Introduction

Over a long period of time, numerous studies in developed countries have reported substantial socioeconomic (SE) inequalities in morbidity and mortality, irrespective of how SE inequalities have been measured.1–3 In the interpretation of the results, emphasis has been put on inequalities in the exposure to the putative risk factors. The conclusion has been drawn that SE factors, such as educational level, may represent a proxy variable for material, psychosocial and behavioural risk factors.4–6

However, registered morbidity and mortality are not only dependent on risk factors, but also on the health services provided.7,8 From an ethical point of view, substantial SE differences in the occurrence of diseases are unacceptable, but SE differences in the provision of health services in favour of well-off groups are intolerable. Medico-ethical rules have recommended that health services should be provided according to need rather than social background. Still, recent legislation in Norway, one of the world’s most egalitarian countries,9 has found it necessary to emphasize equal provision of health services irrespective of social background.10
Also in adverse outcomes of pregnancy, substantial SE inequalities have been observed in a number of countries. Even with a perinatal mortality in Norway in 2011 of 4.8 per 1000 births, substantial differences have been reported between social groups. Many of the risk factors for adverse outcomes of pregnancy are associated with a low SE level. However, SE inequalities persist even after adjustment for these risk factors, suggesting the influence of other factors not accounted for.

Only few studies have addressed the question to which extent inequality in the provision of health services can account for inequality in health. Less well-off women may get less adequate health services.

Another vulnerable category of mothers is the increasing group of immigrants to western countries. Irrespective of their length of education or SE status in their country of origin, they may experience poor living conditions with a limited network and language difficulties.

Use of interventions is related to pathological conditions with different occurrence in different SE groups. By analysing subgroups with the same occurrence of pathology, valid estimates of possible effects of short education or status as immigrant on use of obstetrical interventions may be obtained. One such subgroup is preterm birth in which degree of pathology seems to be more independent of SE conditions than in term birth. Accordingly, need of intervention in preterm birth would be expected to be more independent of SE level.

A generation ago, long education among women was less common than today. As a group, women with short education were more heterogeneous. Today, women with short education represent a smaller and more homogeneous group with a higher burden of risk factors. Therefore, we might expect more health problems and more interventions among these women.

The objective of the present study was to assess possible associations between SE conditions as well as ethnic background and obstetric care. Based on data from the Medical Birth Registry of Norway, we wanted to assess to which extent provision of various types of obstetric intervention is dependent on the parent’s SE level measured in terms of length of education. We also wanted to assess whether immigrants are provided with less adequate obstetric care.

A possible secular trend in the use of obstetric interventions across educational groups might also reflect attitudes among professionals that change over a period of time. Thus, we studied time trends in the associations of level of education and ethnic background with obstetric interventions and perinatal mortality throughout the observation period 1967–2009.

**Methods**

Based on compulsory notification, the Medical Birth Registry of Norway has, since 1967, registered all pregnancies in the country. Items of personal data include the national identification number as well as medical data on maternal health before and during the pregnancy, on the delivery and on the newborn. All data are notified by the attending midwife and doctor. The national identification number provides linkage with the Statistics Norway for data on parental education and country of birth.

During the observation period 1967–2009 altogether 2 518 758 births were notified. After exclusion of multiple births and birthweight under 500 g or gestational age under 22 weeks, the study population comprised 2 305 780 births. After further exclusion of births with lacking data on both parental education and country of birth, and births with gestational age 43+ weeks, the main analyses included 2 234 568 births.

Exposure variables included education defined as the highest level of education for the mother or the father obtained by 2009 and categorized as (i) university or college (more than 14 years), (ii) intermediate (11–14 years) and (iii) none or no more than compulsory education (0–10 years). All births to mothers who were born in Norway, Western Europe, the USA, Australia and New Zealand were categorized according to the highest parental level of education. As we also wanted to assess whether non-western born mothers were provided with an adequate obstetric care, all these women were included in a group 4 irrespective of their educational attainment. Since this group was small until the 1980s, we do not report complete data for the first period 1967–80.

