

The impact of family members on the self-reported health of older men and women in a rural area of Bangladesh

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ABSTRACT

The purpose of this study is to examine whether the co-residence of spouses and children affects self-reported general health among older men and women in a rural area of Bangladesh. Binary logistic regression has been used to explore the impact of spouses and children on self-reported health, with particular attention to the gender of children and interactions with chronic disease. The data are from the *Matlab Health and Socio-Economic Survey*. A sample of 765 women and 979 men aged 60 or more years with at least one surviving child was available. The principal result is that for an older woman, optimum self-reported health is most likely when a spouse and at least one son and one daughter are present. Any deviation from this family pattern (either no spouse or children of only one sex) leads to a significantly increased risk of poor self-reported health. On the other hand, among older men there were no differences in self-reported health among the various spouse-child combinations. The relationship between a balanced gender distribution of children and optimum self-reported health among older women may explain the levelling out of fertility at roughly three children per woman despite intensive family planning promotion in the area. Further reductions in fertility (an important policy concern) may depend on improving the substitutability of sons and daughters in the support of their elderly mothers.

KEY WORDS – self-assessed health, ageing, gender of kin, co-residence.

Introduction

This paper investigates the impact of the co-residence of spouses and children on the self-reported health of men and women aged 60 or more years in a rural area of Bangladesh. Numerous studies in the economically developed world and a few in the developing world have explored the impact of family members on old age mortality. In contrast, there is relatively

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little information about the relationships between the availability of family members (particularly children) and the morbidity of older people. In the few analyses which have considered the impact of spouses and children on older people's health, the impacts have been explored independently with little regard to what may be important interaction effects between spouses and children, and between different genders of children.

Marital status has been shown to be an important determinant of mortality for older people in numerous studies in the economically developed world, with by and large the currently married having a significant survival advantage (Lillard and Waite 1995; Ross, Morowski and Goldstein 1990; Hu and Goldman 1990; Kaplan *et al.* 1988). Important gender differences have, however, emerged in the relationship between marital status and survival in old age. Once access to resources is controlled for, the lack of a spouse appears to affect health and survival adversely for older men but not for older women (Lillard and Waite 1995; Goldman, Korenman and Weinstein 1995; Ross, Morowski and Goldstein 1990). In recent years, several studies have demonstrated a parallel relationship between marital status and morbidity, whereby currently married older people generally report lower morbidity than their currently non-married counterparts (Glazer and Grundy 1997; Goldman, Korenman and Weinstein 1995; Wyke and Ford 1992). A noteworthy exception to this beneficial influence comes from a recent British study, which found that the impact of marital status on self-reported health and limitations in activities of daily living was insignificant (Arber and Cooper 1999).

Unlike the situation in the developed world, relatively little is known about the impact of kinship ties on morbidity or mortality in the developing world. From a theoretical perspective, one might hypothesise that in developing countries, which lack well-established state or market mechanisms to meet predictable and unanticipated disadvantages (from natural disasters to disability), such as pensions and national insurance schemes, there are few alternatives to family support for older people and kin ties might have a substantial impact on health and survival in old age (Wu and Rudkin 2000; Rahman 1999*a*; Rahman, Menken and Foster 1992; Martin 1990). Moreover in societies where patriarchal/patrilocal kin relationships are the norm and most women have few income earning opportunities and are dependent on primary male relatives for support, as in many parts of rural Bangladesh, the absence of spouses and sons could be much more disadvantageous for the health and survival of older women than for older men (Rahman 1997; Ellickson 1988; Cain 1984, 1986).

A series of well-controlled longitudinal, prospective mortality studies from rural Bangladesh have demonstrated complex relationships between the presence of spouses and sons and elderly survival, and that, by and

large, older men have lowered survival in the absence of a spouse (Rahman 1999 *a*, 1999 *b*, 2000 *a*). These papers have also shown that the situation for older women is less consistent: some studies show a clear-cut survival advantage for older women with spouses, but others show no effect or an effect only for women whose spouses are heads of households. Previous results have also shown that the presence of sons reduces mortality for both elderly women and men but to a greater extent for women.

