

# Life Expectancy in Co-resident States among Oldest-Old Chinese: An Alternative Application of IMACh

Zachary Zimmer and Danan Gu

## Study aims

1. Employ IMACh to estimate number of years oldest old in China can expect to be living in and out of co-residence, i.e., with and without an adult child.
2. Determine importance of considering end of life co-residence transitions on expectancy estimates.
3. Assess how a demographic (sex, residence) and need (lives with spouse, ADL limitation) characteristics influence percent of remaining life in co-residence.

## Background

Living together, or **co-residing**, with an adult child, is common among elders in China and is considered as a means of providing support for the oldest-old.

Earlier research has shown the probability of a transition into or out of co-residence among oldest-old is common and **accelerates just before death** (Zimmer and Korinek 2010).

Probabilities of a transition also depend on: a) baseline co-residence state, with shifts **into** being more common than shifts **out of** co-residence; b) demographic characteristics like **age**, **sex** and **urban/rural residence**; c) characteristics that define support needs, such as **ADL limitations** and **marital status** (Korinek, Zimmer and Gu 2011; Zimmer 2005; ).

Since transitions in co-residence are common, 'healthy life expectancy' methods such as IMACh, can be effective for dividing years of life expected in states of co-residence, which in turn has policy implications for formal and informal support.

## Data

Because end of life is a high probability transition period, precise estimates of life expected in co-residence states require information about shifts occurring prior to death.

The Chinese Longitudinal Healthy Longevity Survey panel data recorded up to four waves of co-residence data (1998, 2000, 2002 and 2005) including a **post-mortality interview** with next of kin that recorded **co-resident status at time of death**.

Deaths and losses to follow-up were refreshed at each wave with a new cohort.

The current estimates are based on 17,236 individuals 80+ who entered the survey at some point during the first three waves.

### CITATIONS:

Kim Korinek, Zachary Zimmer, Danan Gu. 2011. Transitions in Marital Status and Functional Health and Patterns of Intergenerational Coresidence Among China's Elderly Population. *Journal of Gerontology: Social Sciences*. 66(2): 260-270.

Zachary Zimmer. 2005. Health and living arrangement transitions among China's oldest-old. *Research on Aging*. 27(5): 526-555.

Zachary Zimmer and Kim Korinek. 2010. Shifting coresidence near the end of life: Comparing decedents and survivors of a follow-up study in China. *Demography*. 47(3): 537-554.

## Methods

An IMACh dataset was constructed that included month and year of interview, month and year of death among decedents, and co-resident state at each observation. **An inserted observation** was added at **month of death minus one** for decedents to account for pre-death transitions.

E.g. data for a decedent that died before the 2<sup>nd</sup> wave would look like this:

Inserted observation					
1 <sup>st</sup> wave date	Co-residence state 1	Date of death minus 1 month	Co-residence state 2	Date of death	
mm/yyyy	X	mm/yyyy	X	mm/yyyy	

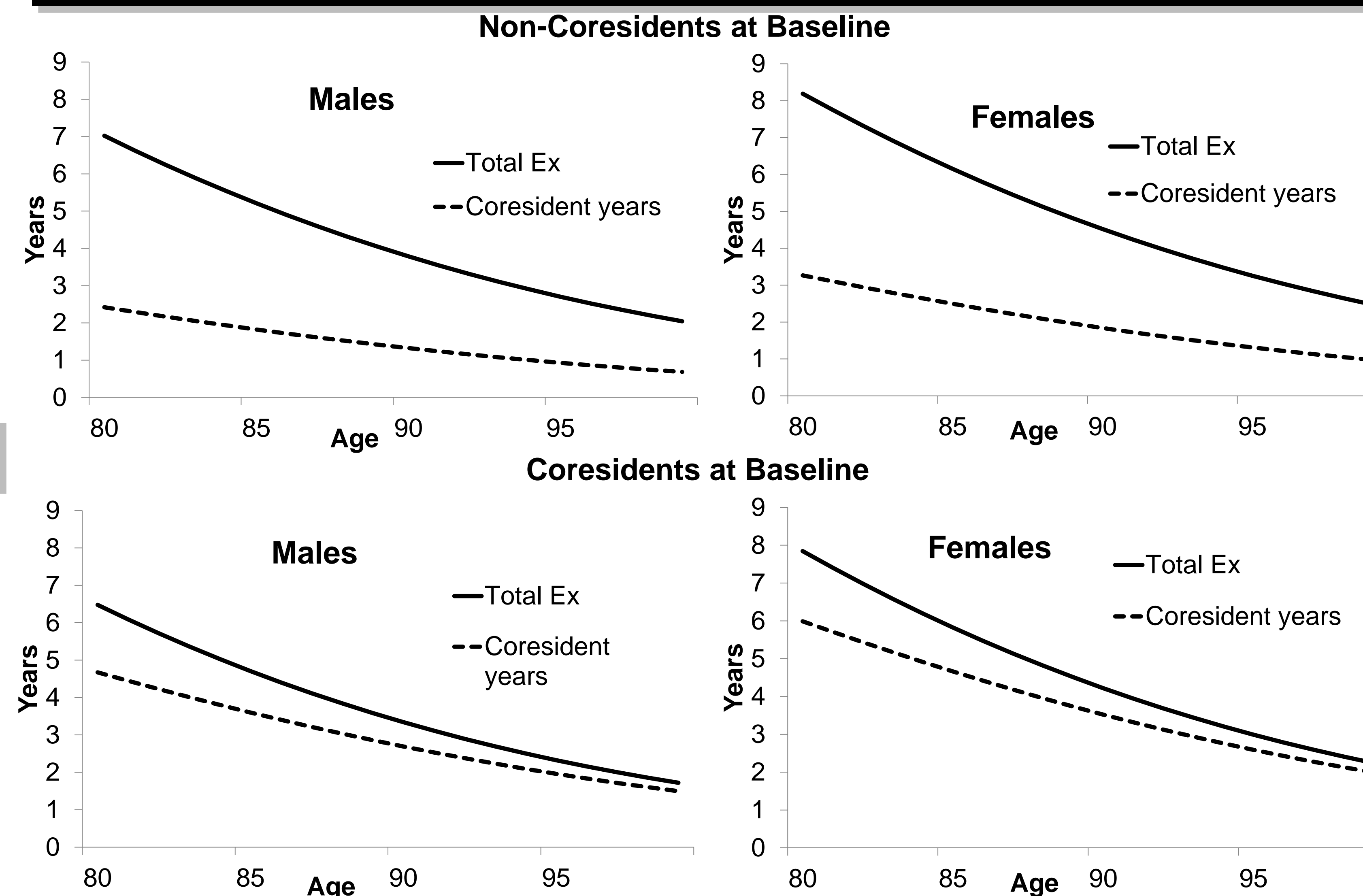
Data for a survivor over two waves would look like this:

