Health Transition Review 7, 1997, 1-12

The effect of spouses on the mortality of older people in rural Bangladesh

M. Omar Rahman

Department of Population and International Health, Harvard School of Public Health, 665 Huntington Avenue, Boston, MA 02115

Abstract

This paper uses prospective data to show that older widowed and divorced individuals in rural Bangladesh have significantly higher mortality than their currently married peers. In contrast to Western societies however, women suffer more from widowhood (in terms of decreased survival) than men. This disparity can plausibly be attributed to the greater poverty associated with widowhood for women than for men. However the effect of adverse selection into widowhood on the basis of poor health for both men and women cannot be ruled out nor can the effects of adverse changes in lifestyle.

Although those aged 45 and above represent a relatively small fraction of the population of South Asia, they constitute a sizeable number and are expected to increase significantly in the next three decades[1] (United Nations 1986). South Asian society however, like many of its Asian neighbours, has paid little attention to this segment of society. Because of the lack of formal social support networks, insurance and pension schemes, in this part of the world, older men and women are largely dependent on spouses for support and those without spouses are considered to be very vulnerable, particularly older women (Cain 1985, 1986). As South Asia plans for its future, it will need a lot more information than is currently available on the importance of spousal support for the welfare of older men and women, and the consequences of lack of such support. This paper uses data from rural Bangladesh to examine the effect of the absence of spouses on the survival of older people, focusing especially on differences in effects between men and women.

A number of studies in Western societies have shown that older widowed and divorced people have significantly higher mortality than their married counterparts with the excess risk being proportionately greater for men than for women (Gove 1973; Helsing and Szklo 1981; Helsing, Szklo and Comstock 1981; Helsing, Comstock and Szklo 1982; Hu and Goldman 1990). Relatively little is known however about mortality differentials by marital status in non-Western societies such as those in South Asia. Unlike the West, where men appear to suffer more than women in terms of mortality risks as a result of marital dissolution, women in South Asia arguably bear the brunt of the negative effects of widowhood and divorce on survival. In these patriarchal, patrilineal and patrilocal societies, social and economic status for a women is tied to marriage perhaps more than in other societies, and loss of a husband through widowhood or divorce may well be catastrophic (Cain 1985, 1986). Thus, one might

[1]Conventionally the cut-off for the aged is around age 60. However given that life expectancy in South Asia is around 55, I have decided to investigate a broader age range starting at age 45.

expect the relative risk of mortality associated with widowhood and divorce to be larger for females than males in such societies.

Hypotheses

In this paper I focus on the mortality experience of older widowed and divorced individuals in rural Bangladesh in order to investigate the following hypotheses:

(1) There are significant differences by sex in the relative mortality risk associated with widowhood and divorce. Specifically widowed and divorced women are likely to have higher mortality compared to their married peers than their male counterparts.

(2) The higher relative mortality of widowed and divorced women can be largely accounted for by greater differentials in economic status between married and non-married women *vis-à-vis* their male counterparts.

Methods

Study population - background

The data for this study come from the Matlab demographic surveillance system (DSS) organized under the aegis of the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B). A detailed description of the surveillance area can be found in Shah and Koenig (1988).

The Matlab surveillance system has maintained a continuous register of all vital events, births, deaths, marriages and migrations, in a population of approximately 190,000 people in 142 villages since the mid-1960s. In addition, censuses were held in 1974 and 1982 to assess a number of different socio-demographic variables including household assets, living arrangements, occupational status and educational level. Currently, a linked data file for the period 1974-1982 is available for analysis. The major advantages of this data set are its prospective, reliable recording of dates of key demographic events, the large sample size and the ability to follow longitudinally all marital status transitions.

Study sample selection

All men and women aged 45 and above who were living in the surveillance area at the time of the census of 1974 (13,508 men and 11,381 women) were included in the analysis. These individuals were then followed for eight years up to 1982 during which period all deaths and all changes in marital status were recorded; person-years were allocated to the relevant marital status category in one-year intervals. All persons were followed until either the end of the study, their date of death or their date of emigration from the study area.

