

Descriptive analyses of women's health in Sweden

Bilaga 2 till rapporten Kvinnors hälsa och sjukdomar – kartläggning och analys av forskningsbehov

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With warm thanks to Professor Gita Mishra for her tireless efforts in inspiring, instructing, and encouraging colleagues and students in international women's health.

Sammanfattning

I likhet med andra höginkomstländer har medellivslängden ökat för både män och kvinnor i Sverige under de senaste decennierna, med en stor förbättring särskilt när det gäller kardiovaskulära sjukdomar. De befintliga könsskillnaderna liknar den internationella situationen där mortaliteten är högre bland män medan sjuklighet och användning av hälso- och sjukvård är högre bland kvinnor.

Internationella jämförelser av könsskillnader i vuxendödlighet visar på mindre absoluta skillnader mellan män och kvinnor i Sverige än i andra OECD-länder. Geografiska och utbildningsmässiga skillnader i dödlighet och sjuklighet från olika grupper av sjukdomar finns både bland män och kvinnor i Sverige. Tillgängliga uppgifter om hälsa bland invandrabefolkningen i Sverige tyder också på en ökad börda av vissa typer av sjuklighet i denna grupp.

Det finns relativt mindre data om kvinnospecifika sjukdomar i Sverige. En stor del av svensk epidemiologisk forskning är baserad på data från administrativa register över dödsfall, patientregister (sjukhusvistelser och kontakt med öppenvård) och kvalitetsregister. Vi saknar mer data från befolkningsundersökningar för djupare analyser av hälsobehov och ojämlikheter i tillgång till och användning av hälso- och sjukvård.

Ökad medvetenhet om och intresse för kvinnors hälsa bland allmänheten, beslutsfattare och forsknings- och yrkesgrupper skapar nya möjligheter att minska ojämlikheter i hälsa och att etablera ytterligare forskningssamarbeten och infrastrukturer för kvinnors hälsa.

Summary

Similar to other high-income countries, there has been improvements in survival of both men and women over the last few decades, with a major improvement in the area of circulatory disease in particular. The existing gender differences in Sweden are similar to the international situation in that mortality of men tends to be higher while morbidity and use of health care is higher among women. International comparisons of gender differences in adult mortality indicate smaller absolute differences between men and women in Sweden, compared to other OECD countries. Both geographical and educational differences in mortality and morbidity from different groups of diseases are present among men and women in Sweden. The available data on health among the immigrant population in Sweden also indicate an increased burden among this group.

Relatively less data is available on the burden of female specific diseases in Sweden and it is difficult to e.g. draw firm conclusions about the situation of Swedish women in an international perspective. With a large part of Swedish demographic and epidemiological research being based on data from routine registers of deaths, quality registers, and contacts with health care providers (hospitalizations and contact with outpatient specialized care), we lack important information about time trends in incidence and prevalence of specific health conditions, including their less severe forms and/or conditions that remain untreated to are treated by general practitioners. The relative paucity of data from population surveys also complicates analyses of health needs and inequities in access to and use of health care.

Increasing awareness of and interest in women's health among the general public, policy makers, and the research and professional communities, creates new opportunities for achieving equity and for establishing further research collaborations and infrastructures for women's health.

Introduction

This report has been commissioned by the Swedish Research Council for Health, Working Life and Welfare (FORTE) in June 2023. Its purpose is to provide a descriptive overview of the state of women's health and gender inequalities in health and health care in Sweden.

FORTE has been assigned by the government, to analyze research needs with respect to women's health. The main goal with the need assessment is to develop a proposal for a research agenda on women's health. The analysis is done in collaboration with the Swedish Research Council, incorporates different aspects of women's health and includes different scientific views and perspectives.

The specific objectives are:

1. To identify the main challenges related to women's health.
2. To identify the main research needs related to women's health.
3. To identify the most appropriate type of grants for a research agenda on women's health.

As part of the first objective “to identify the main challenges related to women’s health”, an overarching descriptive analysis on women’s health has been requested from researchers at Stockholm University. Based on publicly available data and research literature, this descriptive analysis employs a broad framework of women’s health (and health care) including different aspects such as: (i) Female specific conditions; (ii) Conditions more common in women including multimorbidity; (iii) Conditions causing high morbidity and mortality among women; as well as (iv) Conditions and risk factors linked to inequalities in women’s health.

The overview of current issues in women’s health has its main focus on the situation in Sweden, while including research results and evidence from Sweden and other countries as well. As far as possible, analyses on sociodemographic sub-groups are considered with respect to all studied outcomes.

Contributors are researchers and research students based at the Department of Public Health Sciences of Stockholm University. Work on this overview was performed in July-August 2023.

Background and state of the art

In Sweden and internationally, there are more and more voices arguing for more effort to address specific needs of women. In their recent editorial published by the Nature journal, Smith (2023a; 2023b) provides some very convincing arguments for boosting investment into addressing conditions and diseases that affect women. From a US perspective, the author also provides a comprehensive summary of evidence demonstrating the gender specific burden of disease, with female-dominant diseases such as e.g., depression or headaches, typically receiving less funding. Another important comment relates to the fact that women’s health should not only focus on female-specific conditions or conditions that affect women disproportionately but also needs to address conditions where women experience different symptoms or respond differently to treatments (Smith, 2023a).

In their second edition of “A Life Course Approach to Women’s Health” (Mishra et al., 2023), the editors refer to the European Institute for Gender Equality’s (EIGE) definition of a woman as “a person assigned as female sex at birth, or a person who defines herself as woman” (EIGE, 2023). The editors and authors of the book base their discussions on the Institute’s definition of sex as “Biological and physiological characteristics that define humans as female or male”, with additional notes acknowledging that “These sets of biological characteristics are not mutually exclusive, as there are individuals who possess both, but these characteristics tend to differentiate humans as females or males” (EIGE, 2023). Within this framework, and with reference to work of the United Nations Entity for Gender Equality and the Empowerment of Women (UN Women, 2023), gender is defined as “Social attributes and opportunities associated with being female and male and to the relationships between women and men and girls and boys, as well as to the relations between women and those between men” (EIGE, 2023).

There is substantial interest in understanding both the biological aspects and the influences of societal constructs on women’s health among the public health and health

research community, with some promising and innovative approaches to disentangling these complex interactions in epidemiological studies (Colineaux et al., 2022; Colineaux et al., 2023). However, in most empirical research, the term “women” is still mainly used as a binary gender construct for comparisons with data on men. Mishra et al. (2023) make an important point in arguing that people from nonbinary and gender-diverse groups who may experience menstrual cycles, pregnancy, endometriosis, and the menopause, also require access to women’s health and reproductive services. Consequently, any evidence on women’s health should be translated into respectful and responsive policies and preventive initiatives that are inclusive of those from nonbinary and gender-diverse groups.

Work plan and methodological considerations

This short overview aims to describe the current situation in women’s health in Sweden, based on data that is publicly available and with references to published research evidence.

New analyses and summaries of time trends, geographical variations, and gender and age differences in mortality and morbidity from different specific causes, are mostly based on data provided by the Swedish National Board of Health and Welfare (National Board of Health and Welfare, 2023) in their on-line data base. For overview and analyses of time trends in birth outcomes and health behaviors of pregnant women, we also accessed data collected by the Swedish Medical Birth Registry, available through this comprehensive online data together with data published by the World Health Organization (WHO 2023) and the World Bank (2023). We also consulted data available from the Institute for Health Metrics and Evaluation through the Global Burden of Disease initiative (IHME 2023), and we used data provided by Statistics Sweden (2023) for documenting trends in birth rates and fertility.

The Organisation for Economic Co-operation and Development (OECD) European Observatory on Health Systems and Policies has published a very comprehensive recent review of the Swedish health system that constitutes a good starting point for comparisons of the health situation of Swedish women in an international perspective (OECD 2021). We have chosen to refer to this publicly available, rich data source for further information on specific features of the Swedish health care system, and on current challenges for population health in Sweden, and women’s health in particular.

There is a long tradition of research in social and life course epidemiology at the Department of Public Health Sciences of Stockholm University, with a large part of our recent and ongoing projects being carried out in collaboration with Karolinska Institutet and other Swedish and foreign universities. We build heavily on evidence from ongoing and recent research at the Department in our discussions on health inequalities, with some further references to the state of the art in our field.

Our choices to focus on some specific health conditions that we see as important priorities for further research on women’s health, are justified by the size of the disease burden, the importance of the conditions for health of future generations, persisting gaps in understanding of causes and natural history of disease, or health problems that are common but under-researched in a global or Swedish context.

