Is there a mortality differential by marital status among women in South Africa? A study on a rural sub-district of Mpumalanga Province in the North-East South Africa.

Mercy Shoko[1]
Statistics South Africa
MercySh@statssa.gov.za

Abstract

Using longitudinal data collected between 1999 and 2006 for Agincourt Demographic Surveillance Area (ADSA), the paper examines the effect of marital status and co-residence on mortality of women aged between 20 and 80. The Cox Proportional Hazard Model is used to investigate the relationship between mortality and marital status, woman's country of origin, co-residence, and marital duration for married women. The number of months the husband was resident in the ADSA is used as a proxy for co-residence. Divorced/separated and widowed women had a higher probability of dying compared to those who were married. In addition, being married to a migrant partner increased the woman's probability of dying. Thus the study concludes that marital status and co-residence both affect mortality.

Key words: Marital status, married, previously married, mortality

Resumé

Utilisant des données longitudinales rassemblées entre 1999 et 2006 pour le Domaine d'Etudes Démographiques d'Agincourt, cet article étudie l'effet de l'état matrimonial et de la co-résidence sur le taux de mortalité des femmes âgées entre 20 et 80 ans. Nous avons utilisé le modèle des risques proportionnels de Cox pour examiner la relation entre la mortalité et l'état matrimoniale, la co-résidence, le pays natal de la femme et la durée du mariage pour les femmes mariées. Le nombre de mois que le mari était résident dans le Domaine d'Etudes Démographiques d'Agincourt est utilisé comme variable de la co-résidence. Les femmes divorcées/séparées ou veuves ont une probabilité de mortalité plus élevée que les femmes mariées. En plus, être marié à un partenaire migrant a augmenté la probabilité de mortalité de la femme. Ainsi l'étude conclut que l'état matrimonial et la co-résidence affectent tous les deux la mortalité.

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Introduction

Research on marital status and mortality in Sub-Saharan Africa is particularly important because HIV/AIDS is wreaking havoc on the continent, significantly impacting on the trends of morbidity and mortality. Moreover, women are disproportionately affected by the pandemic; 56% of people living with the disease are women aged 15 and over[1].

Literature review

Marriage as an institution is declining, either due to complete avoidance or due to divorce and reluctance to remarry after marital dissolution[2], or due to the increase in the age at first marriage[3]. Indeed the benefits of marriage have been questioned in recent times. Interestingly, marriage remains the central relationship for adults, with at least 56% of adults in United States of America married and living with their spouse[4]. Marriage may also be distinctive; having a supportive network does not moderate the (negative) effects of being single; spousal relationship may be more influential than other relationships[5].

Research has shown that married individuals have a health and mortality advantage over the unmarried. This has been explained largely in terms of the psychosocial and economic support that is provided by each spouse to the other. Other scholars have argued that marriage has great beneficial effects for health; nonetheless, men derive greater benefits than women and consequently are worst affected by its dissolution [6,7,8,9]. In a study amongst Dutch participants, there was evidence to suggest that the married women experience the lowest morbidity rates, divorced experience the highest and the widowed and never married have rates in between[10]. In a study using Israel longitudinal data there was evidence to suggest that the effect of marriage gets stronger over time[11,12].

Some scholars make a distinction between the individuals who are married and those cohabiting and argue that cohabitation has some but not all the characteristics of marriage and hence does not derive all the benefits from the union like those married[2]. However, research has also shown that there is no difference in health outcomes for cohabitation and marriage such that exiting either union seems to have similar effects, and tends to have a negative effect on health[13].

There is a debate around whether marriage is selective or protective. The selection school of thought argues that healthy individuals are more likely to marry or remarry and less likely to experience marital dissolution than unhealthy individuals, not that marriage makes people healthier[14]. The protection school of thought asserts that married individuals experience less physical and emotional pathology compared with the unmarried because they have continuous companionship with a spouse who provides interpersonal closeness, emotional gratification and support in dealing with daily stress[2]. Married people on average engaged more often in healthy behaviours than those in other marital status groups[13], and therefore exhibit lower risk of dying than those previously marrie[7,2]. In fact, it has been found that there is a heightened mortality rate for survivors in the first year/s of the death of their spouse[6,15]. This might suggest the pro-

tective effects of marriage and the its subsequent erosion following marital dissolution.

