RESEARCH

Can Healthy Aging Boost Labor Supply? Evidence from Korea

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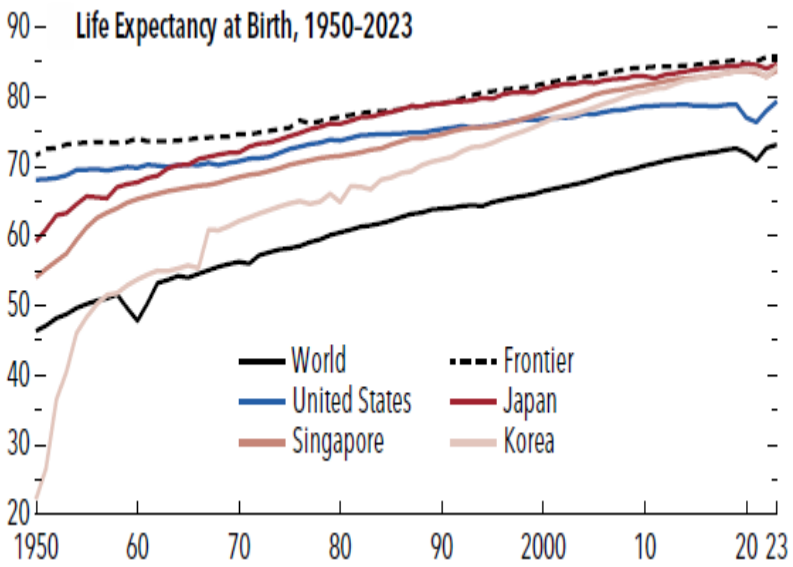
*The views herein are those of the authors and do not necessarily represent those of the IMF, its Executive Board, or its management.

Korea experienced among largest gains in (healthy) life expectancy

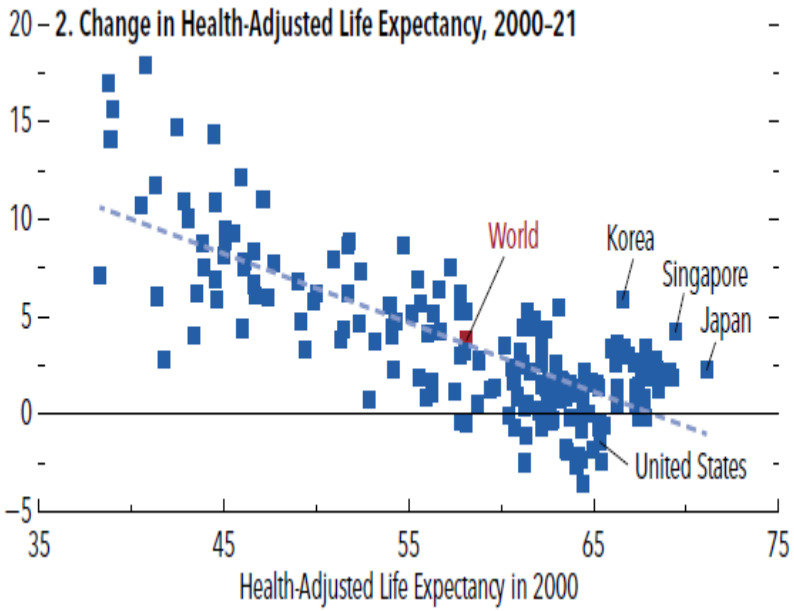
- Korea's life expectancy has risen remarkably since 1950, reaching the current global frontier.
- According to WHO's health-adjusted measure, additional years of life are mostly in 'good health'.

Life expectancy
(years)



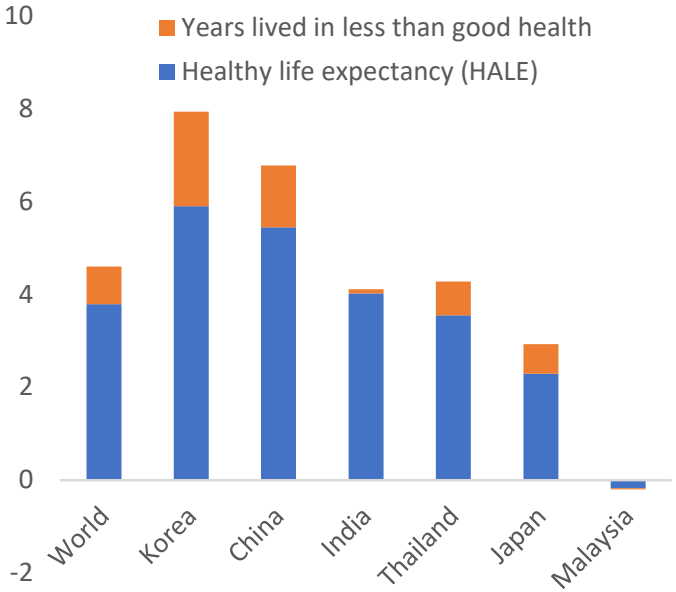
Sources: UNWPP; and IMF staff calculations.
Note: World average is population-weighted, based on 183 countries. "Frontier" = maximum life expectancy across countries.

Health-adjusted life expectancy
(years)



Sources: WHO; and IMF staff calculations.
Note: World average is population-weighted, based on 183 countries.

Life Expectancy Gains, 2000-21
(years)



Sources: WHO; and IMF staff calculations.
Note: World average is population-weighted, based on 183 countries.

Key Questions

To what extent has healthy aging boosted older individuals' labor supply in Korea during 2006-20?

- *Healthy aging*: Do we see evidence of healthy aging—older individuals aging in better physical health (across birth cohorts) in micro datasets?

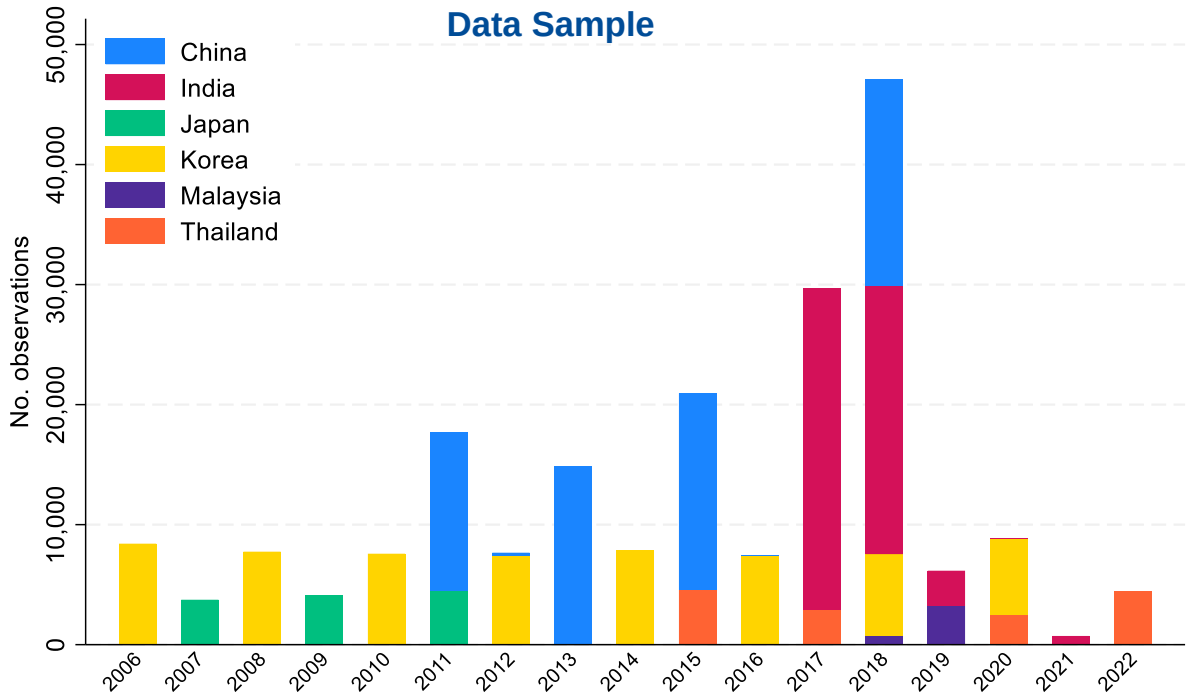
- *Labor supply effects*: Does better health lead older individuals to raise their labor supply—decision to participate in labor force and postpone retirement?

