



Expected lifespan and healthspan among rural and urban individuals in Java, Indonesia

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Abstract In Indonesia, adults living in rural areas have a longer life expectancy than their urban counterparts. Beyond observed longevity, attention has focused on lifespan and healthspan expectations as predictors of health outcomes. This study examines expected lifespan and expected healthspan and their associated factors among rural and urban populations in Java, Indonesia. The cross-sectional Healthy Longevity (HELO) survey collected data from the general population using in-person interviews and an online platform. Multinomial logistic regression analyses identified sociodemographic characteristics,

knowledge and perceptions, personality traits, health behaviours, social support, and health status associated with expected lifespan and expected healthspan. A total of 1,199 individuals (602 rural; 597 urban) completed the survey (63.5% of rural and 66.8% of urban were female). Median age was 49 years [34 – 64] in rural areas and 50 years [35 – 63] in urban areas. Among those aged 40 – 64 years, 68.7% of rural versus 63.9% of urban individuals expected to live to 80 – 99 years. Expected healthspan was shorter among urban individuals, with 42.5% versus 38.9% expecting healthspan to end at 60 – 79 years. Higher chronological age, perceiving same-age individuals as long-lived, and stronger expectancy and value of healthy longevity were associated with higher expected lifespan and healthspan in both areas. Balanced diet and weight monitoring showed similar association in both groups.

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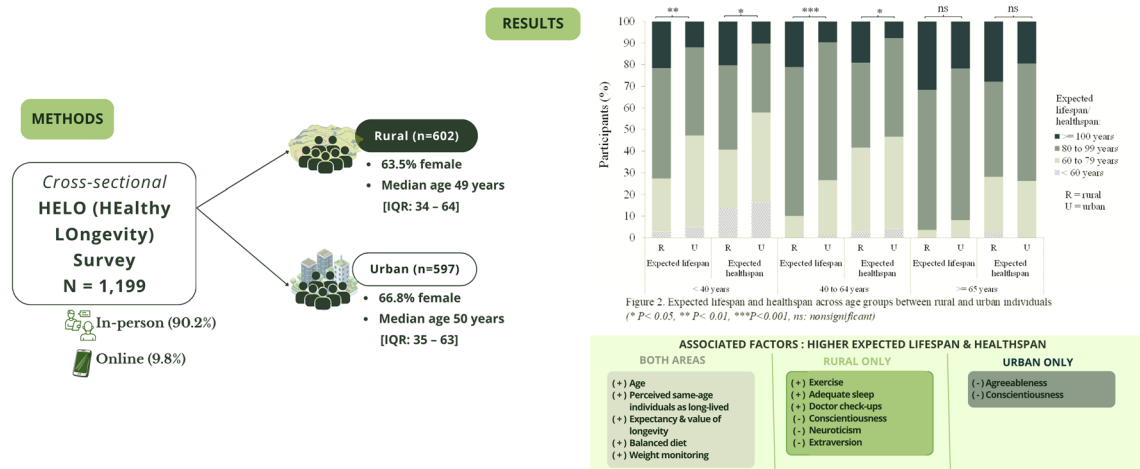
Exercise, sleep, and doctor check-ups were associated only with rural individuals. Higher conscientiousness, neuroticism, and extraversion were associated

with lower expectations in rural individuals, whereas higher agreeableness and conscientiousness showed similar associations in urban individuals.

Graphical abstract

Expected lifespan and healthspan among rural and urban individuals in Java, Indonesia

GRAPHICAL ABSTRACT



Keywords Longevity · Lifespan · Healthspan · Java · Rural · Urban

Introduction

Lifespan in Indonesia has followed global trends, rising from 46.3 years in 1960 to 72.7 years in 2025 [1]. Healthspan, however, has increased at a slower pace, from 59.4 years in 2000 to 60.7 years in 2021 [2]. Expected lifespan, an person's estimation of how long they expect to live, and expected healthspan, how long they anticipate living in good health, free from chronic diseases [3], are increasingly recognized as a meaningful predictors of health outcomes [4] and a range of health-related behaviours [5]. Expected lifespan and healthspan are influenced by sociodemographic, psychosocial and environmental factors. For instance, Korean adult females reported an expected lifespan 1.59 years longer than males [6]. Lower education and income levels have been associated with lower expected lifespan [7], whereas having children, particularly adult children,

has been associated with higher expected lifespan [8], an association discussed in relation to emotional support from children and a greater sense of security about the future [8]. Certain personality traits have also been linked to expected lifespan: neuroticism, a classically maladaptive trait, has been associated with lower expected lifespan among older adults [9], and agreeableness, which relates to a younger perceived age, is associated with longer expected lifespan [10]. Health-related behaviours, including non-smoking [7], maintaining a balanced diet [11], and engaging in physical activity [12], are also associated with greater perceived lifespan. Emotional support and strong family relationships are linked to longer expected lifespan, likely driven by a sense of security and reassurance about the future [8]. Evidence on factors associated with expected healthspan remains limited, particularly in urban and rural settings.

Indonesia experiences significant regional disparities in lifespan and healthspan between rural and urban populations [13]. Rural men and women reported a higher lifespan than urban men and women, by 2.2 and 1.2 years, respectively [14]. Although urban areas typically have lower poverty rates, better healthcare facilities and higher healthcare utilization rate [15], rapid urbanization in Indonesia has outpaced infrastructure investment, leading to inadequate basic services, such as clean water and sanitation [16]. Only about 34.6% of the urban population has access to safe water [16]. Lifestyle changes in urban areas have also been substantial. People in urban areas consume more processed foods, are less physically active, and are more obese than those in rural areas [17]. These contextual differences are likely to shape how individuals perceive and anticipate both the length and quality of their future lives, highlighting the importance of examining expected lifespan and expected healthspan across rural and urban settings to understand how personal, social, and health-related factors influence life planning and health.

This study explores the expected lifespan and healthspan, and their associated factors, among rural and urban individuals in Java, Indonesia.

Methods

Study design

This study used data from the cross-sectional HELO (HEalthy LOngevity) Indonesia survey aimed to assess the knowledge and perceptions of lifespan and healthspan and included adults aged 18 years and older from both multigenerational families (with three or more generations) and non-multigenerational households in rural and urban families in Java, Indonesia. Data collection took place from April 21 to May 22, 2024, primarily through in-person interviews (90.2%), while 9.8% was collected via online surveys for individuals unable to attend the in person. Individuals could complete the survey using pen-and-paper or could have researchers administer the questions and record their answers for them.

Sampling

The study was conducted in rural and urban communities across Java, Indonesia, with classifications based on demographic and geographic criteria established by the Indonesia Statistics Bureau, including population density, the proportion of agricultural households, and the availability of urban facilities [18]. A multi-stage sampling method was used [19], beginning with province selection, followed by the random selection of districts, areas, and households. Provinces on Java Island were stratified to capture economic inequality. Based on Gini index levels, Yogyakarta, East Java, and Central Java were selected to represent high, middle, and low inequality, respectively. Within each province, district-level Gini index data were used to identify districts reflecting rural and urban contexts. One district for rural and urban was then randomly chosen using a random table. From each selected district, one rural area or one urban area was further selected at random. Six areas were selected: Sokaraja, Cilangkap, Warungboto, Giripurwo, Kiduldalem, and Sumbermanjing Wetan. Using a sampling frame provided by the local village office, households within the selected areas were randomly selected using a table of random numbers. To ensure robust findings and enable subgroup analyses based on location and family structure, a target sample size of 1,200 participants was set, a broad estimate given the lack of prior data on the variance of expected lifespan and healthspan in the target population.

Variables and measures

The variables included in this study are summarized in the conceptual framework presented in Fig. 1.

Expected lifespan and healthspan

Expected lifespan and healthspan were measured by asking the individuals “how long do you expect to live?” and “how long do you expect to live in good health?”, respectively. Individuals were provided with multiple-choice options ranging from “less than 40 years”, to “40 to 59 years,” with subsequent options increasing in 20-year increments up to “140 years or more” with an additional option “of refused to answer”.

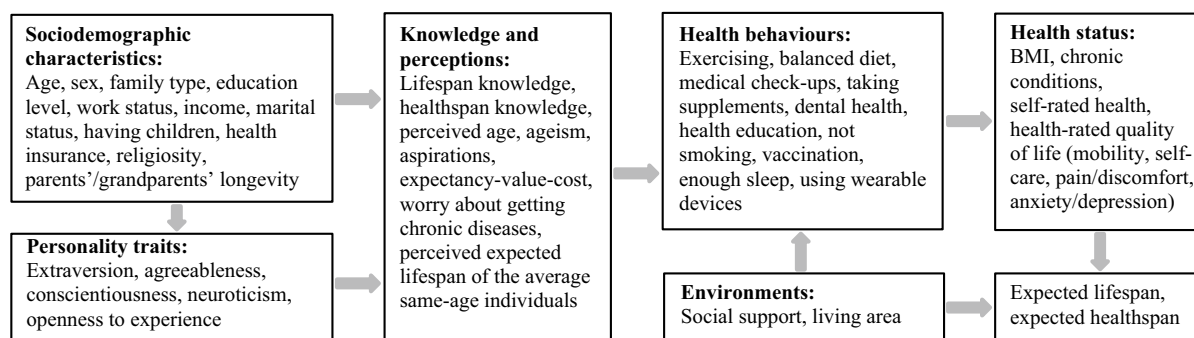


Fig. 1 Conceptual framework of factors associated to expected lifespan and healthspan. (BMI = Body mass index)

Sociodemographic characteristics

Sociodemographic characteristics were assessed using a close-ended questionnaire. Age was recorded in years. Sex was assessed as male, female, third gender, and prefer not to say. Family type was defined as multigenerational (three or more generations) or non-multigenerational (one or two generations) [20] within the household. Education was categorized as low (no formal education, primary, or junior high school), middle (senior high school), and high (professional diploma, undergraduate, or postgraduate). Work status was classified as full-time, part-time, retired, or unemployed. Individual income, defined as total monthly earnings from all sources, was categorized as one million IDR (Indonesian rupiah) or below, one to two and a half million IDR, and above two and a half million IDR. Marital status was classified as single/never married, married, separated or divorced, and widowed. Having children was recorded as a binary variable (yes or no). Health insurance was classified as none, self-funded, and government funded. Religiosity or spiritual viewpoint was recorded on a 5-points scale ranging from “not at all” to “completely”.

Knowledge, perceptions, and personality traits

Knowledge and perceptions (including lifespan knowledge, healthspan knowledge, perceived age, ageism, aspirations, expectancy-value-cost, perceived susceptibility to chronic diseases, and perceived expected lifespan of the average same-age individuals), and personality traits were measured using validated instruments (that had been tested and

published) and newly developed items [21], which were self-developed based on literature and finalized through expert opinion. Knowledge of lifespan and healthspan was measured using a close-ended questionnaire. Individuals were categorized as knowledgeable about lifespan if they answered “yes” to the question “Do you know what lifespan is?” and chose the correct definition from the list options: “the number of years a person is alive.” Similarly, those who said “yes” to knowing what healthspan is and chose the correct definition from the list options: “the number of years a person spends in good health”, were categorized as knowledgeable about healthspan. Ageism was measured by the WHO Ageism [22] against older adults, which consists of five items (e.g. “others think that I have nothing valuable to contribute to society because of my age”). Each item was rated on a 5-point scale range from strongly disagree to strongly agree with an additional option for “do not know/not applicable” [22]. Composite scores were calculated by summing the responses to all five items (total score range: 0–25) with higher scores indicating a stronger prejudice and discrimination toward older people. Aspirations were categorized as intrinsic or extrinsic. Intrinsic aspirations refer to goals related to personal growth, community contribution, and health, while extrinsic aspirations pertain to goals related to wealth and image. These were measured using the aspiration index [23], which includes two questions for each of five of the subscales: wealth, image, personal growth, community, and health. The response scale was a 3-point Likert scale. The intrinsic scores were calculated by summing the three intrinsic goal scores (total score range: 6–18), and similarly, the extrinsic scores were derived by summing the two

extrinsic goal scores (total score range: 4–12) [24]. Higher scores for both intrinsic and extrinsic aspirations indicate a greater desire to achieve goals within the respective aspiration domain. Expectancy of healthy longevity (the perceived likelihood of aging healthily, e.g. “I know I can stay healthy as I age”), value of healthy longevity (the personal importance of aging healthily, e.g. “doing what it takes to be healthy is important to me”), and costs (the perceived costs of aging healthily, e.g. “doing what it takes to be healthy requires too much effort, time or money”) were measured by adapting two items from each expectancy, value and cost subscale of a validated Expectancy-Value-Cost scale [25]. Each item was rated on a 5-point scale range from strongly disagree to strongly agree. Worry about getting chronic diseases was assessed with the question: “How worried are you about getting chronic diseases such as dementia, heart disease, or cancer?” Responses were measured using a 5-point Likert scale ranging from “not worried at all” to “extremely worried.” Perceived expected lifespan of the average same-age individuals was measured with the following question: “Think about the average person your age. How long do you think they will live?” The response options were identical with expected lifespan and healthspan. Five personality traits were assessed with the Big Five Inventory 10-item (BFI-10) [26]: assesses in extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience. Responses were provided in a 5-point scale range from strongly disagree to strongly agree.

