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Socio-economic inequalities in Norwegian health care utilization over 3 decades: the HUNT Study

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Background: The aim of this study was to investigate socio-economic inequalities in health care utilization from the 1980s and through the last 3 decades in a Norwegian county population. **Methods:** Altogether, 166 758 observations of 97 251 individuals during surveys in 1984–86 (83% eligible responses), 1995–97 (51% eligible responses) and 2006–08 (50% eligible responses) of the total population of adults (≥20 years) from Nord-Trøndelag county in Norway were included. Health care utilization was measured as at least one visit to general practitioner (GP), hospital outpatient services and inpatient care in the past year. Socio-economy was measured by both education and income and rescaled to measure relative indexes of inequality (RII). Relative and absolute inequalities were estimated from multilevel logistic regression. Estimates were adjusted for age, sex, municipality size and self-reported health. **Results**: GP utilization was higher among individuals with higher education in 1984–86. Among men the RII was 0.54 (CI: 0.48–0.62), and among women RII was 0.67 (CI: 0.58–0.77). In 2006–08, the corresponding RII was 1.31 (CI: 1.13–1.52) for men and 1.00 (CI: 0.85–1.18) for women, indicating higher or equal GP utilization among those with lower education, respectively. The corresponding RIIs for outpatient consultations were 0.58 (CI: 0.49–0.68) for men and 0.40 (CI: 0.34–0.46) for women in 1984–86, and 0.53 (CI: 0.46–0.62) for men and 0.47 (CI: 0.41–0.53) for women in 2006–08. **Conclusion**: Through the last 3 decades, the previous socio-economic differences in GP utilization have diminished. Despite this, highly educated people were more prone to utilize hospital outpatient consultations throughout the period 1984–2008.

Introduction

Socio-economic health inequalities are a major public health challenge despite substantial health gains in recent decades.[1,2] The causal pathways between socio-economy and health are complex and have been extensively studied.[3] Socio-economic inequalities over time in utilization of health care services, however, have been scarcely investigated.[4–6]

Recent studies from Western countries have found pro-rich and pro-educated socio-economic inequities in utilization of specialist services, but not in use of general practitioner (GP) services.[5,7–11] A common feature of these studies, however, is a limited time span. Our knowledge about the social determinants of health care-seeking behaviour and the effect of health service organization on social inequalities in utilization is generally limited to evidence from more recent cross-sectional studies and international comparisons. A description of trends in social inequalities in health care utilization from longitudinal data can shed light on the way social change and health care sector reform can influence social inequalities in health care utilization in a population.

The HUNT surveys were conducted in the Norwegian county of Nord-Trøndelag in 1984–86, 1995–97 and 2006–08. The data provide a unique opportunity to investigate long-term trends in the socio-economic distribution of health care utilization also adjusting for age, sex, municipality size and self-reported health.

The Norwegian health system 1984–2008

Throughout the study period, the Norwegian health care system was characterized by universal coverage and public provision of services. Copayments for GP services and publicly reimbursed specialist services have been fixed at the national level for each year, and public hospital inpatient care was and is free. Most medical specialist practices outside hospitals are private, but operate on public contracts with regulated fees. Fully private GPs, specialists and hospitals do exist in Norway, but to a very minor degree, and mainly in urban areas.

In 2001, a list-based system for patients in general practice was introduced, assigning nearly all citizens to specific GPs. Throughout the study period, GPs were considered part of the public health care system, and functioned as gatekeepers to specialist and elective hospital services. Before the reform, however, direct access to some specialist services was possible.[5] Hospital management was centralized from county to state level in 2002, in a reform that was in large part aimed at reducing regional variations in treatment quality and availability, and to increase overall efficiency.[12] The national reform of psychiatric care of 1998[13] resulted in markedly increased activity in the psychiatric sector in the years prior to this study.

Aim

The aim of this study was to describe trends in social inequalities in health care utilization from the 1980s and through the last 3 decades in a total Norwegian county population study.

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Methods

Material

The Nord-Trøndelag Health Study (HUNT) is a total adult county population-based health study conducted in the county of Nord-Trøndelag, during three surveys: HUNT1 (1984–86), HUNT2 (1995–97) and HUNT3 (2006–08).[14,15] All individuals aged ≥20 years in the county were invited to participate in each of the surveys. For the present study, self-reported health, age and health care utilization data were taken from HUNT, while personal income before tax and highest level of education attained were appended from register data covering the total population from Statistics Norway (SSB), using the unique personal identity number given all Norwegian citizens.

