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A Case Study in the Rajshahi District of Bangladesh

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Relationships between the Active Aging Index and Disability-Free Life Expectancy: A Case Study in the Rajshahi District of Bangladesh[*]

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Life expectancy has increased considerably throughout the world. In Bangladesh, life expectancy has increased from about 53 years in 1975 to 69 years in 2010. However, it is unknown whether the increase in life expectancy is simultaneously accompanied by an increase in disability-free life expectancy (DFLE). The purpose of the study described in this article was to explore the relationship between life expectancy and DFLE in the Rajshahi District of Bangladesh by examining the relationships between the Active Aging Index (AAI) and DFLE. The findings of the study suggest that urban, more educated, elderly males are more active in all aspects of life and have longer DFLE. Females are found to outlive males but are more likely to live a greater part of their remaining life in disability. Positive correlations between the AAI and DFLE suggest that older adults could enjoy more DFLE by involving themselves in active aging activities.

Keywords: aging, active aging index, disability-free life expectancy, Bangladesh.

Introduction

Life expectancy has increased considerably all over the world; however, increased life expectancy does not necessarily indicate a healthier life. The increase in quality of life at advanced age is more important than the increase in overall life expectancy (Crimmins, Hayward, and Saito 1996; Jagger et al. 2008; Robine and Ritchie 1991). Advancing age may be associated with a higher likelihood of disability, but the processes leading to a decline in health may be reversible. Studies on health dynamics, for example, cite significant evidences of recovery from disability among older people in developed countries. For instance, in Japan, approximately 30 percent of older people who were in a state of disability in 1987 regained their functional ability during the subsequent three years (Liu, Liang, Muramatsu, and Sugisawa 1995). As well, 20 percent of older Americans reported recovery from a disability during a two year period (Rogers, Rogers, and Belanger 1990). No clear picture, however, exists with regard to recovery in developing countries

Other studies also indicate that a number of socioeconomic and environmental factors were found to explain health recovery. These factors include age, education, participations in organizational activities, social support and self-rated health. In particular, younger age and better self-rated health may influence health status by reducing the risk of becoming disabled or

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dying and by facilitating recovery (Liu, Liang, Muramatsu, and Sugisawa 1995). For example, Liu et al. (1995) showed that having less education, being unmarried, and smoking may increase the risk of disability, although these factors do not have a negative effect on recovery. In addition, health transition analysis (Cruz, Saito, and Natividad 2007) has indicated that a significant proportion of older Filipino people experience recovery; although age, sex, place of residence, and health status/behavior indicators (including self-assessed health, drinking and exercise) displayed a significant influence on future health and mortality trajectories, surprisingly, education did not show any significant effect. Several studies, however, have included education as a factor influencing active life expectancy (Crimmins, Hayward, and Saito 1996; Crimmins, Reynolds, and Saito 1999; Yong and Saito 2012). Additionally, in some Latin American and Caribbean countries, aging has been found to be associated with disability or poor quality of health, particularly in individuals with diabetes and obesity (Palloni and McEniry 2007; Wong and Palloni 2009).

According to Ruffing-Rahal (1991), a fundamental goal of health promotion is to facilitate the well-being of older adults on an ongoing basis. Although older adults may suffer from chronic diseases, cognitive impairment, and functional limitations, the adoption of a health promoting lifestyle can minimize health problems and lead to enhanced health outcomes (Ruffing-Rahal, 1991). Self-care has been described as a strategy for coping with life events and stressors (Chen, Chang, and Li 2002; McLaughlin and Zeeberg 1993) and for enhancing quality of life during the aging process (Boyle, and Counts, 1988), thereby promoting independence and healthy aging. Healthy life expectancy - or disability-free life expectancy (DFLE), a quality of life measure - estimates how many of the remaining years of life an individual can expect to live in a healthy state or without any disability. One way to increase healthy life expectancy or DFLE might be by engaging in active aging activities. According to World Health Organization, "active aging is the process of optimizing opportunities for health, participation and security in order to enhance quality of life as people age" (WHO 2002). With regard to older people in Bangladesh, however, little is known about the levels of active aging, as its differentials vary across socioeconomic levels, demographic settings, and functional health transition patterns.

Active aging can be applied to both individuals and population groups. It allows people to realize their potential for physical, social, and mental well-being throughout their lives and to participate in society according to their needs, desires, and capacities, while providing them with adequate protection, security and care, when they require assistance (WHO 2002). According to WHO, if aging is to be a positive experience, longer life must be accompanied by continuing opportunities for health, community participation, and security. Older people who retire from work and those who are ill or live with disabilities can remain active contributors to their families, peers, communities and nations. Active aging aims to extend DFLE and quality of life for all people as they age, including those who are frail, disabled, and in need of care (WHO 2002), yet up until now there has been no study about the relationship between active aging and DFLE, an area in need of critical enquiry.

Background

DFLE takes into account mortality and morbidity or disability and is increasingly emphasized as an indicator for a population's health. Estimates of healthy life expectancy have been published for about 191 counties (Mathers et al. 2001; Mathers, McCallum, and Robine

1994; Robine and Ritchie 1991; Robine, Mathers, Bone, and Romieu 1993). In addition, health policies that focus on healthy expectancy have increased, particularly in developed countries characterized by an aging population, because a longer life and a healthier life are not necessarily synonymous (Brønnum-Hansen, Andersen, Kjøller, and Rasmussen 2004).

In Bangladesh, average life expectancy at birth has increased from about 53 years in 1975 to 69 years in 2010. However, we do not know whether the increase in life expectancy in Bangladesh has been accompanied by an increase in healthy life expectancy or a longer life with disability. Compared with developed countries, developing countries' pace of aging is much faster; therefore they will have less time to adjust to the consequences of aging which take place at much lower socioeconomic levels compared with those of developed countries (United Nations Population Division [UNPD] 2008a). Moreover, the current and emerging effects of population aging will affect several major aspects of life: social, economic, and political (UNPD).

Healthy aging is a critical problem in developing countries, especially in Bangladesh where many elderly live with low incomes. According to the World Population Prospects, there were 164.4 million people living in Bangladesh in 2010 (UNPD 2008b), and 6.2 percent or 10.1 million of them were age 60 or older. It is projected that in 2050, 22.4 percent or 43.6 million will be 60 years of age or older. At present, Bangladesh has not entered into the category of an aging society, but it will reach this level soon, and once it does, it will face challenges because it has the world's third largest number of poor older people (Help Age International [HAI] 2006). Presently, India has the most, followed by China. By 2025, all countries of Southern Asia, except Afghanistan, Nepal and Pakistan, will have aging population (see Table 1). The aging process in Bangladesh is much faster than that of its neighbor India. In Bangladesh, it is projected that the proportion of the population age 60 and older will increase from 9.8 percent in 2025 to 22.4 percent (or 43.6 million) in 2050, while in India it will increase from 11.0 percent in 2025 to 19.1 percent in 2050 (UNPD 2008b). In 2050, Bangladesh will rank sixth in terms of percent of population aged 60 and older. Iran will rank first followed by Maldives, Sri Lanka, Myanmar, and Bhutan. India will rank seventh followed by Nepal and Pakistan. Life expectancy is projected to increase from 69 years in 2010 to 77.7 years in 2050 for Bangladesh (see Table 1). Very soon, Bangladesh will face challenging issues associated with aging, particularly with regard to health services.

