

Indonesia's Social Capacity for Population Health: The Educational Gap in Active Life Expectancy

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Expected growth of Indonesia's elderly population heightens the importance of understanding population burden of disease

- Indonesia's elderly population is projected to be among the largest in the world, at 69.5 million people in 2050 (United Nations 2001).
- Growing numbers of elderly living with chronic health problems strain social capacity to meet elderly population's health care needs.
- Mortality declines that are not accompanied by declines in chronic health problems will precipitate an expansion of morbidity (Crimmins, Hayward and Saito 1994).
- Current study calculates an important indicator of the burden of disease in the population, the expected years of active (and inactive) life of elderly Indonesians using Markov-based multi state life table models.

Social capacity for health will potentially alter the burden of disease in Indonesia

- Morbidity and mortality trends are tied to trends in a population's *education*
- A population's education level as *social capacity* for population health—the *confluence* of individual life course and institutional conditions favorable to health improvements.
- Rising educational levels are accompanied by increased life expectancy, a compression of the years spent with functional problems, and a lower prevalence of functional limitations in the population (Freedman and Martin 1999).

Research Questions

- Does the education level of elderly Indonesians reflect the country's social capacity for population health as measured with transitions in physical functioning?
- How do educational differences in active and inactive life expectancy compare to the influence of gender on transitions in physical functioning?

