Social Epidemiology

The HUNT Study

NOFE Conference Bergen 3.11.2021

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Norwegian social epidemiology during 200 years

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Introduction

Social epidemiology has been defined as *The branch of epidemiology that studies the social distribution and social determinants of states of health* (1). Whereas traditional epidemiology is primarily concerned with health related factors at the individual level, social epidemiology is more concerned with the health conditions between social groups in the population or between populations. Thus, social epidemiology is highly relevant for public health and health policy (S. Westin, this issue), while epidemiology, concerned more with individual risk or resilience is most relevant for treatment of specific diseases within the health services. The epidemiologist Geoffrey Rose (1926-1993) was instrumental in emphasizing the difference between the determinants of individual cases and the determinants of incidence rates, thereby shifting the focus from individuals to populations (2). George Davey Smith recently highlighted main challenges with the individual focus, personalized medicine, and the desire to predict individual destinies – randomness and individual life's coincidences (3). However, when comparing groups of populations or entire populations in social epidemiology, average health can be predicted in a more expected manner based on information on the socioeconomic conditions people are living under; *the social determinants of health*. Social epidemiology attained its name in English in 1950 and is by its definition truly cross-disciplinary, encompassing both the medical, behavioural as well as the social sciences.

In recent years, social epidemiologists have been much occupied with the socioeconomic gradient in health, extending from top to bottom of the social hierarchy, and showed that it is not a poverty threshold that separates those with poor versus good health (4). In addition, research has shown that poor people living in poor neighborhoods are likely to have poorer health than equally poor people living in more affluent neighborhoods (5,6). But are these observations in fact new? Or is it that researchers once again have been willing to engage with questions initially raised during the formative days of epidemiology as a discipline, in the early 19th century (7)?

Pioneers in Norwegian social epidemiology

Eilert Lund Sundt (1817-1875) was a theologist and sociologist (http://no.wikipedia.org/wiki/Eilert_Sundt), known for his work on mortality, marriage and other subjects among the working class (L.M. Irgens, this issue). He was born into a large family of thirteen children, and he had to work during his childhood to help make ends meet in the family. He lived close to all kinds of people in a small community. These experiences probably affected his research interest later in his life, the health effects of poverty, harsh working conditions and issues associated with the transition from the farm culture to business and industry in the 19th century. Sundt had a variety of research interests like the conditions in prisons, living conditions for gypsies, causes of death, conditions of prostitutes, causes of suicide, manual workers' living and working conditions, household hygiene and administration of poverty laws. From 1857 to 1866 Eilert Sundt was editor of Folkevennen ("Friend of the People"), for which he wrote a number of his most influental articles. A true social epidemiologist.

The physician Kristian Feyer Andvord (1855-1934) described the decline in mortality from tuberculosis by birth cohort. Due to the time in which he undertook his research it has been argued that birth cohort analyzes is a Norwegian invention (8). Andvord assumed that mortality changes were due to changes in immunity in the population. However, the prevailing view today is that the successive reduction in mortality was due to improved socio-economic living conditions (8). The study of cohort effects in contrast to effects of age is still a very interesting approach in many settings.

In the 1970s, the Norwegian physician Anders Forsdahl (1930-2006) published ecological analyzes of the relationship between infant mortality in the early 1900s and mortality from cardiovascular disease in the 1960s (9). Forsdahl hypothesized that poor living conditions in early life increaseed the risk of disease later in life in a life-course perspective. Another explanation for the findings is of course that sub-optimal socioeconomic living conditions over the life-course increases the risk of disease through cumulative impact, without mechanisms like "biological programming" involved (10).

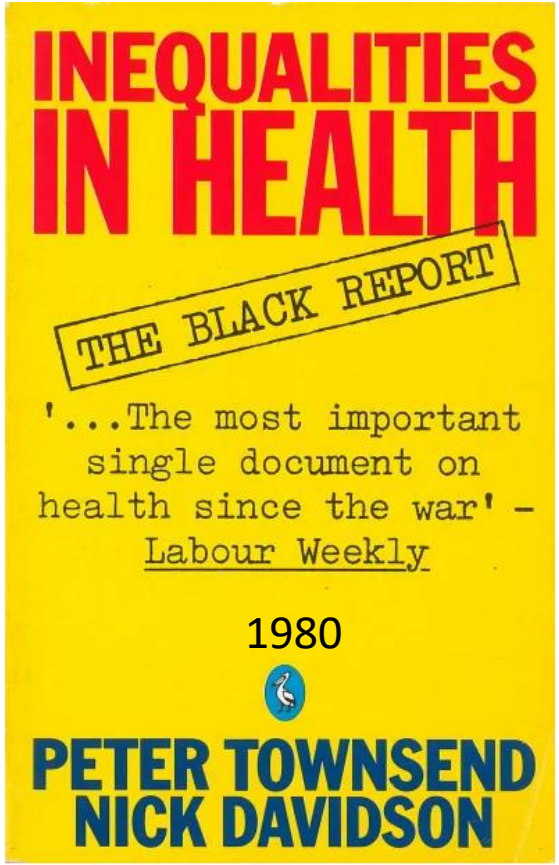
The prelude to today's social epidemiology in Norway, 1950s to 1980s

Occupational health inequalities

In England, data on mortality by occupational class have been available from the 1850s (11). In 1980, the

https://www.ntnu.no/ojs/index.php/norepid/article/view/1895

Three milestones in social epidemiology (or maybe two)



Europe

THE LANCET

Socioeconomic inequalities in morbidity and mortality in western Europe

*Johan P Mackenbach, Anton E Kunst, Adriënne E J M Cavelaars, Feikje Groenhof, José J M Geurts, and the EU Working Group on Socioeconomic Inequalities in Health**

Summary

Background Previous studies of variation in the magnitude of socioeconomic inequalities in health between countries have methodological drawbacks. We tried to overcome these difficulties in a large study that compared inequalities in morbidity and mortality between different countries in western Europe.

Methods Data on four indicators of self-reported morbidity by level of education, occupational class, and/or level of income were obtained for 11 countries, and years ranging from 1985 to 1992. Data on total mortality by level of education and/or occupational class were obtained for nine countries for about 1980 to about 1990. We calculated odds ratios or rate ratios to compare a broad lower with a broad upper socioeconomic group. We also calculated an absolute measure for inequalities in mortality, a risk difference, which takes into account differences between countries in average rates of illhealth.

Findings Inequalities in health were found in all countries. [illegible] ratios for morbidity ranged between about 1·5 and [illegible] ratios for mortality between about 1·3 and [illegible] for self-reported general health, for instance, inequalities [illegible] in Norway were larger than in Switzerland [illegible] (1985 CI): 2·57 [2·07–3·18], 1·60 [1·44–1·88], respectively). For mortality by occupation [illegible] in men aged 30–44, the rate ratio was highest in [illegible] [1·69–1·83]), although there was no large difference in the size of the inequality in those countries with data. For men aged 45–59, for whom France did have data, this country had the largest inequality (1·71 [1·66–1·77]). In the age-group 45–64, the absolute risk difference ranked Finland second after France (9·8% [9·1–10·4], 11·5% [10·7–12·4]), with Sweden and Norway coming out more favourably than on the basis of rate ratios. In a scatter-plot of average rank scores for morbidity versus mortality, Sweden and Norway had larger relative inequalities in health than most other countries for both measures; France fared badly for mortality but was average for morbidity.

Interpretation Our results challenge conventional views on the between-country pattern of inequalities in health in western European countries.

Lancet 1997; 349: 1655–59

*Listed at end of article

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Correspondence to: Prof Johan P Mackenbach

Introduction

Socioeconomic inequalities in health have been reported to vary between countries,[1-11] although comparative studies have methodological drawbacks. Thus looking for conditions that reduce health inequalities is difficult. We have done a large between-country comparison of inequalities in mortality and morbidity in western Europe in which we tried to overcome some of these difficulties. Our full-length report was published in 1996.[12]

Data and methods

Morbidity

Data on morbidity were obtained from nationally representative health interview, level of living, or multipurpose surveys in 11 countries (table 1) over 1985–92 covering around 5000–132 000 (median about 11 000) respondents. Generally, institutionalised populations were excluded in the surveys. We report on persons aged 25–69. Great Britain comprises England, Wales, and Scotland. Germany means the former West Germany.

We selected four health indicators to compare countries: perceived general health (very good or good *vs* fair or less than good), chronic conditions (none *vs* ≥1), long-term disability (none *vs* ≥1), and any long-standing health problem (no *vs* yes). We limited the analysis to common lists of nine chronic conditions and six disabilities.

Mortality

Data on mortality were obtained from nationally representative longitudinal or "unlinked" cross-sectional studies in nine countries (table 3). In a few countries, foreigners, the institutional population, and/or military personnel were excluded. Results on the 30–59 age-group; because of [illegible] were reported separately for 30–44 and 45–59. [illegible]

Longitudinal studies [illegible] France, the four Nordic countries, and Italy [illegible] 1981–93), and mortality during a follow-up of [illegible] except England and Wales, complete census [illegible] followed up. In Italy, the follow-up was 6 months.

Unlinked cross-sectional studies in Switzerland and Spain compared deaths by socioeconomic status on death certificates (numerator) with population numbers by socioeconomic status during the census (denominator), both for about 1980–82.

Socioeconomic status

We used three indicators of socioeconomic status: education (morbidity and mortality; men, women), occupational class (morbidity and mortality; men), and income (morbidity only; men, women). Education was measured as the highest level (general, technical, vocational) successfully completed. Using OECD guidelines,[13] we reclassified the original individual data into four classes (no or only primary, and lower, upper, and post secondary).

Occupational class was measured with the Erikson–Goldthorpe scheme.[14] We reclassified the original individual data into this scheme, which was then collapsed into three classes (non-manual, farmers, manual). This was done for men only; we could not measure occupational class of women in an internationally comparable way. In most studies, there was insufficient

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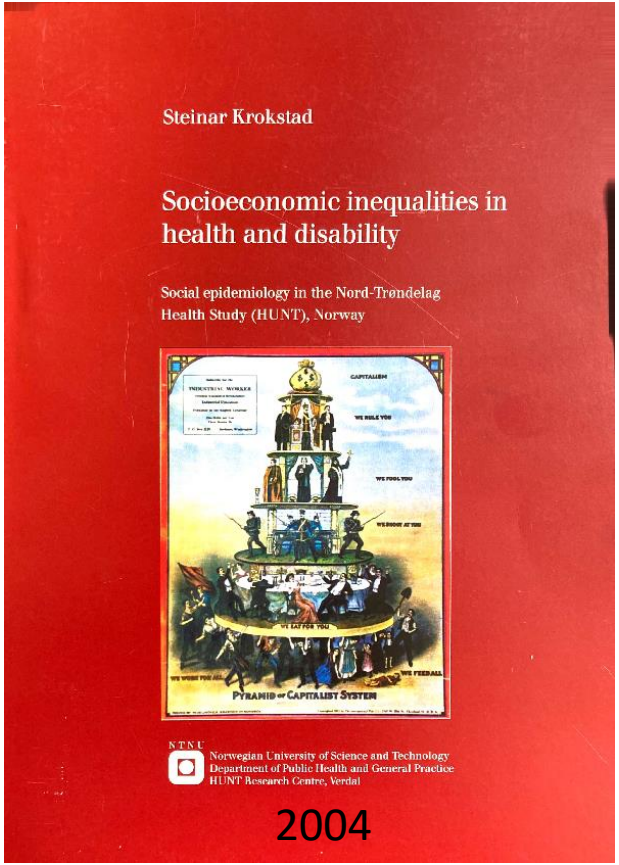
Mackenbach et al Lancet 1997

Norway



The HUNT Study

DET KONGELIGE
HELSE- OG OMSORGSDEPARTEMENT

St.meld. nr. 20

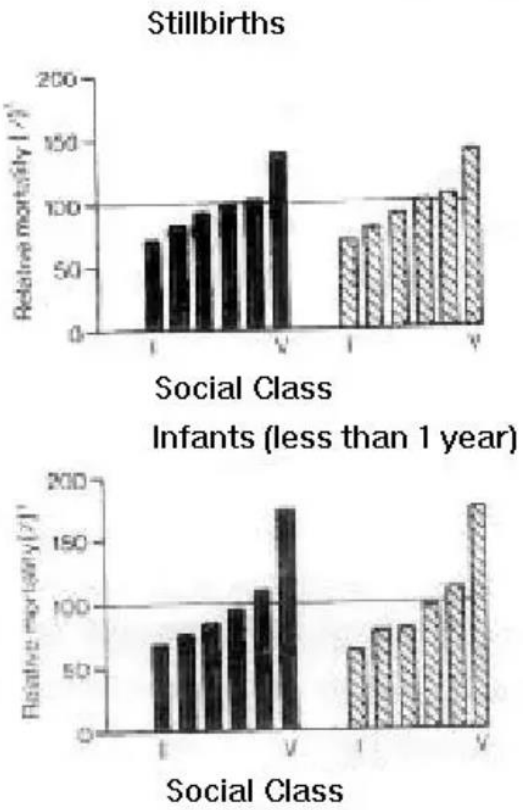
(2006–2007)

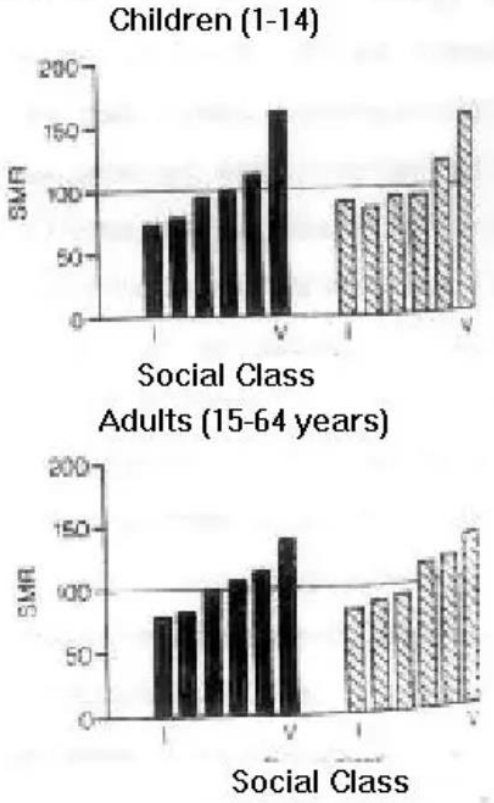
Nasjonal strategi for å utjevne sosiale helseforskjeller

Social inequalities in health on the political agenda
In Norway: White paper 20 (2006-07)

1.1 Rettferdig fordeling er god folkehelsepolitikk

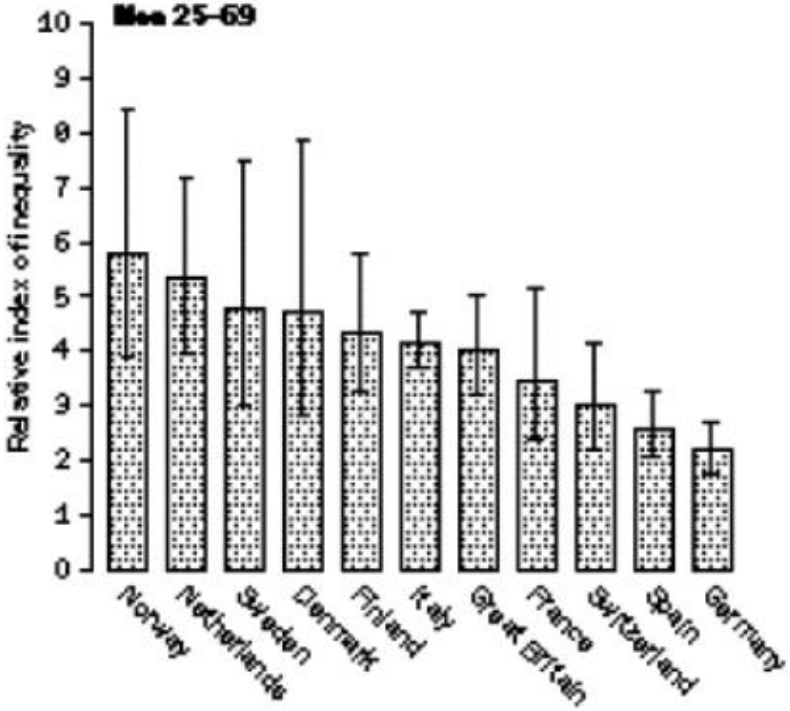
Den norske befolkningens helse er god. Men gjennomsnittstallene skjuler store, systematiske forskjeller. Helse er ulikt fordelt mellom sosiale grupper i befolkningen. Vi må erkjenne at vi har et lagdelt samfunn – der de som er mest privilegert økonomisk også har best helse. Disse helseforskjellene er sosialt skapt, urettferdige og mulig å gjøre noe med. Regjeringen vil derfor sette i verk en bred og langsiktig strategi for å utjevne de sosiale helseforskjellene.

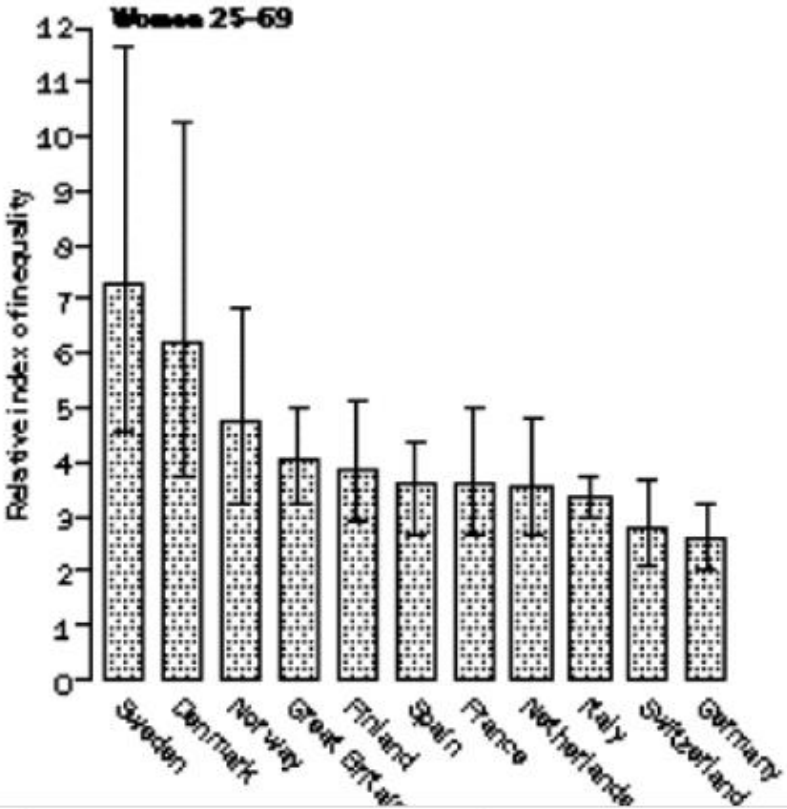




The Black Report

Figure 1. Relative index of inequality for perceived general health by level of education (95% CI)





https://pubmed.ncbi.nlm.nih.gov/9186383/

Papers in my thesis

The start of social epidemiology in the HUNT Study

1. Krokstad, S; Westin, S. **Health inequalities** by socioeconomic status among men in the Nord-Trøndelag Health Study, Norway. Scand J Publ Health. 30(2): 113-24, 2002.

