

Relationship between month of birth and month of death in the elderly

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Alderson, M. (1975). *British Journal of Preventive and Social Medicine*, **29**, 151-156. **Relationship between month of birth and month of death in the elderly.** A special analysis of mortality data for England and Wales for 1972 has been used to examine the relationship between month of birth and month of death. For persons 75 and over in eight subgroups (by sex and marital status) there was a consistent trend in deaths with an excess in the birth month and the following three months. This excess was of the order of only 1% of all deaths in the year but statistically significant for each subgroup. The method of analysis was adjusted for the non-synchronous monthly variation in births and deaths, but a systematic error in recording the month of birth could not be excluded.

A wide range of studies on the relationship between stress, morbidity, and mortality are briefly reviewed; it is suggested that in the elderly a birthday may in some subtle way influence the general morale of an individual. Further studies have been planned to test whether 'birthday stress' is a realistic explanation, or if a number of other hypotheses need to be invoked.

Ten years ago when involved in a World Health Organization study of the cause of adult mortality, the author was impressed by the frequency with which elderly adults appeared to have died in the month or two following the month of their birth. Though a number of subtle factors have been associated with variation in morbidity and mortality (see discussion) there appears to be no clearly documented relationship between month of birth and month of death of adults. This study set out to examine this issue, using national mortality data.

METHOD

A special analysis was obtained from the Office of Population Censuses and Surveys of the mortality data for England and Wales for 1972, tabulating month of birth and month of death, for both sexes under four categories of marital status (single, married, widowed, and other). The intention was to examine material for the elderly, and tables were prepared for persons aged 65 to 74, and 75 and over.

The number of births varies from month to month throughout the year, but in any given year

there are more deaths in the winter months. To remove the effect of season on numbers of births and numbers of deaths, the counts of deaths were aggregated for each of the 12 tabulated months of birth by month of death centred around birth month. This provided a distribution of deaths occurring from the fifth month before the birth month up to the sixth month after the birth month. It was then possible to examine the distribution of observed deaths and the variation between the observed and expected number of deaths month by month.

RESULTS

There were 261 226 deaths of persons aged 75 and over; but the month of birth was not known for 6162 (2.3%) of them, so these were excluded from the analysis. Table I presents the difference between the observed and expected number of deaths in relation to the month of birth for men and women aged 75 and over, according to marital status. It can be seen that there is a deficiency of observed deaths in the months preceding the birth month,

TABLE I

DIFFERENCE BETWEEN OBSERVED AND EXPECTED NUMBER OF DEATHS IN RELATION TO MONTH OF BIRTH, FOR MEN AND WOMEN AGED 75 AND OVER BY MARITAL STATUS, ENGLAND AND WALES, 1972

Death Month	Men				Women			
	Single	Married	Widowed	Other	Single	Married	Widowed	Other
-5	-25	-105	7	-19	-25	-13	26	-19
-4	-7	-38	-153	-12	-54	-74	-91	-20
-3	-43	-85	5	0	-72	-96	-65	-14
-2	-27	-212	-133	3	39	-75	-231	-15
-1	32	-170	42	1	17	-91	-58	9
Birth month	2	98	-10	11	19	53	148	-1
+1	64	221	120	28	97	166	170	7
+2	6	235	100	11	55	98	51	2
+3	-5	183	127	-11	-37	-2	43	21
+4	2	9	-7	5	7	20	18	11
+5	3	-119	-86	-6	13	-2	28	21
+6	-7	-18	-14	-8	-34	16	-46	3
Average number of deaths/ month	499	4132	3665	108	1971	1740	9553	101
P*	<0.05	<0.001	<0.005	<0.01	<0.05	<0.001	<0.005	<0.001

*Derived from Edwards' (1961) test for cyclic trend

and an excess of deaths in the birth month and the following few months. An additional line in the table shows the average number of deaths per month. The same data are shown graphically in Figures 1 and 2.

