COMPARISON OF FRAILTY IN BEIJING AND HONG KONG

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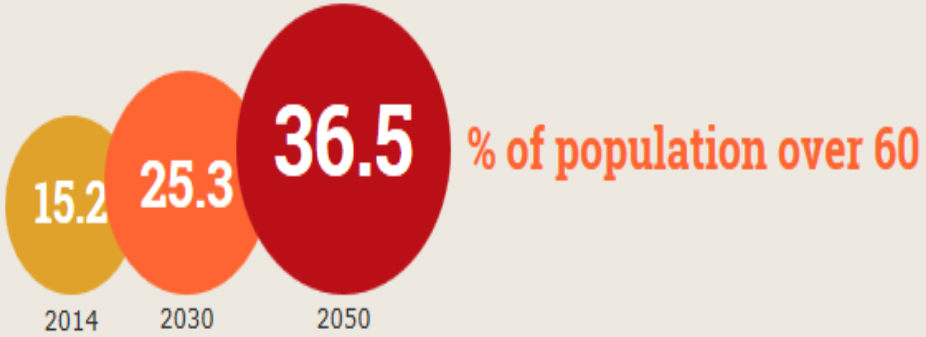
China is Aging Rapidly



112 year old lady in a family with 5 generations
Bama (巴马)Longevity County

But .....

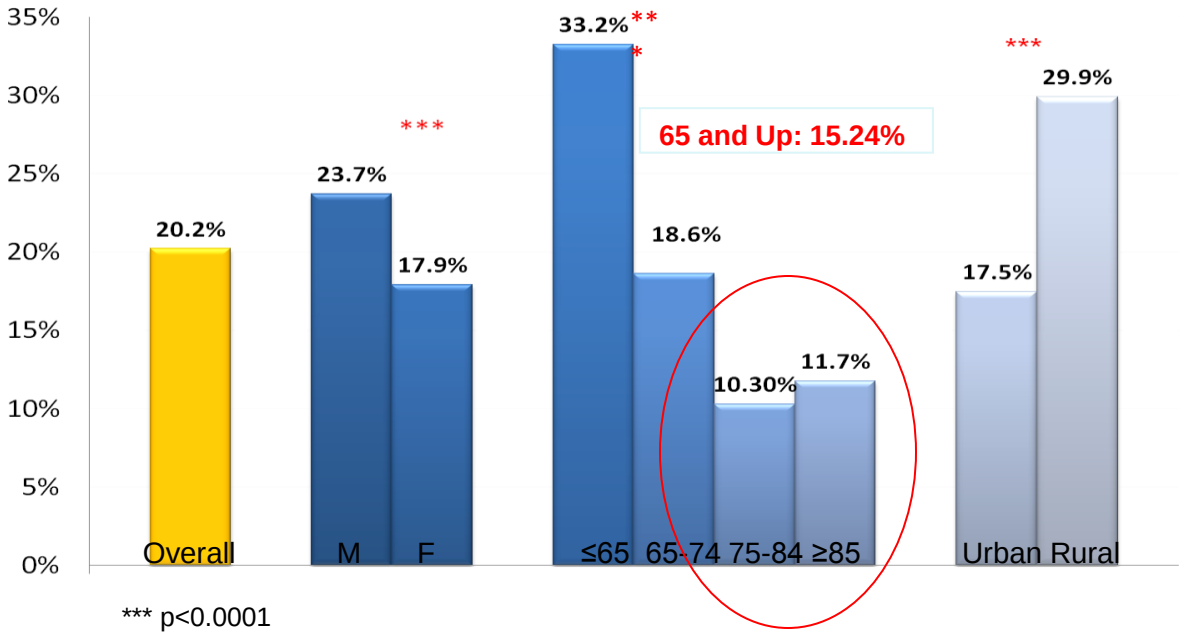
Prevalence of Successful Aging in Beijing

Definition of Successful Aging

- No major disease
- No activity of daily living (ADL) disability
- No difficulty of physical functioning
- Good cognitive functioning
- Being “actively engaged” in social and family activities

Rowe, J. W., & Kahn, R. L. (1987). Human aging: Usual and successful. *Science, 237, 143–149*

Rowe, J. W., & Kahn, R. L. (1997). Successful aging. *The Gerontologist, 37, 433–440.*



*** p<0.0001

Zheng J, et al. *Unpublished data*

Who are Frail (衰弱)?

