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Cohort profile: healthy and active ageing in Myanmar (JAGES in Myanmar 2018): a prospective population-based cohort study of the long-term care risks and health status of older adults in Myanmar

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ABSTRACT

Purpose Myanmar is rapidly ageing. It is important to understand the current condition of older adults in the country. To obtain such information, we conducted home-visit surveys to collect data for evaluating social determinants of health on older adults in Yangon (representative of an urban) and Bago (representative of a rural) regions of Myanmar.

Participants Overall, 1200 individuals aged 60 years or older and who were not bedridden or had severe dementia (defined as an Abbreviated Mental Test score ≤6) were recruited from Yangon and Bago in 2018. A population-proportionate random-sampling method was used for recruitment.

Findings to date Overall, 600 individuals from Yangon (222 men; 378 women) and 600 from Bago (261 men; 339 women) were surveyed. The average age of Yangon-based men and women was 69.4±7.6 and 69.4±7.3 years; in Bago, this was 69.2±7.1 and 70.6±7.5 years, respectively. Compared to their Yangon-based counterparts, Bago-based respondents showed significantly lower socioeconomic status and more commonly reported poor self-rated health (Bago-based men: 32.2%, women: 42.5%; Yangon: 10.8% and 24.1%, respectively). Meanwhile, some Yangon-based respondents rarely met friends (men: 17.1%, women: 27.8%), and Yangon-based respondents scored higher for instrumental activities of daily living and body mass index when compared to their Bago-based counterparts. For both regions, women showed higher physical-function decline (Yangon-based women: 40.7%, men: 17.1%; Bago: 46.3% and 23.8%, respectively) and cognitive-function decline (Yangon: 34.1% and 10.4%, respectively; Bago: 53.4% and 22.2%, respectively). Being homebound was more common in urban areas (urban-based men: 11.3%, rural-based men: 2.3%; urban-based women: 13.0%, rural-based women: 4.7%, respectively).

Future plans A follow-up survey is scheduled for 2021. This will afford longitudinal data collection concerning mortality, becoming bedridden, and developing dementia and long-term care-related diseases. This will allow us to calculate long-term care risks for older adults in Myanmar.

Strengths and limitations of this study

- ► This application of the Japan Gerontological Evaluation Study (JAGES) in Myanmar represents the first longitudinal cohort study of older adults in Myanmar.
- ► Considering the rapid societal ageing that is ongoing in many Southeast Asian countries, including Myanmar, the data obtained through this study can contribute to creating policies for preparing countermeasures for the impending rapid ageing of societies.
- ► The data obtained for Myanmar in this study are comparable with Japanese data (as we used the 2016 JAGES questionnaire), and afford evaluation of long-term care risks and determinants of health and well-being for older adults in Myanmar.
- ► A population-proportionate random-sampling method was applied to select the samples; however, only two regions (Yangon and Bago) from the 14 regions/states in Myanmar were surveyed, meaning the survey results may not be applicable to all older adults in Myanmar.
- ► The data presented in this paper represent baseline data; thus, causal relationships could not be determined.

INTRODUCTION

In many Asian countries, rapid societal ageing has become a matter of concern.[1] This is a particularly important issue for developing countries in Southeast Asia (such as Myanmar) where, although the ageing rate is increasing, effective medical care systems and

long-term care systems remain underdeveloped.[2 3] Such developing countries have limited time and opportunities to adjust and to develop means of accommodating the needs of an aged society.[4]

In Myanmar, the proportion of the population that is aged 60 years or older is projected to reach 13.2% (7.9 million people) by 2030.[5] Further, for many years, the government of Myanmar implemented a policy of international isolation, during which national health investment was very low; consequently, compared to other Southeast Asian countries, health problems such as non-communicable diseases (NCDs) may become especially prevalent among older adults in Myanmar in the future.[6] NCDs are significant in this regard because they can lead to physical and psychiatric functional decline and a need for long-term care; moreover, effects of acute westernisation on health behaviours may also cause a rapid increase in the prevalence of NCDs.[7–9] Considering these factors, it is clearly necessary to focus special attention on older adults in Myanmar in order to predict and address potential future public-health problems in the country.[5]

After political reforms in 2011–2015, during which the country transformed from having a military-backed government to a democracy, the Myanmar population's lifestyle, social and economic circumstances changed drastically.[10] Knodel and Teerawichitchainan reported on the sociodemographic status of older adults in Myanmar using data from a 2012 survey conducted by HelpAge International.[4 11 12] Later, in 2014, the national census of Myanmar was conducted.[13] However, as a result of the country's democratisation, significant circumstantial changes have occurred in Myanmar since these surveys. Thus, it is crucially important to evaluate the current situation for older adults in the country. In particular, to plan effective policies for addressing the problems associated with rapid ageing, it is essential to understand the lifestyles, family status, socioeconomic status, physical and mental function, quality of life, well-being and surrounding environmental conditions for community-dwelling older adults in Myanmar. In other Southeast Asian countries, several social epidemiological surveys were done or ongoing. In Malaysia, the Malaysia Ageing and Retirement Survey was launched in late 2017, which is a longitudinal study aimed at respondents aged 40 years and above.[14] In Indonesia, the Indonesian Family Life Survey (IFLS) is an ongoing longitudinal survey.[15 16] The first wave, IFLS1, was conducted in 1993–1994. The fifth wave IFLS5 was done until now. This survey broadly covers age and area, not focusing on older adults. However, no longitudinal survey is currently ongoing in Myanmar.

Japan was the first Asian country to become a super-aged society (defined as at least 20% of the national population being aged 65 years or older).[17] According to population estimates for 2019, 28.5% of the Japanese population is aged 65 years or older, and 14.7% is aged 75 years or older.[18] Japan's experiences regarding the ageing of its population could be helpful for solving future problems that will be encountered by countries that are also rapidly ageing, such as Myanmar. The Japan Gerontological Evaluation Study (JAGES),[19] a large-scale cohort survey of community-dwelling older adults in Japan that was conducted by a consortium of researchers, obtained a large amount of data indicating that community empowerment is an important policy for addressing current ageing.[20 21] In particular, while previous individual-based approaches have been unsuccessful, community population-based approaches have been found to be effective for promoting the prevention of long-term care among older adults. For instance, older adults with rich community social capital tend to be healthier than do those who live in communities that feature poor social interactions.[22–25] Questionnaire tools that are used in the JAGES survey include items related to lifestyle, medical condition, socioeconomic status, social cohesion and social support, and the overall aim is to evaluate the social determinants of long-term care risks. The data and evidence obtained from the survey facilitated the building of tailored policies for empowering communities and municipalities.[20 26]

The JAGES nationwide cohort study was launched in 2010, and investigated the social determinants of health and well-being among older Japanese adults. Japan's rapid ageing commenced in the 1990s and, to address this, the government developed a long-term care insurance system and a community-based comprehensive care system.[27] Today, information regarding Japan's experiences and associated research data are strongly desired by other countries, and especially Asian countries where rapid ageing has recently commenced. A previous study that used JAGES data reported that health-related social capital has three measurable aspects: civic participation, mutual aid and social cohesion.[28] This indicates that the Japanese government's community-based integrated care model was an appropriate approach.

The present researchers are seeking to apply the JAGES method in Association of Southeast Asian Nations (ASEAN) countries, including Myanmar. One of the aims in this regard is to validate and to adopt the JAGES method for ASEAN countries. It is likely that the social determinants of health and well-being for older adults vary across countries and communities. Thus, to build an appropriate care system for the social and cultural contexts of each country, sociodemographic data concerning the older adults of each country are needed. Thus, the present study concerns our conducting of a cohort study among older adults in Myanmar.