If the protective effect of marriage on health holds, then the health disparities should be realized in all the marital categories[16]. However, negative health consequences of marital dissolution attenuate with time; psychological distress increases just prior to divorce, remains elevated for a few years and eventually returns to levels that are similar to those reported by those continually married and this is also true for the continually widowed[16]. In addition; the prevalence of both health-promoting and health-damaging patterns accompanying marital dissolution have been observed[17]. Infact; differences in health appear to reflect the strains of marital dissolution more than they reflect the benefits of marriage[16].

On the other hand; if selectivity assumption explained the marital advantage, then the differences in mortality would vary with cause of death, with the mortality difference greatest among those who die of genetic diseases or at least diseases that predate the marriage, but research has proved that where there was a mortality difference between the married and the unmarried, the cause of death was social and behavioural related[6].

Recent studies have shown that, being married per se is not universally beneficial, rather, the satisfaction and support associated with such a relationship is important[5,15,18]. Both marital status and quality are important risk factors in health consequences, and marriage appears to confer health benefits for women but only when marital satisfaction is high[15]. Reseach has shown that some marriages can cause no benefits but harm to the woman[2].

Recent evidence has also shown that much of the variation in mortality across the marital categories in women can be explained by economic factors[7,19]. The role substitution theory whereby employment and marriage can come to substitute each other in their beneficial effects on health, is suggested[19]. Both marriage protection and selection are only observed among the unemployed women who do not have an alternative source of financial resources and social support, but not among women who are employed[19]. In a study in rural India, results showed that the poor health and subsequent mortality in widows was a consequence of their social and economic marginalization and not purely because of the marital transition[20].

Married couples living together are the most advantaged[2]. Co-residence of partners may therefore be an important mediating factor between marital status and mortality. Migrants are known to be more likely than non-migrants to engage in risky behaviour conducive to HIV infection[21]. Migrants may feel anonymous, free from the social norms that guided their behaviour in their family, community and culture[22]. The direction of infection (HIV/AIDS) is however not unidirectional from the migrant to the non-migrant partner[23] as the non-migrant partner can also engage in risky sexual behaviours[24].

This report seeks to investigate whether married women in South Africa experience lower mortality than the divorced/separated and widowed individuals, as has been reported in other parts of the world. In addition, a

comparison is made of the married women who have varying degrees of co-residence. This is also in light of the decline in co-residence time for married couples due to high levels of circular migration. Our hypothesis are that married women have a mortality advantage over their non-married counterparts, that migration of a partner increases the probability of death for the woman left behind in the area of origin and that there is a difference in mortality between married women who are co-residing with their partners and those whose partners are temporary migrants.

Data and methods

The site of Agincourt is a sub-district of Mpumalanga province in the north-east South Africa, close to the Mozambique border. Agincourt has approximately 70 000 individuals comprising roughly 11 500 households in 21 villages. The population density is about 175 people per square kilometer. The population chosen included all women who had ever been married.

The study uses marriage histories, residence status and mortality data that were collected as part of the Agincourt Health and Demographic Surveillance. The baseline survey was done in 1992 and since then every year there is an update of the data by way of interviewers collecting data on the site. Trained interviewers conduct interviews with households on the site on demographic events of the previous year. Data quality checks include duplicate surveying of a random sample of 2% of households; in addition a number of validation checks are built into fieldwork and the data entry process.

The period of study is limited to 1999 and 2007, a period which saw a rapid increase in all-cause and female mortality. The data on months the individual spent in the ADSA which is one of the key variables of interest, was also collected every year since 1999.

The dependent variable is death and the independent variables are current marital status, co-residence, woman's country of origin, and duration of union. Country of origin was classified into South African and non-South African due to the small number in those who are not of South African origin. Those never married are not included in the study. Because of the small proportion in marriage of order of two or more, marriage order was not tested. Duration of current union is defined by the period; (months or years) that the partner was married. Distinction was also not made between married and cohabiting women because of the relatively small number of those cohabiting.

The report is based on secondary data, and it means that the researcher has no control over the data. This may be a limitation on the variables one might use and analyses to be done. The report also does not provide the causes of death for the women who died because of the many deaths with undertemined cause.

A Kaplan-Meier estimate with 95% Confidence Interval is used to plot the survival and hazard curves for women for descriptive statistics. For multiple regression, the Cox Proportional Hazard Model with bootstrap estimation of standard errors for time varying and fixed covariates, is used to explore whether there is a relationship between

mortality and the covariates: marital status, months the woman's partner is resident in the ADSA, country of origin, and duration of union. Number of months the partner spent in the ADSA is used as a proxy for co-residence and the number of months the individual woman is resident in the DSA is used as a control variable of the exposure time in the DSA in the model.