Frailty, a progressive physiologic decline in **multiple body systems**, is marked by **loss of function, loss of physiologic reserve, and increased vulnerability to disease and death**. Frailty increases susceptibility to acute illness, falls, disability, institutionalization, and death.

Fried LP, et al. J Gerontol 2001; 56A:M1–M11

Life Expectancy & Comorbidity /Frailty

Life expectancy increase is accompanied by *increasing* multi-morbidity and disability.

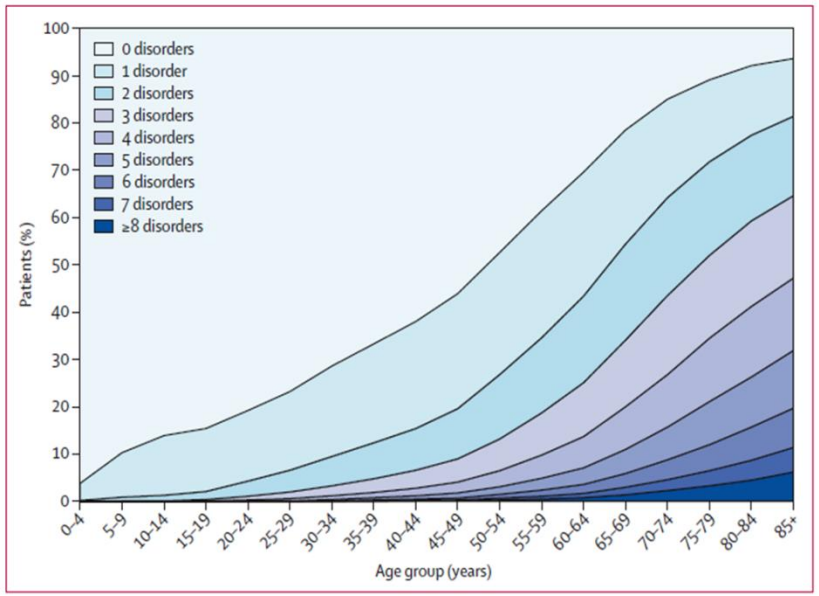
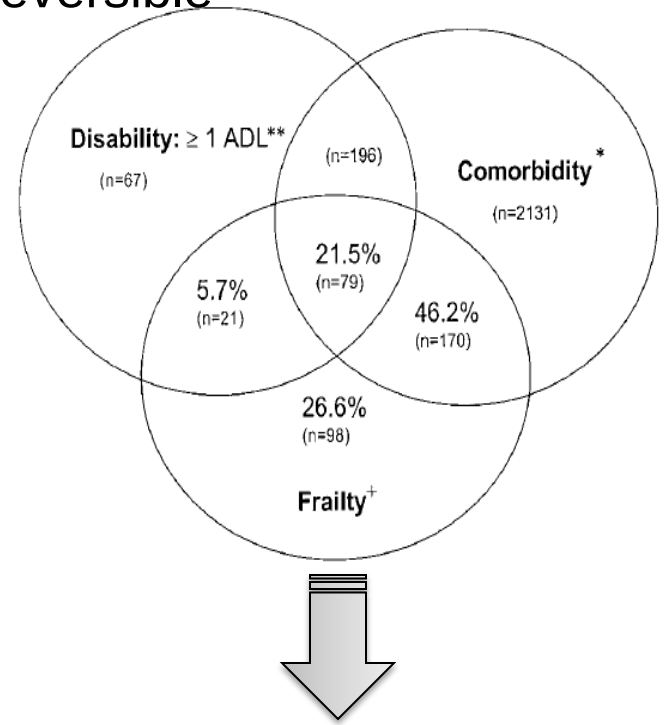


Figure 1: Number of chronic disorders by age-group

Epidemiology of multimorbidity and implications for health care, research, and medical education: a cross-sectional study

Karen Barnett, Stewart W Mercer, Michael Norbury, Graham Watt, Sally Wyke, Bruce Guthrie