COHORT DESCRIPTION

Our study, titled 'Healthy and Active Ageing in Myanmar (JAGES in Myanmar 2018)' comprises a baseline survey for longitudinal research. Community-dwelling older adults aged 60 years or older were recruited from two regions in Myanmar: Yangon and Bago. The Republic of the Union of Myanmar is composed of seven regions and seven states. Our survey was conducted only in

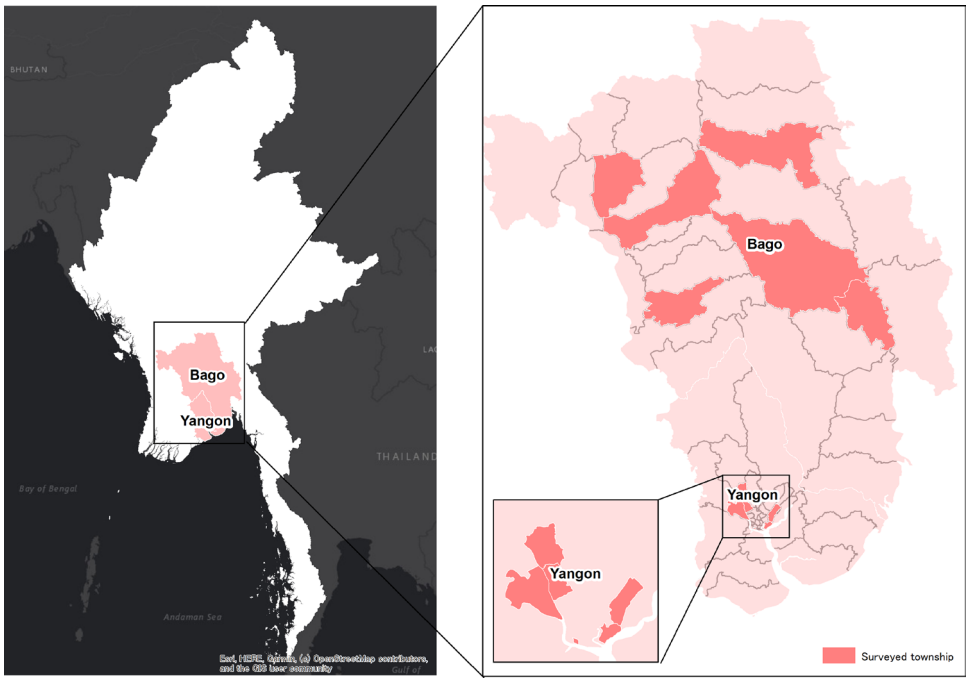

Figure 1 Location of the survey sites.

Yangon and Bago regions, and it could not be representative sample of older adults in whole Myanmar nation. However, one-fourth of the older people aged 60 years or over live in Yangon or Bago according to the national census report in 2014.[29] Yangon is representative of an urban area, while Bago is representative of a rural area. There are 34 townships in the Yangon region, and 28 townships in the Bago region. From each region, six townships were randomly selected, based on population-proportionate sampling (figure 1). Next, in the Yangon region 10 wards were randomly selected from each township; meanwhile, in the Bago region, 10 village tracts were randomly selected from each township. The ward is the minimum unit of a residential district in an urban area, and the village tract is the corresponding level in rural areas. However, some rural areas can contain villages that represent a level below that of a village tract; when such cases arose in the present research, one of these villages was randomly selected to represent the village tract. The difference between a ward and a village tract concerns the degree of urbanisation; urban areas are defined as wards, and rural areas can be defined as village tracts or villages. Occasionally, wards and village tracts coexist in a township. In this survey, we only selected wards from the townships in the Yangon region, and only selected village tracts from those in Bago region; this was because we considered Yangon to be representative of an urban area, and Bago to be representative of a rural area. We conducted our survey between September and October 2018 in the Yangon region; and between November and December 2018 in the Bago region.

The sample size has been calculated using the following equation[30]:

$$n = Z^2 \frac{P(1-P)}{e^2}$$

where:

- Z=level of confidence
- P=prevalence of 'good health' among older persons
- e=margin of error

Using Z=1.96, P=0.3 (estimate obtained from a previous study conducted on older persons in Myanmar) and e=0.05, the initial calculation for sample size is:

$$n = 1.96^2 \times \frac{0.3 \times 0.7}{0.05^2} = 322$$

This initial n is then multiplied by the design effect of 1.5 and the 2 groups of estimates (urban and rural) desired for the survey results:

$$n = 322 \times 1.5 \times 2 = 966$$

Then, we arrive at an ideal sample size of about 1200 with 600 sampled from urban areas and 600 from rural areas with 100 samples margin, in respective area. We did not adjust for certain anticipated response rate because we planned to continue to collect samples up to targeted number.

Advocacy meetings were held to explain the purpose of the study and survey to public health authority and community healthcare providers in the Yangon and Bago regions, respectively. During the administering of the survey, trained surveyors, together with a local public health nurse, visited each home containing an eligible participant. Participants were interviewed using a paper-based questionnaire, which concerned topics such as physical function, mental function, social network, social support, socioeconomic status, civic participation, community environment and mobility (items are shown in table 1). Objective measurements were also obtained from the

Table 1 Summary of baseline survey items for 'Healthy and Active Ageing in Myanmar (JAGES in Myanmar 2018)

Items	Description
Demographic characteristics	Age, sex, family composition, marital status, ethnicity, religion
Socioeconomic status	Equivalised income, educational attainment, employment status, whether the respondent had relocated in the past 5 years
Lifestyle characteristics	Smoking, betel-chewing, alcohol consumption, diet, time spent walking per day, role of religion in daily life, hobbies
Medical characteristics	Frequencies of medical check-ups and hospital/clinic visits, history of medical diagnoses, whether the respondent has been prescribed and adhered to hypertensive drugs
Social network	Relationship with friends
Social capital	Social cohesion, civic participation, mutual assistance
Environment	Access to hygiene-related resources (water, mosquito nets), services provided by the surrounding built environment (park, shop)
General health condition	Self-rated health status, score for the Geriatric Depression Scale
Happiness	Score for the Cantril Ladder
Disability	Score for the Disability Index (seeing, hearing, walking, remembering)
Activities of daily living	Score for the Katz Index (bathing, dressing, toileting, transferring, continence, feeding)
Instrumental activities of daily living	Ability to perform instrumental, intellectual and social activities
Long-term care risks	Oral function, cognitive function, whether the respondent is homebound, frequency of falls
Measured variables	Blood pressure, body height, body weight, abdominal circumference, body composition, grip strength

JAGES, Japan gerontological evaluation study.

participants, including blood pressure, body weight, body height and grip strength. Blood pressure was measured using a blood-pressure monitor (HEM-7120, OMRON Corporation, Kyoto, Japan), body weight was measured using a weighing scale (BC-757, TANITA Corporation, Tokyo, Japan) and grip strength was measured using an analogue grip dynamometer (T.K.K.5001, Takei Scientific Instruments, Niigata, Japan). Inclusion criteria were being aged 60 years or older, residing in a selected ward or village tract, and not being bed-ridden or having severe dementia; severe dementia was defined as an Abbreviated Mental Test (AMT)[31 32] score of 6 or lower. Participants' responses and measured values were recorded and kept as paper based. The whole records were digitised after verifying by two persons. Completed dataset was owned by a collaborative research team (mainly in University of Medicine 1, Yangon and Niigata University). Dataset is not open to public because it contains private information, but it can be shared based on collaborative research under the mutual understanding. Obtained answers and measured values were evaluated in terms of gender and regions. When comparing data among the stratified groups, percentages and average values were calculated. Written informed consent was obtained from each participant before the survey was administered. If a person refused to participate in the survey, he/she was excluded. A follow-up study is planned for 3 years from the baseline data collection (ie, in 2021).