Outcome variables included induction of labour, epidural analgesia, caesarean section (CS), transfer of the newborn to a neonatal intensive care unit (NICU) and perinatal death.

**Statistical analyses**

For statistical analysis, we used SPSS (version 20) and the MLWin programme (version 2.30). Multilevel analysis was used due to the hierarchical structure (the first level was the pregnancy and the second level was the mother). The highest level of parental education was used as reference.

The analyses were stratified according to gestational age categorized as preterm (22–36 weeks) and term (37–42 weeks) and adjusted for maternal age categorized as <20, 20–24, 25–29, 30–34, 35–39 and 40+ years and for birth order categorized as 1, 2, 3, 4 and 5+. Further adjustment was made for size of the maternity unit categorized as 1–499, 500–1499, 1500–2999 and 3000+ births per year since they are related to exposure and outcome.

Particularly in the first part of the observation period, a considerable proportion of the births took place in rural smaller hospitals with limited possibilities to provide some of the interventions studied. An association between rural domicile and short education would confound the results. Thus, the relative risks (RRs) were also adjusted for annual number of births in the hospital where the delivery took place.

**Results**

The proportion of mothers with the highest level of parental education increased from 29.7% in 1967–80 to 53.7% in 2001–09 while the two other groups decreased correspondingly (table 1). The proportion of mothers born in Western world decreased continuously from 99.2% in 1967–80 to 83.0% in 2001–09.

**Preterm births**

In preterm births, during the first part of the observation period 1967–80, women with short education (<11 years) had less frequently induction of labour (RR 0.88), CS (RR 0.91) and epidural analgesia (RR 0.79) and had their newborns less frequently transferred to an NICU (RR 0.81) (table 2). Their offspring also had an excess perinatal mortality (RR 1.13) compared with those with long education (15+ years) (table 4).

During the last part 2001–09, women with short parental education had more frequently induction of labour (RR 1.08), CS (RR 1.08) and epidural analgesia (1.05) and had their newborns more frequently transferred to an NICU (RR 1.05) (table 2). However, the excess perinatal mortality was even higher than in the first period (RR 1.69) (table 4).

**Term births**

In term births during the first period, women with short parental education had their newborn transferred to an NICU, induction of labour and CS more close to the reference group, while epidural analgesia was less frequent (RR 0.69) (table 3). However, during the last period, provision of a number of services increased: transfer to NICU (RR 1.45), induction of labour (RR 1.04), CS (RR 1.36) and epidural analgesia (RR 1.19).

The excess perinatal mortality for term births ranged between RR 1.92 and 1.85 throughout the whole observation period 1967–2009.
In the non-western preterm group, transfer to NICU increased during the study period 1981–2009 (RR from 0.73 to 1.23) (table 4). In the same period the excess ‘birthweight below 2500 g’ increased from RR 2.19 to RR 2.80 (data not shown).

Non-western preterm group
In the non-western preterm group, transfer to NICU increased during the study period 1981–2009 (RR from 0.51 to 0.94), and so did induction of labour (RR from 0.86 to 0.97), CS (RR from 0.83 to 0.98) and epidural analgesia (RR from 0.63 to 0.87) (table 2). Perinatal mortality increased during the whole study period 1967–2009 (RR from 0.73 to 1.23) (table 4).

Non-western term group
In the non-western term group there was an increase in transfer to NICU (RR from 0.97 to 1.11), while the RR of induction of labour and epidural analgesia were close to the reference group while CS decreased (RR from 1.59 to 1.38) throughout the observation period 1981–2009 (table 3). The RR of perinatal mortality increased from 1.24 to 1.96 during the period 1967–2009 (table 4). In the same period the excess ‘birthweight below 2500 g’ ranged between RR 2.34 and RR 2.41 (data not shown).

Discussion
Our results indicate that in the 1970s, women with short education were provided with less obstetric services than women with long education. During the observation period, the utilization of obstetric services in the short-educated group increased both in preterm as well as term births; in preterm births to the level observed in the longer-educated group, and in term births beyond this level. In non-western women, similar trends were observed.