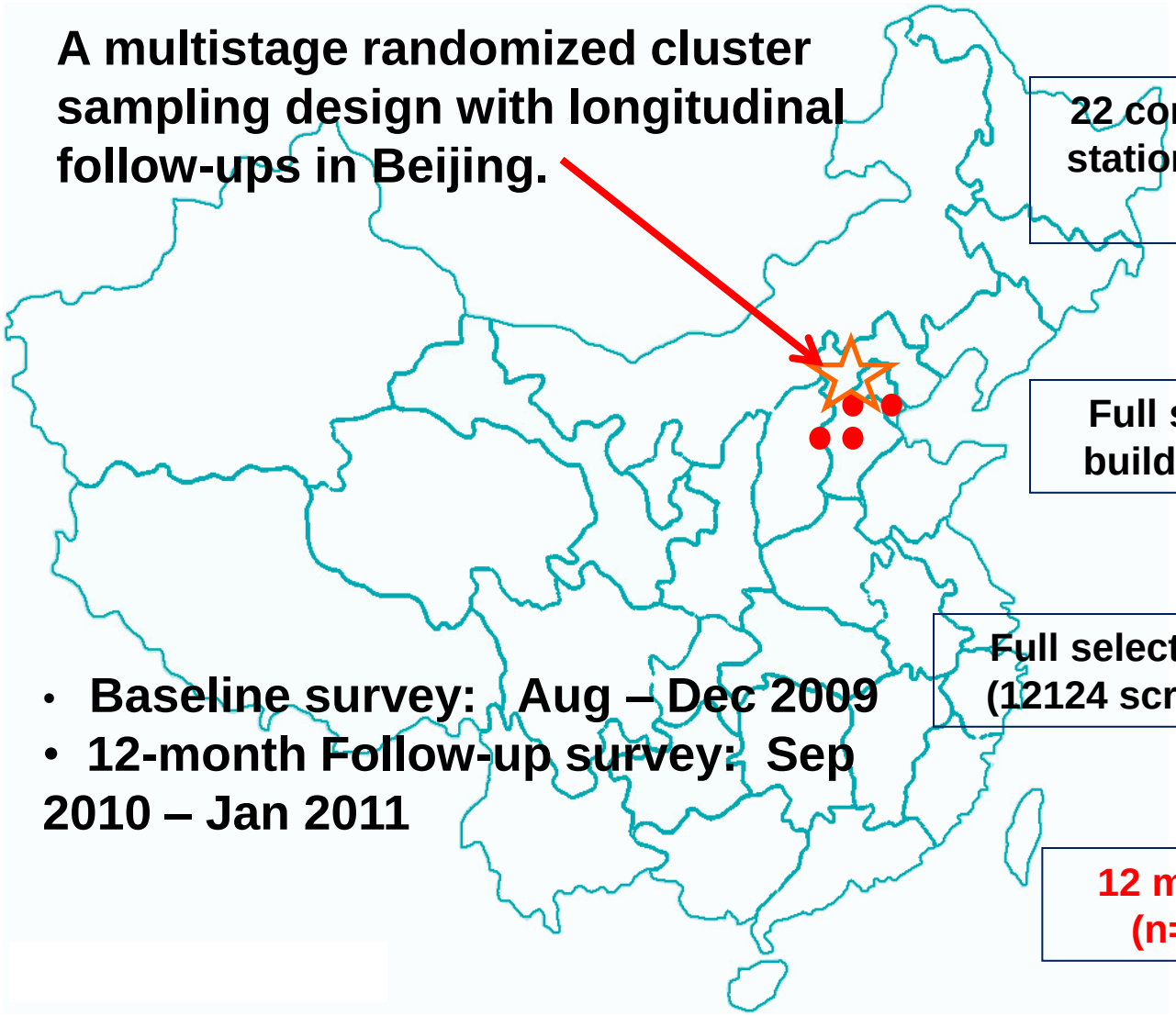
Frailty, overlapping with comorbidity & disability, is reversible



An ideal goal would be increase in life expectancy *without increasing frailty*.

Beijing Longitudinal Study on Ageing II

A multistage randomized cluster sampling design with longitudinal follow-ups in Beijing.



4 Districts in Beijing (3 urban 1 rural)

22 community health stations in urban and 9 in rural

Full selection of 39 buildings or streets

Full selection of residents > 55 y (12124 screened, 10039 enrolled)

12 month follow-up (n=7166) 71.3%

- Baseline survey: Aug – Dec 2009
- 12-month Follow-up survey: Sep 2010 – Jan 2011

Prevalence of frailty and contributory factors in three Chinese populations with different socioeconomic and healthcare characteristics

Jean Woo, Jennifer Zheng, Jason Leung, Piu Chan

Joint collaboration between the CUHK Jockey Club Institute of Ageing of Chinese University of Hong Kong and the Beijing Institute of Geriatrics of Xuanwu Hospital of Capital Medical University

