

Older People's Capacity to Work in Indonesia

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This study aimed to estimate the work capacity of older Indonesians based on their health condition and other characteristics. Two analytic methods were used in this analysis—the Milligan–Wise method and the Cutler–Meara–Richards–Shubik method—and they found relatively small and substantial additional work capacities, respectively. The results showed that mortality alone may not be able to explain the additional work capacity due to only small improvements in the health conditions of older people. The effect of poverty, the dominance of the informal sector, low educational attainment and skills, and inadequate government social protection and assistance were also responsible for the continued employment of older people until serious health conditions halted their economic activities. Thus, several features were highlighted in this study: (i) the feasibility of extending the pensionable age, (ii) flexible terms for a pension scheme for informal workers, (iii) improved health conditions by expanding the noncontributory health insurance, and (iv) upgraded skills for older workers.

Keywords: aging population, health, pension, skill, work capacity

JEL codes: I13, I18, J14, J21, J24, J26

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I. Introduction

Many countries are encountering issues associated with population aging, where the proportion of older people as a share of the total population is larger than the proportion of the productive-age population, causing an increase in the dependency ratio. In developed countries, a rapidly aging population is found to cause a shrinking labor force and a large fiscal deficit, given the high level of coverage of public pensions under the pay-as-you-go schemes (Usui, Satoshi, and Takashi 2016). To overcome this issue, the extension of the pension eligibility age is likely to promote older people to stay longer in the labor market, depending on their health conditions. Given the heterogeneity of health conditions among older people, their capacity to work also varies. Therefore, estimating the work capacity of older people is needed in the context of reviewing the extension of the pension age and other policy reforms.

Over the last 50 years, the number of older people (aged 60 years and over) in Indonesia has dramatically increased. Recently, their share of the total population rose from 7.6% in 2010 to 10.5% in 2022, with predictive estimates showing this to increase up to 19.7% by 2045 (Statistics Indonesia 2018, 2022).

Generally, older people in Indonesia have low educational attainment, with the majority having only an elementary school education or below (73.9%) (Statistics Indonesia 2022). This inadequate educational attainment has led to the non-absorbance of older people in formal employment during their productive ages (15–64 years according to Statistics Indonesia). In this case, long-term working performance was maintained due to inadequate living support and protection from old-age social security (Kudrna, Le, and Piggott 2021). According to Statistics Indonesia, older workers increased gradually from 46.3% in 2013 to 52.6% in 2022. However, many of them were informal workers (86.2%) with low incomes (70.9%). These circumstances induced a higher poverty rate among older people (11.1%) than in the general population (9.4%) (TNP2K and SMERU 2020). They also struggle to meet their daily needs and retirement savings, indicating that “getting old before getting rich” is one of the biggest structural challenges in Indonesia (Vanhuyse and Goerres 2020).

Although Indonesia faces fiscal deficit challenges in financing civil servant pensions (Saputro 2020), the extension of the pension age alone is insufficient to address this issue since the majority of informal workers do not have a pension plan like those in developed countries where formal social security benefits are available to many workers (Putri and Sari 2021). This underdevelopment is observed in the present social security programs organized by the Social Security Agency for Employment (BPJS Ketenagakerjaan), where a low participation rate is found for both the formal and informal workers (Aryani et al. 2020).

This study aims to estimate the work capacity of older Indonesians according to their health conditions and other characteristics. Based on a fiscal-consolidation-driven extension of the mandatory pension age, estimations of work capacity can help to prevent inequality between healthy and unhealthy older people (Usui, Satoshi, and Takashi 2016). Two analytical techniques are employed: the Milligan–Wise (MW) and the Cutler–Meara–Richards–Shubik (CMR) methods, which are based on Milligan and Wise (2015) and Cutler, Meara, and Richards–Shubik (2013), respectively.

Having discussed the study's objective with a brief narrative and the policy framework of population aging in Indonesia, the rest of this paper is organized as follows. Section II explains the MW and CMR methods and the data used for the analysis. Section III provides the estimation outputs and simulations of the health capacity to work. Section IV expands the findings to country-specific analysis and discussion. Finally, section V concludes with a discussion of the results and related policy implications.

II. Methods and Data

A. The Milligan–Wise Method

The MW method examines the extent to which people with a given mortality rate could work today if they were to work as much as those with the same mortality rate in the past (Milligan and Wise 2015). Thus, we examined the health capacity to work of older people in Indonesia based on this method, limiting older people in this analysis to those aged 50–69. In this study, the 2000 and 2019 World Health Organization (WHO) Global Health Observatory (GHO) mortality data for the available age groups were utilized,¹ as opposed to the Life Tables mortality data. This is because the single-age Life Tables generated by the population census were only available for 2000 (Statistics Indonesia 2011) since the 2020 data were unavailable due to the coronavirus disease pandemic. Discrepancies were observed when Life Tables mortality data were plotted with the 2019 GHO data (Table A4 of the Appendix).² Therefore, the GHO mortality data was preferred for the MW method. Meanwhile, the life expectancy data

¹World Health Organization. Global Health Observatory. <https://www.who.int/data/gho/data/indicators/indicator-details/GHO/gho-ghe-life-tables-nmx-age-specific-death-rate-between-ages-x-and-x-plus-n> (accessed 20 June 2022).

²To view all appendixes, please refer to the supplemental materials that are available at: <https://www.worldscientific.com/doi/suppl/10.1142/S011611052440002X>.

were also available for various age groups (e.g., 50–54 and 55–59) from the 2000 and 2019 GHO data (footnote 1), leading to the interpolation of the information to obtain single parameters.³

Employment data were derived from the 2001 and 2020 National Socioeconomic Surveys (SUSENAS) (Statistics Indonesia 2001, 2020), which are a series of large-scale socioeconomic surveys that encompass various indicators for multianalysis purposes.⁴ Initially conducted in 1963 and subsequently every 1–2 years, SUSENAS surveys typically cover a national representative sample comprising at least 200,000 households since 1993 (Surbakti 1995). Starting in 2015, SUSENAS surveys were organized twice a year in March and September (Statistics Indonesia 2018).

We also examined the employment rate and another measure of health using life expectancy. The data on employment rate and life expectancy are based on the 2001 and 2020 SUSENAS and 2000 and 2019 GHO data, respectively.⁵ The data were appropriately interpolated through an interpolation method to generate single-age data (footnote 3). In addition to the analysis of capacity to work using the MW method, we also used the same method to examine labor force participation (Statistics Indonesia 2005–2022) and health data (Statistics Indonesia 2001, 2020; WHO [footnote 1]) in Indonesia to provide a brief overview of the trends and an overview of the relationship between mortality and another measure of health in the review period.

The cross-country analysis by Milligan and Wise (2015) focuses on developed countries and uses data from 1957 to 2007 both in terms of mortality and employment. In comparison, the focus of analysis of this paper is a developing country using a shorter time period (approximately 20 years) with data provision limitations as described above.