In an equality of health care perspective, this result is gratifying as the distribution of obstetric services moved in a beneficial direction with more services provided to less privileged groups. To some extent these trends may reflect changing attitudes among health professionals. However, the increasing excess perinatal mortality observed both in the non-western and the short-educated groups, is disquieting and may indicate that these women as a group are more vulnerable than one generation ago. This is supported by the prevalence of low birth weight.

A strength of the present study is the large study population which provided statistical power. The variables were well defined and acquired from official registers with low occurrence of misclassification, which, to the extent it exists, would be non-differential. Education is a reliable indicator of SE status since it is clearly related to income, occupation, living conditions, social integration, lifestyle, quality of life, burden of disease and health in general. The long observation period made it possible to assess secular trends in the provision of health care to different groups of women.

Our results might have been influenced by a number of confounders. Obviously, the association between SE group and pathology will be affected by the education as well as the birth outcomes. The size of the maternity unit would have different effects in the short-educated and the non-western groups. Women living in remote areas generally have shorter education and deliver in smaller maternity units in which transfer to an NICU or other services are more complicated. This would cause a spurious association between short education and low birth weight.
| Year of birth/number (n), per 1000 births and aRR and 95% confidence interval (CI) | 1967–80 | 1981–90 | 1991–2000 | 2001–09 |
|---|---|---|---|---|
| **Induction of labour** | | | | |
| Education <11 years | 892 | 118.2 | 0.88 (0.81–0.97) | 653 | 209.6 | 1.02 (0.94–1.12) | 864 | 328.6 | 1.04 (0.96–1.12) | 908 | 422.1 | 1.08 (1.00–1.16) |
| Education 11–14 years | 2852 | 121.4 | 0.92 (0.87–0.99) | 2626 | 214.1 | 0.99 (0.94–1.06) | 4174 | 331.1 | 1.03 (0.98–1.07) | 3894 | 427.0 | 1.05 (1.00–1.09) |
| Education ≥15 years | 1457 | 145.5 | Ref | 2054 | 231.0 | Ref | 3915 | 337.8 | Ref | 5076 | 431.0 | Ref |
| Non-western | 275 | 205.8 | 0.86 (0.76–0.98) | 932 | 308.8 | 0.92 (0.86–0.99) | 1903 | 409.2 | 0.97 (0.91–1.02) | 1903 | 409.2 | 0.97 (0.91–1.02) |
| **Caesarean section** | | | | |
| Education <11 years | 628 | 83.2 | 0.91 (0.83–0.99) | 794 | 254.9 | 0.94 (0.87–1.02) | 838 | 318.8 | 1.03 (0.96–1.12) | 787 | 365.9 | 1.08 (1.00–1.17) |
| Education 11–14 years | 2155 | 91.7 | 1.05 (0.97–1.13) | 3494 | 284.9 | 1.00 (0.95–1.05) | 4261 | 338.0 | 1.07 (1.03–1.12) | 3481 | 381.7 | 1.07 (1.02–1.12) |
| Education ≥15 years | 1123 | 112.1 | Ref | 2762 | 310.7 | Ref | 3881 | 334.8 | Ref | 4496 | 381.8 | Ref |
| Non-western | 350 | 262.0 | 0.83 (0.74–0.93) | 919 | 304.5 | 0.92 (0.85–0.99) | 1674 | 359.9 | 0.98 (0.93–1.04) | 1674 | 359.9 | 0.98 (0.93–1.04) |
| **Epidural analgesia** | | | | |
| Education <11 years | 68 | 9.0 | 0.79 (0.60–1.05) | 443 | 142.2 | 0.99 (0.88–1.10) | 433 | 164.7 | 0.99 (0.89–1.10) | 496 | 230.6 | 1.05 (0.95–1.17) |
| Education 11–14 years | 267 | 11.4 | 0.81 (0.67–0.97) | 1675 | 136.6 | 0.92 (0.85–0.98) | 2054 | 162.9 | 0.96 (0.90–1.02) | 1992 | 218.4 | 1.06 (0.99–1.12) |
| Education ≥15 years | 212 | 21.2 | Ref | 1465 | 164.8 | Ref | 2134 | 184.1 | Ref | 2477 | 210.3 | Ref |
| Non-western | 145 | 108.5 | 0.63 (0.53–0.74) | 437 | 144.8 | 0.79 (0.71–0.88) | 878 | 188.8 | 0.87 (0.80–0.94) | 878 | 188.8 | 0.87 (0.80–0.94) |
| **Transfer intensive care** | | | | |
| Education <11 years | 590 | 78.2 | 0.81 (0.74–0.90) | 352 | 113.0 | 0.94 (0.83–1.05) | 469 | 178.4 | 0.90 (0.83–0.99) | 1194 | 555.1 | 1.05 (1.00–1.10) |
| Education 11–14 years | 2104 | 89.5 | 0.84 (0.79–0.91) | 1480 | 120.7 | 0.98 (0.90–1.05) | 2458 | 195.0 | 0.99 (0.94–1.05) | 5101 | 559.4 | 1.06 (1.03–1.09) |
| Education ≥15 years | 1280 | 127.8 | Ref | 1140 | 128.2 | Ref | 2468 | 212.9 | Ref | 6318 | 536.5 | Ref |
| Non-western | 96 | 71.9 | 0.51 (0.42–0.61) | 576 | 190.9 | 0.89 (0.82–0.96) | 2340 | 503.1 | 0.94 (0.91–0.97) | 2340 | 503.1 | 0.94 (0.91–0.97) |
Table 3 Obstetric services provided in term birth (37–42 weeks) according to parental educational level and mothers’ country of origin by year of birth, Norway 1967–2009