Right censored cases are individuals during a specific year who did not experience the event of interest or who migrated out of the DSA before 2007. The left censored cases are those individuals who entered the DSA after 1999. Mortality for the women is compared over the eight year period. All statistical analyses are done using STATA 9 package.

Results

Descriptive analysis

There has been a steady increase of the total population of women in Agincourt as evidenced by the total number for each year in table 1. The proportion divorced has also steadily increased over the years from 18% in 1999 to 21% in 2006. On the other hand the proportion widowed has declined significantly from 32% in 1999 to 24% in 2006 - although the absolute number as with married and divorced/separated has increased significantly over the years.

It is also interesting to note that the proportion widowed, though steadily declining, is higher compared to the divorced/separated throughout the study period.

Table 1 Number of women aged 20 and over by marital status 1999-2006.

Year	1999	2000	2001	2002	2003	2004	2005	2006
Marital Status								
Married	4,110	4,559	5,021	5,420	5,731	5,976	6,394	6,620
	50.09	50.46	50.71	50.76	50.68	50.8	51.33	53.03
Divorced/	1,459	1,648	1,867	2,089	2,283	2,420	2,615	2,592
Separated	17.78	18.24	18.85	19.56	20.19	20.57	20.99	20.76
Widowed	2,636	2,827	3,014	3,169	3,295	3,367	3,447	3,271
	32.13	31.29	30.44	29.68	29.14	28.62	27.67	26.2
Total	8,205	9,034	9,902	10,678	11,309	11,763	12,456	12,483
	100	100	100	100	100	100	100	100

The Kaplan-Meier curve (Figure 1) below shows the survival of women ever married in general irrespective of their marital status. The curve starts off at 100% from age 20 and the probability of survival thereafter gradually decreases with increasing age to 75% at age 75. The results are significant as the 95% confidence interval (CI) is small. However the mortality appears

to have been underestimated as we would expect a lower survival rate. Research has shown a significant increase in female mortality[25].

The hazard function curve (Figure 2) shows the probability of dying at each age. The hazard curve shows that the estimated hazard risk occurring in women in Agincourt is generally low at age 20 and gradually increases to 5% a year at approximately age 40. As would be expected, the hazard risk steeply increases from age 70. The CI of the hazard rates increases with age, particularly after age 70. Levels of mortality are too low across the ages when compared to South African standars, but the rise is expected.

The Kaplan-Meier curves (Figure 3) show that the probability of survival is not very different for the unmarried. The married have a significantly better survival prognosis compared to the non-married. It is important to note that there is not a significant difference in the probability of survival until the age of 37 for the married and the widowed, (see also Annexure A).

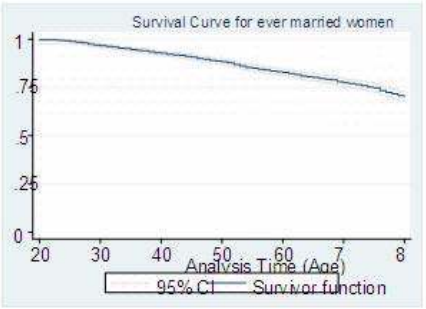

Figure 1 Kaplan Meier-Survival Curve for ever married women

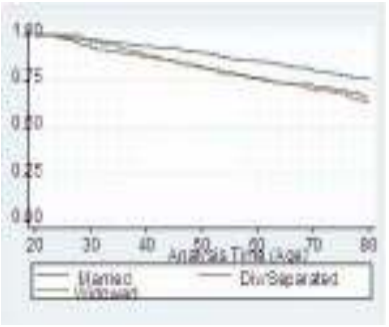

Figure 3 Survival function for the married, divorced/separated and widowed

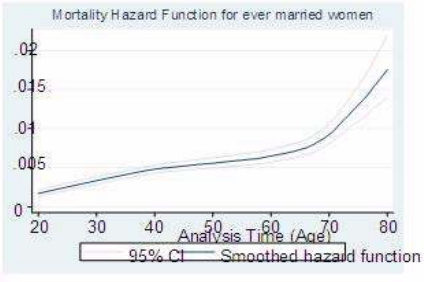

Figure 2 Hazard function for ever married women

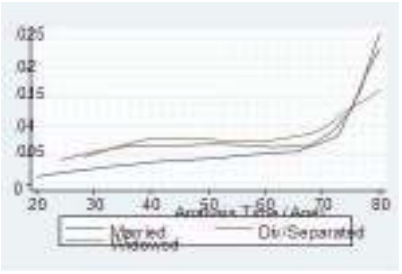

Figure 4 Hazard function for the married, divorced/separated and widowed

Table 2 Results of the cox proportional regression using the bootstrap replications for computation of standard errors