There have been very few studies of kin ties and morbidity in the developing world, largely because of the absence of data on both available kin and morbidity. Wu and Rudkin (2000) used population-based data on three ethnic groups in Malaysia to examine the relationship between kin support and the self-assessed health of individuals aged 50 and more years. The impacts of marital status on health varied by ethnicity: from no impact at all in the case of Indians, to a consistent impact of children among the Chinese, regardless of the frequency or presence of daily contacts. Among Malays, a substitution effect was found, whereby spouses were associated with improved health only in the absence of daily contacts with children.

A preliminary study in rural Bangladesh, using a subset of the study population examined in this paper, produced mixed findings about the impact of spouses and co-resident sons on self-reported health and limitations in the activities of daily living (Rahman 2000 *b*). For women aged 50 or more years, the non-married were more likely to have poor self-reported general health than their currently married counterparts. For men aged 50 or more years, however, marital status had no impact on self-reported health. With regard to self-reported limitations in the activities of daily living, marital status had no impact for either men or women. Using the same data set, a limited exploration of the impact of children on older people's health examined co-resident sons of women aged 50 years or over: their presence was not found to have any impact on either the mother's self-reported general health or her self-reported limitations in the activities of daily living. No comparable information was available for men, nor were interaction effects between spouses and children of different genders explored.

In this paper, it is recognised that very often spouses and children come together (or are co-present), and that their impact on older people's health needs to be considered jointly. It was also believed that attention to the gender of both children and parents was required, and all possible gender combinations of spouses and children have been considered. The mechanisms by which various spouse-child groupings affect an older relative's health are considered, and in the conclusion the policy implications of the results are discussed.

Design and methods

The setting for this analysis is an area of rural Bangladesh where the population has high levels of poverty (the *per capita* income is US \$370 per year), widespread illiteracy (approximately 50 per cent of those aged 15 or more years are illiterate and there are much higher rates among women, particularly in the older ages), and low levels of access to modern health care providers.¹ Individuals aged 60 or more years, the focus of this analysis, currently constitute approximately seven per cent of the population of Bangladesh, and life expectancy at age 60 years is approximately 20 years with no significant gender difference. The overwhelming majority of older people live with adult children (most often sons if available) and alternative sources of financial and instrumental support are scarce. The predominant male occupations are in agriculture, and labour force participation rates are very high even among older men. Women are by convention largely restricted to activities within the home and have relatively few opportunities to venture outside the homestead. Village exogamy is the norm, and the cultural expectation is for married women to be considered primarily part of their husband's family and to be responsible for taking care of their in-laws (Aziz 1979; Rahman *et al.* 1999; Rahman 1986).

The data for the analysis were drawn from the *Matlab Health and Socio-Economic Survey* (MHSS) of 1996, which used multi-stage sampling to collect detailed health and socio-economic information on approximately 11,200 individuals aged 15 or more years in 4,364 households distributed among 2,687 *baris* or residential compounds. The *bari* is the basic unit of social organisation in rural Bangladesh. Most comprise a cluster of households that in many instances have kin links, although about 16 per cent have a single household. Even in multi-household *baris*, kin connections may link only among a sub-set of the households. The Matlab district is 40 miles south east of Dhaka, the capital city, and is considered representative of rural Bangladesh (Rahman and Liu 2000).