Patient and public involvement

As a result of the nature of this cohort profile, no members of the public participated in the design or execution of this study.

FINDINGS TO DATE

In Yangon, surveyors visited 1083 older adults and 610 were at home. Ten were excluded due to not obtaining informed consent (six) and severe dementia or bedridden (four), thus response rate was 98.4% in Yangon. In Bago, surveyors visited 1044 older adults and 694 were at home. Ninety-four were excluded due to severe dementia or bedridden, thus the response rate was 86.5% in Bago. In total, 600 older adults from the Yangon region (222 men and 378 women), and 600 from the Bago region (261 men and 339 women) were surveyed (table 2). Regarding average age, men in Yangon averaged 69.4±7.6 years, while men in Bago averaged 69.4±7.3 years. Meanwhile, for women, the average age was 69.2±7.1 years in Yangon and 70.6±7.5 years in Bago. Most respondents were married and had children, but over half of the women were widowed (56.2%). The Yangon respondents showed a higher number of household members compared to the Bago respondents. The majority ethnicity in both regions was Burmese (85.7% in Yangon and 93.5% in Bago). Further, in both regions, the most common religion was Buddhism (94.8% in Yangon and 96.3% in Bago).

Table 2 Participants' demographic details, stratified by region and gender

		Yangon				Bago			
		Men		Women		Men		Women	
		N=222		N=378		N=261		N=339	
Demographics									
Age	60–69	133	(59.9%)	218	(57.7%)	149	(57.1%)	170	(50.1%)
	70–79	59	(26.6%)	116	(30.7%)	86	(33.0%)	119	(35.1%)
	80	30	(13.5%)	44	(11.6%)	26	(10.0%)	50	(14.7%)
	Average±SD	69.4±7.6		69.4±7.3		69.2±7.1		70.6±7.5	
Marital status	Married	164	(73.9%)	151	(39.9%)	215	(82.4%)	112	(33.0%)
	Widowed	47	(21.2%)	198	(52.4%)	40	(15.3%)	205	(60.5%)
	Divorced	2	(0.9%)	3	(0.8%)	0	(0.0%)	2	(0.6%)
	Never married	9	(4.1%)	26	(6.9%)	6	(2.3%)	20	(5.9%)
Having children	Yes, and alive	209	(94.1%)	338	(89.4%)	252	(96.6%)	315	(92.9%)
	Yes, but all passed away	0	(0.0%)	4	(1.1%)	2	(0.8%)	2	(0.6%)
	No, I don't have any children	4	(1.8%)	10	(2.6%)	1	(0.4%)	2	(0.6%)
Family composition	Living alone	8	(3.6%)	16	(4.2%)	9	(3.4%)	35	(10.3%)
	With my family (blood-related)	210	(94.6%)	356	(94.2%)	235	(90.0%)	294	(86.7%)
	With other family (not blood-related, friend, subordinated family, etc)	4	(1.8%)	6	(1.6%)	17	(6.5%)	10	(2.9%)
	Other	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)
Number of household members	Average±SD	5.0±2.2		4.7±2.4		3.9±1.9		3.7±1.9	
Ethnicity	Bamar	196	(88.3%)	318	(84.1%)	247	(94.6%)	314	(92.6%)
	Kavin	6	(2.7%)	17	(4.5%)	13	(5.0%)	21	(6.2%)
	Rakhine	4	(1.8%)	11	(2.9%)	0	(0.0%)	2	(0.6%)
	Mon	2	(0.9%)	4	(1.1%)	0	(0.0%)	0	(0.0%)
	Shan	2	(0.9%)	3	(0.8%)	0	(0.0%)	0	(0.0%)
	Chin	0	(0.0%)	1	(0.3%)	0	(0.0%)	0	(0.0%)
	Kachin	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)
	Kayah	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)
	Others	12	(5.4%)	24	(6.3%)	1	(0.4%)	2	(0.6%)

Continued

Table 2 Continued

		Yangon				Bago			
		Men		Women		Men		Women	
		N=222		N=378		N=261		N=339	
Religion	Buddhism	215	(96.8%)	354	(93.7%)	252	(96.6%)	326	(96.2%)
	Islam	0	(0.0%)	7	(1.9%)	0	(0.0%)	0	(0.0%)
	Christian	6	(2.7%)	15	(4.0%)	9	(3.4%)	13	(3.8%)
	Hindu	1	(0.5%)	2	(0.5%)	0	(0.0%)	0	(0.0%)
Socioeconomic status									
Educational attainment	No school	1	(0.5%)	39	(10.3%)	4	(1.5%)	60	(17.7%)
	Monastic education (only read and write)	32	(14.4%)	55	(14.6%)	94	(36.0%)	111	(32.7%)
	Some primary	8	(3.6%)	36	(9.5%)	42	(16.1%)	75	(22.1%)
	Finished primary	28	(12.6%)	91	(24.1%)	70	(26.8%)	67	(19.8%)
	Middle school	50	(22.5%)	64	(16.9%)	34	(13.0%)	16	(4.7%)
	High school	69	(31.1%)	55	(14.6%)	16	(6.1%)	10	(2.9%)
	Vocational	2	(0.9%)	1	(0.3%)	0	(0.0%)	0	(0.0%)
	College/university	33	(14.9%)	37	(9.8%)	1	(0.4%)	0	(0.0%)
Equivalised household income	Myanmar Kyats	190 737±170 998		171 096±138 873		83 259±66 907		80 555±62 722	
	None responder	105	(47.3%)	178	(47.1%)	132	(50.6%)	229	(67.6%)
Current perceptive financial situation	Very difficult	0	(0.0%)	1	(0.3%)	9	(3.4%)	21	(6.2%)
	Difficult	26	(11.7%)	47	(12.4%)	53	(20.3%)	90	(26.5%)
	Average	168	(75.7%)	294	(77.8%)	169	(64.8%)	198	(58.4%)
	Comfortable	27	(12.2%)	32	(8.5%)	29	(11.1%)	30	(8.8%)
	Very comfortable	1	(0.5%)	4	(1.1%)	1	(0.4%)	0	(0.0%)
Living condition at child age	Very good	7	(3.2%)	12	(3.2%)	11	(4.2%)	15	(4.4%)
	Good	82	(36.9%)	153	(40.5%)	96	(36.8%)	130	(38.3%)
	Normal	103	(46.4%)	177	(46.8%)	97	(37.2%)	121	(35.7%)
	Bad	29	(13.1%)	36	(9.5%)	54	(20.7%)	70	(20.6%)
	Very bad	1	(0.5%)	0	(0.0%)	3	(1.1%)	3	(0.9%)