Results from descriptive analyses in Sweden and evidence from recent research

Mortality

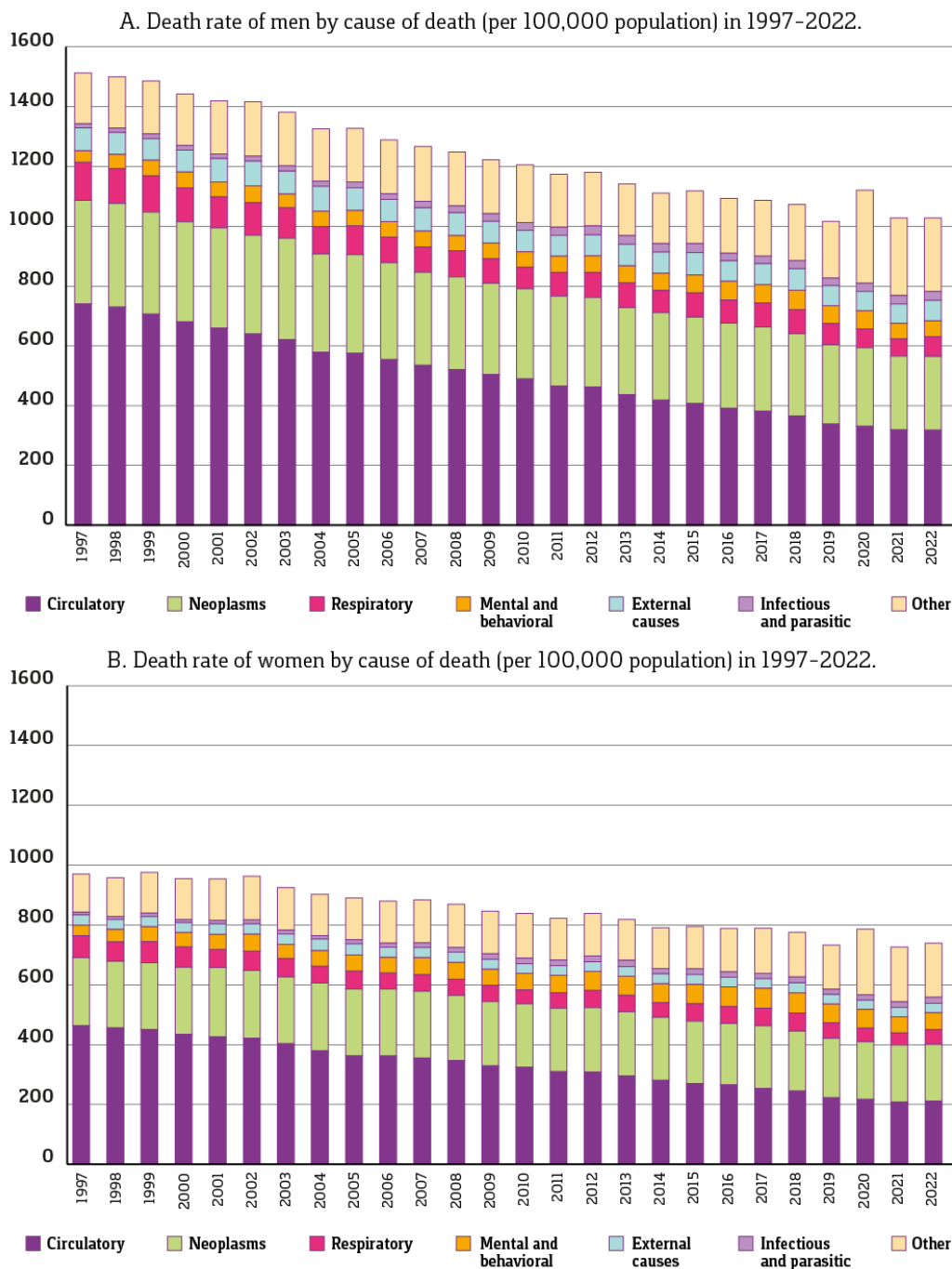
Over the last 25 years, there have been major improvements in survival of both men and women in Sweden. As seen in Figure 1, the decline in death rates of both genders was mainly driven by decreasing death rates from circulatory diseases. A change in the generally decreasing time trends for both genders, was noted in year 2020 with a temporary increase in death rates during the Covid-19 pandemic, followed by somewhat lower, stable death rates in 2021-2022.

Age standardized mortality rates of men are consistently higher than those of women, with higher absolute deaths rates apparent for all groups of causes of death shown in Figure 1. The ratio of age standardized mortality in men compared to women was relatively stable, with a 1.5 times higher death rates among men in 1997, and 1.4-times higher death rates among men in 2022 respectively.

In comparisons of the composition of deaths from different causes among men and women at the start and at the end of our 25-year follow-up period, a decrease in the relative contribution of deaths from circulatory disease is apparent in both genders. These constituted 46 percent of all deaths among men in 1997-2001 but only 31 percent in 2018-2022. The corresponding decline of the proportion of deaths due to circulatory disease among women was from 48 percent to 31 percent. Deaths from neoplasms remain a second largest group of causes of death in both genders, accounting for about a quarter of all deaths. See Figure 2.

The composition of causes of deaths differs by gender. As shown in Figure 2, e.g., deaths from external causes appeared to be more prominent among men and deaths related to mental and behavioral disease relatively more common among women (Figure 2). These gender differences were somewhat more visible during the latest period.

Figure 1 Death rate (per 100,000 population) of men and women in Sweden 1997-2022, by cause of death.

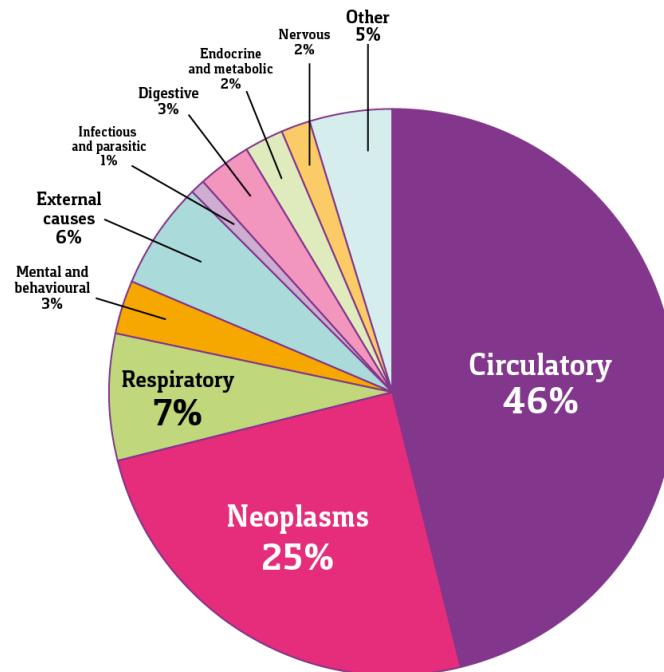


Notes: Results are standardized for Swedish population in 2016. Covid-19 was reported as a separate cause of death and is included among “other causes”. Source of data: Causes of death. Stockholm: Socialstyrelsen (data downloaded on 2023-07-28).

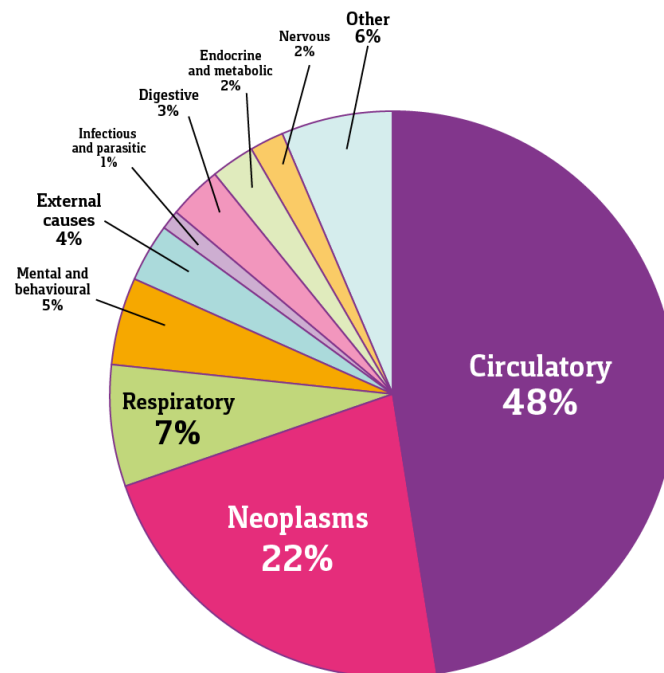
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Figure 2 Composition of causes of death among men and women in Sweden, 1997-2001 and 2018-2022.