The sample was drawn from a population surveillance system which has been used extensively for demographic analysis and is one of the few high-quality data sources in the developing world. In particular, its age reporting is considered to be more accurate than in other South Asian sources (Menken and Phillips 1990). Multi-stage sampling began by taking a random sample of 2,687 *baris* from the total of 8,640 (Rahman *et al.* 1999). Sampling *baris* rather than households provides a better representation of family networks, a focus of the MHSS survey. Within each *bari*, up to two households were selected, and in each selected household, all individuals aged 50 or more years were interviewed. Standard rules for

interviewing a sample of younger adults in large households were followed. Applying these rules, in *baris* with two or fewer households, all households were chosen, while in *baris* with more than two households, the first household was chosen at random and the second was selected using detailed rules of precedence.²

This analysis focuses on 765 women and 979 men aged 60 or more years who had at least one surviving child. For these respondents, who came from 1,320 *baris*, there was information on age, educational status, household assets, marital status, number of sons and daughters alive and their proximity, the presence and severity of chronic disease, and self-reported general health. Individual observations were weighted to reflect population representation, and standard errors have been adjusted for intra-cluster (*bari*) correlation (Rahman *et al.* 1999). Binary-weighted logistic regression with adjustments for intra-cluster correlation was used to examine the impact of different spouse-child combinations on the self-reported health of older people when controlling for age, number of children, chronic disease, household assets and educational status. Separate models were run for men and women, because the two sexes have distinct social roles and responsibilities with regard to their spouses and children, and because women consistently report worse self-reported health (controlling for limitations in the activities of daily living and observed physical performance measures) (Rahman and Liu 2000).

The operationalisation of the variables

The dependent variable is self-reported health, with the reference category being 'good or average' health. Self-reported health is a nuanced multi-faceted indicator of underlying health status that incorporates multiple dimensions of health, including both physical and mental health. It is more likely to capture the influence of the presence of kin on elderly health than narrower health measures. Self-reported health has been used in several associated studies (Rahman *et al.* 1994; Su and Ferraro 1997; Rahman 2000 *b*; Wu and Rudkin 2000) and found to be a good predictor of mortality (Idler and Benyamini 1997; Mossey and Shapiro 1982). The variable used in this analysis derives from a question in the Survey which asked respondents to rate their health as 'good', 'average' or 'poor'.

The major independent variable of interest was the 'spouse-child combination' of the co-resident household. The literature suggests that older people without spouses and adult sons in rural Bangladesh are likely to be in peril of destitution, particularly older women who are to a large extent dependent on their primary male relatives for financial and other

security and support. The role of daughters in sustaining the welfare of older people in the *baris* is unclear, for they marry out of the village and the cultural norm is for older people to live with their sons. The norm of village exogamy suggests that daughters are not available to care for their elderly parents, and that older people with daughters only are at a disadvantage – for the primary normative responsibility of married women is to care only for their in-laws. From this perspective, one might expect that the best-off elderly people would be those with spouses and sons, and the worst-off to be those without either. Six spouse-child combinations were distinguished: (i) spouse and at least one son and one daughter; (ii) spouse and just sons; (iii) spouse and just daughters; (iv) no spouse and at least one son and one daughter; (v) no spouse and just sons; and (vi) no spouse and just daughters. Note that ‘children’ refers to those aged 15 or more years. The first category had the highest prevalence (among men and women) and was adopted as the ‘reference category’: changes in the risk of poor self-reported health in the other categories are examined by comparison.

Age has been found to be an excellent predictor of morbidity and mortality – both increasing with age. As the likelihood of losing a spouse or a child increases with age, the adverse influence of some of the kin combinations without spouses or children may reflect a higher average age, which therefore needs to be controlled. Furthermore, the influence on the self-reported health of some spouse-child combinations may be age-dependent. If, for example, care-giving needs increase with age (as one might expect), then the absence of certain kin may have a greater adverse effect on older than younger elderly people. In addition to the gender composition of the children, the total number may affect the parent’s health. Older people with more children may have access to more sources of support. In the sample, the number of surviving children ranged from one to 15, and 50 per cent of the parents had five or more children alive. Note that only 20 of the 785 older women and none of the 988 older men had no surviving children. Because this case is so uncommon, the analysis was confined to the 765 women and 979 men who had at least one surviving child.