Health behaviour

Health behaviours were collected through a self-reported, close-ended questionnaire. Health-related activities were measured using Good Health Practices Scales [27], which includes 17 preventive health behaviours (e.g. exercising, diet, medical check-ups, and using wearable devices).

Social support and health status

Social support was measured through a self-reported, close-ended questionnaire that assessed perceived assistance of social networks. It was assessed using two items from Perceived Social Support

Questionnaire [F-SozU] [28]. Assessments of health status included body mass index (BMI), chronic conditions, self-rated health, and health-related quality of life (mobility, pain, and anxiety). BMI was calculated from individuals’ self-reported height and weight (kg/m^2). Chronic conditions were measured by asking individuals whether they had been diagnosed with any chronic diseases, with responses were coded as yes or no. Self-rated health was assessed using a single question: “In general, how would you rate your health?” with response options: (1) perfectly healthy, (2) quite healthy, (3) fine, (4) unhealthy, and (5) severely unhealthy. Health-related quality of life was assessed in term of the perceived of mobility, self-care, usual activities, pain/discomfort, and anxiety/depression, and these dimensions were measured using EuroQol-5D [EQ-5D] [29].

Statistical analyses

Demographic characteristics, knowledge, perceptions, personality traits, behaviours, social support, health related status, and expected lifespan and healthspan were summarized by rural and urban groups using descriptive statistics. Categorical variables were presented as frequencies and percentages (%), while continuous variables were reported as means with standard deviations (SD) or medians with interquartile ranges (IQR). The differences in knowledge, perceptions, personality traits, behaviours, social support, and health related status between rural and urban individuals were assessed using the Mann–Whitney U test for continues data, and the chi-square test for categorical data. Crude and age-adjusted multinomial logistic regression analyses were conducted to examine factors associated with expected lifespan and healthspan between rural and urban individuals. Unadjusted and age-adjusted models were run for rural and urban participants separately, predicting expected lifespan and expected healthspan as dependent variables, which were broken down into four categories: expected lifespan/healthspan < 60 years, 60 to 79 years, 80 to 99 years, and 100 years and above. Main findings were reported based on the age-adjusted models. Multicollinearity among personality variables was assessed using variance inflation factors (VIF), with all $\text{VIF} < 5$ indicating no evidence of multicollinearity. To control for false discovery rate (FDR), the Benjamin-Hochberg (BH) procedure was

applied using an FDR calculation tool [30]. Adjusted *p*-values of less than 0.05 were considered significant. All analyses were performed using SPSS version 20.

Results

Demographic and other characteristics of rural and urban individuals

Participant demographics are shown in Table 1. A total of 1,199 individuals completed the survey; 602 from rural areas and 597 from urban areas. The majority were female (63.5% in rural areas and 66.8% in urban areas). The median age was 49 [34–64] years in rural areas and 50 [35–63] years in urban areas. Approximately half of individuals lived in multi-generational families, with 51.4% in rural areas and 48.6% in urban areas. The education level of 58.3% of the rural and 42.9% of the urban individuals was low. Over half (58.6% in rural areas and 56.8% in urban areas) had an individual income of less than one million rupiah per month (approximately \$62 USD). More than half of the individuals were married in both rural (67.9%) and urban areas (56.3%), and the majority had government funded insurance (rural: 69.8%, urban: 82.7%). Rural individuals reported a higher proportion of having parents or grandparents who lived past 90 years, compared to urban individuals (42.4% and 34.5%, respectively).

Knowledge, perceptions, and personality traits of rural and urban individuals

Urban individuals showed higher knowledge of lifespan and healthspan than rural participants. Perceived age did not differ, but ageism differed significantly, with urban individuals reporting higher scores than rural individuals. The personality traits agreeableness and neuroticism were significantly higher among urban individuals. The perceived value of healthy longevity was high in both groups but significantly higher in rural participants. Urban individuals reported higher worry about getting chronic diseases than rural individuals. In addition, rural individuals were more likely to expect that the average their same-age individuals would live longer. Details are presented in Table 2.

Table 1 Demographic characteristics of urban and rural individuals

	Rural (<i>n</i> = 602)	Urban (<i>n</i> = 597)
Age (years), median [IQR]	49 [34–64]	50 [35–63]
Sex, female	382 (63.5)	399 (66.8)
Multigenerational family, yes	335 (51.4)	317 (48.6)
Education level		
Low education	351 (58.3)	256 (42.9)
Middle education	195 (32.4)	266 (44.6)
High education	56 (9.3)	75 (12.6)
Work status		
Unemployed	241 (40)	280 (46.9)
Retired	18 (3.0)	24 (4.0)
Part-time	179 (29.7)	144 (24.1)
Full-time	164 (27.2)	149 (25)
Income (in millions IDR)		
1.00 or below	353 (58.6)	339 (56.8)
1.01–2.5	159 (26.4)	151 (25.3)
2.51–5	58 (9.6)	60 (10.1)
5.01 or more	8 (1.3)	20 (3.2)
Refuse to answer	24 (4.0)	27 (4.5)
Marital status		
Widowed	77 (12.8)	119 (19.9)
Separated or divorce	22 (3.3)	18 (3.0)
Married	304 (67.9)	336 (56.3)
Single	94 (15.6)	124 (20.8)
Having children, yes	493 (81.9)	462 (77.4)
Health insurance		
Self-funded	21 (3.5)	35 (5.9)
Government funded insurance	420 (69.8)	494 (82.7)
None	161 (26.7)	68 (11.4)
Religiosity		
Not at all	2 (0.3)	2 (0.3)
Slightly	5 (0.8)	10 (1.7)
Moderately	135 (22.4)	130 (21.8)
Mostly	169 (28.1)	197 (33.0)
Completely	291 (48.3)	258 (43.2)
Parents or grandparents' live past 90 years (person)		
0	287 (53.2)	317 (61.2)
1–2	229 (42.4)	179 (34.5)
> 2	24 (4.4)	22 (4.2)

Categorical data are presented as *n* (%) unless otherwise indicated

IQR = Interquartile range

IDR = Indonesian rupiah

Table 2 Knowledge, perceptions and personality traits of urban and rural individuals

	Rural (<i>n</i> = 602)	Urban (<i>n</i> = 597)	<i>P</i> -value
Knowledge of lifespan, yes	69 (11.5)	120 (20.1)	0.001
Knowledge of healthspan, yes	78 (13.0)	126 (21.0)	0.001
Perceived age	45 [30–60]	43 [28–60]	0.150
Ageism score (range: 0–25)	9 [6–12]	9 [6–13]	0.017
Aspirations			
Intrinsic aspirations (range: 6–18)	12 [10–13]	12 [10–13]	0.024
Extrinsic aspirations (range: 4–12)	6 [4–8]	6 [4–8]	0.079
Expectancy value cost			
Expectancy (range: 2–10)	9 [7–10]	9 [7–10]	0.315
Value (range: 2–10)	10 [9–10]	10 [8–10]	0.001
Cost (range: 2–10)	8 [6–10]	8 [6–10]	0.493
Worry about getting chronic diseases			
Not worried at all	164 (27.2)	132 (22.1)	0.198
Slightly worried	104 (17.3)	96 (16.1)	
Moderately worried	133 (22.1)	145 (24.3)	
Very worried	129 (21.4)	151 (25.3)	
Extremely worried	72 (12.0)	73 (12.2)	
Perceived expected lifespan of the average same-age individuals			
Less than 60 years	24 (4.0)	40 (6.7)	<0.001
60 to 79 years	221 (36.7)	273 (45.7)	
80 to 99 years	227 (37.7)	200 (33.5)	
100 years and more	31 (5.1)	16 (2.7)	
Personality traits			
Extraversion (range: 2–10)	3 [2–6]	3 [2–5]	0.706
Agreeableness (range: 2–10)	2 [2–3]	2 [2–4]	0.014
Conscientiousness (range: 2–10)	3 [2–5]	3 [2–5]	0.964
Neuroticism (range: 2–10)	4 [2–6]	5 [3–6]	<0.001
Openness to experience (range: 2–10)	6 [4–8]	6 [4–7]	0.931

Categorical data are presented as *n* (%), continuous data are presented as median [IQR] IQR = Interquartile range

Health behaviours of rural and urban individuals

Rural individuals had a more balanced diet, enough sleep, and received vaccinations, while urban individuals engaged significantly more in taking supplements, having regular check-ups, watching their weight, gathering health information, discussing health, and using wearable devices. Smoking and alcohol consumption were not significantly different between rural and urban (Table 3).

Social support and health status of rural and urban individuals

Both rural and urban individuals commonly reported having someone to rely on and had a lower mass

index compared to urban individuals. Self-rated health and anxiety differed significantly between groups, with rural individuals reporting better health and fewer anxiety problems than urban individuals (Table 4).

Expected lifespan and healthspan of rural and urban individuals

Of the 1,199 survey individuals, those who did not answer their expected lifespan (*n* = 222, 18.5%) or expected healthspan (*n* = 190, 15.8%), were majority female and had low educational attainment. They were significantly older compared to responders but did not differ from them otherwise (see supplementary material 1 for non-responder characteristics).

Table 3 Health behaviours of rural and urban individuals

	Rural (<i>n</i> = 602)	Urban (<i>n</i> = 597)	<i>P</i> -value
Health activities, (range: 1–5)			
Exercise	2 [1–3]	2 [1–3]	0.051
Balanced diet	3 [3–4]	3 [3–4]	0.002
Limit unhealthy food	3 [1–4]	3 [2–4]	0.444
Taking vitamins	1 [1–2]	1 [1–3]	<0.001
Taking supplemets	1 [1–1]	1 [1–2]	<0.001
Brush teeth	5 [4–5]	5 [4–5]	0.859
Dental flossing	1 [1–1]	1 [1–1]	0.351
Regular check-ups to dentist	1 [1–1]	1 [1–1]	0.001
Regular check-ups to doctor	1 [1–2]	1 [1–3]	0.043
Watch weight	3 [1–4]	3 [2–4]	0.019
Gather health information	3 [1–4]	3 [2–4]	0.022
Watch signs of health problems	3 [2–4]	3 [2–4]	0.574
Discussing health	1 [1–4]	3 [2–4]	0.030
Not smoking	5 [4–5]	5 [4–5]	0.089
Get vaccinations	4 [3–5]	4 [3–5]	0.012
Enough sleep	4 [3–5]	4 [3–5]	<0.001
Use wearable device	1 [1–1]	1 [1–1]	0.021

Categorical data are presented as *n* (%), continuous data are presented as median [IQR]
IQR = Interquartile range

These participants were excluded from analysis. Expectations regarding lifespan and healthspan differed between rural and urban populations across age groups (Fig. 2). Across all age groups, rural respondents reported longer expected lifespans than urban individuals. Among those aged < 40 years, expectations of living to 80–99 years were higher in rural than urban areas (51.0% vs. 40.8%), as were expectations of living to ≥ 100 years (21.7% vs. 12.0%). In the 40–64 year age group, rural individuals expected more frequently to live to 80–99 years (68.7% vs. 63.9%) and to ≥ 100 years (21.2% vs. 9.6%) compared with urban individuals. Similarly, among individuals aged ≥ 65 years, expectations of living to ≥ 100 years were higher in rural than urban areas (31.8% vs. 21.8%).

Expected healthspan was shorter than expected lifespan in both populations across all age groups, with consistently lower expectations among urban individuals. Among those aged < 40 years, expectations of healthspan ending at 60–79 years were higher in urban than rural areas (41.5% vs. 27.0%). This pattern persisted in the 40–64 year group (42.5% vs. 38.9%) and among individuals aged ≥ 65 years (26.1% vs. 25.8%).