Each of the eight sets of data (four marital status subgroups for either sex) shows a cyclical trend with a deficiency of observed deaths leading up to the birth month and an excess during the few months after. A statistical test for the examination of cyclical trend has been applied to the observed data month by month (Edwards, 1961/1962); this shows a significant variation from random distribution for each of the eight subsets of the data.

The excess number of deaths in the birth month and the three succeeding months have been added together and compared with the total number of deaths in the year for each of the eight subsets of the material. These data are shown in Table II. This shows that the overall excess is about 1% of all deaths; it is higher for men than for women, and higher in those with 'other' marital status and lowest among the widows.

The results have also been examined for deaths of persons aged 65 to 74 and the younger age groups, but the results are in sharp contrast to the consistent

TABLE II
EXCESS DEATHS IN BIRTH MONTH AND THREE SUCCEEDING MONTHS FOR MEN AND WOMEN AGED 75 AND OVER, BY MARITAL STATUS, ENGLAND AND WALES, 1972

Sex	Marital Status	Excess Deaths	Deaths in the Year	Excess as Percentage of All deaths
Male	Single	67	5993	1.1
	Married	737	49579	1.5
	Widowed	337	43981	0.8
	Other	39	1299	3.0
	All	1180	100852	1.2
Female	Single	134	23650	0.6
	Married	315	20876	1.5
	Widowed	412	114631	0.4
	Other	29	1217	2.4
	All	890	160374	0.6
Total		2070	261226	0.8

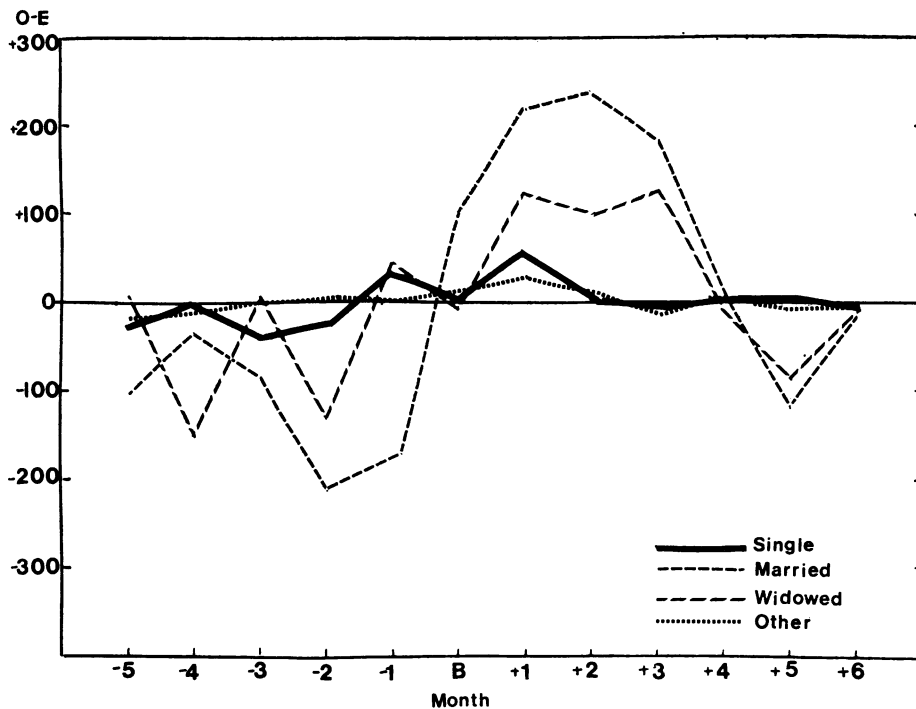


FIG. 1. Variation in observed minus expected deaths for men over 74, by months in relation to birth month and marital status, England and Wales 1972.