Major disease with significant dysfunction

The presence of significant chronic disease intuitively is likely adversely to affect self-reported health. The influence of specific spouse-child combinations may lie either in a change in the prevalence of chronic diseases or in the interaction effects, for example, that in the presence of significant chronic disease, older people with favourable spouse-child combinations may report higher self-reported health because the children provide more

or better care and access to medical resources. In this analysis, 'major disease with significant dysfunction' is a dichotomous variable which summarises whether respondents reported significant problems in daily activities in one or more of 13 chronic symptom clusters during the three months before the Survey (the presence of a problem was coded '1').

The variable was constructed in three steps. First, the presence or absence of 13 chronic health conditions was coded (anaemia, arthritis, fractures, cataracts, other eye problems, asthma, other breathing problems, diabetes, urinary problems, tuberculosis, abdominal complaints, oedema, and other conditions unspecified). For each condition, respondents who reported that during the three months before the survey they had experienced symptoms which resulted in a lot of difficulty with day-to-day activities were coded '1'. The second step was to aggregate the scores across the 13 chronic symptom categories, giving an index with a range from '0' to '13'. The third step was to create a dichotomous 'has major disease' variable, by scoring '1' if any of the 13 chronic conditions were reported. The reference category (coded '0') were the respondents who reported no significant problems from any of the 13 chronic conditions. It is important to note that the reference category, 'not having a major disease with significant dysfunction', included respondents who may have experienced chronic disease symptoms in the last three months but did not feel that their day-to-day activities were significantly hampered.

Household assets and level of education

It was expected that those with more wealth would on average have better health. In the framework of the analysis, one mechanism by which favourable spouse-child combinations may improve an older person's health is through access to financial resources that support improved nutrition and health care. Moreover, it was also of interest to see whether an older person's wealth overrode any adverse impact of the absence of a spouse or of a son or daughter. The measure of wealth used in this analysis was a relatively crude household measure that estimated the money value of all assets. The primary household asset in the area is land, both homestead and agricultural. Other assets incorporated in the measure included jewellery, various household goods (furniture, bicycle, radios), and livestock. The monetary values were self-reported by the heads of households. The household asset distribution was highly skewed, with most households having very few assets and a small proportion having substantial assets (median = US \$1,380; mean = US \$3,567). A dichotomous 'low assets' variable was created, with '1' signifying a respondent whose household assets were in the lowest decile of the

distribution (not more than US \$287 in 1996 value). The reference group (coded '0') were those in households with greater assets.³

Individuals with a higher level of education are likely to have more contacts with the health care system, to know about disease processes and the need for appropriate treatment, and thereby to have better health. In the study setting, the relatively well-educated older people may be less disadvantaged by non-optimal spouse-child combinations of accessible relatives. The rural Bangladeshi population has a high level of illiteracy, particularly in the older age groups: in the sample, 86 per cent of women aged 60 and more years had received no formal education compared to 50 per cent of older men. The respondents were categorised as either having 'no' or 'some' formal education, with the latter being the reference category.

Results

Table 1 shows the socio-demographic characteristics of the weighted study sample. Most of the older men (85%) and women (92%) had at least one surviving son and at least one surviving daughter. Overall, the men (92%) were much more likely to be currently married than women (38%). It was quite uncommon for older men and older women to have a child or children of just one sex. The modal spouse-children category of the men was a spouse, at least one son and at least one daughter (85% of men). For women, the modal category was to be widowed and to have at least one son and at least one daughter (52%). It is worth noting that the average number of children ever born was seven, and the mean number of children alive was 5.34. It is not therefore surprising that most older men and women had at least one child of both sexes. The average spousal age difference was about eight years (men being older). Moreover, re-marriage was more likely for males, so the older women were much more likely to be widowed than the men.

Not only were the women younger than the men, they were more likely to be poor (13% *versus* 8% of men were in the lowest asset decile), and much more likely to have received no formal education (87% *versus* 49% of men). Women were also much more likely to report a disease with significant dysfunction (54% *versus* 32% of men), and to report poor self-reported general health (53% *versus* 38%). With regard to the differential impact of the various spouse-child combinations on self-reported health, a statistically significant difference was found for women but not for men ($p > 0.05$). Women with a spouse, at least one son and at least one daughter had the lowest reported prevalence of poor general health (37.6%).

