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Health Status in Norway 2018

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Health Status in Norway 2018

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Preface

Effective public health efforts require continuous monitoring of the population's health and diseases, as well as research and analysis on how to prevent disease and promote health.

In this short version of the public health report *Health Status in Norway 2018*, we describe the current state of health in the population in 2018 and look at health trends over time. The content is structured around public health aims regarding life expectancy, health and well-being, as well as social inequalities in health. We also present challenges within infectious disease control and the environment. The report is based on updated chapters in the full version of the Public Health Report, available at www.fhi.no/fhr/.

To enable the health authorities to keep pace with developments in public health, discover new risk factors and assess whether any policy actions work as intended, we require high-quality data. Health registries, health studies and biobanks, in conjunction with data on socio-economic and demographic factors, are important sources of knowledge about public health. To some extent, what is presented in this report is influenced by the nature of the data sources available to us. This means that factors other than those addressed here may also impact public health either negatively or positively.

While, on the whole, we have sound evidence and data for understanding mortality in the population, there is greater uncertainty concerning data to account for health deterioration through the illnesses we live with. For example, one major challenge is monitoring trends in mental disorders and musculoskeletal disorders and the factors that affect these. For this, systematic health studies are a requirement. There is also a need for more knowledge about health in the immigrant population.

Our aim has been to write in a style that ensures that everyone, regardless of their professional background, can read the report. We have focused on ensuring that the report is accurate and reflects new research results in the field. For this reason, we include a comprehensive references section.

The work on the public health report and this short version has involved many professionals throughout the Norwegian Institute of Public Health. We have also received assistance from other specialist environments on topics that others are more qualified to describe. Of those, thanks are due in particular to the Cancer Registry of Norway for preparing the chapter on cancer. I would also like to thank a number of peer reviewers for their valuable comments on the individual chapters in the full version of the report at www.fhi.no/fhr/.

Finally, I would like to extend my thanks to everyone else who has worked hard to produce this report!

Oslo, May 2018

A handwritten signature in black ink, appearing to read 'Knut-Inge Klepp', with a long horizontal line extending to the left.

Knut-Inge Klepp, Executive Director

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Main messages

Life expectancy and causes of death

The health status of the population of Norway in 2018 is generally good. In 2017, life expectancy was 84.3 years for women and 80.9 years for men.

The two main causes of death are cardiovascular disease and cancer. The mortality rate for cardiovascular disease has fallen significantly over the last 50 years and deaths have largely shifted to the over-80 age groups.

In younger age groups, the number of deaths is low. Every year, between 550 and 600 people commit suicide; around half before the age of 50. Compared to other countries, Norway has a relatively high number of drug-induced deaths; an average of 260 per year. Deaths due to road traffic accidents have fallen considerably.

Health and disease

The main causes of disability and reduced health are musculoskeletal disorders, mental disorders, cardiovascular disease and cancer. Annually, nearly 70,000 people are treated in hospitals and out-patient clinics for cardiovascular disease and 32,000 new cases of cancer are detected.

Mental disorders often have an early age of onset and a prolonged trajectory. Over any one year, one in five adults will be afflicted by a mental disorder, with anxiety and depression being the most prevalent. Among the under 75s, nearly six per cent of the population take antidepressants.

Non-communicable diseases such as diabetes, COPD and dementia also weigh heavily in the burden of disease. An increasing number of people live with diabetes, but there are signs that the number of new cases is levelling off. Many people are still insufficiently physically active and consume too much sugar. The incidence of obesity in adults is increasing.

Smoking has decreased, but more than 10 per cent of the adult population still smoke on a daily basis. Snus is currently the predominant tobacco choice in younger age groups. Lung cancer continues to increase among women and is responsible for most smoking-related deaths. Over the age of 15, per capita alcohol consumption in Norway is on average nearly seven litres per year. Men drink approximately twice as much as women. Alcohol use is declining among adolescents and young adults.

As life expectancy increases, more persons are living longer with one or more chronic diseases, and prescription drug consumption is high. Between 80,000 and 100,000 people suffer from dementia.

Social inequalities in health

Men and women with the highest educational attainment live 5–6 years longer and have better health than those with the lowest educational attainment. There are fewer people who smoke and are overweight in groups with the highest educational attainment. The social inequalities in life expectancy are increasing, particularly among women. The inequalities are greater in Norway than in many other European countries.