Table 1. Percent of Population Aged 60 or Older and Their Life Expectancy, Ranked by Percent at Age 60 or Older in 2050

Country	Population aged 60+ (%)		Life expectancy at birth	
	Year 2025	Year 2050	Year 2025	Year 2050
Iran	12.7	33.1	76.1	79.6
Maldives	11.3	31.2	80.8	83.8
Sri Lanka	18.4	27.4	77.6	80.7
Myanmar	13.0	24.5	71.1	76.3
Bhutan	9.9	24.1	72.2	76.8
Bangladesh	9.8	22.4	73.4	77.7
India	11.0	19.1	69.9	74.4
Nepal	8.2	16.9	73.3	77.6
Pakistan	8.2	15.8	68.8	72.7
Afghanistan	4.1	6.7	55.1	64.5

The main goal of this study was to quantify the relationship between increased life expectancy and Disability-free Life Expectancy by examining the relationships between the Active Aging Index (AAI) and DFLE. To accomplish this, we used the Sullivan (1971) method to compute the DFLE and constructed an AAI based on the World Health Organization's determinant of active aging and additional indicators as recommended by the Active Aging Task Force (2003) of the Western Australian Government. We collected data from 896 older residents aged 60 and above from the Rajshahi District of Bangladesh. We then applied these methods, and examined the relationship between the AAI and DFLE. If a positive relationship between the AAI and DFLE was identified, this active aging concept might be taken as a good step towards suppressing morbidity while allowing individuals to enjoy more disability-free years of life. Policy of such a relationship could promote changes in health, social participation, and security that could keep older adults healthy to enjoy a more disability-free life as they age. Additionally, it could help older adults and the nation to reduce medical costs associated with disability. To the best of our knowledge, there has not been a similar study examining the relationship between active aging and DFLE in Bangladesh or any other developed or developing countries. The study described here is thus unique because it represents the first attempt to examine the relationships between an AAI and DFLE in Bangladesh.

Data and Methods

We used a number of research methods and sources to obtain the data necessary for this study. The primary data used for the study were collected during April 2009 and came from a research project entitled "Socio-Demographic Status of the Aged Population and Elderly Abuse: A Study on Rural-Urban Differentials in the Rajshahi District, Bangladesh". The objectives, sampling design, and methodologies of the research project are described elsewhere in detail (Tareque 2009). In brief, the 2009 project was a socio-economic as well as a demographic study of the aged (60 years old and over) population of the Rajshahi District of Bangladesh.

Bangladesh is divided administratively (from large to small) into divisions, districts (zilas), and sub-districts (upazilas and thanas). In rural areas, each thana is divided into several union councils, and each union council consists of multiple Mouzas. A Mouza is a type of administrative unit corresponding to a specific land area within which there may be one or more settlements. Today a Mouza has become mostly synonymous with a *gram* or village. In urban areas, thanas are divided into several wards, and each ward is further divided into multiple mahallas. In this study, two rural Mouzas of Yusufpur Union (two villages namely, Baduria and Sahapur) and one urban Ward (Ward number 5) were selected as sample areas using the probability proportion to size (in terms of households) sampling technique. All households in the selected Mouzas and Ward were enumerated and all older individuals residing in the households were enumerated in 2009. Thus, the total sample included 896 respondents, with 477 from rural areas and the remainder from urban areas.

To reach the goals of the 2009 project, a questionnaire was prepared and pre-tested by a pilot survey. Field investigators then went to each house and a trained surveyor posed the survey questions to the respondents and recorded the answers on questionnaires. To reach the required response rate, repeated visits were made. A structural interview schedule containing closed-ended questions was utilized to collect information on (a) the respondents' identification, (b) details about family members, (c) health conditions, (d) daily activities, (e) economic activities

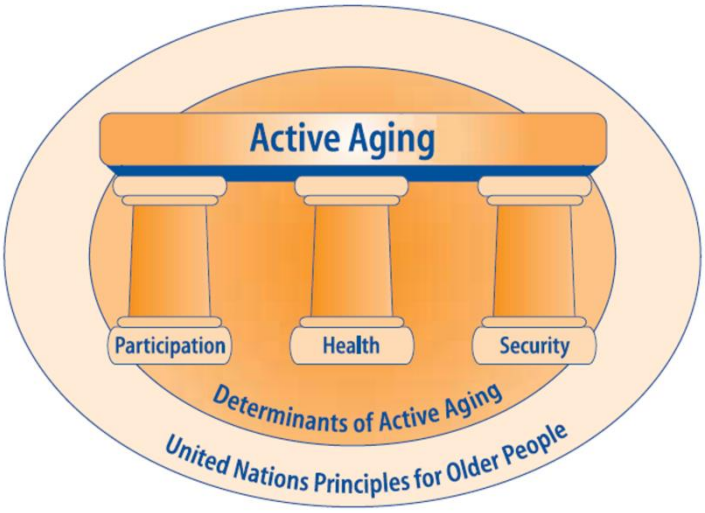
(except for income information), (f) living conditions, and (g) abuse. For more accurate data collection, a Bengali version of the questionnaire was prepared for the convenience of interviewees and field investigators. Responses were then converted to English for data entry.

Measures

Construction of the AAI

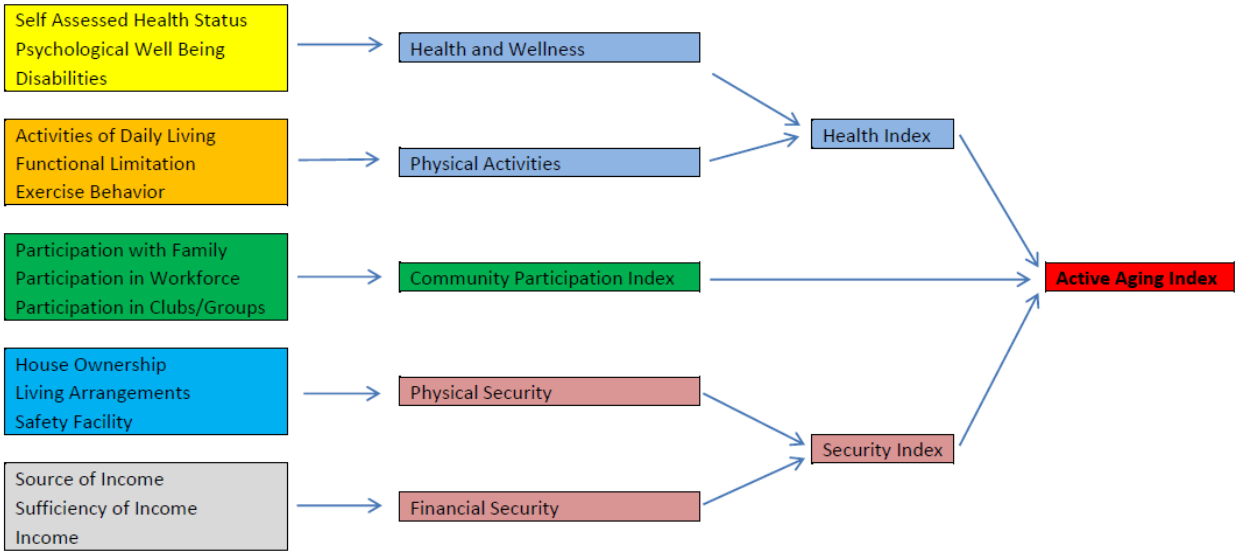
Active aging depends on a variety of "influences" or "determinants" that surround individuals, families, and nations (WHO 2002). Although WHO tried to accumulate the determinants of active aging under three pillars (see Figure 1), it confirmed more research was needed to clarify and specify the role of each determinant, as well as the interaction between determinants, in the active aging process (WHO 2002).

