Who Receives Healthcare? Age and Sex Differentials in Adult Use of Healthcare Services in Rural Bangladesh

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Abstract

Use of healthcare services may vary according to the cultural, social, economic and demographic situation of the person who may need care. In certain contexts, it particularly varies with age and sex of the potential user. Bangladesh is a less developed, primarily rural and predominantly Muslim traditional society with a pluralistic healthcare system. This paper endeavours to delineate the age, sex and other factors associated with obtaining healthcare in this pluralistic system. Using the Matlab Health and Socio-economic Survey, the paper uses logistic regression to ask whether factors commonly related to Western healthcare utilization in a theoretical framework useful in the study of Western research on healthcare services are also useful in the study of healthcare utilization in the developing world. Elderly women, never-married women and Hindus were less likely to visit any practitioner, which may indicate less health empowerment for these groups. Obtaining care is inversely related to household size and positively related to age (for men), education, poor health status and impaired mobility. Controlling for these factors, household wealth and ever-married status showed no significant effect on obtaining care. The differential in use of healthcare services can partially be ameliorated by changes in policy related to the elderly and women.

Introduction

There is a long history of studies of healthcare utilization in the developed world in which, frequently, higher utilization is taken to indicate better health. Inequality in use is taken as an indicator that health inequity[1] may exist (see, for example, Suchman 1965; Kohn and White 1976; Andersen and Aday 1978). In this paper, we hypothesize that there are significant differentials in use of healthcare in rural Bangladesh based on age and sex and controlling for other social and health factors; we apply a model of healthcare utilization often used in investigations in industrialized countries, with careful cultural modifications, to study these differentials.

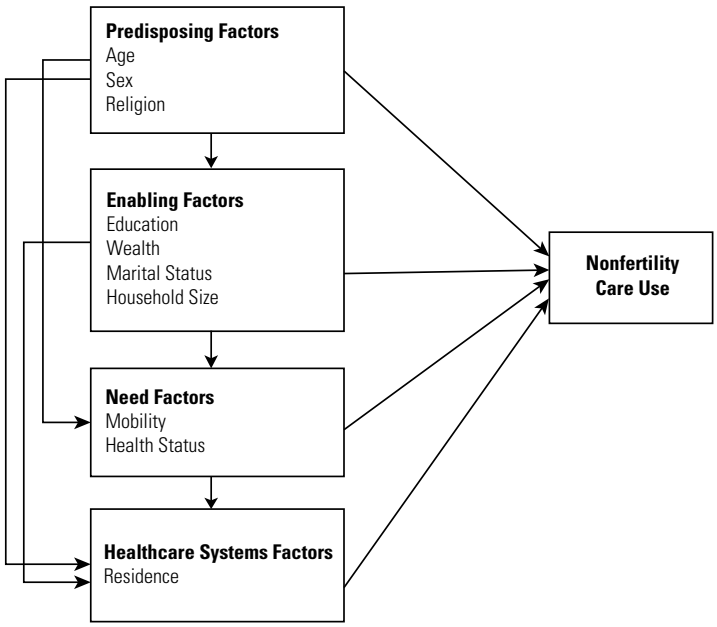
We first examine patterns of adult healthcare utilization by age and sex in the Matlab area of Bangladesh, one of the world's poorest countries. Next, we examine these and other factors related to utilization in Matlab. Finally, we discuss the issue of equity in healthcare use and the policy implications for Matlab healthcare and social systems. To do so, we use data from the Matlab Health and Socio-economic Survey (MHSS) carried out in 1996-97[2].

Until recently, studies of healthcare use in the developed world focused almost exclusively on modern, allopathic medical care. Modern healthcare systems are far less prevalent and dominant in developing countries. Instead, pluralistic systems of care, melding traditional and modern care practices, are the norm. Government healthcare budgets, routinely $14/per person per year, are small. Provision of services must compete for funds with public health needs, such as development of clean water sources, sewage disposal and the reduction of environmental and biological hazards (Perry 2000). These differences in the cultural and medical milieu make the study of healthcare utilization in the developing world necessarily distinct from industrialized country settings.

Bangladesh ranked 139th of the 175 countries for which UNDP calculated its Human Development Index for 2003 and 132nd in per capita GDP (UNDP 2003). It is a rural (but urbanizing), densely populated, predominantly Muslim country that is undergoing a rapid demographic and epidemiological transition, with high but declining population growth, decreasing infant and total mortality rates, decreasing total fertility rates and a transition from predominantly acute to chronic disease problems (Mostafa 1999). Survival into old age is becoming the norm, but overall health of adults, and particularly the elderly, has not been a major concern for governmental and non-governmental entities. Most research and health interventions have focused on child and maternal health and mortality and family planning. Health systems for adults and the elderly are in early stages of development. Therefore, an analysis of adult and elderly use of health services is timely, and may inform the development of healthcare policy in Bangladesh.

Matlab is a river delta region about 55 kilometres southeast of the capital, Dhaka, with agriculture and fishing as its primary economic activities. Per capita income in the late 1990s was less than $400 per year. Since 1963, it has been the site of health research sponsored by ICDDR,B: the International Centre for Health and Population Research (formerly the International Centre for Diarrhoeal Disease Research, Bangladesh). The initial emphasis of research in the region was on

FIGURE 1. **Andersen and Aday Model Applied to Matlab, Bangladesh**



diarrheal diseases, but over the years research branched into other areas – child and maternal health, perinatal care, family planning – and social and economic determinants of health and other aspects of well-being. Underpinning these efforts, the Health and Demographic Surveillance System (HDSS) has, since 1966, collected vital event information about all residents of a defined area of Matlab, thus providing reliable longitudinal demographic data for this population. In 1978, ICDDR,B divided the HDSS region, for the purpose of its research, into consistent "program" and "comparison" areas, permitting more effective evaluations of programs. The declines in infant and perinatal mortality, general mortality and morbidity, and total fertility, particularly in the program area, have preceded and outstripped those of the rest of Bangladesh (Mostafa 1999). Modern healthcare is provided at hospitals and clinics under the direction of ICDDR,B and other governmental agencies. ICDDR,B community health workers regularly canvass, educate and offer some treatment to householders. Basic health education is offered in the schools and clinics and to adults in home visits. Mortality and other selected aspects of health in Matlab are studied on an ongoing basis. Alongside the modern systems are multiple forms of traditional medical practice that complement and interact with the efforts of the modern medical system. These traditional forms of healthcare are based on homeopathic and herbal remedies as well as some allopathic medical concepts (Islam 1980).

