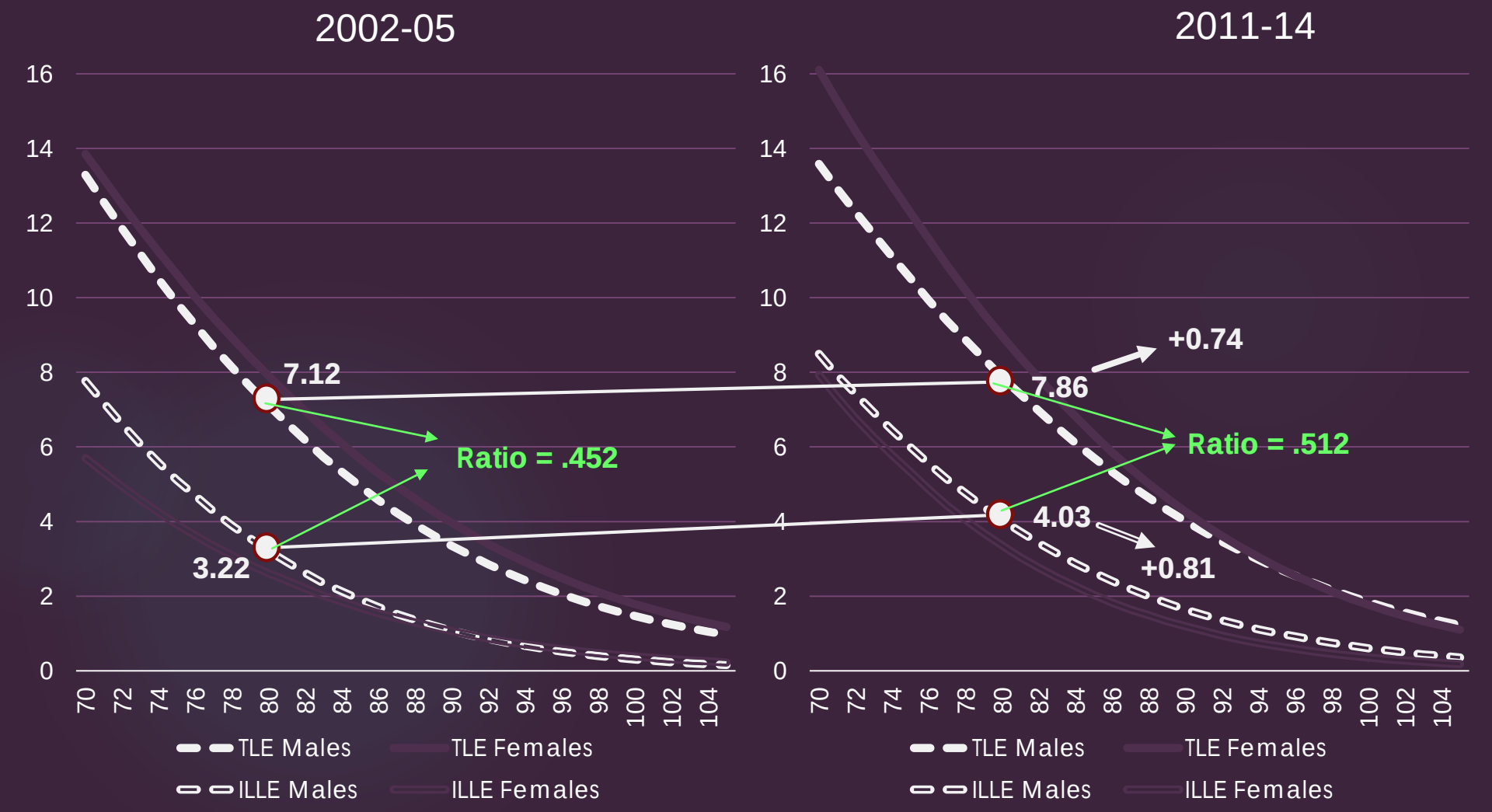
Total (TLE) and independent living (ILLE) life expectancy by period, age and sex