1 <sup>st</sup> wave date	Co-residence state 1	2 <sup>nd</sup> wave date	Co-residence state 2	Date of death
mm/yyyy	X	mm/yyyy	X	99/9999

with additional observations for other waves.

IMACh .98 was employed to estimate transition probabilities and expectations of total life and life in co-resident states.

## Result (1): State-based life and co-resident life expectancy



## Result (2): Bias if not including transitions before death

Estimates that do not consider co-resident transitions before death and can greatly **underestimate years of expected co-residence**. The bias is greatest for non co-residents at baseline and increases by age.

Example: Expected co-resident years for a non co-resident female at baseline

Age	Not considering pre-death transitions	Considering pre-death transitions	% underestimate
85	2.289	2.496	9.1
90	1.622	1.841	13.5
95	1.103	1.311	18.9

## Result (3): State-based estimates with covariates

Non-co-resident at baseline						
Sex	Residence	Lives with spouse	ADL limitation	E <sub>80</sub>	Expected years living with a child	% E <sub>80</sub> as a co-resident
Male	Rural	No	No	6.86	2.10	<u>30.6</u>
		Yes	Yes	4.45	1.06	23.8
		Yes	No	7.95	2.27	28.6
		Yes	Yes	5.30	1.23	23.2
	Urban	No	No	6.34	2.67	<u>42.1</u>
		Yes	Yes	4.52	1.40	31.0
		Yes	No	7.78	2.85	36.6
		Yes	Yes	5.28	1.59	30.1
Female	Rural	No	No	8.61	3.09	<u>35.9</u>
		Yes	Yes	5.68	1.65	29.0
		Yes	No	9.81	3.26	33.2
		Yes	Yes	6.67	1.87	28.0
	Urban	No	No	8.56	3.83	<u>44.7</u>
		Yes	Yes	5.76	2.15	37.3
		Yes	No	9.59	4.01	41.8
		Yes	Yes	6.63	2.38	35.9
Coresident at baseline						
Sex	Residence	Lives with spouse	ADL limitation	E <sub>80</sub>	Expected years living with a child	% E <sub>80</sub> co-resident
Male	Rural	No	No	6.71	5.07	75.6
		Yes	Yes	4.42	3.43	<u>77.6</u>
		Yes	No	7.42	4.66	62.8
		Yes	Yes	4.86	3.22	66.3
	Urban	No	No	6.38	4.94	77.4
		Yes	Yes	4.19	3.29	<u>78.5</u>
		Yes	No	7.08	4.69	66.2
		Yes	Yes	4.66	3.17	68.0
Female	Rural	No	No	8.60	6.53	75.9
		Yes	Yes	5.88	4.79	<u>81.5</u>
		Yes	No	9.40	5.99	63.7
		Yes	Yes	6.40	4.48	70.0
	Urban	No	No	8.22	6.43	78.2
		Yes	Yes	5.58	4.60	<u>82.4</u>
		Yes	No	9.00	6.09	67.7
		Yes	Yes	6.10	4.40	72.1

## Main Conclusions

1. Oldest-old in China make frequent co-resident transitions. Baseline non co-residents can expect to live about 1/3 of their remaining years with an adult child. Baseline co-residents can expect to live about 1/4 of their remaining years without an adult child.
2. Considering co-resident status at time of death is critical for accurate estimates of co-resident years remaining.
3. Not living with a spouse increases the percent of remaining years living with an adult child. Having ADL limitation increases the percent of remaining years as with adult child **among those co-resident at baseline**.

IN SUM: 'Healthy Life Expectancy' methods such as IMACh can be easily extended to estimating other outcomes that involve frequent transitions.