

Short report

Employment status and self-rated health among Chinese middle-aged and older workers: results from a nationwide longitudinal study

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Abstract

Background: The ageing workforce in China posed a challenge to the healthcare and social systems. This study investigated the association between employment categories and self-rated health (SRH) among Chinese middle-aged and older adults.

Methods: We analysed data from baseline survey of the China Health and Retirement Longitudinal Study (14,445 participants aged 45 years and older). The association between employment status and SRH was analysed using multivariable logistic regression. Multiple imputation combined with inverse-probability weighting was performed to deal with missing covariate data and to account for complex survey design.

Results: The overall prevalence of poor SRH was 27.1%. After controlling for socio-demographic factors and health behaviours, adjusted odds ratios of poor SRH in non-agriculturally self-employed workers, agriculturally employed workers, and agriculturally self-employed workers were 1.49 (95% CI, 1.16-1.90), 1.58 (95% CI, 1.13-2.22), and 2.17 (95% CI, 1.76-2.68), compared to non-agricultural employees. The odds ratios of poor SRH were 2.61 (95% CI, 2.04-3.35) in non-agricultural retirees and 4.37 (95% CI, 3.41-5.59) in agricultural retirees.

Conclusion: There are pronounced differences in SRH between employment categories and between rural and urban residents. Chinese non-agricultural employees had considerably better health than other working groups.

What is already known on this topic

1. The literature shows that unemployment and precarious employment have a negative impact on self-rated health.
2. Urban-rural health inequities exist among China's older adults.
3. Health effect of retirement may depend on factors such as the retirement context, retirement timing, work characteristic, time spend in retirement, and the accumulation of advantages and disadvantages during the life course.

What this study adds

1. The prevalence of poor self-rated health was generally high. Among Chinese middle-aged and older workers, non-agricultural employees had considerably better health status than other working groups.
2. There are urban-rural differences in the association between employment status and SRH among Chinese middle-aged and older workers.
3. We found significant disparities between agricultural and non-agricultural retirees.

Introduction

An ageing workforce is becoming an important challenge globally [1]. In China, individuals aged 45 years or over are expected to account for 45% of working-age population by 2050 [2]. Meanwhile, labour force participation rates decrease dramatically in the mid-forties [3, 4], largely due to retirement [5, 6]. Under the delayed retirement policy which takes effect in 2025, the statutory retirement age will be gradually raised to 63 for males, and to 55 (blue-collar workers) or 58 (white-collar workers/cadres) for females over a 15-year period, with no set retirement age for farmers. This discrepancy contributes to differing labour force participation rates between rural and urban areas [6]. So far, there has been little information on the association between different types of employment and health.

Previous studies have highlighted the negative impact of unemployment and precarious employment on self-rated health (SRH) [7-10] while findings on the effects of retirement on SRH have been inconsistent [11], and reports have noted the urban-rural health inequality in China [12]. However, none of the studies examined the effect of specific employment categories (or types of participation in productive activities) on SRH in rural China, and no studies investigated the urban-rural differences in this association. To fill these gaps, this study investigates the association between employment status, including both agricultural and non-agricultural working status, and SRH using data from China Health and Retirement Longitudinal Study (CHARLS).

Methods

Study population

CHARLS is a nationally representative survey of Chinese community residents aged 45 years or over in 28 provinces of China [13]. It aims to provide longitudinal data covering both health measures and indicators of socioeconomic status (SES) of the middle-aged and older individuals to enable research of Chinese ageing population [13]. We used data from CHARLS baseline survey conducted

between 2011 and 2012. The analytical sample comprised 14,445 CHARLS baseline participants with non-missing employment status information and SRH information given without using a proxy. More details on CHARLS data are available at <https://charls.pku.edu.cn/en/> [13].

Variables

Employment status was divided into six categories: 1) non-agriculturally employed, 2) non-agriculturally self-employed or working for an unpaid family business, 3) non-agriculturally retired, 4) agriculturally employed, 5) agriculturally self-employed, and 6) agriculturally retired. Agricultural retirement was defined as not having engaged in agricultural work for more than 10 days in the past year, not having undertaken non-agricultural work for more than one hour in the past week, and not being on temporary leave. Additionally, participants must have worked for at least three months during their lifetime and must not have searched for a new job in the past month.