Study Aims

- Compare frailty prevalence and contributory factors across three Chinese populations: Beijing rural, Beijing urban, and Hong Kong (urban).
- Contributory factors studied:
  - Demographic differences
  - Socioeconomic differences (health and social care systems)
  - Life style differences
  - Environmental differences: air pollution, climate, food and water quality

Study Cohorts

Beijing Urban (Beijing Longitudinal Study of Ageing II)	Beijing Rural (Beijing Longitudinal Study of Ageing II)	Hong Kong Urban Mr. OS and Ms. OS study
• Age 65 and up (mean age 74.62) • 2432 M/3888 F • Year of survey: 2009 • 22 Community health centers in urban	• Age 65 and up (mean age 74.9) • 419 M/559 F • Year of survey: 2009 • 9 Community health centers in rural	• Age 65 and up (mean age 74.5) • 2000 M/2000 F • Year of survey: 2001 and 2003 • Hong Kong urban

Variables Included in Frailty index

Type	item	Questions	Variable in Beijing	Variable in Hong Kong
Chronic disease history	1	Hypertension	Yes	Yes
	2	Cardiovascular disease	Yes	Yes
	3	COPD	Yes	Yes
	4	Stroke	Yes	Yes
	5	Dementia	Yes	Yes
	6	Diabetes type I or II	Yes	Yes
	7	Arthritis	Yes	Yes
	8	Tumor	Yes	Yes
	9	Cataract	Yes	Yes
	10	Deaf	Yes	-
	11	Heart failure	Yes	Yes
	12	Kidney failure	Yes	Yes
Functional assessment	13	Tinetti's Mobility Test (POMA)<24	Yes	-
	14	GDS short ≥8	Yes	Yes
	15	MNA<24	Yes	-
	16	MMSE<24	Yes	Yes

Variables Included in Frailty index

Type	item	Questions	Variable in Beijing	Variable in Hong Kong
Geriatric syndromes	17	Joint pain or inflammation	Yes	Yes
	18	Gout	Yes	Yes
	19	Risk of fall[a]	Yes	Yes
	20	Osteoporosis	Yes	Yes
	21	Arterial Sclerosis	Yes	Yes
	22	Difficulty in movement	Yes	Yes
	23	Less activity	Yes	Yes
	24	Often feel fatigue or tired	Yes	Yes
	25	Weight loss>3kg in recent 3 months	Yes	Yes
	26	Urinary inconsistence	Yes	-
	27	Fecal inconsistence	Yes	-
	28	Memory loss	Yes	-
	29	Vision loss in recent 3 months	Yes	-
	30	Hearing loss in recent three month	Yes	-
Physical/ lab tests	31	BMI<19	Yes	Yes
	32	Dsylipideamia (mmol/l)[c]	Yes	-
	33	Plasma fasting glucose	Yes	-
	34	Blood urine acid	Yes	-

Frailty Index

- Frailty Index (FI) score was calculated by *percent of deficits* using Rockwood's accumulation of deficits method (Rockwood 2006). Total 34 deficits for Beijing cohorts and 23 for Hong Kong cohort.
- *Variable selection* criteria:
  1. *Only objective measures were used*
  2. Functional deficit measured by scales
  3. Geriatric syndromes
  4. Chronic diseases based on hospital diagnosis
  5. BMI and Lab tests
- **FI ≥ 25% as frailty cut-off.**

S Searle etc. "A standard procedure for creating a frailty index" on BMC Geriatrics 2008, 8:24

FI/Life expectancy ratio (FI/LE)

- Allows quick comparison of compression of morbidity between populations
  - the higher FI/LE ratio, the sicker /weaker the population is
- Good Indicator for planning of health and social services

Attributable Fraction (AF)

- Risk factors and attributable fraction (AF) for frailty were compared across the three cohorts.

$$\mathbf{AF} = \frac{\mathbf{OR} - \mathbf{1}}{\mathbf{OR}}$$

- Standardization: Beijing rural and Hong Kong were standardized by age (5-year groups) and gender to that of the Beijing urban population(reference group).