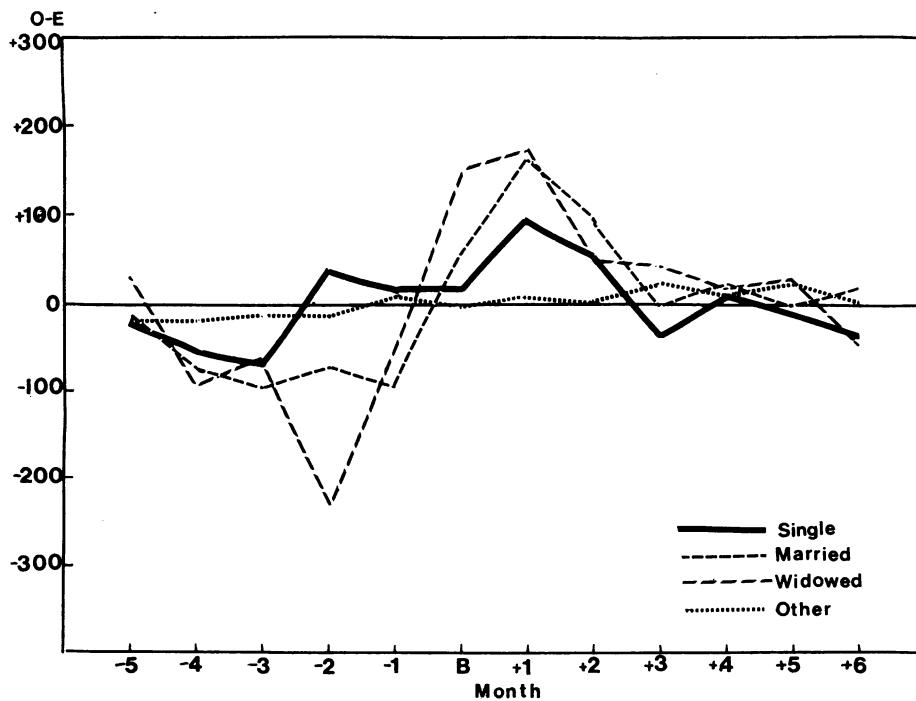


FIG. 2. Variation in observed minus expected deaths for women over 74, by months in relation to birth month and marital status, England and Wales 1972.

picture presented here. There is no suggestion of an excess of deaths following the month of birth at younger ages; analysis showed nothing other than random fluctuation.*

DISCUSSION

An examination of national morbidity data to check whether there was an association between the month of birth and the month of death among the elderly shows a consistent picture for eight subgroups for those aged 75 who died in England or Wales during 1972. Though the variation between observed and expected deaths in the subgroups examined is only about 1% of the average monthly number of deaths, the trend in each of the sets is consistent and statistically significant when tested for cyclic trend. This suggests that the finding is not therefore a statistical quirk. The method of analysis was adjusted for the non-synchronous monthly variation in births and deaths, but a systematic error in recording the month of birth could not be excluded in these data; a further study of this is in progress.

A number of authors (Young, Benjamin, and Wallis, 1963; Rees and Lutkins, 1967; Parkes, Benjamin, and Fitzgerald, 1969) have shown that there is increased mortality among widowers; these studies showed that mortality was particularly high in the six months following bereavement. The Registrar General (1971) has produced tables showing mortality rates by cause, age, and marital status indicating those high in the widowed. Other studies (Stein and Susser, 1969; Parkes, 1964) suggested that bereavement may be a causative factor in the development of mental illness. MacMahon and Pugh (1965) studied a sample of widows who had committed suicide and a matched widowed sample who had died from other causes. Compared with deaths from other causes, deaths from suicide were clustered in the first four years of widowhood, particularly the first year. In a study of a small number of people who were bereaved due to suicide, Shepherd and Barraclough (1974) found no significant difference in mortality compared with those widowed from other causes. Bunch and Barraclough (1971) showed that more than the expected number of suicides killed themselves at a time near to the anniversary of a parent's death. There is a statistical excess of admissions to psychiatric hospital among persons the same age as that at which their parents died, or when their children reach the age the patient was when their parent died (Hilgard, Newman, and Fisk, 1960; Hilgard and Newman, 1961).