Continued

Table 2 Continued

		Yangon				Bago			
		Men		Women		Men		Women	
		N=222		N=378		N=261		N=339	
Longest job	Professional/technical	15	(6.8%)	17	(4.5%)	0	(0.0%)	1	(0.3%)
	Managerial	15	(6.8%)	8	(2.1%)	2	(0.8%)	0	(0.0%)
	Clerical	10	(4.5%)	11	(2.9%)	1	(0.4%)	0	(0.0%)
	Sales/service	38	(17.1%)	121	(32.0%)	8	(3.1%)	52	(15.3%)
	Skilled labour	46	(20.7%)	40	(10.6%)	19	(7.3%)	15	(4.4%)
	Agriculture, forestry or fisheries	26	(11.7%)	42	(11.1%)	206	(78.9%)	237	(69.9%)
	Self-employment other than agriculture, forestry or fisheries	15	(6.8%)	31	(8.2%)	0	(0.0%)	9	(2.7%)
	Other	56	(25.2%)	31	(8.2%)	25	(9.6%)	18	(5.3%)
	Never	1	(0.5%)	77	(20.4%)	0	(0.0%)	7	(2.1%)
Working condition	Working	46	(20.7%)	46	(12.2%)	130	(49.8%)	52	(15.3%)
	Retired	172	(77.5%)	252	(66.7%)	131	(50.2%)	282	(83.2%)
	Never	4	(1.8%)	80	(21.2%)	0	(0.0%)	5	(1.5%)
Relocation within 5 years	Never	213	(95.9%)	359	(95.0%)	259	(99.2%)	334	(98.5%)
	Once or twice	7	(3.2%)	17	(4.5%)	1	(0.4%)	5	(1.5%)
	Three to five times	2	(0.9%)	2	(0.5%)	1	(0.4%)	0	(0.0%)
Lifestyle									
Smoking	Almost every day	47	(21.2%)	31	(8.2%)	96	(36.8%)	65	(19.2%)
	Sometimes	13	(5.9%)	7	(1.9%)	11	(4.2%)	18	(5.3%)
	Quit recently (less than 5 years)	10	(4.5%)	6	(1.6%)	13	(5.0%)	15	(4.4%)
	Quit more than 5 years ago	51	(23.0%)	21	(5.6%)	35	(13.4%)	33	(9.7%)
	Never smoked	101	(45.5%)	313	(82.8%)	106	(40.6%)	208	(61.4%)
Chewing betel	Chew almost every day	65	(29.3%)	69	(18.3%)	99	(37.9%)	120	(35.4%)
	Chew sometimes	11	(5.0%)	21	(5.6%)	30	(11.5%)	31	(9.1%)
	Quit recently (less than 5 years)	6	(2.7%)	4	(1.1%)	3	(1.1%)	6	(1.8%)
	Quit more than 5 years ago	20	(9.0%)	9	(2.4%)	21	(8.0%)	11	(3.2%)
	Never chewed	120	(54.1%)	275	(72.8%)	108	(41.4%)	171	(50.4%)

Continued

Table 2 Continued

		Yangon				Bago			
		Men		Women		Men		Women	
		N=222		N=378		N=261		N=339	
Drinking alcohol	Yes	25	(11.3%)	1	(0.3%)	31	(11.9%)	1	(0.3%)
	Quit recently (less than 5 years)	5	(2.3%)	2	(0.5%)	28	(10.7%)	0	(0.0%)
	Quit more than 5 years ago	60	(27.0%)	1	(0.3%)	93	(35.6%)	1	(0.3%)
	Never drank	132	(59.5%)	374	(98.9%)	109	(41.8%)	337	(99.4%)
Frequency of eating meat or fish over the past month	Twice a day or more	90	(40.5%)	137	(36.2%)	60	(23.0%)	69	(20.4%)
	Once a day	50	(22.5%)	78	(20.6%)	28	(10.7%)	35	(10.3%)
	Four to six times a week	54	(24.3%)	82	(21.7%)	64	(24.5%)	60	(17.7%)
	Two or three times a week	23	(10.4%)	67	(17.7%)	93	(35.6%)	141	(41.6%)
	Once a week	2	(0.9%)	9	(2.4%)	13	(5.0%)	19	(5.6%)
	Less than once a week	0	(0.0%)	3	(0.8%)	2	(0.8%)	12	(3.5%)
	None	3	(1.4%)	2	(0.5%)	1	(0.4%)	3	(0.9%)
Frequency of eating fruits and vegetables over the past month	Twice a day or more	103	(46.4%)	187	(49.5%)	155	(59.4%)	194	(57.2%)
	Once a day	45	(20.3%)	62	(16.4%)	27	(10.3%)	42	(12.4%)
	Four to six times a week	42	(18.9%)	84	(22.2%)	54	(20.7%)	64	(18.9%)
	Two or three times a week	26	(11.7%)	34	(9.0%)	16	(6.1%)	30	(8.8%)
	Once a week	2	(0.9%)	6	(1.6%)	5	(1.9%)	3	(0.9%)
	Less than once a week	1	(0.5%)	1	(0.3%)	1	(0.4%)	2	(0.6%)
	None	3	(1.4%)	4	(1.1%)	3	(1.1%)	4	(1.2%)
Time of walking a day on average	No, I can't walk	2	(0.9%)	7	(1.9%)	2	(0.8%)	3	(0.9%)
	Less than 30 min	65	(29.3%)	152	(40.2%)	76	(29.1%)	126	(37.2%)
	30–59 min	83	(37.4%)	128	(33.9%)	75	(28.7%)	120	(35.4%)
	60–89 min	35	(15.8%)	44	(11.6%)	37	(14.2%)	37	(10.9%)
	90 min or more	37	(16.7%)	47	(12.4%)	71	(27.2%)	53	(15.6%)
Have a hobby	Yes	175	(78.8%)	(254)	(67.2%)	201	(77.0%)	225	(66.4%)
	No	47	(21.2%)	124	(32.8%)	60	(23.0%)	114	(33.6%)

Continued

Table 2 Continued

		Yangon				Bago			
		Men		Women		Men		Women	
		N=222		N=378		N=261		N=339	
Frequency of participating charity events	Four or more a week	11	(5.0%)	1	(0.3%)	1	(0.4%)	0	(0.0%)
	Two or three times a week	5	(2.3%)	4	(1.1%)	0	(0.0%)	0	(0.0%)
	Once a week	11	(5.0%)	20	(5.3%)	3	(1.1%)	2	(0.6%)
	One to three times a month	14	(6.3%)	12	(3.2%)	29	(11.1%)	7	(2.1%)
	A few times a year	19	(8.6%)	19	(5.0%)	21	(8.0%)	9	(2.7%)
	None	162	(73.0%)	322	(85.2%)	207	(79.3%)	321	(94.7%)
Frequency of donation	Four or more a week	23	(10.4%)	45	(11.9%)	34	(13.0%)	69	(20.4%)
	Two or three times a week	25	(11.3%)	38	(10.1%)	1	(0.4%)	2	(0.6%)
	Once a week	18	(8.1%)	46	(12.2%)	12	(4.6%)	14	(4.1%)
	One to three times a month	37	(16.7%)	61	(16.1%)	45	(17.2%)	46	(13.6%)
	A few times a year	108	(48.6%)	173	(45.8%)	149	(57.1%)	187	(55.2%)
	None	11	(5.0%)	15	(4.0%)	20	(7.7%)	21	(6.2%)
Frequency of going to a temple, mosque, church, etc	Four or more a week	18	(8.1%)	14	(3.7%)	7	(2.7%)	3	(0.9%)
	Two or three times a week	13	(5.9%)	7	(1.9%)	19	(7.3%)	11	(3.2%)
	Once a week	52	(23.4%)	165	(43.7%)	110	(42.1%)	164	(48.4%)
	One to three times a month	53	(23.9%)	75	(19.8%)	72	(27.6%)	80	(23.6%)
	A few times a year	57	(25.7%)	67	(17.7%)	47	(18.0%)	63	(18.6%)
	None	29	(13.1%)	50	(13.2%)	6	(2.3%)	18	(5.3%)
Medical characteristics									
Frequency of receiving medical check	Within a year	34	(15.3%)	55	(14.6%)	5	(1.9%)	8	(2.4%)
	Between 1 and 4 years ago	12	(5.4%)	28	(7.4%)	10	(3.8%)	10	(2.9%)
	More than 4 years ago	9	(4.1%)	15	(4.0%)	3	(1.1%)	2	(0.6%)
	Never	167	(75.2%)	280	(74.1%)	243	(93.1%)	319	(94.1%)