Infectious disease control and the environment

At present, diseases caused by climate change, environmental pollutants and antibiotic resistance account for a small proportion of the total burden of disease in Norway.

Introduction

Every four years, the Norwegian Institute of Public Health summarises trends in the health status of the population. The previous report was published in 2014: Health Profile for Norway 2014. An online edition containing chapters from the 2014 report was also published and subsequently updated. New chapters have been added for the 2018 report. The Public Health Report is now only published online, with its individual chapters updated on a regular basis; see www.fhi.no/fhr/.

Health Status in Norway 2018 is a short version of the Public Health Report of 15 May 2018. Norway has three overarching aims for public health work (5;6):

- Norway shall be in the top three countries globally for life expectancy.
- The Norwegian population shall experience more years of good health and well-being and reduced social inequalities in health.
- We shall create a society that promotes good health throughout the entire population.

The content of *Health Status in Norway 2018* is based on the public health aims regarding life expectancy, health and well-being and social inequalities in health. We also present challenges within infectious disease control and the environment.

The text concerning life expectancy shows the life expectancy for women and men, trends over time and life expectancy in Norway compared to other countries. In addition, the main causes of death in the different age groups are presented in figures and diagrams.

The section on health and well-being describes the current status and key trends for disease groups weigh heavily in the burden of disease in Norway: musculoskeletal disorders, mental disorders, as well as cardiovascular disease, cancer, diabetes and COPD. These diseases particularly affect the adult and older segment of the population. In addition, we describe the status and trends for a number of key health issues among children, adolescents and young adults, and the elderly.

Smoking, use of alcohol and other lifestyle factors are discussed in a separate section. The text on social inequality in health highlights differences in disease and risk factors, as well as trends over time. The final section covers preparedness and challenges within infectious disease control and environmental health protection. Infectious diseases and pollution constitute a small proportion of the burden of disease in Norway today. The text addresses important areas which, based on current knowledge, should be monitored.

Public health is the state and distribution of health in a population.

Public health work: society's efforts to influence factors that directly or indirectly promote the health and well-being of the population; prevent mental and somatic illnesses, disorders or injuries; or that protect against health threats; as well as efforts seeking a more equal distribution of factors that directly or indirectly affect health.

Source: [The Public Health Act](#)

Life expectancy



Life expectancy in Norway

Life expectancy is an important health metric in a population. It gives an indication of how long a person can expect to live, assuming they live their entire life under the mortality conditions that currently apply. As such, life expectancy is a theoretical measure.

In 2017, life expectancy in Norway was 84.3 years for women and 80.9 years for men (1).

Figure 1 shows that life expectancy has consistently been higher for women than for men since measurements began in Norway in the mid-19th century. The difference was between 2 and 4 years until the mid-1950s, but increased to almost 7 years by the mid-1980s. Since then, the difference between men and women has gradually decreased again, and was 3.4 years in 2017.

From 2007 to 2017, life expectancy increased by 2.7 years for men, but by only 1.6 years for women. This can be explained, for example, by the different “smoking careers” of men and women.

While smoking among men increased until the mid-1950s before subsequently declining, the increase among women was slower and only began to diminish at the end of the 1990s; see figure 2. In addition, men born before 1950 began smoking earlier in life than women born in the same years. As the age at smoking cessation was around the same for both sexes, males born before 1950 had a much greater exposure to cigarettes than their female counterparts. Smoking-related deaths are therefore much higher for men than for women born in these year-groups.

For men and women born after 1950, and particularly after 1960, the duration of their smoking careers was quite similar for both sexes (7).

A survey among 30 European countries from 2003–2005 showed that slightly over 40 per cent of gender differences in mortality (excessive male mortality) could be ascribed to smoking (8). The difference is probably somewhat less today.

