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Socio-demographic differentials of adult health indicators in Matlab, Bangladesh: self-rated health, health state, quality of life and disability level

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Background: Mortality has been declining in Bangladesh since the mid- twentieth century, while fertility has been declining since the late 1970s, and the country is now passing through the third stage of demographic transition. This type of demographic transition has produced a huge youthful population with a growing number of older people. For assessing health among older people, this study examines self-rated health, health state, quality of life and disability level in persons aged 50 and over.

Data and methods: This is a collaborative study between the World Health Organization Study on global AGEing and adult health and the International Network for the Demographic Evaluation of Populations and Their Health in developing countries which collected data from eight countries. Two sources of data from the Matlab study area were used: health indicator data collected as a part of the study, together with the ongoing Health and Demographic Surveillance System (HDSS) data. For the survey, a total of 4,000 randomly selected people aged 50 and over (HDSS database) were interviewed. The four health indicators derived from these data are self-rated health (five categories), health state (eight domains), quality of life (eight items) and disability level (12 items). Self-rated health was coded as dummy while scores were calculated for the rest of the three health indicators using WHO-tested instruments.

Results: After controlling for all the variables in the regression model, all four indicators of health (self-rated health, health state, quality of life and disability level) documented that health was better for males than females, and health deteriorates with increasing age. Those people who were in current partnerships had generally better health than those who were single, and better health was associated with higher levels of education and asset score.

Conclusions: To improve the health of the population it is important to know health conditions in advance rather than just before death. This study finds that all four health indicators vary by socio-demographic characteristics. Hence, health intervention programmes should be targeted to those who suffer and are in the most need, the aged, female, single, uneducated and poor.

Keywords: *adult health*; *self-rated health*; *health state*; *quality of life*; *disability*; *Matlab*; *Bangladesh*; *INDEPTH WHO-SAGE*

Access the supplementary material to this article: INDEPTH WHO-SAGE questionnaire (including variants of vignettes), a data dictionary and a password-protected dataset (see **Supplementary files** under **Reading Tools** online). To obtain a password for the dataset, please send a request with 'SAGE data' as its subject, detailing how you propose to use the data, to global.health@epiph.umu.se

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Mortality has been declining in Bangladesh since the mid-twentieth century, while fertility has been declining since the late 1970s, and the country is now passing through the third stage of demographic transition (1). This type of demographic transition has produced a huge youthful population and

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a growing number of older people. Due to such an age structure, the population is now experiencing a double disease burden; over 50% of deaths in Matlab are now due to non-infectious diseases (2).

Bangladesh is one of the 20 developing countries with the largest numbers of older people, and by 2025 Bangladesh, along with four other Asian countries, will account for about half of the world's older population (3). In fact, population increase among those aged 65 and over was negligible in Bangladesh during the first half of the twentieth century, but it increased substantially during the second half (2.4 million) and it is projected to increase by 20.8 million during the first half of the twenty-first century (4).

As social security is almost non-existent for older people in Bangladesh (pension for government and semi-government employees 5%, and governmental support for elderly people 10%), older people usually live in extended households and depend primarily on adult children for economic support and personal care (5). However, the traditional family support system for older people is under pressure due to the increasing out-migration of household members to cities, and women's labour force participation outside the home, causing vulnerability for older people.

In Bangladesh about 50% of the population fall below the poverty line, and so older people are likely to be in ill health, in social isolation and in poverty (6). Moreover, the majority of the older people live in rural areas where there is no specialised care service for older people in health facilities (Upazila Health Complex). Based on Matlab data, it was documented earlier that the prevalence of chronic morbidity was 75% among older people (last 3 months) while it was about 50% (last 1 month) for acute morbidity (7); 2.1% of older males and 3.6% of females could not use a toilet without help.

