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The warm summer of 2018 – increased mortality among older people?

KORT RAPPORT

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BACKGROUND

Heatwaves in Europe and the USA have been shown to cause excess mortality among older persons. The summer of 2018 was unusually hot in south-eastern Norway. The purpose of this study was to investigate whether more older persons died that summer compared with the average for the previous ten summers.

MATERIAL AND METHOD

Temperature data from the Norwegian Meteorological Institute and mortality data for the summer of 2018 (June, July and August), divided into age groups and counties, were compared to the previous ten summers.

RESULTS

For Norway as a whole, there was no increase in mortality among persons more than 75 years and 85 years of age in summer 2018. None of the counties in south-eastern Norway stood out as having elevated mortality for persons more than 75 years of age, apart from Vest-Agder county. Three counties, among them Aust-Agder, had somewhat lower mortality than expected.

INTERPRETATION

We are unable to show any increase in mortality among older persons in summer 2018 compared with the average for the period 2008–17. Due to climate change and prognoses of more frequent heatwaves, mortality should nevertheless be monitored and public warning systems considered.

The global climate changes we are witnessing entail consequences for our health. Heat-related morbidity and death are some of these consequences (1). The association between health condition and climate impact is complex and involves medical, social and environmental factors (2). Death can be directly caused by high temperatures (heat stroke) or indirectly by causes related to the effects of heat on chronic conditions such as diabetes, cardiovascular diseases, respiratory diseases and frailty in older persons (3). There is evidence of excess mortality among older people during heat waves in Europe (4, 5). A study from Finland that investigated the relationship between average daily temperature and mortality in the Nordic countries found that mortality rose during both very low and very high temperatures (6). In Sweden, both total mortality and mortality from cardiovascular diseases have been shown to increase during heatwaves (7).

The summer of 2018 was unusually warm in South-Eastern Norway, with extended periods of warm weather and record temperatures in many places. Prognoses for climate change indicate that we can expect larger climate variations, with warm summers becoming warmer (8). It is crucial to investigate whether older people in Norway constitute a vulnerable group during heatwaves. Heat-related illness, injury and death are preventable, for example through improved social conditions for vulnerable groups and 'heat alerts' with advice to the population (9, 10).

In this study, we investigated whether there were more deaths among older people during the summer months (June, July and August) in 2018 when compared to the ten preceding years.

Material and methods

This is a descriptive epidemiological study in which we have examined temperature data and mortality data for the summer months of June, July and August over the years 2008–18. The Norwegian Meteorological Institute has provided temperature data from central weather stations in each county. Data on mortality were retrieved from the National

Registry and grouped by age: under 75 years, 75–84 years and over 84 years. We have chosen to analyse the data by county, but we have also grouped the data by the four health regions.

We used a Poisson regression to model the trend in mortality over the summer months. We included a dummy variable for the summer of 2018 that captured the mortality in this period specifically, and the coefficient for this dummy variable indicated whether mortality in the summer of 2018 differed from that of the other years.

The population figures for the counties were added to the model as a logarithmic offset. The model can be expressed as follows:

$$log(N) = a + b \cdot t + c \cdot summer2018 + log(population\ size)$$

N is the number of deaths during the summer months of June, July and August, where a is the mortality for the initial year of 2008, t is the year (2008–18) with the coefficient b, and coefficient c indicates the divergence for the summer of 2018. The relative risk of death (RR) is found by taking the exponent of c, RR = exp(c). For temperature, we used linear regression with a similar dummy structure, in which c indicates the difference in absolute temperature for the summer of 2018 when compared to the preceding summers.

Results

At the nationwide level, the summer of 2018 was 1.5 °C warmer than the preceding summers. All the counties of South-Eastern Norway had elevated temperatures in the summer of 2018, while the other counties did not differ significantly from the preceding years in this respect. Buskerud county had the greatest divergence from normal temperatures, with 2.7 °C above average in the summer of 2018 (Figure 1).