B. The Cutler–Meara–Richards–Shubik Method

The CMR method explores the extent to which people with a given level of health could work if they were to work as much as their younger counterparts with

³Data were interpolated using an interpolation command, *mipolate*, for the missing values in Stata 14 in conjunction with spline method to perform a natural cubic spline interpolation, which is commonly used to construct new points within the boundaries of a set known point (Cox 2016).

⁴Following the International Labour Organization guidelines, an employed person is defined as those aged 15 years and over who report that they participated in paid work or uncompensated family business for at least 1 hour in the previous week or who had a job but were absent from work during the reference week.

⁵Life expectancy is the average number of years of life a person who has attained a given age can expect to live as defined by the Center for Disease Control and Prevention. Life Expectancy. <https://www.cdc.gov/nchs/nvss/life-expectancy.htm> (accessed 21 March 2023).

similar health (Cutler, Meara, and Richards-Shubik 2013). In this study, the relationship between the health and employment of those aged 50–54 years is estimated through regression analysis. Since the earliest mandatory pension age for most formal workers in Indonesia in 2014 was 56 years, the selected baseline age is 50–54 years. Subsequently, we combined the coefficients from the regression analysis with the actual characteristics of those aged 55–79 to simulate the work capacity.

Regression analysis was employed with a binary of employment status serving as the dependent variable. This variable equals 1 if the individual was employed during the last week, based on the definition of employment by Statistics Indonesia. Meanwhile, the independent variables were a set of health measures encompassing functional limitations, the prevalence of health conditions, risk factors, and individual demographic characteristics divided into three specification models. Logistic regression was employed for work capacity simulation to ensure that the probability of labor participation is bounded at the maximum of 100%.

There were three standard models employed. First, model (0) was the most parsimonious one. In this model, several features were used: (i) self-reported health; (ii) four items of activities of daily living (ADL) impairment for functional limitation, including walking, dressing, bathing, and eating (ADL-1); (iii) the number of illnesses for the prevalence of health conditions, involving diabetes, hypertension, and heart diseases; (iv) smoking status for risk factors; and (v) individual characteristics consisting of marital status, area (urban or rural), and provincial region as the control variables.

Second, all the variables used by the previous model were used in model (1), except for the number of illnesses. This led to subsequent extensions with some variables in each health measure. In this case, each of the three diagnosed illnesses—diabetes, hypertension, and heart disease—was implemented as an independent variable. Furthermore, depressive symptom variables were added through the 10-item Centre for Epidemiological Depression Scale assessment tool. Given that the maximum score of each item is 3, the maximum total score for this assessment tool is 30. However, the optimum cut-off point for older people to be addressed with depressive symptoms is 10 (Fu, Si, and Guo 2022). Educational attainment was also included in the model as a control variable of individual characteristics.

Third, model (2) was used to explain more about specific conditions, through some modified and additional variables. This model was supported by the addition of two ADL impairment items—toileting and getting out of bed—and addressed as ADL-2. Some variables related to functional limitations were also provided, including (i) five items of instrumental activities of daily living impairment (grocery shopping,

meal preparation, medication, household chores, and managing money); (ii) visual impairment; (iii) hearing impairment; (iv) physical limitations; and (v) cognitive impairment. Cognitive impairment was assessed using Modified Telephone Interview for Cognitive Status, according to the data availability in the Indonesian Family Life Survey (IFLS) (Strauss, Witoelar, and Sikoki 2016). Regarding the prevalence of health conditions, some diagnosed illnesses—such as cancer, asthma or lung disease, and arthritis—were also included in the analysis. Moreover, obesity and ethnicity were added to risk factors and individual characteristics, respectively.

The predicted share of employed older people aged 55–79 was calculated by combining the regression analysis coefficients with the actual characteristics of individuals in each age group. The difference between the predicted and actual shares of employment is additional work capacity (Cutler, Meara, and Richards-Shubik 2013).

We used the IFLS Wave 5 data fielded in 2014 due to the methodological requirement of complex information. A sample of 3,021 men and 3,440 women aged 50–79 were used in the analysis. IFLS is a large-scale longitudinal survey providing the dynamics of behavior at the individual, household, and community levels (Witoelar, Strauss, and Sikoki 2009). It also provides a rich set of information on labor participation, demographic characteristics, and extensive health status measures, including self-reported health, symptoms, pain, chronic conditions, and physical and functional limitations (Strauss, Witoelar, and Sikoki 2016). The first wave, which was administered in 1993, represented 83% of the Indonesian population. A total of five IFLS waves have been fielded to date, with each successive wave expected to reinterview the same participants and their split-offs (Strauss, Witoelar, and Sikoki 2016).

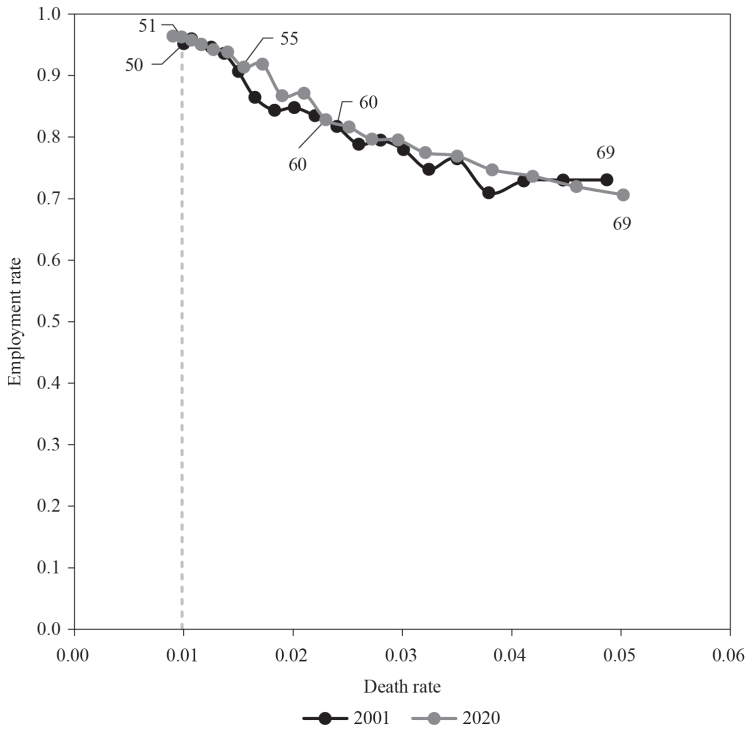
In this paper, we expanded the heterogeneity analysis to a subsample. In addition to gender and educational attainment, which have been included by Cutler, Meara, and Richards-Shubik (2013), we added the location of residence and job type in our analysis. These characteristics might cause some adjustments in the implementation of pension policy from developed countries and suggest the best policy alternatives for Indonesia.