Empirical approach based on survey data

Micro survey data focused on older-age individuals: Korea and 5 Asian peers 2006-22

- Measured and self-reported physical health; chronic diseases; health behaviors.
- Employment: Labor force status; work hours/weeks; earnings.
- Individual socio-economic characteristics: Age; gender; education; wealth.

Methodology: OLS; Mundlak (using longitudinal data); IV (using exogenous health shocks)

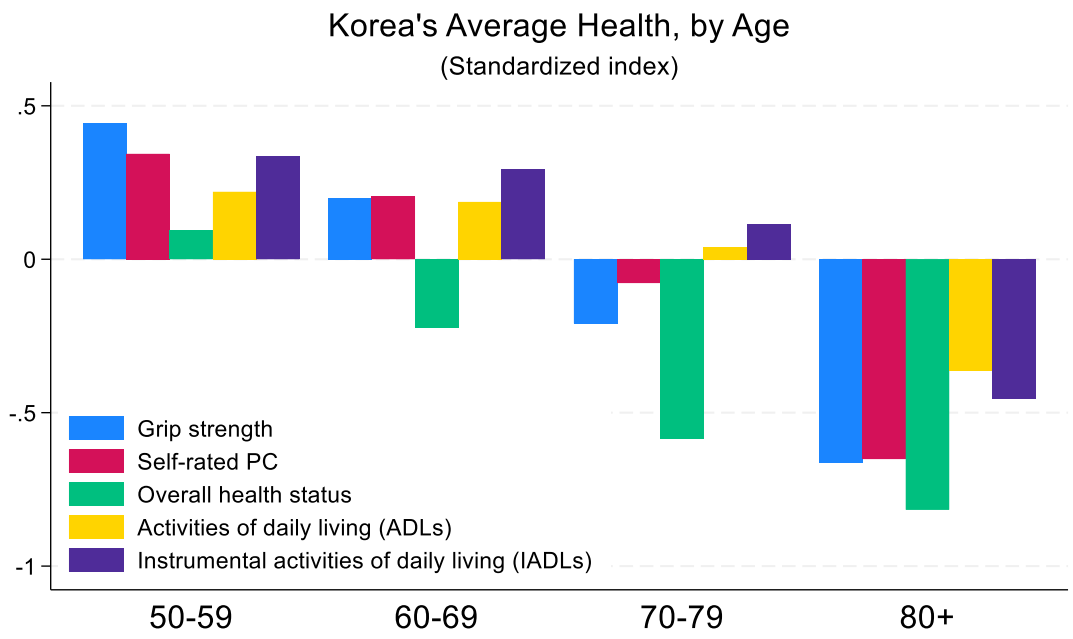


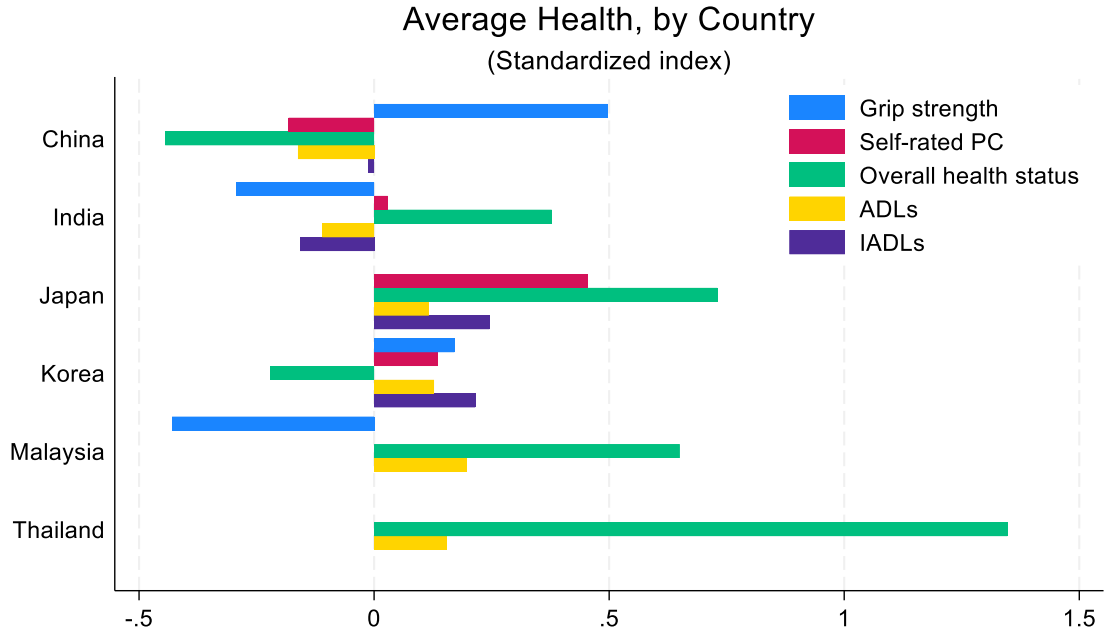
Sources: Gateway to Global Aging; household survey datasets for China (CHARLS), India (LASI), Japan (JSTAR), Korea (KLoSA), Malaysia (MARS), Thailand (HART), and IMF staff calculations.

I. Healthy aging

Data on Health

- Study improvements across birth cohorts in **measured health** (grip strength) **and first principal component (PC) of self-rated health indicators**—overall health status, ease of doing activities of daily living (ADLs) and instrumental activities of daily living (IADLs).
- Unbalanced health data availability; standardize indicators for cross-comparability (mean 0, std dev 1).





Sources: Gateway to Global Aging Data; national microdata sources; and IMF staff calculations.
Note: Health scores have been standardized to mean zero and standard deviation one. Self-rated PC is the first principal component of self-reported overall health status and ease of doing activities of daily living (ADLs) and instrumental activities of daily living (IADLs).

We see broad-based evidence of 'healthy aging' in Korea

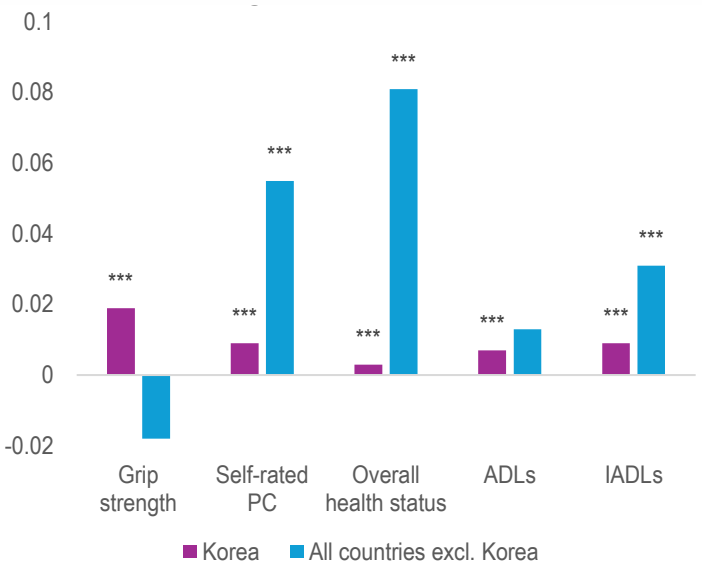
There have been improvements across birth cohorts in various physical health metrics (*H*):

$$H_{i,t} = \beta_0 + \beta_1 BirthYear_i + \boldsymbol{\theta X}_{i,t} + \varepsilon_{i,t}$$

controlling for individuals' age, gender, education, and household wealth (***X***). **Healthy aging gains strongest for grip strength.**

Robustness: Using longitudinal data, Mundlak regressions (Abeliansky et al 2020; Old and Scott 2023) augment a random effects model with within-individual averages of time-varying control variables—to address concerns that unobserved individual effects may bias results. **Results show somewhat stronger healthy aging gains (and mostly stronger than Asian peers).**

OLS Estimates: Healthy Aging Trends
(Linear trend coefficient)



Mundlak Estimates: Healthy Aging Trends
(Linear trend coefficient)

Sources: Gateway to Global Aging; household survey datasets for China (CHARLS), India (LASI), Japan (JSTAR), Korea (KLoSA), Malaysia (MARS), Thailand (HART), and IMF staff calculations.
Note: This figure shows the coefficient from OLS regressions of health indicators on individuals' year of birth, controlling for the individual's age, gender, dummies for upper and tertiary education, and (log) household wealth. Stars (***,**, and *) denote significance of the country fixed effect coefficients at the 1,5, and 10 percent level.