2. Krokstad, S; Ringdal, K; Westin, S. **Classifying people by social class** in population based health survey. Norsk Epidemiologi. 12(1): 19-25, 2002.

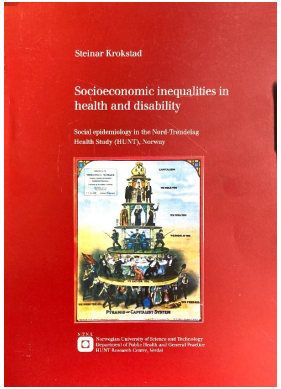
3. Krokstad, S; Kunst, AE; Westin, S. **Trends in health inequalities** by educational level in a Norwegian total population study. J Epidemiol Community Health. 56(5): 375-80, 2002.

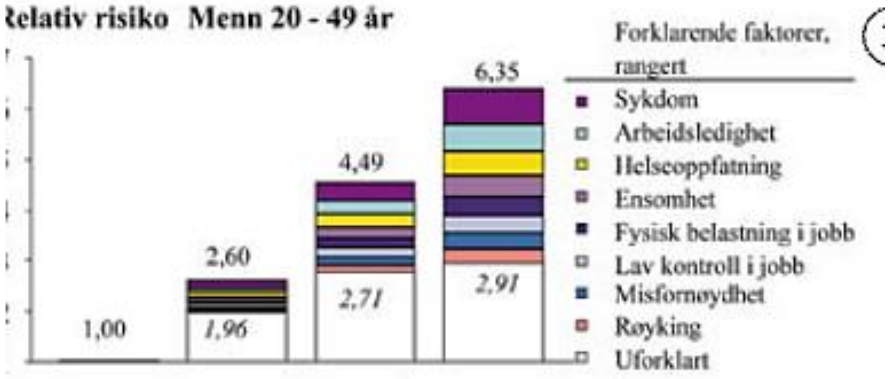
4. Elstad, JI; Krokstad, S. Social causation, health-selective mobility, and the **reproduction of socioeconomic health inequalities** over time: panel study of adult men.. Social Science & Medicine. 57(8): 1475-89, 2003.

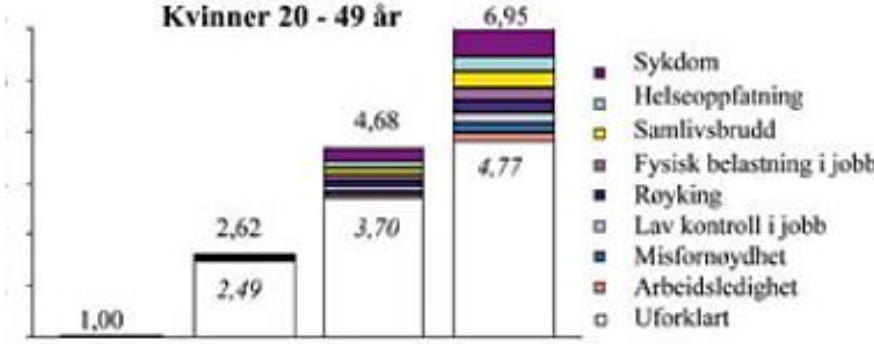
5. Krokstad, S; Westin, S. **Disability in society** − medical and non-medical determinants for disability pension in a Norwegian total county population study.. Social Science & Medicine. 58(10): 1837-1848, 2004.

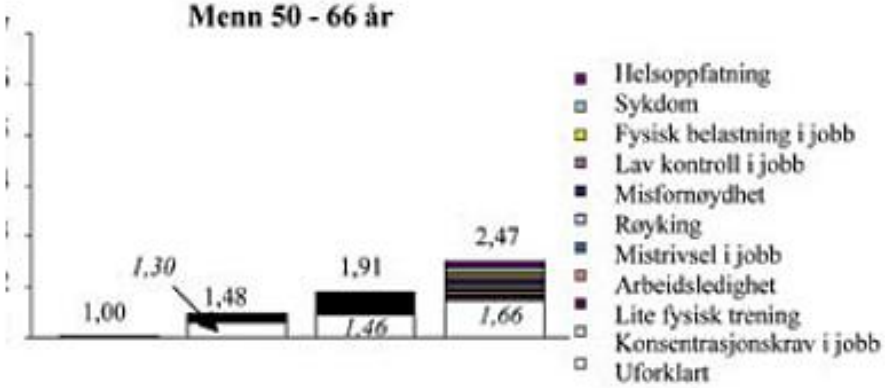
6. Krokstad, S; Johnsen, R; Westin, S. **Social determinants of disability pension**: a 10-year follow-up of 62 000 people in a Norwegian county population.. International Journal of Epidemiology. 31: 1183-91, 2002.

7. Krokstad, S; Magnus, P; Skrondal, A; Westin, S. The importance of social characteristics of **communities** for the medically based disability pension. Eur J Public Health. 14(4): 406-12, 2004.

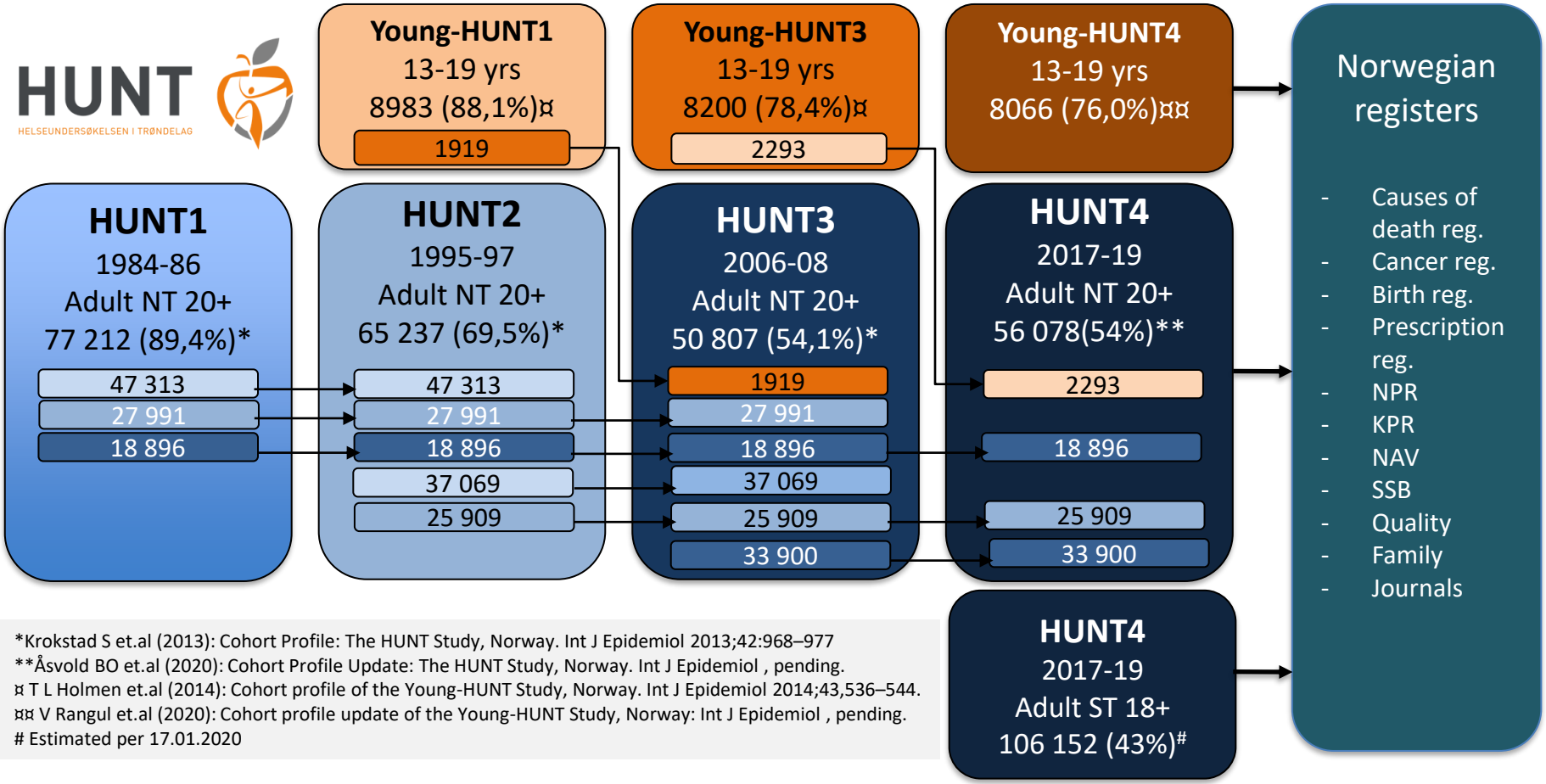








https://tidsskriftet.no/2002/06/tema-trygdemedisin/medisinske-og-ikke-medisinske-risiko-faktorer-uforepensjon



*Krokstad S et.al (2013): Cohort Profile: The HUNT Study, Norway. Int J Epidemiol 2013;42:968–977
**Åsvold BO et.al (2020): Cohort Profile Update: The HUNT Study, Norway. Int J Epidemiol , pending.
¤ T L Holmen et.al (2014): Cohort profile of the Young-HUNT Study, Norway. Int J Epidemiol 2014;43,536–544.
¤¤ V Rangul et.al (2020): Cohort profile update of the Young-HUNT Study, Norway: Int J Epidemiol , pending.
Estimated per 17.01.2020

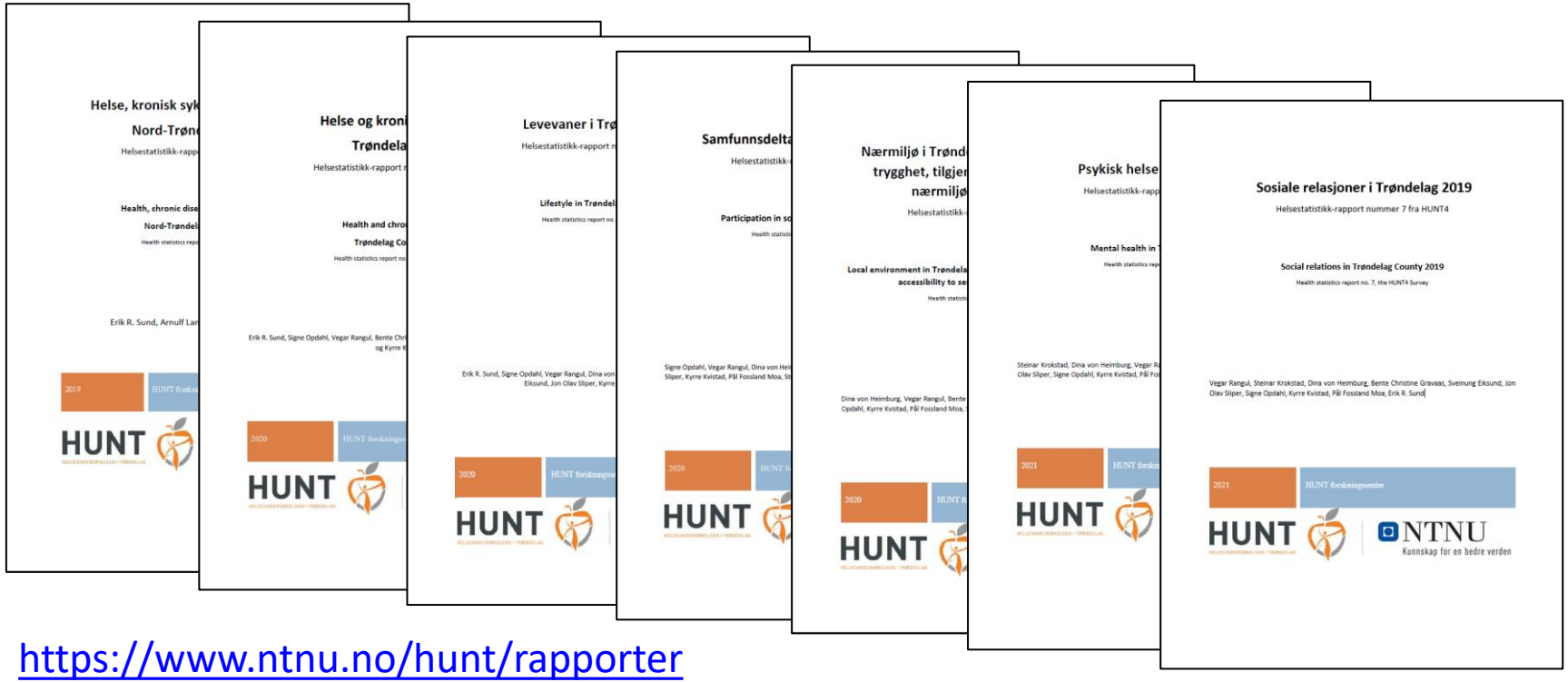
Social epidemologists in HUNT

1. Steinar Westin – social inequality and social benefits
2. Steinar Krokstad – social inequality and social benefits
3. Erik R Sund - geography
4. Johan Håkon Bjørngaard - methods
5. Sara Marie Nilsen – adolescents behaviour
6. Kristine Pape – adolescents mental health
7. Karin de Ridder - school dropout
8. Gunnhild Aaberge Vie – family and genetics
9. Eirik Vikum – health services
10. Linda Ernstsen – health behaviour
11. Terje Andreas Eikemo - methods
12. Christoffer Holseter - SRH
13. Joakim Døving Dalen – SRH
14. Håvard Rydland – hypertension treatment
15. Daniel Weiss – diabetes technology
16. Anne Sofie Helvik – hearing
17. Berit Rostad – womens health
18. Vera Skalicka - mechanisms
19. Margret Olafia Tomasdottir – childhood experiences
20. Siri Høivik Storeng - longevity
21. Magnhild Torske – farmers mental health
22. Kristin Vinjerui - multimobidity
23. Bente Løkken – cultural participation
24. Sofie Lauvås Hjorthen – costal communities
25. Morten A. Krokstad – adolescents mental health
26. Karoline Selvik - adolescents mental health
27. Bodil Aasan – public health interventions
28. Vilde Hatlevold Stensrud - sepsis
29. Hanne Dahl Vonen – sosial inequalities
30. …

International and large projects

- Mindmap
  - http://www.mindmap-cities.eu/
- Synchros
  - https://synchros.eu/
- NCDNOR
  - https://www.fhi.no/cristin-prosjekter/aktiv/ncdnor/
- IHCC
  - https://ihccglobal.org/
- Active Worker consortium
  - https://pubmed.ncbi.nlm.nih.gov/30373782/
- EPHOR(?)
  - https://www.ephor-project.eu/

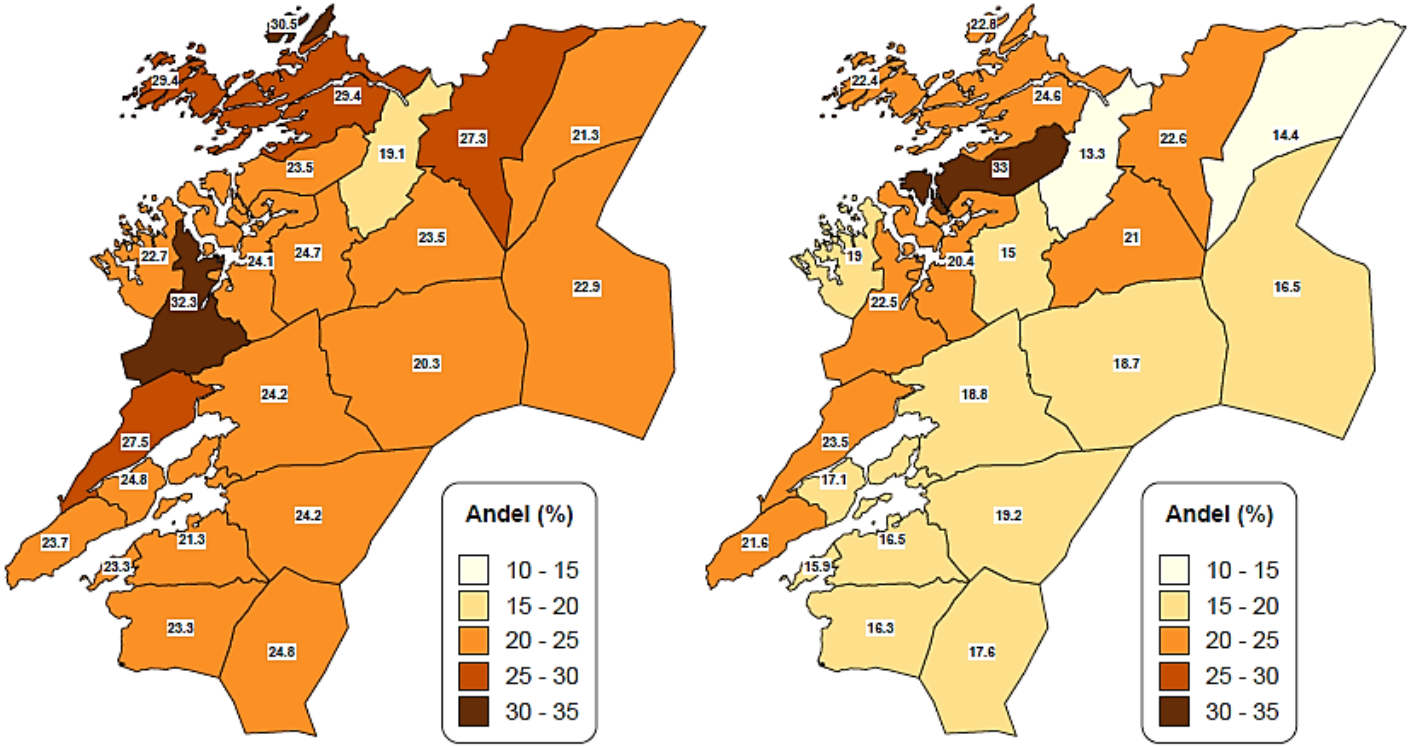
Reports from HUNT4



https://www.ntnu.no/hunt/rapporter

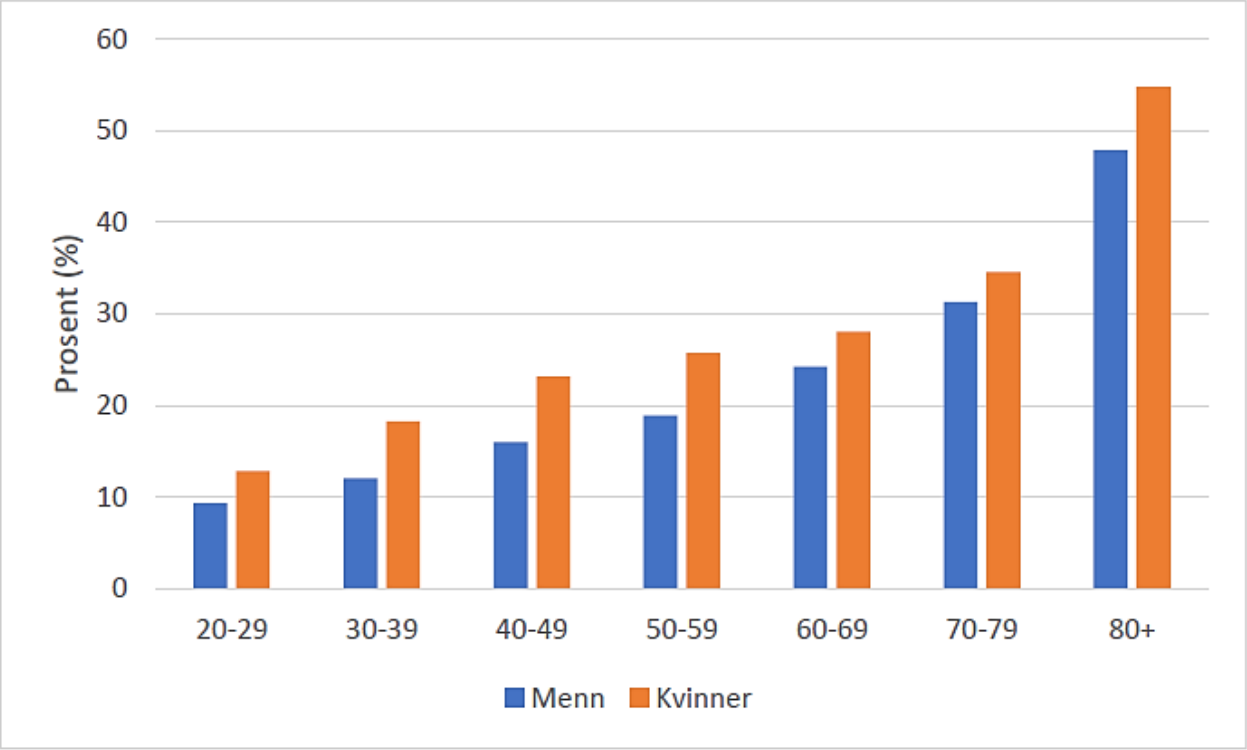
Geographical distribution of self-rated health