No. of subjects = 14561
No. of failures = 434
Time at risk = 88276
Wald chi2(28) =87.68
Log pseudolikelihood = -3225.2842 Prob> chi2 = 0.0000

Covariates	Hazard Ratio	Standard Error	Z-Value	P-Value	95% CI
Marital Status: Married Women are the reference					
Divorced/ Separated	1.77	0.292	3.47	0.001	1.28 2.45
Widowed	2.03	0.387	3.72	0.000	1.4 2.95
Women resident months in the ADSA (Control Variable): 12 months is the reference					
0 Months	2.99	1.194	2.76	0.006	1.37 6.54
1 Months	1.04	0.259	0.15	0.878	0.64 1.69
2 Months	1.22	0.285	0.86	0.390	0.77 1.93
3 Months	1.25	0.291	0.97	0.334	0.79 1.97
4 Months	1.34	0.511	0.77	0.444	0.64 2.83
5 Months	1.09	9.658	0.01	0.992	3.32 3.61
6 Months	1.95	13.669	0.10	0.924	2.13 179
7 Months	2.89	0.901	3.40	0.001	1.57 5.32
8 Months	0.93	7.581	-0.01	0.993	1.12 7748336
9 Months	3.47	1.255	3.43	0.001	1.71 7.05
10 Months	1.34	0.469	0.84	0.400	0.68 2.66
11 Months	1.62	0.654	1.19	0.236	073106 3.57
Partner resident months in the ADSA : 0 months is the reference					
1 Months	1.77	0.402	2.52	0.012	1.14 2.77
2 Months	1.2	0.266	0.80	0.423	0.77 1.85
3 Months	0.9	0.259	-0.38	0.702	0.51 1.58
4 Months	0.66	2.15	-0.13	0.898	0.00 404.27
5 Months	1.56	13.32	0.05	0.959	-∞8.14 +∞2.98
6 Months	1.01	22.21	0.00	0.999	-∞4.10 +∞2.58
7 Months	1.99	23.076	0.06	0.952	-∞2.84 +∞1.40
8 Months	0.85	17.83	-0.01	0.994	-∞1.22 +∞5.93
9 Months	0.76	16.331	-0.01	0.990	-∞3.91 +∞1.48
10 Months	2.99	1.394	2.34	0.019	1.20 7.45
11 Months	2.15	34.005	0.05	0.962	-∞6.94 +∞6.63
12 Months	1.00	0.2	0.00	0.997	0.68 1.48
Union Duration	0.99	0.008	-0.59	0.558	0.98 1.01
Country of Origin: South Africa is the Reference					
Other	0.99	0.116	-0.06	0.954	0.79 1.25

The hazard function (Figure 4) shows the hazard rate for those who are married is lowest between ages 20 and 68 and is significantly different from that of the divorced/separated and widowed. Interestingly, the hazard rate for those who are widowed is constantly higher than the divorced/separated between mid 30s and mid 70s. This is contrary to previous research that widowed women experience lower mortality compared to the divorced/separated[10].

This phenomenon could be related to HIV/AIDS where the widows' risk of dying may be high if their husbands died from HIV/AIDS-related complications. It is not however surprising that from age 68 the hazard rate for the married and the non-married sharply rises. This is because mortality is generally higher at older ages. After approximately age 75, the differences between the three categories are not significant.

Multivariate analysis

In the multivariate analysis, the duration of residence in months will be controlled by including in the covariates. This is because at the descriptive level, the mortality hazard rates appeared to be too low and so could not take account of the exact period of residence in the DSA of the circular migrant women. However, in the Cox model, the duration of residence will not be interpreted as such. It will only serve as a control variable, so that other covariates can be rightly interpreted, all duration of residence of the woman being equal.