SRH was measured using a five-point Likert scale ranging from ‘very good’ to ‘very poor’; due to the small sample size in some SRH categories, SRH was dichotomised into ‘good or fair’ (‘very good’, ‘good’, ‘fair’) and ‘poor’ (‘poor’, ‘very poor’). This SRH measurement has good reliability in the Chinese population [14].

Covariates included age, sex, education, household wealth (quartiles), marital status, residence type defined by household registration status (urban, migrant, rural), region, smoking status, and alcohol consumption.

Missing data and multiple imputation

Twenty-nine percent (n=4,156) of the analytical sample had missing covariate data, primarily in the household wealth variable. The missing covariate data followed a multivariate non-monotone pattern, and multiple imputation by chained equations (MICE) was performed assuming data were ‘missing at random’ (MAR). To incorporate the complex survey features, MICE was combined with inverse-probability weighting by including sample weights in the imputation models to account for the concern about performance of Rubin’s rules [15-17].

Analytical models

To investigate the association between employment status and SRH, multivariable logistic regression models were estimated, controlling for socio-demographic factors and health behaviours. Covariates were added to the model using a forward stepwise approach. Attenuation was assessed for each model. Effect modification was identified by adding interaction terms with employment status. Results were adjusted for survey weights. All the analyses were performed using Stata/MP [18].

A sensitivity analysis was conducted in the full sample of 15,896 participants (i.e. including the 1,451 subjects who had missing data in either employment status or covariates) to investigate whether the association between employment status and SRH was affected by excluding participants with unclear employment status. An additional sensitivity analysis was performed on the subset of complete case data (n=10,289), intended to examine the potential impact of missing data on our findings.

Results

Of the 14,445 participants, 27.1% reported poor or very poor SRH (Table 1). Current workers account for 66% of the analytical sample (non-agricultural workers: 26%, agricultural workers: 40%) and retirees account for 34%. The prevalence of poor SRH was the lowest among non-agricultural employees (10%). Substantial differences in the prevalence of poor SRH were also seen by age group, sex, education, wealth, marital status, urban-rural areas and geography. Since adjusting for survey weights did not materially change the results, the unweighted percentages are shown.

Figure 1 shows the odds ratios of poor SRH by employment categories, after adjustment of age and sex and in multivariable models controlling for all covariates. Compared to non-agricultural employees, non-agriculturally and agriculturally self-employed workers had 1.76 (95% CI, 1.36-2.28, $p<0.001$) and 3.47 (95% CI, 2.83-4.25, $p<0.001$) times higher odds of poor SRH, respectively, while the odds ratios in non-agricultural and agricultural retirees were 2.14 (95% CI, 1.69-2.72, $p<0.001$) and 5.46 (95% CI, 4.27-6.98, $p<0.001$), respectively.

The associations between employment categories and SRH remained significant after full adjustment (adjusted for age, sex, education, household wealth, marital status, residence type, region, smoking status, and alcohol consumption). In the fully adjusted model, compared to non-agricultural employees, non-agriculturally self-employed workers, agriculturally employed workers, and agriculturally self-employed workers had 1.49 (95% CI, 1.16-1.90, $p < 0.05$), 1.58 (95% CI, 1.13-2.22, $p < 0.05$), and 2.17 (95% CI, 1.76-2.68, $p < 0.001$) times the odds of poor SRH, separately, and non-agricultural and agricultural retirees had 2.61 (95% CI, 2.04-3.35, $p < 0.001$) and 4.37 times (95% CI, 3.41-5.59, $p < 0.001$) the odds of poor SRH, respectively. While the odds ratios for most employment categories seemed larger in agricultural sector in age-sex adjusted model, this difference disappeared after controlling for other covariates (p for interaction with urban/rural residence was 0.34).

Results were similar when imputing employment status and in the complete case analysis. Overall, no major differences were observed between the main analysis and the sensitivity analyses.

Discussion

Main findings

In this nationally representative study of Chinese middle-aged and older adults, we found considerable differences in SRH between employment categories. Compared to non-agricultural employees, non-agriculturally self-employed workers (or those working for unpaid family business) and agricultural workers had increased odds of reporting poor SRH. The magnitude of the differences was large: after full adjustment, non-agricultural and agricultural retirees had 2.6 and 4.4 times the odds of reporting poor SRH compared to non-agricultural employees, respectively.