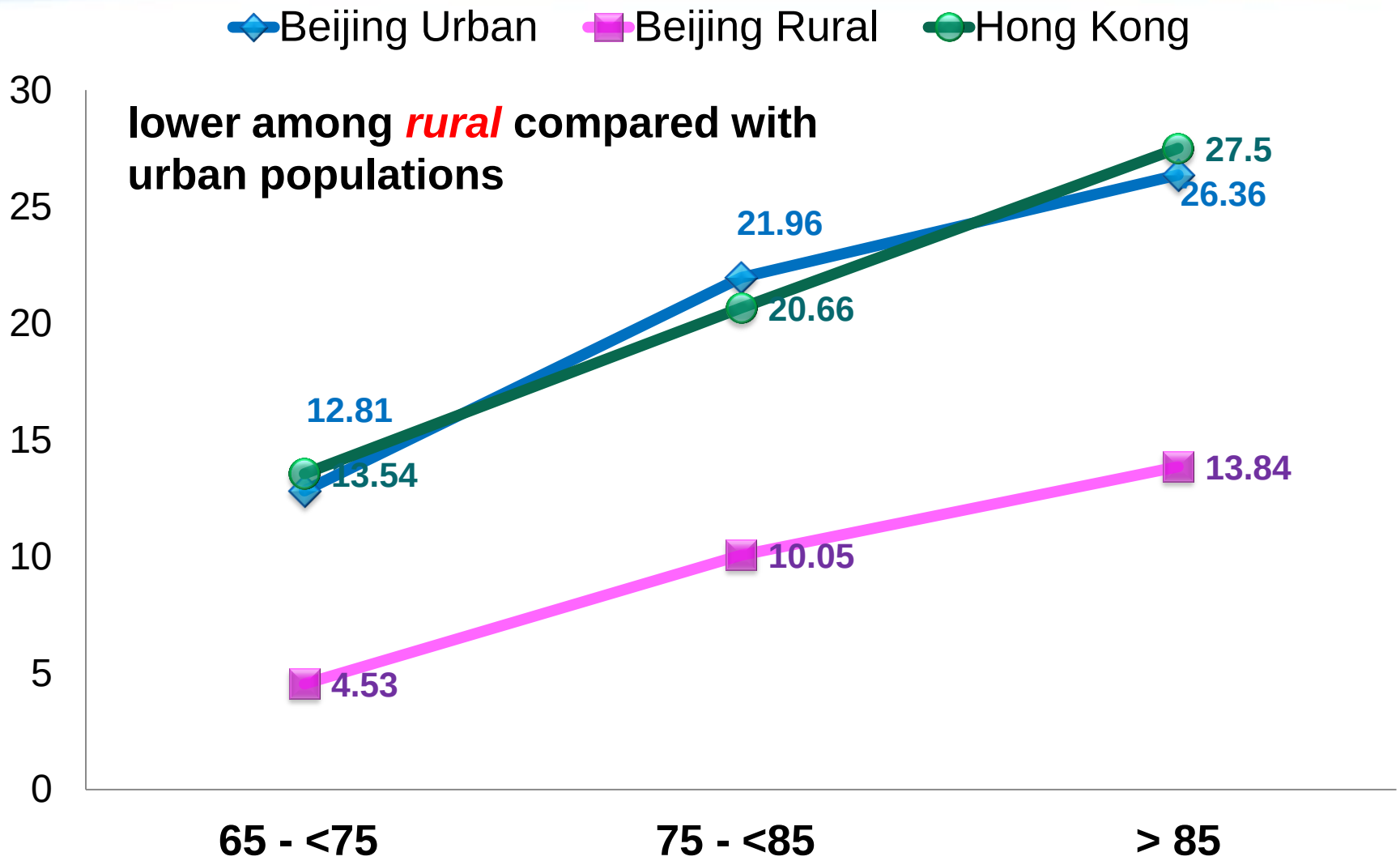
RESULTS demographics for male

	Mean (sd)/ Freq (%)		
	Beijing urban (1)	Beijing rural (2)*	Hong Kong (3)*
Male	**N=2432**	**N=419**	**N=2000**
Age, mean (sd)	74.62 (5.62)	74.89(5.79)	74.47 (5.50)
Currently married	2136 (87.83%)	365(79.39%) [1]	1760 (85.46%) [1,2]
Education≤Middle school	632 (26.02%)	248(72.18%) [1]	1422 (72.74%) [1]
Living alone	149 (6.13%)	19(6.80%)	92 (5.58%)
Current smoking	508 (20.89%)	157(35.49%) [1]	238 (11.42%) [1,2]
Current alcohol use‡	516 (21.22%)	163(37.35%) [1]	471 (21.21%) [2]
Daily exercise<0.5h	645 (26.61%)	48(14.73%) [1]	523 (27.68%) [2]
No. of diseases			
0	534 (21.96%)	175(45.44%) [1]	435 (19.85%) [2]
1-2	1300 (53.45%)	221(48.05%)	1118 (55.43%)
≥3	598 (24.59%)	23(6.51%)	447 (24.72%)
Daily drugs ≥ 4	663 (27.59%)	42(9.65%) [1]	137 (6.92%) [1]
GDS≥8	273 (12.06%)	5(1.55%) [1]	169 (8.92%) [1,2]
MMSE<24	249 (10.26%)	83(28.93%) [1]	227 (14.28%) [1,2]