Factors associated with expected lifespan among rural and urban individuals

Among rural individuals, higher chronological age, perceiving the average same-age individuals as long-lived, and placing greater expectancy and value on healthy longevity were positively associated with a higher expected lifespan. Health-related behaviours, particularly maintaining a balanced diet and obtaining sufficient sleep, were associated with greater expected lifespan. In contrast, higher levels of extraversion, conscientiousness, and neuroticism, as well as higher body mass index, were associated with a lower expected lifespan. A similar pattern was observed among urban individuals: higher chronological age, perceiving the average same-age individuals as long-lived, stronger expectancy and valuation of healthy longevity, and engaging in balanced dietary practices and regular weight monitoring were significantly associated with higher expected lifespan. In urban individuals, higher levels of agreeableness and conscientiousness were associated with lower expected lifespan. Across both rural and urban populations, these associations were most pronounced when comparing individuals who expected to live to 100 years

Table 4 Social support and health status of rural and urban individuals

	Rural (<i>n</i> = 602)	Urban (<i>n</i> = 597)	<i>P</i> -value
Social support 1 (having someone to account on)			
Strongly disagree	25 (4.2)	31 (5.2)	0.002
Somewhat disagree	25 (4.2)	45 (7.5)	
Neither agree nor disagree	45 (7.5)	39 (6.5)	
Somewhat agree	115 (19.1)	151 (25.3)	
Strongly agree	392 (65.1)	331 (55.4)	
Social support 2 (reliable help during illness)			
Strongly disagree	22 (3.7)	29 (4.9)	0.180
Somewhat disagree	27 (4.5)	31 (5.2)	
Neither agree nor disagree	63 (10.5)	52 (8.7)	
Somewhat agree	114 (18.9)	140 (23.5)	
Strongly agree	376 (62.5)	345 (57.8)	
Health status			
BMI, median [IQR]	22.3 [19.5–25.4]	23.4 [20.5–26.3]	0.003
Chronic conditions, yes	154 (25.6)	178 (29.8)	0.101
Self-rated health			
Perfectly healthy	127 (21.1)	107 (17.9)	0.022
Quite healthy	280 (46.5)	277 (46.4)	
Fine	127 (21.1.)	162 (27.1)	
Unhealthy and severely unhealthy	68 (11.3)	51 (8.5)	
Health-related quality of life			
Mobility, no problem	503 (83.6)	513 (85.9)	0.253
Self-care, no problem	541 (89.9)	549 (92.0)	0.208
Usual activity, no problem	507 (84.2)	513 (85.9)	0.580
Pain/discomfort, no problem	383 (63.6)	344 (57.6)	0.033
Anxiety/Depression, no problem	522 (86.7)	477 (79.9)	0.002

Categorical data are presented as *n* (%), continuous data are presented as median [IQR]
IQR = Interquartile range

and more compared to those who expected to live to 60–79 years (Table 5 and 6).

Associated factors of expected healthspan among rural and urban individuals

Among rural individuals, higher chronological age, perceiving the average same-age individuals as long-lived, and higher perceived expectancy and value of healthy longevity were positively associated with higher expected healthspan. Exercise, balanced diet practices, regular weight monitoring, and routine medical check-ups were associated to longer expected healthspan. In contrast, having government health insurance coverage, receiving vaccinations, greater knowledge of the definition of lifespan, and higher levels of extraversion, agreeableness, conscientiousness, and neuroticism were associated with lower expected healthspan. Among urban individuals,

similar positive associations were observed for chronological age, perceived expected lifespan of the average same-age individuals, perceived value of healthy longevity, balanced diet practices, and weight monitoring, whereas personality trait associations were confined to agreeableness and conscientiousness, both negatively associated with expected healthspan. In both populations, these patterns were most evident when comparing individuals expecting to remain healthy until 80–99 years or ≥ 100 years with those expecting healthspan to end at 60–79 years (Table 7 and 8).

Discussion

Rural individuals reported longer expected lifespan and healthspan than urban individuals of the same chronological age. Higher age, perceiving the average

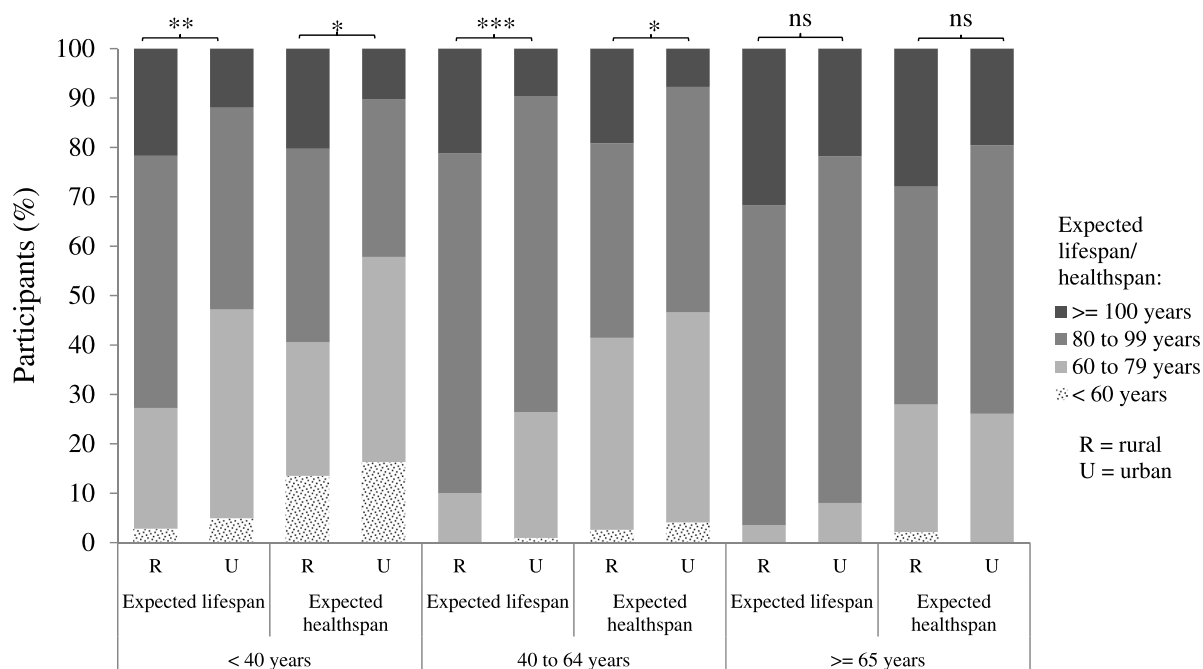


Fig. 2 Expected lifespan and healthspan across age groups between rural and urban individuals. (* $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$, ns: nonsignificant)

same-age individuals as long-lived, greater perceived value on healthy longevity, maintaining to a balanced diet, and regular weight monitoring were associated with higher expected lifespan and healthspan in both rural and urban individuals, whereas exercise, sleep, and doctor check-ups were observed only in rural individuals. Higher levels of conscientiousness, neuroticism, and extraversion were associated with lower expected lifespan and healthspan in rural individuals, whereas in urban individuals only agreeableness and conscientiousness were negatively associated. Having government health insurance coverage and greater knowledge of lifespan, were associated with lower expected lifespan and healthspan in rural population.

The rural–urban gap in expected lifespan and healthspan observed in this study appears to reflect interconnected socioeconomic and health literacy differences. Rural individuals had lower levels of education, income and were more often uninsured. In our population, socioeconomically disadvantaged individuals tend to have higher expected lifespan and healthspan, suggesting inflated and less calibrated expectations regarding longevity across the life course [31–33]. Although previous studies have

shown that the longevity expectations are positively associated with demand for life insurance [34, 35], inaccurate expectations may be associated with sub-optimal financial and health-related decisions [36]. At the same time, rural individuals more frequently reported having parents or grandparents who lived beyond the age of 90 years and perceiving the average same-age individuals as long-lived [37], suggesting that longevity expectations are associated with perceived patterns of survival within families and communities.

According to the actuarial population lifetable of Indonesia, life expectancy at birth in Indonesia is 72.7 years [1] and healthy life expectancy at birth was 60.7 years [2]. Only a small proportion of both rural and urban individuals reported an expected lifespan of 60–79 years, which most closely reflects actuarial population lifespan. Similarly to other developing countries, e.g. Brazil, people expect to have inflated their perceived lifespan of up to 87.6 years [38]. This differs from findings in developed countries where actuarial population lifespan is above 80 years. A study of the Dutch population found that most individuals provided accurate estimates (up to

Table 5 Factors associated with expected lifespan among rural individuals, adjusted by chronological age

Factors	Outcome: expected lifespan (N =407)						Adjusted P-value*
	Less than 60 vs. 60 to 79 years		80 to 99 years vs. 60 to 79 years		100 years and more vs. 60 to 79 years		
	Crude OR (95% CI)	Age-adjusted OR (95% CI)	Crude OR (95% CI)	Age-adjusted OR (95% CI)	Crude OR (95% CI)	Age-adjusted OR (95% CI)	
Age (year)	0.86 (0.70—1.05)		1.05 (1.03—1.06)		1.05 (1.03—1.07)		
Sex, female (ref)							
Male	4.30 (0.42—44.0)	3.23 (0.31—33.8)	0.78 (0.43—1.40)	0.87 (0.47—1.61)	0.79 (0.40—1.55)	0.88 (0.44—1.78)	0.789
Family type, NF (ref)							
MF	-	-	1.00 (0.56—1.79)	1.34 (0.72—2.51)	1.25 (0.64—2.42)	1.69 (0.83—3.41)	0.665
Education, low (ref)							
Middle education	3.39 (0.33—34.9)	1.45 (0.13—15.7)	0.73 (0.39—1.36)	1.89 (0.91—3.93)	0.44 (0.21—0.89)	1.02 (0.44—2.36)	0.573
High education	-	-	0.74 (0.29—1.87)	1.35 (0.50—3.65)	0.34 (0.11—1.12)	0.59 (0.17—2.02)	
Work status, unemployed (ref)							
Retired	1.43 (1.42—1.42)	6.56 (6.56—6.56)	-	-	-	-	0.777
Part-time	1.11 (0.07—19.1)	7.54 (0.32—175)	0.99 (0.49—1.20)	0.67 (0.31—1.44)	0.71 (0.32—1.58)	0.47 (0.20—1.12)	
Full-time	2.22 (0.19—26.6)	4.58 (0.34—61.2)	0.87 (0.43—1.76)	0.96 (0.34—2.01)	0.71 (0.32—1.58)	0.81 (0.46—2.01)	
Income (in millions IDR), 2.5 or more (ref)							
1 or below	-	-	1.46 (0.63—3.39)	1.45 (0.61—3.44)	1.38 (0.52—3.64)	1.33 (0.49—3.63)	0.789
1–2.5	-	-	1.30 (0.51—3.30)	1.47 (0.56—3.82)	1.40 (0.48—4.07)	1.60 (0.54—4.78)	
Marital status, single (ref)							
Married	0.21 (0.02—2.14)	1.95 (0.09—42.0)	3.47 (1.78—6.78)	1.41 (0.57—3.46)	2.58 (1.17—5.71)	0.83 (0.29—2.42)	0.789
Separated or divorce	-	-	1.21 (0.27—5.40)	0.42 (0.08—2.26)	2.67 (0.57—12.4)	0.73 (0.12—4.22)	
Widowed	-	-	17.6 (2.22—139)	2.55 (0.21—30.5)	17.3 (2.04—147)	1.63 (0.18—22.6)	
Having children, no (ref)							
Yes	0.22 (0.02—2.21)	2.03 (0.11—38.1)	3.52 (1.86—6.64)	1.31 (0.57—3.05)	2.80 (1.34—5.89)	0.79 (0.30—2.13)	0.777
Health insurance, none (ref)							
Self-funded	2.50 (0.12—50.4)	2.36 (0.11—50.8)	0.28 (0.07—1.14)	0.38 (0.09—1.59)	0.14 (0.02—0.90)	0.20 (0.03—1.32)	0.273
Government funded	0.48 (0.04—5.79)	0.64 (0.05—7.97)	0.70 (0.33—1.48)	0.56 (0.26—1.21)	0.40 (0.18—0.90)	0.31 (0.13—0.71)	
Religiosity	0.79 (0.26—2.35)	0.82 (0.24—2.76)	1.11 (0.80—1.55)	1.07 (0.75—1.51)	1.15 (0.79—1.68)	1.11 (0.75—1.65)	0.954
Knowledge of lifespan, no (ref)							
Yes	-	-	0.62 (0.29—1.37)	1.05 (0.46—2.39)	0.54 (0.21—1.38)	0.95 (0.35—2.54)	0.777

Table 5 (continued)