Figure 1. The Determinants of Active Aging According to the World Health Organization (WHO 2002: 45)



To address these concerns, this study included additional indicators for constructing an AAI as recommended by the Active Aging Taskforce of the Western Australian Government (2003). Specifically, we included 15 indicators used by Thanakwang and Soonthorndhada (2006) which also fall among the determinants of active aging used by WHO (2002). These indicators represent three core or primary dimensions: six indicators for health (three indicators for health and wellness and three indicators for physical activities), three indicators for community participation, and six indicators for security dimension (three indicators for physical security and three indicators for financial security). Composite indices of health, community participation, and security were constructed first. Then, the AAI was constructed by combining these three indices. These indicators are illustrated in the Active Aging Framework shown in Figure 2.

Figure 2. Conceptual Framework of Active Aging Index



A detailed description of these three dimensions with their relevant indicators is provided in Table 2. For each dimension, a weighted score for each of the indicators was calculated. Each composite score is the sum of responses to several indicators within each dimension. However, since there was variability in the range of possible responses to the questions within each composite, a simple summation of answers would not have insured equal contribution of all questions to the composite score. To address this issue, we applied a method to adjust each composite for the range of answers to each indicator and for the total number of indicators in the composite measure (Haque, Tareque, and Mostofa 2010; McGahan, Griffith, Parente and McLellan 1986; Thanakwang and Soonthorndhada 2006). For example, the composite score on the health dimension is composed of six indicators ($H_1 - H_6$). The actual score of each dimension is calculated by summing the positive responses of the respondents in favor of their activeness as shown in the equation:

$$\text{Composite score} = H_1/M_1 \times T + H_2/M_2 \times T + H_3/M_3 \times T + H_4/M_4 \times T + H_5/M_5 \times T + H_6/M_6 \times T$$

Where, H = the score of each indicator
M = the maximum answer value of each indicator
T = the total number of indicators of a dimension

Then we created an index for each dimension following the Human Development Index (HDI) constructed by the United Nations Development Programme (UNDP 2006) using the following equation:

$$Dimension\ Index = \frac{Actual\ score - Minimum\ score}{Maximum\ score - Minimum\ score}$$

The maximum and minimum score of each dimension is measured by the performance in each dimension, expressed by 1 or 0 in accordance with the construction method of the HDI, and 1 minus the indices value measure the gaps of activeness.

According to the WHO's concept of active aging, the elements of health, community participation, and security are inextricably linked. Therefore, the AAI is computed in a straightforward manner simply taking an average of these three indices. Based on the UNDP criteria for levels of human development, we classified each index into three levels, which constitute an indicator of the quality of life, as follows: (1) an index value less than 0.5 is low; (2) an index value between 0.5 and 0.79 is moderate; and (3) an index value equal or higher than 0.8 is high.

As noted, we used six indicators to measure health: (a) self-assessed health status, (b) psychological well-being, (c) disabilities/impairments were used as indicators of health and wellness, (d) activities of daily living, (e) functional limitations, and (f) exercise behavior were used to assess physical activities. Self-assessed health is a global measure of health assessment (Mantzavinis, Trikalinos, Dimoliatis, and Ioannidis 2006) and is a multidimensional concept (Shooshtari, Mecec, and Tate 2007). Self-assessed health is the most informative measure of human health status as well as a unique, valuable, and widely used single measure of human health status (Jylha 2009).

Despite variation in the wording of the question "How would you describe your health status …", there is extensive evidence that self-assessed health is an important predictor of future survival/mortality and morbidity (Bailis, Segall, and Chipperfield 2003; Idler and Benyamini 1997), functional decline (Idler, Hudson, and Leventhal 1999), and disability and utilization of health care (Bailis et al. 2003; Goldman, Glei, and Chang 2004). In our study, we measured it on the basis of responses to the individual question, "How would you describe your state of health these days? Would you say it is … (a) very good; (b) good; (c) fair; (d) poor; (e) very poor?" Psychological well-being, or the perception of a sense of mental wellness in terms of self-esteem, was assessed with the question, "Are you mentally healthy?" with response categories of (a) high, (b) moderate, (c) low, and (d) no. Disabilities or impairments such as paralysis, blindness, and deafness were measured with a value of 1 (having no disability) and 0 (having one or more disabilities).

Activities of daily living (ADL) limitations were assessed on the basis of four items: the ability to perform (a) dressing; (b) eating; (c) bathing, and using toilet; and (d) walking. Responses were coded as 1 (can easily do all activities) or 0 (have trouble with one or more activities). Functional or physical limitations (squatting, lifting up objects weighing 5 kilograms, walking about 1 kilometer, and climbing stairs of 2-3 steps) were categorized as 1 (with no physical limitation) or 0 (with one or more physical limitations). Finally, exercise engaged in at least once a week in the six months prior to the survey was coded as 1 if the respondents performed any exercise or 0 if he or she did not.

Community participation was assessed based on participation in the workforce, participation in the family, and participation in clubs/groups (see Table 2). Participation in the workforce was coded as 0 if the respondent did not work or 1 if he or she worked in a paid or unpaid position. If a respondent reported providing one or more forms of support (e.g., food, housekeeping, child care) to family members, he or she was given a value of 1, 0 otherwise. Finally, respondents were asked whether they were active members of any of six types of voluntary groups (i.e., seniors groups, professional groups, vocational groups, housewives' groups, co-operative groups, and/or voluntary groups). A value of 1 was assigned if the respondent was affiliated with one or more voluntary groups or a value of 0 if they were not.