As costs associated with assessing health status of a population are high, there is a need for low-cost health indicators, particularly for developing countries. Currently, some low-cost health indicators are available for developed countries that are good predictors of mortality and functional ability (8–11), but such indicators are rare for the developing countries. Based on the Matlab Health and Socio-economic Status Survey of Bangladesh, (12) it was reported that adults of this community can effectively assess their own health even with poor education and low levels of interaction with the modern health system.

The current study has collected data on four indicators of health using a summary version (SAGE–INDEPTH) of the full WHO-SAGE questionnaire: self-rated health, health state, quality of life and disability level. The study will examine these four health indicators for people aged 50 and over, and their relationship with various socio-demographic characteristics as well as the inter-relationship of these health indicators.

Methods

Setting

Data for this study come from Matlab *Upazila* (sub-district) where the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B) has maintained a field station since 1963. Matlab is a rural area located about 55 km south-east of Dhaka. The area is a low-lying deltaic plain intersected by the tidal river *Gumti* and its numerous canals. In the past, major modes of transport within the area were walking, country boat and in some cases small steamer or launch. However, in recent years most of the villages have become accessible by rickshaw. Farming is the dominant occupation, except in a few villages where fishing is the means of livelihood (13). Most of the farmers are in marginal situations with less than a hectare of land and 40% of them are landless. For many families, sharecropping and work on others' land on a daily wage basis have become the main sources of livelihood. Some people work in mills and factories in different towns and cities but their families live in the study area. Rural–urban out-migration is about 5% in recent years, while it is about 1% for international migration; however, these rates were much lower in the 1980s (3.3% vs. 0.3%). Women are largely restricted to activities in the home, with relatively little opportunity to venture outside the home, although these restrictions have decreased in recent years. Rice constitutes the staple food and is harvested three times annually. Rates of illiteracy are high and are higher among older people.

Since 1966 the ICDDR,B has maintained a Health and Demographic Surveillance System (HDSS) in the Matlab area covering about 225,000 people. The surveillance system collects data on births, deaths, migrations, marriages, divorces and household divisions (14), and also collects cross-sectional socio-economic data which are available for 1974, 1982, 1996 and 2005. The HDSS data are of high quality because they have been collected during regular household visits (every 2 weeks until 1997, every month between 1998 and 2006 and every 2 months since then) by the Community Health Research Workers (CHRWs).

Since October 1977, half of the surveillance area has been exposed to Maternal and Child Health and Family Planning (MCH-FP/ICDDR,B service area) services while the other half is a comparison area (15, 13). These two areas are almost similar in socio-economic conditions but differ in access to the MCH-FP programme. Beginning in 1996, the community-based maternity care service of the ICDDR,B service area was gradually phased out and replaced by a facility-based strategy of sub-centres.

However, these health services are targeted mainly at mother and child health and not to older population, except for services for diarrhoeal diseases. In fact, treatment for diarrhoea has been provided from the Matlab field hospital since the beginning and such service is open to all irrespective of place of residence.

The history of modern medicine is rather short in Bangladesh, since it did not reach the rural population until after World War II. During 1947–1970 the physical infrastructure for delivering health services by the then government was mainly urban-based, and such services were more curative than preventive in nature. The government accepted primary health care as a national health objective in 1978, since when the health care system has been reoriented to provide essential care to the general mass of the population. Funding for the health sector increased significantly from the early 1980s, with new facilities including Maternal and Child Welfare Centres in urban and sub-urban areas, Upazila Health Complexes at Upazila level and Family Welfare Centres at Union level (16). In Matlab town the government runs a 31-bed free general hospital with nine doctors (Upazila Health Complex) along with several Family Welfare Centres, each with a sub-assistant Community Medical Officer and a Family Welfare Visitor. Except for the service from Upazila Health Complex, all other services are targeted to maternal and child health. Finally, there are across the country both private practitioners (qualified and unqualified), private clinics (in big cities) and traditional practitioners (*Ayurvedic*, *Unani and Homoeopathy*); these services cover the population across all age groups.