Figur 1 Andel som oppgir dårlig selvopplevd helse (%) i kommuner i HUNT4, kvinner (til venstre) og menn (til høyre)



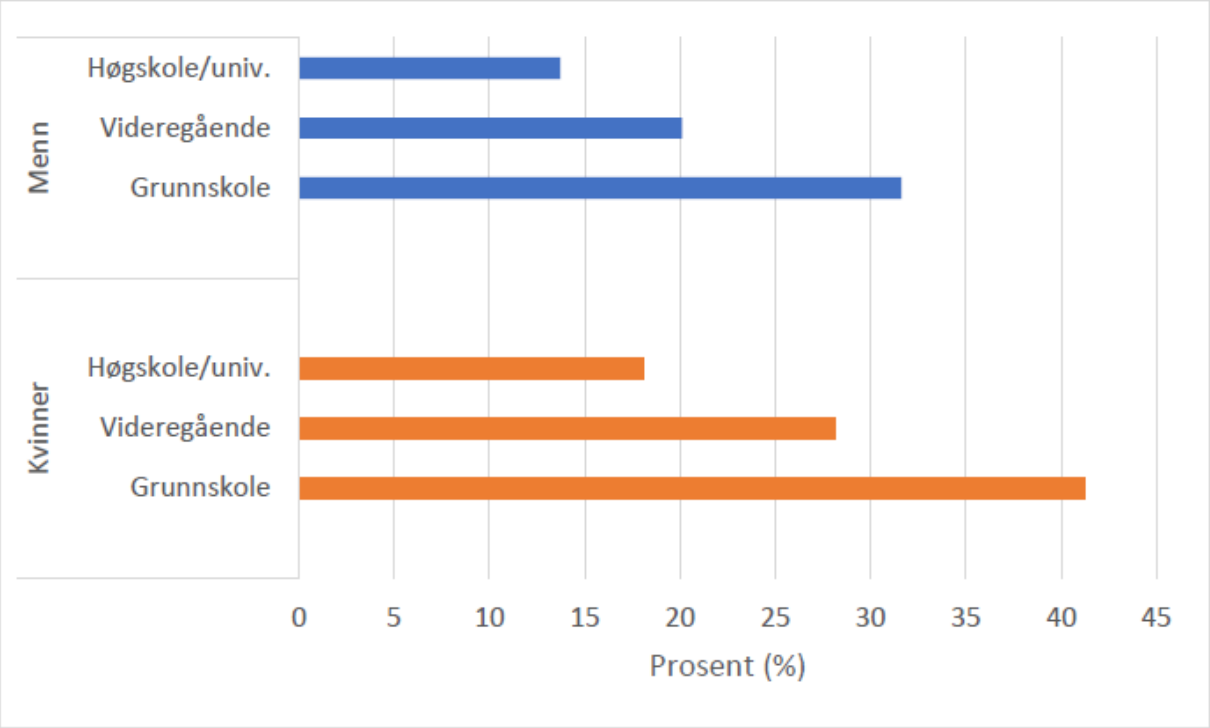
Age distribution of self-rated health

Figur 2 Andel som oppgir dårlig selvopplevd helse (%) etter alder og kjønn i HUNT4

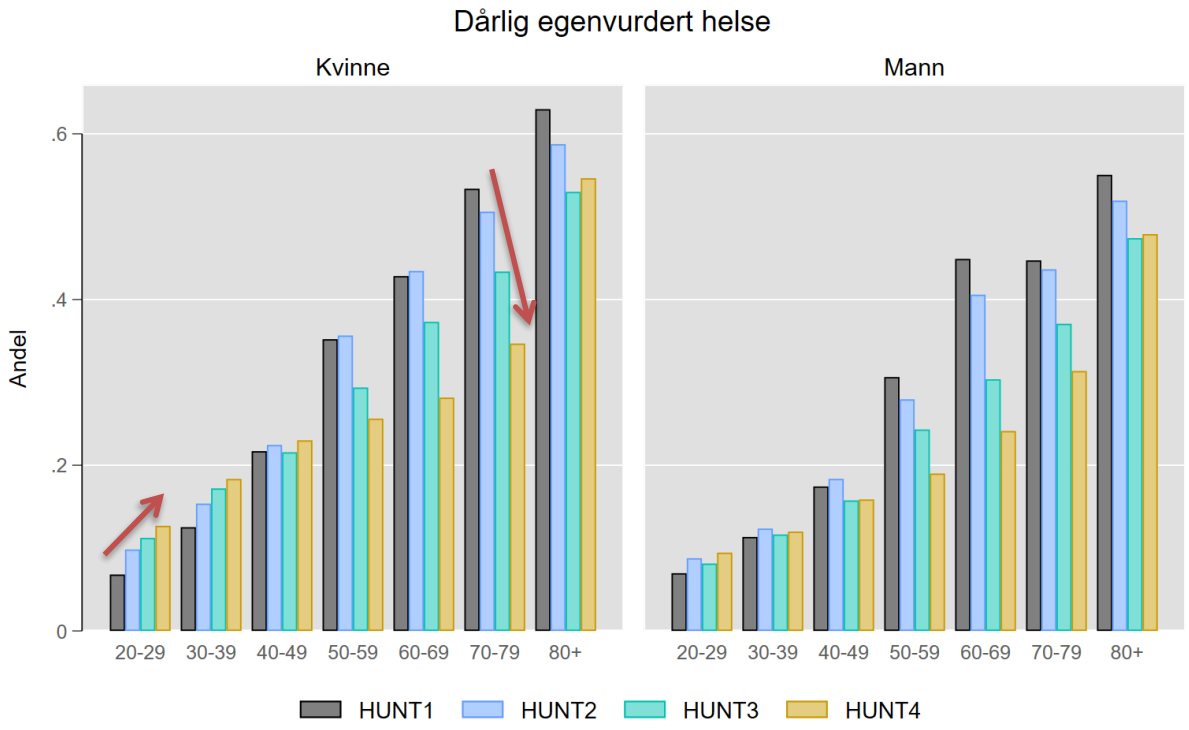


Socioeconomic distribution of self-rated health

Figur 3 Andel menn og kvinner som oppgir dårlig selvopplevd helse (%) etter utdanningsnivå i HUNT4

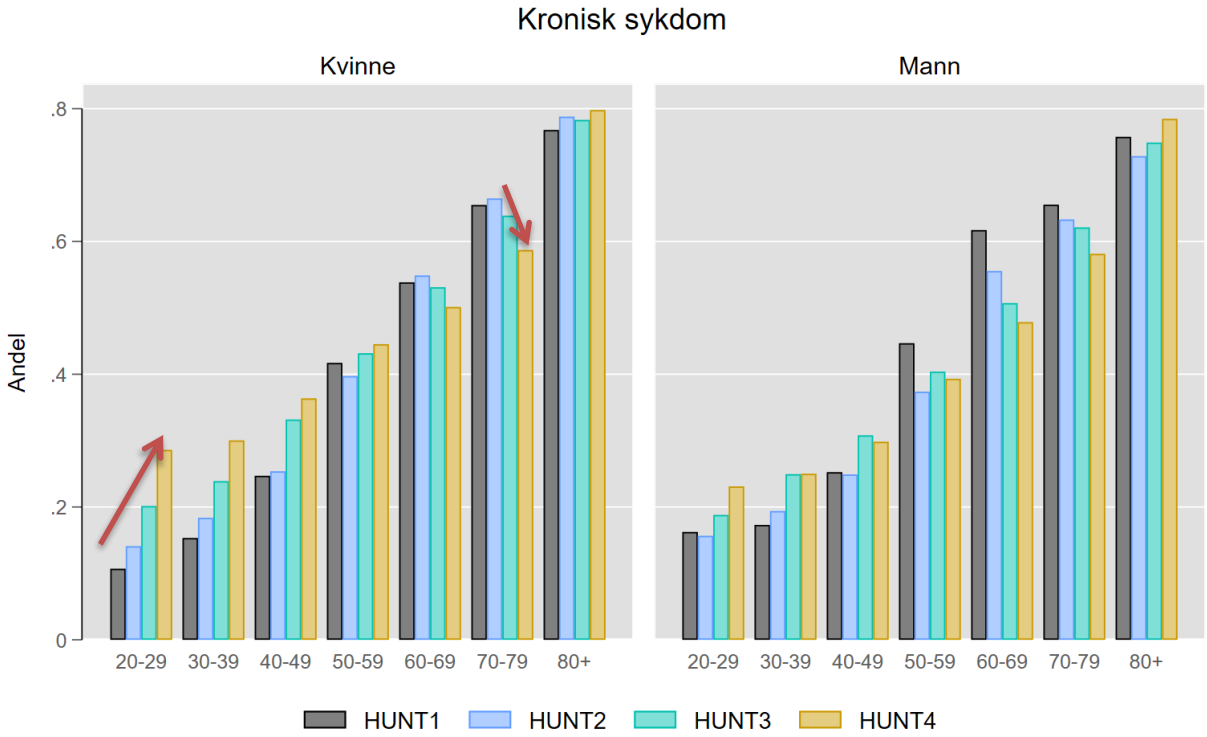


Self-perceived health trends HUNT1-4



Graphs by Kjønn

Chronic limiting illness trends HUNT1-4



Graphs by Kjønn

2 Har du nå noen langvarig (minst 1 år) sykdom, skade eller lidelse av fysisk eller psykisk art som nedsetter dine funksjoner i ditt daglige liv?

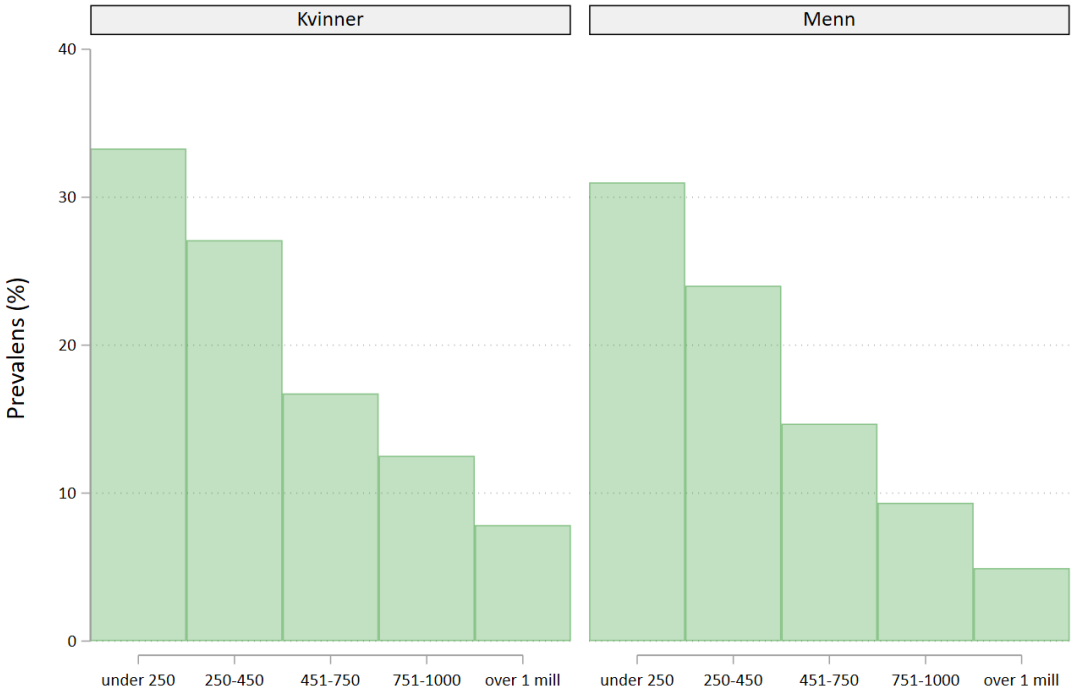
Nei ☐ Ja ☐

Health inequalities in Trondheim

	N	Prosent
Family income		
Under 250 000 kr	4535	7.9
250 000 - 450 000 kr	8965	15.6
451 000 - 750 000 kr	15015	26.2
751 000 -1 000 000 kr	11145	19.4
Over 1 000 000 kr	17741	30.9
Total	57401	100
Education		
Basic	3160	5.5
Seciondary	19646	33.9
Tertiary	35149	60.7
Total	57955	100
In payed work		
No	10048	20.5
Yes	38974	79.5
Total	49022	100