Table 2. Measurement of Active Aging Index by Dimension Types

Dimensions	No.	Indicators	Description	Measurements	Rural		Urban		Overall	χ^2
					Male (N=206)	Female (N=271)	Male (N=205)	Female (N=214)		
Health Index	1	Self-assessed health status	Self-assessed health status is an individual's own assessment of his or her health	5 = very good	-	-	2 (1.0%)	1 (0.5%)	3 (0.3%)	38.81*
				4 = good	18 (8.7%)	10 (3.7%)	33 (16.1%)	12 (5.6%)	73 (8.1%)	
				3 = fair	65 (31.6%)	70 (25.8%)	84 (41.0%)	77 (36.0%)	296 (33.0%)	
				2 = poor	72 (35.0%)	130 (48.0%)	63 (30.7%)	103 (48.1%)	368 (41.1%)	
				1 = very poor	51 (24.8%)	61 (22.5%)	23 (11.2%)	21 (9.8%)	156 (17.4%)	
	2	Psychological well-being	The perception of sense of mental wellness in terms of self-esteem	3 = high	188 (91.3%)	219 (80.8%)	183(89.3 %)	175 (81.8%)	765 (85.%)	1.80 ns
				2 = moderate	14 (6.8%)	50 (18.5%)	21 (10.2 %)	36 (16.8%)	121 (13.%)	
				1 = low	2 (1.0%)	2 (0.7%)	1 (0.5 %)	3 (1.4%)	8 (0.9%)	
				0 = no	2 (1.0%)	-	-	-	2 (0.2%)	
	3	Disabilities[§]	The number of handicaps such as paralysis, blindness and deafness	1 = no	197 (95.6%)	258 (95.2%)	196 (95.6%)	205 (95.8%)	856 (95.5%)	0.05 ns
				0 = 1 or more	9 (4.4%)	13 (4.8%)	9 (4.4%)	9 (4.2%)	40 (4.5%)	
	4	Activity of daily living (ADL) limitations	ADL limitations consider inability in performing usual daily activities like eating, dressing, bathing etc.	1 = no	200 (97.1%)	267 (98.5%)	197 (96.1%)	208 (97.2%)	872 (97.3%)	1.33 ns
				0 = 1 or more	6 (2.9%)	4 (1.5%)	8 (3.9%)	6 (2.8%)	24 (2.7%)	
	5	Functional limitations	Physical limitation, such as squatting, lifting up objects weighing 5 kg, walking about 1 km, and climbing stairs (2-3 steps)	1 = no	153 (74.3%)	168 (62.0%)	114 (55.6%)	79 (36.9%)	514 (57.4%)	41.12*
				0 = 1 or more	53 (25.7%)	103 (38.0%)	91 (44.4%)	135 (63.1%)	382 (42.6%)	
	6	Exercise behavior	Having performed any exercise during last 6 months prior to the interview	1 = yes	131 (63.6%)	149 (55.0%)	149 (72.7%)	94 (43.9%)	523 (58.4%)	0.05 ns
				0 = no	75 (36.4%)	122 (45.0%)	56 (27.3%)	120 (56.1%)	373 (41.6%)	

Table 2. Measurement of Active Aging Index by Dimension Types (Continued)

Dimensions	No.	Indicators	Description	Measurements	Rural		Urban		Overall	χ^2
					Male (N=206)	Female (N=271)	Male (N=205)	Female (N=214)		
Community Participation Index	1	Participation in work force	Still participates in paid and unpaid work	1 = yes	144 (69.9%)	210 (77.5%)	86 (42.0%)	120 (56.1%)	560 (62.5%)	59.72*
				0 = no	62 (30.1%)	61 (22.5%)	119 (58.0%)	94 (43.9%)	336 (37.5%)	
	2	Interaction with family members	The elderly person provides support to family members, e.g. food supply, housekeeping and child care	1 = 1 or more	199 (96.6%)	265 (97.8%)	195(95.1%)	203 (94.9%)	862 (96.2%)	3.20 ns
				0 = no	7 (3.4%)	6 (2.2%)	10 (4.9%)	11 (5.1%)	34 (3.8%)	
	3	Participation in clubs/groups	The elderly person takes part in activities proposed by various groups, i.e. elderly group, funeral group, vocational group, house wife group, cooperatives group, and volunteer scout group	1 = 1 or more	-	-	19 (9.3%)	1 (0.5%)	20 (2.2%)	23.29*
				0 = no	100%)206)	100%)271)	90.7%)186)	99.5%)213)	97.8%)876)	
Security Index	1	Income‡	The income is categorized just to show the percentage, not for constructing AAI	4 = 3001+	28 (13.6%)	2 (0.7%)	121 (59.0%)	33 (15.4%)	184 (20.5%)	137.75*
				3 = 501 – 3000	127 (61.7%)	34 (12.5%)	46 (22.4%)	49 (22.9%)	256 (28.6%)	
				2 = 100 – 500	2 (1.0%)	24 (8.9%)	-	2 (0.9%)	28 (3.9%)	
				1 = 0	49 (23.8%)	211 (77.9%)	38 (18.5%)	130 (60.7%)	428 (47.0%)	
	2	Sufficiency of income	The self-assessment by the older person on whether his/her income is sufficient for living	2 = sufficient	2 (1.0%)	1 (0.4%)	48 (23.4%)	24 (11.4%)	75 (8.4%)	83.51*
				1 = not sufficient	155 (75.2%)	62 (21.7%)	119 (58.0%)	64 (27.9%)	400 (44.6%)	
				0 = no income	49 (23.8%)	208 (77.9%)	38 (18.5%)	126 (60.7%)	421 (47.0%)	
	3	Sources of income	The number of sources of income that the elderly person receives, i.e. work, pension, government living allowance, saving/interest, spouse, children, relatives, or others	2 = 2 or more	33 (16.0%)	21 (7.7%)	68 (33.2%)	40 (18.7%)	162 (18.1%)	31.57*
				1 = 1 source	172 (83.5%)	249 (91.9%)	136 (66.3%)	174 (81.3%)	731 (81.6%)	
				0 = no	1 (0.5%)	1 (0.4%)	1 (0.5%)	-	3 (0.3%)	
	4	House ownership	The ownership of the dwelling in which the older person is living	1 = yes	176 (85.4%)	85 (31.4%)	158 (77.1%)	75 (35.0%)	494 (55.1%)	0.07 ns
				0 = no	30 (14.6%)	186 (68.6%)	47 (22.9%)	139 (65.0%)	402 (44.9%)	
	5	Living arrangement	The co-residence of the elderly person with family members or others in their household	1 = with spouse, children or others	201 (97.6%)	227 (83.8%)	204 (99.5%)	200 (93.5%)	832 (92.9%)	15.06*
				0 = living alone	5 (2.4%)	44 (16.2%)	1 (0.5%)	14 (6.5%)	64 (7.1%)	
	6	Safety of facilities	Safety of facilities refers to whether or not toilet facilities are safe.	1 = yes	152 (73.8%)	176 (64.9%)	199 (97.1%)	206 (96.3%)	733 (81.8%)	116.63*
				0 = no	54 (26.2%)	95 (35.1%)	6 (2.9%)	8 (3.7%)	163 (18.2%)	

Table 2. Measurement of Active Aging Index by Dimension Types (Continued)