Factors	Outcome: expected lifespan (N = 407)						Adjusted P-value*
	Less than 60 vs. 60 to 79 years		80 to 99 years vs. 60 to 79 years		100 years and more vs. 60 to 79 years		
	Crude OR (95% CI)	Age-adjusted OR (95% CI)	Crude OR (95% CI)	Age-adjusted OR (95% CI)	Crude OR (95% CI)	Age-adjusted OR (95% CI)	
Knowledge of healthspan, no (ref)							
Yes	-	-	0.64 (0.30—1.36)	0.91 (0.42—1.97)	0.53 (0.21—1.32)	0.78 (0.30—1.98)	0.778
Perceived age (year)	0.88 (0.75—1.03)	1.04 (0.77—1.40)	1.04 (1.02—1.06)	0.98 (0.93—1.03)	1.04 (1.02—1.06)	0.97 (0.92—1.02)	0.789
Ageism	1.13 (0.93—1.35)	1.11 (0.91—1.35)	1.02 (0.96—1.08)	0.10 (0.94—1.07)	0.99 (0.92—1.06)	0.96 (0.90—1.04)	0.665
Intrinsic aspirations	0.94 (0.65—1.37)	0.92 (0.59—1.45)	0.89 (0.79—0.99)	0.91 (0.81—1.02)	0.82 (0.73—0.94)	0.85 (0.74—0.97)	0.341
Extrinsic aspirations	0.31 (0.08—1.20)	0.30 (0.08—1.07)	0.90 (0.80—1.02)	0.98 (0.86—1.12)	0.89 (0.78—1.03)	0.98 (0.84—1.14)	0.085
Expectancy value cost							
Expectancy	1.75 (0.87—3.54)	1.66 (0.80—3.47)	1.32 (1.15—1.51)	1.39 (1.19—1.61)	1.58 (1.32—1.89)	1.67 (1.38—2.02)	<0.001
Value	0.98 (0.53—1.81)	0.93 (0.52—1.66)	0.97 (0.81—1.16)	1.00 (0.84—1.20)	1.46 (1.10—1.93)	1.54 (1.15—2.05)	0.009
Cost	1.07 (0.70—1.62)	1.04 (0.65—1.65)	1.07 (0.96—1.20)	1.10 (0.98—1.24)	0.98 (0.86—1.11)	1.01 (0.89—1.16)	0.525
Worry about getting chronic diseases	0.92 (0.43—1.97)	0.92 (0.42—2.00)	0.83 (0.67—1.03)	0.87 (0.69—1.10)	0.74 (0.58—0.95)	0.78 (0.60—1.02)	0.665
Perceived expected lifespan of the average same-age individuals	-	-	5.06 (2.76—9.29)	4.67 (2.53—8.61)	12.0 (6.01—23.9)	11.2 (5.58—22.5)	<0.001
Personality traits							
Extraversion	1.12 (0.69—1.80)	0.99 (0.62—1.59)	0.94 (0.82—1.08)	1.00 (0.86—1.16)	0.70 (0.59—0.84)	0.75 (0.62—0.90)	<0.001
Agreeableness	0.76 (0.35—1.65)	0.77 (0.34—1.74)	0.89 (0.75—1.06)	0.88 (0.74—1.05)	0.73 (0.59—0.92)	0.73 (0.58—0.91)	0.139
Conscientiousness	0.86 (0.51—1.45)	0.83 (0.47—1.47)	0.83 (0.72—0.96)	0.79 (0.68—0.93)	0.72 (0.61—0.86)	0.69 (0.57—0.83)	0.009
Neuroticism	0.96 (0.59—1.56)	0.97 (0.57—1.67)	0.86 (0.77—1.02)	0.88 (0.76—1.02)	0.72 (0.61—0.85)	0.72 (0.60—0.85)	0.009
Openness to experience	1.03 (0.66—1.59)	1.10 (0.72—1.70)	1.12 (0.99—1.27)	1.07 (0.94—1.21)	1.09 (0.95—1.26)	1.04 (0.90—1.20)	0.825
Parents or grandparents' live past 90 years (person), 0 (ref)							
1–2	2.76 (0.24—32.5)	3.73 (0.30—45.7)	0.97 (0.52—1.82)	0.77 (0.40—1.48)	1.35 (0.66—2.75)	1.05 (0.50—2.21)	0.483
> 2	29.0 (0.95—881)	33.4 (0.97—1150)	2.02 (0.25—16.6)	1.52 (0.17—13.0)	5.80 (0.69—48.9)	4.25 (0.48—37.6)	
BMI	1.42 (1.13—1.77)	2.22 (1.08—4.56)	1.08 (1.00—1.17)	1.06 (0.98—1.14)	1.06 (0.97—1.15)	1.04 (0.95—1.13)	<0.001
Health activities							
Exercise	1.08 (0.52—2.23)	0.85 (0.40—1.79)	0.84 (0.68—1.04)	0.94 (0.75—1.17)	0.97 (0.76—1.23)	1.10 (0.86—1.42)	0.665
Balanced diet	1.12 (0.45—2.77)	1.09 (0.45—2.67)	1.34 (1.03—1.73)	1.36 (1.04—1.79)	1.77 (1.29—2.49)	1.81 (1.31—2.50)	0.022
Limiting unhealthy food	1.41 (0.70—2.85)	1.35 (0.65—2.80)	1.11 (0.91—1.36)	1.14 (0.93—1.41)	1.31 (1.04—1.64)	1.35 (1.06—1.71)	0.247
Taking vitamins	1.52 (0.76—3.02)	1.39 (0.65—2.98)	1.11 (0.85—1.45)	1.22 (0.92—1.63)	1.10 (0.82—1.49)	1.23 (0.89—1.69)	0.777

Table 5 (continued)

Factors	Outcome: expected lifespan (N = 407)						Adjusted P-value*
	Less than 60 vs. 60 to 79 years		80 to 99 years vs. 60 to 79 years		100 years and more vs. 60 to 79 years		
	Crude OR (95% CI)	Age-adjusted OR (95% CI)	Crude OR (95% CI)	Age-adjusted OR (95% CI)	Crude OR (95% CI)	Age-adjusted OR (95% CI)	
Taking Supplements	1.48 (0.71—3.10)	1.41 (0.65—3.08)	1.21 (0.90—1.62)	1.25 (0.92—1.70)	1.20 (0.87—1.65)	1.25 (0.89—1.74)	0.753
Brush teeth	0.91 (0.36—2.27)	0.83 (0.65—1.18)	0.78 (0.58—1.03)	0.87 (0.65—1.18)	0.97 (0.70—1.34)	1.13 (0.80—1.61)	0.341
Dental flossing	2.01 (0.95—4.26)	1.69 (0.79—3.74)	1.09 (0.69—1.73)	1.22 (0.75—1.97)	1.17 (0.71—1.91)	1.31 (0.78—2.20)	0.777
Regular check-ups to dentist	1.21 (0.46—3.15)	0.99 (0.36—2.75)	0.84 (0.59—1.20)	1.02 (0.70—1.49)	0.82 (0.54—1.26)	1.01 (0.65—1.59)	1.000
Regular check-ups to doctor	1.68 (0.88—3.22)	1.93 (0.96—3.90)	1.13 (0.89—1.44)	1.03 (0.80—1.33)	1.01 (0.76—1.33)	0.90 (0.67—1.21)	0.483
Watch weight	1.28 (0.63—2.58)	1.13 (0.58—2.21)	0.95 (0.80—1.16)	1.05 (0.85—1.30)	1.18 (0.94—1.48)	1.34 (1.06—1.71)	0.112
Seeking health information	1.48 (0.66—3.35)	1.42 (0.61—3.27)	0.79 (0.64—0.98)	0.84 (0.67—1.05)	0.96 (0.76—1.22)	1.03 (0.81—1.32)	0.200
Watch possible sign of health problems	1.22 (0.54—2.79)	1.23 (0.56—2.72)	0.95 (0.76—1.18)	0.98 (0.78—1.23)	1.04 (0.81—1.35)	1.09 (0.84—1.41)	0.789
Discussing health with friends and relatives	1.15 (0.55—2.41)	1.27 (0.59—2.70)	0.93 (0.75—1.16)	0.92 (0.73—1.15)	1.07 (0.84—1.37)	1.05 (0.82—1.36)	0.665
Not smoking	0.88 (0.52—1.48)	0.93 (0.54—1.60)	1.16 (0.99—1.35)	1.11 (0.94—1.31)	1.17 (0.97—1.40)	1.12 (0.92—1.35)	0.777
Get vaccinations	2.05 (0.56—7.49)	2.14 (0.62—7.41)	1.04 (0.82—1.32)	1.08 (0.84—1.39)	1.13 (0.86—1.48)	1.18 (0.88—1.57)	0.678
Enough sleep	1.48 (0.56—3.92)	1.57 (0.61—4.05)	1.08 (0.86—1.36)	1.03 (0.81—1.30)	1.50 (1.13—1.99)	1.42 (1.06—1.91)	0.085
Wearable device used	1.84 (0.94—3.61)	1.65 (0.79—3.47)	0.97 (0.69—1.39)	1.22 (0.83—1.80)	1.08 (0.73—1.58)	1.38 (0.91—2.10)	0.665
Social support	0.83 (0.56—1.23)	0.80 (0.51—1.24)	1.16 (1.01—1.34)	1.12 (0.97—1.30)	1.23 (1.04—1.46)	1.18 (0.99—1.42)	0.378
Chronic conditions, yes (ref)							
No	-	-	0.69 (0.34—1.40)	1.05 (0.53—2.47)	0.73 (0.33—1.64)	1.30 (0.55—3.09)	0.789
Self-rated health	0.99 (0.45—2.17)	1.06 (0.41—2.72)	1.05 (0.84—1.31)	0.97 (0.76—1.24)	1.13 (0.88—1.43)	1.03 (0.79—1.34)	0.954
Mobility	-	-	1.13 (0.51—2.51)	0.63 (0.27—1.52)	1.53 (0.64—3.65)	0.84 (0.33—2.16)	0.777
Self-care	-	-	2.35 (0.73—7.50)	1.23 (0.36—4.23)	2.76 (0.82—9.34)	1.38 (0.38—5.06)	0.954
Usual activities	0.23 (0.01—8.72)	-	0.81 (0.37—1.78)	0.45 (0.18—1.11)	1.02 (0.42—2.47)	0.54 (0.20—1.46)	0.665
Pain/discomfort	-	1.54 (0.14—16.4)	1.18 (0.67—2.05)	0.75 (0.41—1.36)	1.03 (0.54—1.94)	0.62 (0.31—1.23)	0.665

Table 5 (continued)

Factors	Outcome: expected lifespan (N = 407)				Adjusted P-value*
	Less than 60 vs. 60 to 79 years	80 to 99 years vs. 60 to 79 years	100 years and more vs. 60 to 79 years		
	Crude OR (95% CI)	Age-adjusted OR (95% CI)	Crude OR (95% CI)	Age-adjusted OR (95% CI)	
Anxiety/Depression	1.41 (0.18–11.2)	1.54 (0.14–16.4)	0.67 (0.33–1.37)	0.61 (0.28–1.31)	0.777
			0.88 (0.39–1.95)	0.78 (0.33–1.83)	

85–90 years), with only 2% overestimating population life expectancy [39]. Accurate expectations about lifespan are essential for effective lifecycle planning. If underestimating lifespan, people may save too little for retirement, increasing the risk of financial insecurity in old age [40]. Pessimism discourages investment in healthy behaviours and preventive care that could slow health decline later in life. On the other hand, if overestimating expected lifespan, people may overwork, limiting time and resources for health, leisure, and overall well-being [40, 41].

Higher chronological age and lack of health insurance were associated with higher expected lifespan and healthspan. The age-related findings are consistent with previous studies showing that longevity expectations tend to increase with age [42, 43]. Expected lifespan is dynamically updated across the life course [44], as perceptions of what constitutes “old age” shift over time. For example, at age 50 years, 70 years may appear to be a natural limit, whereas by age 70 years, individuals often recalibrate their expectations and consider ages 85–90 years attainable. Higher expected lifespan is also embedded in the cultural narratives of some rural regions, such as Okinawa and Nicoya, where individuals expect to live longer because they observe many older adults reaching 90 years or beyond [37].

Knowledge about lifespan definition was associated with lower expected healthspan in rural individuals, not in urban individuals. Urban individuals demonstrated higher overall knowledge of lifespan. This higher baseline knowledge may have reduced the relative impact of knowledge on expected healthspan in urban settings, whereas in rural areas, where knowledge was lower, knowledge appeared to play a more distinct role in shaping healthy longevity expectation [39]. Individuals who perceived the average same-age individuals as having a longer lifespan reported higher expected lifespan and healthspan, consistent with previous findings showing that individuals reported their remaining lifespan to be, on average, 12% longer than that of their age-matched individuals [40].