TABLE I. Socio-demographic and health characteristics by gender

Characteristic	Females %	Males %
Spouse-child combinations		
Spouse and 1+ son(s) and 1+ daughter(s)	32.5	84.7*
Spouse and 1+ son(s)	4.0	5.2
Spouse and 1+ daughter(s)	1.1	2.1
No spouse and 1+ son(s) and 1+ daughter(s)	52.1	6.9*
No spouse and 1+ son(s)	6.1	0.3*
No spouse and 1+ daughter(s)	4.2	0.5*
Age in years		
60–69	72.1	67.0*
70–79	20.7	27.2*
80+	7.2	5.8
Major disease with significant dysfunction	54.1	31.8*
In lowest decile of household assets	12.8	7.6*
No formal education	86.8	49.0*
Self-reported poor health		
Spouse and 1+ son(s) and 1+ daughter(s)	37.6	36.4
Spouse and 1+ son(s)	72.6	28.3*
Spouse and 1+ daughter(s)	76.2	44.1
No spouse and 1+ son(s) and 1+ daughter(s)	59.1	50.5
No spouse and 1+ son(s)	52.6	55.3
No spouse and 1+ daughter(s)	69.1	87.1
Total sample	52.9	37.5*
Mean number of children	5.0	5.6*
Sample size	765	979

* Gender differences are significant at $p < 0.05$.

Given the possibility of confounding variables and effect modification through interactions, multi-variate models were estimated of the impact of various spouse-child combinations on the older people’s health controlling for age, number of children, household assets, educational status, and major disease with significant dysfunction. As noted earlier, separate models for men and women were calibrated, because in this traditional patriarchal society the social roles are gender-specific: the impact of the presence of a family member is likely to be quite different for men and women. In addition, because we use self-reported health, the dependent variable may be affected by gender differences in reporting. Table 2 presents the sequential logit models of the impact of various socio-demographic variables on health for women aged 60 or more years. Various spouse-child combinations were explored controlling for number of children and age. The reference category for all the models was an elderly woman with a spouse, at least one son and at least one daughter. Joint

TABLE 2. *The influence of the presence of spouses and children on self-reported health for women and men aged 60 and more years: Model 1*

	Log odds	Standard error	95% C.I.
Women			
Spouse and 1+ son(s)	1.35	0.63	0.12–2.59
Spouse and 1+ daughter(s)	1.63	1.18	–0.70–3.95
No spouse and 1+ son(s) and 1+ daughter(s)	0.67	0.24	0.20–1.13
No spouse and 1+ son(s)	0.25	0.42	–0.58–1.07
No spouse and 1+ daughter(s)	0.97	0.68	–0.37–2.31
Age in years	0.04	0.02	0.01–0.07
Number of children	–0.04	0.05	–0.14–0.06
Men			
Spouse and 1+ son(s)	–0.43	0.44	–1.30–0.44
Spouse and 1+ daughter(s)	0.38	0.54	–0.67–1.44
No spouse and 1+ son(s) and 1+ daughter(s)	0.39	0.33	–0.25–1.04
No spouse and 1+ son(s)	0.40	0.78	–1.12–1.92
No spouse and 1+ daughter(s)	2.24	1.21	–0.13–4.61
Age in years	0.05	0.01	0.02–0.08
Number of children	–0.01	0.05	–0.09–0.10

Notes: The results are of sequential weighted logit models, and have been weighted for the *bari* cluster sizes. The reference spouse-child combination is ‘spouse and 1+ son(s) and 1+ daughter(s)’. Self-reported health was ‘poor’, ‘average’ or ‘good’: for the scoring see text. C.I. – confidence interval. None of the spouse-child combinations have a statistically distinct effect. In the model for women, there were 765 observations, seven parameters, and $-2 \log \text{likelihood} = 1006.14$. In the model for men, there were 979 cases, seven parameters, and $-2 \log \text{likelihood} = 1257.33$.

significance tests indicated that none of the other spouse-child combinations significantly changed self-reported health.