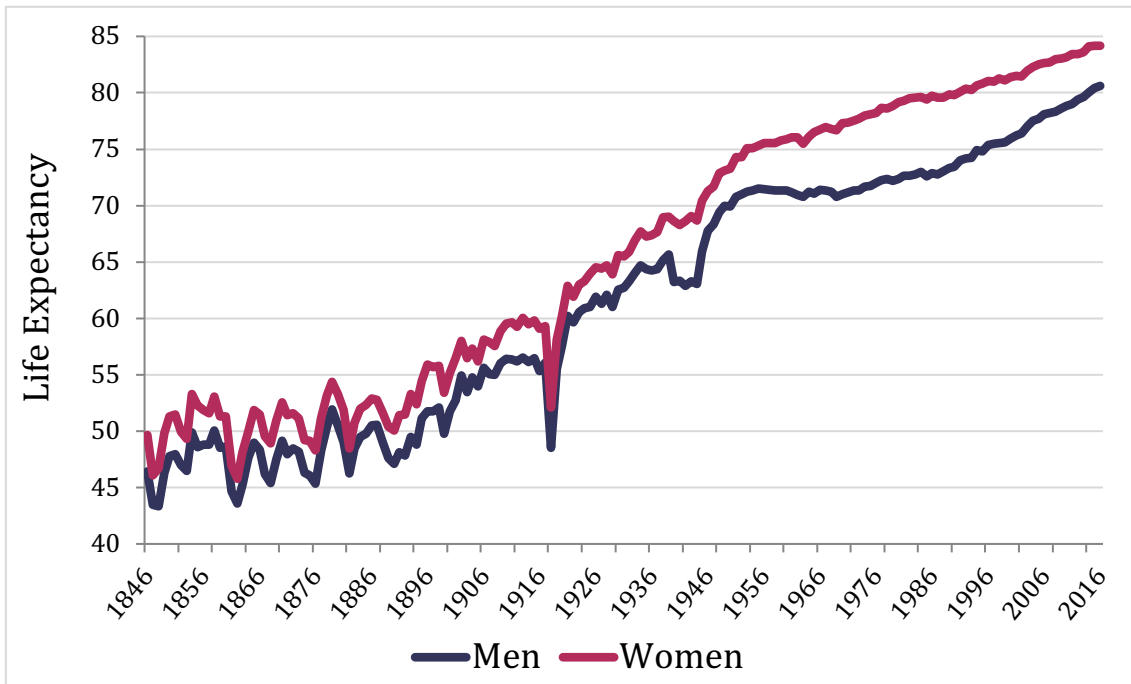


Figure 1. Life expectancy in Norway, 1846–2016. Source: Human Mortality Database, Statistics Norway's data for 2015 and 2016.

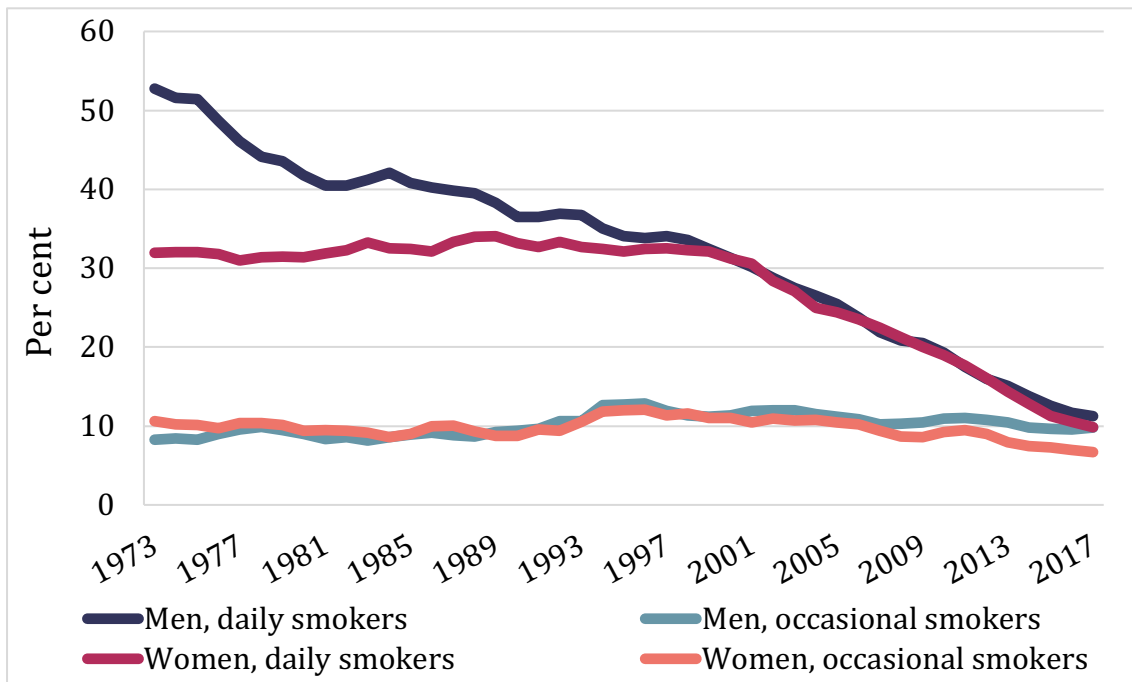


Figure 2. Trend in smoking among women and men (aged 16–74), 1973–2016. Source: Statistics Norway.