| Year of birth/number (n), per 1000 births and aRR with 95% confidence interval (CI) | 1967–80 | 1981–90 | 1991–2000 | 2001–09 |
|---|---|---|---|---|
| | n | Per 1000 | aRR (95% CI) | n | Per 1000 | aRR (95% CI) | n | Per 1000 | aRR (95% CI) | n | Per 1000 | aRR (95% CI) |
| **Induction of labour** | | | | | | | | | | | | |
| Education <11 years | 11 152 | 120.6 | 0.90 (0.88–0.92) | 5424 | 144.2 | 1.06 (1.03–1.09) | 4966 | 160.7 | 1.16 (1.12–1.19) | 5021 | 205.3 | 1.04 (1.02–1.05) |
| Education 11–14 years | 49 680 | 124.7 | 0.93 (0.92–0.94) | 29 673 | 144.5 | 1.03 (1.01–1.04) | 30 946 | 154.9 | 1.08 (1.06–1.10) | 29 181 | 207.2 | 1.02 (1.02–1.03) |
| Education ≥15 years | 30 460 | 143.7 | Ref | 27 132 | 150.6 | Ref | 34 702 | 155.2 | Ref | 47 084 | 198.9 | Ref |
| Non-western | 739 | 125.0 | 0.87 (0.80–0.93) | 2129 | 145.4 | 0.97 (0.93–1.02) | 5582 | 154.1 | 1.05 (1.02–1.08) | 13 437 | 189.5 | 1.00 (1.00–1.01) |
| **Caesarean section** | | | | | | | | | | | | |
| Education <11 years | 2889 | 31.2 | 1.04 (0.99–1.09) | 3626 | 96.4 | 1.24 (1.19–1.29) | 3383 | 109.5 | 1.32 (1.27–1.37) | 3296 | 134.8 | 1.36 (1.31–1.41) |
| Education 11–14 years | 12 855 | 32.3 | 1.01 (0.98–1.05) | 18 913 | 92.1 | 1.09 (1.07–1.12) | 20 574 | 103.0 | 1.15 (1.13–1.17) | 19 888 | 141.2 | 1.24 (1.22–1.26) |
| Education ≥15 years | 8326 | 39.3 | Ref | 17 272 | 95.9 | Ref | 22 759 | 101.8 | Ref | 31 386 | 132.6 | Ref |
| Non-western | 2031 | 138.7 | 1.59 (1.51–1.67) | 4762 | 131.5 | 1.47 (1.42–1.52) | 11 189 | 157.8 | 1.38 (1.35–1.42) | |
| **Epidural analgesia** | | | | | | | | | | | | |
| Education <11 years | 465 | 5.0 | 0.69 (0.62–0.76) | 3473 | 92.3 | 1.04 (1.00–1.08) | 4126 | 133.6 | 1.10 (1.06–1.13) | 7674 | 313.8 | 1.19 (1.16–1.22) |
| Education 11–14 years | 2392 | 6.0 | 0.64 (0.60–0.67) | 16 465 | 80.2 | 0.91 (0.89–0.93) | 24 848 | 124.4 | 0.99 (0.98–1.01) | 37 329 | 265.1 | 1.08 (1.07–1.09) |
| Education ≥15 years | 3128 | 14.8 | Ref | 19 002 | 105.5 | Ref | 31 883 | 142.6 | Ref | 62 617 | 264.6 | Ref |
| Non-western | 1612 | 110.1 | 0.95 (0.90–1.00) | 5043 | 139.2 | 0.97 (0.94–1.00) | 17 787 | 250.9 | 0.95 (0.94–0.97) | |
| **Transfer intensive care** | | | | | | | | | | | | |
| Education <11 years | 703 | 7.6 | 0.93 (0.85–1.02) | 371 | 9.9 | 1.27 (1.13–1.43) | 616 | 19.9 | 1.11 (1.02–1.21) | 1633 | 66.8 | 1.45 (1.37–1.53) |
| Education 11–14 years | 3360 | 8.4 | 0.95 (0.95–1.01) | 1868 | 9.1 | 1.13 (1.06–1.22) | 3627 | 18.2 | 1.02 (0.97–1.07) | 8246 | 58.6 | 1.25 (1.22–1.29) |
| Education ≥15 years | 2253 | 10.6 | Ref | 1570 | 8.7 | Ref | 4416 | 19.7 | Ref | 12 137 | 51.3 | Ref |
| Non-western | 125 | 8.5 | 0.97 (0.81–1.16) | 910 | 25.1 | 1.30 (1.21–1.41) | 3945 | 55.6 | 1.11 (1.07–1.16) | |
Table 4  Perinatal mortality in preterm and term births according to parental educational level and mothers’ country of origin by year of birth, Norway 1967–2009