Model 2 is a parsimonious model with a merged spouse-child category which includes all deviations from the reference category (Table 3). It implies that any deviation from the reference category caused an equivalent increase in the likelihood of poor self-reported health: not having a spouse was as deleterious as not having one each of a son and daughter. Model 3 controls for a major disease with significant dysfunction. As expected, this had a substantial impact on self-reported health and modestly attenuated the coefficient of the spouse-child kin grouping, suggesting that the value of having the optimum spouse-child combination lies in the reduced likelihood of having major disease. There remained, however, a significant residual. Model 4 explored whether there was an interaction between disease status and kin group. The results show no such interaction, again suggesting that the value of the optimum kin group was no different for women with and without major disease accompanied by significant dysfunction. Finally Model 5 controls for education and household assets which turned out not to have a significant impact on women’s self-reported health.

Tables 2 and 3 also present the results from an analogous series of models for men aged 60 years and over. The results show no significant

TABLE 3. The influence of the presence of spouses and children on self-reported health for women and men aged 60 and more years: Models 2 to 5

	Model 2		Model 3		Model 4		Model 5	
	Log odds	s.e.	Log odds	s.e.	Log odds	s.e.	Log odds	s.e.
Women								
All other spouse-child combinations	0.71	0.23	0.61	0.24	0.42	0.33	0.56	0.24
Age in years	0.03	0.02	0.04	0.02	0.04	0.02	0.05	0.02
Number of children	-0.05	0.05	-0.04	0.05	-0.04	0.05	-0.02	0.05
Major disease			1.24	0.21	1.00	0.37	1.27	0.21
Household assets							0.32	0.30
No education							0.28	0.35
Major disease by all other spouse-child combinations					0.36	0.45		
-2 log-likelihood	1013.2		948.3		947.1		938.7	
Number of parameters	3		4		5		6	
Sample size	765		765		765		762	
Men								
All other spouse-child combinations	0.18	0.24	0.16	0.25	0.14	0.32	0.17	0.26
Age in years	0.05	0.01	0.04	0.02	0.04	0.02	0.04	0.01
Number of children	0.01	0.05	0.04	0.05	0.04	0.05	0.04	0.05
Major disease			1.33	0.20	1.32	0.22	1.35	0.21
Household assets							0.01	0.39
No education							0.53	0.20
Major disease by all other spouse-child combinations					0.06	0.57		
-2 log-likelihood	1266.1		1182.7		1182.8		1168.7	
Number of parameters	3		4		5		6	
Sample size	979		979		979		979	

Notes: The reference spouse-child combination is 'spouse and 1 + son(s) and 1 + daughter(s)'. s.e. is the standard error. Coefficients and standard errors have been adjusted for clustering on *bari* population weights. None of the spouse-child combinations for either women or men are statistically distinct from each other.

difference among the various spouse-child combinations in terms of their effect on self-reported health. As expected, men who reported major disease with significant dysfunction were more likely to report poor health. Moreover, men with no education were more likely to report poor health than their peers with some education. Various interactions were explored, but none were found significant.

Discussion

The results of this study demonstrate that there are complex interactions between the availability of spouses and children and the self-reported health of men and women aged 60 or more years in rural Bangladesh. As there

were significant gender differences in these relationships, the effects for women and men were examined separately.

Women's health and the presence of a spouse and children

In the analyses we employed a novel approach to the analysis of the impact of kin on health. The universe of possibilities of spouse-child combinations have been examined, reflecting our conviction that important interaction effects exist between spouses and children and also between children of different genders. A typology of spouse-kin combinations was developed with the reference category being an elderly respondent with a spouse, at least one son and at least one daughter. Subsequently joint significance tests indicated that the five other categories (listed earlier) could be collapsed into one representing all possible deviations from the reference category. This result suggests that, with reference to self-reported health, spouses are no more important than the gender diversity of children. For an older woman in this area of rural Bangladesh, the presence of three types of kin is important for their health: (i) a husband; (ii) at least one son; and (iii) at least one daughter. None of these categories can substitute for the other – for maximal or optimal health a woman needs all three. Any absence has a negative impact on self-reported health.

