



Urban/rural variation in the influence of widowhood on mortality risk: A cohort study of almost 300,000 couples



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ABSTRACT

Death of a spouse is associated with increased mortality risk for the surviving partner (the widowhood effect). We investigated whether the effect magnitude varied between urban, rural and intermediate areas, assembling death records (2001–2009) for a prospective cohort of 296,125 married couples in Northern Ireland. The effect was greatest during the first six months of widowhood in all areas and for both sexes. Subsequently, the effect was attenuated among men in rural and intermediate areas but persisted in urban areas (HRs and 95% CIs: rural 1.09 [0.99, 1.21]; urban 1.35 [1.26, 1.44]). Among women the effect was attenuated in all areas (rural 1.06 [0.96, 1.17]; urban 1.09 [1.01, 1.17]). The impacts of spousal bereavement varied between urban and more rural areas, possibly due to variation in social support provided by the wider community. We identify men in urban areas as being in greatest need of such support and a possible target for health interventions.

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1. Introduction

Widowhood is a common major life transition among older people that has been associated with elevated risk of mortality in the surviving spouse (the widowhood effect) across many populations, providing strong evidence that changes in social ties affect health outcomes (Shor et al., 2012; Manzoli et al. 2007). Besides gender differences (men usually experience a greater increase in relative risk than women; Moon et al., 2011) various socio-economic and health related factors moderate the widowhood effect (Boyle et al., 2010; Shor et al., 2012; Pandey and Jha, 2012) and the largest relative increases in mortality risk are found in groups with low pre-existing risks of mortality (e.g. those with good health and high socioeconomic status; Shah et al., 2012; Boyle et al., 2010). Mortality rates associated with a variety of causes are elevated by widowhood indicating that the effect is not limited to a single pathway (Elwert and Christakis, 2008a) and three main explanatory mechanisms have been proposed: emotional stress and grief, loss of emotional social support and loss of instrumental (task related) social support (Martikainen and Valkonen, 1996a).

The widowhood effect is greatest during the first six months of widowhood (Martikainen and Valkonen, 1996a; Boyle et al., 2010;

Moon et al., 2011; Manor and Eisenbach, 2003; Lichtenstein et al., 1998; Lusyne et al., 2001), especially deaths related with accidents, violence, alcohol or unexpected respiratory or circulatory diseases (Martikainen and Valkonen, 1996a; Shah et al., 2012). A proportion of the excess deaths due to cardiac conditions in the early stages of bereavement may result from inadequate condition management immediately prior to bereavement (Shah et al., 2013), indicating that acute stress at this stage contributes to the widowhood effect (Vable et al., 2015). As time since bereavement increases the mortality differential between widows and non-widows tends to decrease for women in the first ten years but may increase subsequently, whereas men are likely to show a sustained or increased mortality differential (Shor et al., 2012; Berntsen and Kravdal, 2012; Martikainen and Valkonen, 1996a). In summary, grief and acute stress appear to play a significant role in elevating mortality risk in the early stages of widowhood, replaced over time by more subtle effects due to withdrawal of spousal support in daily living, both emotional and instrumental (Elwert and Christakis, 2006; Stroebe et al., 2007).

Estimates of the magnitude of the widowhood effect are heterogeneous among studies but there have been few attempts to identify modifiers other than individual socio-economic or health status (Moon et al., 2011), so we investigated the influence of socio-geographic context (urban or rural residence) on the widowhood effect. Urban–rural gradients in risk have been observed for several health outcomes; e.g. all-cause mortality in England (Riva et al., 2011), mental health status across multiple developed countries, and have been attributed variously to stress, pollution,

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over-concentrated housing or social isolation in urban areas (O'Reilly et al., 2007; Peen et al., 2010). However, in some contexts health gradients show the opposite pattern with higher incidence of suicide, more severe injuries from road accidents and delayed cancer diagnosis in rural parts of some countries (Campbell et al., 2001; Levin and Leyland, 2005; Weiss et al., 2014).

Of the factors thought to contribute to urban–rural health gradients, social environment may modify the widowhood effect at different stages of bereavement by two different mechanisms. Acute stress during early bereavement may be buffered by intentionally supportive interactions within an individual's social network (or at least the perception that emotional, informational or instrumental support is available; Thoits, 2011; Holt-Lunstad et al., 2010). As time since bereavement increases the 'main-effects' of social relationships may come to the fore; a set of emotional, behavioural or cognitive processes stemming from social relationships that are not intentionally supportive but often have beneficial influences on health (e.g. societal pressure to fulfil a family role may cause people to adopt a healthy lifestyle to fulfil that role; Thoits, 2011). There is some evidence that social support during widowhood influences health outcomes including mortality risk. A study collating vital event records for over 400,000 elderly couples in the US showed that the race of the partners influences the widowhood effect. Whites in endogamous marriages suffered a large increase in mortality risk but the effect was not evident among blacks, a distinction that may be related to higher levels of familial support for the elderly in black families (Elwert and Christakis, 2006).