Personality traits were differentially associated with expected lifespan and healthspan across rural and urban contexts. In rural areas, higher conscientiousness, neuroticism, and extraversion were associated with lower expected lifespan and healthspan, whereas in urban areas, only agreeableness and

Table 6 Factors associated with expected lifespan among urban individuals, adjusted by chronological age

Factors	Outcome: expected lifespan (N = 487)						Adjusted P-value*
	Less than 60 vs. 60 to 79 years		80 to 99 years vs. 60 to 79 years		100 years and more vs. 60 to 79 years		
	Crude OR (95% CI)	Age-adjusted OR (95% CI)	Crude OR (95% CI)	Age-adjusted OR (95% CI)	Crude OR (95% CI)	Age-adjusted OR (95% CI)	
Age (year)	0.95 (0.90—1.01)		1.04 (1.03—1.05)		1.04 (1.03—1.06)		
Sex, female (ref)							
Male	4.15 (0.99—17.5)	3.56 (0.83—15.2)	0.97 (0.60—1.54)	1.07 (0.65—1.75)	0.70 (0.34—1.42)	0.77 (0.37—1.61)	0.583
Family type, NF (ref)							
MF	2.96 (0.59—14.9)	1.97 (0.36—10.8)	0.99 (0.64—1.53)	1.32 (0.83—2.12)	0.91 (0.48—1.72)	1.23 (0.63—2.38)	0.820
Education, low (ref)							
Middle education	0.33 (0.07—1.54)	0.21 (0.04—1.01)	0.40 (0.24—0.65)	0.66 (0.38—1.12)	0.28 (0.14—0.57)	0.47 (0.22—1.02)	0.281
High education	1.50 (0.24—9.35)	1.40 (0.22—9.03)	1.05 (0.49—2.29)	1.52 (0.68—3.40)	1.07 (0.40—2.89)	1.58 (0.56—4.42)	
Work status, unemployed (ref)							
Retired	-	-	0.77 (0.24—2.45)	0.24 (0.07—0.84)	1.01 (0.23—4.48)	0.35 (0.14—0.88)	0.366
Part-time	0.26 (0.03—2.23)	0.38 (0.04—3.42)	0.82 (0.48—1.41)	0.67 (0.37—1.19)	0.43 (0.18—1.05)	0.75 (0.32—1.73)	
Full-time	0.30 (0.04—2.58)	0.34 (0.04—2.89)	1.28 (0.74—2.20)	1.38 (0.78—2.46)	0.68 (0.30—1.55)	0.31 (0.06—1.50)	
Income (in millions IDR), 2.5 or more (ref)							
1 or below	-	-	0.96 (0.51—1.82)	1.12 (0.57—2.18)	2.42 (0.76—7.73)	2.80 (0.86—9.11)	0.617
1–2.5	-	-	0.90 (0.44—1.84)	1.16 (0.55—2.44)	1.65 (0.46—5.90)	2.17 (0.59—7.97)	
Marital status, single (ref)							
Married	0.58 (0.15—2.27)	1.81 (0.27—12.3)	2.96 (1.75—5.01)	1.20 (0.59—2.47)	10.4 (3.44—31.4)	1.35 (0.44—4.12)	0.655
Separated or divorce	-	-	1.74 (0.57—5.33)	0.69 (0.20—2.42)	-	-	
Widowed	-	-	6.30 (2.74—14.5)	1.26 (0.37—4.24)	2.80 (1.17—6.66)	2.77 (0.52—14.7)	
Having children, no (ref)							
Yes	0.48 (0.12—1.88)	1.82 (0.28—11.7)	2.76 (1.69—4.51)	0.92 (0.46—1.83)	3.13 (1.40—6.99)	0.94 (0.33—2.66)	0.949
Health insurance, none (ref)							
Self-funded	-	-	0.28 (0.10—0.78)	0.31 (0.10—0.91)	0.17 (0.08—1.55)	0.19 (0.02—1.79)	0.227
Government funded	-	-	1.35 (0.70—2.61)	1.09 (0.54—2.18)	1.48 (0.55—4.04)	1.18 (0.42—3.30)	
Religiosity	0.59 (0.28—1.23)	0.63 (0.29—1.38)	1.15 (0.89—1.49)	1.04 (0.80—1.36)	1.17 (0.80—1.71)	1.05 (0.72—1.55)	0.830
Knowledge of lifespan, no (ref)							
Yes	1.79 (0.46—7.07)	1.35 (0.33—5.46)	0.54 (0.33—0.89)	0.78 (0.46—1.32)	0.49 (0.22—1.07)	0.73 (0.32—1.66)	0.881
Knowledge of healthspan, no (ref)							
Yes	1.73 (0.44—6.79)	1.37 (0.34—5.52)	0.52 (0.32—0.85)	0.71 (0.42—1.20)	0.72 (0.35—1.47)	1.04 (0.49—2.21)	0.694
Perceived age (year)	0.95 (0.90—1.01)	0.99 (0.87—1.13)	1.03 (1.02—1.05)	0.99 (0.97—1.02)	1.04 (1.02—1.06)	1.01 (0.97—1.05)	0.882

Table 6 (continued)

Factors	Outcome: expected lifespan (N = 487)						Adjusted P-value*
	Less than 60 vs. 60 to 79 years		80 to 99 years vs. 60 to 79 years		100 years and more vs. 60 to 79 years		
	Crude OR (95% CI)	Age-adjusted OR (95% CI)	Crude OR (95% CI)	Age-adjusted OR (95% CI)	Crude OR (95% CI)	Age-adjusted OR (95% CI)	
Ageism	1.09 (0.97–1.23)	1.08 (0.96–1.22)	1.01 (0.97–1.05)	1.01 (0.96–1.05)	0.97 (0.91–1.04)	0.97 (0.91–1.03)	0.617
Intrinsic aspirations	1.28 (0.96–1.69)	1.28 (0.96–1.69)	0.92 (0.85–1.00)	0.92 (0.85–1.00)	0.88 (0.78–1.00)	0.88 (0.78–0.99)	0.204
Extrinsic aspirations	1.13 (0.86–1.48)	1.37 (0.34–5.52)	0.93 (0.85–1.02)	0.71 (0.42–1.20)	0.84 (0.73–0.97)	1.04 (0.49–2.21)	0.655
Expectancy value cost							
Expectancy	0.83 (0.59–1.16)	0.83 (0.59–1.16)	1.05 (0.92–1.19)	1.05 (0.92–1.20)	1.21 (1.00–1.50)	1.21 (0.99–1.48)	0.462
Value	0.84 (0.60–1.17)	0.86 (0.63–1.18)	1.02 (0.89–1.17)	1.03 (0.89–1.19)	1.28 (0.99–1.66)	1.30 (0.99–1.70)	0.462
Cost	0.81 (0.62–1.06)	0.81 (0.62–1.06)	1.01 (0.92–1.12)	1.01 (0.92–1.11)	1.08 (0.93–1.24)	1.07 (0.93–1.24)	0.617
Worry about getting chronic diseases	1.28 (0.73–2.23)	1.22 (0.67–2.23)	0.94 (0.79–1.11)	1.04 (0.86–1.24)	0.75 (0.59–0.97)	0.84 (0.65–1.09)	0.599
Perceived expected lifespan of the average same-age individuals	0.03 (0.00–0.23)	0.03 (0.00–0.30)	5.75 (3.57–9.28)	5.39 (3.29–8.81)	15.3 (7.74–30.1)	14.8 (7.39–29.7)	<0.001
Personality traits							
Extraversion	1.30 (0.94–1.80)	1.18 (0.83–1.66)	0.86 (0.77–0.97)	0.96 (0.85–1.09)	0.82 (0.69–0.98)	0.92 (0.76–1.12)	0.820
Agreeableness	1.14 (0.75–1.72)	1.10 (0.70–1.74)	0.85 (0.73–0.10)	0.90 (0.76–1.06)	0.58 (0.43–0.79)	0.63 (0.46–0.85)	0.170
Conscientiousness	1.12 (0.77–1.63)	1.03 (0.68–1.56)	0.83 (0.73–0.94)	0.90 (0.78–1.02)	0.74 (0.60–0.90)	0.79 (0.65–0.97)	0.462
Neuroticism	1.09 (0.80–1.49)	1.01 (0.75–1.47)	0.99 (0.90–1.11)	1.04 (0.93–1.16)	0.86 (0.73–1.01)	0.90 (0.76–1.06)	0.589
Openness to experience	0.80 (0.58–1.12)	0.82 (0.59–1.14)	1.03 (0.94–1.14)	1.01 (0.91–1.12)	1.15 (1.00–1.33)	1.12 (0.96–1.30)	0.583
Parents or grandparents' live past 90 years (person), 0 (ref)							
1–2	1.65 (0.35–7.80)	2.07 (0.42–10.1)	1.27 (0.76–2.11)	1.02 (0.60–1.74)	6.80 (1.24–37.3)	1.26 (0.59–2.70)	0.640
> 2	-	-	2.56 (0.54–11.1)	2.50 (0.51–12.2)	1.58 (0.75–3.31)	6.60 (1.15–37.9)	
BMI	1.01 (0.87–1.17)	1.05 (0.90–1.22)	1.02 (0.97–1.07)	1.00 (0.94–1.04)	1.00 (0.93–1.08)	0.98 (0.91–1.06)	0.882
Health activities							
Exercise	1.17 (0.70–1.96)	1.11 (0.63–1.94)	1.01 (0.85–1.20)	1.04 (0.87–1.25)	0.91 (0.71–1.17)	0.95 (0.73–1.27)	0.882
Balanced diet	0.82 (0.43–1.58)	0.85 (0.43–1.66)	1.38 (1.12–1.71)	1.29 (1.03–1.61)	1.65 (1.21–2.25)	1.52 (1.11–2.10)	0.204
Limit unhealthy food	0.88 (0.52–1.48)	0.93 (0.54–1.60)	1.21 (1.03–1.43)	1.14 (0.96–1.35)	1.17 (0.93–1.49)	1.09 (0.86–1.39)	0.737
Taking vitamins	0.82 (0.44–1.51)	0.71 (0.36–1.43)	1.01 (0.85–1.19)	1.04 (0.87–1.25)	0.85 (0.65–1.12)	0.89 (0.67–1.17)	0.737
Taking supplements	0.74 (0.35–1.56)	0.65 (0.28–1.50)	1.19 (0.99–1.43)	1.22 (1.01–1.49)	0.95 (0.71–1.26)	0.98 (0.73–1.30)	0.227
Brush teeth	0.67 (0.43–1.04)	1.10 (0.90–1.33)	1.15 (0.85–1.56)	0.56 (0.34–0.94)	1.23 (1.00–1.52)	1.31 (0.95–1.80)	0.179

Table 6 (continued)