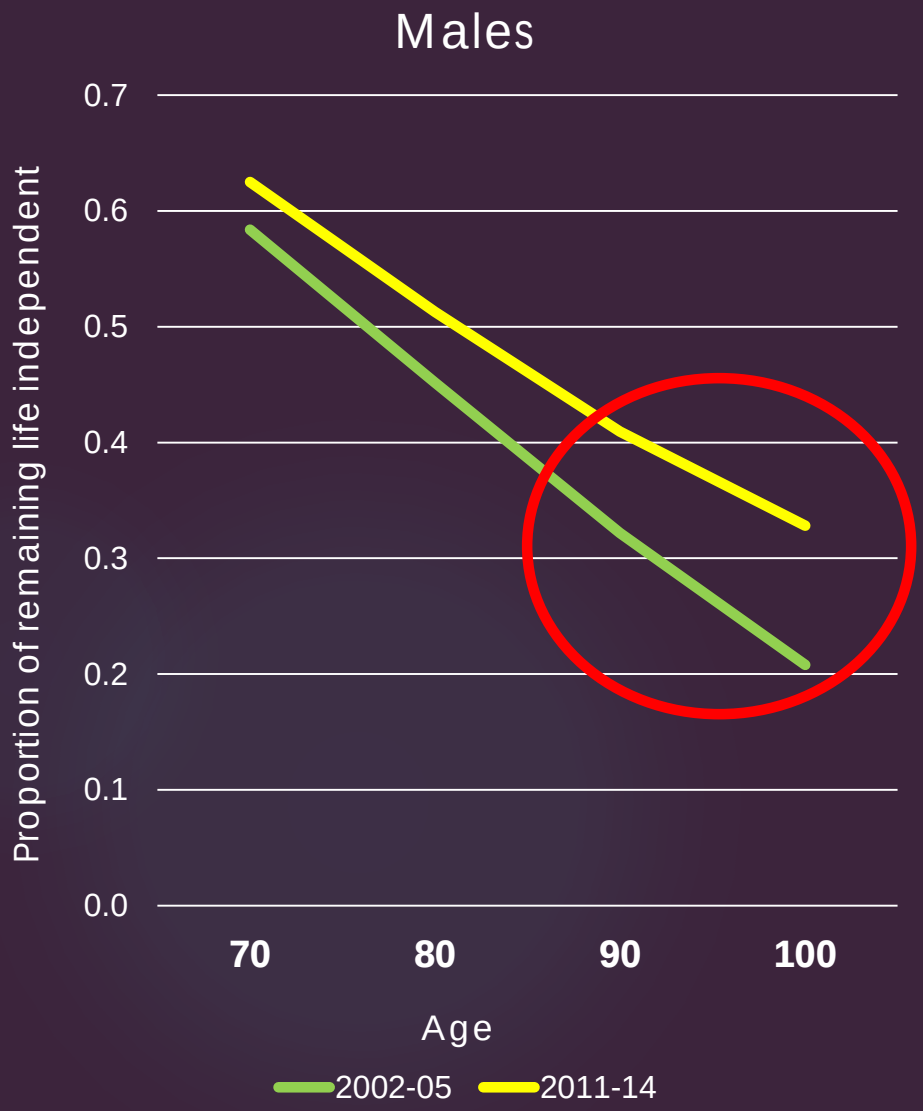
Total (TLE) and independent living (ILLE) life expectancy by period and age, females