| Year of birth/number (n), per 1000 births and aRR with 95% confidence interval (CI) | 2001–09 | Total |
|---|---|---|
| n | 2001–09 | aRR (CI) | 1981–90 | aRR (CI) | 1991–2000 | aRR (CI) | 1967–80 | aRR (CI) | Per 1000 |
| Preterm (22–36 weeks) | | | | | | | | | |
| Education 11 years | 1152 | 20.0 | 0.69 (0.62–0.77) | 458 | 17.2 | 1.17 (1.07–1.27) | 681 | 16.8 | 1.33 (1.24–1.42) | 3005 |
| Education 11–14 years | 4844 | 19.8 | 1.02 (0.96–1.08) | 1228 | 18.1 | 1.00 (0.93–1.08) | 3758 | 18.0 | 1.00 (0.93–1.08) | 9828 |
| Education ≥15 years | 1743 | 20.3 | 1.02 (0.94–1.10) | 661 | 17.2 | 1.00 (0.92–1.08) | 1153 | 17.3 | 1.00 (0.92–1.08) | 4657 |
| Term (37–42 weeks) | | | | | | | | | |
| Education 11 years | 869 | 9.4 | 1.34 (1.22–1.47) | 220 | 5.8 | 1.53 (1.35–1.73) | 563 | 6.9 | 1.53 (1.35–1.73) | 1652 |
| Education 11–14 years | 2596 | 6.8 | 1.42 (1.33–1.51) | 693 | 5.0 | 1.50 (1.33–1.68) | 1186 | 5.4 | 1.50 (1.33–1.68) | 4475 |
| Education ≥15 years | 1033 | 6.9 | 1.42 (1.33–1.51) | 349 | 4.6 | 1.50 (1.33–1.68) | 684 | 5.2 | 1.50 (1.33–1.68) | 2066 |
| Perinatal mortality | | | | | | | | | |
| Education 11 years | 1294 | 26.5 | 1.07 (1.00–1.14) | 332 | 5.9 | 1.09 (1.02–1.16) | 922 | 5.9 | 1.09 (1.02–1.16) | 1948 |
| Education 11–14 years | 4754 | 24.9 | 1.07 (1.00–1.14) | 1021 | 5.9 | 1.09 (1.02–1.16) | 2713 | 5.9 | 1.09 (1.02–1.16) | 8520 |
| Education ≥15 years | 1934 | 24.7 | 1.07 (1.00–1.14) | 453 | 6.2 | 1.09 (1.02–1.16) | 1481 | 6.2 | 1.09 (1.02–1.16) | 3868 |