In this setting, the Matlab Health and Socio-economic Survey was fielded in 1996 to assess the health and socio-demographic status and behaviour of the population, particularly adults and the elderly (Rahman et al. 1999). From this survey, we examine social, cultural and economic differentials in healthcare utilization with particular focus on age and sex differentials in the use of care.

Conceptual Model

Studies of use of healthcare in the United States have long been based on theories that posit social, psychological, social network, institutional, national and international determinants of illness behaviour and the use of health services (Aday and Andersen 1975; Andersen and Aday 1978; Becker and Maiman 1975; Coulton and Frost 1982; Parsons 1951). These theories generally assume that the practitioner contacted will be a physician, enmeshed in a network of hospitals, care providers, families and institutions of care, insurers and governmental programs responsible for healthcare (in short, an allopathic healthcare system).

In the developing world, this institutional view of care and the hegemony of modern care do not hold. Complicated plural health systems combine traditional and modern practice, rarely include insurance, and have minimal governmental support, which is usually limited to specific programs to improve child and maternal health and to prevent and treat epidemic diseases (Islam 1980).

The many models of healthcare-seeking behaviour in industrialized countries (Andersen 1968; Rosenstock 1967; Suchman 1965; Suchman 1967; Kroeger 1983; Pescosolido 1992) can be classified into three principal types – the social psychological, network and health behaviour models (see Young 2004 for a critical review). Only the last seems suitable to a developing country context and to the data available for this study.

The ***health behaviour model***, which can be represented by the work of Andersen and Aday (cf. 1974), posits that economic, educational, social and cultural characteristics affect and determine healthcare utilization. The original formulation included three types of factors that influence care use. *Predisposing factors* are demographic and socio-structural in nature and have a low degree of mutability (potential to be changed by social action). *Enabling factors*, such as individual, household and family characteristics, distance to care, health insurance and other resources, are those factors that may promote use; they have a higher degree of mutability. *Need factors* include health status and physical capability. Later formulations (e.g. Andersen and Aday 1978) added a fourth category, *healthcare system factors*. The health behaviour model thus can include individual factors, characteristics of the person's family and community network and the health systems in which the individual is embedded. We find it the logical choice for an initial analysis of healthcare utilization in the Bangladesh context. Figure 1 shows the version of the health behaviour model used in this analysis. The broken lines show the interrelationships of predisposing, enabling, need and health

systems factors, all of which are significant. However, in this paper, we focus on the relationships of each set of factors to healthcare use (the direct effects and the interactions with age and sex)[3].

Developing Country Studies Related to the Health Behaviour Model

Empirical analyses of factors related to healthcare utilization in the developed world that are based on the health behaviour model are plentiful, dating back to pioneering studies such as those of Greenlick (1968) and Kohn and White (1976), and have been reviewed by Young (2004). Here we consider only studies in the developing world that are based on the health behaviour model or aspects of that model.

Relationships of predisposing and enabling factors to health or healthcare have been found in studies across the developing world. A number have found gender differences in healthcare utilization and mortality (Buschkens and Slikkerveer 1982; Bloom et al. 2001). Abedin (1999) showed that, in Bangladesh, health of women and the aged was adversely affected by traditional family structure and the nuclearization of the extended family. Fosu (1989) and Subedi (1989) found some differentials in healthcare utilization by sex; the former focused on urban areas and the latter on modern care use. Okojie (1994) and Basu (1990) noted that gender inequality causes differential and often diminished healthcare utilization in the third world, thereby increasing female mortality and morbidity. Pebley (1984) found both age and sex differences in mortality and morbidity in Matlab. Chen et al. (1981) posit the lack of social empowerment of women as the cause of the female deficit in care utilization.

Studies using enabling factors have included ethnicity and religion (Bhardwaj 1975), education (Hinderling 1973), household size (Seo 1976), socio-economic status (Durkin et al. 1994), and cost of care (Sarder and Chen 1981) as factors related to utilization. Henderson (1998), studying economic, political and educational influences on obtaining care in eight provinces in rural China, found that the young obtained care more than the old, and that education, political structure and socio-economic status were not factors. D'Souza and Bhuiya (1982), however, noted an inverse relationship between socioeconomic status, education and mortality in Matlab. They also found a significant interaction between education and socio-economic status. Muhuri (1995) found that health interventions and maternal education are associated with lower child mortality and increased child healthcare utilization in Matlab. Oths (1997) in Peru and Hao et al. (1997) also found direct relationships between higher income and education and the use of healthcare in China. Kinman (1999) noted that spatial distance to care might be crucial to the decision to seek care in situations where transportation systems are inadequate. Sauerborn et al. (1989) found that distance to a clinic in Burkina Faso, as well as cost and availability of care, might affect the decision to go.

Several studies take functional capability, perceived health status and perceived quality of life as measures of need for services (Essink-Bot et al. 1997; Ware and Shelbourne 1992; Rahman and Liu 2000).

Mwabu (1986) studied healthcare decision-making in Kenya, where there is a dual traditional-modern system of care. The personal wishes of the patient as well as economic, cultural, social and religious factors were part of the calculus of care use. Gish (1990) warns that determinants of care may be local, differing from region to region, and that an overall global model may not be possible. These studies suggest, however, that the behavioural health model is appropriate for the developing world, at least as an initial perspective, and offer a set of variables to be included in the analysis. For these reasons, we treat Matlab as a local region of social, cultural, religious, economic, educational and family characteristics and investigate healthcare use in this specific context.

Data and Methods

Data

The Matlab Health and Socioeconomic Survey (MHSS) was conducted in 1996-97. The ICDDR,B Health and Demographic Surveillance System (HDSS) provided the sampling frame and a source of

internal validity for this survey[4]. A stratified random sample oversampled people aged 50 and above (Rahman et al. 1999: 26-29). Analytical frequency weights that reflect the probability that each person is included in the sample (Rahman et al. 1999: 30-34) are used throughout this analysis. The overall response rate was 95.4% (Rahman et al. 1999: 50). Non-response occurred almost exclusively because the entire household had moved between the time the HDSS data used for the sampling frame were collected and the survey. A total of 11,151 adults aged 15 and over were interviewed.