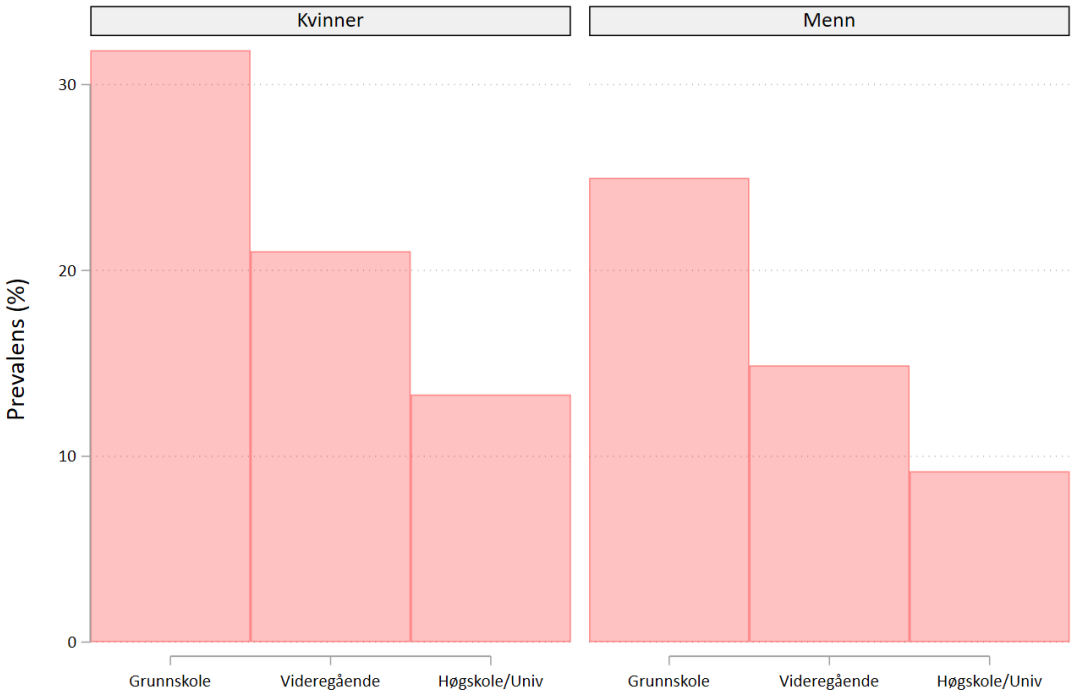
Mental illness (%) by family income

Age 18-67, age adjusted
CONOR mental health index ≥ 2,15



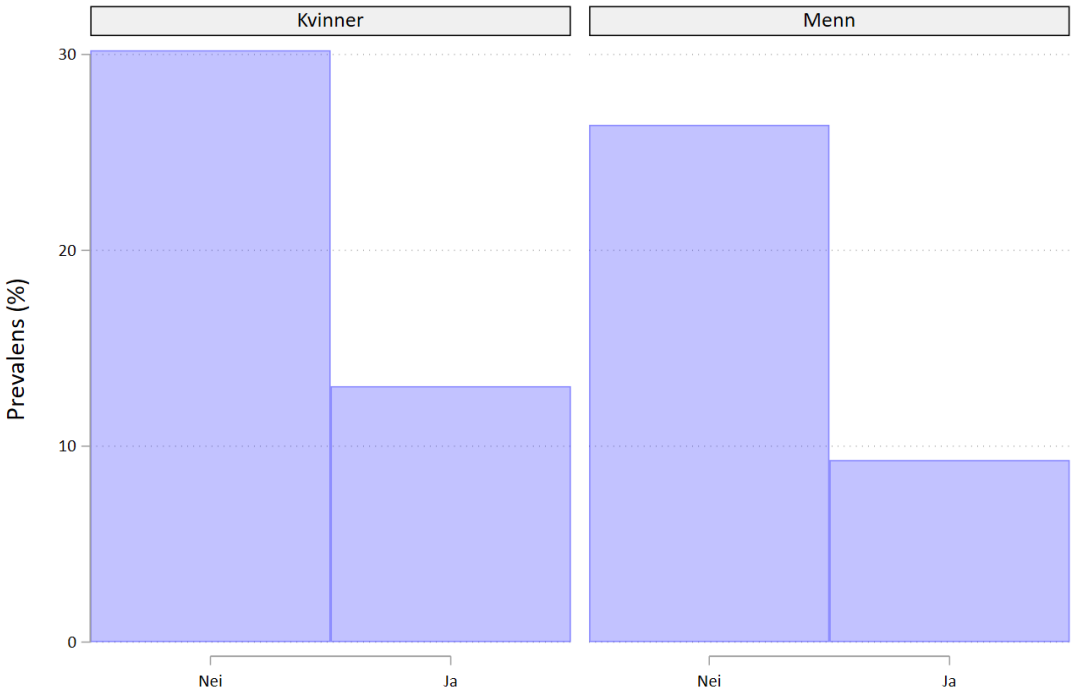
Mental illness (%) by educational level

Age 18-67, age adjusted
CONOR mental health index ≥ 2,15



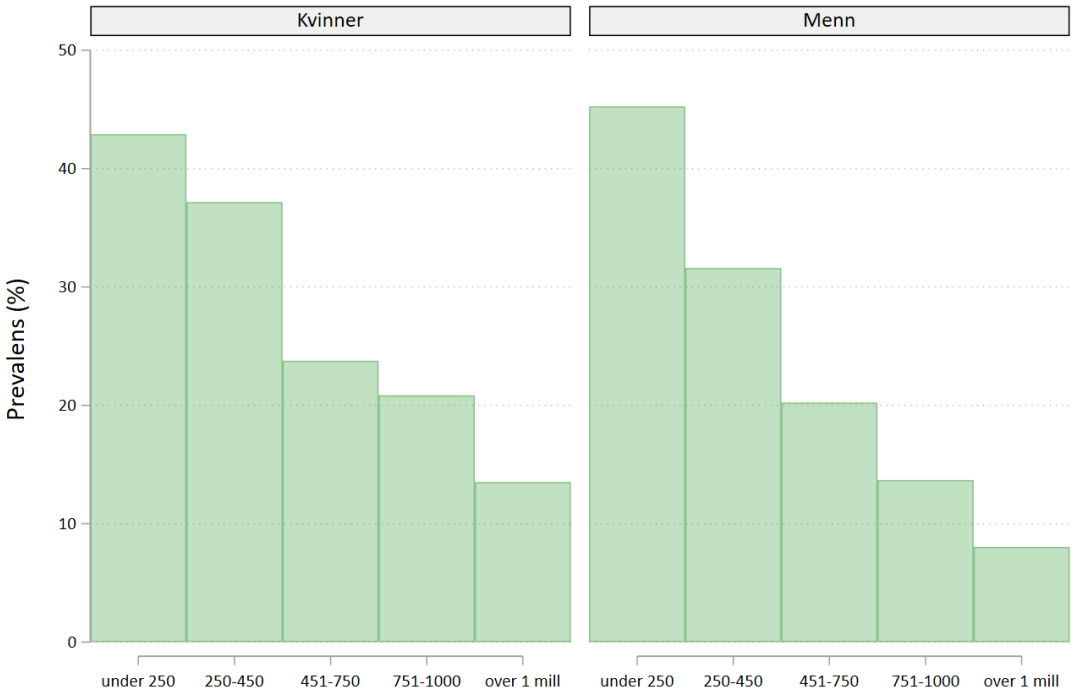
Mental illness (%) by work status

Age 18-67, age adjusted
CONOR mental health index ≥ 2,15



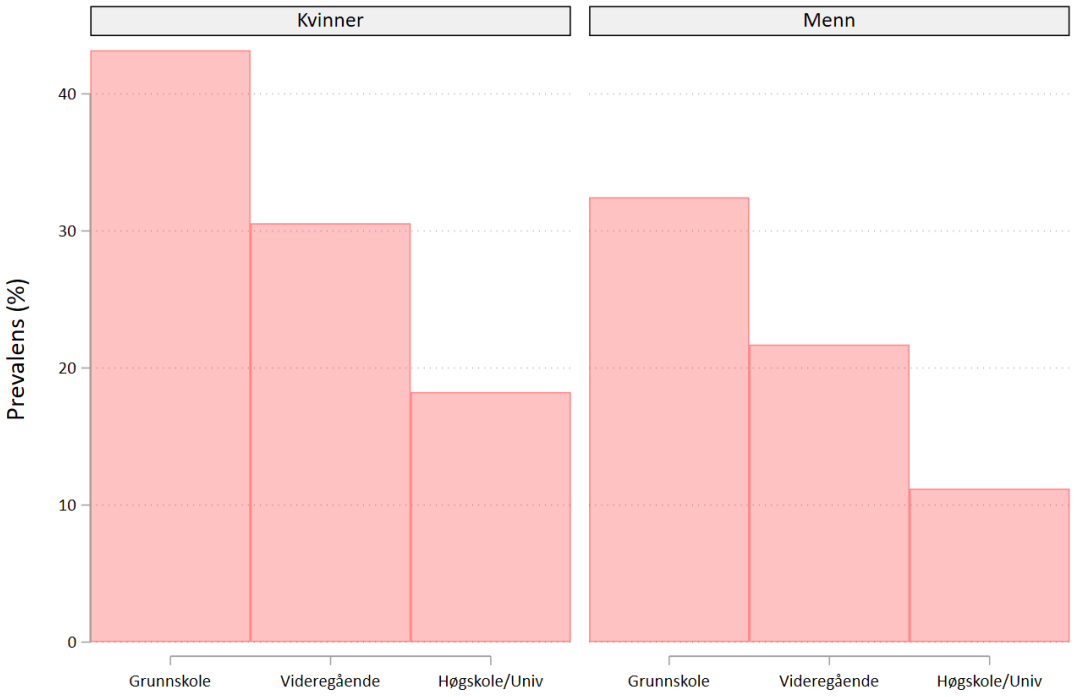
Self-perceived health less than good (%) by family income

Age 18-67, age adjusted



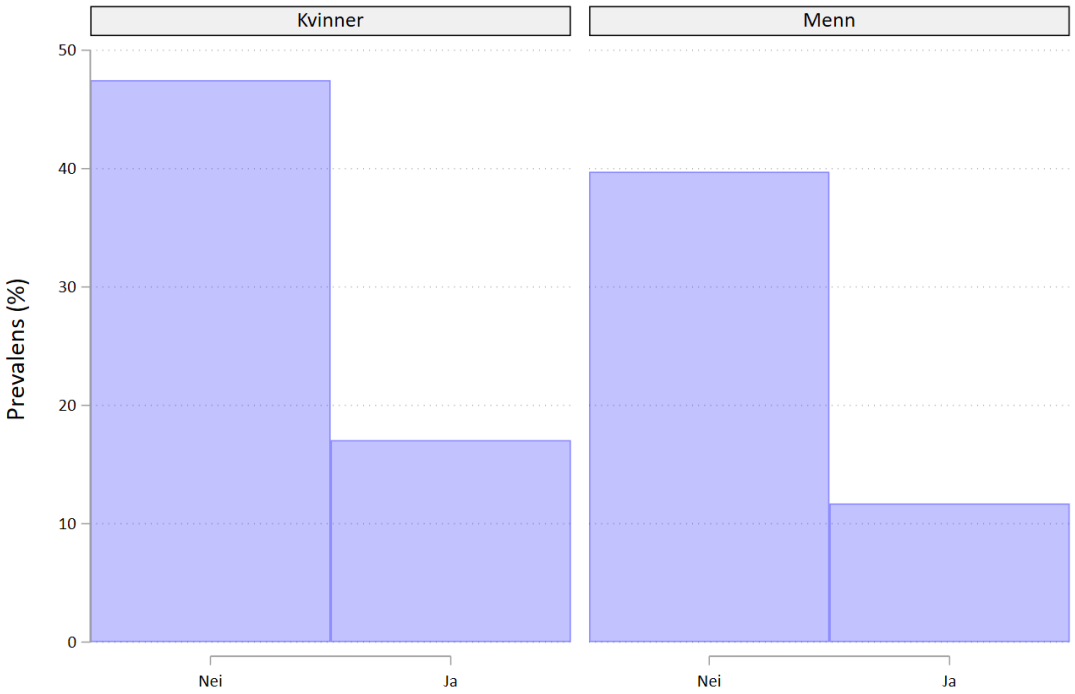
Self-perceived health less than good (%) educational level

Age 18-67, age adjusted



Self-perceived health less than good (%) by work status

Age 18-67, age adjusted



Causation or selection?

- Panel data HUNT 1 – 2
- 9000 men aged 25-49 yrs at baseline
- Changes in perceived health during the study period were more negative in lower social classes
- Mobility between those employed at both observation points was not selective for health
- Transitions out of employment were strongly health-selective
- Transformation of the health inequality pattern among those employed was solely due to social causation

PERGAMON

Social Science & Medicine 57 (2003) 1475–1489

SOCIAL SCIENCE & MEDICINE

www.elsevier.com/locate/socscimed

Social causation, health-selective mobility, and the reproduction of socioeconomic health inequalities over time: panel study of adult men

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[b] HUNT Research Centre, Neptunveien 1, 7650 Verdal, Norway

Abstract

This study examines how socioeconomic inequalities in perceived health were reproduced as a cohort of adult men became 10 years older, and focuses especially on the role of social causation and health-selective mobility. A two-wave panel data set collected by the Nord-Trøndelag Health Study (HUNT), Norway, is used, and the study is based on a sample of 9189 men aged 25–49 at baseline. Systematic socioeconomic inequalities in perceived health were observed both at baseline and 10 years later when the sample was aged 35–59. Measured as age-adjusted percentage differences, inequalities in perceived health widened during the study period, both among those who were continuously employed and between the employed and non-employed. The pattern of health inequalities was transformed as a result of numerous changes in perceived health and considerable social mobility during the study period. Compared to higher white collar, changes in perceived health during the study period were more negative among medium-level and manual occupations, and even more negative among the non-employed. Mobility between occupational classes among those employed at both observation points was not selective for health, but transitions into and out of employment were strongly health-selective. It is argued that the transformation of the health inequality pattern among those continuously employed was solely due to social causation, i.e., to more negative changes in perceived health among medium/manual occupations than among the white collar. The wider difference in perceived health between the employed and non-employed was, however, primarily a result of health-selective mobility into and out of the non-employed category.
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Keywords: Socioeconomic inequalities in health; Perceived health; Social causation; Health-selective mobility; Norway

Introduction

Socioeconomic inequalities in health have been documented in a wide range of countries (Kunst, 1997; Cavelaars, 1998; Lahelma, Lundberg, Manderbacka, & Roos, 2001). Such inequalities are observed both among young adults, the middle aged, and among those who inequalities are *reproduced* during the adult life course. This does not mean that inequalities remain unchanged, but the main *pattern* is preserved. The theme of this paper is the reproduction of inequalities in perceived health as a cohort of adult men grows older. We examine how this reproduction takes place, and focus in particular on the role of social causation and health-

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The predictive ability of SRH on mortality risk between different educational groups in Norway (Do people in different social groups rate there health differently)

Table II. Mortality hazard by SRH and education. Reference category is primary educated with good health. Hazard ratios (95% CI).

	Model 1 Age	Model 2 Model 1 + married/ partner	Model 3 Model 2 + severe health problems	Model 4 Model 3 + functional impairment	Model 5 Model 4 + health related behaviour
Men (N = 27,749)					
Primary poor/health	1.46 (1.38–1.54)	1.45 (1.38–1.53)	1.30 (1.24–1.38)	1.22 (1.15–1.29)	1.19 (1.12–1.26)
Lower secondary/good health	0.92 (0.86–0.99)	0.93 (0.87–1.00)	0.94 (0.87–1.01)	0.94 (0.87–1.01)	0.95 (0.89–1.03)
Lower secondary/poor health	1.46 (1.34–1.59)	1.47 (1.35–1.60)	1.30 (1.19–1.42)	1.22 (1.12–1.33)	1.22 (1.12–1.33)
Upper secondary/good health	0.82 (0.76–0.88)	0.84 (0.78–0.90)	0.83 (0.77–0.89)	0.83 (0.77–0.90)	0.87 (0.80–0.93)
Upper secondary/poor health	1.34 (1.22–1.49)	1.38 (1.25–1.52)	1.29 (1.17–1.42)	1.21 (1.09–1.33)	1.23 (1.11–1.36)
Tertiary/good health	0.74 (0.66–0.84)	0.76 (0.68–0.86)	0.76 (0.67–0.85)	0.76 (0.68–0.85)	0.82 (0.73–0.92)
Tertiary/poor health	1.17 (0.95–1.44)	1.18 (0.96–1.45)	1.08 (0.88–1.33)	1.01 (0.82–1.24)	1.03 (0.84–1.27)
Women (N = 29,039)					
Primary/poor health	1.46 (1.38–1.54)	1.46 (1.39–1.54)	1.31 (1.24–1.39)	1.21 (1.14–1.28)	1.17 (1.10–1.24)
Lower secondary/good health	0.86 (0.79–0.93)	0.86 (0.79–0.93)	0.86 (0.79–0.93)	0.86 (0.79–0.93)	0.87 (0.80–0.95)
Lower secondary/poor health	1.36 (1.25–1.49)	1.37 (1.26–1.50)	1.27 (1.17–1.39)	1.18 (1.08–1.30)	1.17 (1.07–1.29)
Upper secondary/good health	0.77 (0.70–0.86)	0.77 (0.70–0.86)	0.77 (0.70–0.86)	0.77 (0.70–0.86)	0.80 (0.72–0.89)
Upper secondary/poor health	1.26 (1.11–1.43)	1.27 (1.12–1.45)	1.17 (1.02–1.32)	1.08 (0.95–1.23)	1.09 (0.96–1.24)
Tertiary/good health	0.64 (0.52–0.77)	0.64 (0.52–0.77)	0.64 (0.53–0.78)	0.64 (0.52–0.77)	0.69 (0.57–0.84)
Tertiary/poor health	1.29 (0.98–1.72)	1.31 (0.98–1.73)	1.24 (0.93–1.64)	1.14 (0.86–1.51)	1.19 (0.80–1.58)

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Scandinavian Journal of Public Health, 2012; 40: 641–647

SJPH

ORIGINAL ARTICLE

Are there educational differences in the association between self-rated health and mortality in Norway? The HUNT Study

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Abstract

Aim: The aim of this study was to test whether the association between self-rated health and mortality differs between educational groups in Norway, and to examine whether health problems and health-related behaviour can explain any of these differences within a previously unexplored contextual setting. *Methods*: The study used data from the Nord-Trøndelag Health Study 84-86 (HUNT) with a 20-year follow up. The analyses were performed for respondents between 25–101 years at baseline (n = 56,788). The association between self-rated health and mortality was tested using Cox regression. *Results*: The results indicate that although self-rated health is associated with mortality there is no difference in the association between self-rated health and mortality between educational groups. Introducing health-related variables did not have an impact on the result. ***Conclusions*: Given the small educational differences in the association between self-rated health and mortality, this supports the reliability of self-reported health as a measurement for objective health.**

Key Words: *Self-rated health, mortality, socioeconomic position, education, HUNT-Study*

Introduction

Self-rated health (SRH) is a widely applied health measure in public health and the social sciences and a growing number of studies have shown that subjective measures of health are strongly correlated with mortality [1–5]. It has also been demonstrated that SRH predicts mortality equally between men and women [6]. However, the literature is less consistent as to whether the association between SRH and mortality varies by socioeconomic position (SEP). The answer to this has important implications for studies exploring the associations between SRH and SEP.

We know that there is a strong and persistent relationship between SRH and educational attainment [7-12]. However, an important assumption of these studies is that inequalities in SRH reflect differences in the true unmeasured health status between socioeconomic groups. That is, the implicit aim of studies examining socioeconomic inequalities in SRH is often to investigate the socioeconomic gradient in objective health. This claim is valid if SRH predicts objective health and mortality equally across socioeconomic groups. If the association between SRH and mortality varies by SEP, it would suggest that we are over- or underestimating health inequalities.

When determining the reliability of people's subjective perception of their health in different socioeconomic groups, we should look at previous research and differentiate between studies exploring educational, occupational and income-related health inequalities. The two pioneer studies to examine this applied Swedish longitudinal data and found that the predictive power of SRH for mortality is unaffected

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The predictive ability of SRH on mortality risk between different occupational and income groups

OCCUPATIONAL CLASS

Good health	Men (N = 20 098) HR (95% CI)	Women (N = 18 871) HR (95% CI)
Higher-grade class	1 (Reference)	1 (Reference)
Medium-grade class	1,08 (0,97–1,21)	1,22 (1,03–1,45)
Lower-grade class	1,00 (0,89–1,12)	1,24 (1,02–1,50)
Unemployed[1]	1,03 (0,42–2,48)	1,56 (1,28–1,91)
Poor health		
Higher-grade class	1,27 (1,04–1,55)	1,39 (1,02–1,88)
Medium-grade class	1,25 (1,09–1,44)	1,31 (1,07–1,61)
Lower-grade class	1,33 (1,16–1,53)	1,63 (1,30–2,03)
Unemployed[1]	3,96 (1,47–10,67)	2,15 (1,72–2,69)

INCOME

Good health	Men (N = 20 095) HR (95% CI)	Women (N = 18 867) HR (95% CI)
Income quartile 4	1 (Reference)	1 (Reference)
Income quartile 3	1,04 (0,94–1,15)	0,90 (0,67–1,21)
Income quartile 2	1,19 (1,06–1,34)	0,96 (0,73–1,26)
Income quartile 1	1,30 (1,14–1,49)	1,13 (0,87–1,48)
No income	1,69 (1,31–2,18)	1,56 (1,19–2,06)
Poor health		
Income quartile 4	1,43 (1,24–1,65)	1,00 (0,57–1,76)
Income quartile 3	1,22 (1,06–1,40)	1,24 (0,84–1,84)
Income quartile 2	1,28 (1,09–1,50)	1,08 (0,78–1,50)
Income quartile 1	1,72 (1,45–2,04)	1,40 (1,04–1,87)
No income	1,73 (1,28–2,35)	1,85 (1,39–2,48)

[1] Unemployed or staying at home with no report of previous work.

Figure 1 *Adjusted hazard ratios (HR) for mortality by self-rated health, occupational class and income (95 % CI). All the models are adjusted for diabetes, angina, myocardial infarction, stroke, reduced mobility, reduced vision, reduced hearing, loss of function as a result of physical illness or mental illness, smoking, alcohol consumption and exercise, as well as age and civil status*

Tidsskriftet
DEN NORSKE LEGEFORENING

Self-rated health and mortality in different occupational classes and income groups in Nord-Trøndelag County, Norway

ORIGINAL ARTICLE

BACKGROUND

People with a lower socioeconomic position have a higher the prevalence of most self-rated health problems. In this article we ask whether this may be attributed to self-rated health not reflecting actual health, understood as mortality, in different socioeconomic groups.

MATERIAL AND METHOD

For the study we used data from the Nord-Trøndelag Health Study 1984–86 (HUNT1), in which the county's entire adult population aged 20 years and above were invited to participate. The association between self-rated health and mortality in different occupational classes and income groups was analysed. The analysis corrected for age, chronic disease, functional impairment and lifestyle factors.

RESULTS

The association between self-rated health and mortality was of the same order of magnitude for the occupational classes and income groups, but persons without work/income and with poor self-rated health stood out. Compared with persons in the highest socioeconomic class, unemployed men had a hazard ratio for death that was three times higher in the follow-up period. For women with no income, the ratio was twice as high.

INTERPRETATION

Self-rated health and mortality largely conform to the different socioeconomic strata. This supports the perception that socioeconomic differences in health are a reality and represent a significant challenge nationally. Our results also increase the credibility of findings from other studies that use self-reported health in surveys to measure differences and identify the mechanisms that create them.