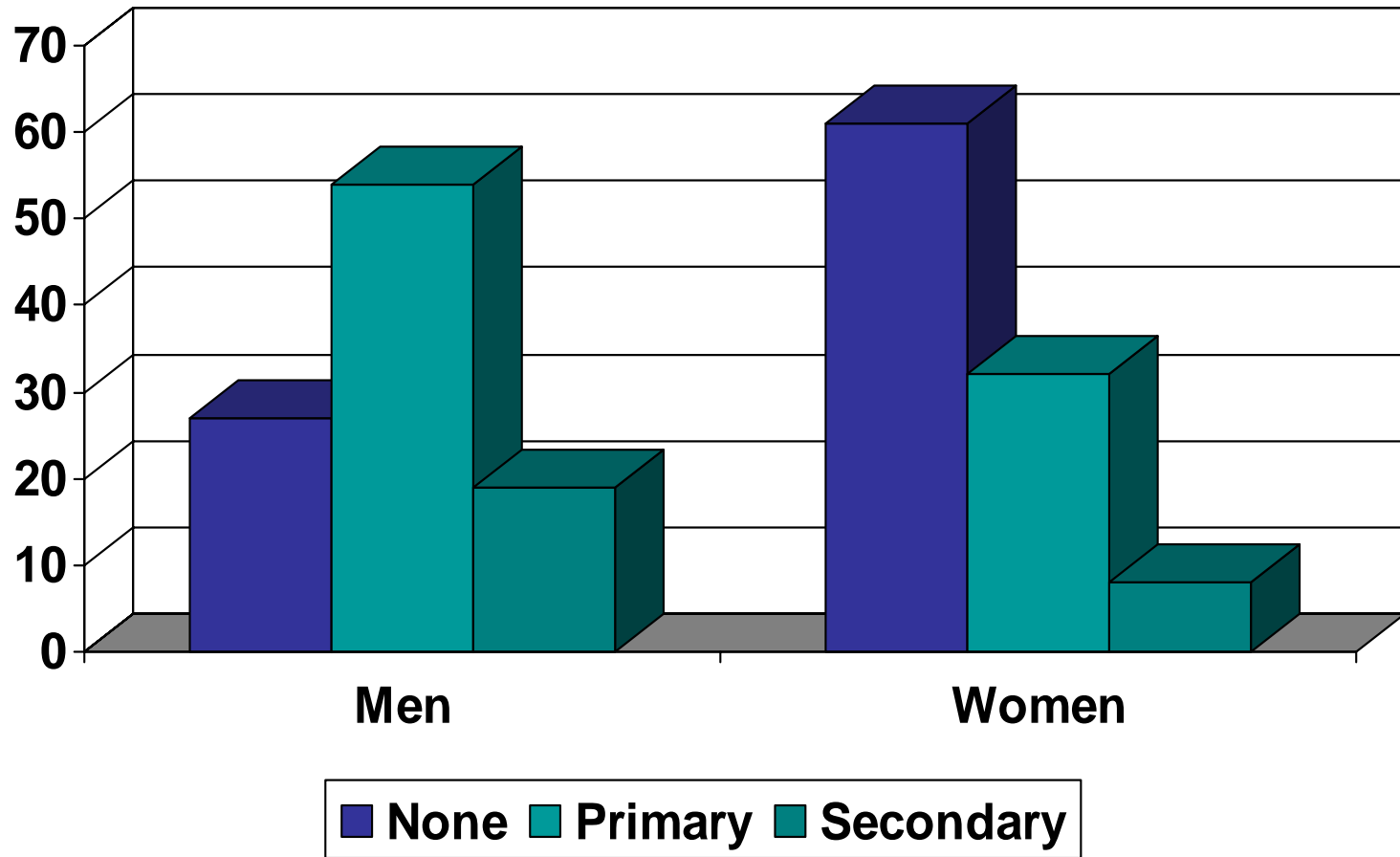
Data and Measures

- Indonesia Family Life Survey (IFLS) Waves 1 and 2 (1993-1997)
- Longitudinal study of households, face-to-face interviews, 91% response rate
- Obtained data on household economy, marriage, fertility, children, health, and community facilities
- Estimate morbidity and mortality incidence using statistical models for persons age 50+ (N=3,649)
- 1,773 men and 1,876 women
- Representative of 83% of population, sampled 7224 households

Measuring Functional Limitations

- *Main question*
 - “If you have to [...], could you do it?”
- *Nagi measures*
 - Carry a heavy load (like a pail of water) for 20 meters
 - Draw a pail of water from a well
 - Walk for 5 km
 - Bow, squat, kneel
- *Inactive:* Difficulty with or Unable to do 1 or more activities

Measuring Education



Methods

- Markov-based multi state life table (MSLT) models of active life expectancy
- MSLTs are calculated separately for Educated/Uneducated by Sex
- Population-based MSLTs calculated to assess the prevalence of functional statuses in the population
- Status-based MSLTs calculated to assess implications of having inactive conditions at a given age on subsequent health

Modeling Approach

- Transition rates are estimated using statistical models
- Rate is defined as:

$$\mu_{ij}(x) = \lim_{\Delta x \rightarrow 0} \frac{p_{ij}(x, x + \Delta x)}{\Delta x} = \mu_{ijx}$$

- Rates are estimated using a log-linear model of the general form:

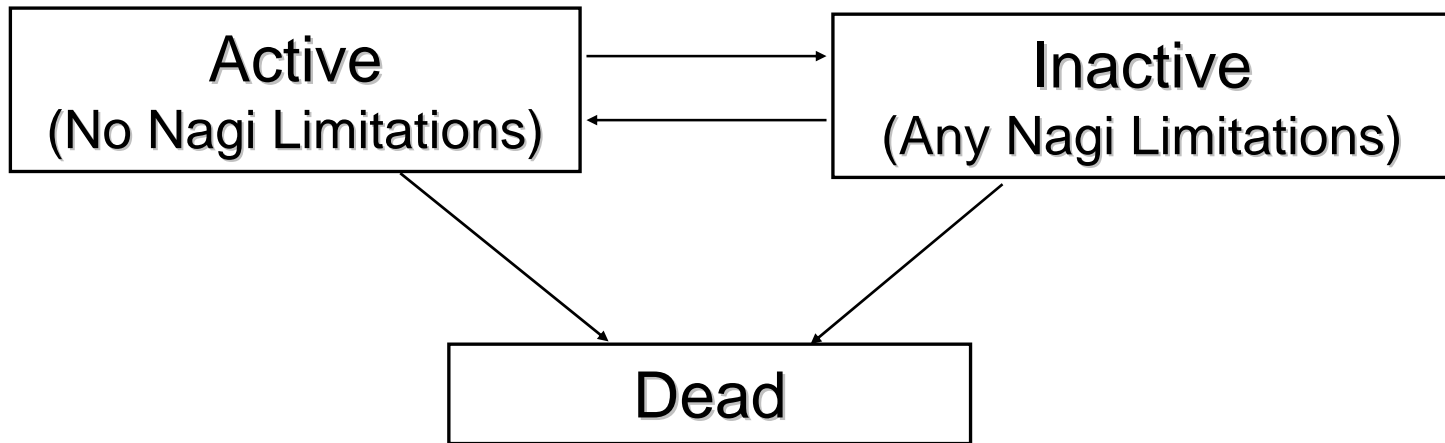
$$\ln \mu_{ijx} = \beta_0 + \beta_1 \text{Age}_x + \beta_2 \text{Male} + \beta_3 \text{Education}$$

- Transition rates are the inputs for the MLSTs

Predicted Life Expectancies for IFLS Respondents (1993-97) and World Health Organization Life Expectancies (2000)

	Men		Women	
	IFLS 1993-97	WHO 2000	IFLS 1993-97	WHO 2000
e_{50}	22.9	22.7	26.9	25.3
e_{60}	16.4	15.5	19.7	17.5
e_{70}	11.2	9.7	14.0	10.9