The ***outcome variable*** is use of the healthcare system. Respondents were asked "Did you visit a health practitioner in the last three months?" They were then asked the reason(s) for each visit in that period. Many of the visits made by women (and none by men) were for reasons related to fertility, whether pregnancy or family planning. Both the Bangladeshi government and ICDDR,B have emphasized maternal health and family planning, and the system of care for these purposes is quite different than and separate from the system for other health conditions. For these reasons, we classified people by type of use of healthcare: none in the three-month period, only for fertility-related reasons, only for nonfertility reasons, and for both fertility and nonfertility purposes. We combined the latter two categories into one – those who had any nonfertility visit to a healthcare practitioner – as an outcome variable. Unfortunately, we have no way of telling whether a woman first visited for a fertility-related reason and, in the course of the visit, was also found to have a problem unrelated to fertility, or vice versa, or had entirely separate reasons for the visits. Thus, people who visit for both reasons may not have gone for care for the problem that was unrelated to their fertility. We therefore view the proportion with nonfertility only visits as an underestimate of the likelihood of obtaining care for conditions unrelated to fertility and the proportion with any nonfertility visits as an overestimate of this likelihood, biased upward by those who went only for fertility reasons but were found to have a nonfertility-related condition that was treated, either then or in another visit. We have chosen, conservatively, to use as our measure of health utilization whether the individual had any visit unrelated to fertility in the three months prior to the MHSS. This measure includes all visits related to care for customary health problems and minimizes the influence of fertility-related visits.

The ***predisposing factors*** that we include are *age*, *religion* and *sex*. Age, especially of adults, is poorly measured in many developing countries because date of birth is not recorded officially, family knowledge may be inaccurate, and memory of exact dates is unreliable. The MHSS benefited from accurate dating provided by the HDSS of all births since the early 1960s; ages of all those born in the area since the inception of the system are known, basically without error. Ages of those over 40 were estimated when they were either children or relatively young adults, except for those few who migrated into the area as elders. Age is represented by both a linear and a squared term to test for nonlinear relationships. In separate models, five-year age groups were introduced, but the model fits were no better than the more parsimonious continuous representation. Because health problems generally increase with age, we expected a similar increase in healthcare use. Use of services differs by gender in many contexts. In the rural traditional society in Matlab, social norms of female modesty (purdah) as well as differential valuation of women may reduce their access to healthcare services, despite health programs targeted to women and children. Use may also differ by religion. Over 90% of Matlab residents are Muslim; the remainder are Hindus, who constitute a minority that may have less access to healthcare.

The ***enabling factors*** included are *education*, *per capita household wealth*, *marital status* and *household size*. Our hypothesis is that better educated people and those from better-off households have greater access to healthcare and perhaps more understanding of the need for services. Marital status may be important, especially for women, in that those who are married may be valued more within the household and therefore better able to request and receive care. Household size may be relevant in that per capita wealth may go further if there are economies of scale and there may be more people available to help in travel for healthcare and taking over the tasks of the person obtaining care. The reverse may also be true – small families with greater per capita wealth may make greater use of healthcare.

Education, reported in completed years, was divided into four categories: none, primary (1-4 years), secondary (5-9 years) and higher (10+ years). Some information on income and assets was collected from all individuals. The household head was believed to be most knowledgeable about the household economic situation, so some questions about income and assets were asked only of that person. As a consequence, information for individuals who were not asked for self-reports may be especially affected by recall and measurement biases. In addition, many adults, especially women and elders, reported no personal income, even though they report engaging in productive activities. For these reasons, we chose to use household wealth because we believe it is measured more accurately than individual income and serves as an indicator of household resources that could be applied to healthcare. Kuhn (2001) created a measure of household wealth that is the sum of real income, net transfers to the family, the value of land and the value of personal property. It ranged from 200,000 taka to 820,000 taka (at the time of the survey, $1 = 38 taka). Household wealth was divided by household size to create a measure of per capita wealth, which was then divided into three categories: low (lowest quartile), middle (middle two quartiles) and higher (highest quartile). Marital status has three categories: never-married, previously married (divorced or widowed) and currently married. Being married may itself have a salutary effect on health and healthcare use (Rogers et al. 2000). Further, those with no spouse may have fewer resources (economic and social) to deal with illness and obtain services.

Several potentially important enabling factors are not included in this study. Distance to care facilities was measured only for those who actually obtained care. Its omission is not as problematic as might be the case in other areas. In Matlab, distances to various care facilities are small and nearly uniform; most villages have local traditional practitioners. At the time of the MHSS, some care offered by the government and by ICDDR,B was provided to women in the home to preserve religious traditions. Cost of care is also omitted, primarily because it was measured only for those who actually obtained care. Much of modern care is free in Matlab (though medications, the cost of transportation, work forgone and wages lost to illness are not factored in), especially in government intervention programs for child and maternal health. Traditional care does have costs specific to the care provided. No significant insurance program exists in Matlab: therefore this factor cannot be included here.

Need factors for healthcare vary with biological infirmity and must be included in models of healthcare utilization. In this study, need is measured by two variables, *self-reported health status* and *mobility*. Self-reported health was originally measured on a scale from poor to excellent, but was transformed to two categories, poor and adequate. Rahman and Liu (1998) created an index of mobility for MHSS respondents based on self-reported and objectively observed ability to do everyday activities that may affect the capacity to obtain care in this rural setting. These abilities include climbing, carrying heavy objects and walking short or moderate distances. We use a two-category (poor versus adequate) version of the mobility index.

The only ***healthcare systems factor*** used here is *area of residence*. To some extent area of residence (in the ICDDR,B program area or the comparison area), treated as a healthcare systems factor in our models, may also be considered a proxy for access to modern healthcare. More health intervention and health education programs are in the program rather than the comparison area. Both increased health education and increased health programs can increase use of services.