Factors	Outcome: expected lifespan (N =487)						Adjusted P-value*
	Less than 60 vs. 60 to 79 years		80 to 99 years vs. 60 to 79 years		100 years and more vs. 60 to 79 years		
	Crude OR (95% CI)	Age-adjusted OR (95% CI)	Crude OR (95% CI)	Age-adjusted OR (95% CI)	Crude OR (95% CI)	Age-adjusted OR (95% CI)	
Dental flossing	1.08 (0.44—2.63)	0.99 (0.37—2.65)	1.08 (0.79—1.46)	1.17 (0.84—1.64)	0.99 (0.62—1.58)	1.09 (0.67—1.76)	0.882
Regular check-ups to dentist	0.96 (0.41—2.24)	0.83 (0.33—2.10)	0.98 (0.75—1.27)	1.14 (0.86—1.52)	1.05 (0.73—1.51)	1.24 (0.84—1.82)	0.820
Regular check-ups to doctor	0.45 (0.14—1.41)	-	1.14 (0.96—1.36)	-	0.98 (0.75—1.28)	-	0.582
Watch weight	0.77 (0.45—1.36)	0.71 (0.40—1.28)	1.26 (1.03—1.43)	1.35 (1.13—1.61)	1.27 (1.01—1.62)	1.38 (1.07—1.77)	0.051
Seeking health information	0.89 (0.53—1.49)	0.87 (0.50—1.50)	0.93 (0.79—1.10)	0.96 (0.81—1.14)	0.91 (0.72—1.16)	0.94 (0.74—1.21)	0.949
Watch possible sign of health problems	0.84 (0.49—1.45)	0.84 (0.48—1.48)	1.12 (0.94—1.33)	1.11 (0.92—1.33)	1.10 (0.85—1.42)	1.09 (0.84—1.42)	0.820
Discussing health with friends and relatives	0.79 (0.54—1.14)	0.72 (0.39—1.33)	1.19 (1.05—1.35)	1.10 (0.90—1.29)	1.19 (0.98—1.45)	0.90 (0.70—1.16)	0.583
Not smoking	0.79 (0.54—1.14)	0.78 (0.53—1.15)	1.19 (1.05—1.35)	1.18 (1.03—1.34)	1.19 (0.99—1.46)	1.18 (0.97—1.44)	0.204
Get vaccinations	0.79 (0.48—1.29)	0.77 (0.46—1.29)	1.08 (0.91—1.29)	1.11 (0.93—1.34)	0.89 (0.70—1.14)	0.92 (0.72—1.18)	0.582
Enough sleep	0.72 (0.43—1.22)	0.73 (0.41—1.30)	1.22 (1.03—1.44)	1.13 (0.94—1.35)	1.10 (0.85—1.40)	1.01 (0.78—1.30)	0.599
Wearable device used	1.15 (0.66—1.99)	0.98 (0.54—1.80)	0.86 (0.69—1.07)	1.07 (0.84—1.36)	1.04 (0.78—1.39)	1.34 (0.98—1.83)	0.617
Social support	0.95 (0.71—1.27)	0.92 (0.67—1.26)	1.05 (0.94—1.16)	1.05 (0.94—1.17)	1.05 (0.90—1.22)	1.05 (0.90—1.23)	0.882
Chronic conditions, yes (ref)							
No	-	0.96 (0.91—1.01)	0.49 (0.29—0.83)	0.87 (0.49—1.55)	0.46 (0.23—0.95)	0.86 (0.39—1.88)	0.693
Self-rated health	-	1.43 (0.86—2.38)	1.05 (0.88—1.26)	0.99 (0.82—1.19)	1.00 (0.77—1.31)	0.93 (0.71—1.22)	0.784
Mobility	-	-	3.03 (1.41—6.52)	1.89 (0.84—4.22)	2.22 (0.81—6.06)	1.28 (0.45—3.66)	0.583
Self-care	-	-	4.92 (1.56—15.5)	2.54 (0.79—8.15)	2.59 (0.62—10.8)	1.18 (0.27—5.10)	0.462
Usual activities	0.36 (0.03—3.98)	0.10 (0.00—34.4)	1.42 (0.75—2.68)	0.91 (0.44—1.89)	1.32 (0.53—3.26)	0.81 (0.31—2.13)	0.882
Pain/discomfort	1.27 (0.31—5.24)	1.27 (0.31—5.24)	0.10 (0.64—1.56)	1.00 (0.64—1.56)	0.96 (0.52—1.80)	0.96 (0.52—1.80)	0.988
Anxiety/Depression	1.05 (0.75—1.47)	1.05 (0.75—1.47)	1.04 (0.93—1.16)	1.04 (0.93—1.16)	0.90 (0.76—1.60)	0.90 (0.76—1.06)	0.882

Table 7 Factors associated with expected healthspan in rural areas, adjusted by chronological age

Factors	Outcome: expected healthspan (N = 434)				Adjusted P-value*
	Less than 60 years vs. 60 to 79 years				
	Crude OR (95% CI)	Age-adjusted OR (95% CI)	Crude OR (95% CI)	Age-adjusted OR (95% CI)	
Age (year)	0.95 (0.92—0.97)		1.00 (1.00—1.02)		
Sex, female (ref)					
Male	1.34 (0.58—3.08)	1.12 (0.48—2.65)	0.96 (0.61—1.53)	0.97 (0.62—1.54)	0.936
Family type, NF (ref)					
MF	1.86 (0.78—4.43)	1.23 (0.47—3.12)	1.03 (0.66—1.61)	1.04 (0.67—1.63)	0.863
Education, low (ref)					
Middle education	1.96 (0.78—4.89)	0.71 (0.26—2.00)	1.02 (0.63—1.66)	1.13 (0.65—1.99)	0.398
High education	2.08 (0.63—6.85)	1.09 (0.31—3.81)	0.59 (0.28—1.26)	0.63 (0.29—1.37)	
Work status, unemployed (ref)					
Retired	0.94 (0.10—9.18)	3.20 (0.25—41.0)	1.13 (0.31—4.06)	1.01 (0.28—3.72)	0.275
Part-time	0.48 (0.17—1.31)	0.88 (0.29—2.67)	0.50 (0.29—0.87)	0.49 (0.28—0.83)	
Full-time	0.75 (0.27—2.10)	0.75 (0.26—2.15)	1.01 (0.57—1.78)	1.06 (0.60—1.88)	
Income (in millions IDR), 2.51 or more (ref)					
1.00 or below	1.33 (0.36—5.00)	1.28 (0.33—4.93)	1.28 (0.64—2.53)	1.26 (0.63—2.50)	0.543
1.01–2.5	1.75 (0.40—7.58)	1.52 (0.34—6.75)	2.09 (0.97—4.52)	2.11 (0.97—4.56)	
Marital status, single (ref)					
Married	0.17 (0.07—0.43)	0.67 (0.18—2.45)	1.15 (0.61—2.17)	1.70 (0.77—3.79)	0.098
Separated or divorce	0.33 (0.04—3.11)	1.60 (0.12—20.7)	0.80 (1.19—3.36)	1.22 (0.26—5.65)	
Widowed	0.27 (0.03—2.52)	5.16 (0.22—123)	4.50 (1.56—12.9)	9.61 (2.33—39.7)	
Having children, no (ref)					
Yes	0.23 (0.09—0.55)	0.77 (0.23—2.54)	1.45 (0.80—2.60)	1.46 (0.70—3.03)	0.577
Health insurance, none (ref)					
Self-funded	1.80 (0.34—9.54)	1.31 (0.24—7.21)	0.33 (0.80—1.35)	0.35 (0.09—1.45)	0.035
Government funded	0.45 (0.17—1.22)	0.57 (0.21—1.59)	0.44 (0.25—0.77)	0.42 (0.24—0.75)	
Religiosity	0.70 (0.44—1.13)	0.75 (0.46—1.23)	0.75 (0.57—0.97)	0.74 (0.57—0.97)	0.301
Knowledge of lifespan, no (ref)					
Yes	0.52 (0.15—1.85)	0.29 (0.08—1.06)	0.33 (0.17—0.67)	0.34 (0.16—0.68)	0.044
Knowledge of healthspan, no (ref)					
Yes	0.72 (0.23—2.26)	0.50 (0.15—1.59)	0.48 (0.25—0.91)	0.48 (0.25—0.93)	0.260
Perceived age (year)	0.95 (0.92—0.97)	0.99 (0.92—1.06)	1.00 (0.99—1.02)	0.99 (0.96—1.02)	0.880
Ageism	1.06 (0.97—1.15)	0.07 (0.98—1.17)	1.01 (0.96—1.06)	1.01 (0.96—1.06)	0.410
Intrinsic aspirations	1.04 (0.88—1.21)	0.99 (0.84—1.17)	0.98 (0.90—1.07)	0.99 (0.91—1.07)	0.880
Extrinsic aspirations	0.97 (0.81—1.15)	0.86 (0.72—1.06)	0.88 (0.79—0.97)	0.87 (0.79—0.97)	0.121

Table 7 (continued)

Factors	Outcome: expected healthspan (N = 434)						Adjusted P-value*
	Less than 60 years vs. 60 to 79 years		80 to 99 years vs. 60 to 79 years		100 years and more vs. 60 to 79 years		
	Crude OR (95% CI)	Age-adjusted OR (95% CI)	Crude OR (95% CI)	Age-adjusted OR (95% CI)	Crude OR (95% CI)	Age-adjusted OR (95% CI)	
Expectancy value cost							
Expectancy	0.91 (0.75—1.10)	0.94 (0.91—0.97)	1.41 (1.24—1.61)	1.42 (1.25—1.61)	1.51 (1.28—1.78)	1.52 (1.29—1.79)	<0.001
Value	0.93 (0.76—1.15)	0.91 (0.74—1.13)	1.26 (1.09—1.46)	1.27 (1.09—1.48)	1.51 (1.20—1.91)	1.54 (1.22—1.94)	<0.001
Cost	1.00 (0.85—1.18)	0.97 (0.81—1.15)	1.03 (0.94—1.12)	1.03 (0.94—1.13)	0.93 (0.84—1.03)	0.94 (0.84—1.04)	0.436
Worry about getting chronic diseases	1.01 (0.74—1.37)	0.93 (0.67—1.28)	1.08 (0.92—1.28)	1.09 (0.93—1.29)	0.94 (0.77—1.14)	0.95 (0.78—1.15)	0.543
Perceived expected lifespan of the average same-age individuals	0.30 (0.14—0.66)	0.38 (0.18—0.83)	2.34 (1.59—3.43)	2.34 (1.59—3.45)	4.19 (2.59—6.75)	4.21 (2.60—6.79)	0.017
Personality traits							
Extraversion	1.01 (0.83—1.23)	0.92 (0.74—1.13)	0.87 (0.79—0.99)	0.89 (0.79—0.99)	0.69 (0.59—0.80)	0.69 (0.59—0.80)	<0.001
Agreeableness	1.09 (0.87—1.36)	1.11 (0.88—1.40)	0.77 (0.66—0.89)	1.01 (0.99—1.02)	0.68 (0.56—0.84)	0.68 (0.56—0.84)	<0.001
Conscientiousness	1.49 (1.20—1.85)	1.67 (1.29—2.17)	0.93 (0.83—1.05)	0.93 (0.83—1.05)	0.71 (0.60—0.83)	0.71 (0.60—0.84)	<0.001
Neuroticism	0.99 (0.81—1.21)	0.97 (0.79—1.20)	0.93 (0.84—1.04)	0.93 (0.84—1.04)	0.78 (0.68—0.89)	0.78 (0.68—0.90)	0.017
Openness to experience	0.97 (0.82—1.16)	1.03 (0.86—1.23)	1.04 (0.94—1.14)	1.03 (0.94—1.14)	1.02 (0.91—1.14)	1.01 (0.91—1.14)	0.938
Parents or grandparents' live past 90 years (person), 0 (ref)							
1–2	0.66 (0.25—1.72)	0.82 (0.31—2.20)	1.03 (0.64—1.66)	1.02 (0.63—1.66)	1.37 (0.78—2.41)	1.33 (0.75—2.35)	0.936
> 2	0.97 (0.11—8.94)	1.25 (0.13—12.1)	1.53 (0.49—4.76)	1.51 (0.48—4.72)	1.83 (0.50—6.68)	1.71 (0.46—6.32)	
Health activities							
Exercise	1.58 (1.17—2.14)	1.41 (1.03—1.94)	0.88 (0.74—1.04)	0.86 (0.74—1.05)	1.12 (0.92—1.36)	1.14 (0.93—1.38)	0.031
Balanced diet	1.31 (0.89—1.93)	1.33 (0.90—1.99)	1.52 (1.23—1.88)	1.52 (1.22—1.88)	1.89 (1.44—2.48)	1.87 (1.44—2.47)	<0.001
Limiting unhealthy food	1.22 (0.92—1.62)	1.20 (0.90—1.61)	1.10 (0.95—1.28)	1.10 (0.95—1.29)	1.34 (1.11—1.60)	1.34 (1.12—1.61)	0.055
Taking vitamins	1.47 (1.10—1.96)	1.38 (1.02—1.89)	1.05 (0.86—1.27)	1.05 (0.86—1.29)	1.01 (0.84—1.33)	1.07 (0.85—1.35)	0.410
Taking supplements	1.27 (0.95—1.70)	1.28 (0.94—1.73)	0.87 (0.71—1.06)	0.87 (0.71—1.06)	0.97 (0.79—1.23)	0.97 (0.79—1.23)	0.231
Brush teeth	0.94 (0.70—1.26)	0.79 (0.57—1.09)	1.10 (0.92—1.31)	1.13 (0.94—1.36)	1.26 (0.99—1.59)	1.32 (1.03—1.68)	0.088
Dental flossing	1.12 (0.72—1.73)	0.98 (0.62—1.57)	0.75 (0.54—1.06)	0.76 (0.54—1.07)	0.94 (0.67—1.31)	0.95 (0.68—1.33)	0.543
Regular check-ups to dentist	1.54 (1.05—2.27)	1.28 (0.85—1.93)	0.77 (0.52—1.08)	0.76 (0.52—1.07)	0.97 (0.67—1.40)	1.00 (0.69—1.45)	0.268
Regular check-ups to doctor	1.42 (1.07—1.88)	1.64 (1.21—2.23)	1.07 (0.90—1.28)	1.06 (0.89—1.28)	0.93 (0.75—1.17)	0.92 (0.73—1.16)	0.033
Watch weight	1.19 (0.90—1.58)	1.08 (0.81—1.44)	1.01 (0.87—1.18)	1.02 (0.87—1.20)	1.28 (1.07—1.53)	1.32 (1.10—1.60)	0.055
Seeking health information	1.33 (0.98—1.81)	1.25 (0.91—1.71)	0.91 (0.78—1.08)	0.92 (0.78—1.09)	1.10 (0.91—1.33)	1.12 (0.92—1.36)	0.231
Watch sign of health problems	1.34 (0.96—1.88)	1.30 (0.93—1.83)	1.00 (0.84—1.18)	1.00 (0.85—1.19)	1.10 (0.90—1.35)	1.11 (0.91—1.36)	0.448
Discussing health with friends and relatives							
Discussing health with friends and relatives	1.27 (0.93—1.72)	1.34 (0.97—1.86)	0.94 (0.79—1.11)	0.94 (0.79—1.11)	1.12 (0.92—1.37)	1.12 (0.92—1.37)	0.186
Not smoking	0.87 (0.69—1.08)	0.91 (0.73—1.15)	0.97 (0.85—1.10)	0.96 (0.85—1.09)	1.07 (0.92—1.26)	1.07 (0.91—1.25)	0.577
Get vaccinations	0.81 (0.57—1.16)	0.81 (0.56—1.91)	0.89 (0.56—0.84)	0.69 (0.66—0.84)	0.78 (0.61—0.98)	0.78 (0.62—0.99)	0.017