Data and methods

This is a multi-country study between the World Health Organization Study on global AGEing and adult health (SAGE) and the International Network for the Demographic Evaluation of Populations and Their Health in developing countries (INDEPTH), and collected data from eight countries of Africa and Asia. Two sources of data from the Matlab study area were used: survey data collected as a part of the study and the ongoing HDSS data. For the survey, questionnaires were received from the SAGE–INDEPTH and piloted in the field after translating into local languages. A total of 4,000 people 50 years and older, out of 31,400, were selected randomly from the HDSS database (ICDDR,B-service area); a sample from half of the HDSS area was selected to minimise travel time to visit the sample households.

The survey was conducted by a team of college-graduate females with data collection experience. Interviewers received extensive training on data collection, particularly about asking questions on sensitive topics and on the data collection tools designed for the survey. The interviews were conducted at the residence of the respondent by face-to-face interview and contact with absentees was attempted three times. As a quality check, about 2% of samples were re-interviewed by an independent field worker/supervisor and feedback was incorporated accordingly.

Based on the survey data, four health indicators were calculated: self-rated health, health state, quality of life and disability level. Self-rated health was a categorical variable (five categories), health state was measured through eight domains (affect, cognition, interpersonal activities and relationship, mobility, pain, self-care, sleep/energy, and vision), quality of life was measured through eight items and disability was assessed through 12 items (17). Self-rated health was coded as a dummy while scores were calculated using the WHO-tested instruments for health status, quality of life and disability level. All three of these scores were transformed into 0–100 scales on which higher scores indicate better outcomes [better health status, better quality of life (WHOQoL) and better functional ability (WHODASi)].

Analyses were undertaken using both bivariate and multivariate methods. The dependent variable was dichotomous for self-rated health and involved continuous scores for health state, quality of life and disability level. The independent variables were age of respondent, sex, marital status, proportion of people aged above 50 in the household, education level and asset quintiles.

Age was grouped into four (50–59, 60–69, 70–79 and 80 and over), completed years schooling into three (none, 1–5 and 6 years or more), marital status into two (now single and in current partnership) and proportion of people aged above 50 in household into four groups (<0.25, 0.25–0.49, 0.50–0.74 and 0.75 or more). Asset index was calculated based on a number of consumer items (radio, watch, etc.), dwelling characteristics (wall and roof material) and type of drinking water and toilet facilities (18). For this study we have studied first to fifth quintiles as poorest to richest.

For examining the interrelationship between two variables, self-rated health was grouped into two categories (very good, good, moderate $=1$ and bad/very bad $=0$); health status (IRT health $\leq 55.2 = 0$ and $> 55.2 = 1$); quality of life (WHOQoL $\leq 80.0 = 0$ and $> 80.0 = 1$); disability level (WHODASi $\leq 81.0 = 0$ and $> 81.0 = 1$); χ^2-tests were performed for significance level.

Results

About two-fifths of the sample belonged to the age group 50–59 years while about one-fifth were aged 70 and over (Table 1). Educational level was low, with about 55% illiterate and only about 15% had six or more years of schooling. About 25% of people were single, 30% of household members were 50 years or older and mean household size was slightly over 5. Sample households are not equally distributed across quintiles, with more from

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Table 1. Background characteristics (%) of the study population in Matlab, Bangladesh

Variables	Respondents ($N=3,990$)	Non-respondents ($N=31,425$)
Sex		
Men	49.9	47.4
Women	50.1	52.6
Age group (years)		
50–59	45.3	44.0
60–69	33.8	34.0
70–79	17.1	17.3
80 and over	3.8	4.7
Education level		
No formal education	56.3	57.4
Less than or equal to 6 years	28.7	28.7
More than 6 years	14.9	13.9
Marital status		
Now single	23.8	29.7
In current partnership	76.2	70.3
Socio-economic quintile		
First quintile	15.2	13.6
Second quintile	16.6	16.8
Third quintile	17.5	20.3
Fourth quintile	23.2	23.5
Fifth quintile	27.4	25.9
Mean number of household members	5.4	4.9
Percentage of household members aged 50 years and over	18.6	16.6

the fourth and fifth quintiles, because the quintiles are population-based. In fact, sample characteristics are comparable to the population characteristics.