The model, Cox Proportional Hazard Model uses bootstrap replications to produce standard errors. This is to account for the fact that the data are not coming from a sample but from the whole population of the Agincourt subdistrict. The model explains a fair amount of heterogeneity in the population. Looking at each of the independent variables examined, the current marital status and the number of months that the woman and the partner is resident in the DSA are significant and it should also be noted that for the variables which are important predictors of mortality in these women, the hazard ratios are all greater than 1 and this thus shows an increased risk of dying. The woman who has a partner who is resident for only 1 month has 1.77 higher chance of dying (95% CI 1.14-2.77, P= 0.012) and is also almost 2.99 times more likely to die (95% CI 1.20-7.45, P= 0.019) if their partner is in residence for 10 months. Being in residence for a month means that the partner is a temporary migrant who might be coming home during special holidays and vacations and is away from his wife for 11 months. The results show that migration does affect mortality and it does not matter where the partner spent most of the months residing, in the DSA or at another location. Similarly, the partner who is only two months away from his usual place of residence (residence of 10 months) may put the woman at higher risk of dying because the temporary migration increases the chances of infectious disease, like HIV/AIDS, because they might be having additional wives or extramarital affairs.

Current marital status is the most important predicting factor of female mortality. The results concur with studies done elsewhere that women have a higher chance of survival when married. The risk of dying increases by 1.77 when divorced/separated (95% CI

1.28-2.45, P<0.001) and by 2.03 when widowed (95% CI 1.40-2.95, P<0.001) compared to those married (reference group).

The results show that the country of origin is not as significant a predictor of mortality. The marital duration also has no effect. This is contrary to research suggesting that the benefits of marriage attenuate or diminish with duration of union [11,12].

Conclusion

Using longitudinal data from Agincourt Demographic Surveillance Site, it was possible to measure the effect of current marital status, co-residence and mortality by controlling for confounding factors like residence of woman in the study site. There is sufficient evidence to confirm our initial hypotheses: Married women have a mortality advantage over their non-married counterparts;. Migration of a partner increases the probability of dying of woman left behind; and there is a difference in mortality between married women who are co-resident with their partners and those with partners who are temporary migrants. Duration of union and country of origin are however, not important factors in predicting mortality in women. The duration of residence of the partner had an ambigious effect because it was not continous. Further research could be done utilizing exact period of residence.

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Annexure A: comparing probability of survival on different marital status					
Age-group	Total at risk	Died	Survivor Function	Standard Error	95% C I
Married					
20-24	277	1	0.9964	0.0036	0.9747 0.9995
25-29	1546	9	0.9894	0.0043	0.9765 0.9952
30-34	2006	33	0.9719	0.0052	0.9597 0.9805
35-39	2004	37	0.9539	0.0059	0.9409 0.9641
40-44	1710	31	0.9381	0.0064	0.9242 0.9495
45-49	1405	24	0.9236	0.0070	0.9087 0.9362
50-54	1083	24	0.9054	0.0078	0.8890 0.9195
55-59	773	35	0.8704	0.0095	0.8505 0.8878
60-64	552	10	0.8571	0.0102	0.8357 0.8759
65-69	430	11	0.8372	0.0116	0.8129 0.8586
70-74	306	13	0.8060	0.0141	0.7767 0.8319
75-79	198	7	0.7814	0.0165	0.7471 0.8117
Divorced/Separated					
20-24	11	0	1.0000	.	-
25-29	196	3	0.9800	0.0116	0.9385 0.9936
30-34	327	13	0.9337	0.0168	0.8917 0.9598
35-39	519	13	0.9041	0.0182	0.8616 0.9341
40-44	498	13	0.8818	0.0188	0.8392 0.9136
45-49	462	15	0.8557	0.0194	0.8129 0.8894
50-54	411	16	0.8249	0.0202	0.7813 0.8606
55-59	320	12	0.7981	0.0209	0.7533 0.8357
60-64	216	12	0.7608	0.0226	0.7131 0.8017
65-69	176	5	0.7410	0.0237	0.6911 0.7841

70-74	114	3	0.7249	0.0250	0.6725 0.7704
75-79	81	3	0.7029	0.0273	0.6457 0.7526
Widowed					
20-24	0	0	1.000	.	-
25-29	29	0	1.000	.	-
30-34	80	3	0.9584	0.0236	0.8759 0.9865
35-39	180	5	0.9295	0.0263	0.8555 0.9664
40-44	257	10	0.8900	0.0280	0.8205 0.9337
45-49	303	11	0.8566	0.0287	0.7893 0.9038
50-54	350	14	0.8216	0.0290	0.7561 0.8710
55-59	369	14	0.7904	0.0291	0.7264 0.8411
60-64	397	11	0.7680	0.0291	0.7050 0.8193
65-69	495	18	0.7369	0.0288	0.6754 0.7598
70-74	554	21	0.7083	0.0284	0.6486 0.7598
75-79	568	21	0.6834	0.0279	0.6253 0.7345