A higher occurrence of pathology in short-educated groups may involve more than 20% of all births, and eventually the use was quite equally distributed between the groups. The increase in availability seemed to even out the inequalities, with less discrimination as a result.

During the observation period, the CS-rate increased from 3.8% in 1967–70 to 15.5% in 2001–09. This may be accounted for by technological development as well as an increasing maternal age, but the number of CSs performed on maternal request demand has also increased. In these pregnancies, medical indications for a CS are rare, which involves a possibility of an SE gradient. However, we observed a 'higher' CS rate in the short-educated and the non-western groups. In term births, it remained high in the short-educated group and increased in the non-western group. In the interpretation of these results, we have to consider that the short education group has become much smaller and more marginalized during the study period. Consequently, the group will be more exposed to risk factors and thereby suffer an increasing perinatal mortality.

The situation is different for non-western women. They represent an increasing group of births. The group is heterogeneous, comprising different cultural, religious and social backgrounds, as well as individual factors related to lifestyle and living conditions. This makes it difficult to identify specific risk factors causing the excess perinatal mortality. Still, it seems reasonable to suggest that the needs for more care in these births are not met by the beneficial redistribution of the obstetric services observed in Norway.

Technological development represents a factor contributing to the change in provision of health care observed since 1970s. Obstetric pain relief is an example. Epidural analgesia was implemented in obstetric care in the 1970s. In the beginning, the use was restricted and thereby limited to a smaller group; women with long education were overrepresented. Throughout the observation period, the use of epidural analgesia increased to involve more than 20% of all births, and eventually the use was quite equally distributed between the groups. The increase in availability seemed to even out the inequalities, with less discrimination as a result.
In addition to occurrence of pathology and attitudes among health professionals, several other mechanisms may be involved in the processes by which health needs are met by the health services. Adequate treatment depends on the patient acknowledging a problem and seeking medical attention, communication, mutual understanding and finally the type of intervention involved.

Our results suggest a challenge to antenatal care, which needs to be addressed, most likely both by educating the parents and in the training of health professionals. Still, the fact that the RRs involved approached unity and equality towards the end of the observation period was gratifying.

Conclusion

Our study suggests a favourable development during the last decades in the distribution of obstetric health services in Norway between different SE groups. While medical interventions in the 1970s were employed less in women of short than long education, the employment in women with short education increased to equal or even higher levels towards the end of the period. The same trend was observed for non-western women. Still, the excess perinatal mortality in both the short-educated and the non-western groups remained. The results suggest increasing perinatal health problems in vulnerable groups and indicate need for a closer obstetric follow-up and surveillance. Midwives and general practitioners should be aware of risk factors and should offer support, education and more frequent contacts. Further studies, addressing distribution of antenatal care would provide a basis for developing preventive measures aiming at SE equality.