Self-rated health is widely used as a measurement of health in epidemiological and social science research (1, 2). This measurement is based on an assumption that people themselves are capable of assessing their own mental and physical health condition, and it

Self-rated health and mortality in different occupational classes and income groups in Nord-Trøndelag County, Norway | Tidsskrift for Den norske legeforening

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Childhood experience and adult health

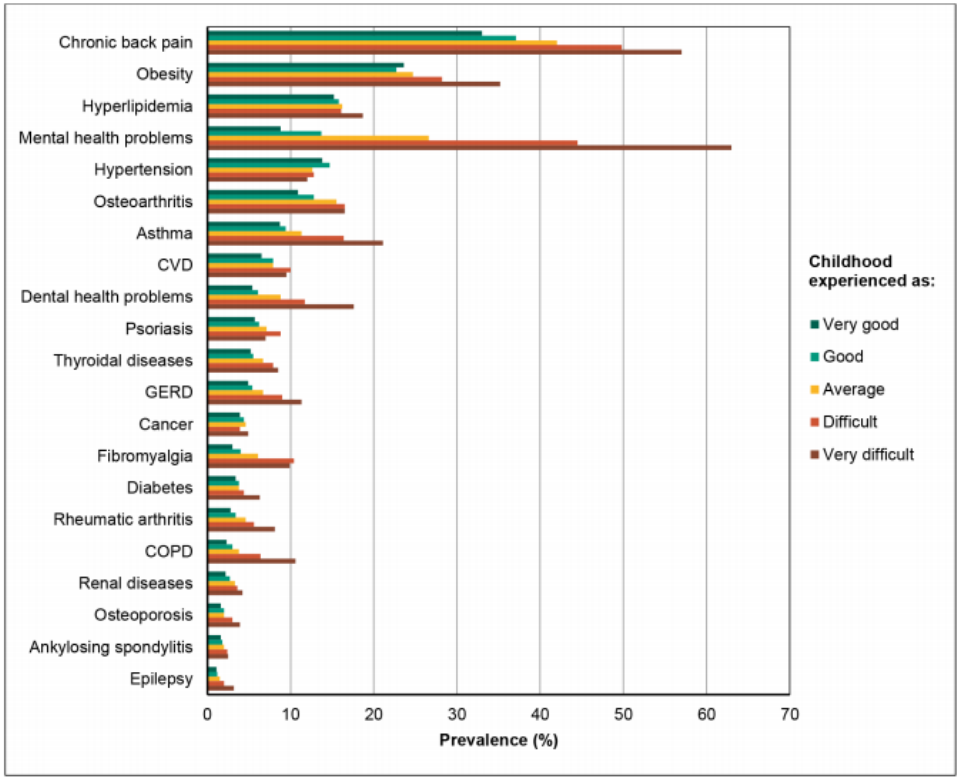

Fig 3. Prevalence of diseases/conditions according to childhood experience for adults (30–69y) in the HUNT3 Study.

PLOS | ONE

RESEARCH ARTICLE

Self Reported Childhood Difficulties, Adult Multimorbidity and Allostatic Load. A Cross-Sectional Analysis of the Norwegian HUNT Study

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Data Availability Statement: Due to restrictions related to patient consent and Norwegian privacy laws, data are available upon request. More information is available at the following URL (http://www.ntnu.edu/hunt/data) and interested parties may contact Dr. Steinar Krokstad (steinar.krokstad@ntnu.no) with further questions.

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Abstract

Background

Multimorbidity receives increasing scientific attention. So does the detrimental health impact of adverse childhood experiences (ACE). Aetiological pathways from ACE to complex disease burdens are under investigation. In this context, the concept of *allostatic overload* is relevant, denoting the link between chronic detrimental stress, widespread biological perturbations and disease development. This study aimed to explore associations between self-reported childhood quality, biological perturbations and multimorbidity in adulthood.

Materials and Methods

We included 37 612 participants, 30–69 years, from the Nord-Trøndelag Health Study, HUNT3 (2006–8). Twenty one chronic diseases, twelve biological parameters associated with allostatic load and four behavioural factors were analysed. Participants were categorised according to the self-reported quality of their childhood, as reflected in one question, alternatives ranging from 'very good' to 'very difficult'. The association between childhood quality, behavioural patterns, allostatic load and multimorbidity was compared between groups.

Results

Overall, 85.4% of participants reported a 'good' or 'very good' childhood; 10.6% average, 3.3% 'difficult' and 0.8% 'very difficult'. Childhood difficulties were reported more often among women, smokers, individuals with sleep problems, less physical activity and lower

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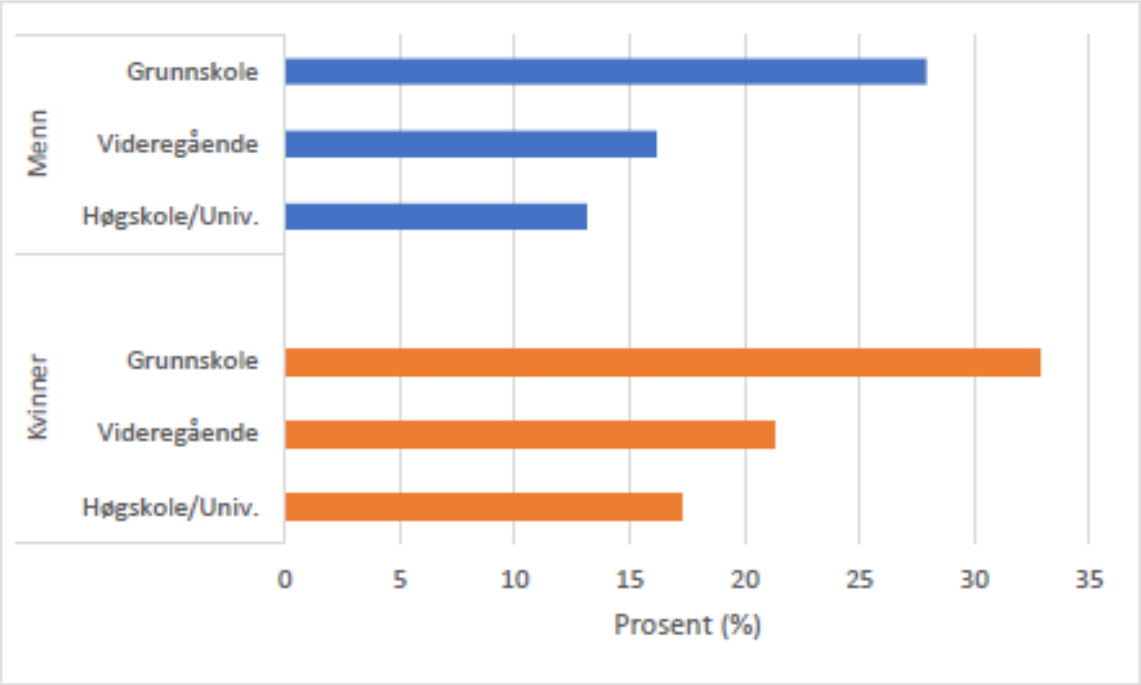
Difficult childhood



Figur 13. Prosentandel av deltakere i HUNT4 (hele Trøndelag) som oppgir at de hadde en vanskelig barndom, etter utdanning og kjønn.

Medical social benefits

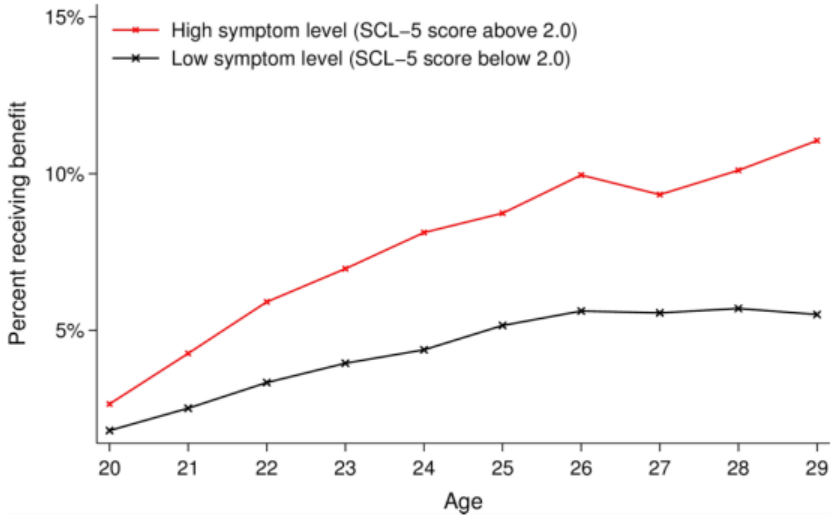
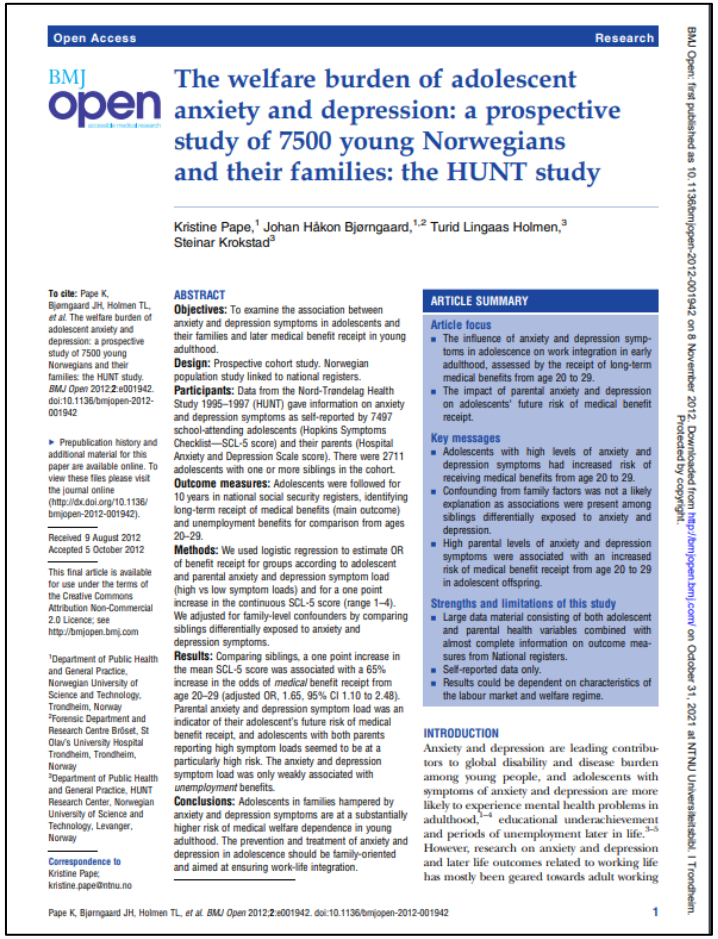


Figure 2 Percentage of the Young-HUNT cohort (n=7497) in receipt of long-term medical benefits at different ages during follow-up according to self-reported anxiety and depression symptom level at baseline.



Open Access Research

BMJ open

The welfare burden of adolescent anxiety and depression: a prospective study of 7500 young Norwegians and their families: the HUNT study

Kristine Pape,[1] Johan Håkon Bjørngaard,[1,2] Turid Lingaas Holmen,[3] Steinar Krokstad[3]

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ABSTRACT

Objectives: To examine the association between anxiety and depression symptoms in adolescents and their families and later medical benefit receipt in young adulthood.

Design: Prospective cohort study. Norwegian population study linked to national registers.

Participants: Data from the Nord-Trøndelag Health Study 1995–1997 (HUNT) gave information on anxiety and depression symptoms as self-reported by 7497 school-attending adolescents (Hopkins Symptoms Checklist—SCL-5 score) and their parents (Hospital Anxiety and Depression Scale score). There were 2711 adolescents with one or more siblings in the cohort.

Outcome measures: Adolescents were followed for 10 years in national social security registers, identifying long-term receipt of medical benefits (main outcome) and unemployment benefits for comparison from ages 20–29.

Methods: We used logistic regression to estimate OR of benefit receipt for groups according to adolescent and parental anxiety and depression symptom load (high vs low symptom loads) and for a one point increase in the continuous SCL-5 score (range 1–4). We adjusted for family-level confounders by comparing siblings differentially exposed to anxiety and depression symptoms.

Results: Comparing siblings, a one point increase in the mean SCL-5 score was associated with a 65% increase in the odds of *medical* benefit receipt from age 20–29 (adjusted OR, 1.65, 95% CI 1.10 to 2.48). Parental anxiety and depression symptom load was an indicator of their adolescent's future risk of medical benefit receipt, and adolescents with both parents reporting high symptom loads seemed to be at a particularly high risk. The anxiety and depression symptom load was only weakly associated with *unemployment* benefits.

Conclusions: Adolescents in families hampered by anxiety and depression symptoms are at a substantially higher risk of medical welfare dependence in young adulthood. The prevention and treatment of anxiety and depression in adolescence should be family-oriented and aimed at ensuring work-life integration.

ARTICLE SUMMARY

Article focus
- The influence of anxiety and depression symptoms in adolescence on work integration in early adulthood, assessed by the receipt of long-term medical benefits from age 20 to 29.
- The impact of parental anxiety and depression on adolescents' future risk of medical benefit receipt.

Key messages
- Adolescents with high levels of anxiety and depression symptoms had increased risk of receiving medical benefits from age 20 to 29.
- Confounding from family factors was not a likely explanation as associations were present among siblings differentially exposed to anxiety and depression.
- High parental levels of anxiety and depression symptoms were associated with an increased risk of medical benefit receipt from age 20 to 29 in adolescent offspring.

Strengths and limitations of this study
- Large data material consisting of both adolescent and parental health variables combined with almost complete information on outcome measures from National registers.
- Self-reported data only.
- Results could be dependent on characteristics of the labour market and welfare regime.

INTRODUCTION

Anxiety and depression are leading contributors to global disability and disease burden among young people, and adolescents with symptoms of anxiety and depression are more likely to experience mental health problems in adulthood,[1–4] educational underachievement and periods of unemployment later in life.[3–5] However, research on anxiety and depression and later life outcomes related to working life has mostly been geared towards adult working

Pape K, Bjørngaard JH, Holmen TL, *et al*. *BMJ Open* 2012;**2**:e001942. doi:10.1136/bmjopen-2012-001942 1

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Table 2 Logistic regression analyses associating family exposures of anxiety and depression symptoms in adolescence with receipt of medical benefits from age 20 to 29, imputed data

	Medical benefits from age 20 to 29					
	Model 1*		Model 2*		Model 3*	
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
Adolescent anxiety and depression symptoms, n=7497						
SCL-5 scale score†	1.47	(1.29 to 1.68)	1.33	(1.17 to 1.53)	1.29	(1.12 to 1.48)
Low symptom load	1.00	(ref)	1.00	(ref)	1.00	(ref)
High symptom load	1.58	(1.33 to 1.87)	1.42	(1.20 to 1.69)	1.37	(1.15 to 1.64)
Adolescent and parental anxiety and depression symptoms, n=7497						
Adolescent low and parents low	1.00	(ref)	1.00	(ref)	1.00	(ref)
Adolescent low and one parent high	1.31	(1.08 to 1.58)	1.29	(1.06 to 1.56)	1.16	(0.96 to 1.41)
Adolescent low and both parents high	1.92	(1.38 to 2.69)	1.88	(1.34 to 2.64)	1.56	(1.10 to 2.22)
Adolescent high and parents low	1.68	(1.33 to 2.13)	1.53	(1.21 to 1.94)	1.52	(1.20 to 1.93)
Adolescent high and one parent high	1.82	(1.34 to 2.49)	1.61	(1.18 to 2.21)	1.39	(1.01 to 1.92)
Adolescent high and both parents high	2.30	(1.40 to 3.77)	1.98	(1.19 to 3.27)	1.58	(0.95 to 2.65)
Comparison of siblings within families, n=577‡						
SCL-5 scale score†	1.86	(1.25 to 2.76)	1.65	(1.10 to 2.48)		

*Model 1: adjusted for age, sex and follow-up time; Model 2: adjusted for age, sex, follow-up time and adolescent somatic health; Model 3: as Model 2, with additional adjustment for parental educational level and family risk factors.
†OR of a one point increase in the SCL-5 score (range1–4).
‡Fixed-effect model (conditional logistic regression).

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Occupation and health
Depression among farmers

Sex	Occupational group	n	n caseness	Odds ratio	95% CI
Men	Higher grade professionals	2456	153	1	reference
	Lower grade professionals	2063	137	1.11	0.87-1.41
	Non-manual routine workers	1391	115	1.42	1.01-1.82
	Farmers	1100	125	1.94	1.52-2.49
	Skilled manual workers	3737	343	1.60	1.31-1.95
	Unskilled manual workers	379	27	1.23	0.80-1.88
Women	Higher grade professionals	2143	88	1	reference
	Lower grade professionals	3886	206	1.35	1.04-1.74
	Non-manual routine workers	5940	392	1.66	1.31-2.11
	Farmers	317	25	2.00	1.26-3.17
	Skilled manual workers	539	56	2.76	1.95-3.92
	Unskilled manual workers	921	86	2.38	1.75-3.24

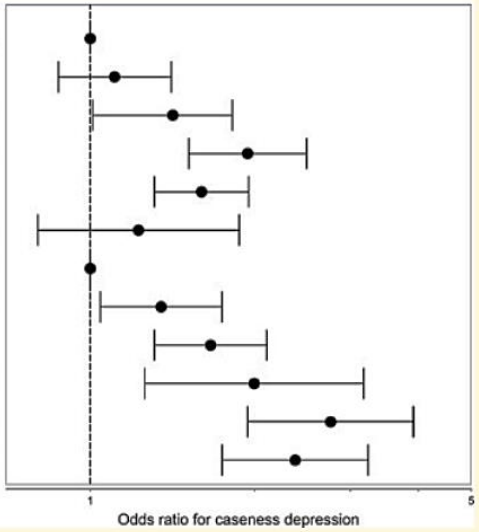

Figure 2.

Odds ratios for caseness of depression (HADS-D ≥8), stratified by sex and adjusted for age. The HUNT3 Survey (2006–2008).

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Anxiety and Depression Symptoms Among Farmers: The HUNT Study, Norway

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ABSTRACT

Agriculture has undergone profound changes, and farmers face a wide variety of stressors. Our aim was to study the levels of anxiety and depression symptoms among Norwegian farmers compared with other occupational groups. Working participants in the HUNT3 Survey (The Nord-Trøndelag Health Study, 2006–2008), aged 19–66.9 years, were included in this cross-sectional study. We compared farmers (women, n = 317; men, n = 1,100) with HUNT3 participants working in other occupational groups (women, n = 13,429; men, n = 10,026), classified according to socioeconomic status. We used the Hospital Anxiety and Depression Scale (HADS) to measure anxiety and depression symptoms. Both male and female farmers had higher levels of depression symptoms than the general working population, but the levels of anxiety symptoms did not differ. The differences in depression symptom levels between farmers and the general working population increased with age. In an age-adjusted logistic regression analysis, the odds ratio (OR) for depression caseness (HADS-D ≥8) when compared with the general working population was 1.49 (95% confidence interval [CI]: 1.22–1.83) in men and 1.29 (95% CI: 0.85–1.95) in women. Male farmers had a higher OR of depression caseness than any other occupational group (OR = 1.94, 95% CI: 1.52–2.49, using higher-grade professionals as reference). Female farmers had an OR similar to men (2.00, 95% CI: 1.26–3.17), but lower than other manual occupations. We found that farmers had high levels of depression symptoms and average levels of anxiety symptoms compared with other occupational groups.