III. Results

A. Older People’s Capacity to Work Using the Milligan–Wise Method

An overview of the Indonesian labor force participation and health data is presented in Figures A1–A3 of the Appendix (footnote 2). Figure 1 presents the employment and mortality rates of men in 2001 and 2020. In 2020, the employment

Figure 1. **Employment versus Mortality for Men**



Note: The employment rates shown in this graph refer to data in 2001 and 2020, while the mortality rates refer to data in 2000 and 2019.

Sources: World Health Organization. Global Health Observatory Data Repository. <https://www.who.int/data/gho/data/indicators/indicator-details/GHO/gho-ghe-life-tables-nmx-age-specific-death-rate-between-ages-x-and-x-plus-n> (accessed 20 June 2022); Statistics Indonesia (2001, 2020).

rate for 51-year-old men was about 96% and the mortality rate was 1%. In 2001, 50-year-old men had a mortality rate of 1% and an employment rate of 95%. Therefore, if men in 2020 had the same employment rate as they did in 2001, as well as the same mortality rate, the employment rate of 51-year-olds would have been 1 percentage point lower, which implies a higher employment rate in recent years than in 2001. We extend the calculation through age 69.

Table A5 of the Appendix illustrates how much more men in 2020 aged 50–69 could have worked if they had worked as much as men with the same mortality rate who worked in 2001. The mortality–employment rate curve for men in 2001 lies below that for 2020, with the gap between the curves being relatively small. At most ages, the employment rate in 2020 was higher than in 2001—except for the ages 50, 52, 53, 54, 58, 60, 62, and 68. At an age of 50, an additional 0.6% of men could have

worked for an additional 0.006 years, while at an age of 68, an additional 1.1% of men could have worked for an additional 0.011 years. We repeated the calculation for each age through 69 and cumulated the amounts to generate an estimated total amount of additional employment capacity. When men in 2020 worked as much as those in 2001 with the same death rates, the total gain in work capacity was -0.2 years. We also estimated the average length of employment, which denotes the number of years worked over the age range (Milligan and Wise 2015), by calculating the total employment rate of those aged 50–69. As the average length of employment between the ages 50 and 69 in 2020 is 17 years, the -0.2 years represent 1.2% less employment capacity than those who worked in 2001.⁶

Over almost 2 decades, the gain in the ages of equivalent mortality was around 1 year for men aged 50–62, while the ages of equivalent mortality of men aged 63–66 were equal to zero, demonstrating a small improvement in health. Data also showed that the mortality rate increased for those over the age of 67 in 2019, as depicted in Figure A2 of the Appendix. Besides the rising number of estimated deaths among men over the age of 60 in 2019 reported by the Global Health Estimates, the same analysis also documented an increase in estimated disability-adjusted life years,⁷ which was caused by noncommunicable diseases among the same age group in 2019, compared to 2000. This evidence might justify the reasons the health of Indonesian men deteriorated in the last 2 decades. However, recent-year men worked more than their comparison-year peers despite having worse health according to the mortality data. There are probably other determinants besides health that could explain this anomaly, such as job market and policy differences. For example, the analyses conducted by Milligan and Wise (2015) and others (see, for example, García-Gómez, Jimenez-Martin, and Castelló 2016; Usui, Satoshi, and Takashi 2016; Milligan and Schirle 2018) demonstrate significant results on work capacity being extended over a longer time period than found in this analysis. These works focus on developed countries with relatively strong economic growth and developed infrastructure, advanced technology in various areas such as health care, and more resources available for citizens, which could explain the greater health improvements shown in their studies than in our study. Moreover, social security policy revisions in developed countries provide benefits to workers that induce earlier retirement and contribute to a decline in

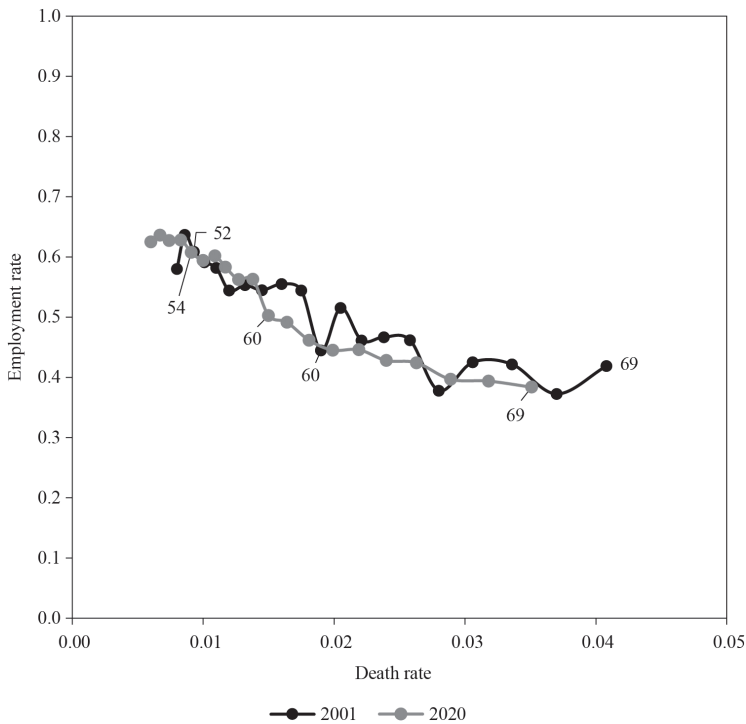
⁶To account for the impact of the 1997/98 Asian financial crisis on the Indonesian working population, we included negative additional working capacity in the calculation of total working capacity.

⁷World Health Organization. Global Health Estimates: Leading Causes of DALYs. <https://www.who.int/data/gho/data/themes/mortality-and-globalhealth-estimates/global-health-estimates-leading-causes-of-dalys> (accessed 2 March 2023).

labor participation (Gruber and Wise 2000). This situation is less likely to be found in developing countries like Indonesia where very high informal employment is in place and similar policy provisions are still developing, resulting in a relatively constant rate of old-age employment.

Figure 2 shows the adoption of a similar approach used in Figure 1 to obtain the relation between employment and mortality for women in 2001 and 2020. In 2020, a 54-year-old woman had an employment rate of 61%, while the mortality rate at this age was 0.9%. In 2001, the mortality rate of a 52-year-old woman was 0.9% and the employment rate was 62%. Thus, if women in 2020 had the same employment rate as they did in 2001 with the same mortality rate, the employment rate of 54-year-olds would have been 1 percentage point higher. Similar to the calculation for men, we also

Figure 2. Employment versus Mortality for Women



Note: The employment rates shown in this graph refer to data in 2001 and 2020, while the mortality rates refer to data in 2000 and 2019.

Sources: World Health Organization. Global Health Observatory Data Repository. <https://www.who.int/data/gho/data/indicators/indicator-details/GHO/gho-ghe-life-tables-nmx-age-specific-death-rate-between-ages-x-and-x-plus-n> (accessed 20 June 2022); Statistics Indonesia (2001, 2020).