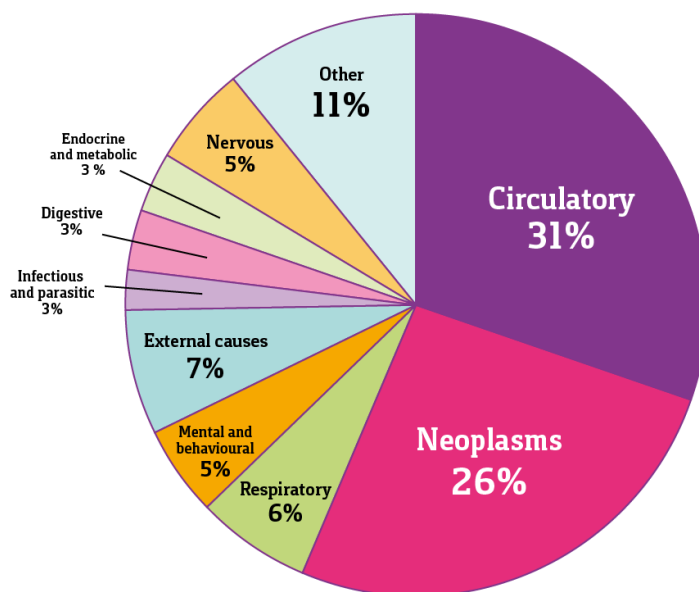
A. Causes of death among men in 1997-2001.



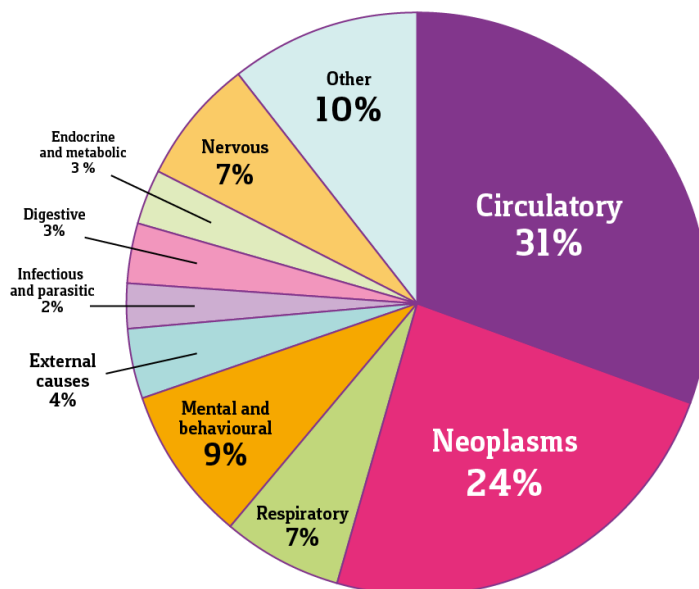
B. Causes of death among women in 1997-2001.



C. Causes of death among men in 2018-2022.



D. Causes of death among women in 2018-2022.



Notes: Covid-19 is included among “other causes” of death. Source of data: Causes of death. Stockholm: Socialstyrelsen (data downloaded on 2023-07-28).

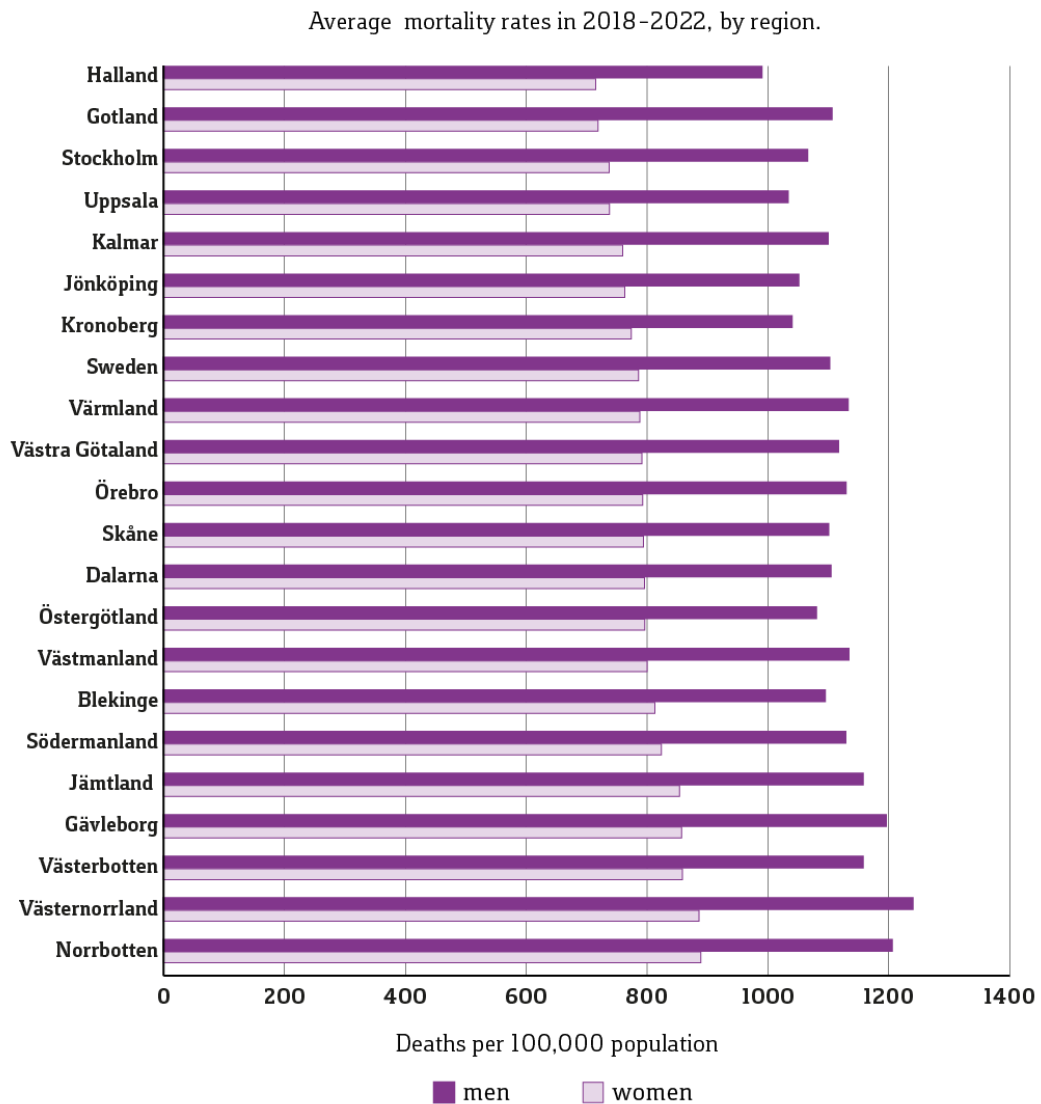
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Research on temporal trends in incidence of circulatory disease: Temporal trends in the incidence of myocardial infarction and ischemic stroke by socioeconomic position among men and women in Sweden between 1987-2010 were investigated by Malki et al (2014). The authors report a decrease in incidence of myocardial infarction and ischemic stroke among men but no significant change in incidence among women during the same period. Importantly, the results also showed persisting large socioeconomic inequality in incidence of myocardial infarction and ischemic stroke in both genders, with a tendency towards increasing inequality in ischemic stroke incidence among younger adults.

Research on case fatality from circulatory disease: Short-term (i.e., death before reaching the hospital or on the disease event day) and long-term (death within one year, conditional on surviving short-term) case-fatality rates for myocardial infarction and ischemic stroke were studied among Swedish men and women in the period of 1990-1994 and 2005-2009 (Malki et al., 2019). Despite general improvements in case fatality rates across all socioeconomic groups and both genders over time, persistent and even increasing differences in case fatality were found among the most disadvantaged socioeconomic groups, older patients, and women.

Gender differences in average annual death rates are present in all regions of Sweden. Figure 3 further illustrates variation in annual death rates across different regions in both men and women, with results sorted by an average annual death rate among women during the latest five-year period with data available. This ranged from 715 deaths/100,000 women in Halland to 889 deaths/100,000 women in Norrbotten annually during 2018-2022. Most regions showed higher death rates than the Stockholm region or the average for Sweden as a whole. Northern regions appeared to have higher death rates but the geographical pattern was not completely clear.

