Original article

Work ability among older workers in an agricultural community in Nan province, Thailand: a cross-sectional study

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Background: There is a global challenge regarding demographic change together with the aging population. Research on work ability among older workers in an agricultural area remains crucial, particularly in Thailand, an aged society country with thirty percent of its working population in the agricultural sector.
Objective: To estimate work ability among older workers in an agricultural community and to determine the relationship between work ability and its associations.
Methods: A cross-sectional study of adults aged 40 to 65 was conducted in an agricultural community in Nan province, Thailand, between May and August 2019. The study subjects consisted of 345 villagers and 82 civil servants in Tan Chum subdistrict, Nan province. All subjects completed a questionnaire on sociodemographic characteristics and the work ability index (WAI). The work ability level and its associated variables were examined using descriptive and logistic regression analyses.
Results: The response rate was 93.7%. The average WAI score was 40.4 (SD = 5.4). Seventy-eight percent of the subjects had a high work ability level. The multiple logistic regression showed that the work ability level was significantly associated with age (OR = 0.89, 95% CI 0.84 – 0.94), abnormal body mass index (BMI) (OR = 0.47, 95% CI 0.26 – 0.87) and education at the university level (OR = 6.49, 95% CI 1.27 - 33.17). Weekly working hours, working years, living on a farm, a longest-held job and subject recruitment were not significantly associated with the work ability level.
Conclusion: Older workers in the study agricultural community in Nan province, generally had high work ability. The high work ability was positively associated with education at the university level but was inversely associated with increasing age and abnormal BMI.

Keywords: Agricultural community, older worker, work ability.

Demographic change together with the aging population is a global challenge. By 2025, it has been estimated that the proportion of older people will be a fifth of the population in Asia.[1] There are various definitions of the 'older worker' depending on the context. The cut-off age of the older worker is labeled between 40 and 65 years.[2] Because of the increasing number of older people worldwide coupled with the decreasing number of young workers affecting the overall workforce, retaining work ability of older workers is important. Besides, promoting work ability has a positive effect on the aging process. [3]

Most of the related research studies on work ability among older workers were conducted in high-income countries. Previous literatures suggested that demands of work, work environment and work community are related to work ability.[3, 4] Saarni SI, *et al*. studied work ability among Finnish workers in several job sectors and found the poorest work ability among those in the agricultural setting.[5] Yet, there is little published literature regarding older workers' work ability in low- to middle-income countries (LMICs), particularly in their agricultural settings.[6] In addition, as there will be more older people remaining in the

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workforce than ever, further research on work ability and its 'individual' factors among older workers remains crucial.[7]

Thailand has been an aged society since 2021 and is expected to be a super-aged society by 2035.[8] Moreover, at least 30.0% of the Thai working population stays in the agricultural areas[9], and accounting for 40.0% of land use.[10] Despite this, older workers in Thailand, particularly in the agricultural context attract very little attention from policymakers and are not protected by the Labour Protection Act.[11] Consistent with the national figure, Nan province has a population aged 60 and above of around 24.0%. Its working population aged 40 - 65 is accounted for 42.0%.[12] Nan province is one of the largest agricultural communities in northern Thailand with more than half of the population working in the agricultural sector.[13] Hence, the main aims of this study were to estimate work ability among older workers and to determine the relationship between work ability and its associated factors in an agricultural community in Nan province, Thailand.

Materials and methods

Study setting and sampling

The research protocol has been approved by the Faculty of Medicine, Chulalongkorn University Institutional Review Board (Med Chula IRB no.766/61). Tan Chum subdistrict of Tha Wang Pha district, Nan province was selected purposely for this cross-sectional study site between May and August 2019. Cochran's sample size formula was used to calculate the minimum sample size.[14] Pothirat C, *et al.* previously surveyed a study in adult populations in Chiangmai province and found that 34.0% of rural villagers aged over 40 were farmers.[15] At the 95% confidence interval (CI), Z-score with a desired precision level of 5.0%, the calculated minimum sample size was 345. Using a cluster random sampling method, all villagers in villages number 3, 11 and 13 of Tan Chum subdistrict aged 40 to 65 were selected according to the Tan Chum health promoting hospital records (n = 345). To ensure the yield of this study, all local civil servants including municipality officers, teachers, police officers, nurses, public health officers and monks aged 40 to 65 who worked full-time in the same subdistrict and did not have their name registered as local villagers were additionally recruited (n = 82). A total of 427 subjects were invited to participate in the study.