Nord-Trøndelag is one of 19 counties in Norway, located in the middle of the country. Its geography is largely rural, with a few small cities. In spite of this, it can be considered representative of Norway as a whole, with a stable and homogenous population of ∼130 000 inhabitants.[14] The level of average income is somewhat lower than the average of Norway.[16]

Table 1 shows an overview of attendance levels in the three surveys for men and women. A total of 97 251 individuals participated in one ($n = 48\,414$), two ($n = 28\,167$) or three ($n = 20\,670$) survey periods, allowing a longitudinal study design with a total of 166 758 observations of 97 251 individuals. We restricted analyses to men and women ≥20 years for analyses on education, and 20–67 years in analyses on income. Supplementary figure S1 shows a schematic overview of the sample composition.

Use of health services

Three dichotomous indicators of health care utilization were used: utilization of GP, outpatient consultation and inpatient care. Only variables available from all three surveys were used. The applied variables were composed from variables that differed between the three surveys in some regards (see Supplementary table 1). The variable for GP utilization included visit to military and company doctors in addition to regular GP in HUNT1; in HUNT2, it included visit to company doctors. Hospital outpatient services in HUNT1 and HUNT2 were measured by the question 'In the past 12 months, have you seen a doctor at a hospital (without being an inpatient)?' In HUNT3, the question was 'In the past 12 months, have you been to an outpatient consultation at the hospital without being hospitalized?' In HUNT3, psychiatric and non-psychiatric outpatient consultations were treated separately, and these variables were combined. The reference period for having received inpatient care at least once was 5 years in HUNT1 and HUNT2, and 12 months in HUNT3.

In HUNT2 and HUNT3, some of the respondents who had missing responses on outpatient consultation utilization had responded positively to having used at least one of the other forms of health care in the proximity of these questions in the questionnaire, and negatively to none. In these cases, the missing values were judged to be owing to a misunderstanding resulting from the questionnaire designs, and non-response was treated as non-attendance (in HUNT2, $n = 6551$; in HUNT3, $n = 6039$). In HUNT2, non-response was associated with being male, having low education, higher age and lower income. In HUNT3, the pattern was the same, except a weak association with higher income.

Socio-economic position

Two measures of socio-economic position were used in this study: education and income. Both variables were recoded to relative index of inequality (RII) for analyses on relative inequalities, and used as categorical variables for analyses on absolute inequalities. For HUNT3, highest educational level attained was obtained from Statistics Norway, following the Norwegian Standard Classification of Education (NUS). In HUNT 1 and 2, this was self-reported. To minimize reporting bias between the surveys, a compound

Table 1 Socio-economic inequalities in health care utilization in the Nord-Trøndelag Health Study, 1984–2008. Participation, population features and utilization levels

Years conducted	HUNT1 1984–86		HUNT2 1995–97		HUNT3 2006–08	
	Men	Women	Men	Women	Men	Women
Participation (% of invited)	88	91	65	73	49	59
Eligible[a] (% of invited)	82	85	48	55	46	54
n	35 316	36 596	22 230	25 756	21 500	25 360
Age groups (%)						
20–39 years	40	39	31	34	20	24
40–59 years	32	31	40	39	44	42
>60 years	28	30	29	27	36	34
Level of education[b] (%)						
Primary education	43	51	27	31	20	24
Secondary education	43	36	54	45	58	48
Tertiary education	14	14	20	24	22	29
Self-reported health status (%)						
Very poor	2	2	2	2	1	1
Poor	21	25	22	25	22	27
Good	60	58	60	57	61	56
Very good	17	15	17	17	16	16
Health care utilization (%)						
GP visit past year	66	70	72	82	75	84
Outpatient consultation past year	11	14	25	29	26	29
Hospitalization[c]	28	41	30	38	11	12

a: The number of eligible responders in this study is lower than the original number of participants owing to missing data from either HUNT or Statistics Norway. In HUNT2, health care data were located on a second form that was mailed out after the first round.
b: Highest level of education attained by 2007, from Statistics Norway, used for all three time periods.
c: Last 12 months for HUNT 3, last 5 years for HUNT 1 and HUNT 2.