KEYWORDS
Agricultural workers; anxiety; cross-sectional studies; depression; socioeconomic factors

Introduction

Few occupations have undergone more profound changes over the past few decades than those experienced by farmers, and the number of Norwegian farmers has decreased.[1] Despite geographical and political differences, the same trends can be seen in most industrialized countries,[2,3] and the demands and stressors farmers face in a rapidly changing sector appear to be similar across borders.[4]

Occupational stressors that are unique to farmers, such as physical environment, family structure, farm economy, bureaucracy, and other uncertainties associated with farming,[5,6] may have been aggravated in recent years because of the structural and economic changes in agriculture.[6] These stressors may be hazardous to mental health, but research has so far not provided a clear answer to the question of whether or not the mental health of farmers differs from that of the general working population.[7] Psychiatric disorders are commonly a contributing factor to suicide,[8] and farmers are at increased risk of suicide.[9,10] Mental illness appears to be particularly stigmatizing in farming communities, and farmers seem reluctant to contact the health care system for help for mental health problems.[5,6] Very limited research is available on the mental health of female farmers, but there is some evidence to suggest that female farmers experience more psychological distress than their male colleagues.[11–13]

The HUNT Study (Helseundersøkelsen i Nord-Trøndelag, the Nord-Trøndelag Health Study) is one of the largest health studies ever performed. It

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Sibling comparison

	Symptoms of depression caseness [c]			
	HUNT2 N_{obs}=2099 $N_{grp=}$=703 $N_{average}$=3.0		HUNT3 N_{obs}=1145 $N_{grp=}$=425 $N_{average}$=2.7	
	OR	95% CI	OR	95% CI
Farmers	1	.	1	.
Siblings	0.75	0.63-0.89	0.70	0.55-0.89

Table 4Depression caseness among farmers compared to their siblings working in other occupations. Adjusted for sex, age, education and birth order. Nobs=number of observations; Ngrp=number of groups (families); Naverage=average number of observations per group.]

Original article

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Farmers' mental health: A longitudinal sibling comparison – the HUNT study, Norway

by Magnhild Oust Torske, DVM,[1] Johan Håkon Bjørngaard, PhD,[2, 3] Bjørn Hilt, MD,[2, 4] David Glasscock, PhD,[5] Steinar Krokstad, PhD [1, 6]

Torske MO, Bjørngaard JH, Hilt B, Glasscock D, Krokstad S. Farmers' mental health in farmers: A longitudinal sibling comparison – the HUNT study, Norway. *Scand J Work Environ Health.* 2016;42(6):547–556. doi:10.5271/sjweh.3595

Objective Studies of the mental health of farmers have been largely cross-sectional and possibly confounded. We performed a prospective cohort study as well as a sibling comparison to control for unmeasured confounding.

Methods Our study included 76 583 participants aged ≥19 years from the Nord-Trøndelag Health Study [HUNT1 (1984–1986), HUNT2 (1995–1997) and HUNT3 (2006–2008)]. We used the Anxiety and Depression Index (ADI) and the Hospital Anxiety and Depression Scale (HADS) to measure symptoms of mental distress. We used logistic regression to investigate the association between occupation at baseline and symptoms of mental distress 11 years later and fixed effects conditional logistic regression to compare farmers with their siblings working in other occupations.

Results In the prospective cohort study, farmers had similar odds of having symptoms of psychological distress and anxiety as other manual occupational groups. Among all the occupational groups in the study, farmers had the highest odds of having symptoms of depression [odds ratio (OR) 1.99, 95% confidence interval (CI) 1.55–2.55, reference group: higher grade professionals]. Compared with their farming brothers and sisters, siblings in other occupations had lower odds of having high depression (OR 0.70, 95% CI 0.55–0.89) and anxiety (OR 0.79, 95% CI 0.63–1.00) scores in 2006–2008.

Conclusion Farmers had higher odds of having high depression scores compared to both other occupational groups and their siblings who were not working as farmers, suggesting that working in agriculture may impact mental health.

Key terms agricultural work; agricultural worker's disease; agriculture; anxiety; depression; depressive symptom; farming; mental disorder.

Work in the agricultural industry is associated with working long hours, economic difficulties, and uncertainties inherent to farming that might influence mental health. However, the evidence for whether the mental health of farmers differs from that of the general population is scarce and shows mixed results (1). Some studies have found that farmers had lower or similar prevalences of mental health problems compared to the general population or other rural residents (2–4), but two large population-based Norwegian studies found indications that farmers had the highest prevalence of depressive symptoms of all the occupational groups included in those studies (5, 6).

The structural changes in agriculture in recent decades may be another source of stress for farmers in industrialized countries (7). The development has been characterized by new technologies and increasing productivity demands, a decrease in the number of farmers, and an increase in farm size (8). Agriculture in Norway has followed this international trend, and this is reflected

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Psychosocial working conditions, sickness absence

TABLE 3. Odds Ratios for All-Cause Sickness Absence More Than 4 Weeks by Psychosocial Work Factors in Women

	Model 1*		Model 2†		Model 3‡		Men	
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
Demands (trend)	1.33	(1.23–1.45)	1.28	(1.17–1.39)	1.25	(1.15–1.36)	1.17	(1.03–1.32)
Does your job require you to work very fast? Often/sometimes vs never/seldom	1.26	(1.13–1.41)	1.22	(1.09–1.37)	1.21	(1.07–1.35)	1.18	(0.96–1.46)
Does your job require you to work very hard? Often/sometimes vs never/seldom	1.35	(1.19–1.54)	1.28	(1.12–1.47)	1.26	(1.10–1.45)	1.17	(1.00–1.38)
Does your job require too great a work effort? Often/sometimes vs never/seldom	1.38	(1.21–1.56)	1.32	(1.15–1.51)	1.30	(1.13–1.48)	1.21	(1.04–1.42)
Control (trend)	0.93	(0.85–1.01)	0.96	(0.88–1.06)	0.97	(0.88–1.06)	0.82	(0.72–0.93)
Does your job require creativity? Often/sometimes vs never/seldom	0.96	(0.85–1.10)	0.94	(0.83–1.07)	0.93	(0.82–1.06)	0.76	(0.63–0.92)
Do you have the possibility to decide for yourself how to carry out your work? Often/sometimes vs seldom/never	0.99	(0.86–1.14)	1.05	(0.91–1.22)	1.07	(0.92–1.24)	0.93	(0.75–1.16)
Do you have the possibility to decide for yourself what should be done in your work? Often/sometimes vs seldom/never	0.88	(0.79–0.99)	0.93	(0.83–1.05)	0.94	(0.84–1.06)	0.78	(0.66–0.92)
Support (trend)	0.73	(0.67–0.81)	0.81	(0.73–0.90)	0.83	(0.75–0.92)	0.90	(0.78–1.04)
There is good collegiality at work Strongly agree/agree vs disagree/strongly disagree	0.69	(0.56–0.84)	0.80	(0.65–0.98)	0.84	(0.68–1.04)	0.88	(0.66–1.18)
My coworkers are there for me (support me) Strongly agree/agree vs disagree/strongly disagree	0.61	(0.50–0.74)	0.69	(0.56–0.85)	0.73	(0.59–0.90)	0.89	(0.66–1.20)
I get along well with my coworkers Strongly agree/agree vs disagree/strongly disagree	0.69	(0.52–0.91)	0.80	(0.60–1.07)	0.84	(0.63–1.13)	0.86	(0.57–1.30)
Bullying/harassment								
Are you bullied/harassed at work? Often/sometimes vs seldom/never	1.62	(1.31–2.00)	1.38	(1.10–1.72)	1.34	(1.07–1.67)	1.37	(1.00–1.89)

*Model 1: adjusted for age and occupation.
†Model 2: adjusted for age, occupation, education, health, and health-related risk factors.
‡Model 3: adjusted for age, occupation, education, health, health-related risk factors, and previous sickness absence.
CI, confidence interval; OR, odds ratio.

ORIGINAL ARTICLE

Psychosocial Working Conditions and Sickness Absence in a General Population

A Cohort Study of 21,834 Workers in Norway (The HUNT Study)

Tonje Strømholm, PhD, Kristine Pape, PhD, Solveig Osborg Ose, Dr Polit, Steinar Krokstad, PhD, and Johan Håkon Bjørngaard, PhD

Objective: To examine the associations between psychosocial working conditions and sickness absence. **Methods:** Data for 21,834 employed adults from the Nord-Trøndelag Health Study (HUNT) were linked to the sickness benefit register and sickness absence during 1 year after survey participation was analyzed with logistic regression. **Results:** A one unit change on a 0 to 3 self-reported job demand scale was associated with a fully adjusted 24% and 25% increased odds of sickness absence in men and women, respectively. A one unit change on a 0 to 3 scale for self-reported support at work was associated with a fully adjusted 13% and 17% reduced odds of sickness absence in men and women, respectively. **Conclusions:** The results of this study indicate that demands, and to some extent support, at work might influence sickness absence—also when adjusting for a detailed categorization of occupations.

Work participation is important for health because it ensures economic safety and contributes to social status, social networks, and self-confidence. On the contrary, workplace factors might contribute to ill health and sickness absence.[1] As the influence from physically hazardous and harmful work conditions has been reduced over the last decades in many developed countries, more attention has been drawn to psychosocial working conditions as important determinants of individual and population health. Psychological and social conditions in the workplace have often been classified as job demands and job control, social reciprocity and fairness, as well as social interaction between coworkers and supervisors.[1] One of the main conceptual models of how these conditions may affect health is the demand-control-support model, which identifies three dimensions of psychosocial working conditions. According to this theory, it is the combination of the factors high job demands, low job control, and low social support at work that is most strongly associated with ill health.[2]

Psychosocial working conditions influence on worker's health status, sickness absence, and work disability have been extensively studied.[3–6] High job demands, low job control, and low social support have repeatedly been associated with cardiovascular disease[7,8] and mental ill health,[9] whereas the associations with musculoskeletal disorders have been less consistent.[10,11] Sickness absence has also been shown to be associated with each of the factors high demands, low control, and low social support.[12] There is also evidence to suggest an influence from health on both actual and perceived working conditions.[13]

Although there is evidence to support the importance of these psychosocial work factors, their relative importance and the size of their effect in relation to ill health differ between studies. One possible explanation for these observed differences may be that the strength of associations differs between occupations. Many studies are based on subpopulations, and the distribution of detrimental levels of demands, control, and support differ with occupation.[14] Studies of general populations have mainly focused on the differences in distribution of these factors across occupations and not on possible differences in the importance of these factors within occupations.[15]

The aim of this prospective study was to utilize data from the large Norwegian HUNT Study to examine the associations between psychosocial working conditions and sickness absence (all-cause and diagnosis-specific) prospectively in a general population. We were able to adjust for a wide range of possible confounding factors regarding baseline health status, previous sickness absence, social position, and a detailed categorization of occupations.

STUDY POPULATION AND METHODS

Study Population

The study population consisted of employed participants in the general working population, aged 30 to 69 years, in the Nord-Trøndelag Health Study (HUNT); 11,746 women and 10,088 men; a total of 21,834.

The HUNT Study is a population survey from the county of Nord-Trøndelag in Norway, and the third wave—the HUNT3 Survey—was conducted in the period 2006 to 2008. In 2006, this population was 128,694 persons (per January 1, 2006). All inhabitants over the age of 20 years received an invitation to participate in the survey along with a questionnaire (Q1). The survey included a screening session and a general interview. On attendance the participants returned the first questionnaire and received a second questionnaire (Q2) according to their sex and age. The participants in the age group 30 to 69 years received a questionnaire that included items on psychosocial work conditions. Of 64,924 invited in the age group 30 to 69 years, 37,842 (58.3%) answered the first questionnaire and 31,010 (47.8%) answered both questionnaires. Of those answering both questionnaires, a total of 23,578 reported being employed. After exclusion of those who were on sick leave at the date of participation in HUNT3 ($n = 1744$), a total of 21,834 remained for analysis.

Data on Sickness Absence

Individual health data from the HUNT3 Survey was linked to the sickness benefit register of the Norwegian Labour and Welfare Administration (available in the event database of Statistics Norway, FD-trygd) by the use of the unique 11-digit national identity

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Health and unemployment

Table 2 Hazard ratio (HR) for unemployment (>90 days) according to baseline symptoms of anxiety and depression, chronic somatic conditions, musculoskeletal pain, gastrointestinal symptoms, insomnia, self-rated health, alcohol consumption and problematic use of alcohol (CAGE)

	Model 1 [a]		Model 2 [b,c]		Model 3 [d]	
	HR	95% CI	HR	95% CI	HR	95% CI
Anxiety and depression (HADS)						
No symptoms (78%)	1.00	Ref.	1.00	Ref.	1.00	Ref.
Anxiety only (12%)	1.23	1.10-1.38	1.29	1.06-1.34	1.13	1.01-1.27
Depression only (3%)	1.33	1.08-1.63	1.25	1.01-1.55	1.20	0.98-1.49
Anxiety and depression (7%)	1.87	1.62-2.16	1.72	1.48-1.99	1.57	1.35-1.83
Chronic somatic conditions						
0 (54%)	1.00	Ref.	1.00	Ref.	1.00	Ref.
1 (32%)	1.20	1.10-1.29	1.19	1.10-1.30	1.17	1.07-1.27
2 (10%)	1.31	1.16-1.49	1.30	1.15-1.48	1.29	1.13-1.46
≥3 (4%)	1.93	1.60-2.32	1.86	1.53-2.26	1.78	1.46-2.17

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Health and unemployment: 14 years of follow-up on job loss in the Norwegian HUNT Study

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Background: Many studies have investigated how unemployment influences health, less attention has been paid to the reverse causal direction; how health may influence the risk of becoming unemployed. We prospectively investigated a wide range of health measures and subsequent risk of unemployment during 14 years of follow-up. **Methods:** Self-reported health data from 36 249 participants in the Norwegian HUNT2 Study (1995–1997) was linked by a personal identification number to the National Insurance Database (1992–2008). Exact dates of unemployment were available. Cox's proportional hazard models were used to estimate hazard ratios (HR) for the association of unemployment with several health measures. Adjustment variables were age, gender, education, marital status, occupation, lifestyle and previous unemployment. **Results:** Compared to reporting no conditions/symptoms, having ≥3 chronic somatic conditions (HR 1.78, 95% CI 1.46–2.17) or high symptom levels of anxiety and depression (HR 1.57, 95% CI 1.35–1.83) increased the risk of subsequent unemployment substantially. Poor self-rated health (HR 1.36, 95% CI 1.24–1.51), insomnia (HR 1.19, 95% CI 1.09–1.32), gastrointestinal symptoms (HR 1.17, 95% CI 1.08–1.26), high alcohol consumption (HR 1.17, 95% CI 0.95–1.44) and problematic use of alcohol measured by the CAGE questionnaire (HR 1.32, 95% CI 1.17–1.48) were also associated with increased risk of unemployment. **Conclusion:** People with poor mental and physical health are at increased risk of job loss. This contributes to poor health amongst the unemployed and highlights the need for policy focus on the health and welfare of out of work individuals, including support preparing them for re-employment.

Introduction

Following the Great Recession, concerns have been raised regarding possible health effects of millions of people losing their jobs. There is a growing body of evidence suggesting adverse effects on health of the crisis, especially concerning higher rates of suicide and mental illness.[1–6] Furthermore, evidence from different countries has indicated an association between unemployment and several health outcomes, including cardiovascular mortality, cancer mortality, poorer general health, somatic complaints, altered alcohol consumption and increased use of health services and prescription drugs.[7–12] However, the causal direction between unemployment and health is not straight forward.

While health effects of unemployment (causation hypothesis) have been extensively studied[13,14] less attention has been paid to whether poor health increases the risk of job loss (health selection hypothesis). If people with impaired health are more likely to lose their jobs, i.e. 'selected' into unemployment, this is an important public health issue *per se* and should be considered in preventive health care and the design of vocational rehabilitation programs. Further, health selection may confound the association between unemployment and health.

Although some studies have found a selection of workers with ill health into unemployment,[15–18] a recent meta-analysis found the selection effects to be weak.[18] However, the existing literature on the influence of poor health on the risk of unemployment has mostly been limited to studies on poor mental health[8,14,18] and overall self-rated health measures,[16,20] whereas somatic conditions and lifestyle have received little attention. High alcohol consumption as a predictor of unemployment has been studied with mixed results.[21] Many previous studies in this field have used survey data only[18] or had short periods of follow-up.[22] The aim of our study was to prospectively investigate the associations between health and lifestyle and subsequent risk of unemployment in a Norwegian labour market context.

Methods

The HUNT Study

All residents of Nord-Trøndelag County in Norway aged ≥20 were invited to participate in the second wave of the HUNT Study (1995–1997, http://www.ntnu.edu/hunt/databank). The study procedures and a non-participation study are described elsewhere.[23,24] Participants were asked to fill in questionnaires and undergo a physical examination. Of the 94 194 invited, 65 600 (70%) participated. In the present study, 36 249 were included in the analysis (figure 1). Inclusion criteria were age 20–66, not pensioned before baseline or within the first year after baseline, having filled in the HUNT2 questionnaire and non-missing on exposures.

The Norwegian Insurance Database (FD-trygd)

Statistics Norway's National Insurance Database covers the entire Norwegian population since 1992 and provided entry/exit dates on all working life events for each HUNT2-participant: unemployment (registered and benefits), sick leave benefits, supplementary benefits, pensions, emigration and death.

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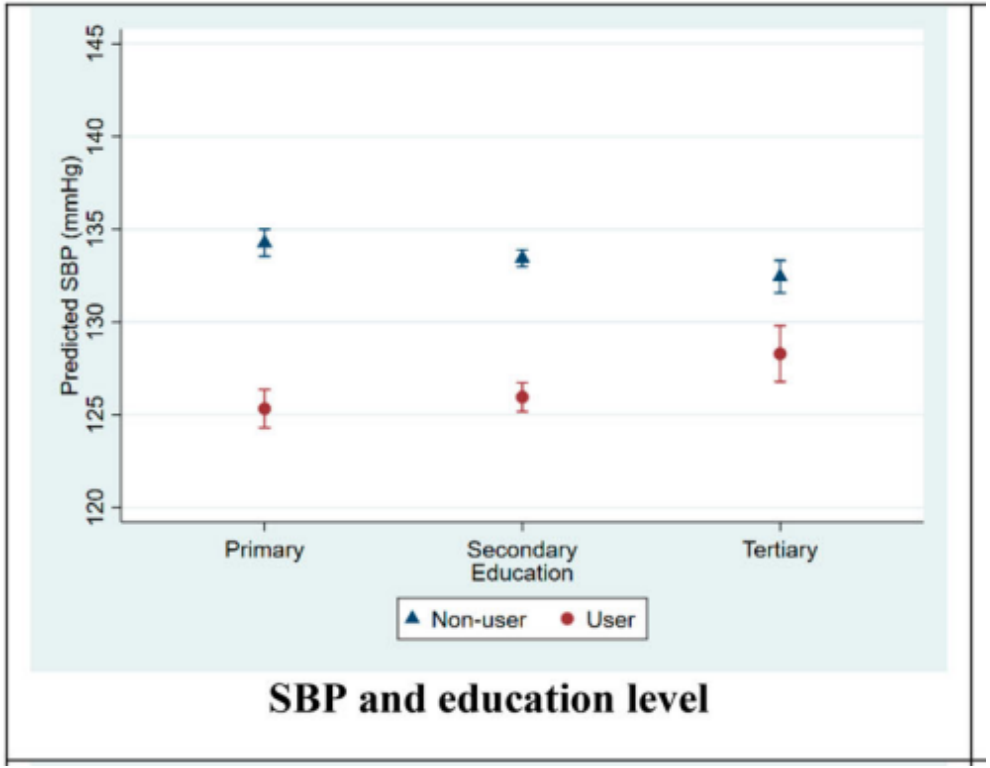

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Medical innovations can reduce social inequalities in health: an analysis of blood pressure and medication in the HUNT study

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ABSTRACT
This paper examines whether the use of blood pressure medication has an influence on social inequalities in blood pressure levels. In Norway, cardiovascular disease has for decades been associated with high mortality and social inequalities. High blood pressure is an important risk factor in this aspect, and prescription drugs have been established as a standard treatment of hypertension. We have seen population blood pressure levels fall, blood pressure inequality levels remaining stabile, and medication use increase. The paper uses panel data from the Nord-Trøndelag Health Study linked with registry data on education and income. Results from fixed effects regression analyses indicate that blood pressure medication overall has a levelling effect. The traditional social gradient is mainly found among non-users of medication. With blood pressure medication being plausibly at a late stage of its diffusion, these findings give some support to the hierarchical diffusion model, while they also imply the need for equal access to sufficient blood pressure treatment.