Why has life expectancy increased?

In the first half of the 20th century there was a substantial increase in life expectancy in Norway, only interrupted by a weak decrease during World War I and a major decrease during the Spanish Flu pandemic of 1918; see figure 1. An important cause was a reduction in life-threatening infectious diseases due to increased prosperity and healthcare interventions.

The current high life expectancy is linked to the substantial decrease in mortality in all age groups over many years.

In around 1900, for example, approximately 80 out of 1,000 live-born infants died within their first year of life. These deaths had a considerable impact on life expectancy projections in Norway, since each death contributed to many lost years of life.

Today, very few infants die, around two in 1,000 live births, and mortality in the younger age groups has also decreased considerably.

Currently, the vast majority of deaths in Norway occur at a higher age; around eight out of ten after the age of 70 (9). The decline in mortality in older age groups has therefore resulted in a sustained increase in life expectancy.

Changes in life expectancy in recent decades correlate strongly with reduced mortality from cardiovascular disease; see figure 3.

From 2005 to 2015, deaths related to cardiovascular disease and cancer were reduced by 19.6 per cent and 7.0 per cent, respectively. The decline in deaths associated with cardiovascular disease was equivalent to 0.9 extra years of life, and the decline in cancer mortality was equivalent to 0.4 extra years of life during this period (10).

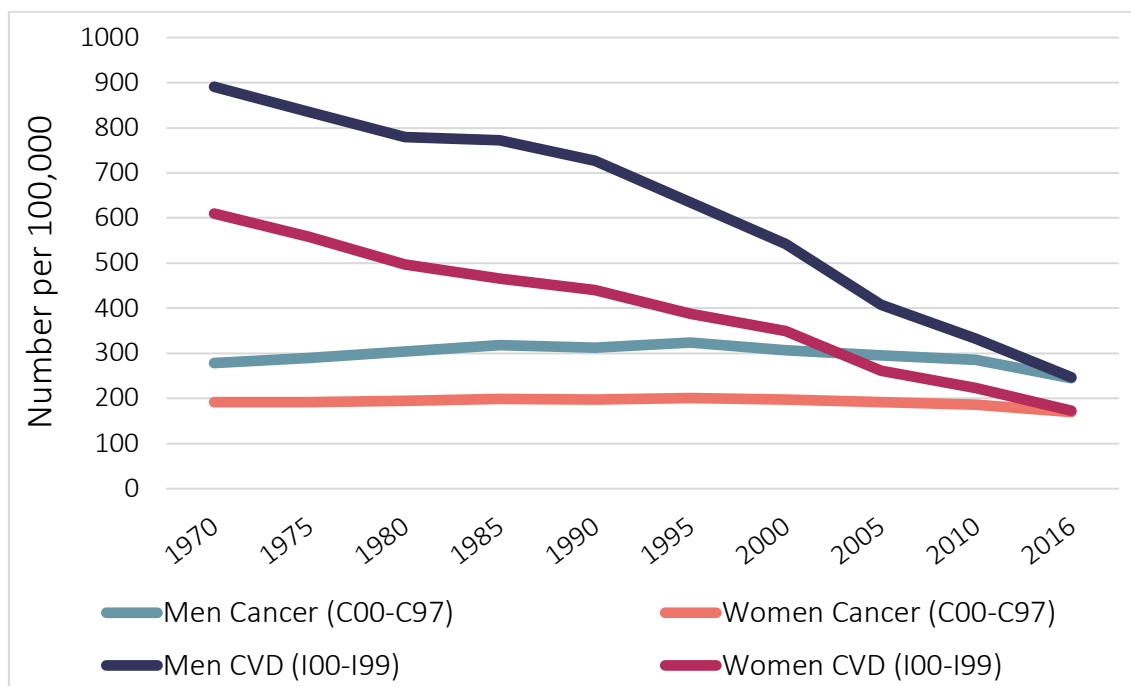


Figure 3. Cardiovascular disease and cancer mortality, 1970–2016, men and women of all ages. Number of deaths per 100,000 in an age-standardised population. Source: Cause of Death Registry, NIPH.