Continued

Table 2 Continued

		Yangon				Bago			
		Men		Women		Men		Women	
		N=222		N=378		N=261		N=339	
Medical-seeking behaviour	Government hospital	8	(8.7%)	18	(10.4%)	14	(14.0%)	28	(16.6%)
	Government health centre (RHC)	2	(2.2%)	1	(0.6%)	5	(5.0%)	11	(6.5%)
	Government health post (subcenter)	0	(0.0%)	0	(0.0%)	17	(17.0%)	60	(35.5%)
	Public village health worker (voluntary health worker)	1	(1.1%)	0	(0.0%)	4	(4.0%)	5	(3.0%)
	Government mobile clinic	0		0		0		0	
	Public UHC centre	1	(1.1%)	1	(0.6%)	0		0	
	Public traditional medical clinic	0		0		0		0	
	Other public medical sector	0		1		0		0	
	Marie Stopes	0		0		0		0	
	Myanmar Red Cross	0		0		0		0	
	PSI/M (SUN)	0		0		0		0	
	MMA private sector	0		0		0		0	
	Other NGO sector	0		1	(0.6%)	0		0	
	Private hospital/clinic	75	(81.5%)	152	(87.9%)	52	(52.0%)	69	(40.8%)
	Pharmacy	5	(5.4%)	3	(1.7%)	0		1	(0.6%)
	Private doctor	5	(5.4%)	7	(4.0%)	10	(10.0%)	5	(3.0%)
	Private mobile clinic	0		0		0		0	
	Traditional medical clinic	0		1	(0.6%)	0		0	
	Other private medical sector	0		1	(0.6%)	0		1	(0.6%)
	Shop	1	(1.1%)	5	(2.9%)	0		0	
	Traditional practitioner	0		0		0		1	(0.6%)

Continued

Table 2 Continued

		Yangon				Bago			
		Men		Women		Men		Women	
		N=222		N=378		N=261		N=339	
Diagnosed medical history	None	47	(21.2%)	49	(13.0%)	33	(12.6%)	16	(4.7%)
	I don't know	0	(0.0%)	3	(0.8%)	0	(0.0%)	1	(0.3%)
	Stroke	12	(5.4%)	11	(2.9%)	3	(1.1%)	7	(2.1%)
	Heart disease	29	(13.1%)	65	(17.2%)	10	(3.8%)	25	(7.4%)
	Diabetes	27	(12.2%)	66	(17.5%)	5	(1.9%)	15	(4.4%)
	Hyperlipidaemia	6	(2.7%)	15	(4.0%)	2	(0.8%)	1	(0.3%)
	Respiratory disease	24	(10.8%)	44	(11.6%)	33	(12.6%)	43	(12.7%)
	Gastrointestinal, liver or gallbladder disease	14	(6.3%)	41	(10.8%)	25	(9.6%)	35	(10.3%)
	Kidney or prostate gland disease	17	(7.7%)	17	(4.5%)	8	(3.1%)	7	(2.1%)
	Musculoskeletal disease	47	(21.2%)	118	(31.2%)	129	(49.4%)	206	(60.8%)
	Traumatic injury	8	(3.6%)	26	(6.9%)	6	(2.3%)	18	(5.3%)
	Cancer	2	(0.9%)	2	(0.5%)	1	(0.4%)	1	(0.3%)
	Blood or immune system disease	51	(23.0%)	111	(29.4%)	83	(31.8%)	155	(45.7%)
	Depression	1	(0.5%)	1	(0.3%)	0	(0.0%)	1	(0.3%)
	Dementia	1	(0.5%)	0	(0.0%)	0	(0.0%)	1	(0.3%)
	Parkinson's disease	3	(1.4%)	6	(1.6%)	2	(0.8%)	8	(2.4%)
	Eye disease	55	(24.8%)	130	(34.4%)	112	(42.9%)	155	(45.7%)
	Ear disease	14	(6.3%)	23	(6.1%)	23	(8.8%)	32	(9.4%)
	Tuberculosis	4	(1.8%)	1	(0.3%)	3	(1.1%)	1	(0.3%)
	HIV	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)
	Malaria	12	(5.4%)	0	(0.0%)	18	(6.9%)	5	(1.5%)
	Gynaecological problem	0	(0.0%)	5	(1.3%)	0	(0.0%)	1	(0.3%)
	Other	12	(5.4%)	21	(5.6%)	5	(1.9%)	3	(0.9%)

MMA, Myanmar medical association; NGO, non-governmental organisation; PSI/M, population services international/Myanmar; RHC, rural health centre; SUN, sun quality health; UHC, urban health centre.

Table 3 Participants' social and environmental characteristics

		Yangon				Bago			
		Men		Women		Men		Women	
		N=222		N=378		N=261		N=339	
Social network									
Frequency of meeting friends/ acquaintances	Four or more times a week	95	(42.8%)	115	(30.4%)	177	(67.8%)	214	(63.1%)
	Two to three times a week	23	(10.4%)	36	(9.5%)	20	(7.7%)	38	(11.2%)
	Once a week	24	(10.8%)	40	(10.6%)	15	(5.7%)	16	(4.7%)
	One to three times a month	25	(11.3%)	38	(10.1%)	26	(10.0%)	17	(5.0%)
	A small number of occasions each year	17	(7.7%)	44	(11.6%)	7	(2.7%)	11	(3.2%)
	Rarely/never	38	(17.1%)	105	(27.8%)	16	(6.1%)	43	(12.7%)
Civic participation									
Religious group activities	Four or more times a week	8	(3.6%)	3	(0.8%)	0	(0.0%)	1	(0.3%)
	Two to three times a week	10	(4.5%)	6	(1.6%)	3	(1.1%)	0	(0.0%)
	Once a week	14	(6.3%)	20	(5.3%)	9	(3.4%)	3	(0.9%)
	One to three times a month	9	(4.1%)	8	(2.1%)	24	(9.2%)	4	(1.2%)
	A small number of occasions each year	8	(3.6%)	5	(1.3%)	19	(7.3%)	6	(1.8%)
	Never	173	(77.9%)	336	(88.9%)	206	(78.9%)	325	(95.9%)
Volunteer group	Four or more times a week	7	(3.2%)	1	(0.3%)	1	(0.4%)	0	(0.0%)
	Two to three times a week	4	(1.8%)	0	(0.0%)	0	(0.0%)	0	(0.0%)
	Once a week	6	(2.7%)	3	(0.8%)	3	(1.1%)	2	(0.6%)
	One to three times a month	12	(5.4%)	12	(3.2%)	11	(4.2%)	4	(1.2%)
	A small number of occasions each year	5	(2.3%)	5	(1.3%)	5	(1.9%)	3	(0.9%)
	Never	188	(84.7%)	357	(94.4%)	241	(92.3%)	330	(97.3%)
Sports groups or clubs	Four or more times a week	1	(0.5%)	1	(0.3%)	0	(0.0%)	0	(0.0%)
	Two to three times a week	0	(0.0%)	1	(0.3%)	0	(0.0%)	0	(0.0%)
	Once a week	2	(0.9%)	0	(0.0%)	0	(0.0%)	0	(0.0%)
	One to three times a month	5	(2.3%)	0	(0.0%)	1	(0.4%)	0	(0.0%)
	A small number of occasions each year	2	(0.9%)	0	(0.0%)	0	(0.0%)	0	(0.0%)
	Never	212	(95.5%)	376	(99.5%)	260	(99.6%)	339	(100.0%)
Hobby groups	Four or more times a week	6	(2.7%)	0	(0.0%)	0	(0.0%)	0	(0.0%)
	Two to three times a week	1	(0.5%)	1	(0.3%)	0	(0.0%)	0	(0.0%)
	Once a week	2	(0.9%)	1	(0.3%)	0	(0.0%)	0	(0.0%)
	One to three times a month	1	(0.5%)	0	(0.0%)	0	(0.0%)	0	(0.0%)
	A small number of occasions each year	3	(1.4%)	3	(0.8%)	0	(0.0%)	0	(0.0%)
	Never	209	(94.1%)	373	(98.7%)	261	(100.0%)	339	(100.0%)
Community meetings	Four or more times a week	1	(0.5%)	0	(0.0%)	0	(0.0%)	0	(0.0%)
	Two to three times a week	4	(1.8%)	0	(0.0%)	0	(0.0%)	0	(0.0%)
	Once a week	3	(1.4%)	1	(0.3%)	0	(0.0%)	0	(0.0%)
	One to three times a month	4	(1.8%)	0	(0.0%)	1	(0.4%)	0	(0.0%)
	A small number of occasions each year	18	(8.1%)	24	(6.3%)	3	(1.1%)	1	(0.3%)
	Never	192	(86.5%)	353	(93.4%)	257	(98.5%)	338	(99.7%)