How the presence of a daughter improves the health of an older mother

One of the most interesting findings of these analyses is the importance of daughters for the health of older women. Much of the existing literature has suggested that in patriarchal societal contexts, older women have limited mobility and income-earning opportunities and are dependent on sons for their sustenance (Cain 1984, 1986). The role of daughters in relation to an older woman's health and survival has been unclear, with at least one study showing no impact of daughters on survival (Rahman 1999*b*). This has been explained by reference to the limited earning capacity of daughters, their obligations to their husband's family, and most importantly to the practice of village exogamy whereby daughters generally marry outside the village and are thus unavailable to care for their parents. From this perspective, women with just daughters should have worse health than their peers with just sons. Moreover, women with just sons should be no different from their counterparts with both sons and daughters. The findings suggest, however, that daughters are equally as important as sons for the mother's health, and no less important than spouses.

One possible explanation is that older women need the services of a younger woman to take care of them and that daughters may be perceived as more reliable sources of care than daughters-in-law. There is however

no empirical evidence to support this proposition, and in fact most older women co-reside with a son and daughter-in-law. Thus women without daughters would not be disadvantaged. Furthermore, in contrast to anecdotal beliefs that daughters are not accessible as care-givers, our data show that village exogamy is not as widespread as had been assumed. Among the older women with at least one surviving child in the study sample, approximately 25 per cent had a daughter living in the same household compound. When the presence of a daughter in the household was entered as a control, there was no diminution of the impact of having a spouse and at least one child of each gender on the self-reported health of the older women. Thus the co-residence of daughters did not account for the beneficial impact of the optimal spouse-child combination. This was true even when the interactions between chronic disease and having a daughter living at home were examined.

Caution is required when interpreting the slight influence of the co-residence of daughters on the health of mothers. Because of the well-recognised problems of endogeneity, whereby the co-residence of daughters may influence the health of the mother and the poor health of the mother may promote co-residence, interpretations of these models are difficult. It may be the case that two opposing processes are at work, one that living close to daughters improves one's health, the other that daughters may be more likely to live close to mothers in poor health. The net result may be that no effect is found for the association between proximity of daughters and the improved health of mothers. An attempt was made to identify the differential relocation of daughters on the basis of the mother's health status by controlling for chronic disease of the mother. Another possible explanation for the lack of impact of the co-residence of daughters on the health of married older women is that daughters living outside the household have more frequent contacts with their parents (especially at times of the parent's serious ill health) than had been previously assumed. Yet another possibility is that daughters living far away provided more financial support (not accounted for by household assets) than had been assumed. Analogous variations and causal relationships apply to the co-residence of sons, but no effect of their presence or absence on the self-reported health of the older parents was found.

Financial resources and the health of older mothers with at least one child of each gender

One plausible hypothesis about the survival advantage of married women with at least one child of each gender is that the presence of children increases household financial resources which could be used for improved nutrition, healthier household environments, increased access to health

care services and more care. If the total money value of household assets is used as a measure of household financial resources, the results show that women with the optimal kin combination, namely a husband and at least one child of each gender, were significantly less likely (4%) than other women (17%) to be in the lowest decile of household assets (below US \$287). Nevertheless, in the multivariate models household assets had no significant effect on self-reported health, and moreover there was no change in the effect of the optimal spouse-kin combination on self-reported health when controlled for household assets. Similarly, when the educational status of women was controlled (a proxy for household income), there was no impact on self-reported health, nor attenuation of the spouse coefficient. One might expect that increased financial resources for married women with at least one child of each gender would be particularly useful in the event of chronic disease, but none of these interaction effects were statistically significant.