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education variable was generated, with priority given to register data of 2007 from Statistics Norway. Where data were missing from Statistics Norway, data from HUNT2 or HUNT1 were used. The variable was recoded into three levels of highest educational level attained: primary (up to 10 years), secondary (up to 12 years) and tertiary (≥13 years).

Data on personal income before tax were supplied by Statistics Norway for participants of all three surveys. A 3-year average income for each person was calculated and used for analyses. Personal income before tax was used in the absence of data on household income after tax, which would have approximated disposable income better. The income variable did not include pensions or welfare transfers. Separate income quartiles were generated for men and women. Analyses on income were restricted to ages 20–67 years to exclude a majority of pensioners with no personal income.

Relative index of inequality

The RII is an inequality measure that takes into account the relative socio-economic position of the various subgroups within a given socio-economic dimension, as well as the relative sizes of these groups within each time period.[17] Thus, in this study, for example, the education RII captures the changes in the educational composition of the population from the first to the last survey period. In the case of the education variable, the indexes were calculated by creating a new variable that ordered the educational groups by highest to lowest level of education, for each time period. Ranging between 0 and 1, each group was given a score based on the midpoint of its cumulative percentage share of the population. Thus, in HUNT1 (1984–86), for example, 14% of men had tertiary education and were in this variable coded 0.070 (0.14/2); 43% had secondary education and were coded 0.355 [0.14 + (0.43/2)]; and finally the 43% with primary education were coded 0.785 [1 − (0.43/2)]. For income, the RII score variable was calculated from income quartiles each comprising 25% of the study population; thus, the composition of the score variable did not change between the surveys.

In this study, the RII can be interpreted as the odds of health care utilization for a hypothetical person with the lowest socio-economic status relative to the odds for a hypothetical person with the highest status, adjusted for self-reported health, age and municipality size. An RII of <1 thus implies lower utilization in groups with low socio-economic status relative to groups with high socio-economic status. Conversely an RII >1 implies higher utilization relative to groups with high socio-economic status.

Self-reported health measure

Self-reported health was measured by (i) four response alternatives ('very good', 'good', 'poor' and 'very poor' health), (ii) a dichotomous response regarding long-term illness or injury ['Do you suffer from long-term (at least 1 year long) illness or injury of a physical or psychological nature that impairs your functioning in your daily life?'] and (iii) past or present suffering from cardiac infarction, diabetes, apoplexy and angina pectoris, combined to one dichotomous variable indicating suffering from one or more of these conditions.

Municipality size

The size of the municipality of residence for each respondent was used in the analyses as a measure to control for regional differences in access to health services. The variable subdivided respondents into three categories: municipalities with <10 000 inhabitants ($n = 19$), large (>10 000 inhabitants) municipalities without hospital ($n = 3$) and large municipalities with hospitals ($n = 2$).

Statistical analysis

All estimates were calculated using a multilevel logistic regression for longitudinal data, with random intercept and a random slope for each person per survey period, and have a cluster-specific interpretation.[18] Thus, the analyses were clustered at the level of the individual, and included all individuals who participated in one, two or all three surveys. Age and self-reported health variables were treated as independent variables in the regression analyses. An interaction product term between age and time period was included to adjust for the time-dependent differences in the effect of age on health care utilization. We also included interaction product terms between the indicators of socio-economic position and time period. All eligible responses to any of the three surveys were included. Because health care utilization may be substantially different for men and women,[7] all regression models were estimated stratified by sex.

Relative inequalities were reported as relative indexes of inequality, calculated as odds ratios (OR). Predicted probabilities of utilization were calculated from the fixed-effects part of the model, at the means of the other variables. The predicted probabilities were based on the same model specifications as the RIIs, except with dummies for educational levels and income quartiles in each survey period instead of the RII score variable.

Confidence intervals were calculated at the 95% level. All analyses were performed using Stata/IC 12.1.

Results

Descriptive statistics of the included variables are presented in table 1. The mean age increased between the surveys, reflecting a lower response rate among younger individuals in the later surveys.[14,15] The percentage of responders with secondary and tertiary education increased over the period, reflecting the increase in education over the period. The sizes of self-reported health status groups were relatively stable in the three surveys. About 66–70% reported having visited a GP in 1984–86, and the utilization levels increased over time. Utilization of hospital outpatient consultations doubled from 1984–86 to 1995–97. Women used health services more than men in all three periods.