Continued

Table 3 Continued

		Yangon				Bago			
		Men		Women		Men		Women	
		N=222		N=378		N=261		N=339	
Political meetings or events	Four or more times a week	1	(0.5%)	0	(0.0%)	0	(0.0%)	0	(0.0%)
	Two to three times a week	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)
	Once a week	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)
	One to three times a month	0	(0.0%)	1	(0.3%)	0	(0.0%)	0	(0.0%)
	A small number of occasions each year	2	(0.9%)	1	(0.3%)	5	(1.9%)	0	(0.0%)
	Never	219	(98.6%)	376	(99.5%)	256	(98.1%)	339	(100.0%)
Mutual assistance									
Receiving emotional support	Spouse	114	(51.4%)	79	(20.9%)	149	(57.1%)	70	(20.6%)
	Cohabiting child	102	(45.9%)	232	(61.4%)	133	(51.0%)	183	(54.0%)
	Non-cohabiting child or relative	7	(3.2%)	25	(6.6%)	22	(8.4%)	41	(12.1%)
	Brother/sister, relative, parent, grandchild	18	(8.1%)	55	(14.6%)	31	(11.9%)	49	(14.5%)
	Neighbour	1	(0.5%)	21	(5.6%)	3	(1.1%)	13	(3.8%)
	Friend	17	(7.7%)	23	(6.1%)	14	(5.4%)	5	(1.5%)
	Other	0	(0.0%)	1	(0.3%)	1	(0.4%)	0	(0.0%)
	I do not receive emotional support	42	(18.9%)	42	(11.1%)	35	(13.4%)	57	(16.8%)
Providing emotional support	Spouse	100	(45.0%)	60	(15.9%)	138	(52.9%)	57	(16.8%)
	Cohabiting child	111	(50.0%)	214	(56.6%)	130	(49.8%)	170	(50.1%)
	Non-cohabiting child or relative	6	(2.7%)	26	(6.9%)	27	(10.3%)	40	(11.8%)
	Brother/sister, relative, parent, grandchild	24	(10.8%)	65	(17.2%)	39	(14.9%)	67	(19.8%)
	Neighbour	7	(3.2%)	33	(8.7%)	9	(3.4%)	19	(5.6%)
	Friend	33	(14.9%)	45	(11.9%)	28	(10.7%)	7	(2.1%)
	Other	0	(0.0%)	1	(0.3%)	0	(0.0%)	0	(0.0%)
	I do not provide emotional support	32	(14.4%)	53	(14.0%)	40	(15.3%)	71	(20.9%)
Receiving instrumental support	Spouse	144	(64.9%)	74	(19.6%)	185	(70.9%)	71	(20.9%)
	Cohabiting child	135	(60.8%)	287	(75.9%)	165	(63.2%)	222	(65.5%)
	Non-cohabiting child or relative	16	(7.2%)	38	(10.1%)	32	(12.3%)	71	(20.9%)
	Brother/sister, relative, parent, grandchild	22	(9.9%)	75	(19.8%)	22	(8.4%)	63	(18.6%)
	Neighbour	0	(0.0%)	7	(1.9%)	2	(0.8%)	8	(2.4%)
	Friend	1	(0.5%)	5	(1.3%)	0	(0.0%)	0	(0.0%)
	Other	1	(0.5%)	2	(0.5%)	0	(0.0%)	0	(0.0%)
	I do not receive instrumental support	7	(3.2%)	6	(1.6%)	5	(1.9%)	9	(2.7%)

Continued

Table 3 Continued

		Yangon				Bago			
		Men		Women		Men		Women	
		N=222		N=378		N=261		N=339	
Providing instrumental support	Spouse	103	(46.4%)	91	(24.1%)	144	(55.2%)	68	(20.1%)
	Cohabiting child	90	(40.5%)	180	(47.6%)	105	(40.2%)	157	(46.3%)
	Non-cohabiting child or relative	5	(2.3%)	15	(4.0%)	13	(5.0%)	30	(8.8%)
	Brother/sister, relative, parents, grandchild	29	(13.1%)	73	(19.3%)	36	(13.8%)	77	(22.7%)
	Neighbour	5	(2.3%)	9	(2.4%)	2	(0.8%)	12	(3.5%)
	Friend	6	(2.7%)	13	(3.4%)	2	(0.8%)	2	(0.6%)
	Other	1	(0.5%)	0	(0.0%)	0	(0.0%)	0	(0.0%)
	I do not provide instrumental support	59	(26.6%)	79	(20.9%)	56	(21.5%)	74	(21.8%)
Social cohesion									
Trust neighbours	Very	57	(25.7%)	117	(31.0%)	109	(41.8%)	140	(41.3%)
	Moderately	110	(49.5%)	146	(38.6%)	95	(36.4%)	113	(33.3%)
	Neutral	19	(8.6%)	54	(14.3%)	18	(6.9%)	27	(8.0%)
	Not really	29	(13.1%)	48	(12.7%)	30	(11.5%)	41	(12.1%)
	Not at all	7	(3.2%)	13	(3.4%)	9	(3.4%)	18	(5.3%)
Reciprocity with neighbours	High	81	(36.5%)	146	(38.6%)	156	(59.8%)	203	(59.9%)
	Moderate	107	(48.2%)	170	(45.0%)	87	(33.3%)	103	(30.4%)
	Neutral	21	(9.5%)	48	(12.7%)	9	(3.4%)	22	(6.5%)
	Low	8	(3.6%)	6	(1.6%)	5	(1.9%)	2	(0.6%)
	None	5	(2.3%)	8	(2.1%)	4	(1.5%)	9	(2.7%)
Attachment to neighbours	High	135	(60.8%)	257	(68.0%)	240	(92.0%)	293	(86.4%)
	Moderate	70	(31.5%)	93	(24.6%)	16	(6.1%)	31	(9.1%)
	Neutral	2	(0.9%)	11	(2.9%)	0	(0.0%)	0	(0.0%)
	Low	6	(2.7%)	4	(1.1%)	2	(0.8%)	3	(0.9%)
	None	9	(4.1%)	13	(3.4%)	3	(1.1%)	12	(3.5%)
Environment									
Access to drinking water	Over 30 min travel	1	(0.5%)	3	(0.8%)	12	(4.6%)	19	(5.6%)
	Within 30 min travel	221	(99.5%)	375	(99.2%)	249	(95.4%)	320	(94.4%)
Mosquito nets in household	Yes	219	(98.6%)	375	(99.2%)	258	(98.9%)	326	(96.2%)
	Yes, but the number is insufficient	2	(0.9%)	3	(0.8%)	3	(1.1%)	12	(3.5%)
	No	1	(0.5%)	0	(0.0%)	0	(0.0%)	1	(0.3%)
Environment that affords exercise (park or footpath) within walking distance	Yes	108	(48.6%)	155	(41.0%)	41	(15.7%)	35	(10.3%)
	No	112	(50.5%)	214	(56.6%)	220	(84.3%)	304	(89.7%)
	Don't know	2	(0.9%)	9	(2.4%)	0	(0.0%)	0	(0.0%)
Shop or facility for obtaining fresh food within walking distance	Yes	209	(94.1%)	356	(94.2%)	49	(18.8%)	55	(16.2%)
	No	13	(5.9%)	22	(5.8%)	212	(81.2%)	284	(83.8%)