Figure 3 Average annual death rates among men and women in Sweden 2018-2022, by region.



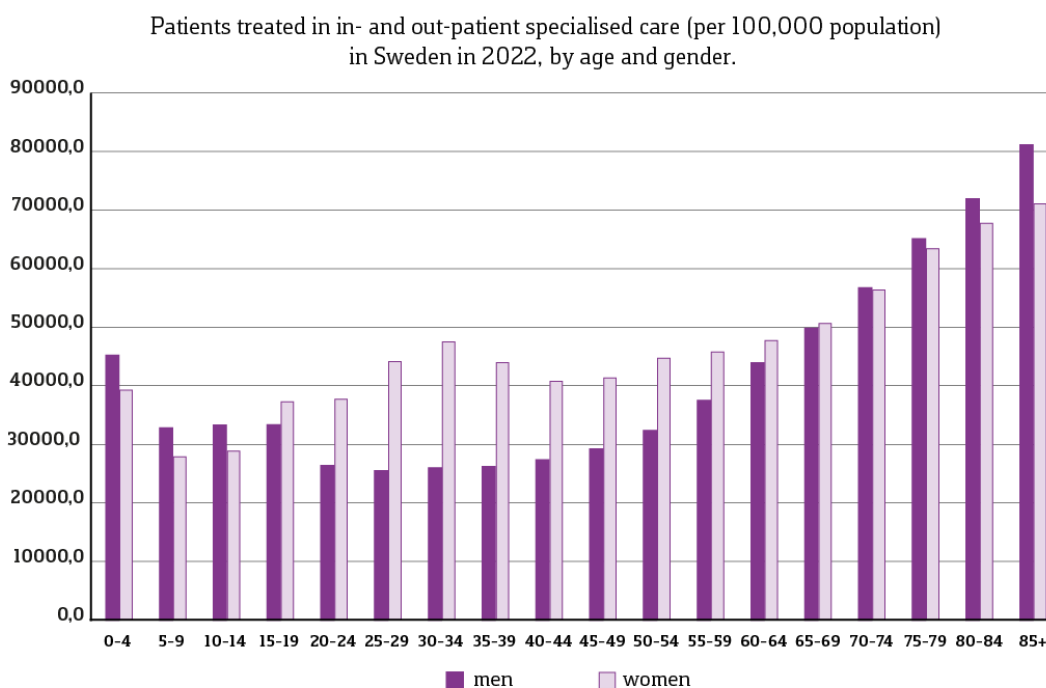
Notes: Annual mortality rates are averaged across a five-year period and age standardized for Swedish population in 2022. Source of data: Causes of death. Stockholm: Socialstyrelsen (data downloaded on 2023-07-28).

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Morbidity

Register data on use of in- and outpatient care show very distinct age- and gender specific patterns, with important differences in men’s and women’s frequency of contact with specialized health care at different ages. By looking at gender ratios, it can be seen that women are more likely to be patients in in- and out-patient care in the age groups from 15-69 years, with the highest women/men ratios during the reproductive years. On the other hand, boys are more likely to have contact with in- and outpatient care in childhood and men at ages 70+ are also more likely to be treated in specialized care (Figure 4). The lowest proportions treated in specialized care were seen for men aged 20-39 years (around 26,000 patients/100,000 population) and for girls at ages 5-14 years (around 28,000 patients/100,000 population).

Figure 4 Patients treated in specialized health care (per 100,000 population) in Sweden in 2022, by age and gender.



Notes: Data source: Diagnoses in inpatient care and in specialized outpatient care. Stockholm: Socialstyrelsen (data downloaded on 2023-09-01). <https://www.socialstyrelsen.se/statistik-och-data/statistik/statistikdatabasen>

When using the routine register data, interpretation of time trends in use of health services has to be done in light of some important data limitations, especially in terms of increasing completeness of data from outpatient care during the most recent period. The changing guidelines for diagnosis and treatment of common diseases, and the absence of data from contacts with general practitioners adds to the complexity in interpreting and comparing available data on morbidity from the Swedish and Nordic patient registers (Laugesen et al., 2021; Ludvigsson et al., 2011). Interpretations are further complicated by changing diagnostic criteria, changing attitudes and possibly also different availability of specific services.

Patients can be in contact with in- and out-patient health care multiple times and also with multiple different diagnoses being registered. Diseases of the genitourinary system, musculoskeletal diseases, eye diseases, injuries, mental and behavioral disorders and neoplasms are the most common groups of diseases among women, while injuries, musculoskeletal disease, eye diseases and mental and behavioral disorders are the most common groups of diseases behind contact with in- and out-patient care among men (all with an annual frequency of more than 40,000 patients/100,000 population in 2022). Interestingly, in age-standardized analyses of register data, the overall proportions of all patients who are annually treated in in- and outpatient specialized care for any reason appear to be stable in Sweden during the period from 2008-2022.

Research on inequality in hospitalization due to non-communicable disease in Sweden:

Using a linkage of register data for three generations of Swedish men and women, Gondek et al. (2021) studied cohort differences in hospitalization due to non-communicable conditions in 1989-2008 and if these varied by paternal socioeconomic position.

Main findings suggest that no substantial progress was made in reducing the socioeconomic inequalities in hospitalization across cohorts born between 1915-1972. The relative socioeconomic differences in hospitalizations were consistent across age and gender, with the younger generation showing a greater prevalence of hospitalization due to conditions such as depression, chronic obstructive pulmonary disease, hypertension or migraine. The authors emphasize that the relationship between morbidity and hospitalization is complex, and potential reasons for increase in hospitalizations may be related to both changes in disease burden and to healthcare utilization.

Figure 5 Time trends in treatment for eating disorders among men and women of different ages in Sweden 2008-2022 (patients per 100,000 population).



Notes: ICD diagnoses F50 Eating disorders. Annual rates are averaged across five-year periods. Quality of data has been improving since 2008. Data source: Diagnoses in inpatient care and in specialized outpatient care. Stockholm: Socialstyrelsen (data downloaded on 2023-09-01). <https://www.socialstyrelsen.se/statistik-och-data/statistik/statistikdatabasen>

The Swedish register data also indicate some very clear time trends with increasing rates of diagnosed eating disorders (Figure 5), endometriosis and some other conditions specific to women's reproductive system (Figure 6) all of which have been receiving more attention from both the professional community and the general population in recent years. The selected conditions can be seen as examples of common diseases that are affecting women at different ages and different stages of their life-course (Figure 7).

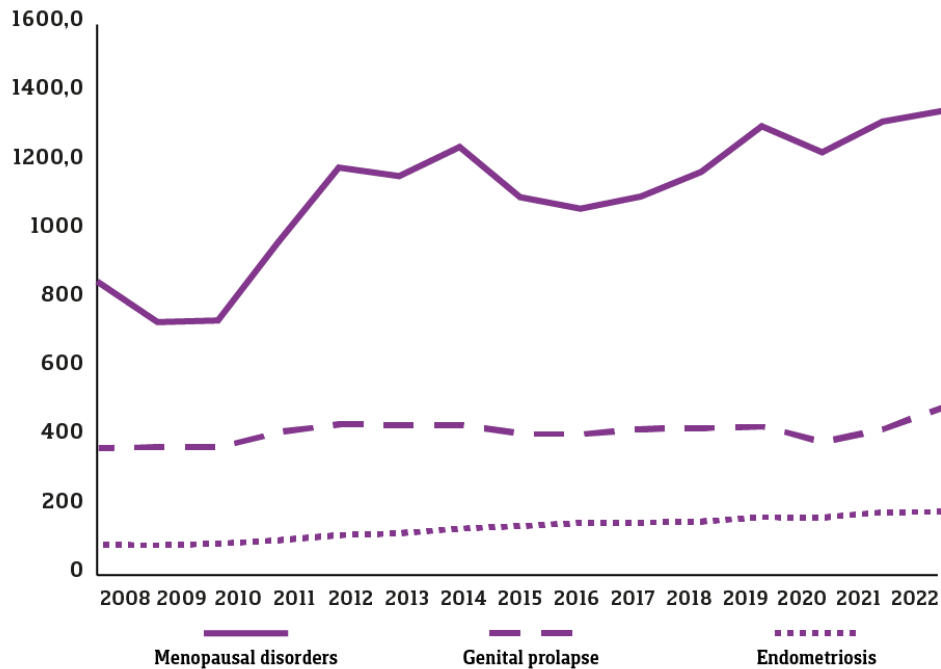
Parallel to the trends among women, the steady increase in eating disorders diagnosed and treated in men is particularly striking and appears to be chiefly affecting younger age groups. The gender ratio in rates of eating disorders diagnosed and treated among women compared to men is very high in all age groups and remains high throughout the period with data available (Figure 5). As discussed above, all time trends have to be interpreted very carefully, as they could indicate an increasing burden of disease but also improving opportunities for diagnosis and treatment.