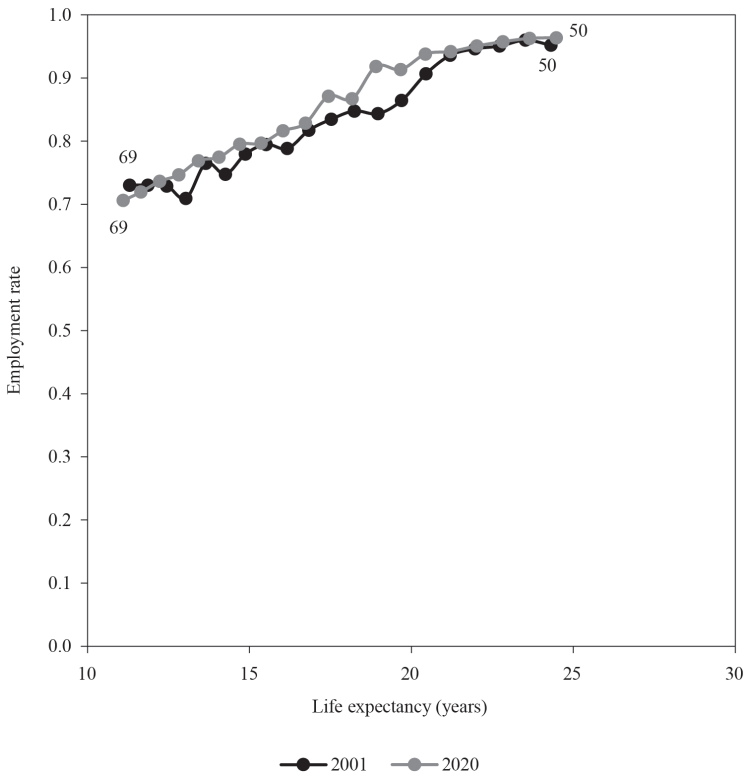
extend the calculation here through age 69. Table A6 of the Appendix shows how much more women aged 50–69 could have worked in 2020 if they had worked as much as the women with the same mortality rate who worked in 2001.

In contrast with the employment–mortality curve for men, a few points along the curve in 2001 were above the 2020 curve, with some distinct gaps between both representations, which potentially reflected positive additional capacity to work. All values of the additional employment capacity were positive, except at the ages 51–53, 55–59, and 67. Since the average employment length of women aged 50–69 in 2020 was 10.4 years, the 0.2 years obtained represented a 2% increase in employment capacity over those working in 2001.

Figures 1 and 2 depict the instability of the employment–mortality profiles for men and women, although the 2020 curves were more stable than the 2001 curves for both of them. One plausible explanation is that Indonesia was still recovering from the 1997/98 Asian financial crisis in 2001, which collapsed economic growth to –13.7% in 1998 (Tambunan 2010). In the aftermath of the crisis, unemployment increased following the closure of many domestic companies (Nagib and Ngadi 2008, Tambunan 2010). Furthermore, IFLS data stated that slightly more men and a larger proportion of women were working in 1998 than in 1997, particularly as unpaid family workers, which probably resulted from limited working opportunities in sectors affected by the crisis (Frankenberg, Thomas, and Beegle 1999). There was also a declining share of men with an additional job, from 23% in 1997 to 17.8% in 1998, specifically in rural areas, reflecting the changes in labor demand. On the other hand, after 1997, more women in urban areas were found to have secured a second job. The situation was subsequently followed by political changes after the fall of the New Order regime that allowed change in leadership and economic policymaking since the former President Soeharto and his supporters no longer controlled the Indonesian economy (Smith 2003). These factors probably led to abnormal labor force participation trends due to the scarce working opportunities in 2001.

Figures 3 and 4 illustrate the relationship between the employment rate and life expectancy for men and women, respectively. The employment rate for men showed a stable declining pattern between the ages of 50 and 69 in both 2001 and 2020. Meanwhile, the curve of employment versus life expectancy in 2020 was located slightly higher than in 2001. Men’s health, as represented by life expectancy, was mostly similar in 2000 and 2019, indicating only a small health improvement. For women (Figure 4), the employment trend was relatively similar to that of men, with minor fluctuations observed in 2001. In general, the life expectancy of women in

Figure 3. **Employment Rate versus Life Expectancy for Men**



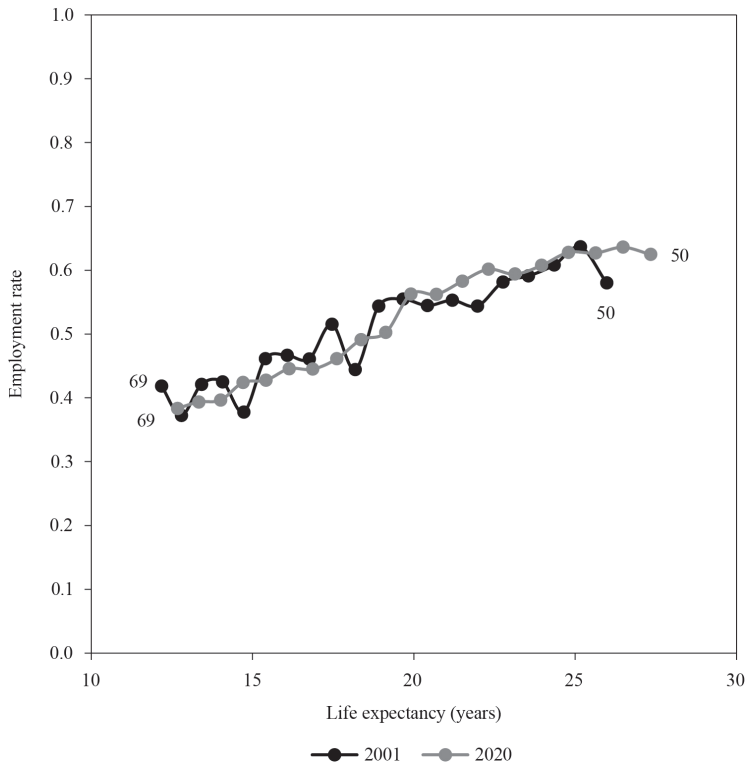
Note: The employment rates shown in this graph refer to 2001 and 2020, while the life expectancies refer to 2000 and 2019.

Sources: World Health Organization. Global Health Observatory Data Repository. <https://www.who.int/data/gho/data/indicators/indicator-details/GHO/gho-ghe-life-tables-by-country> (accessed 20 June 2022); Statistics Indonesia (2001, 2020).

recent years was higher than in earlier years, showing noticeable health improvement among women.

In conclusion, very small or even negative additional work capacity was observed using the MW method. In 2020, the estimated additional work capacities for men and women aged 50–69 were -0.2 years and 0.2 years, respectively, using 2001 as the base period. Women, on average, had shorter periods of employment than men, yet they had more potential to work longer since their mortality rate was lower and their life expectancy was longer than men.

Figure 4. **Employment Rate versus Life Expectancy for Women**



Note: The employment rates shown in this graph refer to 2001 and 2020, while the life expectancies refer to 2000 and 2019.