During 2006-20, “the 70s became the new 60s” in Korea

- In age-equivalent health gains, the grip strength of a 70-year-old in 2020 was comparable to a 61-year-old in 2006.
- The gains were similar for ADLs and IADLs, but smaller for overall health status.

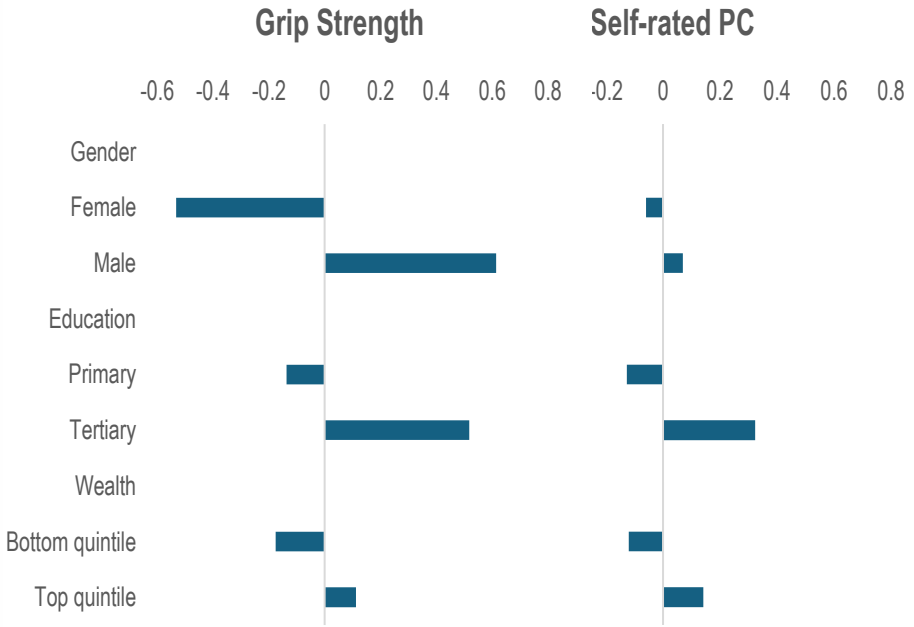
Over 2006-20, Age 70 in Korea became the New…
(Age-equivalent healthy aging gains)

Sources: Gateway to Global Aging; household survey datasets for China (CHARLS), India (LASI), Japan (JSTAR), Korea (KLoSA), Malaysia (MARS), Thailand (HART), and IMF staff calculations.
Note: This figure shows age-equivalent gains, measured as the coefficient on year of birth (trend improvement effect) multiplied by the number of years in our time sample (2020-2006) and divided by (coefficient on age minus coefficient on year of birth).

Within-country health disparities have persisted in Korea

- Socioeconomic inequalities are reflected in health disparities.
- Health gaps have persisted across wealth quintiles, widened by gender, and narrowed across education groups.

Health inequalities
(health score, average)



Sources: Gateway to Global Aging Data; national microdata sources; and IMF staff calculations.
Note: The figure shows average health scores of individuals ages 50 and older by socioeconomic group. T-tests indicate that the differences in means are statistically significant for all socioeconomic categories.

Heterogeneity in healthy aging trends
(regression estimates, trend coefficient)

	(1) Grip strength	(2) Self-rated PC	(3) Overall health	(4) ADLs	(5) IADLs
by Age					
Year of birth x Ages 50-59	0.018***	0.008***	0.004**	0.006***	0.008***
Year of birth x Ages 60-69	0.018***	0.008***	0.004**	0.006***	0.008***
Year of birth x Ages 70-79	0.018***	0.008***	0.004**	0.006***	0.008***
Year of birth x Ages 80-89	0.018***	0.008***	0.004**	0.006***	0.008***
by Gender					
Year of birth x Female	0.013***	0.007***	0.006***	0.004**	0.006***
Year of birth x Male	0.024***	0.010***	0.001	0.008***	0.011***
by Education					
Year of birth x Lower	0.021***	0.011***	0.003*	0.009***	0.011***
Year of birth x Upper secondary	0.018***	0.007***	0.004**	0.005***	0.007***
Year of birth x Tertiary	0.014***	0.004**	0.001	0.002	0.005**
by Wealth quintiles					
Year of birth x Quintile 1	0.020***	0.009***	0.004**	0.006***	0.008***
Year of birth x Quintile 2	0.020***	0.009***	0.004**	0.006***	0.008***
Year of birth x Quintile 3	0.020***	0.009***	0.004**	0.006***	0.008***
Year of birth x Quintile 4	0.020***	0.009***	0.004**	0.006***	0.008***
Year of birth x Quintile 5	0.020***	0.009***	0.004**	0.006***	0.008***

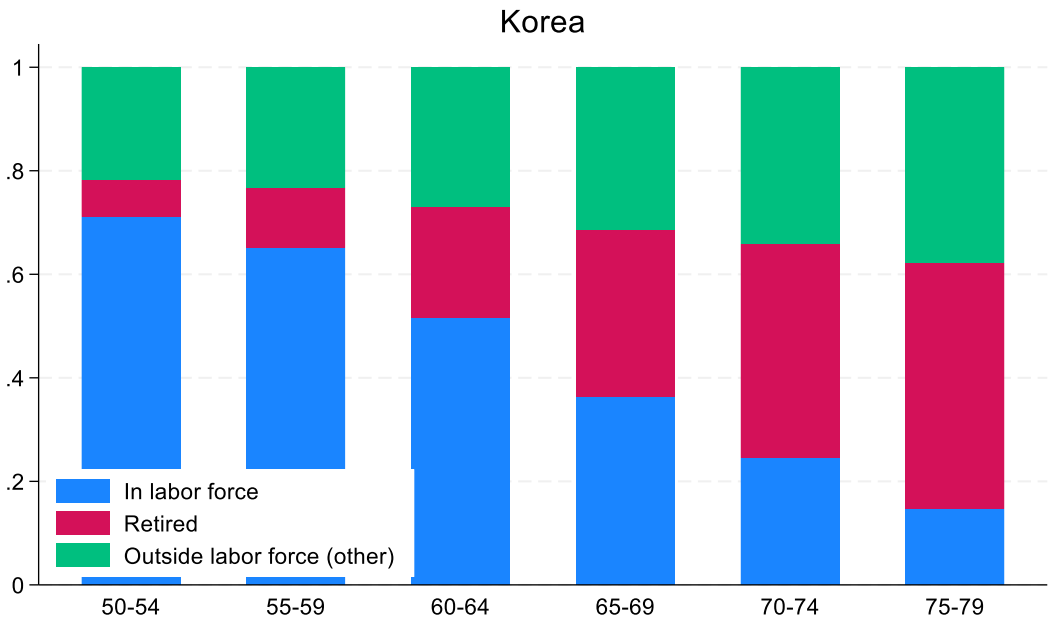
Sources: Gateway to Global Aging Data; national microdata sources; and IMF staff calculations.
Note: The figure shows estimates from ordinary least squares regressions of health scores of individuals ages 50 and older on the year of birth, by socioeconomic group, with individuals' age, gender, education, and wealth controlled for.