Statistical method

This study uses discrete time hazard logistic regression models with one-year time intervals to analyse event histories of individuals (Menken et al. 1981; Allison 1982, 1984).

Essentially what the discrete time hazard model is doing in the context of this data set is as follows: every discrete unit of time (in this case the unit is one year) for every individual is treated as an independent observation. An individual is followed from 30 April 1974 up to the

point where he or she either withdraws from the study, or dies, or the study ends. He or she thus contributes an integer number (0-8) of person-years of exposure.

During any one-year interval of observation, if a person is lost to follow-up, no person-time is allocated for that interval. If the person dies within the interval, the full interval of person-time is allocated. Thus in this scheme, censoring takes place at the beginning of the interval and deaths at the end of the interval. If an interval is truncated by the end of the study, no person-time and consequently no deaths occurring during that time are counted. In terms of the data set any death occurring between 30 April 1982 and 30 June 1982 is not counted. Explanatory variables, most importantly marital status, are allowed to change only at the end of each one-year interval.

The final step in the estimation procedure is to pool all the observations for each individual and calculate maximum likelihood estimates of the logistic regression model:

$$\log(P/(1-P)) = \text{constant} + B_1*X_1 + B_2*X_2 + B_3*X_3 + ...B_k*X_k$$

In the above model, the exponent of each coefficient [$\exp(B_k)$] is interpreted as the relative risk of dying with and without that characteristic X_k.

Results

Table 1 shows mortality rates and mortality ratios (non-married / married) by marital status and age group for men and women aged 45 and above in the Matlab surveillance area for the period 1974-82. Non-married mortality rates are observed to be higher than married mortality rates for both sexes. However, in contrast to developed countries, the excess mortality risk associated with non-marriage is higher for women than for men at most ages, as shown by the mortality ratios in Table 1.

Similarly an analysis of differences in life expectancy by marital status yields for the most part greater declines associated with widowhood for females than for males[2] (Table 2).

In the study population, the vast majority of men (92.5%) are currently married compared to only 42.1 per cent of the females. More than half of the women (56.4%) are widowed compared to only 5.9 per cent of the men. The proportions divorced and never married are very small (approximately 1% divorced and 0.25% never married) and roughly similar for each sex (Table 3). Widowers are on average older than widows reflecting the large age difference, about eight years, between husband and wife in rural Bangladesh.

Of those men who became widowed at ages 45-49 during the eight-year study period, 40.7 per cent remarried while under observation. On the other hand only 6.1 per cent of men who became widowed at ages 60 and above during the study period remarried while under observation. Overall during the eight year study period only 7.7 per cent of the men in the sample who became widowed remarried while under observation. Because not all men who became widowed during the eight-year study period were followed up for the same time, for example someone who became widowed in the last year of the study would have only one year of follow-up, no definite conclusions can be drawn about the likelihood of remarriage after widowhood for men at different ages. However if we assume that older men were no more likely to become widowed late in the study period than younger men, the above results suggest that remarriage is relatively common for men who become widowed at ages 45-49 and declines fairly sharply for those who become widowed at older ages. In the case of

[2]The life expectancies in Table 2 are conditional on remaining in a particular marital state. Thus the large difference between widowed and married life expectancies at each age for women is somewhat deceptive as it does not incorporate the probability of married women becoming widowed.

women, in our study population negligible numbers of women aged 45 and above who became widowed during the study period ended up remarrying while under observation

Table 1
Mortality rates (deaths per 1000 person-years) and ratios during study period by sex, age and marital status