We investigated the association between the widowhood effect and urban or rural residence, using a large cohort of married couples assembled from the Northern Ireland Mortality Study. In Northern Ireland older people living in rural areas receive more family support, being more likely to live with their children and hence less likely to be admitted to care homes (McCann et al., 2014). Adjusting for these differences in family living arrangements, there is an additional reduction in risk of admission to care homes among rural dwellers in comparison with urban dwellers, indicating that greater integration within the wider community may reduce demand for formal care services or replace them when supply is limited (McCann et al., 2014). Therefore we predicted that the mortality differential between widows and non-widows would be less pronounced in rural compared with urban areas, especially once the initial period of shock had passed and the availability of longer term instrumental and emotional support had become of greater importance. We investigated these relationships separately for men and women to account for differences in the size of the widowhood effect between sexes (Moon et al., 2011).

2. Methods

2.1. Data sources

The Northern Ireland Mortality Study 2001 (NIMS 2001) is a prospective record-linkage study, derived from the 2001 Census returns for the whole enumerated population (ca. 1.6 m), to which subsequent registered deaths to the end of 2009 have been linked. Details of NIMS 2001 and linkage processes are described elsewhere (O'Reilly et al., 2012, 2008b). These data were anonymised, held in a safe setting by the Northern Ireland Statistics and Research Agency (NISRA) and made available to the research team for this study. The use of the NIMS 2001 for research was approved by the Office for Research Ethics Committees Northern Ireland (ORECNI).

Table 1

Baseline characteristics of married couples in Northern Ireland, 2001, by widowhood (2001–2009) and sex.

	Males	Widowers	Females	Widows
Cohort (no.)	283,685	12,440	270,744	25,381
Deaths	25,447	2,658	12,506	2,962
Person years at risk	2,428,777	44,961.25	2,428,777	101,339.5
Annual mortality risk (%)	1.05	5.91	0.51	2.92
Age – mean (SD)	49.9 (13.7)	66.4 (12.1)	46.9 (12.8)	64.7 (11.3)
Economic activity ^a				
Employed	49.28	17.97	50.63	17.22
Self employed	18.13	8.20	4.63	1.98
Unemployed	2.90	1.75	1.48	0.54
Inactive	24.59	44.05	41.08	60.46
Aged 75+	5.10	28.03	2.19	19.80
Social class (NS-SEC) ^a				
Professional	32.06	19.08	28.81	15.63
Intermediate	6.09	4.24	17.13	11.15
Small employers/self employed	18.44	11.47	4.93	3.59
Lower supervisory (Semi) routine	7.20	6.22	4.53	3.72
Never worked/long term unemployed/full-time student	28.50	28.20	37.60	38.20
Education ^a				
No qualifications	47.02	53.49	40.14	58.61
Foundation level	14.11	4.16	17.86	6.03
GCSEs	10.83	5.05	17.45	8.15
2+ A-Levels	4.94	1.58	6.71	1.94
First degree	11.77	5.21	11.36	4.22
Higher degree	6.24	2.48	4.29	1.25
Car access				
None	6.76	18.22	6.05	19.93
One	43.59	56.06	43.16	54.29
Two+	49.65	25.72	50.79	25.78
Housing tenure				
Owner occupied	87.39	76.67	87.76	78.16
Privately rented	4.02	4.49	3.98	4.73
Social rented	8.59	18.83	8.26	17.11
Long term limiting illness				
Yes	23.73	44.34	21.56	43.34
No	76.27	55.66	78.44	56.66
General health				
Good	64.78	42.67	63.11	39.44
Fair	22.72	36.46	23.99	37.69
Not good	12.50	20.87	12.9	22.88
Unpaid carer				
None	84.93	73.1	79.33	72.41
1–19 h	9.60	7.72	12.63	7.96
20–49 h	1.93	4.08	3.12	4.05
50+ hours	3.54	15.10	4.93	15.57
Dependent children				
None	48.77	87.45	46.82	88.53
One	16.59	6.42	17.11	6.01
Two	20.16	3.73	20.99	3.24
Three+	14.48	2.40	15.08	2.23
Other adults in household				
No	71.73	70.92	71.81	70.52
Yes	28.27	29.08	28.19	29.48
Country of birth				
Northern Ireland	89.96	89.72	89.55	90.01
England	4.45	3.96	3.87	2.90
Scotland	1.24	1.58	1.13	1.11
Wales	0.26	0.27	0.17	0.20
Republic of Ireland	2.38	3.55	3.45	4.63
Ireland (place not specified)	0.16	0.13	0.14	0.12
Other	1.55	0.79	1.69	1.02
Religion (community background)				
Roman Catholic	36.87	32.43	38.61	32.08
Presbyterian	26.66	28.84	25.90	30.07
Church of Ireland	18.46	21.91	18.44	21.66
Methodist	4.53	5.14	4.57	5.44
Other Christian	10.88	9.98	10.41	9.40
Other/none	2.61	1.70	2.07	1.35
Rurality				
Urban	36.4	43.4	36.2	41.7

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