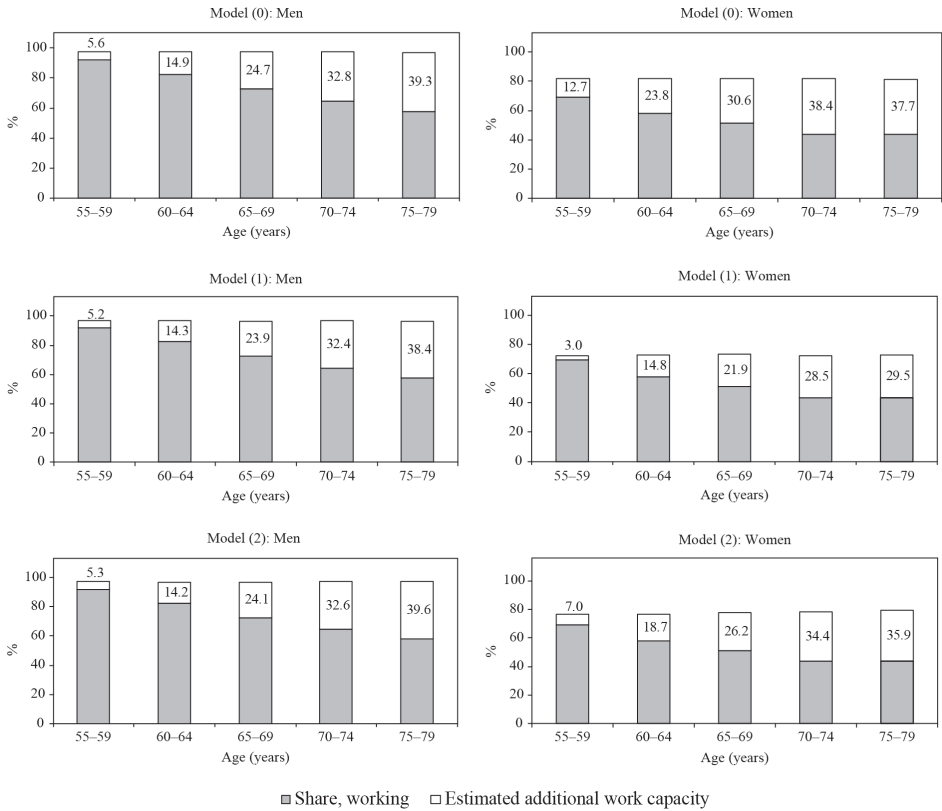
Sources: World Health Organization. Global Health Observatory Data Repository. <https://www.who.int/data/gho/data/indicators/indicator-details/GHO/gho-ghe-life-tables-by-country> (accessed 20 June 2022); Statistics Indonesia (2001, 2020).

B. Older People’s Capacity to Work Using the Cutler–Meara–Richards–Shubik Method

Figure 5 summarizes the simulation of the predicted and actual shares of employment, as well as the additional work capacity by gender and age groups.

Based on the results, all three models predicted that the share of employed men across all age groups was about 96%–97%. For example, for model (0), the predicted share of employed men was 97.4% at the ages 55–59, while this predicted share slightly declined to 97.1% at the ages 75–79. For the actual working share, 91.9% was achieved at the ages 55–59, with a drastic decline to 57.9% observed at the ages 75–79. This indicated that large work capacity increases of 5.6%–39.3% were

Figure 5. Simulation of Work Capacity by Gender and Age Group



Source: Authors’ calculations based on the 2014 Indonesian Family Life Survey Wave 5.

observed as the age increased. Similar conditions were also found with models (1) and (2). The same decreasing actual employment share and increasing additional work capacity trends were also found in the women’s sample.

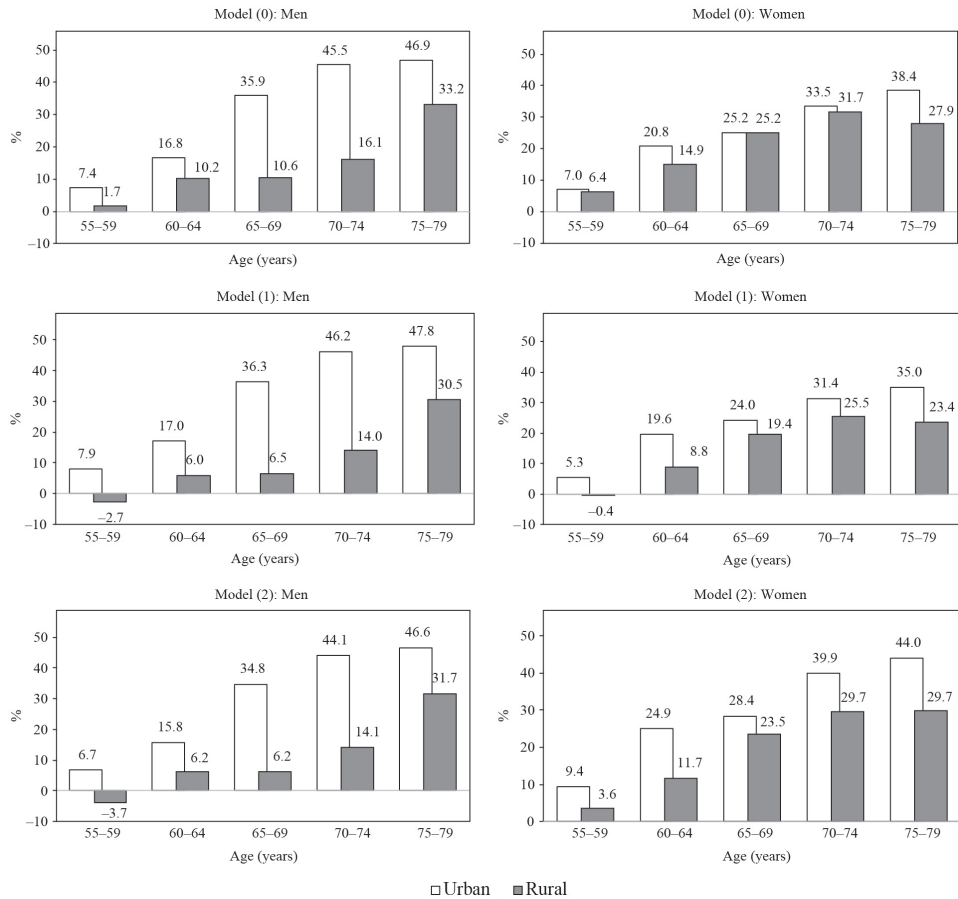
From the results, model (1) showed the lowest percentage of additional work capacity, compared to models (0) and (2). This was because model (0) essentially used ADL-1 and the total number of three diagnosed illnesses for functional limitation and prevalence of health conditions, respectively. These three illnesses were subsequently degraded for use in model (1), while providing depression and educational attainment variables. Model (2) also had the most implemented variables due to the addition of some functional limitations, prevalence of health conditions, and individual characteristics.