Methods

Weighted logistic regression was used to assess the relationships of these indicators to use of healthcare by adults 15 and older (Hosmer and Lemeshow 2000). Variables were entered into the model in blocks representing predisposing, enabling, need and healthcare systems characteristics. The main effects in the predisposing characteristic category were estimated first. Next, sex and age interactions were added, since we are especially interested in asking whether the relationship of characteristics to healthcare use varies by sex and age.[5] If the main effect and corresponding interactions were jointly not significant, the variable and its interactions were dropped from further analysis. This procedure

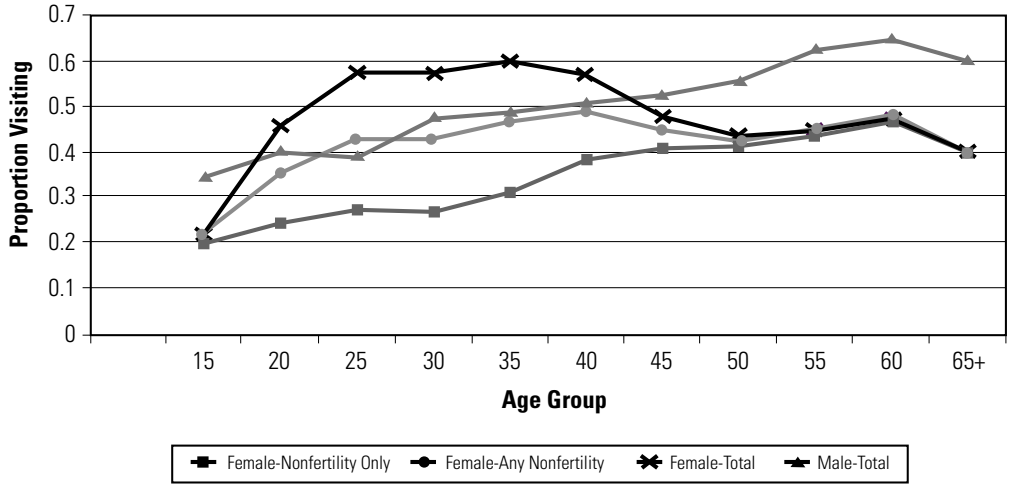
was repeated, adding enabling, need and healthcare systems categories (and their interactions with sex and age) in sequence to produce the full model. For the final model, only those variables with significant main effects or interactions were retained.

Results

Of the 11,151 adult respondents in the MHSS, only 117 (1%) had information missing on any of the variables included in our models. The wealth variable accounted for more than half (64 people) of respondents with missing data. Residual regression analysis showed that omitting those with missing data did not affect the results. Therefore, only the 11,034 adults for whom information on all variables in the models was available are included in the analyses presented here. Table 1 contains weighted descriptive statistics for these respondents.

Healthcare Visits: Nearly half of all men (47%) and women (46%) made at least one healthcare visit in the three months prior to the MHSS, but nearly a third of women who made any visits did so either for fertility only reasons (6.9%) or for both fertility and nonfertility reasons (7.5%). No men visited only for fertility reasons and only 15 (0.2%) had both fertility and nonfertility visits. The distribution of visits by type differs by age as well as by gender. Figure 2 shows that the proportion of males who visited increases with age (bold line). The remaining lines are for women. The bottom line (the proportion visiting for nonfertility reasons only) follows the age pattern for men, but is about 20 percentage points lower. The middle line (the proportion visiting for any nonfertility reason) adds those who visited for both fertility and nonfertility reasons. Through the reproductive years, approximately the same proportion of women as men made visits for nonfertility reasons, but at older ages, substantially fewer women than men made visits. The final and highest line includes all visits for women including those visits that were exclusively fertility-related. It shows that *more* women than men visited a healthcare provider through the reproductive years. These results may reflect the differential need for healthcare that fertility causes as well as the access women have to maternal and child health programs for pregnancy care and for family planning. Because these systems are generally not available to men, we limit further analysis to nonfertility visits, whether or not there was also a fertility-related reason for visiting. In so doing, we reiterate that we cannot tell, for the 7.5% of women who gave both fertility and nonfertility reasons for their visits, whether the nonfertility visit was simply a byproduct of the fertility visit. Therefore, we recognize that differences between reproductive age women and men are likely to be underestimated in our further analyses.

FIGURE 2. **Proportions of Persons Visiting a Healthcare Provider by Age, Sex and Visit Type, MHSS 1996 (Weighted)**



Predisposing Factors: The weighted sample contains 6% more women than men, although there were actually 10% more female than male respondents. The mean age for women (39.3) was slightly younger than for men (41.2). Overall, approximately 24% were aged 50+. The sample is largely Muslim (88%), with little difference between men and women.

Enabling Factors: There is a decided male advantage in education. Just over half of women compared to 35% of men had received no education. There are comparable deficits in secondary

TABLE 1. **Descriptive Demographic Characteristics by Sex and Variable Category, MHSS Data, 1996 (Weighted)**

		Male (%)	Female (%)	Total (%)
Sample Size		5052	5982	11034
Healthcare Visits in Three-months prior to MHSS				
Reasons for visits				
a. Nonfertility only		47.2	31.7	39
b. Both Nonfertility and fertility		0.002	7.5	4
c. Fertility only		0	6.9	3.7
	Any Nonfertility (a+b)	47.3	39.2	43
	Any visit (a+b+c)	47.3	46.1	46.7
Mean Visits per Person Visiting		1.82	1.46	1.65
A: Predisposing Factors				
Sex	Unweighted	45.6	55.4	100
	Weighted	47	53	100
Age Group	15-19	22	18.4	20
	20-24	14.7	11.7	13.1
	25-29	10.5	12	11.3
	30-34	7.6	11.9	9.9
	35-39	7.9	9.7	8.9
	40-44	6.2	7	6.6
	45-49	5.1	6.6	5.9
	50-54	5.9	7.4	6.7
	55-59	5.5	5.4	5.4
	60-64	6.2	4.5	5.3
	65+	8.6	5.5	6.9
	Mean Age	41.25	39.3	40.19
	Range	15-92	15-96	15-96
Religion	Hindu	11.7	12.5	12.1
	Muslim	88.3	87.5	87.9
B: Enabling Factors				
Education	None	35	50.1	43.3
	Primary	19.1	18.9	19
	Secondary	31.4	25.1	28.7
	Higher	14.1	4.5	9
	Mean (years)	3.9	2.4	3.1
	Range	0-18	0-18	0-18
Wealth (per capita)	Low (1st Quartile)	24.6	25.5	25
	Middle (2nd and 3rd Quartiles)	49.8	50.4	49.8
	High (4th Quartile)	25.6	24.1	25.2
	Mean (in Taka)	6347	5810	6066
	Range in Taka	-140550 to 315000		
Marital Status	Currently Married	72.6	73.5	73
	Never Married	25.4	11.7	18
	Previously Married	2	14.8	9
Household Size	1	0.2	1.3	0.8
	2	2.7	2.8	2.7
	3	5.9	6.7	6.3
	4	11.7	13.1	12.5
	5	18.4	18.7	18.6
	6-10	54.9	51.7	53.1
	11-15	5.8	4.7	5.2
	16-20	0.6	1.1	0.8
	Mean Household Size	6.02	5.9	5.95
C: Need Factors				
Impaired Mobility		10.7	25.7	18.6
Poor Health Status		11.7	20.3	16.2
D: Healthcare Systems Factors				
Program Area Residence		57.5	60.7	59.3

and higher education for women. There is little difference between men and women in per capita wealth of the households in which they reside. About the same proportion of men and women are married, but the distribution of the non-married is quite different. Almost all non-married men had never married, whereas more non-married women were previously married (and most of those were widows) rather than single. In Matlab, nearly all widowers remarry, while few widows do so. The average age of non-married men is 23.2 years and of non-married women, 40.5 years. Men and women live in households of nearly the same average size.