				Mortality rates			
Marital status				**Age in years**			
	45-54	55-64	65-74	75-84	85+	45+	60+
Males							
Married	16.38	27.71	54.18	92.82	173.04	35.62	55.56
Widowed	24.78	44.36	79.28	133.18	211.76	90.57	107.07
Divorced	39.47	69.93	54.05	127.66	250.00	62.76	90.91
All males	16.70	28.67	56.17	100.01	186.21	38.93	60.70
Females							
Married	7.25	19.01	39.42	51.09	111.11	15.36	33.93
Widowed	12.89	28.54	63.80	128.16	186.21	48.72	70.03
Divorced	23.04	33.51	88.44	52.63	500.00	42.93	66.48
All females	9.33	24.65	59.20	123.21	181.99	34.65	61.83
				Mortality ratios (Divorced or widowed/married)			
Marital status				**Age in years**			
	45-54	55-64	65-74	75-84	85+	45+	60+
Males							
Widowed	(ns) 1.51	1.60	1.46	1.43	1.28	2.54	1.93
95% C.I.	(0.89-2.57)	(1.23-2.08)	(1.22-1.76)	(1.21-1.70)	(1.01-1.63)	(2.31-2.80)	(1.74-2.13)
Divorced	2.41	2.52	(ns) 1.00	(ns) 1.38	(ns) 1.44	1.76	1.64
95% C.I.	(1.25-4.66)	(1.62-3.93)	(0.50-2.00)	(0.61-3.07)	(0.36-5.82)	(1.31-2.36)	(2.13-2.37)
Females							
Widowed	1.78	1.50	1.62	2.851	(ns) 1.68	3.17	2.06
95% C.I.	(1.38-2.29)	(1.28-1.75)	(1.34-1.96)	(1.47-4.26)	(0.75-3.78)	(2.88-3.50)	(1.81-2.35)
Divorced	3.18	1.76	2.24	(ns) 1.03	(ns) 4.5	2.80	1.96
95% C.I.	(1.30-7.78)	(1.00-3.08)	(1.27-3.98)	(0.23-4.53)	(0.54-37.38)	(1.97-3.96)	(1.29-2.97)

Note: ns=not significant at the 5% level

Table 2
Life expectancy, by age, sex and marital status

Exact age (years)	e_x widowed (years)	e_x married (years)	e_x married-widowed (years)
Females			
45	23.61	27.89	4.3
50	19.44	23.93	4.5
55	15.78	19.73	3.9
60	12.27	16.01	3.7
65	9.48	12.91	3.4
70	7.10	9.70	2.6
75	5.18	9.09	3.9
80	4.32	6.73	2.4
85	3.10	3.50	0.4
Males			
45	18.33	23.73	5.4
50	16.45	20.50	4.0
55	13.30	17.13	3.8
60	11.02	14.10	3.1
65	8.75	11.31	2.6
70	6.34	8.90	2.6
75	5.18	6.91	1.7
80	3.90	5.23	1.3
85	2.86	2.76	-0.1

Note e_x = life expectancy at exact age x

Table 3
Proportion of total person-years during study period in each marital state for men and women aged 45+

	Males		**Females**	
Marital state	Person-years	col.%	Person-years	col.%
Married	83,139	92.50	32,560	42.05
Divorced	719	0.80	790	1.02
Widowed	5,321	5.92	43,679	56.41
Never married	180	0.20	194	0.25
Unknown [a]	521	0.58	209	0.27
Total	89,880	100.00	77,432	100.00

[a]No information on the marital history of these individuals was available and their exposure was eliminated from all multivariate analyses

Table 4
Proportion disabled by sex and marital status

	Males			Females		
Marital state	Disabled Person-years	Total Person-years	Row %	Disabled Person-years	Total Person-years	Row %
Married	624	83,139	0.70	403	32,560	1.24
Divorced	36	719	5.02	35	790	4.42
Widowed	584	5,321	10.98	3,005	43,679	6.88
Never married	40	180	22.22	13	194	6.74
Total [a]	1,284	89,359	1.44	3,456	77,223	4.47