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KEYWORDS
Norway; social inequalities; blood pressure; cardiovascular disease; fundamental cause theory; diffusion

Having low education and starting on medication predicted a 7.3 mmHg decrease in systolic BP among men, while the decrease for the high-educated was 2.6 mmHg (Figure 1, top left panel)

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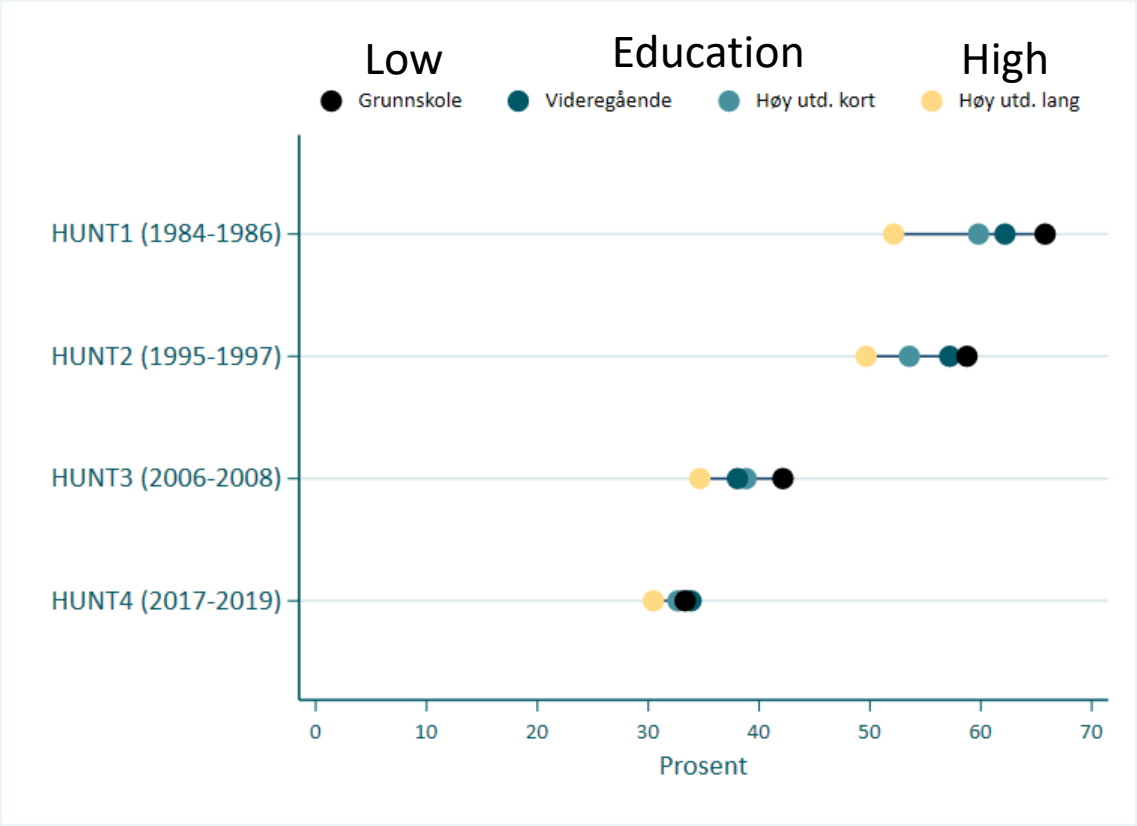
Hypertension by educational level
Men 40+ yrs
HUNT4



Hypertension by educational level
Women 40+ yrs
HUNT4

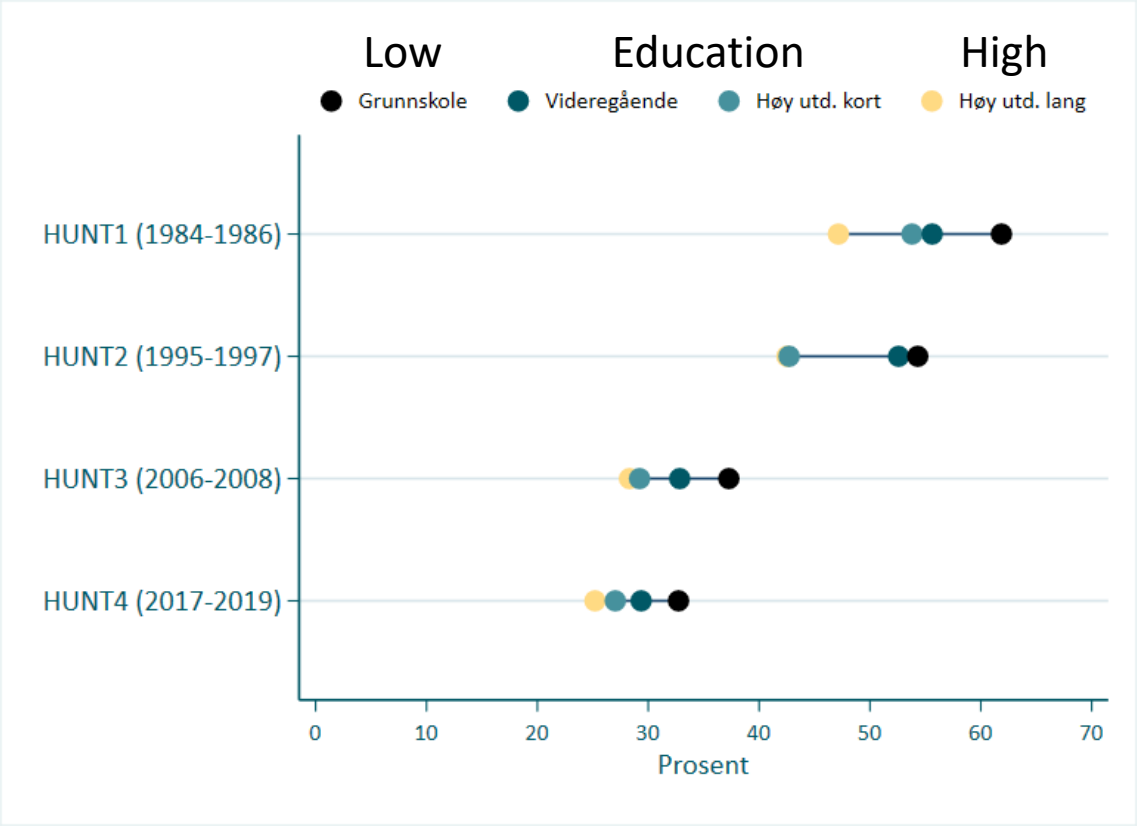


Table 2 Age-standardized prevalence, RII*and SII of current smoking and diabetes among women and men aged 40–59 years between 1984 and 2008 in The Nord-Trøndelag Health Study (HUNT), by level of education**

	HUNT I (1984–86)	HUNT II (1995–97)	HUNT III (2006–08)	P for trend
	Current smoking			
Women				
Educational level				
Primary	37.6	48.6	46.2	
Secondary	30.1	37.9	33.9	
Tertiary	17.5	19.6	22.3	
RII (95% CI)	2.00 (1.77-2.24)	2.57 (2.35-2.80)	2.55 (2.28-2.81)	0.001
SII (95% CI)	22.54 (18.92-26.17)	36.13 (32.96-39.31)	30.09 (26.74-33.45)	<0.001
Men				
Educational level				
Primary	40.4	42.9	35.7	
Secondary	35.4	34.2	26.6	
Tertiary	25.7	20.1	17.4	
RII (95% CI)	1.57 (1.41-1.73)	2.31 (2.07-2.54)	2.48 (2.11-2.85)	0.000
SII (95% CI)	17.05 (13.26-20.84)	28.65 (25.30-32.00)	23.24 (19.59-26.89)	0.048

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RESEARCH ARTICLE Open Access

Trends in absolute and relative educational inequalities in four modifiable ischaemic heart disease risk factors: repeated cross-sectional surveys from the Nord-Trøndelag Health Study (HUNT) 1984–2008

Linda Ernstsen[1,2,3*], Bjørn Heine Strand[4], Sara Marie Nilsen[5], Geir Arild Espnes[1,2,6] and Steinar Krokstad[5,7,8]

Abstract

Background: There has been an overall decrease in incident ischaemic heart disease (IHD), but the reduction in IHD risk factors has been greater among those with higher social position. Increased social inequalities in IHD mortality in Scandinavian countries is often referred to as the Scandinavian "public health puzzle". The objective of this study was to examine trends in absolute and relative educational inequalities in four modifiable ischaemic heart disease risk factors (smoking, diabetes, hypertension and high total cholesterol) over the last three decades among Norwegian middle-aged women and men.

Methods: Population-based, cross-sectional data from The Nord-Trøndelag Health Study (HUNT): HUNT 1 (1984–1986), HUNT 2 (1995–1997) and HUNT 3 (2006–2008), women and men 40–59 years old. Educational inequalities were assessed using the Slope Index of Inequality (SII) and The Relative Index of Inequality (RII).

Results: Smoking prevalence increased for all education groups among women and decreased in men. Relative and absolute educational inequalities in smoking widened in both genders, with significantly higher absolute inequalities among women than men in the two last surveys. Diabetes prevalence increased in all groups. Relative inequalities in diabetes were stable, while absolute inequalities increased both among women ($p = 0.05$) and among men ($p = 0.01$). Hypertension prevalence decreased in all groups. Relative inequalities in hypertension widened over time in both genders. However, absolute inequalities in hypertension decreased among women ($p = 0.05$) and were stable among men ($p = 0.33$). For high total cholesterol relative and absolute inequalities remained stable in both genders.

Conclusion: Widening absolute educational inequalities in smoking and diabetes over the last three decades gives rise to concern. The mechanisms behind these results are less clear, and future studies are needed to assess if educational inequalities in secondary prevention of IHD are larger compared to educational inequalities in primary prevention of IHD. Continued monitoring of IHD risk factors at the population level is therefore warranted. The results emphasise the need for public health efforts to prevent future burdens of life-style-related diseases and to avoid further widening in socioeconomic inequalities in IHD mortality in Norway, especially among women.

Keywords: Trends, Socioeconomic inequalities, Gender differences, Ischaemic heart disease risk factors, Smoking, Diabetes, Hypertension, High total cholesterol

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Life expectancy

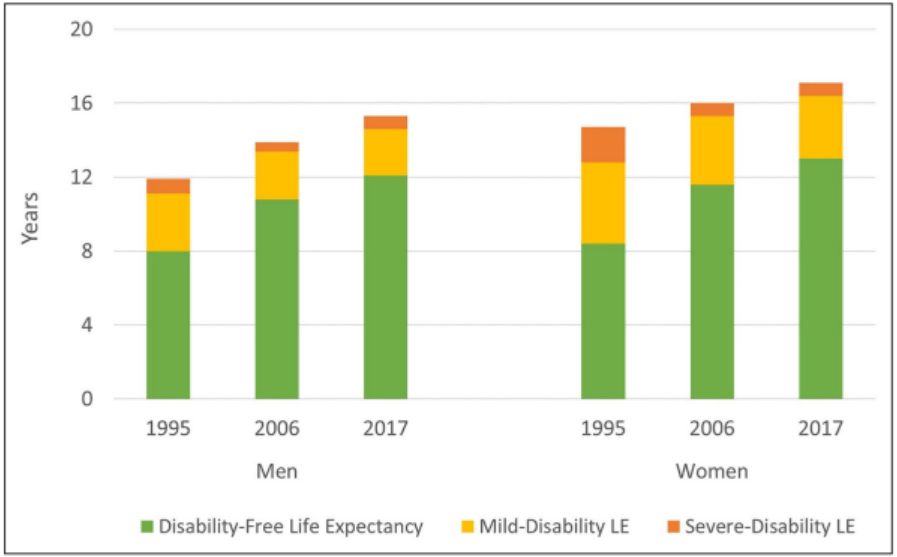

Figure 1. Disability-Free LE (DFLE), Mild-Disability LE, Severe-Disability LE for men and women at age 70 years from 1995 to 2017, the HUNT Study, Norway.

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Scandinavian Journal of Public Health, 1–10

ORIGINAL ARTICLE

Trends in Disability-Free Life Expectancy (DFLE) from 1995 to 2017 in the older Norwegian population by sex and education: The HUNT Study

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Abstract

Aim: Understanding whether increasing Life Expectancy (LE) translates to improved health and function among older adults is essential, but results are inconclusive. We aimed to estimate trends in Disability-Free Life Expectancy (DFLE) in the older Norwegian population by sex and education from 1995 to 2017. *Method:* National life table data were combined with cross-sectional data on functional ability for 70+ year-olds from the population-based Trøndelag Health Surveys 2-4 (1995–1997, 2006–2008 and 2017–2019) (n=24,733). Self-reported functional ability was assessed on a graded scale by a combination of Instrumental Activities of Daily Living (IADL) such as paying bills, going out or shopping (mild disability) and Personal Activities of Daily Living (PADL) such as washing, dressing or eating (severe disability). LE, DFLE, Mild-Disability LE and Severe-Disability LE at age 70 were estimated by the Sullivan method. *Results:* From 1995 to 2017 DFLE at age 70 increased from 8.4 to 13.0 years in women, and from 8.0 to 12.1 years in men. DFLE increased in the basic and high educational groups, but more so in the high educational group among men. Educational inequalities in years spent with disability however, remained low. ***Conclusions:* From the mid-1990s and over the past three decades both LE and DFLE at 70 years increased in the older Norwegian population, for both men and women, and across basic and high educational levels. Educational inequalities in DFLE increased, especially in men, but years spent with disability were similar across the three decades.**

Keywords: *Disability-Free Life Expectancy, Activities of Daily Living, Life Expectancy, aged, Norway, HUNT*

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Cultural participation and mortality

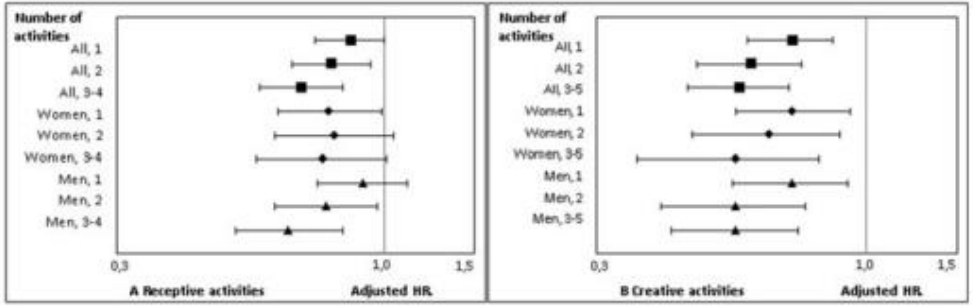

Figure 1 Sum of activities score (1, 2, 3–4) of receptive activities (A) and score (1, 2, 3–5) creative activities (B) and the fully adjusted HRs with all-cause mortality for the whole population and by gender. *Adjusted for age, gender, occupation, marital status, LLI, BMI, PA, alcohol consumption and smoking.

Original research

Cultural participation and all-cause mortality, with possible gender differences: an 8-year follow-up in the HUNT Study, Norway

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► Additional material is published online only. To view please visit the journal online (http://dx.doi.org/10.1136/jech-2019-213313).

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ABSTRACT
Background Cultural activities can promote health and longevity, but longitudinal studies examining a broad spectrum of participation are scarce. This study investigated the gender-specific association between all-causes of mortality and participation in single types of cultural activities, amount and participation frequency.
Methods We used cohort data from the Nord-Trøndelag Health Study (HUNT Study), Norway (2006–2008), resulting in 35 902 participants, aged 20 and above. Cultural participation in receptive and creative activities was measured. HRs were reported for partially and fully adjusted models.
Results A total of 1905 participants died during the median 8-year follow-up. Mortality risk was higher for non-participants in any receptive or creative activities, except sport event attendees. Gender association was also evaluated: among men, we found similar results as

However, most intervention studies were conducted with patients in clinical contexts involving small samples, which limits generalisation for scaling up of the evidence towards public health purposes.[4 5] Epidemiological research, on the other hand, can explore how cultural participation positively affects population health by preventing morbidity and mortality and improving quality of life and well-being. Most of the research to date were cross-sectional, which cannot support causality.[6] While evidence from longitudinal studies has grown in the past decade, these investigations have been characterised by fragmented approaches that focus on the health benefits of specific cultural activities, such as attending church and religious services[7 8] as well as longitudinal studies on physical activity, exercise and sport participation.[9] However, a person's cultural lifestyle as a whole has rarely been examined in the same sample.[4 10] Furthermore, some longitudinal studies involved only one gender, and few studies referred to the gender difference between cultural participation and its impact on health.[11] Yet female and males exhibit different choices of behaviours and decision about time allocation,[9] considering gender in these studies is crucial.

Taking part in cultural activities can be 'passive' (ie, receptive mode—sports event, concerts, theatre and so on) or 'active' (ie, creative mode—playing musical instruments, outdoor activities and so on).[1–3] Active participation modes are commonly studied in relation to population health; both modes are rarely examined together and investigated simultaneously. The Nord-Trøndelag Health Study (HUNT Study) in Norway provides a rare opportunity to profile participants' cultural pattern due to the rich information collected on receptive and creative participation. Persisting inequalities in mortality highlight the need for exploring factors that can promote longevity in the general population; leisure behaviour needs further exploration.

The main purpose of this study was to identify the types of cultural activities and participation modes (receptive and creative) that protect against all-cause mortality. A number of activities and frequency of weekly participation were considered. Possible gender differences were also considered.