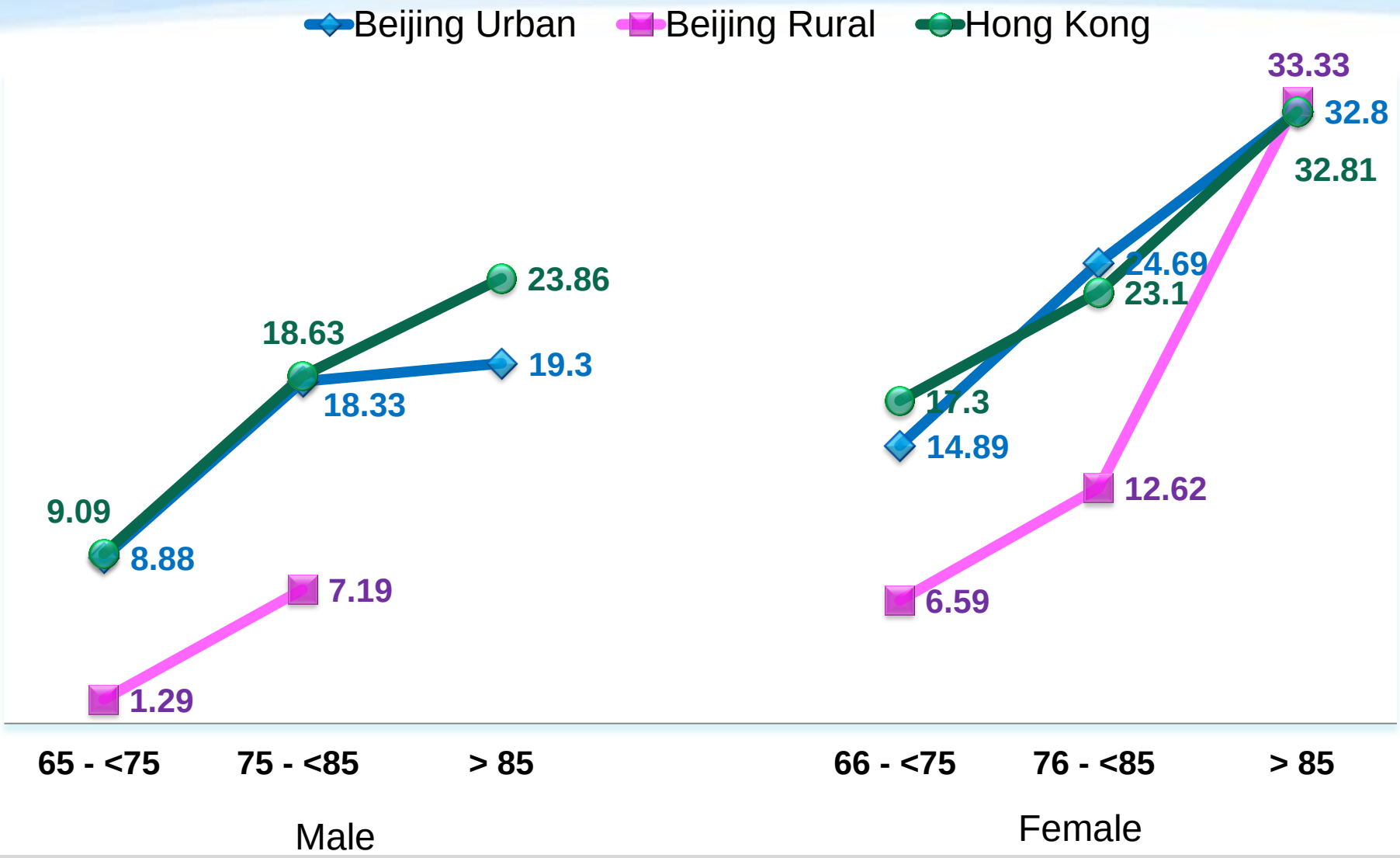
RESULTS demographics for female

	Mean (sd)/ Freq (%)		
	Beijing urban (1)	**Beijing rural (2)***	**Hong Kong (3)***
Female	**N=3888**	**N=559**	**N=2000**
Age, mean (sd)	73.85 (5.28)	73.94(5.07)	73.73 (5.32)
Currently married	2687 (69.11%)	398(61.94%) [1]	1069 (49.42%) [1,2]
Education≤Middle school	2038 (52.46%)	430(85.35%) [1]	1728 (87.23%) [1]
Living alone	494 (12.71%)	36(7.44%) [1]	341 (18.62%) [1,2]
Current smoking	196 (5.04%)	32(5.44%)	37 (1.91%) [1,2]
Current alcohol use‡	64 (1.65%)	26(5.42%) [1]	51 (2.35%) [2]
Daily exercise<0.5h	1074 (27.77%)	81(16.57%) [1]	647 (33.26%) [1,2]
No. of diseases			
0	661 (17.00%)	162(29.01%) [1]	385 (17.85%) [1,2]
1-2	2108 (54.22%)	337(60.05%)	1167 (58.88%)
≥3	1119 (28.78%)	60(10.94%)	448 (23.27%)
Daily drugs ≥ 4	1116 (29.15%)	87(15.31%) [1]	127 (6.70%) [1,2]
GDS≥8	517 (14.13%)	11(2.87%) [1]	203 (10.64%) [1,2]
MMSE<24	756 (19.47%)	250(54.72%) [1]	785 (41.54%) [1,2]