[a]These figures do not include the category of unknown marital status =521 person-years or 0.58%

Table 5
Proportion of men and women with selected household assets

Assets (1974)	Married %	Divorced %	Widowed %
Males			
> 1 room	28.48	26.69	28.96
> 1 boat	68.86	66.92	60.00
ò 1 cow	59.28	43.91	50.01
Owns quilt	41.12	39.07	48.31
Owns watch	16.13	9.48	16.75
Owns lamp	70.27	64.22	68.99
Females			
> 1 room	42.63	17.25	22.69
> 1 boat	73.79	32.68	48.15
ò 1 cow	66.67	24.64	41.42
Owns quilt	55.46	26.85	37.83
Owns watch	22.74	07.52	14.49
Owns lamp	76.82	33.20	56.4

Note: The asset data refer to men and women who retained their original marital state as of 1974

Although a larger proportion of all women are classified as disabled (4.5%) compared to all males (1.4%), a larger proportion of widowers are disabled (11%) than widows (6.9%). This is probably to a large extent a function of the higher mean age of widowers than widows (Table 4).[3]

Table 5 presents comparisons of selected household assets for men and women who did not experience any marital transitions during the study period. This avoids the problem of changes in asset structure which may accompany widowhood or divorce, especially for females. As mentioned earlier, information on economic status is only available on a

[3]For the purposes of this study, disabled is an occupational category which refers to gross physical handicaps, such as blindness, paralysis, loss of a limb, which make it impossible for the respondent to work.

household level and is measured at the beginning of the study. Household assets are a crude measure of access to resources for individuals within the household. Clearly this is a better measure for household heads who have more control over allocation of resources than do other family members. As older men are generally household heads, while older women are not, household assets in general are more reflective of the individual economic status of men than of women. Thus men and women who live in households with similar levels of household assets may have widely divergent levels of control over resources. Chen, Huq and D'Souza (1981) using data from the same study population have conclusively demonstrated that older women within the household are allocated a significantly smaller share of nutritional resources than older men.

The data show that compared to men, non-married women live in households with significantly lower levels of assets relative to their married counterparts. Keeping in mind the discussion above, this would imply that widowed and divorced women have substantially less access to resources relative to their married counterparts than do men. Insofar as less access to resources is correlated with deterioration in health status, this pattern is consistent with the higher widowed to married mortality ratios observed for women in our study.

Multivariate analysis

Multivariate analysis (Table 6) helps to clarify some of the questions arising from the bivariate tabulations. Table 6 presents results from a discrete time hazard model analysis of sex differences in mortality differentials by marital status for older men and women. When no control variables are introduced (Model 1, Table 6), relative to the currently married, the excess risk of mortality associated with widowhood is substantially smaller for males than for females (i.e. the widow*male interaction coefficient in Model 1, Table 6 is negative and statistically significant at the 5% level). This suggests that males suffer less mortality disadvantage relative to their married peers while being widowed than do females. On the other hand the increase in the relative odds of mortality associated with divorce appears to be statistically no different for men and women (i.e. the divorce*male interaction coefficient in Model 1, Table 6 is not statistically significant at the 5% level). Introduction of controls for age (Model 2, Table 6) sharply reduces the non-married excess risk, more for the widowed than for the divorced, reflecting the higher mean age of widowed persons compared to divorced and married persons[4].

Introduction of disability status (a measure of gross visible handicaps — Model 3, Table 6) as a control reduces the relative risks for widowed and divorced individuals, suggesting that disability accounts for some proportion of the excess mortality associated with widowhood and divorce, more for widowhood than divorce. Differences in disability account for more of the mortality differential between the widowed or divorced and the married in the case of males than females. This is shown in the increase in the 'widow*male' and 'divorce*male' coefficients in Table 6, reflecting a further widening of the disparity between the male and female mortality ratios.