Research on social and early life determinants of eating disorders: Using a total population cohort based on Swedish register data, increasing rates of anorexia nervosa, bulimia nervosa and eating disorders not-otherwise-specified were documented for both men and women born 1973-1998 (Goodman et al., 2014a). In addition to the high gender ratio in incidence of diagnosed eating disorders (1.5 percent of females and 0.1 percent of males in the study received an eating disorder diagnosis during the follow-up from 1985-2010), the study also found that family history of education predicts eating disorders in a gender- and disorder-specific way, with effects in females observed across multiple generations (i.e. between grand-daughters and grandparents). Furthermore, using linked data for Swedish men and women born 1975-1998, Goodman et al. (2014b) performed helpful consistency checks with data on eating disorders from in- and outpatient registers, and showed that shorter gestational age and multiple-birth status independently predicted anorexia nervosa, whereas higher birth weight for gestational age predicted bulimia nervosa, findings that also persisted in sibling analyses.

Research on osteoporosis: Sizeable gender ratios in incidence of osteoporosis were documented in a register-based study of Swedish men and women born in 1920-1960 by Gao et al. (2023, in press). At ages from 50-92 years, women on average had 5 times higher rates of receiving first osteoporosis diagnosis than men. Region of birth and education were also associated with incidence of osteoporosis in a gender-specific pattern.

Figure 6 Time trends in in- or outpatient specialized care treatment of selected diseases of the genitourinary system among women in Sweden, 2008-2022.

Women treated for endometriosis, genital prolapse and menopausal disorders (patients per 100,000 population) in in- or outpatient specialised care in Sweden, 2008-2022.



Notes: ICD diagnoses N80 Endometriosis, N81 Female genital prolapse, N95 Menopausal and other perimenopausal disorders. All ages combined, age standardization using the 2022 population. Quality of data has been improving since 2008. Data source: Diagnoses in inpatient care and in specialized outpatient care. Stockholm: Socialstyrelsen (data downloaded on 2023-09-01). <https://www.socialstyrelsen.se/statistik-och-data/statistik/statistikdatabasen>

Research on incidence of endometriosis among Swedish women: Gao et al. (2020a) documented the incidence rates of first diagnosis of endometriosis in national inpatient and outpatient registers for Swedish women born in 1973-1987 during the follow-up period between 1987-2012. They also found evidence of fetal origins of endometriosis, with exposure to maternal smoking and growth restriction during the fetal period in particular being associated with an increased risk of endometriosis at early to mid-reproductive life (Gao et al., 2019a, 2020a). In their total population based study, mother's educational level showed an inverse association with offspring's incidence of endometriosis, and the adjusted rate of endometriosis in women born to mothers with university education was 16 percent (95 percent CI, 9 percent–22 percent) lower than in those with mothers who only completed elementary education (Gao et al., 2020a).

Research on comorbidity among women with endometriosis: In another longitudinal study based on the total female population of Sweden born between 1973-1990, Gao et al (2020b) explored psychiatric comorbidity among women with endometriosis. After adjustment for birth characteristics and education, women with endometriosis had an increased risk of being later diagnosed with depressive-, anxiety and stress-related disorders, alcohol/drug dependence, and attention-deficit hyperactivity disorder compared with the general population and with their sisters without endometriosis. The adjusted hazard ratios ranged from 1.56 (95 percent CI 1.29-1.88) for depressive disorders to 1.98 (95 percent CI 1.34-2.93) for attention-deficit hyperactivity disorder in the sibling analysis. Also, women with previous affective psychotic disorders, depressive-, anxiety and stress-related disorders, eating disorders, personality disorders, and attention-deficit hyperactivity disorder were more likely to be later diagnosed with endometriosis. This high degree of comorbidity has important implications for clinical practice that needs to consider multidisciplinary approaches to treatment and psychosocial support to women with endometriosis.

Research on menopausal disorders in Sweden: Linked register data has been also used to study cumulative incidence of different types of perimenopausal disorders among an older cohort of Swedish women born 1915-1929 followed at ages 40-65 years by Gao et al (2019b). In addition to reporting some evidence on possible fetal origins of menopausal and climacteric states, the authors also found that rates of being diagnosed with perimenopausal disorders were generally higher among women with well-educated parents and among women who had a higher educational level themselves. Further investigations of the social patterning of health needs and differences in access to health care or help seeking behaviors are needed.

Research on polycystic ovary syndrome: Given the complexity of current diagnostic criteria (Deswal et al., 2020), opportunities for monitoring the burden and inequality in polycystic ovary syndrome (PCOS) in publicly available register data are limited. On the other hand, Swedish register data has been extensively used in original research on the etiology of PCOS, its comorbidity and also for research about consequences of PCOS for health of the offspring. Valgeirsdottir et al. (2019) reported associations of maternal smoking and increased body mass index with higher risk of PCOS in offspring. Using family and twin study designs, psychiatric comorbidities of PCOS have been studied by Cesta et al. (2016, 2017). Finally, associations of PCOS in mothers with a higher risk of stillbirth (Valgeirsdottir et al., 2021a), preterm birth (Valgeirsdottir et al., 2021b), and development

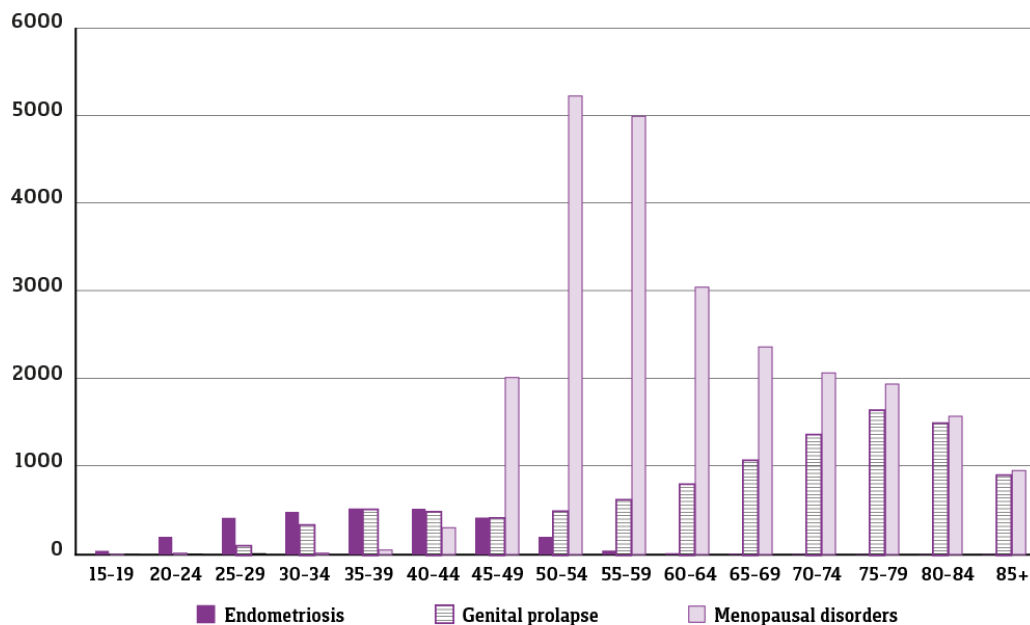
of neuropsychiatric disorders in offspring (Cesta et al., 2020) have been also documented in large population samples.

Research on ovarian dysfunction: Boldis et al. (2022) studied a population of women born from singleton pregnancies in Sweden between 1973-1995, followed from age 15 to 40. The incidence of ovarian dysfunction (of which PCOS constitutes a major proportion) was measured using hospital register data. Results from the study confirmed very high heritability of ovarian dysfunction, and provided further evidence suggesting that heavy smoking and obesity in mothers were linked to higher risk of ovarian dysfunction in daughters. No strong social gradients in the incidence of this condition were reported (Boldis et al., 2022). Boldis et al. (2023, in press) also reports higher risks of obesity and psychiatric comorbidity (depression and anxiety) among Swedish women with ovarian dysfunction.

Although the exact causal mechanisms behind the above reported associations still need to be better understood, combined effects of both genetic and environmental factors are most likely. The generally consistent research findings that indicate early life determinants of endometriosis and PCOS, their psychiatric comorbidities, and consequences for health of offspring, have important implications for antenatal and mental health care.