Tables 2 and 3 show education and income-related RIIs for utilization in each of the three survey periods, as well as $P < 0.01$ for the overall trend in the RIIs from 1984–86 to 1995–97 and 2006–08 combined. Figures 1 and 2 show predicted probabilities of utilization by educational level and income quartiles in the three time periods, for men and women, respectively.

Among both men and women, the RIIs for GP utilization indicate higher probability of utilization among individuals with higher income and higher education in 1984–86. For 2006–08, the education-related RII for men is 1.31 (95% CI: 1.13–1.52), indicating a higher odds of GP utilization among men with low compared with high education. Only the personal income RII among women favours the better-off for 2006–08, RII = 0.67 (95% CI: 0.56–0.79). There was a statistically significant trend toward increased equity in all measures over time (interaction of time × education and time × income: $P < 0.01$). The absolute differences presented in figures 1 and 2 reflect the same pattern.

The RIIs for utilization of outpatient consultations are <1 for both men and women in all three periods, indicating higher odds of outpatient utilization among individuals with higher socio-economic status. The absolute differences presented in figures 1 and 2 reflect the same pattern. A statistically significant trend toward more equity was found among women (interaction of time × education: $P < 0.001$, time × income: $P < 0.01$), but not among men (interaction of time × education: $P = 0.60$, time × income: $P = 1.00$).

There was a statistically significant trend toward a distribution of inpatient care utilization more favourable to men and women with

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Table 2 Socio-economic inequities in health care utilization among men in the Nord-Trøndelag Health Study, 1984–2008. Utilization of GP, outpatient consultations or inpatient care in the past year.[a] Men aged ≥20 years[b]

Type of care	1984–86		1995–97		2006–08		*P* trend
	RII[c]	95% CI	RII[c]	95% CI	RII[c]	95% CI	
General practitioner							
Education	0.54	0.48–0.62	0.86	0.74–0.99	1.31	1.13–1.52	$P<0.001$
		$n=46\,806$			Observations = 79 046		
Personal income	0.22	0.19–0.25	0.50	0.43–0.58	1.03	0.88–1.2	$P<0.001$
		$n=40\,510$			Observations = 64 520		
Outpatient consultation							
Education	0.58	0.49–0.68	0.59	0.51–0.68	0.53	0.46–0.62	$P=0.60$
		$n=46\,668$			Observations = 78 070		
Personal income	0.75	0.64–0.88	0.75	0.65–0.88	0.75	0.63–0.88	$P=1.00$
		$n=40\,397$			Observations = 63 931		
Inpatient care							
Education	0.97	0.86–1.09	0.90	0.79–1.04	1.34	1.09–1.63	$P<0.01$
		$n=46\,678$			Observations = 78 315		
Personal income	1.15	1.02–1.30	1.24	1.06–1.44	1.08	0.86–1.36	$P=0.59$
		$n=40\,409$			Observations = 63 961		

a: The reference period for inpatient care was 5 years for HUNT1 and HUNT2, and 1 year for HUNT3.
b: Personal income analyses were restricted to men aged 20–67 years.
c: RII calculated using a mixed effects logistic regression with random intercept and slope for each individual, adjusted for age, self-reported health and municipality size.

Table 3 Socio-economic inequities in health care utilization among women in the Nord-Trøndelag Health Study, 1984–2008. Utilization of GP, outpatient consultations or inpatient care in the past year.[a] Women aged ≥20 years[b]

Type of care	1984–86		1995–97		2006–08		*P* trend
	RII[c]	95% CI	RII[c]	95% CI	RII[c]	95% CI	
General practitioner							
Education	0.67	0.58–0.77	0.90	0.77–1.05	1.00	0.85–1.18	$P<0.01$
		$n=50\,445$			Observations = 87 712		
Personal income	0.40	0.35–0.46	0.55	0.47–0.65	0.67	0.56–0.79	$P<0.01$
		$n=43\,114$			Observations = 71 103		
Outpatient consultation							
Education	0.40	0.34–0.46	0.74	0.65–0.84	0.47	0.41–0.53	$P<0.001$
		$n=50\,265$			Observations = 86 412		
Personal income	0.49	0.43–0.56	0.68	0.59–0.77	0.65	0.56–0.74	$P<0.01$
		$n=42\,948$			Observations = 70 309		
Inpatient care							
Education	0.79	0.72–0.88	0.95	0.84–1.07	0.98	0.83–1.15	$P<0.05$
		$n=50\,238$			Observations = 86 668		
Personal income[d]	1.39	1.26–1.54	0.99	0.88–1.12	0.86	0.72–1.03	$P<0.001$
		$n=42\,949$			Observations = 70 328		