TABLE 2. **Logistic Regressions: Healthcare visit for nonfertility reason in three months prior to MHSS in relation to predisposing, enabling and need characteristics: 1996, MHSS**

		Predisposing Models				+Enabling Factors				+Need Factors			
		Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
Predisposing Factors		Coeff.	P-value	Coeff.	P-value	Coeff.	P-value	Coeff.	P-value	Coeff.	P-value	Coeff.	P-value
Age		0.076	0.000	0.045	0.000	0.031	0.003	0.082	0.001	0.098	0.000	0.103	0.000
Age Squared		-0.001	0.000	-0.001	0.005	-0.001	0.166	-0.001	0.018	-0.001	0.000	-0.001	0.000
Religion	Hindu	-0.282	0.000	-1.252	0.001	-1.232	0.001	-1.261	0.001	-1.289	0.001	-1.245	0.001
	Muslim	ref		ref		ref		ref		ref		ref	
Sex	Female	-0.381	0.000	-1.155	0.000	-1.315	0.000	0.507	0.242	1.009	0.000	0.766	0.000
	Male	ref		ref		ref		ref		ref		ref	
Enabling Factors													
Education	None					-0.269	0.000	-0.169	0.615	-0.278	0.000	-0.282	0.000
	Primary					ref		ref		ref		ref	
	Secondary					-0.022	0.704	0.374	0.232	ref		ref	
	High					0.147	0.07	1.107	0.041	0.162	0.031	0.168	0.025
Wealth	Lowest quartile					0.037	0.441	0.115	0.673				
	Middle Two quartiles					ref		ref					
	Highest quartile					0.008	0.876	-0.324	0.267				
Marital Status	Currently Married					ref		ref		ref		ref	
	Never Married					-0.229	0.003	1.067	0.001	0.86	0.001	0.909	0.001
	Previously Married					0.029	0.735	-0.073	0.769	ref		ref	
Household Size						-0.028	0.001	-0.085	0.087	-0.03	0.000	-0.031	0.000
Need Factors													
Health Status	Poor									0.544	0.000	2.42	0.000
	Not Poor									ref		ref	
Mobility	Impaired									0.407	0.000	1.82	0.001
	Not Impaired									ref		ref	
Interactions between Age, Sex and													
Predisposing Factors	Age*Female			0.059	0.000	0.063	0.000	-0.008	0.652	-0.033	0.000	-0.024	0.000
	Age*Hindu			0.05	0.012	0.046	0.021	0.047	0.018	0.05	0.011	0.048	0.015
	Agesq*Female			-0.001	0.000	-0.001	0.000	-0.001	0.285				
	Agesq*Hindu			-0.001	0.042	-0.001	0.058	-0.001	0.054	-0.001	0.03	-0.001	0.037
	Hindu*Female			-0.184	0.146								
Enabling Factors	Age* No Education							-0.01	0.581				
	Age* Secondary Education							-0.025	0.161				
	Age* Higher Education							-0.044	0.141				
	Age* Low Wealth							-0.01	0.48				
	Age* High Wealth							0.012	0.444				
	Age* Post-married							-0.002	0.687				
	Age* Never Married							-0.053	0.014	-0.022	0.021	-0.024	0.021
	Age* Household Size							0.003	0.31				
	Agesq* No Education							0.001	0.439				
	Agesq* Secondary Education							0.001	0.189				
	Agesq* Hindu							0.001	0.375				
	Agesq* Low Wealth							0.001	0.258				
	Agesq* High Wealth							-0.001	0.786				
	Agesq* Post-married							0.001	0.565				
	Agesq* Never Married							0.001	0.1				
	Agesq* Household Size							-0.001	0.347				
	Female* No Education							-0.021	0.85				
	Female* Secondary Education							0.1	0.384				
	Female* High Education							0.088	0.633				
	Female* Low Wealth							-0.039	0.693				
	Female* High Wealth							-0.07	0.502				
	Female* Post-married							0.082	0.742				
	Female* Never Married							-1.014	0.000	-1.09	0.000	-1.026	0.000
	Female* Household Size							0.007	0.697				
Need Factors	Age* Poor Health											-0.062	0.001
	Age* Impaired Mobility											-0.045	0.043
	Agesq* Poor Health											0.001	0.014
	Agesq* Impaired Mobility											0.001	0.114
	Female* Poor Health											-0.325	0.016
	Female* Impaired Mobility											-0.19	0.259
Constant		-1.7	0.000	-1.26	0.000	-0.62	0.008	-1.801	0.001	-2.24	0.000	-2.538	0.000
N=11034													
Log Likelihood		-7318		-7283.2		-7254.2		-7217.9		-7155.1		-7131.1	
Pseudo-R^2		0.0295		0.0341		0.038		0.0428		0.0511		0.0543	
DF		4		9		16		40		15		21	

Coefficients 0.001 and -0.001 are rounded from smaller numbers to that figure for simplicity

Need and Healthcare System Factors: There are striking differences in need. Women are more than twice as likely to be mobility-impaired than men (26 vs. 11%) and more likely to report poor health (20 vs. 12%). Slightly more women than men live in the program area.

The results of the regression analysis are provided in Tables 2 and 3. As described earlier, variables were added in blocks, first as main effects only and then with all interactions with age and sex. Nonsignificant interactions were dropped at each stage. When both the main effect of a variable and all interactions with age and sex were jointly nonsignificant, that variable was dropped from further analysis. Interactions among other predictors were tested; none was significant. Table 2 shows the successive introduction of predisposing, enabling and need characteristics. Table 3 adds healthcare system characteristics and the final model. Wealth and its interactions were jointly nonsignificant in the models in Table 2, so they are not included in Table 3 (although they were re-entered into the final model and remained nonsignificant). Similarly, secondary education did not differ from primary education in its effect, so the two categories were combined. Also, married and previously married statuses did not differ in their effects, so these categories were combined.