Ethical approval

The study was approved by the internal review board of the Medical Birth Registry of Norway and by the regional ethics committee, REK Vest, Norway (2009/1868).

Conflicts of interest: All authors have completed the Unified Competing Interest form at www.icmje.org/coi_disclosure.pdf (available from the corresponding author).

Key points

- During the study period 1967–2009 the distribution of obstetric services moved in a beneficial direction with more services provided to less privileged groups.
- Perinatal mortality remained almost twice as high among children of short-educated women and non-western immigrants throughout the study period.
- Even though the study suggests a better distribution of obstetric health services across socioeconomic groups, the need for obstetric follow-up and surveillance seems to increase among vulnerable groups.

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Social inequalities in medical rehabilitation outcomes—a registry-based study on 219 584 insured persons in Germany

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Background: Given limited knowledge on the extent of social inequalities in longer-term work ability of people with a chronic disease, this study analyses social inequalities of three consecutive indicators of work ability following medical rehabilitation in a large sample of insured employees. Methods: Based on data from the German statutory pension insurance, a representative 20% random sample of all employed persons undergoing medical rehabilitation between 2006 and 2008 was included in a longitudinal analysis (n=219 584 persons). Three measures of consecutive work-related outcomes (physicians’ assessment of work ability at discharge; return to work in the year thereafter; disability pension during follow-up) and socioeconomic position (SEP) (education, occupational position and income) were assessed. Adjusted relative risks (RRs) for each outcome were calculated according to SEP, applying Poisson regression analysis. Results: The measures of SEP were associated with all three outcomes of work ability in the fully adjusted models. Relatively strongest relationships were observed for education as SEP measure, and they were particularly pronounced for ‘low work ability’ (RR=2.38 for lower secondary education compared to tertiary education; 95% CI: 2.26–2.51). Based on average marginal effects, absolute differences of work ability by SEP indicate a socially graded pattern, with only few exceptions. Conclusions: Despite Germany’s universal access to medical and vocational rehabilitation social inequalities in longer-term work ability following chronic disease persist, thus calling for targeted programmes of prevention and occupational health promotion.

Introduction

Scientific evidence indicates that social gradients of morbidity and mortality persist in many countries with developed social and health policies, leaving people in lower socioeconomic positions (SEPs) at higher risk to develop a disease. Less knowledge, though, is available on social inequalities of the longer-term consequences for living and working conditions among those who already developed or survived an incident chronic disease, such as cardiovascular disease, cancer or depression. Recent data from the German micro census (2013), e.g. suggests that 12.7 million people with impairments are living in Germany. They are 30 percentage points less likely to participate on the labour market and 7 percentage points more likely to experience poverty compared to the population without impairments. While several investigations documented social gradients of success in return to work following hospitalization due to a stroke, coronary heart disease, cancer or other long-standing illnesses, few studies only analyzed longer-term outcomes, such as disability pensions, for these patient groups. A recent report from Finland provides an exception as it explored whether social inequalities of disability pension differed between hospitalized persons with severe disease and persons without severe disease. Although this study observed social gradients in disability pensions in both groups, the association of SEP with disability pension was somewhat stronger among persons with hospitalization, in particular in case of injuries and musculoskeletal disorders. Yet, a comprehensive study on socioeconomic differences of trajectories of work ability from hospitalization to differential opportunities of returning to work and to longer-term risks of early exit from labour market is still missing.

To fill this gap, administrative data derived from the German health and social security system are of interest. There are almost no social differences in access to, and treatment obtained in medical rehabilitation clinics for persons insured under the German pension insurance scheme. The pension funds have established a detailed registry of patients’ trajectories following medical rehabilitation, including data on sociodemographic characteristics, employment histories (return to work and early exit from paid work) and survival. With this retrospective observational study, we set out to analyze social inequalities of trajectories following medical rehabilitation from chronic disease in a large sample of insured men and women in Germany, using this administrative dataset. More specifically, three steps of these trajectories are studied, (i) the patients’ work...