

Active Aging Index in Vietnam Relative to China, South Korea, Taiwan, and
28 European Union Countries

Supplementary

Formulas to calculate overall AAI and domain-specific scores for 32 countries in this study (Equation 1 to 5)

The score for domain 1–employment (D1) was calculated using the formula:

$$D1 = (D11 \times 25 + D12 \times 25 + D13 \times 25 + D14 \times 25) / 100 \quad (\text{Equation 1})$$

Where D11, D12, D13 and D14 were percentages of older adults (who had any paid work during 7 days before the date of interview) for four age groups 55-59, 60-64, 65-69, and 70-74 respectively. The weight for each indicator was 25% evenly.

The score for domain 2–participation in society (D2) was calculated as following:

$$D2 = (D21 \times 25 + D22 \times 25 + D23 \times 30 + D24 \times 20) / 100 \quad (\text{Equation 2})$$

Where D21, D22, D23 and D24 were the percentages of older adults who participated in voluntary activities at least once a week (D21), cared to children and grandchildren at least once a week (D22), cared to older adults at least once a week (D23) and had political participation in the 12 months preceding the survey (D24), respectively. The indicators' weights were 25%, 25%, 30% and 20% for four indicators respectively.

The score for domain 3–health/independent/secure living (D3) was calculated as following:

$$D3 = (D31 \times 10 + D32 \times 20 + D33 \times 20 + D34 \times 10 + D35 \times 10 + D36 \times 10 + D37 \times 10 + D38 \times 10) / 100$$

(Equation 3)

Where D31, D32, D33, D34, D35, D36, D37, D38 were the percentages of older adults who did physical exercise almost every day (D31), reported no unmet need for medical examination and treatment during the 12 months preceding the survey (D32), lived in a single

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person household or with their spouse (D33), relative median income (D34), were not at risk of poverty (D35), were not severely materially deprived (D36), felt very safe or safe to walk after dark in their local area (D37), received education or training in the four weeks preceding the survey (D38), respectively. The indicators' weights for 8 aforementioned indicators were 10%, 20%, 20%, 10%, 10%, 10%, 10% and 10%, respectively.

The score for capacity and enabling environment for active aging (D4) was calculated as following:

$$D4 = (D41 \times 33.3 + D42 \times 23.3 + D43 \times 16.7 + D44 \times 6.7 + D45 \times 13.3 + D46 \times 6.7) / 100. \quad (\text{Equation 4})$$

Where D41 was a ratio of remaining life expectancy of older people at age 55 to 50 (in order to calculate the proportion of life expectancy achievement in the target of 105 years of life expectancy). D42 was percentage of healthy life years in the remaining life expectancy at age 55. D43 was percentage of older population aged 55+ who had positive mental well-being. D44 was percentage of people aged 55-74 using the internet at least once a week. D45 was the percentage of people aged 55+ who met up socially with friends, relatives or colleagues at least once a week. D46 was percentage of older persons aged 55-74 who had finished upper secondary or tertiary education. The indicator's weights for six indicators of domain 4 were 33.3%, 23.3%, 16.7%, 6.7%, 13.3%, and 6.7%, respectively.

Overall AAI was calculated using the following formula:

$$\text{Overall AAI} = (D1 \times 25 + D2 \times 25 + D3 \times 25 + D4 \times 25) / 100 \quad (\text{Equation 5})$$

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Table S1 Overall and domain-specific AAI and ranking among 32 countries (region)