Table 7 (continued)

Factors	Outcome: expected healthspan (N = 434)						Adjusted P-value*
	Less than 60 years vs. 60 to 79 years		80 to 99 years vs. 60 to 79 years		100 years and more vs. 60 to 79 years		
	Crude OR (95% CI)	Age-adjusted OR (95% CI)	Crude OR (95% CI)	Age-adjusted OR (95% CI)	Crude OR (95% CI)	Age-adjusted OR (95% CI)	
Enough sleep	1.05 (0.74–1.49)	1.14 (0.80–1.62)	0.95 (0.79–1.14)	0.94 (0.79–1.13)	1.15 (0.92–1.45)	1.14 (0.91–1.44)	0.438
Wearable device used	1.46 (1.05–2.04)	1.23 (0.86–1.77)	0.87 (0.65–1.15)	0.88 (0.66–1.17)	1.04 (0.77–1.39)	1.07 (0.79–1.44)	0.448
Social support	0.85 (0.70–1.00)	0.88 (0.72–1.07)	0.99 (0.88–1.12)	0.99 (0.88–1.11)	1.10 (0.95–1.29)	1.20 (0.94–1.28)	0.410
BMI	1.08 (1.01–1.15)	1.08 (1.01–1.16)	1.00 (0.95–1.05)	1.00 (0.95–1.05)	1.00 (0.95–1.06)	1.00 (0.95–1.06)	0.232
Chronic conditions, yes (ref)							
No	0.96 (0.36–2.60)	0.49 (0.17–1.41)	0.71 (0.42–1.19)	0.73 (0.42–1.25)	0.89 (0.48–1.66)	0.96 (0.50–1.84)	0.556
Self-rated health	0.98 (0.71–1.33)	1.06 (0.74–1.51)	1.13 (0.97–1.32)	1.12 (0.96–1.31)	1.03 (0.86–1.25)	1.02 (0.84–1.24)	0.581
Mobility	1.08 (0.39–3.03)	2.08 (0.67–6.44)	0.92 (0.52–1.64)	0.85 (0.47–1.56)	0.93 (0.47–1.84)	0.84 (0.41–1.71)	0.581
Self-care	1.56 (0.59–4.14)	4.66 (1.43–15.1)	1.04 (0.55–1.95)	0.97 (0.50–1.87)	1.03 (0.49–2.16)	0.92 (0.42–2.01)	0.231
Usual activities	0.43 (0.10–1.77)	0.51 (0.07–3.70)	1.07 (0.58–2.00)	1.03 (0.55–1.94)	1.14 (0.55–2.36)	1.07 (0.51–2.24)	0.936
Pain/discomfort	0.77 (0.34–1.17)	1.36 (0.57–3.22)	1.01 (0.67–1.53)	0.96 (0.62–1.49)	0.71 (0.42–1.19)	0.64 (0.37–1.10)	0.410
Anxiety/Depression	2.66 (1.10–6.41)	3.16 (1.22–8.14)	1.35 (0.72–2.52)	1.33 (0.71–2.47)	0.93 (0.42–2.07)	0.92 (0.42–2.03)	0.231

Table 8 Factors associated with expected healthspan among urban individuals, adjusted by chronological age

Factors	Outcome: expected healthspan (N=458)						Adjusted P-value*
	Less than 60 years vs. 60 to 79 years		80 to 99 years vs. 60 to 79 years		100 years and more vs. 60 to 79 years		
	Crude OR (95% CI)	Age-adjusted OR (95% CI)	Crude OR (95% CI)	Age-adjusted OR (95% CI)	Crude OR (95% CI)	Age-adjusted OR (95% CI)	
Age (year)	0.95 (0.93—0.98)		1.02 (1.01—1.03)		1.03 (1.01—1.04)		
Sex, female (ref)							
Male	1.61 (0.75—3.43)	1.33 (0.61—2.91)	1.05 (0.68—1.62)	1.11 (0.71—1.72)	0.85 (0.42—1.69)	0.90 (0.45—1.81)	0.899
Family type, NF (ref)							
MF	2.10 (0.94—4.67)	1.41 (0.60—3.27)	1.09 (0.72—1.63)	1.20 (0.79—1.82)	0.99 (0.53—1.86)	1.20 (0.58—2.07)	0.897
Education, low (ref)							
Middle education	2.04 (0.82—5.09)	1.21 (0.47—3.14)	0.56 (0.36—0.86)	0.72 (0.45—1.16)	0.54 (0.27—1.07)	1.18 (0.43—3.26)	0.798
High education	2.29 (0.65—8.00)	1.79 (0.51—6.43)	1.04 (0.54—2.00)	1.28 (0.65—2.49)	0.93 (0.35—2.49)	0.74 (0.35—1.53)	
Work status, unemployed (ref)							
Retired	-	-	1.26 (0.42—3.78)	0.77 (0.25—2.38)	1.37 (0.32—5.82)	0.83 (0.18—3.70)	0.574
Part-time	0.72 (0.28—1.85)	1.05 (0.39—2.85)	0.80 (0.47—1.35)	0.75 (0.44—1.28)	0.48 (0.20—1.12)	0.45 (0.19—1.06)	
Full-time	0.92 (0.37—2.30)	1.02 (0.40—2.60)	1.38 (0.84—2.27)	1.48 (0.89—2.46)	0.54 (0.23—1.27)	0.58 (0.24—1.37)	
Income (in millions IDR), 2.51 or more (ref)							
1.00 or below	1.35 (0.42—4.29)	0.93 (0.28—3.12)	0.88 (0.48—1.62)	0.91 (0.50—1.68)	2.14 (0.69—6.63)	2.20 (0.71—6.86)	0.550
1.01–2.5	0.44 (0.10—1.92)	0.30 (0.07—1.36)	0.71 (0.37—1.39)	0.80 (0.41—1.56)	1.00 (0.28—3.56)	1.13 (0.31—4.08)	
Marital status, single (ref)							
Married	-	-	3.79 (1.91—7.52)	2.63 (0.95—7.32)	4.82 (1.71—13.6)	3.37 (0.71—16.1)	0.550
Separated or divorce	0.51 (0.06—4.43)	2.29 (0.22—24.3)	2.16 (0.71—6.58)	1.76 (0.53—5.81)	-	-	
Widowed	0.63 (0.29—1.35)	2.79 (0.94—8.34)	2.31 (1.36—3.93)	1.87 (0.94—3.72)	2.29 (0.94—5.58)	1.86 (0.61—5.71)	
Having children, no (ref)							
Yes	0.54 (0.25—1.14)	3.18 (1.09—9.28)	2.14 (1.32—3.49)	1.36 (0.72—2.57)	2.35 (1.03—5.33)	1.35 (0.48—3.76)	0.550
Health insurance, none (ref)							
Self-funded	1.40 (0.38—5.20)	1.39 (0.36—5.32)	0.40 (0.13—1.23)	0.43 (0.14—1.34)	0.20 (0.02—1.80)	0.22 (0.02—1.99)	0.550
Government funded	0.52 (0.19—1.43)	0.72 (0.25—2.04)	0.20 (0.02—1.80)	1.04 (0.54—2.02)	0.89 (0.35—2.23)	0.76 (0.30—1.93)	
Religiosity	0.71 (0.47—1.08)	0.81 (0.52—1.24)	1.02 (0.80—1.30)	0.97 (0.76—1.24)	1.05 (0.72—1.52)	0.99 (0.67—1.44)	0.899
Knowledge of lifespan, no (ref)							
Yes	2.46 (1.14—5.34)	1.66 (0.74—3.73)	0.83 (0.50—1.35)	1.05 (0.63—1.76)	0.73 (0.34—1.64)	0.97 (0.42—2.23)	0.821
Knowledge of healthspan, no (ref)							
Yes	2.46 (1.14—5.34)	1.74 (0.78—3.87)	0.88 (0.54—1.43)	1.10 (0.66—1.83)	1.17 (0.57—2.42)	1.57 (0.73—3.34)	0.685
Perceived age (year)	0.95 (0.92—0.97)	0.96 (0.91—1.02)	1.02 (1.00—1.03)	0.99 (0.96—1.01)	1.02 (1.00—1.04)	0.99 (0.96—1.03)	0.739

Table 8 (continued)

Factors	Outcome: expected lifespan (N=458)						Adjusted P-value*
	Less than 60 years vs. 60 to 79 years		80 to 99 years vs. 60 to 79 years		100 years and more vs. 60 to 79 years		
	Crude OR (95% CI)	Age-adjusted OR (95% CI)	Crude OR (95% CI)	Age-adjusted OR (95% CI)	Crude OR (95% CI)	Age-adjusted OR (95% CI)	
Ageism	1.03 (0.96—1.11)	1.03 (0.96—1.11)	0.99 (0.96—1.03)	0.99 (0.95—1.03)	0.98 (0.92—1.04)	0.97 (0.91—1.03)	0.787
Intrinsic aspirations	0.97 (0.85—1.11)	0.92 (0.79—1.06)	0.91 (0.85—0.98)	0.94 (0.87—1.01)	0.87 (0.77—0.97)	0.89 (0.79—1.00)	0.550
Extrinsic aspirations	1.00 (0.85—1.16)	0.84 (0.70—1.01)	0.89 (0.81—0.97)	0.94 (0.85—1.03)	0.86 (0.75—0.99)	0.92 (0.79—1.06)	0.550
Expectancy value cost							
Expectancy	0.90 (0.74—1.08)	0.89 (0.73—1.08)	1.16 (1.03—1.30)	1.17 (1.04—1.32)	1.01 (0.88—1.16)	1.27 (1.04—1.54)	0.026
Value	0.97 (0.79—1.19)	0.96 (0.78—1.17)	1.31 (1.13—1.53)	1.34 (1.15—1.57)	1.27 (1.04—1.54)	1.38 (1.06—1.80)	<0.001
Cost	1.02 (0.87—1.19)	0.99 (0.84—1.17)	0.97 (0.89—1.06)	0.98 (0.90—1.07)	1.01 (0.88—1.16)	1.03 (0.90—1.18)	0.927
Worry about getting chronic diseases	1.18 (0.88—1.58)	1.08 (0.79—1.48)	1.04 (0.89—1.21)	1.10 (0.93—1.29)	0.79 (0.61—1.00)	0.83 (0.65—1.07)	0.550
Perceived expected lifespan of the average same-age individuals	0.44 (0.24—0.83)	0.57 (0.31—1.05)	2.87 (2.00—4.11)	2.77 (1.92—3.99)	5.10 (2.88—9.02)	5.03 (2.81—9.00)	<0.001
Personality traits							
Extraversion	1.24 (1.03—1.49)	1.09 (0.90—1.33)	0.91 (0.82—1.02)	0.97 (0.86—1.09)	0.83 (0.69—1.00)	0.88 (0.72—1.07)	0.632
Agreeableness	1.04 (0.81—1.32)	0.98 (0.76—1.28)	0.76 (0.65—0.89)	0.79 (0.67—0.92)	0.46 (0.31—0.67)	0.48 (0.33—0.70)	<0.001
Conscientiousness	1.10 (0.90—1.35)	1.01 (0.80—1.26)	0.83 (0.73—0.93)	0.85 (0.75—0.96)	0.65 (0.52—0.81)	0.68 (0.54—0.85)	0.010
Neuroticism	0.99 (0.83—1.18)	0.93 (0.77—1.12)	1.00 (0.91—1.10)	1.03 (0.93—1.13)	0.89 (0.76—1.03)	0.91 (0.78—1.06)	0.632
Openness to experience	1.03 (0.87—1.22)	1.08 (0.90—1.29)	0.96 (0.88—1.06)	0.94 (0.85—1.03)	1.10 (0.95—1.27)	1.07 (0.92—1.24)	0.550
Parents or grandparents' live past 90 years (person), 0 (ref)							
1–2	1.18 (0.49—2.79)	1.59 (0.64—3.94)	1.04 (0.65—1.63)	0.92 (0.58—1.48)	1.11 (0.53—2.27)	0.99 (0.47—2.07)	0.798
> 2	0.01 (0.00—0.00)	-	1.22 (0.41—3.64)	1.15 (0.38—3.49)	1.98 (0.46—8.49)	1.88 (0.43—8.16)	
Health activities							
Exercise	1.19 (0.90—1.58)	1.15 (0.85—1.57)	0.95 (0.81—1.11)	0.95 (0.81—1.12)	0.83 (0.64—1.06)	0.83 (0.65—1.07)	0.630
Balanced diet	1.01 (0.70—1.43)	1.10 (0.76—1.58)	1.34 (1.10—1.63)	1.27 (1.04—1.55)	1.52 (1.11—2.06)	1.43 (1.05—1.95)	0.319
Limiting unhealthy food	1.19 (0.90—1.57)	1.36 (1.01—1.83)	1.14 (0.98—1.32)	1.09 (0.93—1.27)	1.01 (0.79—1.27)	0.95 (0.75—1.21)	0.550
Taking vitamins	1.14 (0.86—1.51)	1.09 (0.80—1.49)	1.08 (0.92—1.27)	1.09 (0.92—1.28)	0.87 (0.66—1.14)	0.88 (0.67—1.16)	0.632
Taking supplements	1.24 (0.94—1.63)	1.29 (0.95—1.74)	1.08 (0.92—1.27)	1.07 (0.90—1.26)	0.88 (0.66—1.16)	0.87 (0.66—1.15)	0.550
Brush teeth	0.83 (0.63—1.08)	0.75 (0.55—1.01)	1.14 (0.95—1.37)	1.20 (1.00—1.45)	1.10 (0.82—1.46)	1.17 (0.88—1.56)	0.171
Dental flossing	1.18 (0.80—1.73)	1.16 (0.76—1.78)	0.89 (0.68—1.17)	0.90 (0.68—1.18)	0.95 (0.62—1.43)	0.95 (0.63—1.43)	0.852