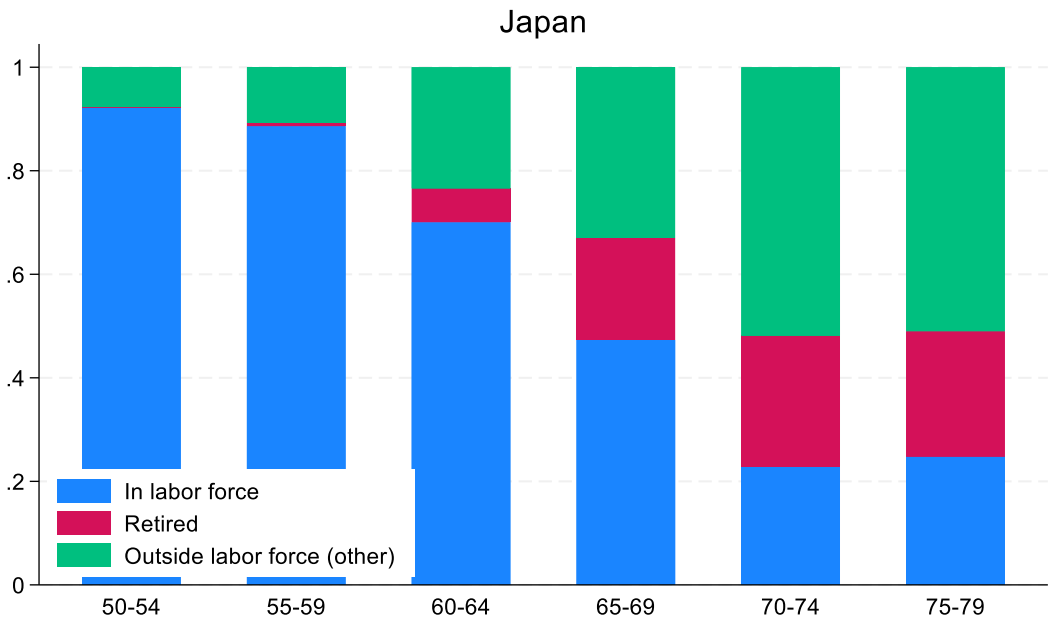
II. Effect of health improvements on labor supply

Data on Labor Force Status

- Study effect of health on: (i) whether the individual participates in the labor market, and (ii) whether the individual is retired. While related, these two measures are distinct—retirement is only one form of labor market inactivity and is typically only applicable beyond a certain age.

- In Korea, older individuals tend to transition from activity into retirement (with small fraction moving into non-retirement inactivity). There is also relatively high inactivity at early ages, driven by a sizeable LFP gender gap.





Sources: Gateway to Global Aging Data; national microdata sources; and IMF staff calculations.

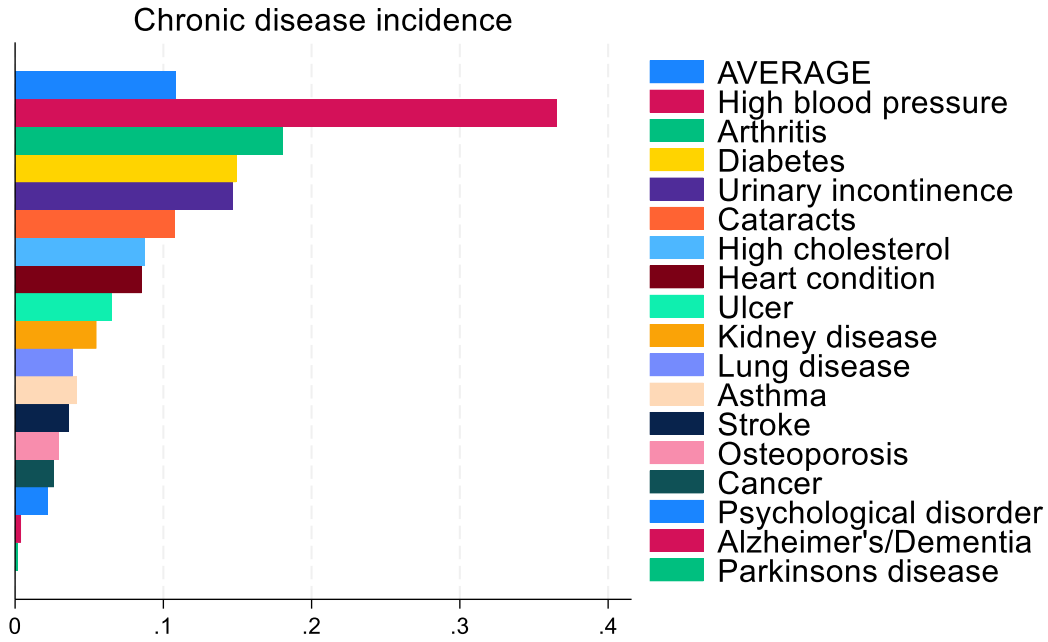
Methodology

- **Correlations—OLS regressions**: regress each labor market indicator (LMI) on health indicators one at a time:

$$LMI_{i,t} = \beta_0 + \beta_1 H_{i,t} + \boldsymbol{\theta Z}_{i,t} + \beta_2 t + \varepsilon_{i,t}$$

  controlling for individuals' age, gender, education, and household income ($\boldsymbol{Z}$), and a time trend (or time fixed effects).

- **Causal analysis—Instrumental Variable: incidence of chronic diseases**
  Identification assumption: some chronic diseases cases are random (controlling for health behaviors – exercise, BMI, smoking, drinking).



Sources: Gateway to Global Aging Data; national microdata sources; and IMF staff calculations.

Better health raises older individuals' labor supply in Korea

- Better physical health is associated with higher labor force participation and lower probability of retirement.
- Causal analysis: (1) chronic disease incidence passes weak-IV test and (2) yields larger estimated effects.
  - Effects are larger for individuals in their 50s and 60s (than older age groups) and for men (than women).
  - Effects are larger (around double) in Korea than Asian peer countries.

Effect of health on decision to participate and/or retire—Korea
(regression coefficients)

	(1) Grip strength	(2) Self-reported PC	(3) Overall health	(4) ADLs	(5) IADLs
OLS					
Labor force participation (dummy)	0.052***	0.078***	0.071***	0.057***	0.069***
	(0.007)	(0.007)	(0.005)	(0.005)	(0.006)
Retired (dummy)	-0.043***	-0.070***	-0.062***	-0.051***	-0.064***
	(0.006)	(0.007)	(0.004)	(0.006)	(0.007)
IV: 2nd Stage					
Labor force participation (dummy)	0.889***	0.259***	0.171***	0.460***	0.518***
	(0.141)	(0.035)	(0.020)	(0.087)	(0.089)
Retired (dummy)	-0.874***	-0.264***	-0.177***	-0.461***	-0.523***
	(0.111)	(0.034)	(0.021)	(0.079)	(0.085)
IV: 1st Stage					
Chronic disease	-0.326***	-1.334***	-2.021***	-0.751***	-0.666***
	(0.050)	(0.094)	(0.052)	(0.108)	(0.089)
Weak IV F-statistic	43	202	1496	48	56
Socio-economic controls	Yes	Yes	Yes	Yes	Yes
Lifestyle controls	Yes	Yes	Yes	Yes	Yes

Sources: Gateway to Global Aging Data; national microdata sources; and IMF staff calculations.

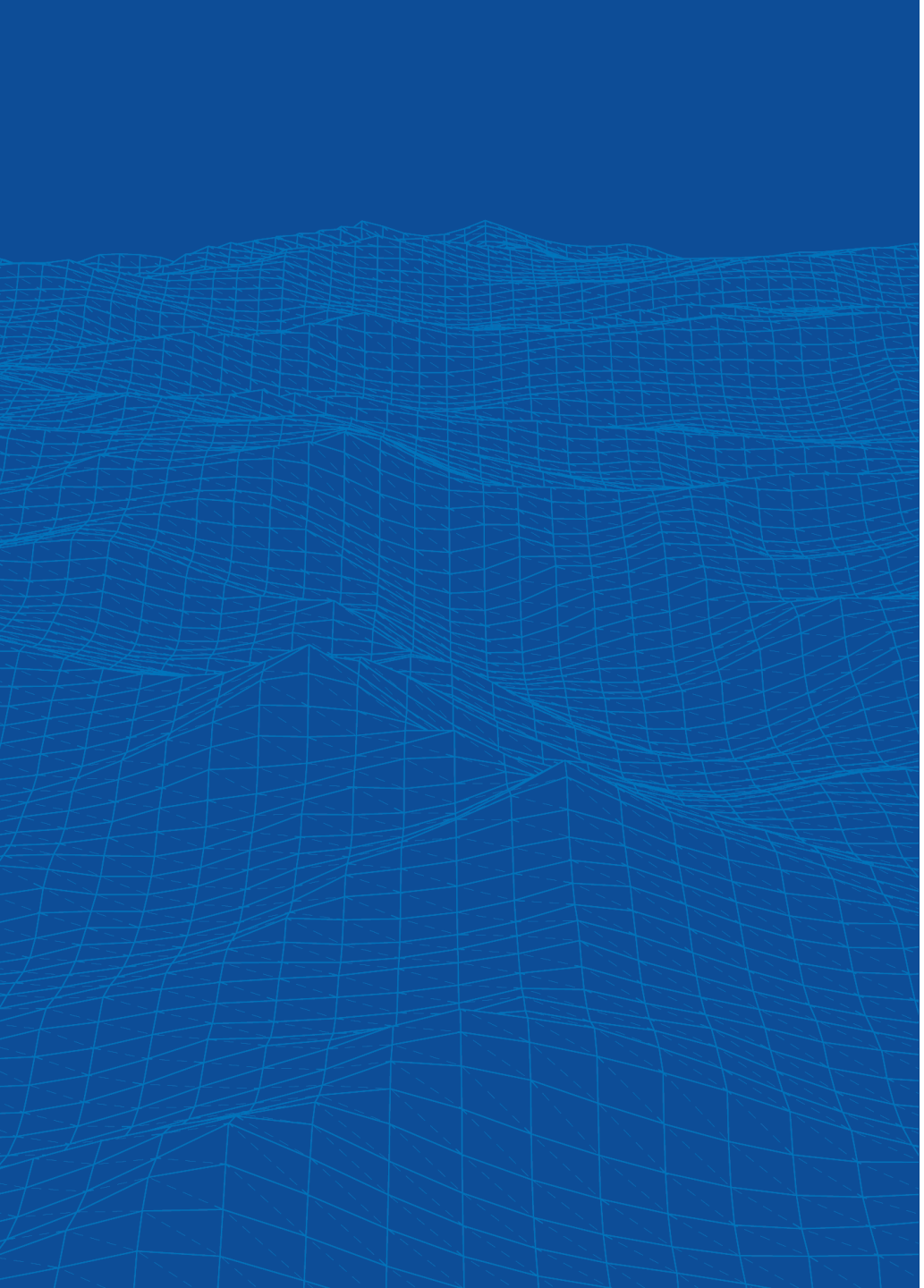
Altogether, healthy aging can meaningfully increase labor supply.