No.	Country (region)	Employment		Social participation		Independent, healthy and secure living		Capacity and enabling environment		Overall AAI	
		score	rank	score	rank	score	rank	score	rank	score	rank
1	Belgium	23.8	28	27.0	1	73.3	11	62.8	9	46.7	9
2	Bulgaria	30.5	18	9.7	31	66.2	22	55.9	18	40.5	27
3	Czech R.	34.2	15	16.2	20	71.4	14	58.7	16	45.1	13
4	Denmark	40.6	6	21.7	8	78.4	2	66.5	2	51.8	2
5	Germany	39.4	7	15.9	21	74.9	9	63.6	6	48.4	6
6	Estonia	44.5	4	14.3	23	66.5	21	53.2	23	44.6	15
7	Ireland	35.4	14	18.8	12	75.0	8	63.2	7	48.1	7
8	Greece	20.6	31	11.8	28	63.9	27	50.0	29	36.6	32
9	Spain	25.7	26	16.2	19	71.6	12	59.7	15	43.3	18
10	France	26.9	23	26.2	3	75.4	6	62.2	11	47.7	8
11	Croatia	21.2	30	15.8	17	64.2	26	49.4	30	37.7	31
12	Italy	28.0	20	17.3	16	68.0	19	55.9	17	42.3	21
13	Cyprus	30.8	17	19.4	11	71.5	13	54.9	20	44.2	17
14	Latvia	37.9	9	17.8	15	57.7	31	50.2	28	40.9	24
15	Lithuania	37.9	10	11.1	30	65.3	25	48.5	31	40.7	26
16	Luxembourg	20.2	32	23.8	6	74.2	10	62.2	10	45.1	14
17	Hungary	27.5	21	11.6	29	65.6	24	51.0	27	38.9	29
18	Malta	25.6	27	20.9	9	70.6	16	60.5	12	44.4	16
19	Netherlands	36.3	12	26.6	2	77.3	5	64.7	4	51.2	3
20	Austria	27.2	22	18.8	13	77.7	3	60.0	14	45.9	12
21	Poland	26.5	24	13.1	25	66.1	23	52.7	25	39.6	28
22	Portugal	33.4	16	11.9	27	67.7	20	54.2	21	41.8	22
23	Romania	28.9	19	13.6	24	63.7	28	44.6	32	37.7	30
24	Slovenia	21.3	29	15.7	22	71.0	15	55.5	19	40.8	25
25	Slovakia	26.3	25	16.1	18	69.2	18	52.9	24	41.1	23
26	Finland	35.7	13	22.6	7	77.6	4	63.1	8	49.8	5
27	Sweden	45.4	2	26.0	4	79.2	1	71.2	1	55.5	1
28	UK	39.3	8	20.7	10	75.3	7	63.9	5	49.8	4
29	China	40.7	5	18.4	14	59.6	30	53.2	22	43.0	19
30	South Korea	45.2	3	4.0	32	60.1	29	60.2	13	42.3	20
31	Taiwan	36.8	11	12.4	26	69.7	17	66.2	3	46.3	10
32	Vietnam	51.8	1	25.2	5	54.7	32	52.6	26	46.1	11

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Data sources

Data for Vietnam was collected from this cross-sectional study. The adaptation and validation of the Vietnam AAI was published elsewhere (Pham, Chen, Van Duong, Nguyen, & Chie, 2019).

Data for China and South Korea was retrieved from Um, Zaidi, and Choi (2019).

Data for Taiwan was retrieved from a published paper (Hsu, Liang, Luh, Chen, & Lin, 2019)

Data for 28 EU countries was retrieved from Active Aging Index project (2018)

Figure 4: Sampling Procedure for This Study

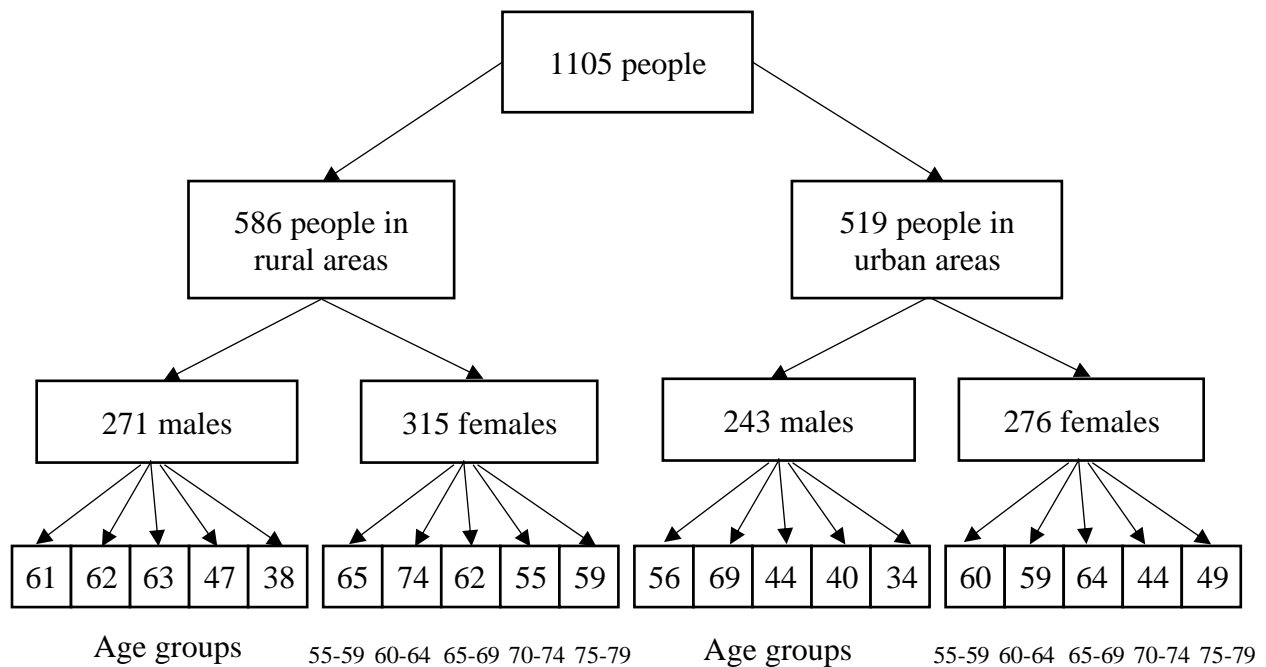


Figure 4. Sampling procedure for this study

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Table S2 Domains, indicators, survey items, and responses of the Vietnam AAI