The location of residence, educational attainment, and type of job were also estimated as subsamples in this analysis. These characteristics might affect the differences in additional work capacity, with older Indonesian workers mostly

characterized by low levels of education and a concentration in informal employment—specifically in the agriculture sector, which is generally situated in rural areas (Hanri 2018)—despite most of the samples of this study living in urban locations. Furthermore, educational attainment and type of job were constructed by recategorizing some IFLS variables. For educational attainment, two categories were implemented: (i) elementary school and below, and (ii) middle school and above. For the job type variable, formal workers were considered to be either government or private employees, while informal workers served as either self-employed, casual, or unpaid workers.

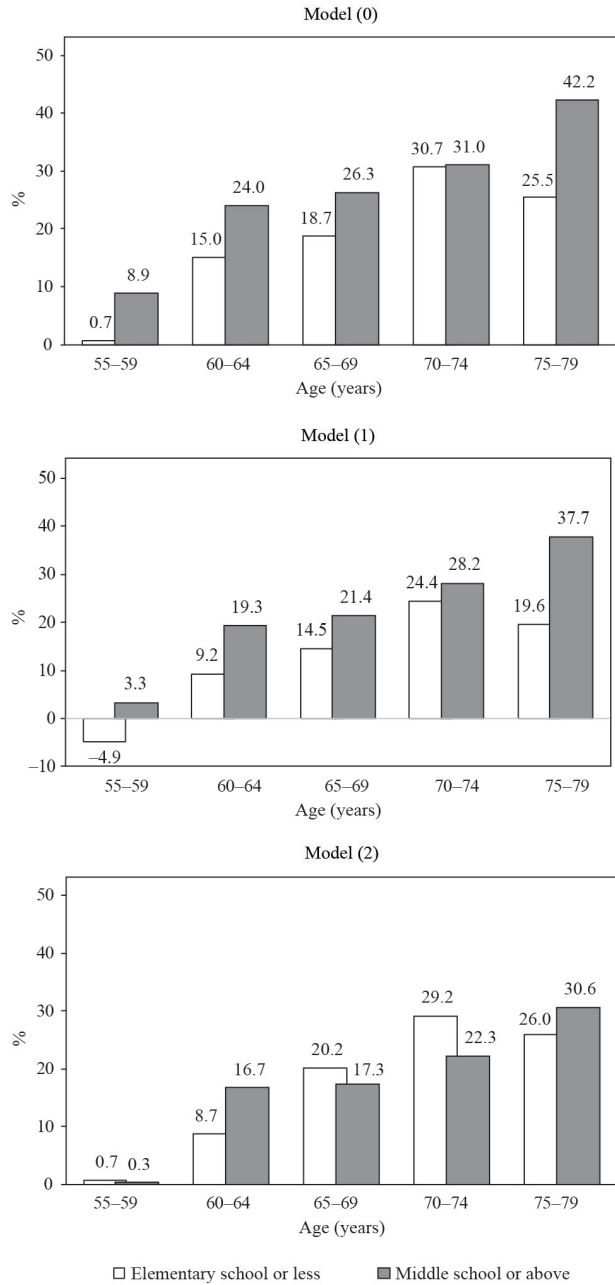
Figure 6 presents the simulation of work capacity by gender, age group, and the location of residence. From this context, both men and women showed that the actual

Figure 6. Estimated Additional Work Capacity by Gender, Age Group, and Location of Residence



Source: Authors' calculations based on the 2014 Indonesian Family Life Survey Wave 5.

Figure 7. **Estimated Additional Work Capacity of Women by Age Group and Educational Attainment**

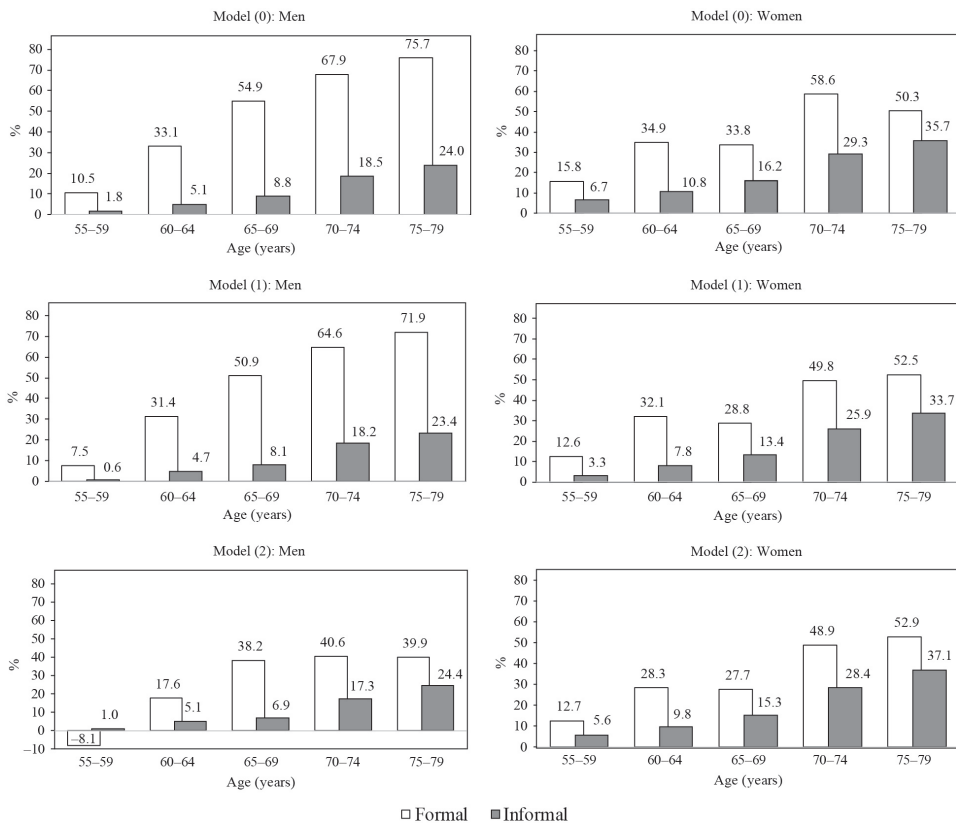


Source: Authors' calculations based on the 2014 Indonesian Family Life Survey Wave 5.

working share in rural areas was higher than that in the urban areas. Based on the predicted working share, a large difference was also observed in the estimated additional work capacity between urban and rural workers, except for women in model (0). In Figure 6, men in urban areas had large additional work capacity, ranging from 6.7% to 47.8%, while those in rural locations exhibited between -3.7% and 33.2% additional work capacity. The women’s sample in model (0) did not indicate much additional work capacity difference between rural and urban workers in any age group. Meanwhile, higher additional work capacity in urban areas was reflected in models (1) and (2).