Figure 7 Age distribution among women treated for selected diseases of the genitourinary system in in- and outpatient specialized care in Sweden in 2022 (patients per 100,000 population).

Women treated for endometriosis, genital prolapse and menopausal disorders in in- and outpatient specialised care in Sweden in 2022 (patients per 100,000 population), by age.



Notes: ICD diagnoses N80 Endometriosis, N81 Female genital prolapse, N95 Menopausal and other perimenopausal disorders. Data source: Diagnoses in inpatient care and in specialized outpatient care. Stockholm: Socialstyrelsen (data downloaded on 2023-09-01). <https://www.socialstyrelsen.se/statistik-och-data/statistik/statistikdatabasen>

Health of pregnant women and complications of pregnancy

Enhancing sexual and reproductive health, assuring universal health coverage and reducing maternal, newborn and child mortality are among the main health-related Sustainable Development Goals (WHO, 2023). Sweden belongs to countries with traditionally low maternal mortality ratio and low infant mortality. According to the World Bank data, maternal mortality ratio was stable at 5 deaths/100,000 live births in Sweden in 2014-2020. The most recently reported infant and under-five mortality for Sweden in 2021 was 2 deaths/100,000 live births and 3 deaths/100,000 live births respectively (World Bank, 2023). In comparison with other countries, Sweden also has one of the lowest adolescent birth rates (2.4 births/1000 women aged 15-19 years) (WHO, 2023).

The mean birth weight of live born infants has been fairly stable during the period from 1992-2021, ranging between 3493-3538 g, and with a mean birth weight of 3502 g recorded in 2021. International comparisons of maternal and child health often include indicators such as low birth weight, defined by the World Health Organization (WHO) as weight at birth less than 2500 g. The proportion of infants born with birth weight lower than 2500 g is relatively low in Sweden, ranging between 4.1-4.6 percent of all live births during 1992-2021, and is highest among births to primiparous women in older age categories (7.3 percent among primiparous women aged 35+ years in 2021).

The proportion of births with high birth weight (4500 g) has recently also become of concern in terms of delivery complications and health outcomes for both mother and offspring. There has been a slight decrease in the total proportion of births of 4500 g from around 4 percent in early 2000s to the current level of 3 percent in Sweden. Birth with high birth weight are more common among multiparous women.

A gradual and rather substantial increase in proportion of women whose body mass index can be classified as overweight (BMI between 25-30 kg/m²) or obese (BMI 30+ kg/m²) at start of pregnancy can be seen in Figure 8. The prevalence of overweight and obesity is consistently higher among multiparous women, among whom 29.5 percent were overweight and 18.9 percent obese in 2021. The corresponding figures for nulliparous women were 26.3 percent overweight and 14.0 percent obese in 2021. The trend of increasing burden of overweight and obesity affects both nulliparous and multiparous women. Despite limitations of register data in terms of partly missing data or variations in terms of exact time or method of measurement, the evidence for increasing burden of overweight and obesity among women of childbearing age is robust, consistent with recent evidence from other countries (Brown et al., 2021), and is of concern in terms of related complications.

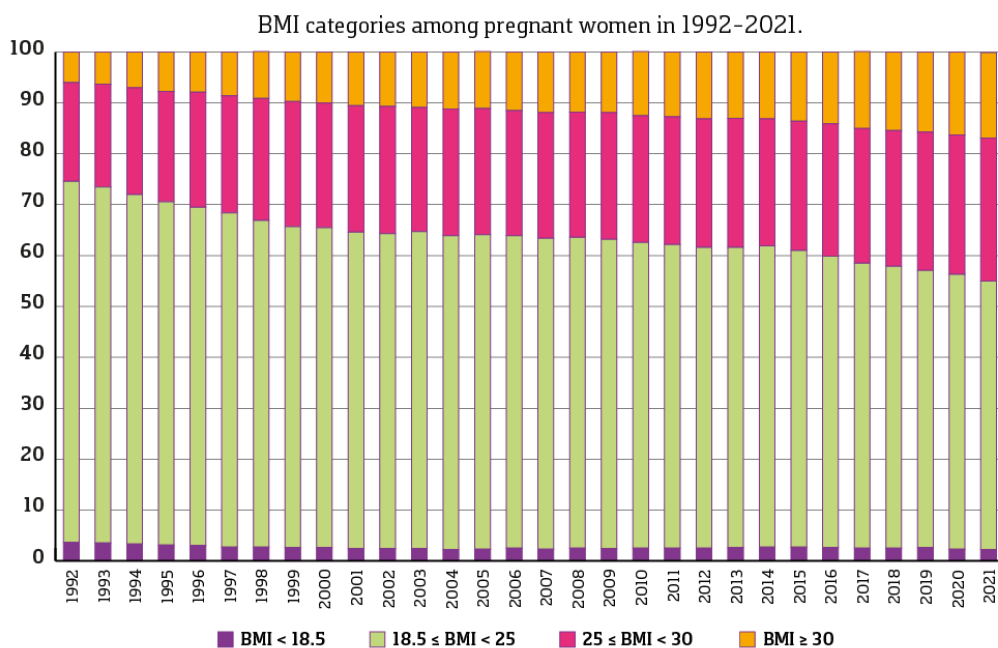
Research on time trends and geographical differences in overweight and obesity among pregnant women: The Swedish Medical Birth Registry data is often used in analyses of overweight and obesity among Swedish women. Chaparro et al. (2015) mapped regional differences and time trends in women's overweight and obesity at start of first pregnancy between 1992-2010. They reported a significant increase in prevalence of pre-pregnancy overweight/obesity and obesity in all Swedish counties between 1992, and 2010. In 2010, Södermanland and Gotland exhibited the highest age-standardized overweight/obesity (40 percent) and obesity (15 percent) prevalence, respectively. The sharpest increases between 1992 and 2010 were observed in Västerbotten for overweight/obesity and

in Gotland for obesity. Across the years, Stockholm had the lowest prevalence of overweight and obesity. The reasons behind the observed disparities are not fully understood.

Research on educational inequalities in obesity and gestational weight gain:

Optimal gestational weight gain depends on the woman’s pre-pregnancy body size, and both inadequate and excessive gestational weight gain can lead to complications in the mother and the offspring (Khanolkar et al., 2020). Holowko et al. (2014) first demonstrated social inequality in excessive gestational weight gain, using a linkage of register data for a smaller cohort of Swedish women with singleton first births in 1982-2008. In their subsequent research based on a larger cohort of Swedish women having their first and second singleton birth in 1982-2010, Holowko et al. (2015) further showed that lower educated women had the largest body mass index increase between pregnancies, and that these inequalities were greatest among women with excessive gestational weight gain in the first pregnancy. These results highlight the importance of supporting women to maintain a healthy pre-pregnancy body mass index, appropriate gestational weight gain and a healthy postpartum weight.

Figure 8 Categories of body mass index (BMI, in kg/m²) at start of pregnancy among women in Sweden, 1992-2021.