Table 6
Regression coefficients (standard errors) from discrete hazard models of mortality for males and females aged 45 years and above

Model	1	2	3	4	5

[4]As the mean age of widowers is higher than that of widows and age is positively correlated with mortality risks, introduction of age as a control further widens the disparity between the relative risks (widowed versus married) of males and females.

Variable	B (S.E.)	B (S.E.)	B (S.E.)	B (S.E.)	B (S.E.)	Reference
Intercept	-4.1369*	-10.6629*	-11.0092*	=11.5136*	-11.5530*	
Male	.8321*	.4182*	.4560*	.4459*	.3790*	
	(0.0479)	(0.0493)	(0.0493)	(0.0493)	(0.0495)	Female
Widowed	1.1652*	.5326*	.4790*	.4749*	.2949*	
	(0.0495)	(0.0516)	(0.0513)	(0.0519)	(0.0528)	Married
Divorced	1.0326*	.7092*	.6875*	.6854*	.4079*	
	(0.1808)	(0.1827)	(0.1830)	(0.1831)	(0.1840)	Married
Never married	.6766*	.3238	.1655	.1783	.1312	
	(0.2433)	(0.2502)	(0.2542)	(0.2536)	(0.2500)	Married
Widow - male	-.1669*	-.2032*	-.2526*	-.2433*	-.1016	
	(0.0713)	(0.0728)	(0.0733)	(0.0734)	(0.0739)	
Divorce - male	-.4313	-.0916	-.1338	-.1138	-.0728	
	(0.2382)	(0.2416)	(0.2424)	(0.2425)	(0.2429)	
Age in years		.1444*	.1581*	.1691*	.1819*	
		(0.0119)	(0.0121)	(0.0121)	(0.0121)	
Age squared		-.0005*	-.0007*	-.0007*	-.0008*	
		(0.0001)	(0.0001)	(0.0001)	(0.0001)	
Disabled			.8019*	.7441*	.7714*	
			(0.0470)	(0.0473)	(0.0474)	Able
(1974-75) year of famine				.3606*	.3473*	
				(0.0365)	(0.0366)	(1977-82)
(1975-76) famine year +1				.3531*	.3483*	
				(0.0371)	(0.0372)	(1977-82)
Owns one or more boats					-.0734*	
					(0.0308)	No boat
Owns quilt					-.2310*	
					(0.0317)	No quilt
> 1 room in household					-.0566	
					(0.0313)	One room
≥ one cow in household					-.2428*	
					(0.0303)	No cows
Owns watch					-.1554*	
					(0.0419)	No watch
Owns lamp					-.1627*	
					(0.0313)	No lamp
-Z log Likelihood:	51912.3	48810.5	48549.3	48398.2	47991.2	
parameters	6	8	9	11	17	

Note: * $p < 0.05$

Thus, controlling for age and disability (Model 3, Table 6), non-married mortality risks are higher than married mortality risks and male mortality risks are higher than female mortality risks at each age and for each marital category: male married mortality is higher than female married mortality and male non-married mortality is higher than female non-married mortality. However there is a greater proportionate increase associated with widowhood for females than for males, that is, female widowed/married mortality ratios are

higher than those for males. Although divorced/married mortality ratios are suggestive of female disadvantage they are not statistically significant at the 5 per cent level.

Once controls for baseline economic status are introduced[5] the picture changes substantially (Model 5, Table 6). Sex differences in the mortality risks associated with widowhood or divorce are substantially attenuated and no longer statistically significant. The widowed or divorced are still at higher risk than the married, with male mortality risks being higher for each marital category. However widowed versus married mortality ratios for females are now no longer significantly greater than those for males, implying that economic status accounts for a greater proportion of the differential mortality between the non-married and the married for females than for males.