Dimensions	No.	Indicators	Description	Measurements	Rural		Urban		Overall	χ^2
					Male (N=206)	Female (N=271)	Male (N=205)	Female (N=214)		
Health Index		A composite index constructed from 6 components		3 = high	108 (52.4%)	95 (35.1%)	106 (51.7%)	52 (24.3%)	361 (40.3%)	
				2 = moderate	87 (42.2%)	165 (60.9%)	87 (42.4%)	151 (70.6%)	490 (54.7%)	2.29 ns
				1 = low	11 (5.3%)	11 (4.1%)	12 (5.9%)	11 (5.1%)	45 (5.0%)	
Community Participation Index		A composite index constructed from 3 components		3 = high	-	-	10 (4.9%)	1 (0.5%)	11 (1.2%)	
				2 = moderate	143 (69.4%)	210 (77.5%)	85 (41.5%)	119 (55.6%)	557 (62.2%)	66.90*
				1 = low	63 (30.6%)	61 (22.5%)	110 (53.7%)	94 (43.9%)	328 (36.6%)	
Security Index		A composite index constructed from 6 components		3 = high	1 (0.5%)	-	33 (16.1%)	8 (3.7%)	42 (4.7%)	
				2 = moderate	177 (85.9%)	70 (25.8%)	159 (77.6%)	115 (53.7%)	521 (58.1%)	83.01*
				1 = low	28 (13.6%)	201 (74.2%)	13 (6.3%)	91 (42.5%)	333 (37.2%)	
AAI		A composite index constructed from 3 dimensions	The positive or active living of the elderly based on the WHO concept (a combination of health, community participation and security indices)	3 = high	2 (1.0%)	-	24 (11.7%)	3 (1.4%)	29 (3.2%)	
				2 = moderate	182 (88.3%)	212 (78.2%)	157 (76.6%)	154 (72.0%)	705 (78.7%)	27.69*
				1 = low	22 (10.7%)	59 (21.8%)	24 (11.7%)	57 (26.6%)	162 (18.1%)	

Notes: N = sample size;§ Indicator number 3 (disability) under health index is measured in a different way than that of disability prevalence for calculating DFLE; ‡ Respondent's personal monthly income in Bangladeshi currency – BDT; * $p < 0.05$; ns = not statistically significant; two-tailed test for difference between rural and urban areas.

To address the security dimension, we included financial and physical measures in our data. Financial security was assessed using three indicators. Sources of income (e.g., work, pension, government living allowance, saving/interest, family members, relatives, or others) were categorized into three groups: no sources, only one source, and two or more sources. Sufficiency of income was assessed with the following question, "Is your income sufficient for living?" with response categories as (a) no income, (b) not sufficient, and (c) sufficient. Finally, respondents' monthly incomes were categorized into four groups (no income, from 100 to 500, from 501 to 3,000, and 3001 and more in Bangladeshi Currency Taka (BDT).

Physical security was also assessed using three indicators. Home ownership was measured with question, "Do you own the house you live in?" responses were dichotomous (yes or no). Living arrangements were measured on the basis of responses to the question, "Whom do you live with?" Five options were coded: (a) alone, (b) spouse, (c) unmarried son/daughter, (d) married son/daughter, and € others. Two response categories were used: lived alone versus lived with others. Finally, respondents were asked whether or not they had sanitary toilets and safe materials such as handrails, no water on the toilet floor, toilet slippers, and so forth. Response categories were yes or no.

Five age categories were created (60-64, 65-69, 70-74, 75-79, and 80 and older) for describing the study population and DFLE calculations (see Table 3). Three religious categories were created (Muslim, Hindu, and Others) with "Others" including Buddhists, Christians, and others. Three educational categories were created (no education; 1-5 years, as primary education; and 6 years and above, as secondary and above). Two marital status categories were created (married and other) with "other" including single individuals, widows, or others. Finally, two types of family (nuclear, and joint) were created.

Computation of the DFLE

The DFLE was computed using the method devised by Sullivan (1971). This method partitions total life expectancy into DFLE and life expectancy with disability based on the prevalence data on disability within a representative sample at a single point in time. Using the UNPD (2008b) projected population for 2005 and 2010, we first estimated the 2008 and 2009 age- and sex-specific population for Bangladesh based on the exponential growth rate from 2005 to 2010. These estimates for Bangladesh were then proportioned for the Rajshahi District using the 2001 Bangladesh Population Census data to produce 2008 and 2009 population estimates for the district by age and sex for the total as well as for rural-urban areas. Preston and Bennett's (1983) method was then applied to those age distributions to compute five life tables for total and rural-urban areas by sex for 2009. By combining the computed life expectancies with age- and sex-specific disability prevalence rates obtained from the survey, we calculated the DFLE for our study population. For more details on computation of health expectancy using the Sullivan method, see Jagger, Le Roy, and European Health Expectancy Monitoring Unit (2006). It should be noted that disability was assessed with the following question, "Are you restricted in daily activities as a result of longstanding illness(es), condition(s) or handicap(s)?". The answers "all the time" and "now and then" were defined as having disability and "seldom" or "no" answers as having no disability.

In this study, the AAI was constructed using the framework of Figure 2 and the DFLE using the Sullivan (1971) method. Univariate classification analysis was performed in order to determine the percentage of active aging attributes of the older-adult population. Mean

distribution has been presented to show the differences among study participants for the AAI and DFLE. Finally, cross-tabulation analyses as well as Pearson's correlation analysis were completed to determine the relationship between the AAI and DFLE including tests of differences between the correlations.

Results

As can be seen from the Health Index (see Table 2), almost 96 percent of older-adult respondents reported no disability while about 59 percent reported either poor or very poor health status. Nevertheless, about 85 percent of respondents indicated a high level of psychological well-being. About 43 percent of those respondents had some functional limitations. More urban females had one or more limitation(s) than rural females or urban or rural males. However, based on self-assessments of their health, the urban respondents were found to be in better health than their rural counterparts, both male and female. Almost all respondents (97.3 percent) could perform their activities of daily living (ADL) successfully. About 6 out of 10 respondents participated in some exercise during the last six months prior to the survey, and males were more active than females in both rural and urban areas.

An overwhelming majority of the respondents (6.2 percent) reported that they supported their families by providing food, housekeeping, or child care. Very few (2.2 percent) respondents stated that they participated in any clubs or group activities. Particularly in rural areas, no one participated in any groups or clubs; it may be that such resources are not available in rural areas. About 78 and 61 percent of older rural and urban females, respectively, had no personal income; 99 percent of rural respondents were not satisfied with their incomes. Comparatively, urban older-adults had higher incomes than their rural counterparts. About 93 percent of study respondents live with their spouse, children, or others, while 16.2 percent of rural females reported living alone. The most striking finding was that about 35.1 percent of rural females had no safe toilet facilities. In fact, they had no toilet at all.

Using the composite indices, about 40 percent of the adults in our study were classified as highly active and in good health, with males being more active than their female counterparts both in rural and urban areas. In community participation and security dimensions, most older adults were moderately active, with females more active in community participation and males have higher levels of security. Based on the AAI, about 79 percent of the older adults were moderately active, with males more active than females in both rural and urban areas.

Table 2 provides the distribution of characteristics for the respondents of the present study. As can be seen from Table 2, the overall mean age of the respondents is 68.4 years, 57.9 percent are young-old (i.e., 60-69 years), 21.5 percent are between 70-74 years of age, and 20.5 percent are 75 years of age and above. Overall, 59 percent of the respondents do not have any education. In rural areas 93.0 percent of women do not have any education compared with 63.6 percent for men. In urban areas almost 51 percent of women do not have any education compared with 18.0 percent for men. In rural areas, only 1.8 percent of the female respondents have secondary or above education while almost 19 percent of the male respondents have secondary and above education. In urban areas 17.3 percent of the female respondents have secondary or above education while 66.3 percent of the male respondents have secondary and above education. In rural Bangladesh, the female literacy rate is very low, a well-known phenomenon (Rahman, Tareque, Rahman, and Islam 2007). About 97 percent of the respondents are Muslim and about

60 percent are married. Also of interest, more than 70 percent of urban elderly live in joint families, while a little over 20 percent live in nuclear families.