a: The reference period for inpatient care was 5 years for HUNT1 and HUNT2, and 1 year for HUNT3.
b: Personal income analyses were restricted to women aged 20–67 years.
c: RII calculated by mixed effects logistic regression with random intercept and slope for each individual, adjusted for age, self-reported health and municipality size.
d: The RII for personal income and inpatient care was based on a mixed effects logistic regression with random intercept only, due to non-convergence.

low education (interaction of time × education among men: $P<0.01$, and among women: $P<0.05$), while a trend toward inequity favouring higher personal income is seen among women (interaction of time × income: $P<0.01$). For 2006–08, men with lower education were significantly more likely to utilize inpatient care (RII = 1.34, 95% CI: 1.09–1.63).

Discussion

The present large population-based longitudinal study found that previous socio-economic differences in GP utilization have diminished in the past 3 decades. Education and income was, however, positively associated with higher utilization of hospital

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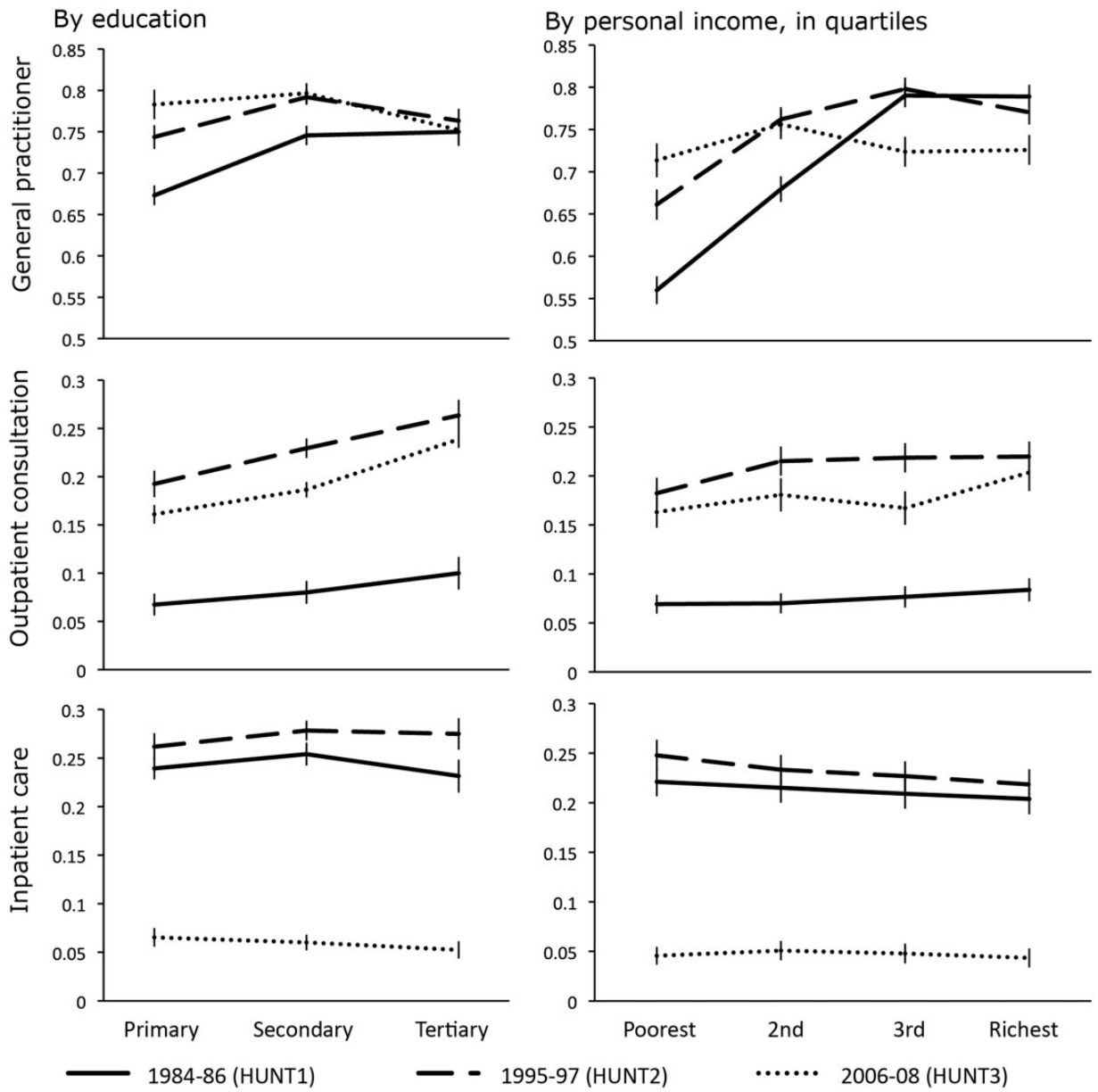