The log-likelihood and Pseudo-R2 of the model improve with addition of each set of factors. We recognize that the models displayed are not exactly nested, because factors were dropped at each stage of the process. However, the changes are close approximations to those of nested models. Changes calculated from fully nested models (listed as, for example, Model 2a but not shown) are given below. Starting from the model with predisposing factors only, need factors increase the explanatory power of the model the most. The change in log-likelihood and degrees of freedom for each additional set of factors is as follows:

	Change in log-likelihood	Difference in Degrees of freedom
Predisposing to Enabling (Model 2a to Model 4a)	37	6
Enabling to Need (Model 4a to Model 6a)	130	5
Need to Healthcare Systems (Model 6a to Model 9)	26	2

We limit description of the results to the final model, Model 9, starting with the predisposing factors. As expected, visits increase with age but at a decreasing rate for the reference category, ever-married Muslim males with primary or secondary education, who are in good health and without mobility restriction, and who live in the comparison area. Hindus are less likely to visit than Muslims, but the significant age interactions show that visits increase more steeply with age, but at a higher decreasing rate. For Muslim men in good health, the odds of going for a healthcare visit increase until age 51.5 and then decline, whereas for Hindu men in good health, the odds begin to decline at age 38. Overall, as Figure 2 showed, women are more likely to visit than men during the reproductive years because of fertility-related visits, but the increase with age is much lower (the age/female interaction is significant and negative). As women pass beyond the reproductive ages, they are actually less likely to obtain care, despite what can be perceived as at least equivalent need to males. As age increases, therefore, males have a distinctly better chance of having a healthcare visit than females, despite at least equivalent need.

All enabling factors except household wealth were associated with differences in healthcare. Use of healthcare services increases with education, without any significant difference by sex or age. The odds of visiting for those with no education were 24% lower than for those with primary or secondary education and 16% higher for those with 10+ years of education. Overall, never-married men use health services more than currently married men. The opposite is the case for women – the significant female/never-married interaction term is highly negative, so that never-married women use less than ever-married women. In addition, use by the never-married goes up more slowly with age (the age/never-married coefficient is negative). Odds of use of services decrease 2.6% per additional person in the household.

Differences in use by those in need through overall poor health are also gendered. Men in poor health are far more likely to visit (odds = 12.9), but the increase is sizably smaller for women in poor

TABLE 3. **Logistic Regressions: Healthcare visit for nonfertility reason in three months prior to MHSS in relation to predisposing, enabling, need and healthcare system characteristics: 1996, MHSS**

		+ Healthcare Systems							
		Model 7		Model 8		Model 9			
Predisposing Factors				Full		Reduced			
		Coeff.	P-value	Coeff.	P-value	Coeff.	P-value	Odds	SE
Age		0.099	0.000	0.111	0.000	0.103	0.000	1.109	0.012
Age Squared		-0.001	0.000	-0.001	0.000	-0.001	0.000	0.999	0.0001
Religion	Hindu	-1.323	0.000	-1.432	0.000	-1.357	0.000	0.258	0.381
	Muslim	ref		ref		ref			
Sex	Female	0.857	0.000	0.905	0.000	0.853	0.000	2.346	0.168
	Male	ref		ref		ref			
Enabling Factors									
Education	None	-0.276	0.000	-0.277	0.000	-0.276	0.000	0.759	0.046
	Primary or Secondary	ref		ref		ref			
	High	0.156	0.037	0.148	0.048	0.152	0.042	1.164	0.075
Marital Status	Ever Married	ref		ref		ref			
	Never Married	0.843	0.001	0.811	0.002	0.827	0.002	2.288	0.265
Household Size		-0.027	0.001	-0.027	0.001	-0.027	0.001	0.974	0.008
Need Factors									
Health Status	Poor	2.588	0.000	2.529	0.000	2.557	0.000	12.892	0.397
	Not Poor	ref		ref		ref			
Mobility	Impaired	0.441	0.000	0.439	0.000	0.438	0.000	1.55	0.07
	Not Impaired	ref		ref		ref			
Healthcare Systems Factors									
Residence	Program Area	0.296	0.000	0.855	0.000	0.543	0.000	1.721	0.1
	Comparison Area	ref		ref		ref			
Interactions between Age, Sex and									
Predisposing Factors	Age*Female	-0.028	0.000	-0.028	0.000	-0.028	0.000	0.973	0.004
	Age*Hindu	0.049	0.013	0.054	0.008	0.049	0.013	1.05	0.02
	Agesq*Hindu	-0.001	0.032	-0.001	0.024	-0.001	0.04	0.999	0.0002
Enabling Factors	Age* Never Married	-0.023	0.023	-0.022	0.03	-0.022	0.025	0.978	0.01
	Female* Never Married	-1.047	0.000	-1.045	0.000	-1.046	0.000	0.351	0.131
Need Factors	Age* Poor Health	-0.07	0.000	-0.068	0.000	-0.069	0.000	0.933	0.018
	Agesq* Poor Health	0.001	0.002	0.001	0.003	0.001	0.002	1.001	0.0002
	Female* Poor Health	-0.324	0.012	-0.323	0.012	-0.325	0.012	0.722	0.129
Healthcare Systems Factors	Age* Program Area			-0.022	0.077	-0.007	0.007	0.993	0.002
	Agesq* Program Area			0.001	0.206				
	Female* Program Area			-0.085	0.301				
Constant		-2.458	0.000	-2.75	0.000	-2.588	0.000		
N=11034									
Log Likelihood		-7108.7		-7103.5		-7105			
Pseudo-R^2		0.0573		0.058		0.0578			
DF		19		22		20			

Coefficients 0.001 and -0.001 are rounded from smaller numbers to that figure for simplicity

health (odds = 9.3). The age pattern of use is different for those in poor health compared to those in better health and will be examined further below. The odds of a healthcare visit are 55% higher for those with poor mobility. Interestingly, these odds do not differ either by age or gender.