Socioeconomic status was significantly lower in Bago than in Yangon; however, self-perceived financial status did not differ greatly between the two regions. For the Bago respondents, the longest-held job was mainly agriculture related; however, various occupations were mentioned in this regard by the Yangon respondents. In terms of lifestyle, alcohol consumption, smoking and betel-chewing were significantly more common among men than women. Interestingly, women in Bago smoked and chewed betel more frequently than did women in Yangon. Most of the

Table 4 Participants' activities of daily living, objective measurements and long-term care risk

		Yangon				Bago			
		Men		Women		Men		Women	
		N=222		N=378		N=261		N=339	
General health condition									
Self-rated health	Excellent	7	(3.2%)	6	(1.6%)	4	(1.5%)	2	(0.6%)
	Good	105	(47.3%)	115	(30.4%)	62	(23.8%)	53	(15.6%)
	Fair	86	(38.7%)	166	(43.9%)	111	(42.5%)	140	(41.3%)
	Poor	24	(10.8%)	91	(24.1%)	84	(32.2%)	144	(42.5%)
Score for the Geriatric Depression Scale	0–4	203	(92.3%)	295	(78.9%)	195	(75.0%)	228	(68.7%)
	5–9	17	(7.7%)	79	(21.1%)	65	(25.0%)	101	(30.4%)
	≥10	0	(0.0%)	0	(0.0%)	0	(0.0%)	3	(0.9%)
Happiness									
Score for the Cantril Ladder	Average±SD	7.0±1.8		6.6±1.9		6.8±2.1		6.2±2.1	
Disability									
Difficulty seeing	No difficulty	91	(41.0%)	115	(30.4%)	81	(31.0%)	102	(30.1%)
	Some difficulty	125	(56.3%)	241	(63.8%)	160	(61.3%)	218	(64.3%)
	Significant difficulty	6	(2.7%)	22	(5.8%)	20	(7.7%)	19	(5.6%)
	Cannot see at all	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)
Difficulty hearing	No difficulty	177	(79.7%)	298	(78.8%)	211	(80.8%)	269	(79.4%)
	Some difficulty	39	(17.6%)	69	(18.3%)	44	(16.9%)	65	(19.2%)
	Significant difficulty	5	(2.3%)	11	(2.9%)	6	(2.3%)	5	(1.5%)
	Cannot hear at all	1	(0.5%)	0	(0.0%)	0	(0.0%)	0	(0.0%)
Difficulty walking	No difficulty	106	(47.7%)	96	(25.4%)	102	(39.1%)	71	(20.9%)
	Some difficulty	103	(46.4%)	244	(64.6%)	145	(55.6%)	234	(69.0%)
	Significant difficulty	12	(5.4%)	36	(9.5%)	14	(5.4%)	34	(10.0%)
	Cannot walk at all	1	(0.5%)	2	(0.5%)	0	(0.0%)	0	(0.0%)
Difficulty remembering or concentrating	No difficulty	130	(58.6%)	180	(47.6%)	126	(48.3%)	100	(29.5%)
	Some difficulty	90	(40.5%)	193	(51.1%)	133	(51.0%)	226	(66.7%)
	Significant difficulty	2	(0.9%)	5	(1.3%)	2	(0.8%)	13	(3.8%)
	Cannot remember or concentrate at all	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)
Activities of daily living (Katz Index)									
Bathing	Do not need assistance	218	(98.2%)	365	(96.6%)	258	(98.9%)	333	(98.2%)
	Need assistance	4	(1.8%)	13	(3.4%)	3	(1.1%)	6	(1.8%)
Dressing	Do not need assistance	220	(99.1%)	367	(97.1%)	259	(99.2%)	334	(98.5)
	Need assistance	2	(0.9%)	11	(2.9%)	2	(0.8%)	5	(1.5%)
Toileting	Need assistance	2	(0.9%)	11	(2.9%)	1	(0.4%)	7	(2.1%)
Transferring	Do not need assistance	221	(99.5%)	369	(97.6%)	260	(99.6%)	334	(98.5%)
	Need assistance	1	(0.5%)	9	(2.4%)	1	(0.4%)	5	(1.5%)
Continence	Complete self-control	201	(90.5%)	335	(88.6%)	223	(85.4%)	286	(84.4%)
	Partially or totally incontinent	21	(9.5%)	43	(11.4%)	38	(14.6%)	53	(15.6%)

Continued

Table 4 Continued

		Yangon				Bago			
		Men		Women		Men		Women	
		N=222		N=378		N=261		N=339	
Feeding	Do not need assistance	221	(99.5%)	368	(97.4%)	260	(99.6%)	337	(99.4%)
	Need assistance	1	(0.5%)	10	(2.6%)	1	(0.4%)	2	(0.6%)
Instrumental activities of daily living									
Modified TMIG Index	Average±SD								
	Total (full score: 10)	7.3±2.1		6.5±2.7		6.1±2.0		5.8±2.1	
	Instrumental self-maintenance (full score: 3)	1.8±1.0		1.9±1.1		1.2±1.0		1.5±1.0	
	Intellectual activity (full score: 3)	2.3±1.0		1.7±1.1		1.5±1.1		1.0±0.9	
	Social role (full score: 4)	3.2±1.0		2.8±1.3		3.5±0.8		3.3±1.0	
Measured variables									
Systolic blood pressure	Average±SD	142±21		141±22		144±22		145±22	
Diastolic blood pressure	Average±SD	86±12		84±12		89±13		85±12	
Body height	Average±SD	162.3±7.4		150.2±6		162.8±5.2		150.5±5.8	
Body weight	Average±SD	60.1±12.5		54±12.8		52.3±10.7		45.1±11.2	
Body mass index	Average±SD	22.8±4.3		23.9±5.3		19.7±3.8		19.9±4.7	
Grip strength	Average±SD	29.5±7		17.9±4.9		28.4±7.1		17.7±4.8	
Long-term care risks									
Physical function									
Decline in physical function	No	184	(82.9%)	224	(59.3%)	199	(76.2%)	182	(53.7%)
	Yes	38	(17.1%)	154	(40.7%)	62	(23.8%)	157	(46.3%)
Oral function									
Number of natural teeth	None	4	(1.8%)	26	(6.9%)	6	(2.3%)	13	(3.8%)
	1–4	15	(6.8%)	29	(7.7%)	15	(5.7%)	35	(10.3%)
	5–9	17	(7.7%)	44	(11.6%)	30	(11.5%)	48	(14.2%)
	10–19	54	(24.3%)	67	(17.7%)	61	(23.4%)	65	(19.2%)
	≥20	132	(59.5%)	212	(56.1%)	149	(57.1%)	178	(52.5%)
Cognitive function									
AMT score	9–10	199	(89.6%)	249	(65.9%)	203	(77.8%)	158	(46.6%)
	7–8	23	(10.4%)	129	(34.1%)	58	(22.2%)	181	(53.4%)
Homebound									
Frequency of outdoor excursions	More than once a week	197	(88.7%)	329	(87.0%)	255	(97.7%)	323	(95.3%)
	Less than once a week	25	(11.3%)	49	(13.0%)	6	(2.3%)	16	(4.7%)
Falling									
Number of falls within the past year	Two or more	5	(2.3%)	22	(5.8%)	12	(4.6%)	36	(10.6%)
	Once	31	(14.0%)	69	(18.3%)	32	(12.3%)	67	(19.8%)
	None	186	(83.8%)	287	(75.9%)	216	(83.1%)	236	(69.6%)