- Healthy aging gains raised older individuals' labor supply in Korea by up to around 1.7pp per year during 2006-20. Estimated effects would be smaller if we consider improvements in Koreans' self-reported health.
- Effect of health on labor supply (2SLS) is robust to controlling for year fixed effects—and thus unrelated to changes in statutory retirement ages—and may reflect stronger *voluntary* labor supply by healthier older individuals.
- Policies promoting better health together with age-friendlier jobs and pension system incentives that are compatible with working for longer (conditional on good health) may help to translate healthy aging into higher voluntary labor supply.

Effect of 1-decade health gains on labor supply decisions
(regression coefficients)

	(1)	(2)	(3)	(4)	(5)
	Grip strength	Self-reported PC	Overall health status	ADLs	IADLs
Baseline					
Effect on labor force participation	0.168***	0.023***	0.006***	0.033***	0.045***
	(0.027)	(0.003)	(0.001)	(0.006)	(0.008)
Effect on retirement	-0.165***	-0.023***	-0.006***	-0.033***	-0.045***
	(0.021)	(0.003)	(0.001)	(0.006)	(0.007)
Robustness to Year FE					
Effect on labor force participation	0.199***	0.026***	0.007***	0.036***	0.049***
	(0.028)	(0.003)	(0.001)	(0.007)	(0.008)
Effect on retirement	-0.179***	-0.023***	-0.006***	-0.033***	-0.044***
	(0.024)	(0.003)	(0.001)	(0.006)	(0.007)

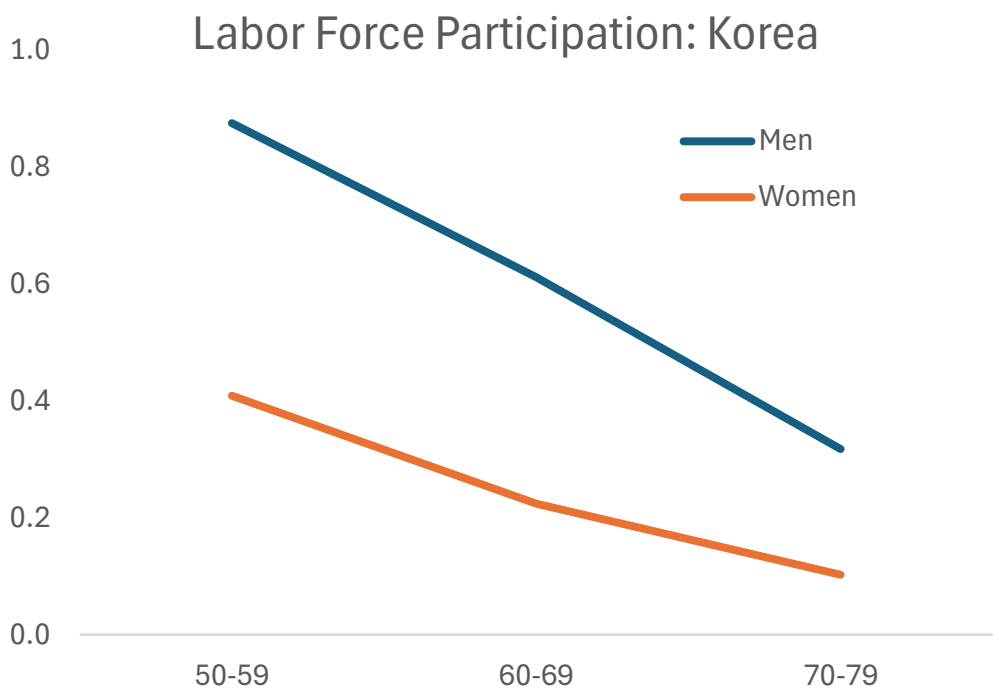
Sources: Gateway to Global Aging Data; national microdata sources; and IMF staff calculations.

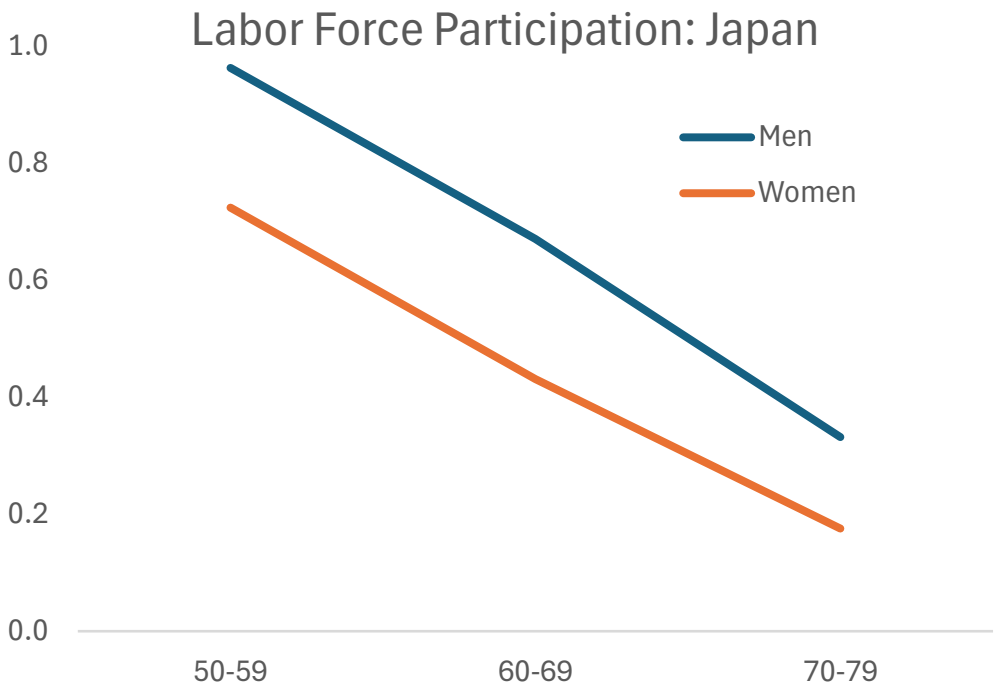


THANK YOU!