It is interesting that adding additional covariates (including wealth) to the age-sex adjusted model made substantial but far from complete attenuation of the differences in SRH between employment categories. This suggests that, particularly

for the agricultural categories (largely corresponding to rural settings), other factors have strong effect on population health.

Comparison with previous findings

Previous studies reported urban-rural health inequality in China [12]. In the current research, the prevalence of poor SRH was very high in general, in line with previous studies, and it was higher in rural residents than urban residents and higher in agricultural workers than non-agricultural workers. We found major disparities between agricultural and non-agricultural retirees. Compared to the whole sample, agricultural retirees were more likely to be rural or migrant residents and had lower education levels, whereas non-agricultural retirees were more likely to be urban residents and had higher education levels.

Existing evidence from Chinese cohort studies on the effect of retirement on perceived general health was conflicting [11], with potential differences in the effects of voluntary retirement, involuntary retirement, and regulatory retirement (retirement at a statutory retirement age). Results of the current study indicated that compared to non-agricultural employment, both non-agricultural retirement (regulatory retirement) and agricultural retirement (might be voluntary or involuntary) were associated with higher prevalence of poor SRH among Chinese middle-aged and older workers, which was consistent with recent findings from CHARLS [19]. Furthermore, factors such as retirement timing may also influence the health effect of retirement [20]. Overall, these large differences in health are likely to reflect lifelong differences in living and working conditions.

Strengths and limitations

For the first time, this study used nationally representative data to investigate the effect of employment status on SRH among agricultural and non-agricultural workers in China. However, potential selection (including non-response) bias, reporting bias and reverse causation cannot be excluded. Both occupational history and SRH were reported subjectively; the reporting may partly reflect people's experiences and conditions. Reverse causation may reflect situations when persons with poor health move to disadvantaged employments or to retirement. These issues

would tend to overestimate the association of SRH with unfavourable working conditions.

Conclusion

There are pronounced differences in SRH between different employment categories as well as urban-rural differences in the association between employment status and SRH among Chinese middle-aged and older workers. Chinese non-agricultural employees had considerably better health status than other working groups.

Ethics approval and consent to participate

Ethical approval for all the CHARLS waves was granted from the Institutional Review Board (IRB) of Peking University (IRB00001052-11015). Informed consent was obtained from all participants, including legal representatives of illiterate participants. All methods were carried out in accordance with relevant guidelines and regulations.

References

1. Harasty C, Ostermeier M. *POPULATION AGEING: Alternative measures of dependency and implications for the future of work*: ILO Working Paper 5 (Geneva, ILO); 2020.
2. *World Population Prospects 2022, Online Edition* [Internet]. United Nations, Department of Economic and Social Affairs, Population Division 2022 [cited 2024]. Available from: <https://population.un.org/wpp/>.
3. *Labour force participation rate by age and sex in China: 2014-2024* [Internet]. International Labour Organization. 2024 [cited 2024]. Available from: <https://ilostat.ilo.org/data/>.
4. Kroeber AR. *China's economy : what everyone needs to know*: New York, NY, United States of America : Oxford University Press; 2016.
5. Liu J, Xu S. *Retirement policy, employment status, and gender pay gap in urban China*. *Journal of Asian Economics*. 2023;**85**:101587.
6. National Research Council. *Aging in Asia: findings from new and emerging data initiatives*. Smith JP, Majmundar M, editors. Washington, DC: The National Academies Press; 2012. 486 p.
7. Popham F, Bamba C. *Evidence from the 2001 English Census on the contribution of employment status to the social gradient in self-rated health*. *Journal of Epidemiology and Community Health*. 2010;**64**(3):277.
8. Ling W, Wang S, Li S. *Diversity patterns in non-standard employment and their relationship with self-rated health in urban China from 2010 to 2021*. *Social Science & Medicine*. 2024;**348**:116827.
9. Luo J, Qu Z, Rockett I, Zhang X. *Employment status and self-rated health in north-western China*. *Public Health*. 2010;**124**(3):174-9.
10. Minelli L, Pignini C, Chiavarini M, Bartolucci F. *Employment status and perceived health condition: Longitudinal data from Italy*. *BMC public health*. 2014;**14**(1):946.
11. van der Heide I, van Rijn RM, Robroek SJW, Burdorf A, Proper KI. *Is retirement good for your health? A systematic review of longitudinal studies*. *BMC Public Health*. 2013;**13**(1):1180.
12. Chen X, Giles J, Yao Y, Yip W, Meng Q, Berkman L, et al. *The path to healthy ageing in China: a Peking University–Lancet Commission*. *The Lancet*. 2022;**400**(10367):1967-2006.

