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Income related inequalities in avoidable mortality in Norway: A population-based study using data from 1994–2011

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ABSTRACT

Objective: The aim of this study was to measure income-related inequalities in avoidable, amenable and preventable mortality in Norway over the period 1994–2011.
Methods: We undertook a register-based population study of Norwegian residents aged 18–65 years between 1994 and 2011, using data from the Norwegian Income Register and the Cause of Death Registry. Concentration indices were used to measure income-related inequalities in avoidable, amenable and preventable mortality for each year. We compared the trend in income-related inequality in avoidable mortality with the trend in income inequality, measured by the Gini coefficient for income.
Results: Avoidable, amenable and preventable deaths in Norway have declined over time. There were persistent pro-poor socioeconomic inequalities in avoidable, amenable and preventable mortality, and the degree of inequality was larger in preventable mortality than in amenable mortality throughout the period. The income-avoidable mortality association was positively correlated with income inequalities in avoidable mortality over time. There was little or no relationship between variations in the Gini coefficient due to tax reforms and socioeconomic inequalities in avoidable mortality.
Conclusions: Income-related inequalities in avoidable, amenable and preventable mortality have remained relatively constant between 1994 and 2011 in Norway. They were mainly correlated with the relationship between income and avoidable mortality rather than with variations in the Gini coefficient of income inequality.

1. Introduction

By international standards Norway is a healthy nation with a life expectancy at birth of 81 years, which is among the highest in the world [1]. In addition, Norway is a country with a low degree of socioeconomic inequality [2] and a public health care system which ensures free medical services to all residents. Hence, it is somewhat surprising that the gap in health status between those at the top and bottom ends of the socioeconomic scale is large in Norway compared with other countries in Western Europe [3–5]. Partly as a consequence of this, in 2007 the Norwegian Ministry of Health and Care Services issued a national strategy to reduce social inequalities in health [6].

The aim of this study was to investigate time trends in income-related inequality in avoidable, amenable and preventable mortality in Norway. It has been suggested

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that inequalities in health may partly be due to inequalities in use of health services [7] and public health interventions [8]. The concept of avoidable mortality refers to all deaths from particular conditions in certain age groups that should not occur in the presence of appropriate health care and public health activities. Avoidable mortality is divided into two subcategories. Amenable mortality refers to those deaths that could be avoided through good quality health care. Preventable mortality refers to those deaths that could be avoided by public health interventions in the broadest sense [9]. We conducted a systematic review on the association between avoidable mortality and socioeconomic status (see web appendix for details). Each of the 27 studies identified, with results from 25 mainly high-income nations, provides evidence of socioeconomic inequalities in avoidable mortality [10–36]. Most studies were conducted using area level data with area level composite indicators of socioeconomic status; some used individual data. The first study we identified was from 1987 [29], however the majority of studies were published after 2005. Although four studies used Norwegian data, none of these investigated time trends [5,14,16,36].

There are a number of reasons for why inequalities in avoidable mortality may change over time. Firstly, health-related technological innovation, which reduces mortality, might not affect individuals equally across socioeconomic groups [37]. If such changes have a stronger effect on high income groups, inequalities in amenable mortality may increase over time. Second, public health interventions may be introduced that have a differential effect across socioeconomic groups. For example, regulations with regards to smoking and alcohol have had an effect on consumption of these goods in Norway [38]. Evidence from Sweden suggests that individuals in lower socioeconomic groups react slower to such public health measures [39]. Hence, such public health measures could increase income-related inequality in preventable mortality. Third, fiscal policy may affect income distribution. For example, recent tax reforms in Norway have caused major temporary deviations in income inequality in Norway [40]. If income inequality has an impact on health inequality, these tax reforms could affect income-related inequalities in health.

We investigate time trends in income-related inequality in avoidable, amenable and preventable mortality in Norway from 1994 to 2011. The concepts of amenable and preventable mortality offer a relatively simple metric for evaluating the performance of health care systems and public health policy. Monitoring the trends in inequalities in avoidable mortality over time in combination with trends in the mortality rate and income inequality will facilitate our understanding of how the development and improvement in the health services contributes to inequalities in health. We analysed trends over time for each type of mortality and then investigated the income-mortality relationship and calculated measures of absolute and relative socioeconomic inequalities. We compared the time trend in inequality in avoidable mortality with the time trend in the Gini coefficient for income inequality; and with the income-avoidable mortality relationship (measured by the marginal effect of income on avoidable mortality). We used these measures to show how the development of income-related inequalities in health over time might be linked to changes in Gini coefficient of income inequality and/or to changes in the income-avoidable mortality relationship.

1.1. Income and avoidable mortality

An association between income and avoidable mortality is a necessary condition for income-related inequalities in avoidable mortality. Hence, a discussion of the relationship between income and avoidable mortality is warranted. Income-related variation in amenable mortality may be caused by differential access to and quality of the health care services received across income groups [9], while income-related variation in preventable mortality may be caused by inequality in population health risk factors that could be prevented by public health policies [41]. Income may also be endogenous in these relationships. We discuss these links below.

1.1.1. Income related inequalities in access or quality of health services received

Income may have an impact on the use of health care and thus also on amenable mortality for two reasons. First, income may affect the utilisation of health services and a number of studies have found differences in health service use by income. Most studies find that, when health need is accounted for, there are pro-rich inequalities in secondary care utilisation in developed countries. Conversely, the use of primary care are either non-significant or pro-poor [7,42]. In studies using Norwegian data no overall pro-rich socioeconomic gradient in needs-adjusted utilisation of general practitioner or inpatient care has been found, though there was pro-rich inequality in utilisation of both private medical specialists and hospital outpatient care [43].

Second, income might have an impact on amenable mortality due to income differentials in the quality of care received. For example, a recent Norwegian study found that higher socioeconomic status was associated with more specialised treatment for cancer and consequently reduced mortality [44].

1.1.2. Income related inequalities in behaviour related health risk factors that could be avoided by public health interventions

Income may affect behaviour related health risk factors and thus also preventable mortality. This view, which has been advocated by the Commission for Social Determinants of Health lead by Michael Marmot, suggests that income affects *intermediate determinants* of health (such as housing quality, consumption potential and social support) [45]. The *intermediate determinants* affect health and then also preventable mortality. Numerous studies have found associations between income and health risk factors. For example in Norway, low income is associated with lower consumption of fruit and vegetables, higher consumption of sugared beverages, more risky alcohol consumption patterns, smoking and reduced physical activity [46]. There