VAAI domains	VAAI indicators	No. of survey questions	Responses (numerical coding)
1. Employment (D1)	1.1 Employment rate 55-59	2	Nominal (0-1)
	1.2 Employment rate 60-64		
	1.3 Employment rate 65-69		
	1.4 Employment rate 70-74		
2. Social participation (D2)	2.1 Voluntary activities	4	Ordinal (1-4)
	2.2 Care to children, grandchildren	1	Ordinal (1-5)
	2.3 Care to alder adults	1	Ordinal (1-5)
	2.4 Polictical participation	4	Nominal (0-1)
3. Independent/ healthy/secure living (D3)	3.1 Physical exercise	1	Ordinal (1-5)
	3.2 Access to health and dental care	1	Nominal (0-1)
	3.3 Independent living	1	Nominal (1-5)
	3.4 Relative median income	0	Not applicable
	3.5 No poverty risk	1	Ratio
	3.6 No material deprivation	10	Nominal (0-2)
	3.7 Environmental safety	1	Ordinal (1-4)
	3.8 Lifelong learning	1	Nominal (0-1)
4. Capacity for active aging (D4)	4.1 Achievement of remaining life expectancy of 50 at age 55	Note: calculate from Vietnam life table 2016	
	4.2 Share of healthy life expectancy at 55	Note: calculate from Vietnam life table	
	4.3 Mental well-being	5	Ordinal (0-5)
	4.4 Use of ICT	1	Ordinal (1-4)
	4.5 Social connectedness	1	Ordinal (1-6)
	4.6 Educational attainment	1	Ordinal (1-5)
4 domains	22 indicators	36 questions	

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Table S3 Items used in Vietnam survey to calculate VAAI

Domains	Weight	Indicators	Weight	Questions and Responses
Employment	25%	1.1 Employment rate 55-59 1.2 Employment rate 60-64 1.3 Employment rate 65-69 1.4 Employment rate 70-74	25% 25% 25% 25%	In the last 7 days, did you do any paid work, either as an employee or as self-employed? 0 <input type="checkbox"/> No 1 <input type="checkbox"/> Yes Even though you were not doing paid work last week, did you have a job or business that you were away from last week (and that you expect to return to)? 0 <input type="checkbox"/> No 1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> Waiting to take up a new job already obtained
Participation in society	25%	2.1 Voluntary activities	25%	How often did you do unpaid voluntary work through the following organizations in the last 12 months? a. Community and social services (e.g. organizations helping the elderly, young people, disabled or other people in need) b. Educational, cultural, sports/ professional associations c. Charities (donating, fundraising, campaigning) d. Social movements (e.g. environmental, human rights) e. Others (write it down):..... Responses for a to e: 4 <input type="checkbox"/> every week 3 <input type="checkbox"/> every month 2 <input type="checkbox"/> Less often 1 <input type="checkbox"/> Not at all
		2.2 Care to children, grandchildren	25%	In general, how often are you involved in caring for your children, grandchildren, great grandchildren outside of paid work? 5 <input type="checkbox"/> every day 4 <input type="checkbox"/> 3-5 days per week 3 <input type="checkbox"/> 1-2 days per week 2 <input type="checkbox"/> less often 1 <input type="checkbox"/> never
		2.3 care to older adults	30%	How often are you involved in caring for elderly or disabled relatives outside of paid work? 5 <input type="checkbox"/> every day 4 <input type="checkbox"/> 3-5 days per week 3 <input type="checkbox"/> 1-2 days per week 2 <input type="checkbox"/> less often 1 <input type="checkbox"/> never
		2.4 political participation	20%	Over the past 12 months, have you participated the following political activities? a. attended a meeting of a trade union, a political party or political action group (For example: Party, Trade union, Fatherland front, War Veteran Association, Farmer union, Women union and Youth union) b. attended a protest or demonstration c. signed a petition (e-mail or online petition) d. contacted a politician or public official (other than routine contact arising from use of public services) Responses for a to d: 0 <input type="checkbox"/> No 1 <input type="checkbox"/> Yes