Despite the fact that divorced individuals of either sex appear to have higher relative risks than the widowed in both sexes (Table 6), joint statistical tests (not shown) indicate that owing to the imprecision of the estimates of relative risks for divorced individuals, it is impossible to reject the hypothesis that there are no differences between the mortality risks of the widowed and the divorced. Controlling for age results in the excess risk of the never-married becoming statistically insignificant. The relatively small number of deaths in the never-married group in the 45+ age category (8 deaths/180 person-years) causes the statistical tests to be low in power, so that only large differences in mortality risks can be detected.

The fact that there are no statistically significant differences in mortality risks between widowed and divorced men in rural Bangladesh is not altogether surprising. Divorce in this population is invariably initiated by men and there is little social stigma attached to the male. There is also little evidence that divorced and widowed men are in substantially different economic situations. Finally although remarriage is somewhat more common for divorced men than their widowed counterparts, this is probably a reflection of the lower age of divorced men than widowed men. Nonetheless, it is still possible that the study's inability to demonstrate mortality differences between widowed and divorced males is due to the small number of divorce-related events in this age group: 45 deaths to divorced men in 717 person-years of exposure to divorce.

In contrast to the situation for males, the lack of observed differentials in mortality risks between divorced and widowed females is more surprising from a conceptual point of view. Divorce in Bangladesh carries a substantial social stigma for women. These women are seen as failures in the eyes of village society, including their immediate kin. Financial settlements are either non-existent or meagre (Cain 1984). They are thus financially and socially worse off than widows and one would expect them to have higher mortality risks. The fact that such differences were not observed may be due to the small number of divorce-related events in this age group: 34 deaths in 792 person-years of exposure to divorce.

Discussion

This study has compared and contrasted the mortality experience of older males in rural Bangladesh with that of their female counterparts in the same population. Comparison with previously existing results from developed countries yields both similarities and differences.

---

[5]There was a major famine in the first year of the study and mortality risks were higher for both males and females in all marital categories in the year of the famine and the year following it (Model 4, Table 11). Mortality ratios for males and females (i.e. widowed/married and divorced/married) did not significantly change with the addition of controls for exposure to famine years. Three-way interactions between sex, famine years and the mortality experience of widowed and divorced individuals were tested for but were not found to be significant. This suggests that the excess mortality risk of widowed and divorced individuals (especially females) *vis-à-vis* their married counterparts did not increase significantly during the famine years.

The results of this analysis show that the non-married have higher mortality risks than their currently married counterparts and males have higher mortality risks than females in all marital states at all ages. A large part of these differentials between the married and non-married can be accounted for by differences in age, disability status and economic status. The relative importance of these modifiers however varies by sex. Economic status seems to account for more of the variation in mortality between the married and the widowed for females than males. This pattern is consistent with the hypothesis that in rural Bangladesh, widowhood is associated with greater poverty for women than men. In this social setting, access to resources for women, unlike men, is largely determined by marital status. This is mainly due to the fact that social constraints bar women from earning their own living. Married women enjoy greater access to resources than their widowed counterparts through the earnings of their husbands. Upon becoming widowed, women in this society are forced to depend upon the earnings of first-degree male relatives, primarily sons. Widowed men on the other hand have no such social constraints against earning their own living and to the extent that they are physically able to work are less dependent on their sons for financial support.

While the above explanation about the increase in poverty associated with becoming widowed is certainly a plausible explanation for the excess risk of mortality associated with widowhood for women relative to men, one cannot completely exclude the effects of selection. Given that we have a heterogeneous group of widowed women, some already widowed before they were first observed, and some who became widowed during the eight-year period of observation; and we have data on household assets at only one point in time, the beginning of the study, and no information on household assets right before the transition to widowhood, it is conceivable that the increased poverty associated with women who are widowed in our study population may be due to a higher likelihood of poor married women becoming widowed than their richer counterparts. This would imply that the state of widowhood *per se* does not necessarily lead to increased poverty and thereby to an increased risk of mortality.

To completely exclude this possibility, it would be necessary to have information on economic status before the transition from being married to being widowed and subsequently for each year of observation until the individual died or was censored.