13. Zhao Y, Hu Y, Smith JP, Strauss J, Yang G. *Cohort profile: the China Health and Retirement Longitudinal Study (CHARLS)*. *Int J Epidemiol*. 2014;**43**(1):61-8.
14. Pan Y, Pikhartova J, Bobak M, Pikhart H. *Reliability and predictive validity of two scales of self-rated health in China: results from China Health and Retirement Longitudinal Study (CHARLS)*. *BMC Public Health*. 2022;**22**(1):1863.
15. Seaman SR, White IR, Copas AJ, Li L. *Combining multiple imputation and inverse-probability weighting*. *Biometrics*. 2012;**68**(1):129-37.
16. Quartagno M, Carpenter JR, Goldstein H. *Multiple imputation with survey weights: a multilevel approach*. *Journal of Survey Statistics and Methodology*. 2020;**8**(5):965-89.
17. Rubin DB. *Multiple imputation for nonresponse in surveys*. New York: Wiley; 1987.
18. StataCorp. *Stata Statistical Software: Release 18*. College Station, TX: StataCorp LLC2023.
19. Tang Y, Liu D, Mou S, Isa SM, Gui S, Wan Q. *Self-Perception or Objective State: A Further Study of the Effects of Retirement on Health*. *Frontiers in Psychology*. 2022;**13**.
20. Calvo E, Sarkisian N, Tamborini CR. *Causal Effects of Retirement Timing on Subjective Physical and Emotional Health*. *The Journals of Gerontology: Series B*. 2013;**68**(1):73-84.

Table 1 Sample characteristics and unweighted prevalence of poor self-rated health.

	Total n (col %)	Poor/very poor SRH n (row %)
All subjects	n=14445	3918 (27.1)
Age		
45-54	5004 (34.6)	1003 (20.0)
55-64	5450 (37.7)	1543 (28.3)*
65 or over	3991 (27.6)	1372 (34.4)*
Sex		
Male	7030 (48.7)	1676 (23.9)
Female	7415 (51.3)	2242 (30.2)*
Education		
High school or above	1912 (13.2)	285 (14.9)
Middle school	2970 (20.6)	593 (20.0)*
Elementary school	3077 (21.3)	813 (26.4)*
Lower than elementary school	2610 (18.1)	841 (32.2)*
Illiterate	3876 (26.8)	1386 (35.8)*
Household wealth		
1 (richest)	3963 (27.4)	687 (17.3)
2	3606 (25.0)	870 (24.1)*
3	3448 (23.9)	1051 (30.5)*
4 (poorest)	3428 (23.7)	1310 (38.2)*
Marital status		
Married	12634 (87.5)	3318 (26.3)
Unmarried	1811 (12.5)	600 (33.1)*
Residence type		
Urban	3062 (21.2)	581 (19.0)
Migrant	3159 (21.9)	717 (22.7)*
Rural	8224 (56.9)	2620 (31.9)*
Region		
East coast	4666 (32.3)	1069 (22.9)
Central	4100 (28.4)	1171 (28.6)*
Western	4604 (31.9)	1405 (30.5)*
Northeast	1075 (7.4)	273 (25.4)
Smoking status		
Never smoker	8642 (59.8)	2434 (28.2)
Former/current smoker	5803 (40.2)	1484 (25.6)*
Alcohol consumption		
Not at all	9604 (66.5)	3020 (31.5)
Occasional/frequent drinker	4841 (33.5)	898 (18.6)*
Employment status		
Non-Ag employed	2421 (16.8)	285 (11.8)
Non-Ag self-employed/unpaid family business	1307 (9.1)	226 (17.3)*
Non-Ag retired	1774 (12.3)	379 (21.4)*
Ag employed	432 (3.0)	92 (21.3)*
Ag self-employed	5424 (37.6)	1579 (29.1)*
Ag retired	3087 (21.4)	1357 (44.0)*

Percentages may not total 100% due to rounding.

Ag: agricultural; Non-Ag: non-agricultural.

* P<0.001 (p values for the difference in the prevalence of poor self-rated health). The first category of each variable is the reference group.

Figure 1. Association between employment status (reference group: non-agricultural employees) and self-rated health.