Table 8 (continued)

Factors	Outcome: expected lifespan (N=458)						Adjusted P-value*
	Less than 60 years vs. 60 to 79 years		80 to 99 years vs. 60 to 79 years		100 years and more vs. 60 to 79 years		
	Crude OR (95% CI)	Age-adjusted OR (95% CI)	Crude OR (95% CI)	Age-adjusted OR (95% CI)	Crude OR (95% CI)	Age-adjusted OR (95% CI)	
Regular check-ups to dentist	1.27 (0.84—1.90)	1.10 (0.71—1.71)	1.16 (0.90—1.49)	1.25 (0.96—1.63)	1.22 (0.85—1.74)	1.32 (0.92—1.91)	0.628
Regular check-ups to doctor	0.87 (0.63—1.19)	0.98 (0.70—1.39)	1.05 (0.89—1.22)	0.97 (0.83—1.15)	0.88 (0.67—1.14)	0.80 (0.61—1.05)	0.678
Watch weight	1.25 (0.94—1.64)	1.21 (0.90—1.62)	1.36 (1.17—1.59)	1.39 (1.19—1.63)	1.20 (0.94—1.50)	1.22 (0.97—1.55)	0.010
Seeking health information	1.31 (0.98—1.74)	1.33 (0.98—1.80)	0.99 (0.84—1.15)	0.99 (0.85—1.16)	0.95 (0.75—1.20)	0.96 (0.76—1.22)	0.581
Watch sign of health problems	1.07 (0.79—1.44)	1.11 (0.81—1.52)	1.09 (0.92—1.28)	1.08 (0.91—1.27)	1.04 (0.81—1.34)	1.03 (0.80—1.32)	0.899
Discussing health with friends and relatives	0.97 (0.72—1.29)	1.04 (0.76—1.41)	1.08 (0.92—1.26)	1.04 (0.89—1.22)	0.82 (0.63—1.04)	0.78 (0.60—1.01)	0.550
Not smoking	0.81 (0.66—0.99)	0.83 (0.67—1.02)	1.08 (0.96—1.22)	1.07 (0.94—1.21)	1.09 (0.90—1.32)	1.07 (0.89—1.30)	0.550
Get vaccinations	0.94 (0.70—1.26)	0.96 (0.70—1.30)	0.93 (0.79—1.09)	0.93 (0.79—1.09)	0.86 (0.67—1.08)	0.85 (0.67—1.09)	0.798
Enough sleep	0.83 (0.62—1.10)	0.91 (0.67—1.24)	1.03 (0.88—1.21)	0.98 (0.83—1.15)	0.97 (0.76—1.24)	0.91 (0.71—1.17)	0.903
Wearable device used	1.48 (1.10—1.97)	1.26 (0.92—1.73)	0.98 (0.78—1.22)	1.10 (0.87—1.38)	1.10 (0.80—1.49)	1.26 (0.91—1.74)	0.632
Social support	0.93 (0.79—1.09)	0.90 (0.76—1.07)	1.06 (0.96—1.16)	1.05 (0.95—1.16)	1.10 (0.93—1.28)	1.09 (0.93—1.28)	0.591
BMI	0.94 (0.86—1.03)	0.98 (0.90—1.07)	1.01 (0.96—1.05)	1.00 (0.95—1.05)	0.98 (0.91—1.05)	0.97 (0.91—1.05)	0.905
Chronic conditions, yes (ref)							
No	2.24 (0.74—6.73)	1.08 (0.33—3.49)	0.55 (0.35—0.86)	0.72 (0.44—1.18)	0.60 (0.30—1.18)	0.85 (0.41—1.78)	0.798
Self-rated health	1.18 (0.90—1.55)	1.30 (0.96—1.75)	1.16 (0.98—1.36)	1.12 (0.95—1.32)	1.00 (0.76—1.30)	0.96 (0.74—1.26)	0.550
Mobility	0.21 (0.03—1.57)	0.35 (0.05—2.75)	1.24 (0.73—2.09)	0.93 (0.53—1.62)	1.15 (0.51—2.58)	0.81 (0.35—1.90)	0.836
Self-care	-	-	1.83 (1.01—3.34)	1.33 (0.71—2.50)	1.08 (0.39—3.02)	0.70 (0.24—2.04)	0.591
Usual activities	0.29 (0.46—3.65)	2.32 (0.68—7.92)	1.45 (0.82—2.59)	1.18 (0.64—2.14)	1.28 (5.29—3.10)	1.01 (0.42—2.42)	0.798
Pain/discomfort	1.21 (0.56—2.62)	0.73 (0.36—1.48)	0.80 (0.54—1.18)	1.04 (0.72—1.50)	0.86 (0.47—1.55)	1.15 (0.66—2.01)	0.798
Anxiety/Depression	1.03 (0.46—2.30)	0.92 (0.41—2.09)	0.92 (0.58—1.44)	0.94 (0.59—1.48)	0.74 (0.35—1.58)	0.76 (0.35—1.62)	0.925

conscientiousness showed such associations. These findings contrast with prior evidence associating agreeableness, conscientiousness, and extraversion to healthier behaviours and longer actual lifespan [10]. Several possible explanations may account for these patterns. Although agreeable individuals often demonstrate stronger social functioning, they may be less assertive in managing their own healthcare needs [45], which could potentially contribute to more pessimistic longevity evaluations. Similarly, individuals high in conscientiousness (reflecting greater organization) and extraversion (reflecting greater social engagement) may have greater awareness of age-related declines in health self-management or social participation, potentially contributing to deflated expectations about lifespan and healthspan. Consistent with prior evidence, greater negative emotionality has been linked to poorer health behaviours [46], which may also relate to lower perceived longevity. Importantly, the associations between personality traits and health-related outcomes appears to vary across socioeconomic contexts [47, 48]. In rural settings, where healthcare access, environmental risks, and reliance on community networks differ from urban environments [15], personality traits related to risk sensitivity (e.g., neuroticism) and social engagement (e.g., extraversion) may have a more salient association with longevity expectations. Conversely, in urban Java environments, where social norms, density, and institutional structures are more pronounced [49], traits linked to social conformity and norm adherence (e.g., agreeableness and conscientiousness) may play a more prominent role in relation to expectations about lifespan and healthspan. Nevertheless, these interpretations remain speculative and warrant further investigation. Multicollinearity among personality variables was assessed using VIF, with acceptable levels observed.

Maintaining a balanced diet and monitoring weight regularly were associated with a higher expected lifespan and healthspan in both areas. These findings are consistent with a previous study that reported individuals who engage in preventive health behaviours, such as following a balanced diet, tend to hold more positive views of aging, which contribute to greater perceived and healthy longevity [11]. Exercise, sleep, and doctor check-ups were significantly associated with expected lifespan and healthspan only in rural

areas. In rural contexts, where healthcare access, institutional density, and formal health messaging are less pervasive [15], observable health behaviours serve as more influential cues for forming expectations about longevity. In addition, higher BMI was associated lower expected lifespan. A previous study, smokers and obese individuals under predicted their lifetime less than, respectively, non-smokers and individuals with normal weight [39]. Although previous studies suggest that self-reported health and health-rated quality of life are positively correlated with subjective life expectancy [7, 50], it was not found in this study.

This study employed systematic methodologies and an unbiased approach by utilizing a multistage probability sampling strategy, stratified by high- and low-Gini index areas, to enhance representativeness across varying socioeconomic contexts and minimize selection bias, adherence to ethical standards, and the absence of conflict of interest. However, several limitations remain. Measuring expected lifespan and healthspan was culturally challenging. In the population studied, where most individuals were Muslim, perceptions toward life and death were shaped by religious beliefs emphasizing that lifespan is determined by God; thus, some individuals were reluctant to predict how long they expected to live or to live healthily. Consequently, some individuals chose not to answer these questions. To address this challenge, the researchers adapted the survey by adding an option to refuse to answer. Non-response to expected lifespan and healthspan questions may have introduced some selection bias. However, aside from being somewhat older, non-responders were similar to responders in terms of their demographic characteristics and adjusting for age in our main analyses likely mitigated age-related differences to some extent. It may nonetheless be that social or cultural factor, e.g., the decreasing ability of older adults to rely on family networks for support [51], may have contributed to more uncertainty about future and hence a higher non-response rates in older participants. Another limitation is that, participants' expected lifespan and healthspan were compared with the 2025 Indonesian life expectancy at birth, the only available actuarial reference, which was applied uniformly across all age groups. This approach simplifies the complex, age-specific variations in life expectancy [52, 53] and may introduce minor biases when comparing expected lifespan across different ages.

Underestimating or overestimating lifespan and healthspan may relate to key life-course decisions, including retirement timing, financial savings, planning for future healthcare needs. Individuals who underestimate their longevity tend to save less and retire earlier, whereas overestimation may be associated with insufficient preparation for periods of poor health in later life [40]. Inaccurate expectations regarding healthspan may also be associated with preventive health behaviours and long-term care planning [40, 41]. As a result, individuals who misjudge their future health and longevity may become more reliant on public pension and healthcare systems than anticipated, posing challenges for the sustainability of public finances in aging societies [54]. Given these implications, providing targeted education on lifespan, healthspan, and their associated factors earlier in adulthood may support more informed decision-making and better allocation of resources for later-life health and well-being, aligning individual planning with demographic and health realities.

Conclusion

Rural individuals reported longer expected lifespan and healthspan than urban individuals of the same chronological age. Incorporating sociodemographic, behavioural, social, and psychological factors associated with expected lifespan and healthspan may help foster realistic longevity planning and inform targeted, context-specific public health responses in aging societies.

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Data availability The data supporting the findings of this study are not yet publicly available, as the researchers are securing intellectual property rights while continuing their analysis for additional publications. However, the data are available from the corresponding author upon reasonable request.

Declarations

Ethical approval Study approval statement: Ethical approval for this survey was obtained from the National University of Singapore Ethics Committee (NUS-IRB-2023–672), the Vrije Universiteit Ethics Committee (VCWE-2024-013R2), and the Jenderal Soedirman University Ethics Committee (No.1350/EC/KEPK/XII/2023).

Competing interest The authors have no conflicts of interest to declare.

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