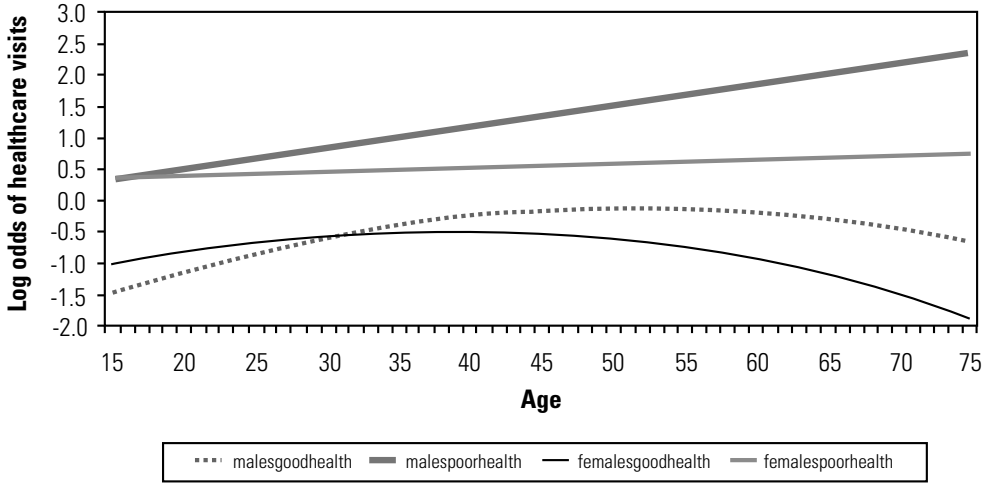
Finally, those in the ICDDR,B program area were more likely to visit a health practitioner and the increase with age was less steep.

To help understand use patterns, we focus on those considered disadvantaged: women, the aged, Hindus, and those whose health is poor, and where interactions make interpretation less straightforward. Figure 3 presents the log odds of a healthcare visit by gender, age and health status, holding all categorical factors at the reference category (Muslim, primary or secondary education, ever-married, mobility not impaired, comparison area residence), and household size at the mean of 6. For those who self-report their health as poor, the top two lines show that log odds of a visit increase with age just about linearly for men, while there is little change for women. For those in good health (bottom two lines), the log odds of use are curvilinear with age, increasing for men to about age 50 and then decreasing. For women, the decline begins much earlier, about age 30. Since higher proportions of people report poor health as they age, weighting these two curves leads to the original use patterns

shown in Figure 2. The figure clearly illustrates the finding above that need characteristics had the greatest explanatory power of the factors introduced in our models.

For ever-married males who self-reported good health, had primary or secondary education, and had unimpaired mobility, we compared predicted log odds of use by Hindus and Muslims in the program and comparison areas. Hindus at every age used services less than Muslims. Use peaked at age 40 for Hindus and 55 for Muslims. At older ages, decline in use by Hindus was greater than for Muslims.

FIGURE 3. **Predicted Log Odds of Healthcare Visit by Age, Sex and Health Status: Muslims with primary or some secondary education, ever-married, mobility not impaired, comparison area residence and household size 6**



The effects of marital status and its interaction with health can be illustrated by a similar analysis of Muslim females with primary or secondary education, unimpaired mobility, and living in the comparison area. Predicted use by never-married females at each age lags behind use by ever-married females. Among the ever-married, use goes up with age if health status is poor, but the reverse is true for never-married females. However, from the mid-20's on, never-married females constitute less than 2% of their age group.

As we have seen, after the reproductive years, women are far less likely than men to have healthcare visits. However, women in the program area do have greater access to fertility-related services. For this reason, we carried out an analysis of women in which having at least one fertility-related visit in the three months prior to the MHSS was the dependent variable. Women in the program area had odds of using fertility services that were 3.2 times higher than for women in the comparison area. Some portion of this use difference appears to be spilling over to the use of nonfertility services, so that provision of fertility services may lead to greater use of general health services. However, further research is needed to demonstrate conclusively whether or not this effect indeed exists.

Summary and Conclusions

The differential use of healthcare services by age and sex has rarely been studied comprehensively outside of the developed world. We present a culturally specific methodology and empirical example that demonstrates the usefulness of the Andersen and Aday behavioural model of healthcare services utilization in one developing country context: the Matlab region of Bangladesh. Predisposing, enabling, need and health systems factors are all related to the use of services. This study clearly

FIGURE 4. **Predicted Log Odds of Healthcare Visit by Age, Religion and Residence: Males with primary or some secondary education, ever-married, not in poor health, mobility not impaired and household size 6**

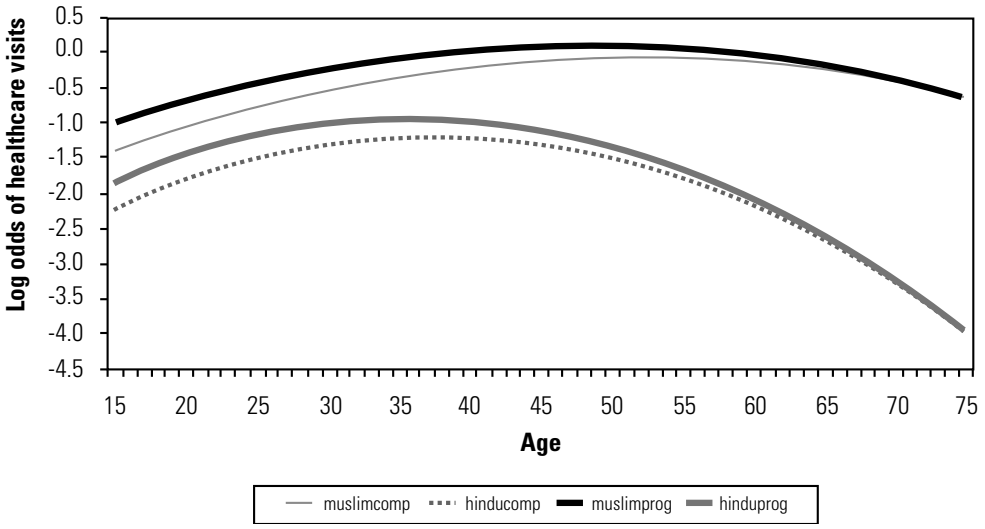
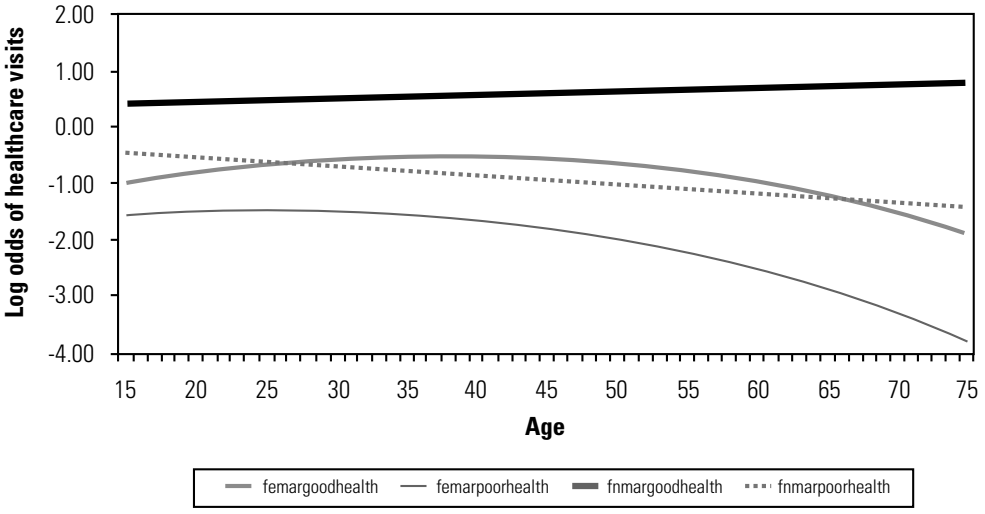