Figure 1 Predicted probabilities of utilization of GP, outpatient and inpatient care[a] by education and personal income among men aged ≥20 years,[b] 1984–2008. Adjusted for age, self-reported health and municipality size
a: The reference period for inpatient care was 5 years for HUNT1 and HUNT2, and 1 year for HUNT3
b: For personal income, analyses were restricted to men aged 20–67 years

outpatient consultations throughout the period. The socio-economic differences in inpatient care utilization were small over the period for both men and women, with a tendency towards higher use among those with low education in 2006–08 relative to 1984–86.

Strengths and limitations

The strengths of this study include the large population-based sample size with three repeated surveys of health and health care utilization over 3 decades. The personal income and education data were appended from Statistics Norway's national registers and are considered accurate.

In this study, we have used the concepts equity and inequity to describe socio-economic inequalities in health care utilization that are adjusted for need for health care, implying unjust inequalities.[19] Our needs-adjustment by self-reported health only approximates objective need, however, and lacks information about the final health outcomes of health care utilization.

Along with typical trends in epidemiologic studies,[20] the response level in the HUNT surveys has declined from 88% in HUNT1 to 54% in HUNT3. The decline presents a potential source of bias in our estimates,[21] as lifestyle factors and low social position are associated with non-participation in epidemiological studies,[22] and the HUNT study is no exception.[23] The implications of the selection for estimates of inequity in health care utilization in HUNT3 have been discussed in a previous study.[7] The lower response levels in HUNT2 and HUNT3 allow for the possibility that the trends we observe in the data are influenced by non-response bias. We consider it most likely that non-response has led to underestimation of socio-economic inequalities in health care utilization in 1995–97 and 2006–08, in which case the trend toward equity we found in GP utilization between 1984–86 and 2006–08 might be overstated to some degree. However, the inequity pattern observed