Data collection and measurement

The data were collected from all subjects based on a face-to-face interview using the developed questionnaire by the authors (JR and WM). The questionnaire consisted of two parts: sociodemographic characteristics and the Thai version of the work ability index (Thai WAI).[16] The sociodemographic part covers age, gender, weight, height, smoking status, household assets (with the following 14 items: electricity; flush toilet; telephone; mobile phone; television; radio; refrigerator; car; motorcycle, washing machine, indoor bath, indoor tap, outdoor tap, and own home)[17], education, weekly working hour, working year, the longest-held job (classified into three groups: 'farming'; 'manual jobs' including cleaner, construction, driver, factory worker, metal worker and safeguard; and 'semi-skilled and skilled jobs' including clerk, caretaker, catering, engineer, manager, monk, municipal worker, nurse, police officer, shopkeeper, soldier,tailor and teacher), and agricultural history (living on a farm and pesticide use).

The Thai WAI is a questionnaire measuring an individual's work ability. It covers seven dimensions: 1) current work ability compared with the lifetime best (one 10-point Likert scale item scoring between 0 and 10); 2) work ability in relation to the demands of the job (two 5-point Likert scale items scoring between 2 and 10); 3) numbers of current diseases diagnosed by a physician (51 items scoring between 1 and 7); 4) work impairment due to diseases (one 6-point Likert scale item scoring between 1 and 6) 5) sick leave during the past year (one item with five choices scoring between 1 and 5); 6) prognosis of work ability two years from now (one item with three choices scoring between 1 and 7); and 7) mental resources (three items scoring between 1 and 4). In the original literature, the total WAI score is summed ranging between 7 and 49 and is classified into four categories: poor (7 to 27), moderate (28 to 36), good (37 to 43), and excellent (44 to 49). [16]

The pilot study was conducted among villagers who had similar characteristics to subjects from village number 14 of Tan Chum subdistrict. Following this pilot test, internal consistency revealed Cronbach's alpha coefficient 0.7 (reliable).

Statistical analysis

Descriptive data of sociodemographic variables and the WAI was carried out consisting of means, standard deviations (SD) and proportions. Using a classification for Asian populations, body mass index (BMI) was calculated as weight (kg) divided by the square of height (m) and determined the 'normal' BMI between 18.5 kg/m^2 and below 23.0 kg/m^2.[18] A household asset score was classified into two levels: 'high' owning ≥ 12; 'low' owning of < 12 of the 14 items mentioned above. [17] The total WAI score was grouped into two levels: 'low' work ability (poor to moderate) and 'high' work ability (good to excellent). [19] All identified independent variables were examined by the bivariate analysis by Student's unpaired *t* - tests and Pearson's Chi-squared tests. Independent variables with their statistical significance in the bivariate analysis were included in the multiple logistic regression model. All results were considered statistically significant at $P < 0.05$. Stata 15 (Stata Corp., College Station, TX, USA) was used to perform all data analyses.

Results

Sociodemographic characteristics

The overall response rate was 93.7%. The response rates in villagers and civil servants were similar, 93.3% and 95.1%, respectively. Half of the 400 subjects were male (50.8%) with a mean age of 53.2 (SD = 6.9). The subjects predominantly had abnormal BMI (60.5%), had never smoked (62.3%), studied at primary school level (56.1%), had a low household asset score (61.0%), lived on a farm (90.8%), had the longest-held jobs as a farmer (70.2%) and ever applied pesticides (76.0%). Their average weekly working hour was 42.7 hours (SD = 15.4) with a working year of 30.6 years (SD = 11.5).