FIGURE 5. **Predicted Log Odds of a Healthcare Visit by Age, Marital Status, and Health Status: Muslim females with primary or some secondary education, mobility not impaired, comparison area residence and household size 6**



shows a deficit for older women in obtaining healthcare. Women are disadvantaged by receiving less care as they age, whether their health is good and especially if it is poor. For people in good health, there is a curvilinear relationship between age and health visits, first increasing, but then declining, so that older relatively healthy people, especially women, receive less care. The reasons for gender differences may be differential valuation of men and women that leads to fewer resources within the family being used for healthcare for those who are less economically active. This proposition is supported by the finding that for men in poor health, visits increase with age, while the gap between men and women in poor health increases markedly. Women also are more likely to be educationally

disadvantaged, thereby increasing the overall gender gap in healthcare. The education gap and the empowerment gap between men and women may affect women in ways that include less participation in decision-making and modesty norms which, though declining, make it more difficult for women to appear in public, even for healthcare visits, and are related to dependence on escorts to access available services.

Matlab has a high level of self-reported poor health – 16.2% in Matlab versus 2.7% in the United States (Rogers et al. 2000). This situation is reflected in high use of services – over 40% used services in Matlab in the three months prior to the survey. Whether these services are effective in maintaining and improving health is not known. What is clear is the need for increased attention to adult health.

That we find use increases with education and decreases with household size is not surprising in this resource-constrained society. Similarly, that the major minority group, Hindus, receives less care is also not surprising.

The policy implications of this study are relatively self-evident. As overall life expectancy is improving in Bangladesh, there is need for greater attention to the heavy adult burden of poor health that disproportionately falls on the disadvantaged – in this case women, especially as they age, and Hindus. It appears that older men can depend on their families for support and attention to their needs. The same support and attention is not being given to elderly women. There is also confirmation that policies and programs are having positive effects. The education programs in which the Bangladesh government and nongovernmental organizations have invested heavily and targeted to girls are increasing overall schooling and decreasing the gender gap. Therefore, more young adults are falling into groups advantaged by their education and better able to seek healthcare. Increasing services, as ICDDR,B has done over the years, has surely increased the rates of use of healthcare. Both men and women who live in the ICDDR,B program area are more likely to have had healthcare visits than those with comparable characteristics who live in the comparison area. It is possible that the current cross-sectional pattern does not offer a good prediction of what will happen to today's young women as they age. Younger women, who through their participation in fertility-related health programs are learning about the availability of healthcare, may, as they age, continue to expect that their health needs will be met and may have established a pattern of use that will persist beyond their reproductive years.

Further research that builds on this study is needed to provide information on which to base new policies. The Western notion that healthcare utilization is a personal right is challenged in this study of a small region of Bangladesh. Obtaining healthcare in Matlab may result from a household decision and may hinge on the economic and social contribution or potential for contribution of the person with healthcare needs. Better measures of each adult's economic contribution to the household are needed for studies of this type, as are better measures of women's status and changes in their status. If healthcare services are to be improved, there is need for better measures of health conditions so that programs can be targeted to the greatest needs. Cohort follow-up is essential to test whether the efforts for a "healthier start," whether through education or healthcare or both, are carrying over to improvements in later life. We are planning a follow-up longitudinal survey that will permit study of changes over time in health and healthcare utilization in relation to the predisposing, enabling, need and health system factors included here.

Finally, it is essential to note the great improvements in Bangladesh in education and other programs, especially for women. It is our hope that these changes – and others targeted to adults, whether female or male – will lead to improvement in health and access to healthcare as those who are advantaged by changing conditions move into older age.

Endnotes

1 According to Whitehead (1992), health inequalities may be biologically or genetically determined, and consequently inevitable. Health inequities, in contrast, result from differences in health outcomes between groups that are avoidable and unnecessary, and hence unjust.

2 The Matlab Health and Socio-economic Survey was a collaborative effort of investigators at RAND, the

International Centre for Diarrhoeal Disease Research, Bangladesh (now ICDDR,B: the International Centre for Health and Population Research), Harvard University, the University of Pennsylvania, Brown University and the University of Colorado at Boulder.

3 Further revisions of the Health Behaviour Model since the mid-1970s added patient satisfaction and outcomes as well as other factors for which we have no data. They are, therefore, omitted from this analysis.

4 The MHSS collected information on social, economic and community factors, and on self-reported health as well as observed physical capabilities. It was designed for comparability to the Indonesian Family Life Surveys (RAND Corporation and the Demographic Institute, 1995-96) and Malaysian Family Life Surveys (Butz 1978; Davanzo 1993). It also has some comparability to surveys of elderly and adult populations of Southeast Asia carried out by the World Health Organization, the Association of Southeast Asian Nations, and the University of Michigan (Rahman et al. 1999: 4-5; Hermalin 1990, 2002), and to the U.S. NHANES and AHEAD surveys (Guralnik et al. 1989).

5 The second-level interactions for all other variables were tested. They were not found to be significant to the model and were omitted from the analysis.

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