More generally, because of data constraints (which are shared by most datasets) we cannot exclude the effect of selection into various marital states on the basis of survival potential. It is quite possible that some of the increased mortality associated with being widowed or divorced relative to being currently married is due to adverse selection into widowhood or divorce on the basis of bad health; that is, widowhood or divorce is not random and unhealthy currently married people are more likely to make those transitions than their healthier currently married counterparts. To fully explore this possibility would require information on initial health status before the transition from the currently married state to the widowed or divorced state.

Finally, aside from the economic changes associated with widowhood and divorce and the effect of selection into those states, it is also important to note that changes in lifestyle associated with widowhood or divorce have been shown to have a significant effect on mortality differentials by marital status (Berkman and Syme 1979; Blazer 1982; Shoenenbach et al. 1986; Bowling 1987). The significant residual excess mortality for widowed and divorced individuals that persists in our models despite controlling for health and economic status can perhaps be attributed to our inability to capture the effects of lifestyle changes.

References

Allison, P.D. 1982. Discrete-time methods for the analysis of event histories. Pp. 61-98 in *Sociologic Methodology*, ed. S. Leinhardt. San Francisco: Jossey-Bass.

Allison, P.D. 1984. *Event History Analysis: Regression for Longitudinal Event Data*. Beverly Hills: Sage Publications.

Berkman, L.F. and L.S. Syme. 1979. Social networks, host resistance and mortality. *American Journal of Epidemiology* 109:186-204.

Blazer, D.G. 1982. Social support and mortality in an elderly community population. *American Journal of Epidemiology* 115:684-694.

Bowling, A. 1987. Mortality after bereavement: a review of the literature on survival periods and factors affecting survival. *Social Science and Medicine* 24:117-124.

Cain, M. 1984. Women's status and fertility in developing countries: son preference and economic security. World Bank Staff Working Papers No. 682. Washington DC: World Bank.

Cain, M. 1985. The fate of the elderly in South Asia: implications for fertility. Pp. 279-291 in *International Population Conference, Florence, 1985*. Vol 4. LiŠge: Ordina.

Cain, M. 1986. The consequences of reproductive failure: dependence, mobility, and mortality among the elderly of rural South Asia. *Population Studies* 40:375-388.

Chen, L.C., E. Huq and S. D'Souza. 1981. Sex bias in the family allocation of food and health care in rural Bangladesh. *Population and Development Review* 7:55-70.

Gove, W.R. 1973. Sex, marital status and mortality. *American Journal of Sociology* 79:46-67.

Helsing, K.J., G.W. Comstock and M. Szklo. 1982. Causes of death in a widowed population. *American Journal of Epidemiology* 116:524-532.

Helsing, K.J. and M. Szklo. 1981. Mortality after bereavement. *American Journal of Epidemiology* 114:41-52.

Helsing, K.J., M. Szklo and G.W. Comstock. 1981. Factors associated with mortality after widowhood. *American Journal of Public Health* 71:802-809.

Hu, Y. and N. Goldman. 1990. Mortality differentials by marital status: an international comparison. *Demography* 27:233-250.

Menken, J., J. Trussell, D. Stempel and O. Babakol. 1981. Proportional hazards life table models. *Demography* 18:181-200.

Shah, F. and M. Koenig. 1988. Longitudinal data files for the Matlab Demographic Surveillance System. The 1974-1982 YETI FILE Final Report. Manuscript prepared by ICDDR, B, Dhaka and Johns Hopkins School of Hygiene and Public Health, Baltimore.

Shoenenbach, V.J, B.H. Kaplan, L. Fredman and D.G. Kleinbaum. 1986. Social ties and mortality in Evans County, Georgia. *American Journal of Epidemiology* 123:577-591.

United Nations. 1986. *World Population Prospects: Estimates and Projections as Assessed in 1984*. New York.