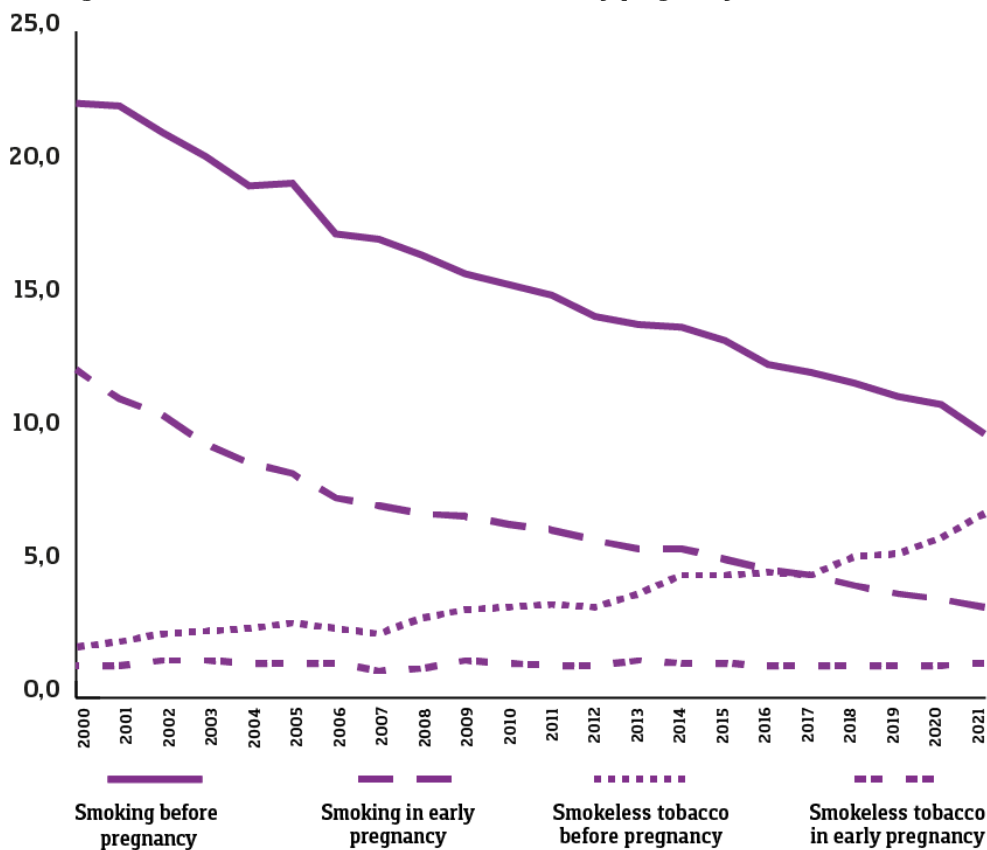


Notes: Data for all ages and parities are combined in the figure. According to Socialstyrelsen, data for Värmland are not included in 2012 and data for 690 births from Skåne are missing in 2021. Results are based on all available data. Source of data: Pregnancies, deliveries and newborns. Stockholm: Socialstyrelsen (data downloaded on 2023-07-31) <https://www.socialstyrelsen.se/statistik-och-data/statistik/statistikdatabasen/>

In contrast to increasing concerns about maternal obesity, there have been some positive trends in proportion of pregnant women who used tobacco before or during their pregnancy (Figure 9). Overall, the prevalence of smoking at 3 months before conception declined from 22.3 percent in 2000 to 9.9 percent in 2021. Of the women who smoked before pregnancy, 45 percent and 65 percent reported quitting by early stage of pregnancy in 2000 and 2021 respectively. While the proportion of women who used smokeless tobacco at 3 months before pregnancy increased steadily, the proportion who continued to use snuff in early stages of pregnancy remained stable at just over 1 percent of pregnant women in 2000-2021. However, smoking in early pregnancy still remains relatively high among the youngest group of pregnant women, both primi- and multiparous, with the proportion of smokers in early pregnancy ranging between 7-9 percent among pregnant women younger than 25 years in 2019-2021.

Figure 9 Smoking and smokeless tobacco (snuff) use in 2000-2021.

Smoking and smokeless tobacco use before and in early pregnancy (%), Sweden 2000-2021.

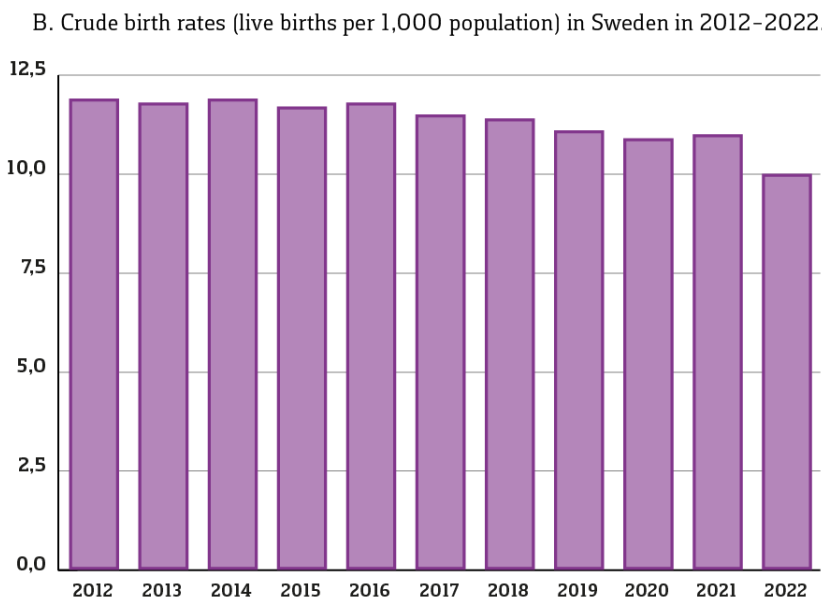
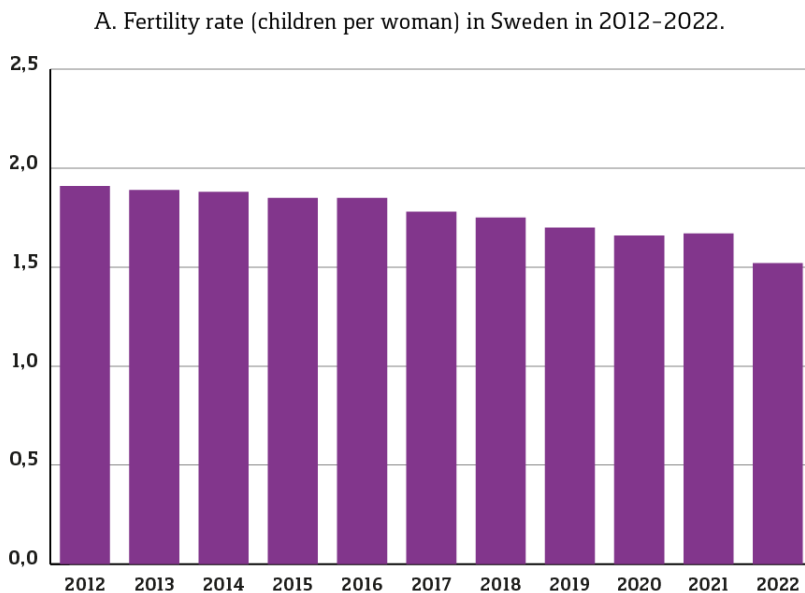


Notes: Data for all parities and ages are combined in the figure. According to Socialstyrelsen, data for 690 births from Skåne are missing in 2021. Results are based on all available data. Source of data: Pregnancies, deliveries and newborns. Stockholm: Socialstyrelsen (data downloaded on 2023-09-01) <https://www.socialstyrelsen.se/statistik-och-data/statistik/statistikdatabasen/>

Demographic changes, childbearing and fertility

Following some fluctuations with two peaks of fertility around year 1990 and 2010, both crude birth rates and fertility have been steadily decreasing in Sweden during the last twelve years (Figure 10).

Figure 10 Fertility and crude birth rates in Sweden, 2012-2022.



Notes: Fertility rate is defined as the average number of children a hypothetical cohort of women would have at the end of their reproductive period if they were subject during their whole lives to the fertility rates of a given period and if they were not subject to mortality. Source of data: Statistics Sweden, February 2023. (Accessed on 2023-08-01) <https://scb.se/>

As larger shares of the female population go on to higher education and choose to pursue a career, the average age of childbearing has been increasing and is projected to keep increasing. Although this development has many societal benefits, one negative consequence is that the rate of infertility increases as well (Statistics Sweden, 2020).

Infertility is estimated to affect 10-15 percent of all heterosexual couples (National Quality Register for Assisted Reproduction, 2023). Infertility is of course not only caused by the higher age of childbearing but can also be a consequence of higher prevalence of ovarian dysfunction such as polycystic ovary syndrome, overall higher rates of overweight and obesity, and other medical factors that contribute to infertility. In some cases, there are no medical factors which cause involuntary childlessness as childlessness can also affect women who haven't found a partner or same-sex couples who have no obvious way of conceiving a child (Statistics Sweden, 2020).

Assisted reproduction technology (ART) such as in vitro fertilization (IVF) can help women conceive and give birth to a child despite problems of infertility and involuntary childlessness. Single women have been granted the right to ART in 2016 (Statistics Sweden, 2020). Prior to that, many single women travelled abroad for intrauterine insemination with donated sperm. The number of IVF treatments per year have been steadily increasing since the first live birth from IVF in Sweden in 1982, although the increase has been less pronounced after 2011.

The chance for a live birth after an IVF treatment is also very dependent on the age at which the treatment is given. However, most couples or single women succeed in conceiving a child within the first three treatments. The risk for adverse perinatal outcomes such as premature birth or low birthweight have decreased over time since the chance of multiple births have decreased with the increase of single embryo transfers (Wennerholm et al., 2022). The proportion of live births that are conceived by IVF has been increasing over time, and more than 5,000 infants are born after IVF annually in Sweden (Wennerholm et al., 2022).