Table 3. Demographic and Socioeconomic Characteristics of the Respondents

Variables	Rural		Urban		Overall
	Male (N=206)	Female (N=271)	Male (N=205)	Female (N=214)	
Age groups					
60-64	72 (35.0%)	100 (36.9%)	74 (36.1%)	82 (38.3%)	328 (36.6%)
65-69	44 (21.4%)	58 (21.4%)	43 (21.0%)	46 (21.5%)	191 (21.3%)
70-74	51 (24.8%)	64 (23.6%)	40 (19.5%)	38 (17.8%)	193 (21.5%)
75-79	10 (4.9%)	12 (4.4%)	18 (8.8%)	22 (10.3%)	62 (6.9%)
80+	29 (14.1%)	37 (13.7%)	30 (14.6%)	26 (12.1%)	122 (13.6%)
χ^2			11.37*		
Mean age†	69.02	67.68	68.96	68.07	68.37
F-value			0.12 ns		
Religion					
Islam	200 (97.1%)	262 (96.7%)	200 (97.6%)	206 (96.3%)	868 (96.9%)
Hindu	6 (2.9%)	9 (3.3%)	1 (0.5%)	4 (1.9%)	20 (2.2%)
Others	-	-	4 (2.0%)	4 (1.9%)	8 (0.9%)
χ^2			12.91*		
Educational level					
No education	131 (63.6%)	252 (93.0%)	37 (18.0%)	109 (50.9%)	529 (59.0%)
Primary	36 (17.5%)	14 (5.2%)	32 (15.6%)	68 (31.8%)	150 (16.7%)
Secondary and above	39 (18.9%)	5 (1.8%)	136 (66.3%)	37 (17.3%)	217 (24.2%)
χ^2			196.60*		
Marital status					
Married	185 (89.8%)	85 (31.4%)	184 (89.8%)	81 (37.9%)	535 (59.7%)
Others	21 (10.2%)	186 (68.6%)	21 (10.2%)	133 (62.1%)	361 (40.3%)
χ^2			4.09*		
Types of family					
Nuclear	112 (54.4%)	107 (39.5%)	55 (26.8%)	43 (20.1%)	317 (35.4%)
Joint	94 (45.6%)	164 (60.5%)	150 (73.2%)	171 (79.9%)	579 (64.6%)
χ^2			49.49*		

Notes: N = sample size; †indicates average age is calculated for the total population by sex and residence; 45.9 and 54.1 percent elderly are male and female respectively; * $p < 0.05$; ns = not statistically significant; two-tailed test for difference between rural and urban areas.

Table 3 provides the distribution of characteristics for the respondents of the present study. As Table 3 shows, the mean age of the respondents was 68.4 years. Over one half (57.9 percent) were young-old (i.e., 60-69), 21.5 percent were between ages 70-74, and 20.5 percent were age 75 and over. Overall, 59 percent of the respondents did not have any education. In rural areas, 93 percent of women did not have any education compare with 63.6 percent of men. In urban areas, almost 51 percent of women did not have any education compared with 18 percent of men. In rural areas, only 1.8 percent of the female respondents had a secondary or higher level of education, while almost 19 percent of the male respondents had a secondary or higher education. In urban areas, 17.3 percent of the female respondents had a secondary or above education compared to 66.3 percent of the male respondents. In rural Bangladesh, the female literacy rate is very low, a well-known phenomenon (Rahman, Tareque, Rahman, and Islam 2007). About 97

percent of the respondents were Muslim; about 60 percent of the respondents were married. Also of interest, more than 70 percent of the urban respondents lived in joint families, and a little over 20 percent lived in nuclear families.

Levels of the AAI and DFLE

Tables 4 and 5 provide core findings of the DFLE, life expectancy ("LE" in the table), proportion of life expectancy without disability and mean values of the AAI, indicating the level of activeness at age 60, 65, 70, 75, and 80 and older by sex with rural-urban differentials. As expected, the level of activeness, the DFLE, and proportion of life expectation without disability all decrease as age increases. For example, overall, persons aged 60 are expected to live 5.85 years without disability, while persons aged 65 years are expected to live 3.98 years without disability. Persons at age 70 are expected to live 3.01 years without disability whereas those at age 75 are expected to live 1.46 years without disability; those aged 80 years and above are expected to live only 0.57 year without disability (Table 4). Older males are expected to enjoy more disability free life compared with older females in both rural and urban areas, except for those aged 80 and above in urban areas where females are expected to enjoy more disability free life than the males, 0.78 and 0.32 years, respectively (see Table 4).

Table 4. Disability-Free Life Expectancy and Life Expectancy by Age, Sex and Place of Residence

Age	Rural		Urban		Overall (N=896)
	Male (N=206)	Female (N=271)	Male (N=205)	Female (N=214)	
	DFLE (95% CI); LE	DFLE (95% CI); LE	DFLE (95% CI); LE	DFLE (95% CI); LE	DFLE (95% CI); LE
60	5.73 (4.62-6.83); 16.34	3.82 (2.96-4.68); 15.86	8.28 (7.39-9.17); 14.76	5.52 (4.57-6.48); 14.89	5.85 (5.34-6.35); 15.71
65	4.45 (3.31-5.58); 13.56	2.61 (1.77-3.44); 12.34	5.07 (4.09-6.05); 12.20	3.43 (2.54-4.31); 11.19	3.98 (3.48-4.48); 12.60
70	3.05 (1.95-4.15); 10.80	2.17 (1.24-3.10); 10.98	3.57 (2.41-4.73); 11.74	3.31 (2.19-4.43); 11.75	3.01 (2.47-3.54); 11.13
75	1.04 (0.05-2.03); 6.55	1.08 (0.18-1.98); 7.04	1.24 (0.42-2.06); 6.55	2.09 (1.18-3.01); 7.04	1.46 (0.99-1.93); 6.80
80+	0.49 (0.00-1.02); 4.79	0.69 (0.13-1.24); 5.08	0.32 (0.00-0.75); 4.78	0.78 (0.08-1.49); 5.08	0.57 (0.29-0.85); 4.94

Notes: N = sample size; DFLE = disability-free life expectancy; CI = confidence interval; LE = life expectancy.

Compared with those in older age categories, 60- and 65-year-old persons are more active and have proportionally longer life expectancy without disability. For example, overall, persons who are aged 60 can expect to enjoy 37.21 percent of their remaining life without disability, whereas those aged 80 and older can expect to enjoy only 11.50 percent of their remaining years without any disability (Table 5). Older males more active and can expect a longer DFLE compared to older females in both rural and urban areas. However, urban males have a much higher proportion of expected life without disability, with the exception of those aged 80 and above. The urban elder respondent demonstrates a higher DFLE compared to rural elders, although some urban older are found to be less active than their rural counterparts. In addition, if we compare the AAI of urban 60-year old females to rural females aged 60 and 65, note that the same level of activeness cannot ensure the same DFLE for all. These AAI effects might reflect the effects of morbidity, declining health as age increases, environment, lifestyle and health facilities.

