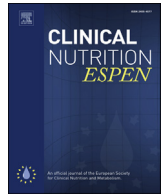




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Original article

Malnutrition related deaths

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SUMMARY

Background and aims: Studies have shown that malnutrition increases the risk of morbidity, mortality, the length of hospital stay, and costs in the elderly population. Approximately one third of all patients admitted to geriatric wards in Denmark are malnourished according to the Danish Geriatric database. The aim of this study is to describe and examine the sudden increase in deaths due to malnutrition in the elderly population in Denmark from 1999 and, similarly, the sudden decline in malnutrition related deaths in 2007.

Method: A descriptive epidemiologic study was performed. All Danes listed in the national death registry who died from malnutrition in the period from 1994 to 2012 are included.

Results: The number of deaths from malnutrition increased significantly during the period from 1999 to 2007, especially in the age group 70 years and over. Additionally, we document a surprising similarity between the development in excess mortality from malnutrition in the five Danish regions during the same period.

Conclusions: During the period 1999–2007 malnutrition was the direct cause of 340 extra deaths, and probably ten times more registered under other diseases. This development in excess mortality runs parallel in all five Danish regions over time.

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1. Introduction

International studies have shown that malnutrition in the elderly population increases the risk of morbidity, mortality, the length of hospital stay, and costs [1]. According to the Danish geriatric database [2], approximately one third of all patients admitted to the medical departments of geriatrics in Denmark are malnourished. Malnutrition is a common complication among elderly patients, as calorie intake, for different reasons, such as diseases, medical side effects, depression, and poor dental status, increases with age. However, poor access to good, healthy food also plays a critical role [3,4].

Every year, malnutrition leads to several deaths, according to the Danish death statistics.

The number of patients who are diagnosed with malnutrition may only be the tip of the iceberg, as malnutrition has not until recently been in focus among health professionals [5,6].

The Danish hospital nutrition was heavily criticized and reforms were proposed during the period 1999–2010 [5–10]. Likewise Danish nursing homes were criticized for their nutritional standard [11].

Malnutrition not only leads to deaths in its own right, but studies have shown that malnutrition also increases the risk of all-cause mortality in the elderly [12–18]. Studies have also shown that underweight increases the risk of among others post stroke mortality and Alzheimer's disease.

Experience from the Dutch famine indicates that malnutrition also has an impact on, among others schizophrenia, cold, and heart attack [19–21].

The death rate directly connected to malnutrition may therefore heavily underestimate the total number of deaths with malnutrition as the main factor.

1999 seems to be a remarkable year in the nutritional situation in Denmark. In all five regions (at that time organized in counties), the death rate from malnutrition increased rapidly. Until January 1, 2007 Denmark had 13 counties (Danish: Amter). The relevant factor for this study is that the counties had the responsibility for the hospitals. With the structural reform of January 1, 2007 the

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counties were replaced by 5 regions. From then the regions became responsible for the daily running of the public hospitals in Denmark.

The five regions are: Capital, Zealand, Southern Denmark, Central Denmark (Midt-jutland), and North Denmark (North-jutland).¹

By the same reforms the number of municipal units was reduced from 270 to 98. The factor of interest for this study is that the municipalities had (and have) the responsibility for elderly care.

The malnutrition period coincides with the Danish government's Public health program 1999–2008 [22]. In 1998 The Danish government introduced a new public health program that ran from 1999 to 2008. The program focused on general initiatives such as helping people stop smoking. We can see that the program runs parallel with the Danish malnutrition period. Introduction of the public health program may have been funded by savings on nutritional care to weak patients suffering from: Stroke, Alzheimer, Schizophrenia, and Diabetes. This could explain our findings.

2. Method and data

The method is primarily descriptive using regression analysis. As neither multicollinearity nor cohort effects were found in the data the method became simpler than the methods applied in [24–26].

The Danish data on the death rate from malnutrition can be found in [23]: The State Serum Institute (Statens Serum Institut): Malnutrition, B-040. "Malnutrition" is doctors classification of cause of death. This dataset is (based on separate studies [24–26]) connected to data for apoplexy, B-061, Alzheimer's disease, B-052, and Schizophrenia, B-046. The death rate is the number of deaths from a certain cause per 100 000 persons in a considered group. The present article is, in principle, based on the total dataset for deaths and death rates from malnutrition in Denmark 1994–2012; however, it is included here only from the age of 55; see Table A1 in the appendix.

3. The malnutrition period 1999–2007, distributed into regions

Figs. 1–5 show the death rates from malnutrition for women in the five regions. In the capital region, the malnutrition period starts 1999 and tops 2004.