Lifestyle factors for life expectancy

Smoking is the lifestyle factor that claims most lives in the form of cardiovascular disease, lung cancer, COPD and other smoking-related diseases. Every fifth death before the age of 70 is attributable to smoking.

In addition to smoking, an unhealthy diet and high blood pressure are the modifiable risk factors that result in the most deaths in the Norwegian population (10). These risk factors contribute not only to deaths from cardiovascular disease and cancer, but also to those related to, for example, diabetes and COPD (10).

The use of alcohol and illegal drugs are key risk factors for poisoning (alcohol and overdoses), certain forms of cancer, liver cirrhosis, road traffic accidents, self-harm and violence (10).

Is Norway in the top three countries globally for life expectancy?

One of the aims of public health work states that “Norway shall be in the top three countries globally for life expectancy” (5).

Compared with other countries, Norway had the highest registered life expectancy for both men and women from 1850 until well into the 1880s. This was also the case for the period 1947–1955 (men) and 1945–1970 (women).

However, in the period from 1960 to the present day, Norway has dropped down the list; see figures 4a and 4b which show life expectancy for men and women in different countries in 2013. These are the most recent figures for benchmark countries.

Japanese women have the highest life expectancy in the world; 86.6 years in 2013. Life expectancy for Norwegian women in the same year was 83.6 years, i.e. three years lower. As shown in figure 4a, Norwegian women are in 11th place in terms of life expectancy, although the difference covering several proximate countries is less than one year. The difference between Swedish and Norwegian women is only 0.1 year. In Russia, life expectancy has fallen, and for Russian women is down to 76.3 years.

Among men, the differences are smaller. Australian men have the highest life expectancy in the world, at 80.6 years in 2013. The difference between Australian and Norwegian men in this year was 0.9 years. In comparison, life expectancy for Russian men is 65.1 years, which is 14.6 years lower than for Norwegian men.

Figure 5 shows life expectancy in countries that have had sustained periods of the highest life expectancy in the world. As the figure shows, there has been a strong convergence of life expectancy in this group of countries. This means that life expectancy is approaching the same level in these countries. Iceland and Japan started out with a much lower life expectancy than Norway and Sweden, but this has risen more rapidly, and is currently somewhat higher.

Life expectancy

In this report, the term “life expectancy” refers to the life expectancy of newborns.

We can also calculate life expectancy for other age groups, for example, at age 60.

Life expectancy is determined by the mortality of every age group.