Appendix

Data on Labor Force Participation, by Gender



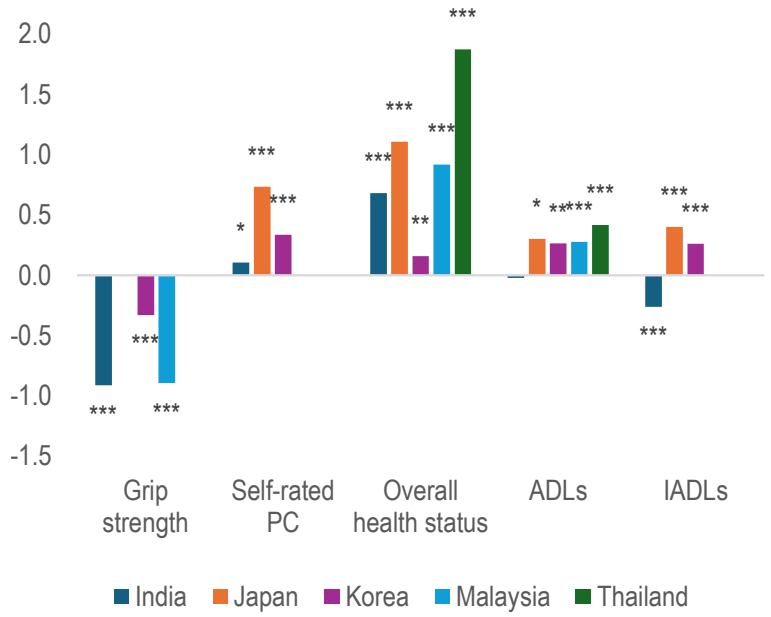


Sources: Gateway to Global Aging Data; national microdata sources; and IMF staff calculations.

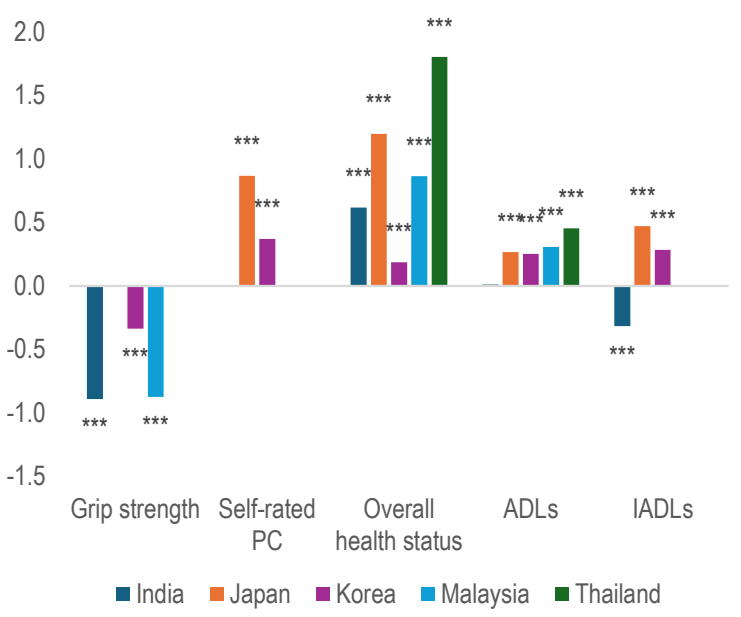
Health metrics show wide disparities across countries

- Even after controlling for individual socio-economic characteristics, significant variation remains across countries.
- Grip strength is notably lower in India and Malaysia. Self-rated overall health is notably higher in Thailand, Japan, and Malaysia. Cross-country differences in ADLs and IADLs are smaller but still meaningful, with most countries scoring slightly higher than China—except for India. The results are robust across both OLS and Mundlak specifications.

Cross-Country Health Differences—OLS
(Country fixed effects vs. China)



Cross-Country Health Differences—Mundlak
(Country fixed effects vs. China)



Sources: Gateway to Global Aging; household survey datasets for China (CHARLS), India (LASI), Japan (JSTAR), Korea (KLoSA), Malaysia (MARS), Thailand (HART), and IMF staff calculations.
Note: This figure shows the coefficient from regressions of health indicators on country dummies, controlling for individuals' year of birth, age, gender, dummies for upper and tertiary education, and (log) household wealth. Stars (***,**, and *) denote significance of the country fixed effect coefficients at the 1,5, and 10 percent level.

Effects of health on labor supply are larger than in peers

- Results for peer countries are qualitatively similar but smaller—roughly half (except similar for self-rated overall health).
- Physical health is a particularly strong determinant of labor supply in Korea. Reasons? Future research.

Effect of health on decision to participate and/or retire—Asian Peers
(regression coefficients)

	(1)	(2)	(3)	(4)	(5)
			Self-reported PC		
	Grip strength	Self-reported PC	Overall health	ADLs	IADLs
OLS					
Labor force participation (dummy)	-0.019	0.037***	0.011	0.038***	0.037***
	(0.017)	(0.009)	(0.014)	(0.007)	(0.006)
Retired (dummy)	-0.012	-0.038***	-0.006	-0.040***	-0.024***
	(0.009)	(0.013)	(0.006)	(0.014)	(0.005)
IV: 2nd Stage					
Labor force participation (dummy)	0.260*	0.101**	0.108***	0.142**	0.149**
	(0.151)	(0.041)	(0.037)	(0.059)	(0.064)
Retired (dummy)	-0.237**	-0.105***	-0.101***	-0.140***	-0.165***
	(0.105)	(0.032)	(0.028)	(0.045)	(0.047)
IV: 1st Stage					
Chronic disease	-0.971***	-2.619***	-2.098***	-1.993***	-1.622***
	(0.187)	(0.163)	(0.194)	(0.214)	(0.184)
Weak IV F-statistic	26.87	256.7	116.8	86.61	77.73
No. countries	2	2	4	3	2
Automatically dropped countries	JAP, THA	MYS, THA	-	THA	MYS, THA
Socio-economic controls	Yes	Yes	Yes	Yes	Yes
Lifestyle controls	Yes	Yes	Yes	Yes	Yes

Sources: Gateway to Global Aging Data; national microdata sources; and IMF staff calculations.

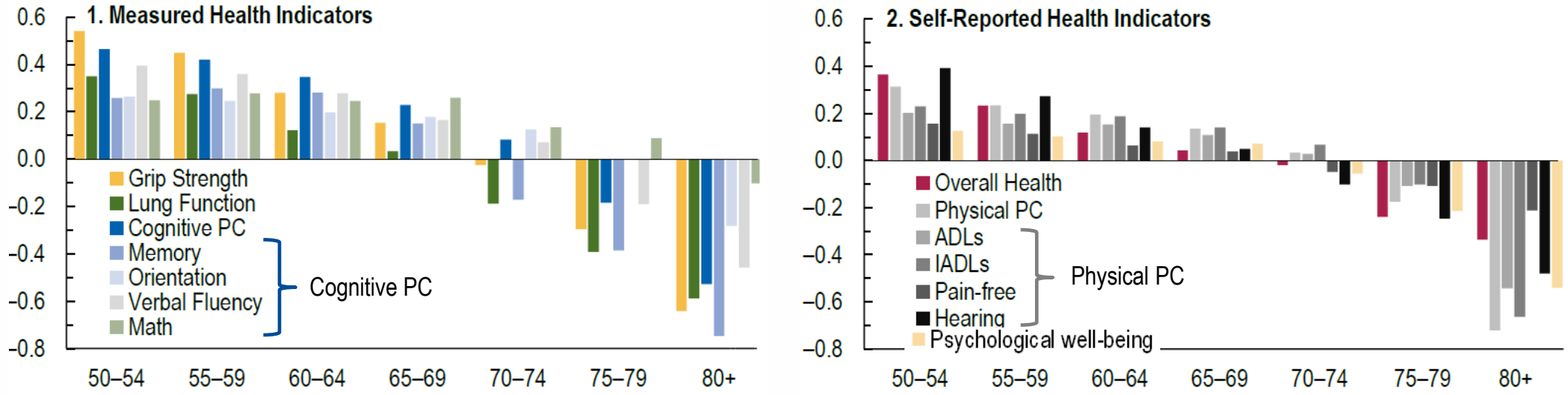
IMF World Economic Outlook April 2025
Chapter 2

Is there evidence of healthy aging, and does it impact labor market outcomes?

Micro survey data focused on older-age individuals (29 AEs and 12 EMs; 2000-22):

- Measured and self-reported health: Physical, cognitive, and mental health; chronic diseases; health behaviors.
- Employment: Labor force status; work hours/weeks; earnings.
- Individual socio-economic characteristics: Age; gender; rural/urban location; education; wealth.

Methodology: OLS; IV (using exogenous health shocks); AIPW.