Thus increased household financial resources as proxied by household assets and or educational status appear not to be the mechanism through which currently married women with at least one child of each gender accrue a survival advantage over their peers with less optimal spouse-child combinations. One needs to be cautious about drawing any definitive conclusions from these results. The measure of household financial resources is quite crude and does not reflect gender differences in individual access to resources. Thus it is quite possible that a finer measure of household and or individual resources would have an impact, but that remains to be determined. For example, measures which reflect short-term household resource variation, such as the value of weekly household consumption, may be more strongly correlated with the presence of sons and elderly health risks (Rahman 1999*a*). This needs further exploration.

In summary, given the lack of significant support in the data for the role of increased financial resources or care-giving, it appears that the beneficial impact of having a husband and at least one child of each gender on the survival of older women in this population may be related to the more nuanced and difficult-to-measure construct of higher social status (Ellickson 1988). High status may lead to decreased social isolation, increased stress buffering, better information networks and healthier habits, any of which may improve health (Umberson 1987; Berkman and Syme 1979; Cassel 1976; Pearlin and Johnson 1977).

Men's health and the presence of a spouse and children

The results show that the presence of a spouse and children had no significant impact on a man's self-reported health. The vast majority of the

men (84.4 %) had the optimal spouse-child combination, which may be why none of the other five categories, all of which had few occurrences, had a statistically significant effect. It may also have been the case that the elderly men had multiple sources of alternative support. Most preserve their financial independence and are less likely to need financial support from their children than older women. We explored the possibility that the presence of spouses and children may be more beneficial for men with major chronic disease but found no statistically significant effect. Men with no education (roughly 50 % of the sample) were more likely to report poor health than their peers with some education. This may be a function of lower levels of health knowledge, less access to material resources or health care, or a higher probability of living in toxic environments.

Conclusions

This analysis has thrown light on the complex gender-specific nature of the interactions between family members and self-reported health for elderly men and women in rural Bangladesh. The limitations of this study include the small sample sizes for many of the spouse-child combinations, the lack of finer measures of individual access to resources, the lack of direct measures of care-giving, and the cross-sectional data. These have precluded temporal sequencing and the ascertainment of several possible cause and effect relationships, as between the proximity of other kin and an older relative's health. Notwithstanding these cautions, the results are intriguing and have important policy implications. They suggest that one way to improve the health of older women in rural Bangladesh would be to increase the availability of spouses, sons and daughters. It is worth noting, therefore, that one contributing factor to early widowhood in Bangladesh is the large spousal age difference of approximately 8–10 years. Increasing women's education would postpone marriage beyond the present average of 15 years and possibly reduce the age difference between spouses.

The association between the presence of a son and a daughter and optimal self-reported health among older women in rural Bangladesh has important implications, given the recent fertility reduction in Bangladesh. After rapid declines during the 1980s, the Total Fertility Rate has levelled out at about 3.3 children per mother. This has been a source of major concern for policy makers. Our results suggest that concerns about old age security and support may pose a barrier to further fertility decline. If the roles of sons and daughters are distinct and non-substitutable, as suggested by this analysis, then mothers are unlikely to settle for two children, for

there will be a 50 per cent chance of having all sons or all daughters. Increasing the total number of children to three means that only 25 per cent of mothers will have children of one gender. If we wish to encourage continued fertility decline to replacement levels, then social changes which equalise the roles and contributions of sons and daughters should be promoted. Another alternative is to promote non-family sources of support (pensions, insurance schemes) which would have the same effect of reducing the dependence on children for old age support.

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NOTES

- 1 For example, there are 4,071 people for every physician, and 17,446 people for every registered nurse.
- 2 The preference order was: (i) the household of the father and/or mother of the head of the first sampled household; (ii) a household containing a son of the head of the first sampled household (chosen at random if there were multiple sons in separate households); (iii) a household containing a brother of the head of the first sampled household (chosen at random if there were multiple brothers in separate households) and (iv) a second randomly-selected household.
- 3 Alternative criteria for the 'assets' measure were tried (an interval measure and other threshold values, such as the lower quartile and median of the distribution): there were no substantial changes in the results.

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