All four measures of health indicator (self-rated health, health state, quality of life and disability level) indicated that health was better for males than females irrespective of age categories and health deteriorated gradually as age increased (Table 2). For self-rated health, the proportion with good health declined from 87.2% to 48.9% for males and 77.4% to 24.2% for females between age groups 50–59 and 80 years and over; while for health status, the mean score declined from 65.7 to 55.6 for males and 57.7 to 50.7 for females between these two age groups. For quality of life, the mean score decreased from 80.3 to 76.4 for males and 77.3 to 71.4 for females between age groups 50–59 and 80 years and over; while for functional ability level, the mean score decreased from 84.0 to 54.6 for males and 62.1 to 42.0 for females between these two age groups.

Table 2. Distribution of health indicators by age and sex for 4,037 adults aged 50 and over in Matlab, Bangladesh

Indicators	Men ($N=2,016$)	Women ($N=2,021$)
Self-rated health (Percentage of very good/good/moderate)		
50–59 years	87.2	77.4
60–69 years	77.9	60.1
70–79 years	64.4	42.9
80 years and over	48.9	24.2
Mean health status (score)		
50–59 years	65.7	57.7
60–69 years	62.2	55.4
70–79 years	59.2	51.3
80 years and over	55.6	50.7
Mean quality of life (score)		
50–59 years	80.3	77.3
60–69 years	79.0	74.7
70–79 years	77.8	72.1
80 years and over	76.4	71.4
Mean functional ability level (score)		
50–59 years	84.0	62.1
60–69 years	76.1	54.5
70–79 years	66.3	45.8
80 years and over	54.6	42.0

Table 3 shows multivariate relationships for self-rated health and health status by socio-demographic characteristics. After controlling for all other variables in the regression model (logistic), males reported significantly better health (2.19 times) than females; health got significantly worse as age increased (7.70 times better for age group 50–59 and reduced to 2.07 times for age group 70–79 compared to age group 80 years and over); educated people had significantly better health than uneducated (0.74 times for those with no formal education and 0.87 times for those less or equal to 6 years compared to those with six or more years of education); and health got significantly worse as socio-economic status declined (0.74 times for first quintile to fifth quintile).

For health status, after controlling for all other variables in the regression model (linear regression), the score for males increased by 7.07 per unit change in the female score; for age group 50–59, the score increased by 8.76 per unit change and 2.51 times per unit change for age group 70–79 compared to those in age group 80 years and over; for no formal education the score declined by 1.22 per unit change and by 0.74 per unit change for those with less or equal to six years compared to those with more than six years of schooling; for single persons the score declined by 0.08 per unit change of those in a current partnership; and for first

Table 3. Multivariate models of factors associated with self-rated health (logistic regression) and health state (linear regression) for 4,037 adults aged 50 and over in Matlab, Bangladesh

Variables	Self-rated health (Exponent of β and 95% CI)	Health status (β coefficient and 95% CI)
Sex (ref: women)		
Men	2.19 (1.83, 2.62)**	7.07 (6.48, 7.66)**
Age group (ref: 80 years and over)		
50–59 years	7.70 (5.34, 11.09)**	8.76 (7.44, 10.07)**
60–69 years	4.06 (2.84, 5.08)**	5.95 (4.64, 7.25)**
70–79 years	2.07 (1.43, 2.99)**	2.51 (1.15, 3.87)**
Education level (ref: more than 6 years)		
No formal education	0.74 (0.57, 0.95)*	−1.22 (−1.98, −0.46)**
Less or equal to 6 years	0.87 (0.67, 1.13)	−0.74 (−1.51, 0.03)***
Marital status (ref: in current partnership)		
Now single	0.97 (0.79, 1.18)	−0.08 (−0.78, 0.63)
Proportion aged 50 years and over in the household (ref: ≥0.75)		
0.25	1.06 (0.82, 1.38)	−0.03 (−0.93, 0.87)
0.25–0.49	0.97 (0.75, 1.25)	−0.08 (−0.95, 0.79)
0.50–0.74	0.83 (0.63, 1.10)	−0.55 (−1.51, 0.41)
Socio-economic quintile (ref: Fifth quintile)		
First quintile	0.74 (0.58, 0.94)*	−1.04 (−1.85, −0.23)*
Second quintile	0.81 (0.64, 1.02)***	−1.33 (−2.10, −0.57)**
Third quintile	0.78 (0.62, 0.98)*	−0.90 (−1.64, −0.15)*
Fourth quintile	0.93 (0.76, 1.15)	−0.56 (−1.24, 0.11)