The work ability index (WAI)

The average WAI score was 40.4 (SD = 5.4), with a range between 17 and 49. Considering the distribution of each WAI dimension shown in Table 1, the subjects had the three highest current work ability compared with the lifetime best at 68.0%, had the three highest work ability in relation to the demands of the job at 53.8%, reported most no current disease diagnosed by a physician at 35.3%, reported most no work impairment due to diseases at 71.5%, reported most no sick leave during the past year at 72.0%, had the same ability as present time for prognosis of work ability two years from now at 71.5%, and had the highest mental resources at 65.5%. Most of the subjects (n = 313) had their total WAI scores at the high work ability level (78.3%).

Work ability and its associated variables

Table 2 shows the bivariate analysis between each sociodemographic characteristic and the work ability level among the subjects. The variables significantly associated with the work ability level were age ($P < 0.001$), weekly working hour ($P < 0.05$), working year ($P < 0.05$), BMI ($P < 0.05$), education ($P < 0.001$), living on a farm ($P < 0.05$), longest-held job ($P < 0.05$) and subject recruitment ($P < 0.05$).Adjusted for all other variables selected from the bivariate analysis, multiple logistic regression summarized in Table 3 reports that the work ability level was significantly associated with age (OR = 0.89, 95% CI 0.84 – 0.94), abnormal BMI (OR = 0.47, 95% CI 0.26 – 0.87) and education at the university level (OR = 6.49, 95% CI 1.27 – 33.17). Weekly working hours, working years, living on a farm, a longest-held job and subject recruitment were not significantly associated with the work ability level.

Table 1. Distribution of the WAI score of the study subjects (n = 400).

Dimension of WAI	Score n (%)											
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Total**
1. Current work ability compared with the lifetime best	0 (0.0)	0 (0.0)	1 (0.2)	1 (0.2)	1 (0.2)	30 (7.5)	22 (5.5)	73 (18.3)	121 (30.3)	57 (14.3)	94 (23.5)	400 (100.0)
2. Work ability in relation to the demands of the job	- -	- -	0 (0.0)	0 (0.0)	8 (2.0)	6 (1.5)	109 (27.2)	62 (15.5)	140 (35.0)	25 (6.3)	50 (12.5)	400 (100.0)
3. Numbers of current diseases diagnosed by a physician	- -	6 (1.5)	20 (5.0)	39 (9.8)	72 (18.0)	122 (30.5)	- -	141 (35.2)	- -	- -	- -	400 (100.0)
4. Work impairment due to diseases	- -	0 (0.0)	4 (1.0)	5 (1.3)	16 (4.0)	89 (22.2)	286 (71.5)	- -	- -	- -	- -	400 (100.0)
5. Sick leave during the past year	- -	11 (2.8)	19 (4.7)	20 (5.0)	62 (15.5)	288 (72.0)	- -	- -	- -	- -	- -	400 (100.0)
6. Prognosis of work ability two years from now	- -	10 (2.5)	- -	- -	104 (26.0)	- -	- -	286 (71.5)	- -	- -	- -	400 (100.0)
7. Mental resources	- -	6 (1.5)	46 (11.5)	86 (21.5)	262 (65.5)	- -	- -	- -	- -	- -	- -	400 (100.0)

Table 2. Sociodemographic characteristics classified by work ability of the study subjects (n = 400).