Table 5. Mean Values of Active Aging Index and Proportion of Life Expectancy without Disability by Age, Sex and Place of Residence with Correlation between AAI and DFLE

Age	Rural		Urban		Overall (N=896)
	Male (N=206)	Female (N=271)	Male (N=205)	Female (N=214)	
	AAI (95% CI); PLEWOD	AAI (95% CI); PLEWOD	AAI (95% CI); PLEWOD	AAI (95% CI); PLEWOD	AAI (95% CI); PLEWOD
60	0.647 (0.631-0.663); 35.06	0.580 (0.568-0.591); 24.08	0.651 (0.631-0.669); 56.08	0.574 (0.557-0.591); 37.08	0.609 (0.602-0.618); 37.21
65	0.628 (0.606-0.649); 32.79	0.561 (0.547-0.576); 21.12	0.620 (0.594-0.646); 41.56	0.554 (0.532-0.576); 30.63	0.589 (0.578-0.599); 31.62
70	0.605 (0.576-0.633); 28.21	0.540 (0.521-0.559); 19.78	0.589 (0.556-0.622); 30.39	0.518 (0.491-0.546); 28.15	0.562 (0.548-0.576); 27.03
75	0.511 (0.466-0.556); 15.92	0.496 (0.466-0.527); 15.30	0.526 (0.487-0.566); 18.94	0.491 (0.448-0.538); 29.74	0.506 (0.487-0.525); 21.49
80+	0.508 (0.453-0.564); 10.30	0.487 (0.451-0.523); 13.50	0.496 (0.442-0.549); 6.70	0.434 (0.376-0.492); 15.40	0.483 (0.459-0.507); 11.50
r	0.974*	0.960*	0.971*	0.950*	0.977*

Notes: N = sample size; AAI = active aging index; PLEWOD = proportion of life expectancy without disability; CI = confidence interval; r indicates the Pearson's correlation between AAI and DFLE; * indicates statistically significant at $p < 0.05$.

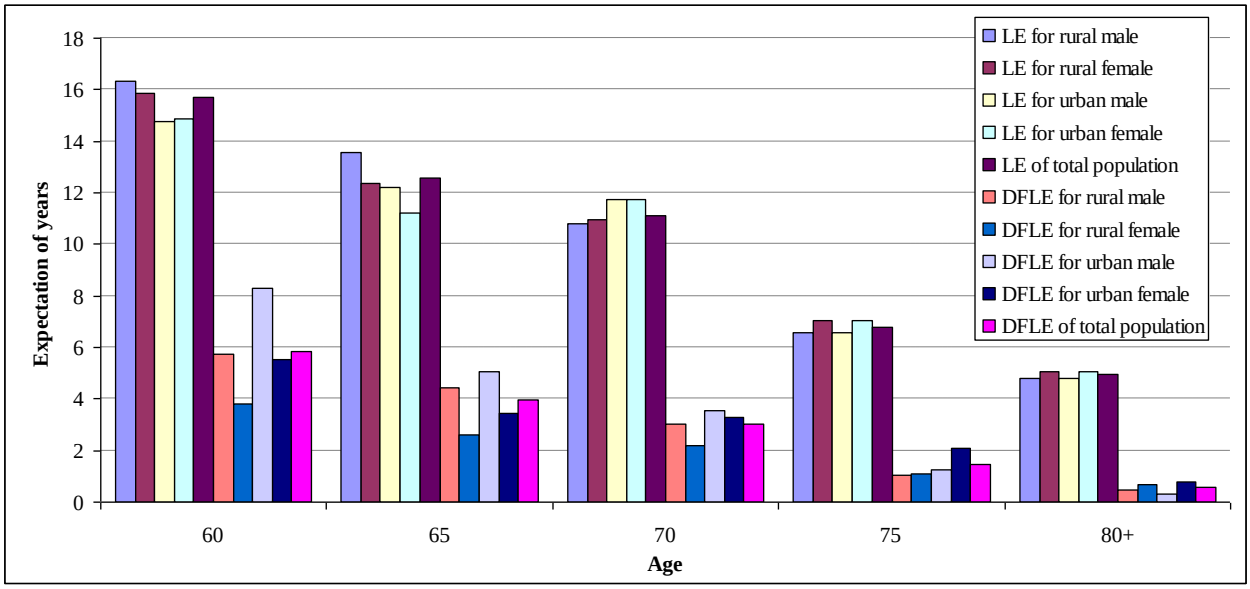
Differences between the LE and DFLE

Life expectancy has frequently been used as an indicator of public health. However, another indicator, DFLE, was introduced in the 1970s. Whereas life expectancy at birth measures overall quality of life, DFLE estimates how many years of remaining life one can expect to live without disability.

As Figure 3 shows, there are large differences between life expectancy and DFLE by age (i.e., life expectancy with disability that one would experience in later life). Overall, there is a mean difference of 7.26 years (with 95% confidence interval [CI], 4.39-10.13; $p < 0.002$) between the life expectancy and DFLE. Thus, the older-adult population is expected to live 7.26 years with disability. In the rural older-adult population, males are expected to live 7.46 years of their remaining life with disability, while females are expected live 8.18 years with disability (with a 95% confidence interval of 4.26-10.65; $p < 0.003$ for males and 4.41-11.96; $p < 0.004$ for females). In the urban older population, males are expected to live 6.31 years of their remaining life with disability, while females are expected live 6.97 years with disability (with a 95% CI of 4.50-8.13; $p < 0.001$ for males and 4.20-9.73; $p < 0.002$ for females). Older males, particularly those from urban areas, have a less disabled life in comparison with females in both areas. These results might be an indication of the positive effect of active participation in every sector of life for older males. This may also indicate lack of comparable resources for older females in both urban and rural areas.

In summary, Figure 3 suggests that starting at age 70, rural females are expected to live longer compare with males in both urban and rural areas. However, rural females expect lower DFLE compared with all other older adults, except those in the oldest age group. There is a clear difference between the life expectancy and DFLE by age group, sex and place of residence except at age 80 and above. The difference may be due to the fact the survival rate at age 80 is very low and that there may not be that much population at this age group.

Figure 3. Differences between LE (Life Expectancy) and DFLE (Disability-Free Life Expectancy) by Age, Sex and Place of Residence



Relationship between the AAI and DFLE

Table 5 suggests that the respondents with higher mean values on the AAI also have a higher proportion of life without disability. Therefore, Pearson's correlation coefficients were computed to assess relationships between the AAI and DFLE for urban males and females, for rural males and females, and also for the overall sample. The results show a very strong significant positive relationship, almost perfect correlation, between the AAI and DFLE for urban males and females, rural males and females, and also for the overall sample. Overall, the correlation between the AAI and DFLE for the sample is 0.977 (significant at $p < 0.05$). For rural males, the correlation is 0.974, and for rural females it is 0.960 (both significant at $p < 0.05$). The correlation between the AAI and DFLE for urban males is 0.971 and for urban females is 0.950 (again, both are significant at ($p < 0.05$). At issue is whether the correlations for males are significantly higher than for females in both rural and urban areas. Thus, a test of differences between correlations were performed that revealed the Z value of 0.15 and 0.26 for rural and urban areas, respectively (not significant at $p < 0.05$).