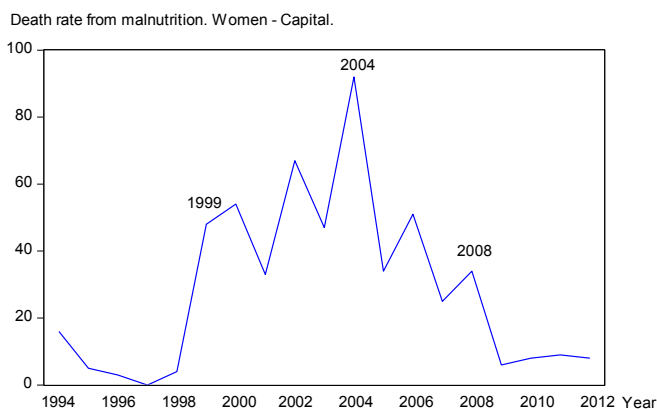


Fig. 1. Capital: The malnutrition period lasted from January 1999 to January 2009.

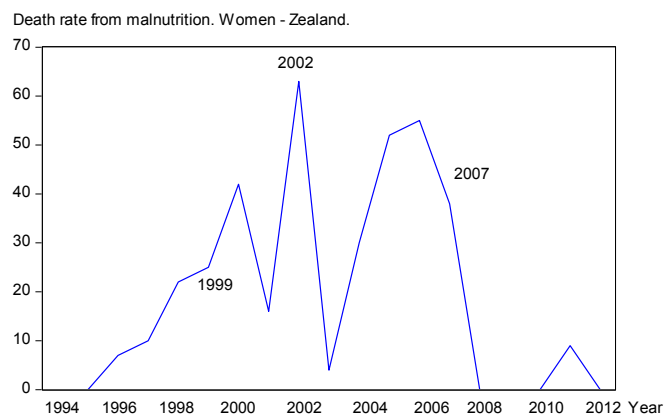


Fig. 2. Zealand: The malnutrition period lasted from January 1999 to January 2008.

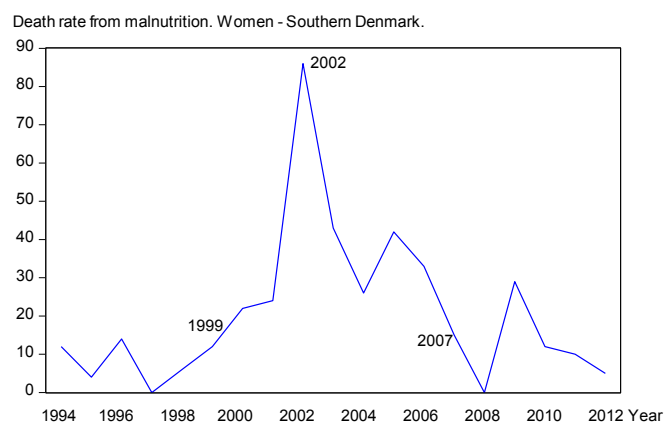


Fig. 3. Southern Denmark: The malnutrition period lasted from January 1999 to January 2008.

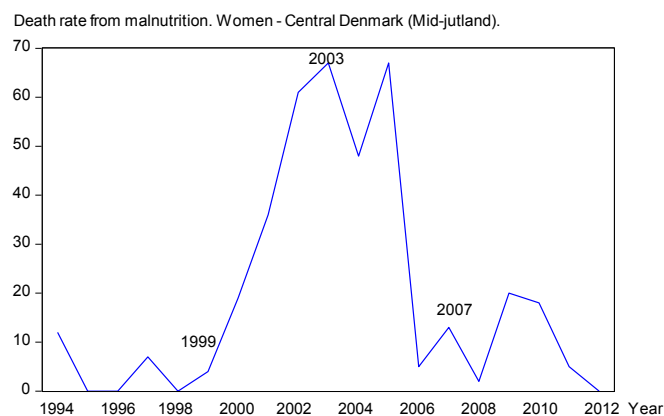


Fig. 4. Central Denmark (Mid-jutland): The malnutrition period lasted from January 1999 to January 2006.

In the Copenhagen municipality a diet policy for the elderly, supported by the Health and Care Management in Copenhagen, was approved in 2003. An annual appropriation of 5 million DKK was granted in 2004 and 2005 to finance three pilot projects. In that context a new organization for the implementation of a nutritional policy was set up. In 2005, a Dietary Secretariat under the Health and Care Management was created and dietary consultants were appointed in all local areas.

¹ In Denmark the English names for Midt-jutland and North-jutland are generally unknown.

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