Continued

Table 4 Continued

		Yangon				Bago			
		Men		Women		Men		Women	
		N=222		N=378		N=261		N=339	
Expected care provider									
Having a potential care provider	Yes	154	(69.4%)	299	(79.1%)	218	(83.5%)	284	(83.8%)
	No	65	(29.3%)	73	(19.3%)	43	(16.5%)	52	(15.3%)
	I don't know	3	(1.4%)	6	(1.6%)	0	(0.0%)	3	(0.9%)
Possible care provider(s)	Spouse	60	(39.0%)	22	(7.4%)	51	(23.4%)	13	(4.6%)
	Child(ren)	120	(77.9%)	251	(83.9%)	197	(90.4%)	255	(89.8%)
	Child(ren)-in-law	1	(0.6%)	12	(4.0%)	4	(1.8%)	4	(1.4%)
	Brother/sister	3	(1.9%)	22	(7.4%)	2	(0.9%)	13	(4.6%)
	Relative(s)	6	(3.9%)	25	(8.4%)	10	(4.6%)	18	(6.3%)
	Friend(s)	0	(0.0%)	1	(0.3%)	0	(0.0%)	0	(0.0%)
	Neighbour(s)	0	(0.0%)	3	(1.0%)	0	(0.0%)	2	(0.7%)
	Other	1	(0.6%)	2	(0.7%)	0	(0.0%)	1	(0.4%)

AMT, abbreviated mental test; TMIG, Tokyo metropolitan institute of gerontology index of competence.

participants received medicine from private hospitals or clinics, but some obtained medicine from governmental facilities; the proportion of respondents who were recipients from governmental facilities was higher in Bago than in Yangon. Bago respondents showed a higher frequency of meeting friends (table 3); notably, some of the older adults in Yangon rarely or never met friends (men: 17.1%, women: 27.8%). Regarding social capital, civic participation was mostly higher in Yangon than in Bago; levels of mutual assistance were similar between Yangon and Bago, but higher social cohesion was observed in Bago. Meanwhile, a higher proportion of poor self-rated health was found for the Bago respondents (men: 32.2%, women: 42.5%) than the Yangon respondents (men: 10.8%, women: 24.1%; table 4). Also, a higher proportion of the Bago respondents showed depressive tendencies (Geriatric Depression Scale/GDS score of 5–9; men: 25.0%, women: 30.4%) when compared to the Yangon respondents (men: 7.7%, women: 21.1%). Only three cases of depression (GDS score of 10 or higher) were observed; all concerning women. Yangon respondents showed a higher happiness index (Cantril Ladder[33] score (men: 7.0±1.8, women: 6.6±1.9) than did the Bago respondents (men: 6.8±2.1, women: 6.2±2.1). Regarding disability, the proportions of older adults with disability were similar between Yangon and Bago, but Bago respondents scored higher for some items. For activities of daily living (ADL), most of the participants were independent. Yangon respondents generally scored higher in instrumental ADL than did Bago respondents, but Bago respondents scored higher for social role, which is a part of the index. Blood pressure values were similar across the two regions. Yangon respondents showed higher body mass index than did the Bago respondents.

Risk factors of long-term care were evaluated; the results are as follows: in both regions, percentage of physical-function decline was higher in women than in men (for Yangon, women: 40.7%, men: 17.1%; for Bago: 46.3% and 23.8%, respectively). Meanwhile, percentage of cognitive-function decline (an AMT score of 7 or 8) was also higher among women than men in both regions (for Yangon, women: 34.1%, men: 10.4%; in Bago: 53.4% and 22.2%, respectively). Women also showed a higher percentage of falls (for Yangon, women: 24.1%, men: 16.3%; for Bago: 30.4% and 16.9%, respectively). Percentage of individuals who were homebound was higher in urban (11.3%) than rural (2.3%) areas (men: 13.0%, women: 4.7%). Finally, all groups showed a similar percentage of individuals with 20 or fewer remaining teeth.

Collaboration

Sections of the questionnaire used in our survey were sourced from the JAGES questionnaire. Using this questionnaire allows us to compare the status of older adults in Myanmar with that of their Japanese counterparts. The present study is the first to apply the JAGES questionnaire in other Asian countries. Although the questions should be modified to suit the social and cultural contexts of each target country, this comparative core questionnaire can be valuable for helping countries that will soon become aged or super-aged societies prepare for future associated issues. The data obtained in the present study in Myanmar are not open to the public; however, there is an opportunity for collaboration, especially among ASEAN and Asian countries. Specifically, by using a common core questionnaire, factors regarding general health conditions, long-term care risks, lifestyle and social surroundings can be compared across countries. We have

conducted a similar survey using the common core questionnaire in Malaysia; thus, by including our present findings, we can facilitate collaboration among Myanmar, Malaysia and Japan regarding the issue of societal ageing.

Further details

Strengths and limitations

There are several strengths to the present study. First, there has been no previous longitudinal cohort study of older adults in Myanmar; thus, the consequent absence of follow-up data means that the long-term care risk for older adults in the country has not yet been defined. When we obtain data from our follow-up study (in 2021), we should be able to evaluate long-term care risk in Myanmar. Second, the broad scope of the questionnaire included not only individual physical and mental health conditions and lifestyle, but also social aspects such as socioeconomic status, social network, social capital and social environment. The questionnaire administered in our survey was originally used in the nationwide survey of JAGES in 2016. Thus, the results are directly comparable with JAGES data, despite certain contextual differences between the countries. Third, we applied a proportionate random-sampling method; thus, in each region (urban and rural), equal representativeness among the participants was ensured. Fourth, we conducted home-visit surveys, which afforded a high response rate and objectively precise measurement.

However, there are some limitations to this study. This was not a nationwide study, instead being focused in the Yangon and Bago regions. Thus, our findings cannot be applied to the entire population of Myanmar, but population of older adults in Yangon and Bago covers 25% of that of the whole nation. Additionally, this was a cross-sectional survey, meaning we could not definitively determine the causal relationships associated with our findings. Future studies in this area could consider these limitations and adopt a more comprehensive recruitment process, which would provide more generalisable results, as well as longitudinal elements, which would provide indications of causal relationships.

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Contributors HHW and YS assumed all responsibility for the survey and research. HHW was the principle investigator in Myanmar. YS was the principle investigator for the project. KTL, PEZ and TZB performed data collection, questionnaire development and survey management. TWN contributed to the development of the questionnaire. IN provided advice regarding conducting the survey in Myanmar and also contributed to the study design. YS, DT and YN contributed to the development of the questionnaire and the study design.

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Map disclaimer The depiction of boundaries on this map does not imply the expression of any opinion whatsoever on the part of BMJ (or any member of its group) concerning the legal status of any country, territory, jurisdiction or area or of its authorities. This map is provided without any warranty of any kind, either express or implied.

Competing interests None declared.

Patient consent for publication Not required.

Ethics approval Before conducting the survey, the entire protocol of the research project was reviewed and approved by the ethical review committee of the Department of Medical Research of the Ministry of Health and Sports, the Republic of the Union of Myanmar. We then contacted local governments and public health divisions to request their cooperation regarding the survey.

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