Discussions

Traditionally and religiously, the older adults of Bangladesh have been respected both within their families and in their communities. They have long been considered the key to family ties and symbols of family identity, since immemorial being treated as guardians of ancestral values as well as venerable counselors.

For these reasons, older adults are highly respected, and the younger generations try to take very good care of their older relatives. However, due to various socio-economic changes,

traditional values and customs are eroding, and traditional joint family living arrangements are breaking down into nuclear family systems (UNESCO 1992). Increased landlessness and poverty are assumed to weaken the relationship between elder members and younger members of the family (Hassan 2007). Because of rural poverty, many adults move to urban areas in search of employment. Women are also joining the urban work force in increasing numbers, resulting in their having less time to take care of older family members than in the past (Hassan 2007). It is unclear how long the society will be able to maintain the tradition of young family members taking care of the older adults in their family. Thus, in this study we have tried to introduce the concept of self-care (i.e. active aging) by examining the socio-demographic status of the older adults through the dimensions of the AAI as well as the relationship between the DFLE and AAI.

The analysis of 15 indicators of the AAI showed that urban older adults had more income, more education, and lead better lives than their rural counterparts. At the same time, almost all older adults were dissatisfied with their incomes regardless of whether the financial support came from the family or other sources. Many older females had no personal income, and it is difficult to understand how they support themselves. However, in Bangladeshi culture, the older adults typically receive support from their own children as well as other extended family members. Adult children, particularly sons, are considered to be the main source of security and economic support to their parents, particularly in times of disaster, sickness and in old age (Cain 1986).

We also found that about 93 percent of older respondents lived with family members, but of the family types observed, 45.9 percent were nuclear and 54.1 percent were joint families in rural areas. In contrast, 23.4 percent were nuclear and 76.6 percent were joint families in urban areas. Financial support from the family might have been reduced in our study sample because of decline in family size.

In addition, most of the study respondents were not active in any clubs or groups activities. Therefore, respondents were asked a multiple choice question, "How do you pass leisure time?". Almost all of the rural older adults (99 percent) reported passing leisure time by gossiping, followed by caring for grandchildren, and religious work, while urban older (96 percent) reported passing time by gossiping, followed by caring for grandchildren, religious work, and reading books or newspapers. In Bangladeshi culture, older adults usually have few responsibilities or obligations, except taking care of grandchildren. Older adults often hand over their business or properties to their children and become inactive in their daily life. Our findings on the DFLE measure indicate that the older Bangladeshi population could benefit from exposure to the concepts of active ageing and an understanding of the significance of adopting an active aging lifestyle. Daily activities could be successfully performed by 97.3 percent of respondents, and these ADL abilities could perhaps motivate them to remain active in every sector of daily life. Older males were also found to be more active and enjoy more disability-free life compared with older females.

Our analysis supports earlier research by Barford, Dorling, Smith, and Shaw (2006) which indicate that even in the poorest countries, women can expect to outlive men. In Bangladesh, we found increased levels of disability with advancing age as well as clear gender differences showing that while females outlive males, they are more likely to live a greater part of their remaining lives with disability. Still, the very strong positive correlation between the AAI scores and DFLE, meaning high activeness in AAI increases DFLE, could be a turning point for older females as well as for all older adults to be more active for an improved quality of life.

This study based on cross-sectional data; consequently, no direct conclusions can be drawn regarding time trends in DFLE. The analysis also has a few other limitations. First, only the 15 indicators (under three pillars) suggested by the Active Aging Taskforce of the Western Australian Government (Active Aging Taskforce 2003) were utilized for constructing the AAI, following the parameters established by Thanakwang and Soonthorndhada (2006). Since the study was based on the WHO concept, more indicators, such as habits related to use of alcohol, smoking, and coping strategies might have been included to construct the AAI. Further analysis is also needed to better understand the pathways that explain how these broad aging and lifestyle determinants actually affect health and well-being.

A second limitation is that some priority measures, such as types and duration of physical exercise, were not addressed here because of financial and time constraints. Third, this study utilized the Preston and Bennett (1983) estimation method for a post-childhood life table. Since we did any have any respondents of 100+ years of age for 2005 and 2010, we assumed $l_{85+} = ({}_5L_{80} + {}_{15}L_{85})/20$ (i.e. the maximum age as 100 years for ${}_{15}L_{85}$ to compute age- and sex-specific life tables. Usually the Sullivan (1971) method is used with same period mortality, but these data are unavailable for Bangladesh. Therefore, the Preston and Bennett (1983) method was used, yielded estimates that are not as sensitive to age-misreporting (UN 1983).

The fourth study limitation is that the institutionalized population was not considered because of the unavailability of associated data. If individuals living in institutions have more disabilities than individuals residing in the community, not considering the institutionalized population might overestimate the DFLE, especially at older ages (Yong, and Saito 2009). In this study, we assumed the number of older individuals living in institutions to be negligible and that they exhibited the same distribution of health conditions and disability as older adults living in the community at large. Addressing these limitations in detail in future research is critical to understanding and enhancing a healthy-aged-society.

Conclusions

Although Bangladesh will face population aging after 2025, it is much more notable that this older-adult population faces challenges in respect to health and socio-economic issues. People with more education and/or higher incomes have been shown to live longer and experience fewer adverse health events (Crimmins and Saito 2001). Our study showed that urban older adults as well as older males in general are more educated, active in all aspects of life, and have longer DFLE than others. These findings indicate that steps should be taken to provide life long learning as well as pragmatic education to motivate the older-adult population to be active in every aspect of life. Opportunities for positive community participation as well as for achieving health and security should also be made available in later life. Urban amenities such as parks and recreational facilities should also be provided in the rural areas. Strengthening family support systems through advocacy and counseling could encourage family members to be more responsible towards older members. Moreover, many elders can take care of themselves if physical exercise and income sources are available. These opportunities should be promoted through mass media (e.g., newspaper, television, radio) in a comprehensible manner. Indeed, physical activity plays a central role in the prevention and management of chronic disease (Cyarto, Moorhead, and Brown 2004) as well as maintaining bone density and preventing

osteoporosis (McCulloch 1996), while physical inactivity is identified as a leading cause of disability among older adults (Buchner 1997).

We should bear in mind that the future health of the older adults will be influenced by a range of factors, so it cannot be assumed that DFLE will remain at current levels. Yong and Saito (2009) concluded that improvements in medical technologies could contribute to longer Japanese healthy life expectancy in the future. Since the Alma-Alta Declaration in 1978, Bangladesh has made important gains in providing primary health care. All health indicators show a steady gain, and the health status of the population has improved (WHO 2010). As a result, Bangladeshi DFLE could be increased. At the same time, positive correlations between the AAI and DFLE suggest that older adults could enjoy more DFLE by becoming more involved in all dimensions of the AAI. Therefore, we suggest introducing the active aging concept properly not only to older adults but to all people, so that they can change their lifestyles and enjoy more disability-free years in later life. Finally, more research on this emerging issue should be done with close monitoring, and the resulting information needs to be scientifically utilized in developing suitable programs to address the needs of poor older residents of the Rajshahi District as well as all the older adults of Bangladesh and other developing countries.

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