Figure 7 shows the additional work capacity of women by age group and educational attainment. Unfortunately, regression analysis using the men’s sample by educational attainment does not produce a robust estimation since many variables were

Figure 8. **Estimated Additional Work Capacity by Gender, Age Groups, and Type of Job**



Source: Authors’ calculations based on the 2014 Indonesian Family Life Survey Wave 5.

omitted due to multicollinearity and “predict success/failure perfectly.”⁸ Thus, we could not use the regression coefficients to calculate the work capacity of men by educational attainment without risking a misleading simulation.

Meanwhile, almost all age groups in the women's sample exhibited positive additional work capacity, except for model (1). For women who completed only elementary school or less and middle school or above, the estimated additional work capacities ranged between -4.9% and 30.7% and between 0.3% and 42.2% , respectively. This indicated that substantially higher work capacity was observed among women who had at least completed middle school, except for the ages 70–74. Nonetheless, model (2) indicated the opposite outputs for the ages 55–59, 65–69, and 70–74, where women who completed elementary school or less had less additional capacity to work.

The estimation of job types is presented in Figure 8. The two categories of job type showed substantial differences in additional work capacity. This indicated that formal workers had larger capacities than informal workers, except for those aged 55–59, who exhibited negative values through model (2). In this case, the work capacity values of men working in the formal and informal sectors, respectively, were between -8.1% and 75.7% and between 0.6% and 24.4% . For women, these ranges were 12.6% – 58.6% and 3.3% – 37.1% , respectively.

IV. Country-Specific Analysis and Discussion

We have examined older Indonesians' health capacity to work by using the MW and CMR methods. This study showed that (i) potential additional work capacity was present among the Indonesian older people; (ii) health, as indicated by the mortality, was unlikely to be the only factor affecting work capacity in Indonesia; and (iii) the type of job influenced the size of additional work capacity. We elaborate each of our main findings accordingly to explain their respective meaning and importance.

First, additional work capacity was found to be available for older people despite the difference in both methodological outputs. Based on the MW method, a very small work capacity was highlighted, affected by the 2001 data when the country was still recovering from the 1997/98 Asian financial crisis. Meanwhile, the CMR method demonstrated a substantial increase in work capacity among the older Indonesian

⁸The “predict success/failure perfectly” warning in data analysis process using the statistical software (Stata 17) informs of a potential error in logistic regression caused by certain characteristics in the data. The error creates a misleading interpretation of the results.

workers. For example, the MW- and CMR-derived additional work capacities for men aged 55–59 ranged from –5.4% to 0% and from 5.2% to 5.6%, respectively. This capacity gap was even bigger for the 65–69 age group, where the MW and CMR methods generated additional work capacities ranging from –3.7% to 1.1% and from 23.9% to 24.7%, respectively. Since the MW method only used mortality to predict the work capacity, the CMR-based data are emphasized more in the discussion.

As shown in Figure A1 of the Appendix, the labor force participation rate of older women was generally lower than that of men. This was because women are often expected to care for their families and children given the Indonesian gender roles (Schaner and Das 2016). When family members of productive age are present in the home with children, women are expected to play the role of caretaker due to unavailable or limited childcare services. In addition, adult Indonesian children commonly depend on their grandparents for childcare when they are employed (Fauziningtyas et al. 2019).

Given the additional work capacity found in this study, an extension of the mandatory pension age would be feasible. The Government of Indonesia started to extend the base retirement age for administrative officials from 56 years old to 58 years old in 2014, while the higher-level government employees have pension eligibility ages of 60–65 depending on their position. In addition, the mandatory pension age for formal private workers was increased from 56 years old to 58 years old in 2022. This was expected to increase by 1 year every 3 years until reaching the age of 65.

With regard to the extension of the retirement age, Saputro (2020) stated that it should be adjusted in accordance with the inflation index to preserve fiscal sustainability under the pay-as-you-go pension scheme. Adjustments to the pension age should also carefully examine domestic trends in old-age financial security to ensure older people's well-being once they retire. Aside from the pension program, the government launched the Old-Age Security Program (JHT), which is implemented by the BPJS Ketenagakerjaan. Compared to a pension system paid out monthly, JHT is an accumulation of all contributions provided by workers or employers that is only paid out when workers reach the pension age, live with permanent disability, or pass away. The program is available for both formal and informal private workers, although most informal workers are unable to afford the stipulated contribution fee due to their low incomes.

Second, the differences between the MW and CMR methods indicate that mortality was likely not the only factor affecting work capacity. Other factors such as poverty, low educational attainment, the domination of informal employment, and the lack of government social protection might also facilitate old-age employment.

As indicated by Figures A2 and A3 of the Appendix, both older men and women experienced a slight decline in mortality over time, proving that health conditions have improved. However, regarding the prevalence of chronic diseases among older cohorts (Ministry of Health of Indonesia 2013, 2019), these figures showed a marginally higher morbidity rate among women than men (Statistics Indonesia 2022). The proportion of those reporting poor health also did not change much over the last 15 years of the review period (Witoelar, Strauss, and Sikoki 2009), with half of the Indonesians continuing to work into old age (Statistics Indonesia 2022).

In developing countries such as Indonesia, many people are often unaware of their chronic health problems due to the high proportion of underdiagnosed chronic diseases (Ministry of Health of Indonesia 2019, Widyarningsih et al. 2022). Moreover, older people tend to resume their daily activities when they are not deeply affected by health problems (Van Eeuwijk 2003). This explains why older people in Indonesia continued to work despite having an illness or other health problems.

Poverty is another factor capable of influencing old-age employment, while no significant change was observed in the old-age poverty rates from 2007 to 2012 (Priebe 2017). The observed rates gradually, but steadily, increased with age. Furthermore, the poverty rates of older men and women are higher than those of the general population (Priebe 2017), with a recent study corroborating the state of old-age poverty among older Indonesians (TNP2K and SMERU 2020). Poverty status was also considered as one of the drivers for older people to continue working (Putri and Sari 2021).

To enhance the health and life quality of older people, access to medical services needs to be improved. Given the high poverty rate among older people, the noncontributory Healthy Indonesia Card (KIS) beneficiaries should be expanded.⁹ In 2022, the utilizations of KIS for outpatient and inpatient care among the lowest 40% of older income earners reached 82.5% and 82.4%, respectively (Statistics Indonesia 2022). Moreover, health-care services dedicated to older people are not yet prioritized in the Community Health Services program, or Puskesmas, leading to nonoptimal quality of services.

Third, less additional work capacity was identified among informal workers than formal ones. Informal work is defined as own-account work, self-employed with workers and self-employed with unpaid family workers or temporary workers, casual workers in agriculture or nonagriculture, and unpaid family work (World Bank 2016). Most informal workers are unable to afford old-age social security contributions,

⁹KIS is a noncontributory health insurance program managed by BPJS Kesehatan.

leading to continued work participation at older ages. Furthermore, informal employment has a similar impact on work as do low educational attainment and income, as observed in the samples of this study. This is also in line with Kudrna, Le, and Piggott (2021), who found that low educational attainment and informal employment caused older people to continue working due to a lack of old-age social protection.