*P <0.05; **P <0.01; ***P <0.10.

socio-economic quintile the score declined by 1.04 per unit change compared to those in fifth quintile.

Table 4 shows the multivariate relationship of quality of life (WHOQoL) and disability level (WHODASi) by socio-demographic characteristics. After controlling for all other variables in the regression model (linear regression), the WHOQoL score for males increased by 2.01 per unit change in female score; for age group 50–59 the score increased by 3.42 per unit change and by 0.87 per unit change for age group 70–79 compared to those in age group 80 years or more; for single persons the score decreased by 4.04 per unit change of those in a current partnership; for no formal education the score decreased by 0.81 per unit change, and by 0.31 per unit change for those with less or equal to 6 years compared to those with six years or more schooling; and for the first socio-economic quintile the score decreased by 2.95 per unit change and by 0.93 per unit change for those in the fourth quintile compared to those in the fifth quintile.

For functional ability level, after controlling for all other variables in the regression model (linear regression), the score for males increased by 20.17 per unit change in the female score; for age group 50–59 the score increased by 25.49 per unit change and by 8.96 per unit change for those in age group 70–79 compared to those 80 years or more; for no formal education the score decreased by 4.31 per unit change and by 2.66 per unit change for those with less or equal to 6 years compared to those with six or more years of schooling; and for the first socio-economic quintile the score decreased by 2.32 per unit change compared to those in fifth quintile.

All four health indicators (self-rated health, health state, quality of life and disability level) show that males, those who were younger, educated and those in higher socio-economic groups reported better health, compared to females, older age groups, illiterates and those in lower socio-economic groups.

Table 5 shows the interrelationship of different health indicators. Results show that all four health indicators are highly significantly related to each other.

Discussion

Bangladesh is currently passing through the third stage of demographic transition, where both fertility and mortality rates are at relatively low levels. Such as demographic transition has produced a huge youthful population with a growing number of older people (4), where disease patterns are changing from infectious to

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Table 4. Multivariate models (linear regression) of factors associated with quality of life and functional ability level for 4,037 adults aged 50 and over in Matlab, Bangladesh

Variables	Quality of life (β coefficient and 95% CI)	Functional ability level (β coefficient and 95% CI)
Sex (ref: women)		
Men	2.01 (1.68, 2.34)**	20.17 (18.82, 21.52)**
Age group (ref: 80 years and over)		
50–59 years	3.42 (2.69, 4.16)**	25.49 (22.50, 28.48)**
60–69 years	2.07 (1.34, 2.80)**	18.08 (15.00, 21.06)**
70–79 years	0.87 (0.11 1.63)*	8.96 (5.86, 12.06)**
Education level (ref: more than 6 years)		
No formal education	−0.81 (−1.23, −0.38)**	−4.31 (−6.05, −2.57)**
Less or equal to 6 years	−0.31 (−0.75, −0.11)	−2.66 (−4.42, −0.89)**
Marital status		
Now single (ref: in current partnership)	−4.04 (−4.43, −3.64)**	0.19 (−1.42, 1.82)
Proportion aged 50 years and over in the household (ref: ≥0.75)		
0.25	−0.23 (−0.74, 0.26)	0.34 (−1.70, 2.40)
0.25–0.49	−0.04 (−0.53, 0.44)	0.80 (−1.19, 2.80)
0.50–0.74	−0.04 (−0.57, −0.50)	−0.37 (−2.57, 1.83)
Socio-economic quintile (ref: least poor quintile)		
Poorest quintile	−2.95 (−3.41, −2.50)**	−2.32 (−4.17, −0.48)*
Second quintile	−2.29 (−2.71, −1.86)**	−2.04 (−3.76, −0.30)*
Third quintile	−1.40 (−1.82, −0.98)**	−1.46 (−3.16, 0.23)
Fourth quintile	−0.93 (−1.31, −0.55)**	−0.72 (−2.27, 0.81)