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Domains	Weight	Indicators	Weight	Questions and Responses
Independent, healthy and secure living	25%	3.1 physical exercise	10%	In the last 12 months, how often do you do sports or physical exercise (physical activity)? 5 <input type="checkbox"/> every day 4 <input type="checkbox"/> 3-5 days per week 3 <input type="checkbox"/> 1-2 days per week 2 <input type="checkbox"/> less often 1 <input type="checkbox"/> never
		3.2 access to health and dental care	20%	In the last 12 months, was there any occasion when you really needed medical examination or treatment but were not able to receive it? 0 <input type="checkbox"/> No 1 <input type="checkbox"/> Yes
		3.3 independent living	20%	Recently, how many people are there in your family? _____ People Which type of household is yours? 1 <input type="checkbox"/> only me 2 <input type="checkbox"/> with my spouse 3 <input type="checkbox"/> with my children 4 <input type="checkbox"/> with my children and grandchildren 5 <input type="checkbox"/> With my spouse and children 6 <input type="checkbox"/> With my spouse, children and grandchildren 7 <input type="checkbox"/> others If separate you and your spouse from your children/grandchildren, would you able to live independently? 0 <input type="checkbox"/> No 1 <input type="checkbox"/> Yes
		3.4 relative median income	10%	
		3.5 no poverty risk	10%	What is your monthly income that you earn from paid job, pension or social assistance? _____ vnd
		3.6 no material deprivation	10%	In the last 12 months, has your household ever been unable to afford? a. to pay your rent, mortgage or utility bills b. to face unexpected expenses (for example: hospitalization, wedding, funeral ceremonies) c. to eat meat or proteins regularly d. to go on holiday e. a television set f. a fridge g. an air condition h. a washing machine i. a motorbike j. a cell phone or telephone Responses: 0 <input type="checkbox"/> no, can't afford 1 <input type="checkbox"/> yes, can afford 2 <input type="checkbox"/> other reasons (don't want/need)
		3.7 physical safety	10%	How safe do you feel walking alone in this area (Respondent's local area or neighborhood) after dark?

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Domains	Weight	Indicators	Weight	Questions and Responses
				1 <input type="checkbox"/> very unsafe 2 <input type="checkbox"/> unsafe 3 <input type="checkbox"/> safe 4 <input type="checkbox"/> very safe
		3.8 lifelong learning	10%	Within the last 4 weeks, did you attend any courses, seminars, conferences or received private lessons or instructions within or outside the regular education system?
Capacity and enabling environment for active aging	25%	4.1 remaining life expectancy of 50 at 55	33%	Data from WHO life table 2016, the same method as EU AAI
		4.2 share of healthy life expectancy at 55	23%	Life expectancy retrieved from WHO life table 2016 and proportion of disability calculated from the following survey question: For the last 6 months, have you been limited because of health problems in activities that people usually do? 1 <input type="checkbox"/> yes, strongly limited 2 <input type="checkbox"/> yes, limited but not severe 3 <input type="checkbox"/> not limited at all
		4.3 mental wellbeing	17%	Over the last 14 days, how many days do you feel... a. I feel happy and am in a good mood b. I feel peaceful and relaxed c. I have felt active and vigorous d. I woke up feeling fresh and rested e. My daily life is full of interesting things 0 <input type="checkbox"/> at no time 1 <input type="checkbox"/> some of the time (1-3 ngày) 2 <input type="checkbox"/> less than half of the time (4-6 ngày) 3 <input type="checkbox"/> more than half of the time (7-10 ngày) 4 <input type="checkbox"/> most of the time (10-13 ngày) 5 <input type="checkbox"/> all of the time (14 ngày)
		4.4 use of internet	7%	How often on average have you used internet (in order to read online newspaper, entertainment, facebook, zalo...) in the last 3 months? 0. <input type="checkbox"/> never 1 <input type="checkbox"/> less than once a month 2 <input type="checkbox"/> at least once a month (but not weekly) 3 <input type="checkbox"/> at least once a week (but not every day) 4 <input type="checkbox"/> Every day or almost every day
		4.5 social connectedness	13%	Q38. How often do you socially meet with friends, relatives or colleagues? 1 <input type="checkbox"/> less than once a month 2 <input type="checkbox"/> once a month 3 <input type="checkbox"/> several times a month 4 <input type="checkbox"/> once a week 5 <input type="checkbox"/> several times a week 6 <input type="checkbox"/> every day or almost
		4.6 educational attainment	7%	Q4. What is the highest level of education that you completed? 0 <input type="checkbox"/> no education completed 1 <input type="checkbox"/> primary 2 <input type="checkbox"/> lower secondary 3 <input type="checkbox"/> upper secondary 4 <input type="checkbox"/> post-secondary non tertiary 5 <input type="checkbox"/> tertiary