METHODS
Study population
The HUNT Study is a longitudinal population health study that consisted of four cross-sectional

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Material, psychosocial and behavioural factors

Table 5 HRs and proportional change for mortality by educational levels in men

	Model	Primary education			Secondary education		
		HR	95% CI	Percentage change	HR	95% CI	Percentage change
1	Age adjusted	1.67	(1.29–2.15)		1.35	(1.04–1.75)	
2	Material	1.54	(1.19–2.00)	19	1.28	(0.98–1.66)	20
3	Behavioural	1.42	(1.10–1.85)	37	1.25	(0.96–1.63)	29
4	Psychosocial	1.43	(1.10–1.85)	36	1.23	(0.95–1.61)	34
5	Biomedical	1.55	(1.20–2.01)	18	1.31	(1.01–1.70)	11
6	Material + psychosocial	1.35	(1.04–1.76)	48	1.19	(0.92–1.55)	46
7	Material + behavioural	1.35	(1.03–1.75)	48	1.21	(0.93–1.57)	40
8	Material + biomedical	1.45	(1.12–1.88)	33	1.25	(0.96–1.63)	29
9	Psychosocial + behavioural	1.27	(0.97–1.66)	60	1.17	(0.90–1.53)	51
10	Behavioural + biomedical	1.36	(1.04–1.77)	46	1.22	(0.94–1.60)	37
11	Psychosocial + biomedical	1.36	(1.04–1.77)	46	1.22	(0.93–1.58)	37
12	Material + psychosocial	1.22	(0.93–1.60)	67	1.15	(0.88–1.50)	57
13	All	1.18	(0.90–1.55)	73	1.14	(0.87–1.49)	60

Tertiary education is the reference category.
Adjusted for age in 5-year intervals.
All nested models were significantly improved.

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Material, psychosocial, behavioural and biomedical factors in the explanation of relative socio-economic inequalities in mortality: evidence from the HUNT study

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Accepted 22 June 2009

Background Previous studies have assessed the relative importance of material, psychosocial and behavioural factors in the explanation of relative socio-economic inequalities in mortality, but research into the contribution of biomedical factors has been limited. Our study examines the relative contribution of (i) material, (ii) psychosocial, (iii) behavioural and (iv) biomedical factors in the explanation of relative socio-economic (educational and income) inequalities in mortality.

Methods Cohort study—baseline data from the Norwegian total county population-based HUNT 2 study linked to mortality data (1995/97 to 2003). In this analysis, 18 247 men and 18 278 women aged 24–80 without severe chronic disease at baseline were eligible.

Results No socio-economic inequalities in mortality among women were found. In men, educational- and income-related inequalities in mortality were found with a relative risk for the lowest educational group of 1.67 (1.29–2.15) and the lowest income quartile of 2.03 (1.57–2.70). Together, the four explanatory factors reduced the relative risk of mortality of the lowest educational group to 1.18 (0.90–1.55) and the relative risk of mortality in the lowest income quartile was attenuated to 1.17 (0.83–1.63). Known biomedical factors contributed least to both educational and income inequalities in mortality.

Conclusions Material factors were the most important in explaining income inequalities in mortality amongst men, whereas psychosocial and behavioural factors were the most important in explaining educational inequalities. This suggests that improving the material, psychosocial and behavioural circumstances of men might bring more substantial reductions in relative socio-economic inequalities in mortality.

Keywords Socio-economic inequalities, material factors, psychosocial factors, behavioural factors, biomedical factors

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Mortality and multimorbidity

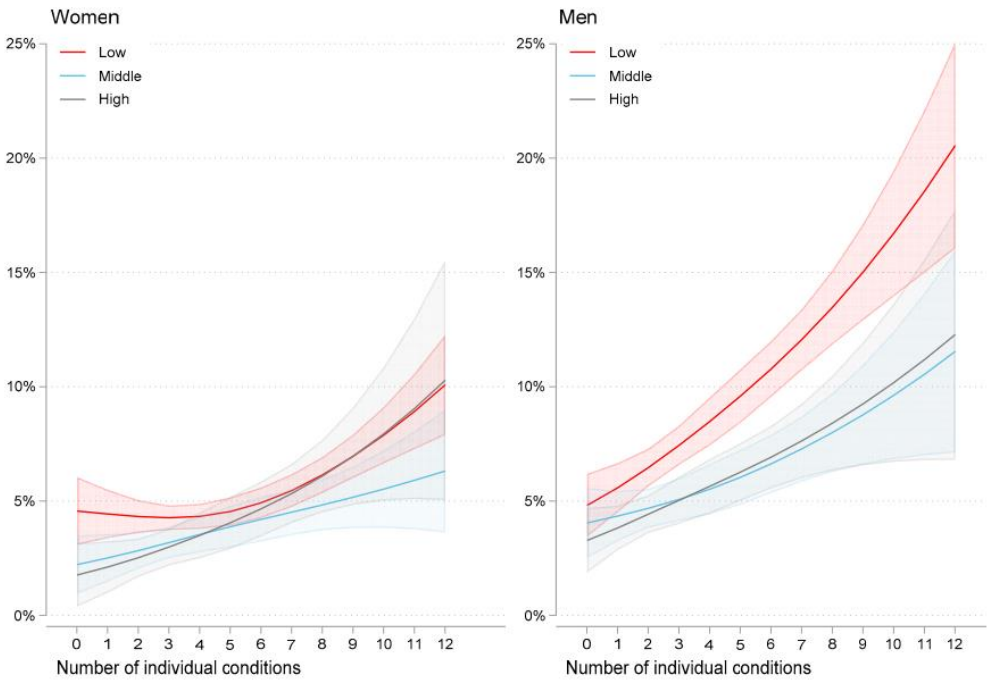

Figure 2. Estimated 10-year all-cause risk of death by number of individual long-term conditions and occupational group for women and men. Shading indicates 95% Cis. Low, middle, and high indicate occupational groups.

Journal of *Clinical Medicine*

MDPI

Article

Socioeconomic Position, Multimorbidity and Mortality in a Population Cohort: The HUNT Study

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Abstract: Multimorbidity and socioeconomic position are independently associated with mortality. We investigated the association of occupational position and several multimorbidity measures with all-cause mortality. A cohort of people aged 35 to 75 years who participated in the Trøndelag Health Study in 2006–2008 and had occupational data was linked to the Norwegian National Population Registry for all-cause mortality from study entry until 1 February 2019. Logistic regression models for each occupational group were used to analyze associations between the number of conditions and 10-year risk of death. Cox regression models were used to examine associations between combinations of multimorbidity, occupational position, and mortality. Analyses were conducted for men and women. Included were 31,132 adults (16,950 women (54.4%)); occupational groups: high, 7501 (24.1%); low, 15,261 (49.0%)). Increased mortality was associated with lower occupational group, more chronic conditions, and all multimorbidity measures. The joint impact of occupational group and multimorbidity on mortality was greater in men than women. All multimorbidity measures are strongly associated with mortality, with varying occupational gradients. Social differences in multimorbidity are a public health challenge and necessitate consideration in health care. Men in lower occupational groups seem to be a particularly vulnerable group.

Keywords: multimorbidity; frailty; socioeconomic status; mortality; occupations; public health; health inequality; The HUNT Study

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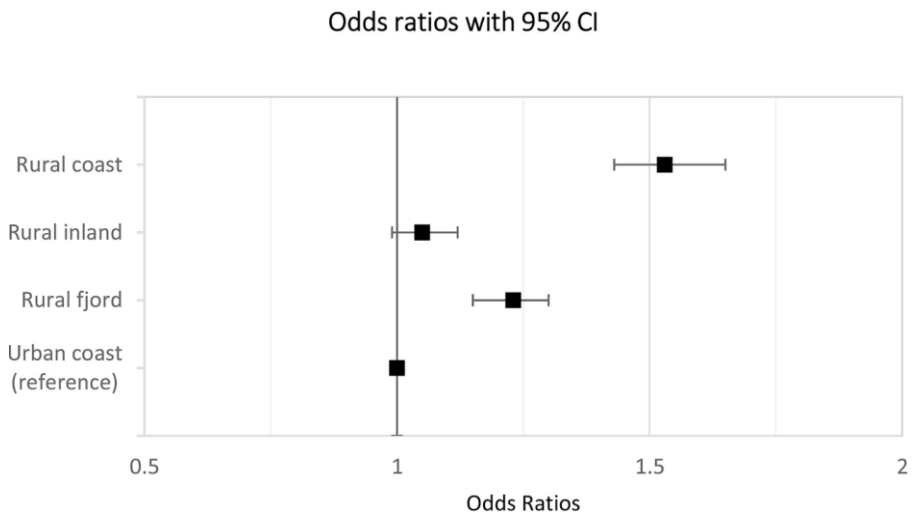

Fig. 1. Age- and gender-adjusted ORs for poor self-rated health by geographical affiliation. Urban coastal population as reference category. The HUNT Study 2006–08 (HUNT3), adults 20+ years.

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Understanding coastal public health: Employment, behavioural and psychosocial factors associated with geographical inequalities. The HUNT study, Norway

Sofie L. Hjorthen [a,*], Erik R. Sund [a,b], Věra Skalická [c], Steinar Krokstad [a,d]

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ABSTRACT

Recent decades have shown an international trend of decline in small-scale fishing, a longstanding and vital industry for numerous coastal populations. The decline has resulted in a loss of livelihoods in many coastal communities, potentially afflicting public health. Still, knowledge about the health situation of these areas is limited. Former studies on coastal health have primarily defined coastal areas based solely on their proximity to the coast, therefore not targeting the traditional coastal communities with longstanding coastal involvement through small-scale fishing. In this paper, we aim to illuminate the health situation in these areas by introducing a more fine-grained classification of the coastal study population; considering both geographical proximity to the coast, population density and employment in fishing. Using data from the Norwegian population-based HUNT Study, we perform individual and simultaneous adjustments for employment, behavioural and psychosocial factors to assess the contributions of these factors to the association between geographical affiliation and self-rated general health. The rural coastal areas with a history of small-scale fishing show a poorer health situation compared to urban coastal, rural inland and rural fjord populations, and behavioural factors contribute the most to the observed health disparities. Our findings encourage greater focus on societal differences between coastal communities when studying coastal health.

1. Introduction

Population statistics of England, Wales and Norway reveal populations of coastal areas to be more likely to report poor health compared to inland populations (ONS, 2014; Aase, 1996). Coastal areas, which are extensive and heterogeneous regions, have been of substantial historical and economic importance to numerous nations; inhabiting vital and bearing industries ranging from long traditions of small-scale fishing and shipping to recent upscale fisheries, fish farming and oil exploration (Hundstad, 2014; Urquhart et al., 2011; Johnson et al., 2012). However, recent decades have shown an international trend of considerable decline in small-scale fishing, a long-standing and widespread coastal industry tightly entangled with both social and economic relations of coastal communities (Johnson et al., 2018; Urquhart et al., 2011). This decline is also apparent in Norway, a sea nation where many coastal communities, often rural, have faced major drops in fish stocks from the mid twentieth century, some places combined with booming new industries of oil and fish farming (Onsager et al., 2015; Christensen and Zachariassen, 2014). Many coastal communities have experienced loss of livelihoods and outmigration, and not all have transitioned to new coastal industries (Iversen et al., 2020). Considering the well-established association between area characteristics and several health outcomes, and the intertwinement of public health and economic and social changes operating over decades (Pickett and Pearl, 2001; Men et al., 2003; Hanlon and McCartney, 2008), the downturn in small-scale fishing might compromise the health of coastal populations.

Existing literature on coastal health provides valuable insights about potential health effects of both biological aspects of marine life (Stewart

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Social inequalities in dental services utilization

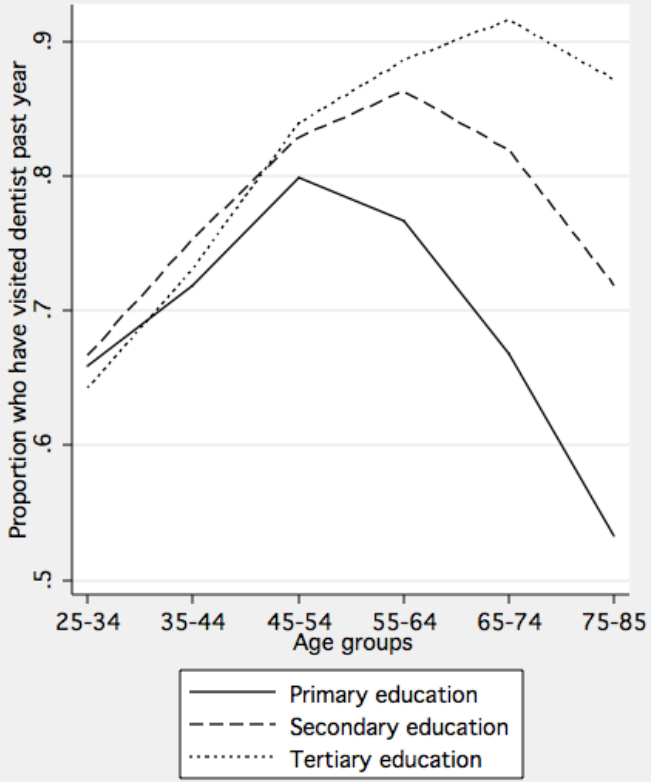

Figure 1: Proportions of the population reporting at least one visit to the dentist past year, by age groups and educational levels. The Nord-Trøndelag Health Study 2006-2008 (HUNT 3).

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Scandinavian Journal of Public Health, 2012; 40: 648–655

ORIGINAL ARTICLE

Socioeconomic inequalities in dental services utilisation in a Norwegian county: The third Nord-Trøndelag Health Survey

EIRIK VIKUM[1], STEINAR KROKSTAD[2,3], DORTHE HOLST[4] & STEINAR WESTIN[1]

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Abstract

Aim: To assess the level of socioeconomic inequity in dental care utilisation in Norway and enable comparison with recent international comparative studies. *Methods*: We studied dental care utilisation among 17,136 men and 21,414 women in the third Nord-Trøndelag Health Survey (2006–08). Respondents aged 20 years and above were included in the study, and analyses were also performed within subgroups of age and gender (20–39, 40–59, and ≥60 years). Income-related horizontal inequity was estimated by means of concentration indices. Education-related inequity was estimated as relative risks. *Results*: We found consistent pro-rich income inequity among men and women of all ages. The level of income inequity was highest among men and women ≥60 years, and in this group the income gradient was steepest between the poorest and the middle quintiles. Pro-educated inequity was found exclusively among men and women ≥60 years. General attendance was high (77%). ***Conclusion*: The overall level of income-related inequity in dental services utilisation was low compared to other European countries as reported in two recent international studies of socioeconomic inequalities in dental care utilisation. Pro-rich and pro-educated inequity is a public health challenge mainly in the older part of the population.**

Key Words: *Dental care, dental services research, horizontal inequity index, income, public health, social inequalities, socioeconomic factors, utilisation*

Introduction

Dental care attendance is one of several means of maintaining oral health. Inequality in access to dental services has been found to influence social inequalities in dental health [1], and studies on inequality in dental care utilisation can play a role in supporting public health policies in countries that work for health equity.

Both inequalities in oral health [1–3] and dental services utilisation have been reported in Scandinavian studies [3–7], but the overall level of utilisation inequity in Sweden and Denmark has been found to be among the lowest, and general attendance rates among the highest, in a group of Organisation for Economic Co-operation and Development (OECD) countries [8]. A series of studies of the Norwegian dental services for adults have concluded that, in spite of high patient charges, annual rates of dental visits are high and income-related inequality relatively low [9–12].

In spite of these findings, we see a need for increased comparability in the literature that will allow better monitoring of trends and more accurate assessments of the size and significance of a given observed inequity. The 2004 OECD report by Van

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The 27th Norwegian Conference on Epidemiology

Bergen, 3-4 November 2021

Programme Overview

Wednesday, November 3rd	
08:45	**Registration** at Radisson Royal Blu Hotel Bergen
09:15	**Welcome and opening**: NOFE leader Linda Ernstsen
09:30	**Invited speakers – Introduction to large Norwegian health surveys** **Chair/ co-chair**: Grete Tell, Marjolein M. Iversen 09.30-09.50 Eva Gerdts – The Hordaland Health Studies – HUSK3 (HHS/HUSK) 09.50-10.10 Bjørn Olav Åsvold – The Trøndelag Health Study (The HUNT Study) 10.10-10.30 Sameline Grimsgaard – The Tromsø Study 10.30-10.50 Ragnhild Brandlistuen – The Norwegian Mother, Father and Child Cohort Study (MoBa)
Coffee break with refreshments	
11:15	**Invited speakers – Examples from studies using Norwegian health surveys** **Chair/ co-chair**: Laila Hopstock, Ragnhild B. Strandberg 11.15-11.45 Steinar Krokstad – Social epidemiology in the HUNT Study 11.45-12.15 Ole Andreassen – Genetic factors in health surveys
12:15	**Lunch**
13:15	**Oral presentations of submitted abstracts – part 1:** Methods A1-A4. *Room: Kongesal 1-2* Reproductive factors B1-B4. *Room: Kongesal 3* FHUS/NHUS C1-C4. *Room: Kongesal 4* Cancer D1-D4. *Room, Dræggen 3* Infection/COVID E1-E4. *Room: Dræggen 4*
14:15	**Coffee break**
14:45	**Publication of the year award and Honorary membership award** Chair: NOFE secretary Marie W. Lundblad
15:45	**Coffee break** with refreshments
16:00	**Invited speakers – COVID-19 and health surveys** **Chair/ co-chair**: Eilev Lund, Anne Kjersti Daltveit 16.00-16.30 Anja Lindman – Beredt C19 – a datalake and preparedness register – a national realtime surveillance system for covid-19 16.30-17.00 Arnoldo Frigessi – Mathematical modelling of the corona virus pandemic in Norway
17:00	**Coffee break**
17.15-18.15	**NOFE annual meeting**
19:30	**Welcome drink** at Radisson Royal Blu Hotel Bergen
20:00	**Conference dinner** at Radisson Royal Blu Hotel Bergen

Thursday, November 4th	
08:45	**Invited speakers – Methodological and analytic challenges and opportunities with health surveys** **Chair/ co-chair**: Rolf Terje Lie, Roy Miodini Nilsen 08.45-09.15 Kyrre Breivik – Missing data in health surveys 09.15-09.45 Håkon K. Gjessing – Event history analysis, with examples from health surveys
09:45	**Coffee break** with refreshments
10:15	**Oral presentation of submitted abstracts – part 2:** Methods A5-A8. *Room: Kongesal 1-2* Mortality/ fractures B5-B8. *Room: Kongesal 3* Cancer C5-C8. Room: *Kongesal 4* CVD D5-D8. Room: *Dræggen 3* Mental health/ pain E5-E8. *Room: Dræggen 4*
11:15	**Poster viewing and coffee break** with refreshments Please see overview of abstracts for the posters P1-P30 in the abstract leaflet
12:00	**Oral presentation of submitted abstracts – part 3:** Reproductive factors A9-A12. *Room: Kongesal 1-2* Occupation/ environmental B9-B12. *Room: Kongesal 3* Nutrition/BMI C9-C12. *Room: Kongesal 4* Pharmaco-epi/ methods D9-D12. *Room: Dræggen 3* Infection/ COVID E9-E12. *Room Dræggen 4*
13:00	**Lunch**
14:00	**Keynote speakers - International health surveys** **Chair/ co-chair**: Lars Christian Stene, Kari Klungsøyr 14.00-14.30 Janet Rich-Edwards – The Nurses' Health Study 14.30-15.00 Nicholas J. Timpson – Avon Longitudinal Study of Parents and Children (the ALSPAC Study)
15.00	**Coffee break**
15:15	**User involvement in population studies** How can user involvement add value to health research? Expectations, opportunities and challenges, by Anne Rita Øksengård Session lead by Sameline Grimsgaard
16.15	**Closing of the conference by NOFE leader Linda Ernstsen**