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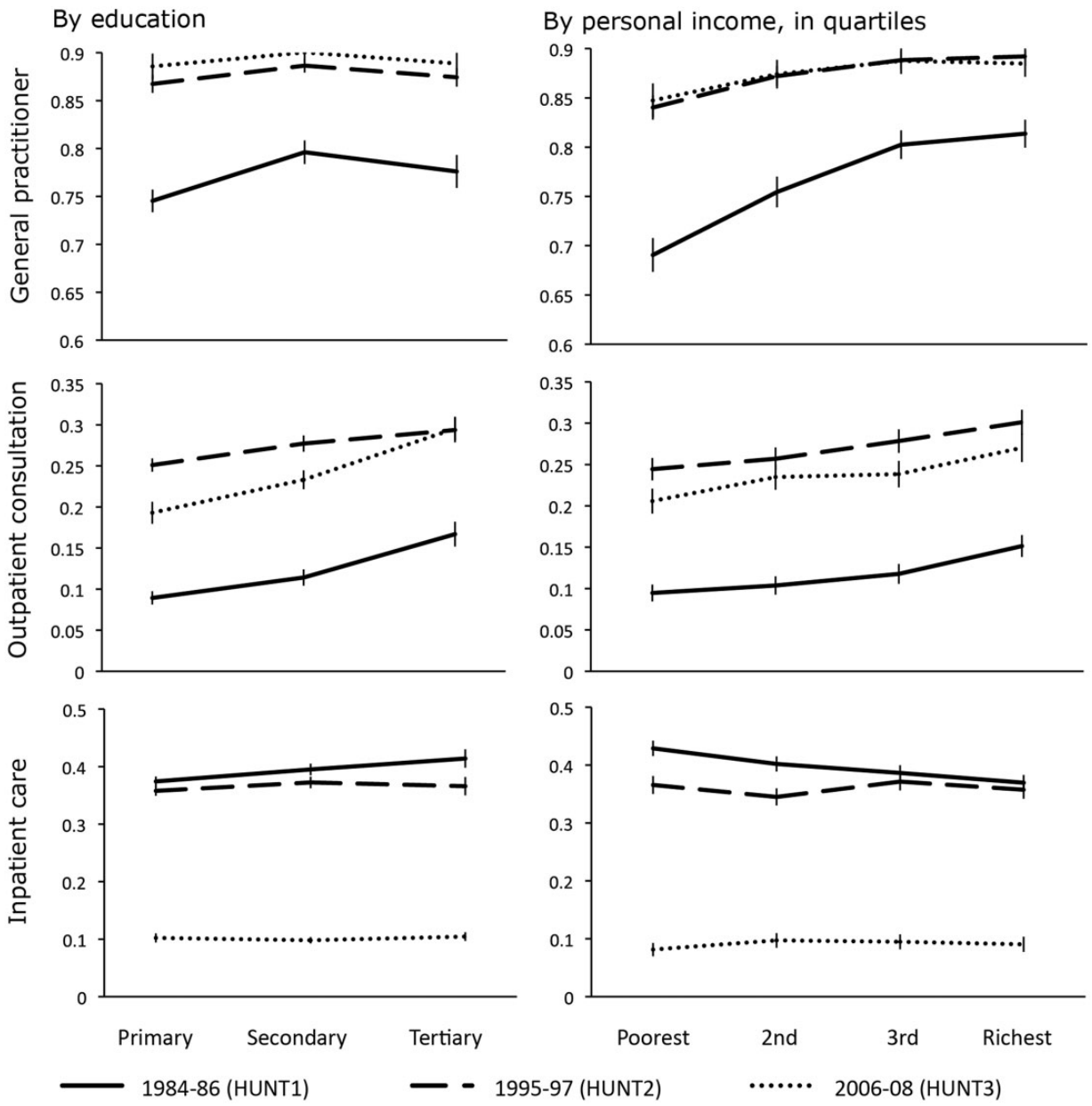

Figure 2 Predicted probabilities of utilization of GP, outpatient and inpatient care[a] by education and personal income among women aged ≥20 years,[b] 1984–2008. Adjusted for age, self-reported health and municipality size
a: The reference period for inpatient care was 5 years for HUNT1 and HUNT2, and 1 year for HUNT3
b: For personal income, analyses were restricted to men aged 20–67 years

for the 2006–08 data corresponds well with recent Norwegian[5,8,11] and international studies,[9,10] generally showing equity in GP and inpatient care utilization, and pro-rich and pro-educated inequity in specialist utilization.

We have used the same categorization of the education variable in all three surveys, in spite of the declining relative societal status of higher education, and the possibly increasing marginalization of the lowest educational group.[1] Owing to the increased share of household income contributed by women over time,[24] personal income might be a better predictor of household income for women in 2006–08 than in the earlier periods. The self-reported nature of the data is a potential source of bias, and our measures of health service utilization do not represent the time or resources spent on health services. Hence, further studies with registry-based information from hospital and GP data would be a welcome contribution.

The observed trends are not likely to be exclusive for Norway, and the inequity pattern for 2006–08 corresponds well with recent international findings.[9,10]. Like many Western countries, Norway has seen a rise in life expectancy, educational levels and material living standards,[25] and growth in health expenditure and availability of medical technology,[26] over the study period. In spite of recent reforms, the principles underlying the Norwegian health care system have been constant over the study period, and recent social trends influencing factors such as personal health awareness are not likely to be isolated Norwegian phenomena. However, there are trends towards more provision of private medical services in urban areas in Norway as in many other countries, and our data may not fully capture such recent developments.

Interpretation

We found a rise in GP care-seeking behaviour from 1984–86 to 2006–08 predominantly among individuals with low education and income, whereas GP utilization levels among high education

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and income groups were largely stable at high levels. The same general trends were observed for men and women. Among women, however, the pro-educated and pro-rich inequity in 1984–86 was not as steep as among men, and the subsequent trend toward equity not as marked. While women exhibited a large increase in GP utilization from 1984–86 to 1995–97 regardless of socio-economy, the increases in GP utilization among men were mostly among low SES groups.