*$P < 0.05$; **$P < 0.01$.

non-infectious (2). Traditionally, older people are viewed in this society as an integral part of the family and used to enjoy absolute authority over the younger generation; however, the status of older people is under pressure due to demographic, social and economic change (19).

As a result of mortality decline during the past few decades, life span has increased significantly in Bangladesh but it is not known whether health status has improved during the increased life span. The study found that all four health indicators (self-rated health, health state, quality of life and ability level) deteriorated with increasing age. The finding is in agreement with a recent study from Matlab that the prevalence of chronic disease increased with age (20). It is likely that this population will need more support (physical/co-residence, social and economic) as the number of older people is increasing rapidly along with an increase in chronic diseases.

In Bangladesh, older females survive better than males (2) but health indicators from the current study (self-rated health, health state, quality of life and disability

Table 5. Inter-relationship of different health indicators in order persons, Matlab, Bangladesh

	Quality of life	Disability level	Health state	Self-rated health
Quality of life				
Disability level	$\chi^2 = 526.7$ $P < 0.001$			
Health state	$\chi^2 = 355.8$ $P < 0.001$	$\chi^2 = 645.6$ $P < 0.001$		
Self-rated health	$\chi^2 = 313.3$ $P < 0.001$	$\chi^2 = 303.8$ $P < 0.001$	$\chi^2 = 499.2$ $P < 0.001$	

Note: Health indicators (categories): self-rated health (very good, good, moderate = 1 and bad/very bad = 0); Health status (IRT health >55.2 = 1 and ≤55.2 = 0); Quality of life (WHOQoL ≤80.0 = 0 and >80.0 = 1); Disability level (WHODASi ≤81.0 = 0 and >81.0 = 1).

level) demonstrate that females are worse-off than males during old age. However, it was reported that the health disadvantage for women reflect their 'greater sensitivity' to health conditions (12). In this society, where women continue to be valued less than men as documented in the past (21), older women's health reflects their lifelong experience of discrimination, deprivation and neglect (6). Traditionally, older women also own fewer assets and have less control over family income, and a recent study from Matlab reported that females experience more chronic disease than their male counterparts (20).

All four health indicators documented that health is better among educated/rich than uneducated/poor people. The finding is also in agreement with mortality patterns, in which educated/rich people had lower mortality than uneducated/poor (2). Some years ago, it was reported (22) that socio-economic differentials in mortality indicate that a degree of success has been achieved in one section of the community that has not been achieved in others. In Matlab (20), it has been documented that some chronic diseases (stroke, heart disease, diabetes) increase with increased education while others (joint pain, pulmonary, hypertension, cancer) decrease.

All four health indicators were found to be interrelated and these indicators also showed similar patterns by socio-demographic characteristics. This indicates that these health indicators, although measuring different dimensions of health, had some common characteristics. Preliminary analysis of the same dataset show that these four health indicators are also predictors of subsequent mortality (23).

To improve the health of the population, it is important to know their health status in advance rather than just before death. The findings of this study have policy implications in terms of assessing the overall burden of diseases and effectiveness of health systems. Moreover, the study indicates that health intervention programmes should be targeted to those who suffer and need most: the older, female and uneducated/poor people.

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