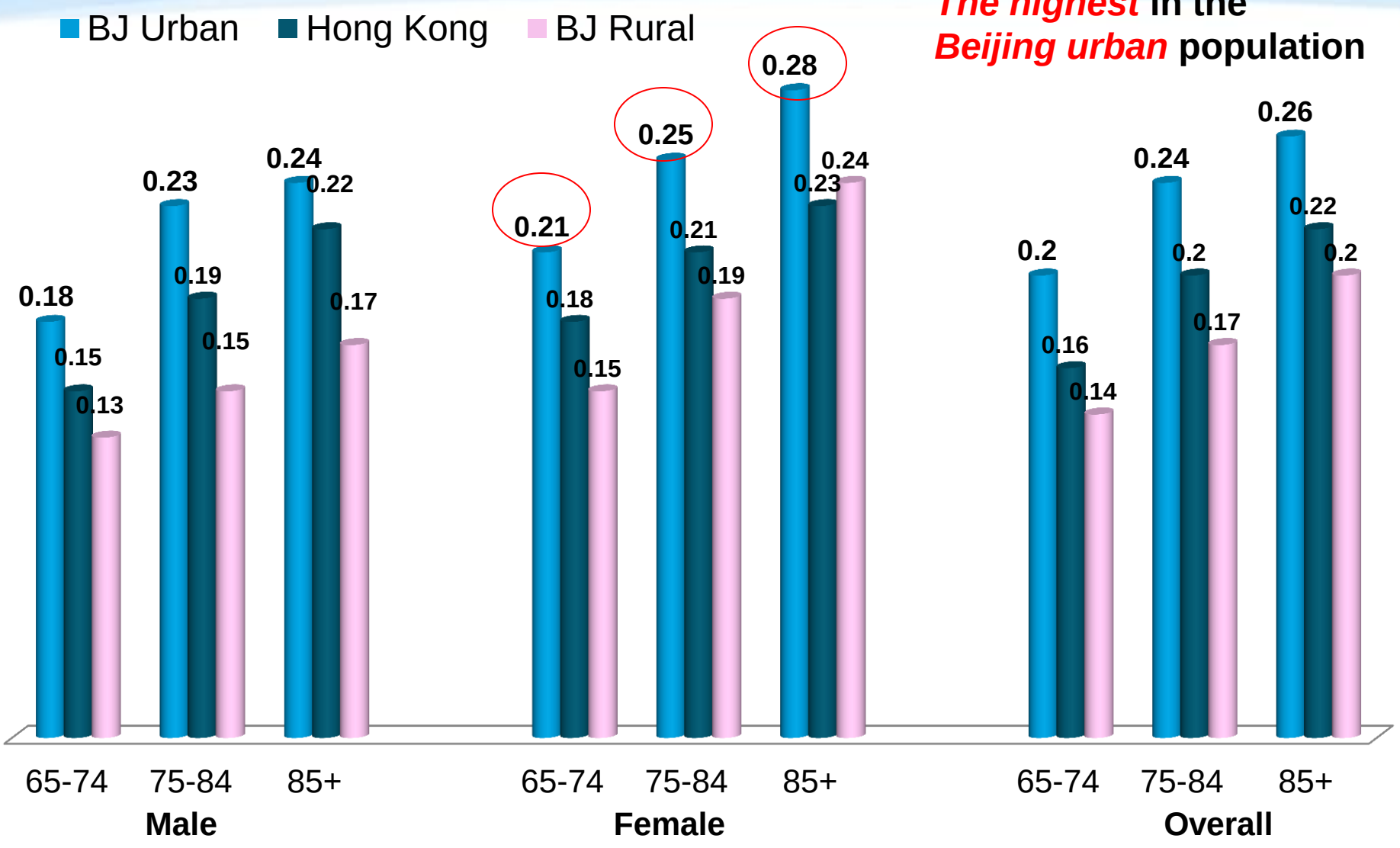
RESULTS prevalence



RESULTS prevalence by gender



RESULTS mean of FI/LE ratios



RESULTS risk factors of frailty by region

	Beijing urban	Beijing rural	Hong Kong
	Adj. OR (95%CI)	Adj. OR (95%CI)	Adj. OR (95%CI)
Female	1.48 (1.26,1.75)	2.97(1.44, 6.13)	1.66 (1.35, 2.04)
Age			
65-74	Ref.	Ref.	Ref.
75-84	1.71 (1.47, 2.00)	3.90(1.97,7.73)*	1.39 (1.14, 1.70)#
85+	2.44 (1.70, 3.52)	10.13(2.91,35.25)*	2.51 (1.61, 3.91)#
Currently married	0.70 (0.56, 0.80)	0.38（0.20,0.73)	/
Education ≤ Middle school	/	/	1.65 (1.26, 2.15)
Current alcohol use	/	/	0.63 (0.43, 0.93)
Daily exercise<0.5h	1.75 (1.49,2.05)	/	1.59 (1.30, 1.95)
No. of diseases≥3	5.20 (4.45, 6.06)	16.31(8.22, 32.37)*	12.19 (9.97, 14.91)*
Daily drugs ≥ 4	3.44 (2.95,4.02)	5.96(3.06, 11.59)	1.43 (1.06, 1.94)*#
AUC:	0.819	0.908	0.825

Summary

- *Risk factors for frailty* were similar in all three populations:
  - multi-morbidity (number of diseases >=3)
  - polypharmacy (number of drugs >=4)
  - age 85+
  - female gender
  - low education level for HK only
  - physical inactivity for Urban of BJ and HK
- *Protective factors for frailty* were:
  - currently married for BJ urban and rural
  - currently alcohol drinking for HK only

RESULTS Attributable fraction for frailty

	Beijing urban	Beijing rural	Hong Kong
Female	32.43%	66.33%	39.76%
Age			
65-74	Ref.	Ref.	Ref.
75-84	41.52%	74.36% *	28.16% #
85+	59.02%	90.13% *	60.16% #