Bartlett (1932) has shown that there is a tendency to exaggerate the significance of events as a means of trying to come to terms with illness (effort after meaning). Brown and Birley (1970), using a standardized technique for questioning patients with mental illness, suggested that both schizophrenic patients and those with depressive illness report a significant excess of exposure to stress in the period preceding development of illness. They describe (Brown, Harris, and Peto, 1973) a statistical technique for differentiating those effects that precipitate an illness and those which have a formative effect, and suggest that certain life events have a formative effect in depressives and a triggering effect on schizophrenic disorders. Beck and Worthen (1972) also showed a precipitative effect of certain life crises on depressive illness, but not for schizophrenia; Chester (1971) showed that a sample of women petitioners for divorce experienced deterioration of health with symptoms presumptively related to stress. An excess incidence of mental illness is known to follow parturition (Paffenbarger, 1964) and hysterectomy (Barker 1968; Richards, 1973).

For many years it has been suggested that 'stress' can be related to a range of physical disorders. Davies and Wilson (1937) found that patients with peptic ulcers had a significant excess of preceding stressful events compared with a control sample of hernia patients; a statistically significant rise was reported in the number of perforations in the London area about the time of the blitz (Spicer, Stewart, and Winser, 1944). Rosenman *et al.*, (1970) developed a technique for measuring an individual's reaction to stress; in a follow-up study they observed a significantly increased rate of coronary heart disease associated with a behaviour pattern that was independent of other risk factors. A number of other studies (Wardwell and Bahnson, 1973; Perlman *et al.*, 1971; Eastwood and Trevelyan, 1971; Rahe *et al.*, 1974) indicate that there is a link between reaction to stress and heart disease. Burns and Howell (1969) found that chronic bronchitis with disproportionate breathlessness reported exposure to psychogenic stress more frequently than control bronchitis. Kasl and Cobb (1969) suggested that there is a relationship between the development of arthritis and indicators of stress in the social setting of the patient, his marriage, or his parents' marriage. It was reported (Jones, MacDonald, and Breslow, 1958) that patients with carcinoma of the cervix had been more consistently exposed to stressful conditions than had control subjects; a further case-control study (Graham *et al.*, 1971) failed to detect any difference between cases and controls for a range of measures of social trauma.

*The tabulated results may be obtained on request from the author.

Other studies indicate a relationship between stress and the onset of acute closed-angle glaucoma (Cohen and Hajioff, 1972) and the incidence of streptococcal throats (Meyer and Haggerty, 1962).

Traditional folk lore ascribes sudden death to emotional shock; Engel (1971) described 170 examples collected over a six-year period, where a precipitating life situation had been followed by sudden death. It was stressed (Elkinton, 1971) that such a report was not a scientific demonstration of cause and effect but a clearly labelled hypothesis that requires testing for specific answers. Sargant (1973) has reviewed the relationship between battle stress and forms of possession; he and also Milton (1973) discuss death from fear and self-willed death.

There does not appear to be a clearly documented study which indicates that the month of birth could be included as a 'stress' factor. It is conceivable that to an elderly person a birthday acts as a reminder that he is growing older, and in some subtle way this may influence the general morale of the individual. The effect that has been observed in this study is only a minor one, being associated with about 1% excess of deaths in the four months following the birth month. The data are, however, another pointer to the subtle range of factors that influence morbidity and mortality. Analysis of material such as this obviously has no direct application but adds a little to the understanding of the influence of stress.

A relatively simple analysis of national material was planned merely to check the hypothesis that there was an association between month of birth and month of death in the elderly. This appears to be so from the data presented here, but a more detailed analysis of national material is required. In particular, checks must be carried out to exclude a systematic error in recording the month of birth. It would be useful to see whether there was a marked excess of certain causes of death; it would also be worth examining the data to see whether the passing of certain milestones is particularly associated with a peak in deaths (is the passage of threescore and ten or fourscore years associated with a greater peak than achieving the age of 77?). Such an exploration of national statistics can throw only limited light on the underlying mechanism that may be responsible for this observation. A case-control study would be required to elicit pointers to the variation in morale and other psychosocial parameters, triggered off by the passage of a birthday in the elderly. One of the difficulties in such a study would be the numbers of subjects required in order to identify a tenuous effect.

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