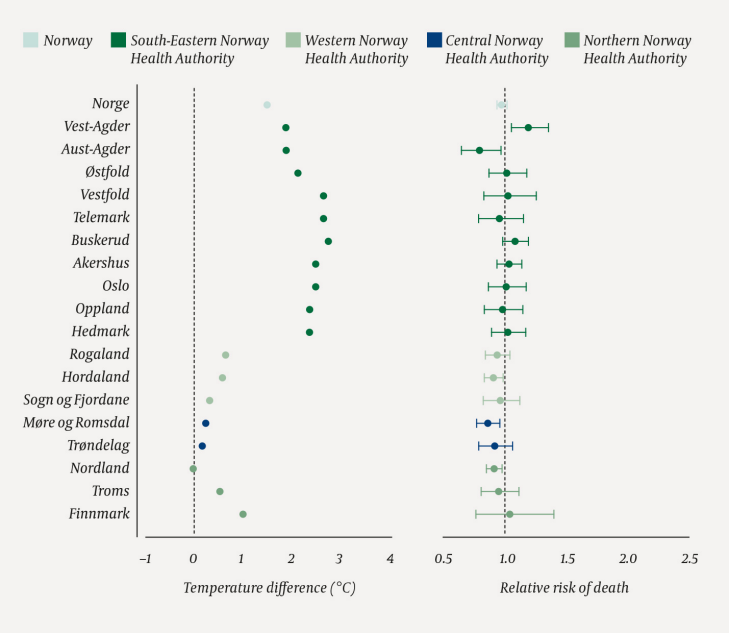

Figure 1 *Average temperature by county, grouped into four health regions, for June, July and August 2018 compared to 2008–17. Mortality among older people (over 75 years) in June, July and August 2018 relative to the period 2008–2018 in Norway as a whole, the counties and health regions. Modelled using Poisson regression.*

During the summer of 2018, altogether 9 385 deaths occurred in Norway, whereof 68 % were in the age group above 75 years. The corresponding figures for 2008 were 9 904 and 69 %.

In Norway as a whole, there was no excess mortality in the age group above 75 years in the summer of 2018. In this age group, none of the counties in South-Eastern Norway stood out in terms of increased mortality, with the exception of Vest-Agder, where mortality was 23 % higher than expected (RR = 1.23; 95 % CI 1.13–1.34). Aust-Agder, on the other hand, had a lower mortality than expected. No counties in the other health regions had increased mortality, while Møre og Romsdal and Nordland had decreased mortality (Table 1 and Figure 1). Nor

could we find any increased mortality among persons over 85 years (data not shown).

Table 1

Mortality in older people (over 75 years) in the summer months (June, July and August) in 2018 compared to 2008–17

County	Average number of deaths 2008–17	Number of deaths 2018
Norway	6550	6388
Vest-Agder	225	269
Aust-Agder	150	128
Østfold	409	400
Vestfold	335	355
Telemark	273	251
Buskerud	356	373
Akershus	583	626
Oslo	646	585
Oppland	330	307
Hedmark	355	369
Rogaland	462	452
Hordaland	622	573
Sogn og Fjordane	170	176
Møre og Romsdal	386	350
Trøndelag	583	545
Nordland	376	330
Troms	197	200
Finnmark	94	99

Discussion

The summer of 2018 was unusually warm in South-Eastern Norway (8), but we found no excess mortality among older people (over 75 years) in this period when compared to the preceding ten years. This contrasts with studies from Sweden and Finland, as well as from countries in Central and Southern Europe, which have shown excess mortality among older people related to heatwaves (4–7). There may be a number of reasons for this. First, there are relatively few deaths and thereby large confidence intervals, and the temperatures have not been as high as in heatwaves further south in Europe. We have not checked for excess mortality in smaller geographical areas or over shorter periods, caused by many consecutive days with a high mean temperature. Vest-Agder county stands out in terms of a higher number of deaths among persons older than 75 years. Most likely, this is a random finding, supported by the fact that three counties, including neighbouring Aust-Agder, had fewer deaths. We have not studied deaths in smaller population groups, for example older people living in city centres or in areas with poor living conditions. However, a study from Sweden points to little effect of socioeconomic factors (7).

Although there was no excess mortality, the heat may have given rise to increased morbidity, including for reasons such as dehydration, falls and exacerbation of chronic illness. Good family and neighbourly relations and well-functioning home-based services and health services may have counteracted increased mortality. Norway has no official alert service for extreme temperatures, but media focus with recommendations for measures may have had a positive effect. Our results provide no strong arguments for establishing an official alert service similar to what is found in other countries (10), but this may become more relevant in the future (11).

Although we failed to find any excess mortality, there is reason to study and monitor possible adverse effects of extreme temperatures on vulnerable population groups, such as

older people, the chronically ill and substance abusers. In particular, there is a need for more research that can elucidate environmental, climate-related and individual factors that have a bearing on morbidity and mortality. This will be especially important since the prognoses for climate change indicate that we will see more periods with high temperatures.

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