Currently married	-42.86%	-163.16%	/
Education ≤ Middle school	/	/	39.21%
Current alcohol use	/	/	-58.48%
Daily exercise<0.5h	42.86%	/	37.15%
No. of diseases≥3	80.77%	93.87% 1	91.80% *
Daily drugs ≥ 4	70.93%	83.22%	30.22% *#

*p-value<0.05, comparing Beijing rural (2) or Hong Kong (3) with Beijing urban (1)
p-value<0.05, comparing Hong Kong (3) with Beijing rural (2)

Summary

- Attributable fraction confirms the finding for risk factors for frailty:
  - For all three cohorts, *age and multi-morbidity* constitute the highest attributable fraction, and were highest in the Beijing rural cohort.
  - high AF from *polypharmacy* in Beijing
  - the 'protective' contribution of being married in Beijing cohort; and being a teetotaler in Hong Kong.

Conclusions

- The first comparison study on frailty among three large cohorts in Chinese
- Population ageing in China is projected to be accompanied by increasing frailty.
- The lowest frailty burden was found in rural area so far, but future urbanization of these areas may result more frailty burden.
- Among aged 85 and up, and/or with comorbidity (>3), frailty was very common, however, there are lack of awareness and action on screening and prevention.
- *Increase physical exercise*, *being married, alcohol drinking* (a surrogate indicator of active social activity?), are beneficial to prevent frailty.

Fundings

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THANK YOU FOR YOUR ATTENTION