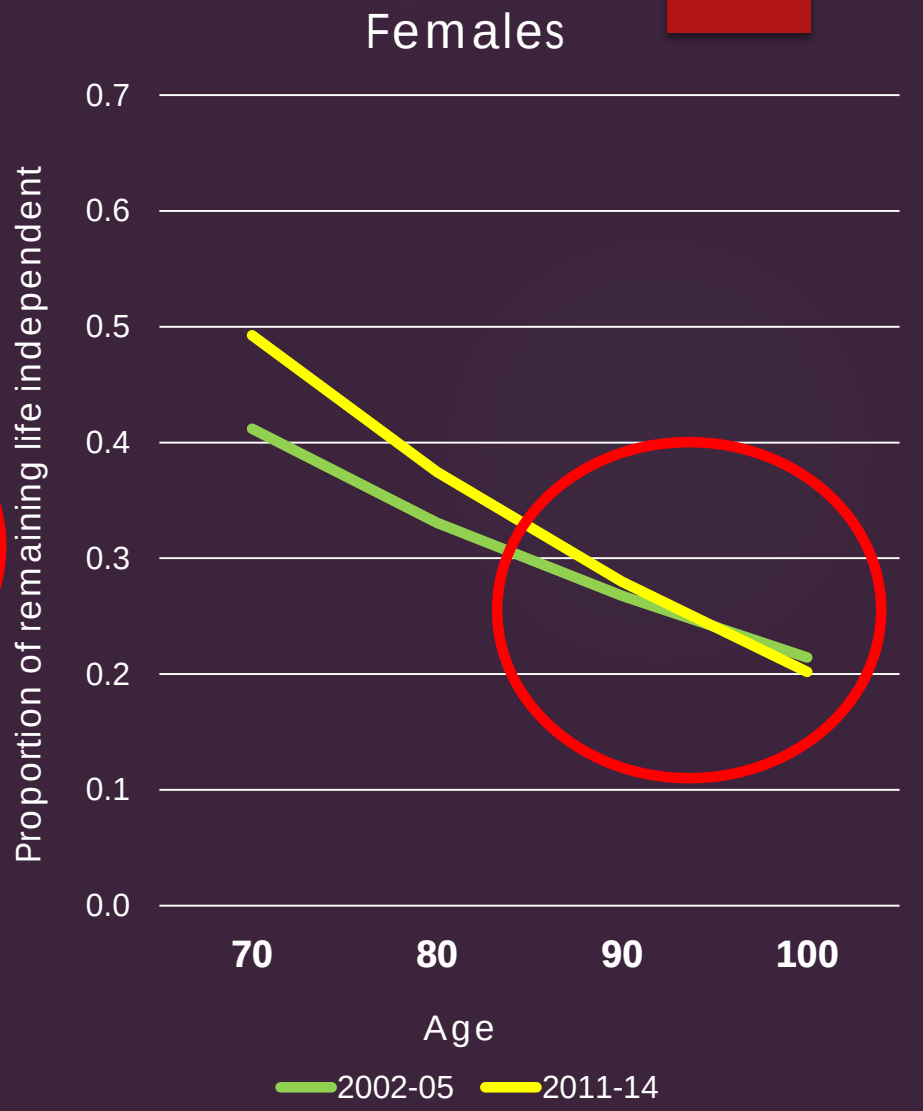


Total (TLE) and independent living (ILLE) life expectancy by period, age, males



Ratio of ILLE/TLE at select ages, by sex and period





Summarizing

1. Older Chinese, have experienced increases in ILLE.

2. The ratio of ILLE/TLE has increased, meaning there has been an expansion of life lived independently.

3. The expansion has been greatest for the oldest men (nonagenarians+).

4. For extremely old women, increases in ILLE proportionately match increases in TLE

Comparing results across four groups:

I. Non disabled/ Married (ND/Marr)
II. Non disabled / Not married (ND/NM)
III. Disabled / Married (Disab/Marr)
IV. Disabled / Not married (Disab/NM)

Total (TLE) and independent living (ILLE) life expectancy estimates at age 80

ND/ Marr	2002-05	2011-14	Net change
Males			
TLE	8.31	9.42	+1.11
ILLE	4.56	5.82	+1.26
Ratio	.549	.618	+.069
Females			
TLE	8.27	9.89	+1.62
ILLE	3.79	4.67	+0.88
Ratio	.458	.472	+.014

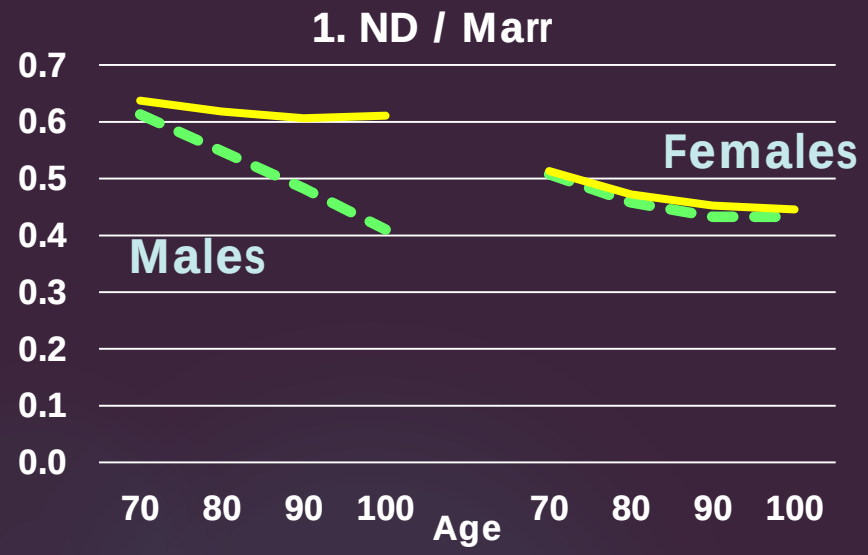
ND/ NM	2002-05	2011-14	Net change
Males			
LE	7.10	8.50	+1.40
LLE	2.44	3.00	+0.56
atio	.344	.353	+.009
Females			
LE	9.10	10.30	+1.20
LLE	2.81	3.43	+0.62