Variables	Low work ability (n = 87)		High work ability (n = 313)		
	Mean	SD	Mean	SD	*P* - value†
Age (years)	57.2	0.6	52.0	0.4	< 0.001**
Weekly working hour (hours)	38.9	1.84	43.6	0.9	0.02*
Working year (years)	33.2	1.3	29.8	0.6	0.02*
	n	Percentage	n	Percentage	*P* - value††
Gender					0.16
Male	37	42.5	160	51.1	
Female	50	57.5	153	48.9	
Body mass index (Asian, kg/m²)				0.005*	
Normal (18.5 to < 23.0)	23	26.4	135	43.1	
Abnormal (< 18.5 or ≥ 23.0)	64	73.6	178	56.9	
Smoking status					0.06
Never	59	67.8	190	60.7	
Ever	15	17.2	91	29.1	
Current	13	15.0	32	10.2	
Education					< 0.001**
Primary school	64	73.6	161	51.4	
None	5	5.8	8	2.6	
Secondary or vocational school	15	17.2	81	25.9	
University	3	3.4	63	20.1	
Household asset score					0.31
Low	49	56.3	195	62.3	
High	38	43.7	118	37.7	
Living on a farm					0.04*
No	3	3.5	34	10.9	
Yes	84	96.5	279	89.1	
Longest-held job					0.008*
Farming	73	83.9	208	66.4	
Manual	3	3.5	20	6.4	
Semi-skilled or skilled	11	12.6	85	27.2	
Pesticide use					0.95
No	15	17.2	81	25.9	
Yes	72	82.8	232	74.1	
Subject recruitment					0.001*
Villagers	81	93.1	241	77.0	
Civil servants	6	6.9	72	23.0	

†Analyzing differences by Student's unpaired *t* - test, ††Analyzing differences by Pearson's Chi-squared test
SD = Standard deviation; *$P < 0.05$, **$P < 0.001$

Table 3. Work ability and its associated factors of the study subjects (n = 400).

Variables	Crude OR	95% CI	Adjusted OR†	95% CI
Age (years)	0.88**	0.85 – 0.92	0.89**	0.84 – 0.94
Weekly working hour (hours)	1.02*	1.00 – 1.04	1.01	0.99 – 1.03
Working year (years)	0.97*	0.95 – 1.00	1.01	0.99 – 1.04
Body mass index (Asian, kg/m²)				
Normal (18.5 to < 23.0)	reference		reference	
Abnormal (< 18.5 or ≥ 23.0)	0.47*	0.28 – 0.80	0.47*	0.26 – 0.87
Education				
Primary school	reference		reference	
None	0.63	0.20 – 1.99	1.28	0.30 – 5.43
Secondary or vocational school	2.11*	1.33 – 3.94	1.54	0.69 – 3.49
University	8.22*	2.49 – 27.13	6.49*	1.27 – 33.17

Table 3. (Con) Work ability and its associated factors of the study subjects (n = 400).

Variables	Crude OR	95% CI	Adjusted OR†	95% CI
Living on a farm				
No	reference		reference	
Yes	0.29*	0.09 – 0.98	0.27	0.04 – 1.68
Longest-held job				
Farming	reference		reference	
Manual	2.31	0.67 – 8.00	1.06	0.25 – 4.45
Semi-skilled or skilled	2.67*	1.35 – 5.29	0.29	0.08 – 1.07
Participant recruitment				
Villagers	reference		reference	
Government employees	4.03*	1.69 – 9.63	2.06	0.52 – 8.13

†Adjusted for all other variables
OR = Odds ratio, CI = Confidence interval; *$P < 0.05$; **$P < 0.001$

Discussion

Seventy-eight percent of older workers in the study agricultural community in Tan Chum subdistrict, Nan province had a high work ability level. The average WAI score of the study subjects was 40.4 categorized as 'good' work ability. This figure is similar to previous studies in Thailand including a study among farmers in Nakhonpathom province by Sripharut K, *et al*. that reports the mean WAI of 39.9 (good work ability)[20] , a study by Thanapop S. and Thanapop C. in Nakhon Si Thammarat province reporting the mean WAI among informal workers of 37.5 (good work ability)[19] and also consistent with a study among adult workers across all five regions in Thailand by Kaewboonchoo O. and Ratanasiripong P. that reports the mean WAI of 40.9 (good work ability). [16] Noticeably, villagers tended to have lower WAI scores than government employees did despite non-statistically significant difference. Farming villagers are a group of workers who attract very little attention from policymakers at the national level and are not protected by the Labour Protection Act or covered by the Thai Social Security Scheme. Policymakers and all stakeholders should consider the farming population as a top priority for promoting work ability campaigns and preventive measures.