Owing to the gatekeeper function of the GP, the inequity in GP utilization in 1984–86 might have been carried forward and partly caused the inequity in outpatient consultation utilization in the same period. This mechanism was less plausible in 2006–08, as GP utilization was then generally not distributed in favour of persons with high income and high education, and a large share of patients in all socio-economic groups reported contact with their GP at least once in the past year. In sum, the diminished inequity in GP utilization was not associated with any change in the inequity in outpatient consultations utilization. Neither was it concurrent with a major shift in the socio-economic distribution of inpatient care utilization, although we found inpatient care to have a distribution that favoured persons with low education more in 2006–08 than in 1984–86, especially among men.

In the context of GP gate-keeping and low fees for specialist care, the paradox of concurrent equity in GP utilization and inequity in outpatient consultations utilization found in 2006–08 is likely to result from either (i) mechanisms in the GP–patient relationship culminating in socio-economic inequalities in referrals to specialist services,[27] and/or (ii) persons with high education and income to a greater extent circumventing the GP before accessing outpatient care, and/or (iii) socio-economic differences in the reasons for which patients consult a GP in the first place. In the latter case, the equity in GP utilization we observe could conceal a socio-economic divide in the way GP care is utilized, with low status groups consulting GPs for issues that are more easily resolved in general practice,[28,29] and refraining from seeking help for issues that are judged to merit further investigations by specialists. Further research should seek to elucidate these inequity-generating mechanisms.

Conclusion

Through the past 3 decades previous pro-rich and pro-educated inequity in utilization of GP care in Norway has diminished. In spite of this, pro-rich and pro-educated inequities in utilization of hospital outpatient consultations were in 2006–08 at levels comparable with 1984–86.

Supplementary data

Supplementary data are available at *EURPUB* online.

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Conflicts of interest: None declared.

Key points

What is already known on this subject

- Several studies have indicated socio-economic equity in utilization of GP care and pro-rich and pro-educated inequity in utilization of specialist services in many Western countries in recent years.

What this study adds

- The present socio-economic equity in GP utilization has come about gradually since the 1980s.
- The pro-rich and pro-educated inequity in utilization of hospital outpatient consultations has not diminished in spite of emerging equity in utilization of GPs through the last 3 decades.
- Low education was more strongly correlated with inpatient care utilization in 2006–08 relative to 1984–86.

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Short Report

Socio-economic inequalities in all-cause mortality in Europe: an exploration of the role of heightened social mobility

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The larger than expected socio-economic inequalities in health in more egalitarian countries might be explained by a heightened social mobility in these countries. Therefore, the aim of this explorative study was to examine the associations between country-level social mobility, income inequality and socio-economic differences in all-cause mortality, using country-level secondary data from 12 European countries. Both income equality and social mobility were found to be associated with larger socio-economic differences in mortality, particularly in women. These findings suggest that social mobility and income equality, beside their shiny side of improving population health, might have a shady side of increasing socio-economic health inequalities.

Introduction

Egalitarian countries, such as the Nordic countries, often show better health outcomes as compared with countries with wider income distributions.[1,2] Nonetheless, they do not necessarily have smaller socio-economic health inequalities.[3–5] The expected greater social mobility in these egalitarian countries is hypothesized to leave behind an increasingly homogeneous group of people that lack the physical and mental characteristics needed for getting ahead; this might underlie the wider than expected socio-economic inequalities in health.[6–8] This hypothesis of country-level social mobility underlying socio-economic health inequalities has, however, not yet been empirically tested. Therefore, we examined (i) the patterns of association between social mobility and socio-economic health inequalities and (ii) the association between social mobility and income inequality.

Methods

Country-level data of 12 European countries were collected on socio-economic inequality in mortality, income inequality and social mobility. We sought data on hypothesized causes that—in time—were preferably measured before the data on hypothesized outcomes. Former communist countries were excluded because of their confounding contexts and histories, particularly in the early 90s,[9] and because of missing data. Relative and absolute socio-economic inequality in mortality were measured by, respectively, the relative index of inequality and slope index of inequality regarding educational differences in all-cause mortality in the 90s.[4] These data were only available for men and women separately. Income inequality was measured by the Gini coefficient (after taxes and transfers) in the mid-90s.[10] Social mobility was measured by 1 − the correlation of participant's and father's International Socio-Economic Index of occupational status score

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