New important research infrastructures are being established in Sweden, that will make use of the unique registers, and will allow researchers to assess the impact of lifestyle and health exposures on ART outcomes, and address hypotheses concerning possible changes in epigenetic profiles and health of infants born after the ART procedures (Iliadou et al., 2019).

Swedish health system and health of women in an international perspective

The Country Health Profile of Sweden in 2021, compiled and published by the OECD and World Health Organization's European Observatory on Health Systems and Policies, provides an up-to-date and comprehensive summary of information on health of the Swedish population and the Swedish health system in the context for cross-country comparisons (OECD, 2021). Particular characteristics and challenges for each country are highlighted, with due attention paid to checks on quality of data provided to the international agencies by official national statistics. The main aim of the reports is to support policymakers and facilitate mutual learning and exchange among the participating

countries. Important information about gender and social inequalities is also provided as a part of the international comparisons.

Despite the temporary reduction due to deaths from Covid-19, life expectancy at birth in Sweden was one of the higher in the European Union (EU) in 2020, and the gender gap in life expectancy in Sweden was much smaller than in other EU countries (3.5 years compared with 5.6 years for the EU average). The education gap in life expectancy among both men (2.7 years in Sweden and 3.4 years in EU18) and women (4.0 years in Sweden and 6.9 years in EU18) were also relatively smaller (OECD, 2021).

In contrast, age standardized rate of cancer was somewhat higher in Sweden (496 per 100,000 population) than the EU average in 2020. Breast cancer constituted the largest proportion (29 percent) of new cancer cases diagnosed among Swedish women in 2020.

Compared to other EU countries, Sweden spends more on health and its health system is very decentralized. Spending on outpatient care per person in Sweden is nearly double the EU average, while a much lower than the EU average amount is spent on inpatient care (typically provided in hospitals) in Sweden.

Sweden has universal population coverage for health services, with user charges varying across regions, and private health insurance rapidly gaining popularity. Unusually long waiting times for health services are described as a longstanding issue in the Swedish health system. Raising concerns are voiced for declining equity in access to services in Sweden as a consequence of recent developments in care organization. At the same time, Sweden's long tradition of public health policies to reduce risk factors and the relatively low levels of preventable deaths are highlighted as a strength of the Swedish system (OECD, 2021).

Health inequalities and health of immigrant women in Sweden

(Please note that relevant references are presented separately at the end of this section)

The health of immigrant women is characterized by a paradox where a mortality advantage is observed despite lower socioeconomic status, a phenomenon often explained by a positive health selection into migration. However, since the immigrant population is such a heterogeneous group this does not apply to all immigrant groups. In particular, due to higher prevalence of alcohol misuse, Finnish immigrants have a slight mortality disadvantage (RR = 1.12), while especially non-European immigrants exhibit a mortality advantage (RR = 0.75), possibly due to a combination of health selection and lower prevalence of health risk behaviors such as smoking and drinking alcohol. This mortality advantage differs by cause of death where higher mortality risks are observed for infectious diseases such as tuberculosis, HIV, and more recently Covid-19 (RR ranging from 1.46 to 3.04) for immigrant women compared to native Swedes, but lower for many chronic diseases such as cardiovascular diseases and most forms of cancers.

Similar to the health differentials between men and women where women have lower mortality but higher morbidity, immigrant women have lower mortality but higher morbidity compared to Swedish women. The most prominent discrepancies are in mental and reproductive health but have also been observed in diabetes for some groups.

In addition to primary and inpatient care outcomes, there is a higher prevalence of social insurance claims based on illness for immigrant women compared to Swedish women.

Mental health

Immigrant women have higher levels of psychosomatic complaints and need for psychiatric care (HR ranges from 1.44-1.67 depending on specific group). Some immigrant groups exhibit increased risk of schizophrenia, and many groups have higher levels of anxiety and depression. Refugee women in particular exhibit higher prevalence of many psychotic disorders. These elevated risks for different aspects of mental health can be understood in light of traumatic experiences at the origin, as well as difficulties relating to integration in Sweden. Language barriers and clashes in cultural norms and expectations can aggravate feelings of isolation and alienation leading to deterioration in mental health. The loss of a social network in the country of origin and discrimination and racism in Sweden can also contribute to mental health issues in immigrant women.

Sexual and reproductive health

For sexual and reproductive health, there are elevated risks for maternal and perinatal mortality (RR for maternal morbidity ranges from 1.05 to 1.55), as well as adverse birth outcomes for the child (RR for low birth weight ranges from 1.25 to 2.14). Here, the issue of access and use of available healthcare services is crucial for immigrant women, where studies have shown a lack of knowledge for contraceptive counselling, and a lower uptake of antenatal and maternity programs. Again, language barriers and differences in cultural norms and religious beliefs can at least in part explain these discrepancies.

Diabetes

Most non-western groups of immigrant women also show elevated risks for diabetes (RR ranges from 1.32 to 1.80 depending on group) and obesity, which may be a consequence of low physical activity and poor diet amongst these groups.

Factors contributing to immigrant women's health

The social determinants of immigrant women's health are a confluence of factors relating to conditions in the country of origin, the migratory process, and the circumstances in settling in the country of origin. In particular, traumatic events relating to conflict at the origin can cause long lasting psychological harm, but also factors such as a higher presence of infectious diseases or some types of bacteria can also have an effect on the health of a migrant.

The migratory process itself can also be very disruptive where experiences of sexual and physical violence are not uncommon, and uncertainty in relation to asylum seeking also contribute to especially mental health issues. However, the social, cultural, and economic conditions that immigrant women are exposed to in Sweden are then of course strong determinants of health for this group.

The working conditions of immigrant women tend to be poorer than their Swedish counterparts, and immigrant women are overrepresented in low paid, low status occupations especially in the healthcare, childcare, and service sectors. They have a weak

socioeconomic position not only in the labor market, but also in the housing market and in the healthcare system where they often encounter barriers of entry and discrimination. These are living conditions which tend to be detrimental to immigrant women's wellbeing.

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Challenges and opportunities for research on women's health in Sweden, concluding remarks

Our short overview of the current situation in women's health in Sweden could only scratch the surface within an important area of population health with many relevant perspectives and outcomes. We appreciated the possibility to access data on health of women and men that were provided by the Swedish agencies, or compiled by international organizations, in a timely and user-friendly manner. At the same time, we are aware that there is a wealth of other existing, still unused, information that would be very helpful in mapping and monitoring trends in health outcomes and health determinants at a more detailed level. All ongoing and new collaborations around register-based research on women's health will be very important in that they have the potential to both inform local and national policy makers and also continue to generate new original knowledge that will be applicable in many other settings.

Some questions relevant for policy and prevention will require other types of data or combinations of information from different sources. There is a good tradition of large population surveys in Sweden, including important initiatives in surveys on health of children and adolescents (e.g. the Health Behavior in School-aged Children, HBSC study). Sweden also has a history of investing into cohort studies specifically focused on issues in women health (The Population Study of Women in Gothenburg, PSWG study), while many other cohort studies are set up to combine data collection in both men and women. In contrast with some other Nordic countries, no national cohort studies combining data on generations of parents and children were set up in Sweden (that would be equivalent to e.g. the Danish or Norwegian national cohort studies from early 2000s).

Swedish researchers were invited to contribute data from the Women's Lifestyle and Health Study (Roswall et al., 2017) to a recent international initiative in harmonization of research on women's health (the InterLACE study), led by the University of Queensland (Mishra et al., 2016). However, given the differences in the extent and methods of data collection among different participating countries, possibilities for direct international comparisons are still limited (Mishra et al., 2016). It is also important to acknowledge that the leaders of this international collaboration in women's health are in a rather privileged position in that their large and nationally representative cohort studies on Australian women's health ([The Australian Longitudinal Study on Women's Health, ALSWH](#)) are to a great extent directly supported by long term grants from the Australian government.

The strategy to advance women's health and gender equality put forward by the World Health Organization (WHO, 2021), addresses many important areas such as women's bodily autonomy (enabling women and girls to make informed sexual, reproductive, and healthcare decisions as a human right for all), equitable gender norms (including those that make violence against women and girls, practices such as early/forced marriage and female genital mutilation, unacceptable), as well as universal health coverage and social protection (covering health costs, child care, paid parental, sick and family care leave and old age pensions). Making further progress in achieving these goals requires cross-sectoral collaborations with a strong commitment of the whole society.

Correspondingly, better answering important questions about health needs of women, effectiveness of health and social policies and equity in access to relevant interventions requires broad cross-disciplinary research collaborations. The expressed interest and willingness of the Swedish government to identify and support such initiatives is very welcome.

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