Our finding on a relationship between age and work ability level confirms the findings from the previous studies. Surveys in recent years in a similar agricultural context

in LMICs also reported that older age resulted in a reduction in work ability. [21, 22] In comparison with a recent Lertvarayut T, *et al*. conducted among 170 adults working on farms in Nan province having its higher mean age of 65.8 with a range between 60 and 80, they found the lower mean WAI of 36.0 accounting for a 'moderate' work ability level. [23] These findings strongly insist on the relationship between increasing age and poorer work ability. One explanation is that those aging workforces tend to have a progressive impairment of health causing increased injury and chronic health conditions. The aging processes have affected both physical and mental health and are a barrier to performing work. [7, 24] In this study, we observed a relationship between abnormal BMI (both underweight and overweight) and lower ability. This finding is in agreement with recent surveys in the Netherlands by van der Ven D, *et al*. and in the United Kingdom by Bridger RS. and Bennett AI. which indicated a decrease in work ability among those with abnormal BMI.[25, 26] Older workers with abnormal weight have difficulties in coping with work. Their limitations by size and shape and physical capacity affect their ability to work, particularly in physical-demand jobs. Moreover, overweight BMI is linked to chronic health conditions related to poor work ability. [27] The literature on the relationship between underweight BMI and work ability is however limited. In consequence, to prevent the future impact on poor work ability among the aging population, health promotion campaigns maintaining a healthy weight, together with physical activities in the younger population are recommended.

Regarding education among older workers, we examined a statistically significant association of those having the highest education at the university level with a high work ability level. Several studies in LMICs found a similar figure consisting of Monteiro MS,

et al.'s among public health workers in Brazil [28], Mazloumi A, *et al*.'s among petrochemical industry workers in Iran [29] and Imamovic H. and Nurka P.'s among diverse workers in Bosnia and Herzegovina. [30] One explanation is that workers with a higher educational level potentially have higher work ability due to their better job opportunities and superior skills at work. Another reason is that workers who have their university degree level tend to have less physical-demand jobs.[29] Hence, to maintain work ability at a higher level, this finding suggests the development of workers' competencies in terms of higher education.

A strength of this study is its high response rate (93.7%). Further, the study had very little missing data. This was achieved in part because the village health volunteer system organized by local villagers helped the authors communicate with subjects and facilitate the fieldwork. Moreover, the study tool was developed by adaptation from the standard questionnaires [16, 17] that were widely used, with additions relevant to the local context so that the data reflected participants in an agricultural community in Nan province. However, this study has some limitations. A cross-sectional study is its inability to assess the direction of any potential causal relationship and to generalize to the other context other than this study setting. Furthermore, sociodemographic and work ability index data collected by the questionnaire despite a face-to-face interview might be open to recall any bias. Misclassification might occur (e.g., accurate working year) and would bias the study findings.

Conclusion

In conclusion, older workers in the study agricultural community in Nan province had high work ability. The high work ability was positively associated with education at the university level. In contrast, it was inversely related to increasing age and abnormal BMI. To maintain work ability among older workers, primary healthcare comprising a local health promoting hospital and village health volunteers are recommended to play a major role in providing health promotion campaigns such as maintaining a healthy weight and physical activities to the local community. Raising awareness about healthy behaviors, particularly nutrition education for the local farming community should be supported. Promoting education should also be implemented by the authorities.

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Conflicts of interest statement

The authors have each completed an ICMJE disclosure form. None of the authors declare any potential or actual relationship, activity, or interest related to the content of this article.

Data sharing statement

The present review is based on the references cited. Further details, opinions, and interpretation are available from the corresponding authors on reasonable request.

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