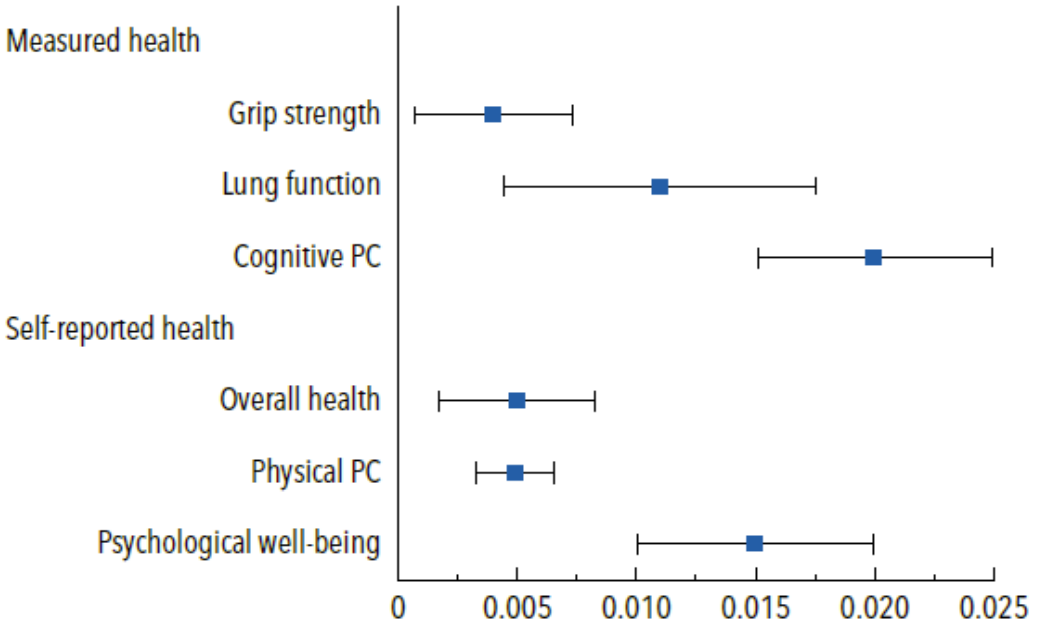


Sources: Gateway to Global Aging Data; national microdata sources; and IMF staff calculations.
Note: Health scores have been standardized to mean zero and standard deviation one and averaged across different age groups. Cognitive PC is the first principal component of the memory, orientation, verbal fluency, and math cognitive functions. Physical PC is the first principal component of activities of daily living (ADLs), instrumental activities of daily living (IADLs), pain frequency, and hearing.

We see broad-based evidence of healthy aging…

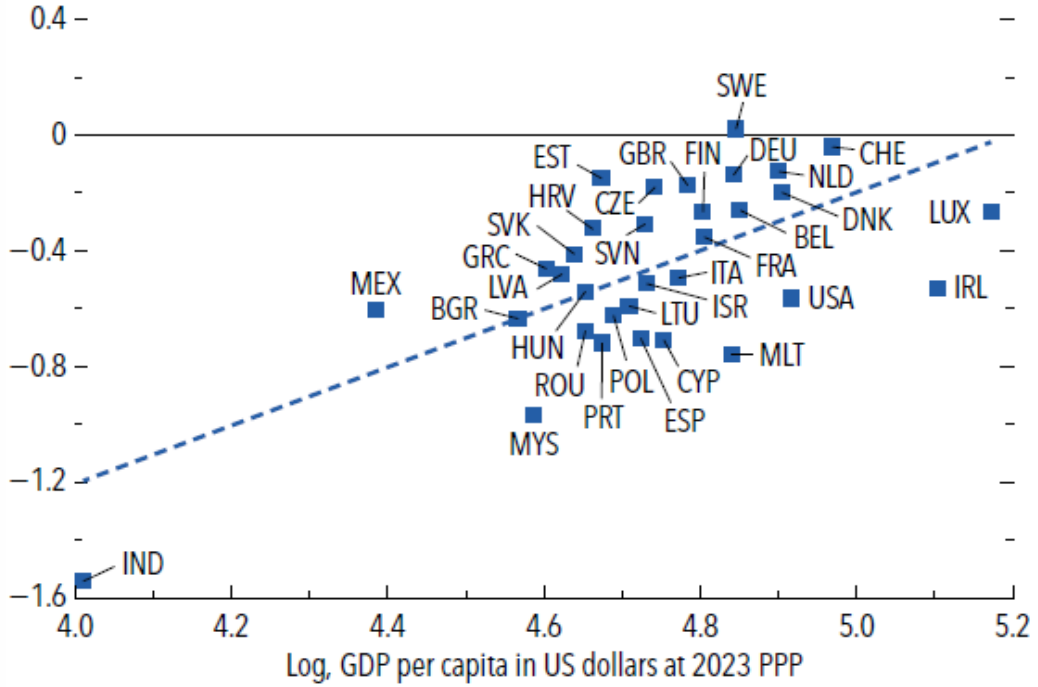
- Broad-based healthy-aging phenomenon for a range of physical, cognitive, and mental health indicators.
- Important cross-country differences.

Healthy aging trends, 2000-22
(regression estimates, trend coefficient)



Sources: Gateway to Global Aging Data; national microdata sources; and IMF staff calculations.
Note: The figure shows the coefficient from ordinary least squares regressions of health indicators of individuals ages 50 and older on the survey year, with individuals' age, gender, education, household wealth, and country fixed effects controlled for. Squares represent point estimates, whereas bars represent 90 percent confidence intervals. PC = principal component.

Cross-country health differences
(cognitive health score, country fixed effects)

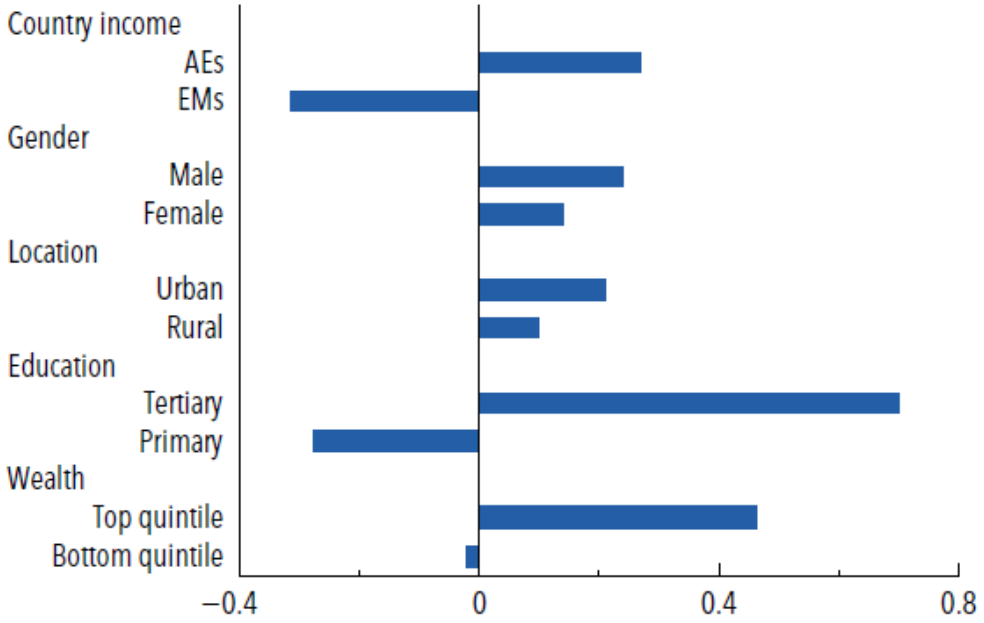


Sources: Gateway to Global Aging Data; national microdata sources; and IMF staff calculations.
Note: The vertical axis shows country fixed effects from ordinary least squares regressions of the cognitive health score of individuals ages 50 and older on the survey year, with individuals' age, gender, education, and household wealth controlled for. Cognitive health score is the first principal component of cognitive indicators, standardized to mean zero, standard deviation one. The regression sample period is 2000–22. Data labels in the figure use International Organization for Standardization (ISO) country codes. PPP = purchasing power parity.