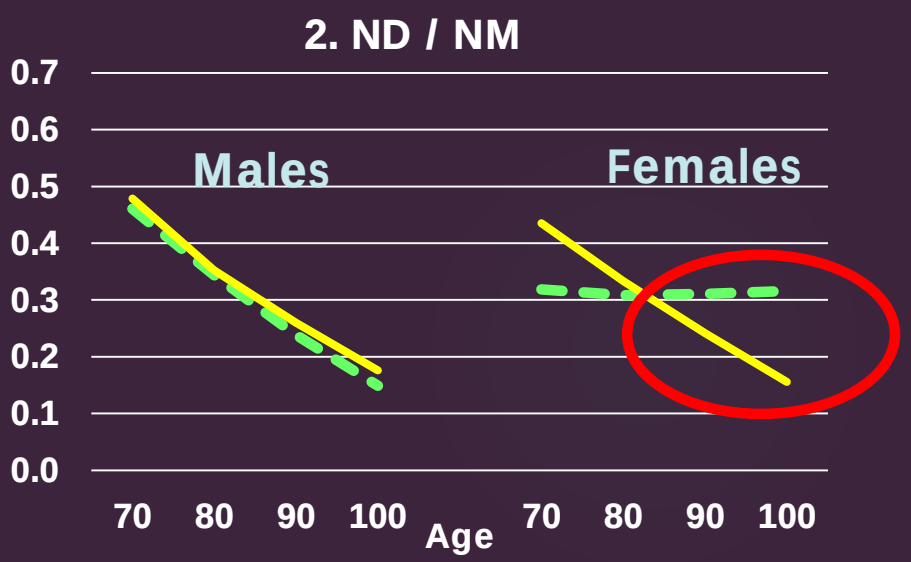
[illegible]	2002-05	2011-14	Net change
Males			
TLE	4.84	4.27	-0.57
ILLE	2.07	2.51	+0.44
Ratio	.428	.588	+.160
Females			
TLE	6.57	7.27	+0.70
ILLE	2.87	3.72	+0.85
Ratio	.437	.512	+.075

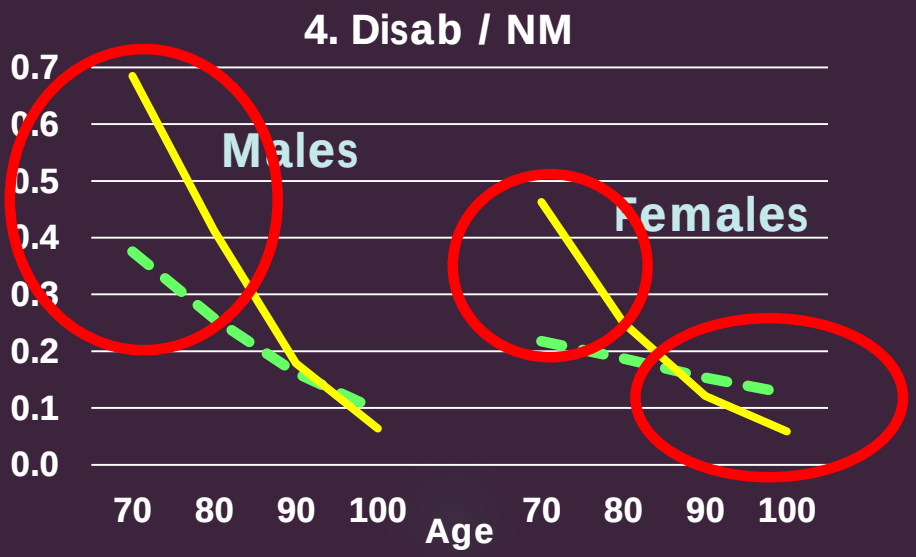
Disab / NM	2002-05	2011-14	Net change
Males			
TLE	3.70	3.74	+0.04
ILLE	0.95	1.54	+0.59
Ratio	.257	.418	+.161
Females			
TLE	5.32	5.08	-0.24
ILLE	1.00	1.27	+0.27
Ratio	.188	.250	+.062

ILLE/TLE ratio at select ages, by sex, period disability and marital status

2002-05 2011-14







Summarizing

1. Dramatic increases in ILLE and ratio of ILLE/TLE among younger disabled (septuagenarians and octogenarians).

2. Extremely old non-married females experienced a decline in proportion of independent life.

Conclusion

* Older Chinese have experienced large increases in ILLE from 2002 to 2011.

Example, an 80 year-old female gained 1.10 years of independent life.

* For females, gain in ILLE is proportionate to gains in TLE. For males, gains in ILLE are larger than gains in TLE. So, ratio of ILLE/TLE has increased faster for males.

* Alarming increases in ILLE/TLE ratio among disabled septuagenarians and octogenarians.

Example, proportion of life independent for a disabled non-married 80 year-old male from 26% to 41%.

Proportion for a disabled non-married female from 19% to 25%.

* Chinese are not only living longer lives, but, on balance, are living more years alone (for those not married) and with spouse only (for those married).

* There are implications for intergenerational transfers, psychological well-being, informal support, traditional structures, filial piety, and all the things that a number of people here care a lot about.

Thank-you

谢谢