The majority of older Indonesian workers are employed in the rural agriculture sector, earn a low wage, and need to continue working to meet their daily needs (Putri and Sari 2021). This explains why the additional work capacity of urban men and women is greater than that of rural residents. Based on the results, two problems were addressed related to our third finding, particularly social protection and skill upgrading for older workers. Government programs such as pensions, health insurance plans, and savings were able to mitigate old-age poverty in many Organisation for Economic Co-operation and Development countries (Whitehouse 2000; Bloom, Jimenez, and Rosenberg 2011). Unfortunately, similar programs have not encompassed all older Indonesians in need, as pensions are only provided to those predominantly engaged in formal employment. Only 8.5% of Indonesian households with older members are covered by a pension, with the majority of older people (86.2%) being informal workers (Statistics Indonesia 2022). Additionally, approximately 27% of older people do not have national health insurance (Statistics Indonesia 2022).

The Government of Indonesia has attempted to address this issue by providing social assistance to older poor people through conditional cash transfer programs such as the Family Hope Program and Rehabilitation Assistance for Older People, the latter of which provides 200,000 Indonesian rupiah (Rp) (\$13.16) monthly. However, its coverage is very low at only around 14% of older Indonesians, with insufficient amounts provided to meet daily needs. According to Cameron and Cobb-Clark (2008), there is little evidence to support family transfers substituting for labor income among older people, perhaps due to the small transfer amounts and/or the unpredictable schedule of transfers. Therefore, the pension system in Indonesia will not meet its role in providing wide coverage of social protection if a significant increase is not realized in the participation of informal workers.

Pension program participation needs to be increased to improve social protection coverage. The participation of informal workers in JHT was low for several reasons, including low program awareness (Aryani et al. 2020). Informal workers may also object when required to contribute when earning insufficient incomes (Adillah and Anik 2015). Moreover, workers often lacked access to the pension plans organized by employers and financial institutions, possessed no official documents for policy

targeting, frequently switched jobs, and lived and worked in rural areas with inadequate financial infrastructure (Hu and Stewart 2009). They may also originate from lower-income and less educated groups, leading to limited knowledge of pension and savings products, as well as finite resources intended for long-term savings. With these constraints, the expansion of informal worker participation in the pension system will be very challenging.

To integrate informal workers into structured pension systems, the introduction of flexible terms is a very important step, such as a flexible contribution percentage or agricultural payment period as is being implemented in the People's Republic of China, Türkiye, and Chile (Hu and Stewart 2009, Peksevim and Akgiray 2019). The adjustment of the nominal contribution as a proportion of income is also a problem-solving option. The government may provide subsidies to workers with low incomes through matching program schemes, which decrease gradually in proportion to salary growth (Saputro 2020).

According to the 2020 Occupational Employment Outlook, the workforce in Indonesia is becoming better educated and more skilled, although some signs of skill mismatches are emerging (World Bank and Kementerian PPN/Bappenas 2020). This gap ensured the failure to enter middle-class jobs that support decent work. Since this type of older worker is common in Indonesia, upgrading their skills is important to promote careers for formal workers and entrepreneurship for informal workers. This should be implemented by offering specific training to older people in targeted groups suited for jobs with high absorptency and/or entrepreneurship. For example, the government's *Kartu Prakerja* program provides vouchers for training courses for job seekers among those aged 18–64 years who are not enrolled in any formal education. In 2022, the program raised its maximum age for eligibility in the program to 64 to increase the participation of older people.

Limitations

Potential caveats accompany this study, particularly concerning data provision. The MW method recommends implementation of the Life Tables mortality data, which typically provide data for single years. Since the required data were limited, the GHO information was alternatively used and interpolated to generate single-year data because of its availability across age groups. There is also a potential bias of employment data in 2001 and 2020, when the lingering impact of the 1997/98 Asian financial crisis and the onset of the coronavirus disease pandemic, respectively, may have affected the employment in these years.

For the CMR method, the IFLS Wave 5 data obtained in 2014 are a bit outdated to depict the current situation. Moreover, our data used employment measures as “working at least one hour per week,” which potentially led to excess older workers, including casual workers who only work for a few hours per week and at irregular intervals. More precise measures of employment such as the number of working hours may be useful for further research. Furthermore, Indonesia needs more comprehensive data for older people, such as updated IFLS and Life Tables, to support future analyses.

V. Conclusion and Policy Implications

The MW and CMR methods were employed to measure work capacity and generate different additional capacities, leading to the consideration of three main findings. First, while the two methods produce different results, substantial additional work capacity is indicated with the more complex variables used by the CMR method. Second, the MW method predicts small additional work capacity since mortality may not be the only predictor of employment status and because the 2001 base data may have been affected by the impact of the 1997/98 Asian financial crisis. Additionally, there is only slight improvement observed for health conditions. Thus, poverty, low educational attainment, the dominance of informal work, and the lack of government social protection contribute to the continued work participation of older people until the emergence of serious health conditions. Third, the predominance of informal workers with low pension coverage needs to be addressed.

From these findings, some policy recommendations emerge. The extension of the mandatory pension age is feasible. However, the extension should be adjusted with regard to fiscal capacity. Another issue that needs to be appraised if such a policy is to be applied is the challenge for the younger generation to find job opportunities if older people stay in the job market longer (Dai et al. 2022), even though this remains debatable (Böheim and Nice 2019).


Furthermore, as improved health status for older people is urgent, the coverage of KIS should be expanded to accommodate more underprivileged people, and programs and institutions should be strengthened at the community level. The collaboration of different stakeholders will be critical to realize this policy. For example, the Ministry of Social Affairs has the responsibility to update the data of KIS-eligible beneficiaries, while the Ministry of Health manages health programs for individuals and communities.


Based on the predominance of older informal workers, Indonesia needs to consider several strategies to improve social protection and support decent work through skill upgrading. Social protection should also be improved by increasing


pension coverage for informal workers. Therefore, the government needs to develop a pension system with flexible terms and matching program options to accommodate informal workers. This would require low-wage informal workers to make some contribution, with the government paying the rest. The precise proportion should be calculated carefully, considering employment conditions, government fiscal capacity, and sociodemographic factors. Thus, appropriate subsequent analysis is urgently needed. Lastly, since many older people are still working, the need to upgrade their skills is required through the provision of targeted training. The Kartu Prakerja program is a facilitative alternative to training due to its ability to support the careers of formal workers while leveraging the entrepreneurship skills for informal workers. For example, job seekers or workers who are already in the labor market may join a certified training that offers MS Office (or similar program) skill development to improve their competency, while informal workers can benefit from a development product training.

A final consideration for further research would be the use of more precise measures of employment, such as the number of working hours, to prevent overestimating the employment rate.

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Appendix

To view all appendixes, please refer to the supplemental materials that are available at: <https://www.worldscientific.com/doi/suppl/10.1142/S011611052440002X>.