Health Status Model



Hazard Coefficients for Transitions in Physical Functioning among Persons Aged 50+ in the IFLS (1993-97)

Covariates	Active to Inactive		Active to Dead		Inactive to Active		Inactive to Dead	
	β	S. E.	β	S. E.	β	S. E.	β	S. E.
Intercept	2.876***	0.251	7.126***	0.609	-2.348***	0.619	-5.672***	0.463
Age	-0.027***	0.004	-0.054***	0.010	0.0873***	0.012	-0.045***	0.007
Male	0.608***	0.070	-0.461*	0.192	-0.432*	0.160	-0.587***	0.149
No Education	-0.009	0.069	-0.286†	0.181	-0.292	0.155	-0.077	0.149
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Log Likelihood	-1825.07		-531.38		-499.94		-537.02	
N	2429		2429		1218		1218	

†p<.10; *p<.05; **p<.001; ***p<.0001

Population-Based Results

Implied Age-Specific Prevalence Rates for Active Initial Status of Cohort ^a

Age	Men		Women	
	No Education	Any Education	No Education	Any Education
50	0.648	0.793	0.527	0.525
60	0.516	0.463	0.247	0.203
70	0.292	0.254	0.096	0.076

^aActive is having no limitations on the Nagi measures (walking, carrying heavy load, drawing water, and bow/squat/kneel); Inactive is having 1 to 4 limitations.

Active and Inactive Life Expectancy by Sex and Education in the Indonesian Family Life Survey (1993-1997)^a

Panel A: Men

<u>Age</u>	<u>No Education</u>			<u>Any Education</u>		
	<u>Active</u>	<u>Inactive</u>	<u>Total</u>	<u>Active</u>	<u>Inactive</u>	<u>Total</u>
50	10.24	7.15	17.39	10.80	8.27	19.07
60	4.62	6.22	10.84	4.33	7.25	11.58
70	1.65	4.96	6.62	1.52	5.57	7.09

Panel B: Women

<u>Age</u>	<u>No Education</u>			<u>Any Education</u>		
	<u>Active</u>	<u>Inactive</u>	<u>Total</u>	<u>Active</u>	<u>Inactive</u>	<u>Total</u>
50	7.19	15.29	22.48	6.54	17.21	23.75
60	2.44	12.54	14.98	2.05	13.80	15.85
70	0.69	9.32	10.01	0.56	10.10	10.66

^aActive is having no limitations on the Nagi measures (walking, carrying heavy load, drawing water, and bow/squat/kneel); Inactive is having 1 to 4 limitations.

Status-Based Results: Men

Active at Wave 1

	No Education			Any Education		
<u>Age</u>	<u>Active</u>	<u>Inactive</u>	<u>Total</u>	<u>Active</u>	<u>Inactive</u>	<u>Total</u>
50	11.44	6.52	17.96	11.43	7.98	19.41
60	6.34	5.33	11.67	6.48	6.28	12.77
70	3.89	3.89	7.78	4.12	4.55	8.67

Inactive at Wave 1

	No Education			Any Education		
<u>Age</u>	<u>Active</u>	<u>Inactive</u>	<u>Total</u>	<u>Active</u>	<u>Inactive</u>	<u>Total</u>
50	8.28	8.20	16.48	7.60	9.81	17.41
60	2.73	7.24	9.96	2.39	8.17	10.56
70	0.73	5.55	6.28	0.64	6.10	6.74

Status-Based Results: Women

Women (Active at Wave 1)

	No Education			Any Education		
<u>Age</u>	<u>Active</u>	<u>Inactive</u>	<u>Total</u>	<u>Active</u>	<u>Inactive</u>	<u>Total</u>
50	8.40	14.61	23.01	7.85	16.57	24.41
60	4.43	11.47	15.90	4.30	12.78	17.08
70	2.73	8.63	11.35	2.75	9.63	12.38

Women (Inactive at Wave 1)

	No Education			Any Education		
<u>Age</u>	<u>Active</u>	<u>Inactive</u>	<u>Total</u>	<u>Active</u>	<u>Inactive</u>	<u>Total</u>
50	5.71	16.29	22.00	4.83	18.29	23.12
60	1.78	13.10	14.88	1.46	14.33	15.79
70	0.52	9.95	10.47	0.44	10.81	11.25

Conclusion

- Mortality declines unaccompanied by declines in chronic health problems may precipitate an expansion of morbidity.
- Indonesia is at the beginning stages for education as a social capacity for population health.
- To anticipate massive population aging with high rates of disability, we call for more development in health care sector.