… but wide health disparities persist

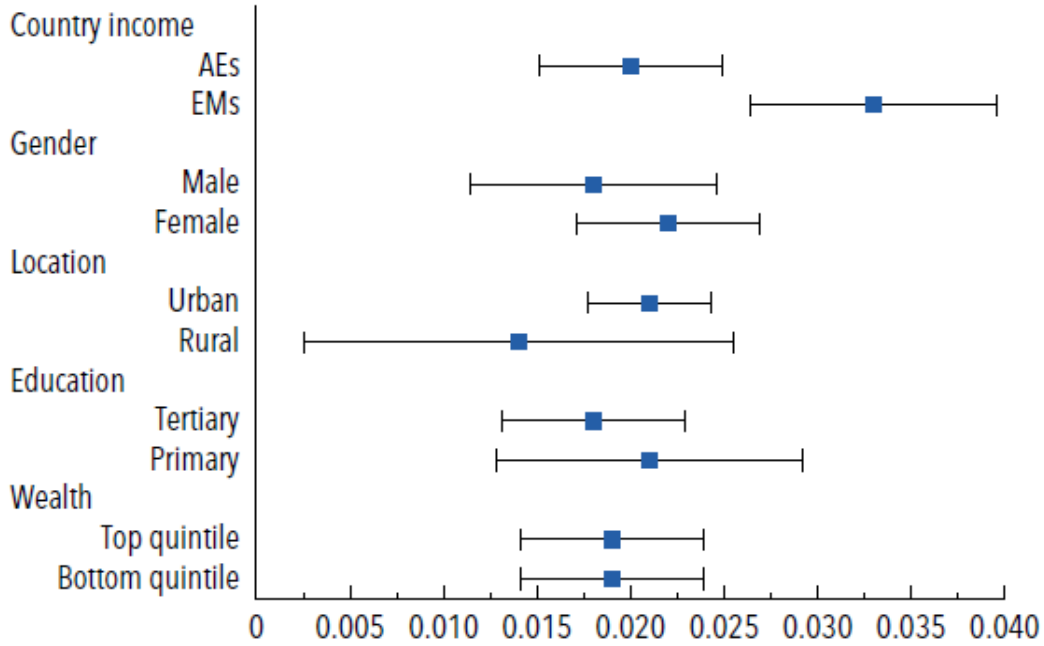
- AE-EM level gap; disparities persist with differences in socioeconomic characteristics.
- Faster pace in EMs relative to AEs; similar pace across socioeconomic characteristics.

Cognitive health inequalities
(cognitive health score, average)



Sources: Gateway to Global Aging Data; national microdata sources; and IMF staff calculations.
Note: The figure shows average health cognitive scores of individuals ages 50 and older by socioeconomic group. Cognitive health score is the first principal component of cognitive indicators, standardized to mean zero, standard deviation one. T-tests indicate that the differences in means are statistically significant for all socioeconomic categories. AEs = advanced economies; EMs = emerging markets.

Heterogeneity in cognitive health trends
(regression estimates, trend coefficient)



Sources: Gateway to Global Aging Data; national microdata sources; and IMF staff calculations.
Note: The figure shows estimates from ordinary least squares regressions of cognitive health score of individuals ages 50 and older on the survey year, by socioeconomic group, with individuals' age, gender, education, wealth, and country fixed effects controlled for. Squares represent point estimates, whereas surrounding bars represent 90 percent confidence intervals. Cognitive health score is the first principal component of cognitive indicators, standardized to mean zero, standard deviation one. AEs = advanced economies; EMs = emerging markets.

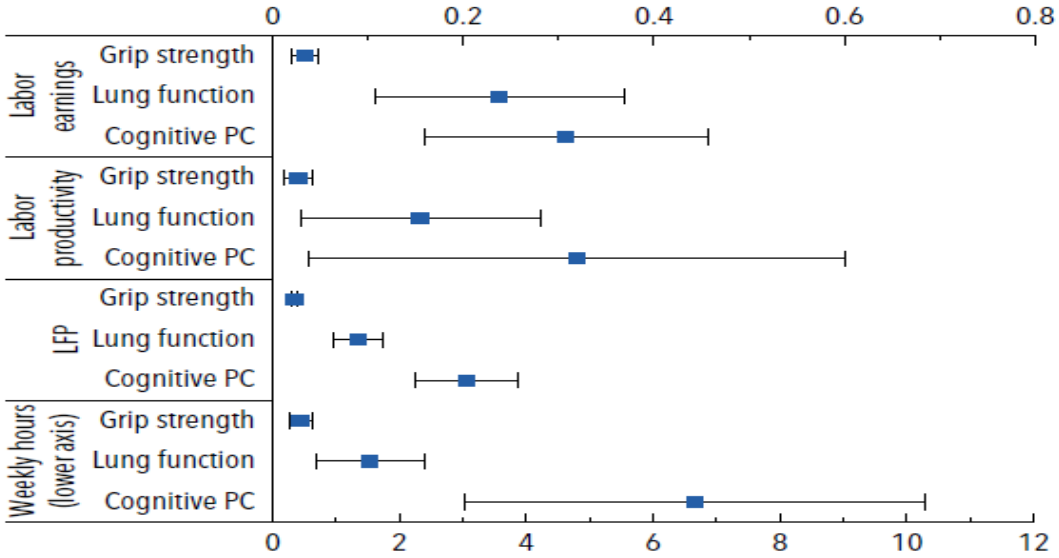
Does healthy aging improve labor market outcomes for older workers?

Better health is associated with higher:

- Labor earnings: Total earnings and labor productivity (hourly wage).
- Labor supply: Extensive margin (LFP, work, unemployment, retirement age) and intensive margin (hours/weeks worked).

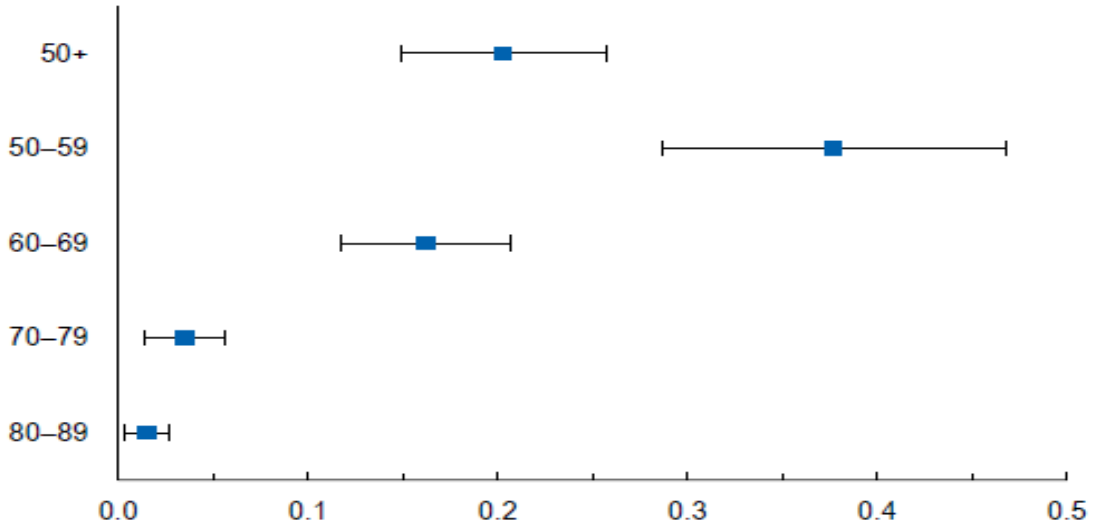
IV assumption: Some chronic diseases cases are random (controlling for health behaviors – exercise, BMI, smoking, drinking).

Effect of healthy aging on labor market outcomes
(regression coefficients)



Sources: Gateway to Global Aging Data; national microdata sources; and IMF staff calculations.
Note: The figure shows estimates from two-stage least squares regressions of labor market outcomes of individuals ages 50 and older on health indicators (one at a time, instrumented by chronic diseases), with individuals' age, gender, education, wealth, and country fixed effects controlled for. Squares represent point estimates, whereas surrounding bars represent 90 percent confidence intervals. The coefficients are rescaled to reflect the estimated impact of "healthy aging" (health trends) over 10 years. PC = principal components; LFP = labor force participation.

Heterogeneous effects of cognitive health on labor force participation, by age group
(regression coefficients)



Sources: Gateway to Global Aging Data; national microdata sources; and IMF staff calculations.
Note: This figure shows the coefficient from the second stage of a two-stage least squares regression of labor force participation (dummy variable) on the first principal component of cognitive health indicators, instrumented by the incidence of chronic diseases and with individuals' socio-economic characteristics (age, gender, education, wealth), lifestyle factors (underweight, obesity, physical inactivity, smoking), the survey year, and country fixed effects controlled for. Squares represent the point estimate whereas surrounding bars represent the 90 percent confidence interval. The coefficients are re-scaled to reflect the estimated impact of 'healthy aging' (health trends) over 10 years.