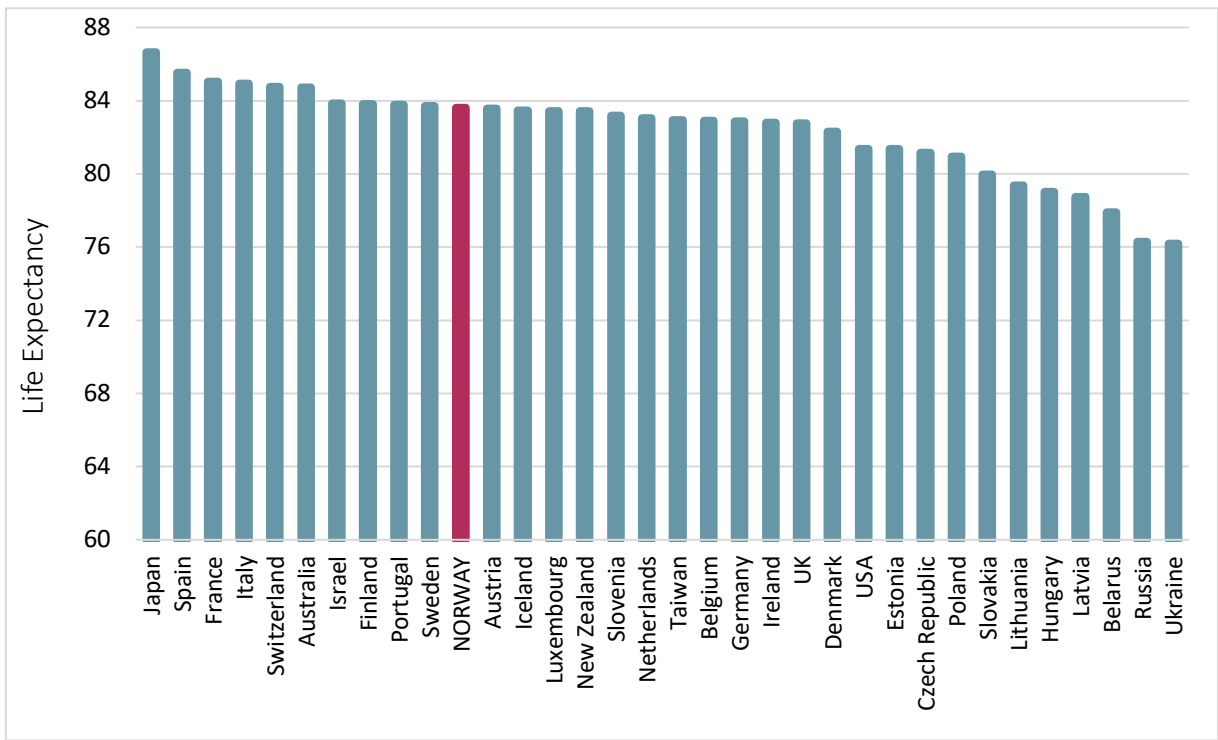


Figure 4a. Life expectancy for women in different countries in 2013. Source: Human Mortality Database.

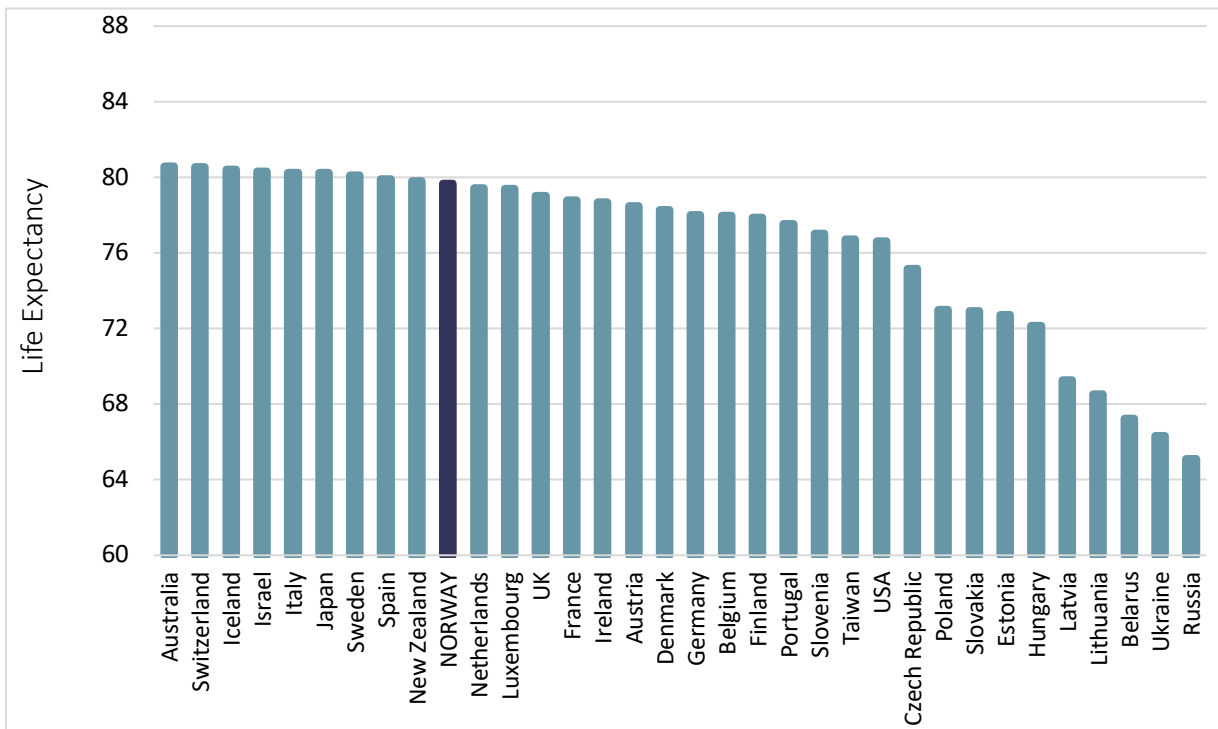


Figure 4b. Life expectancy for men in different countries in 2013. Source: Human Mortality Database.

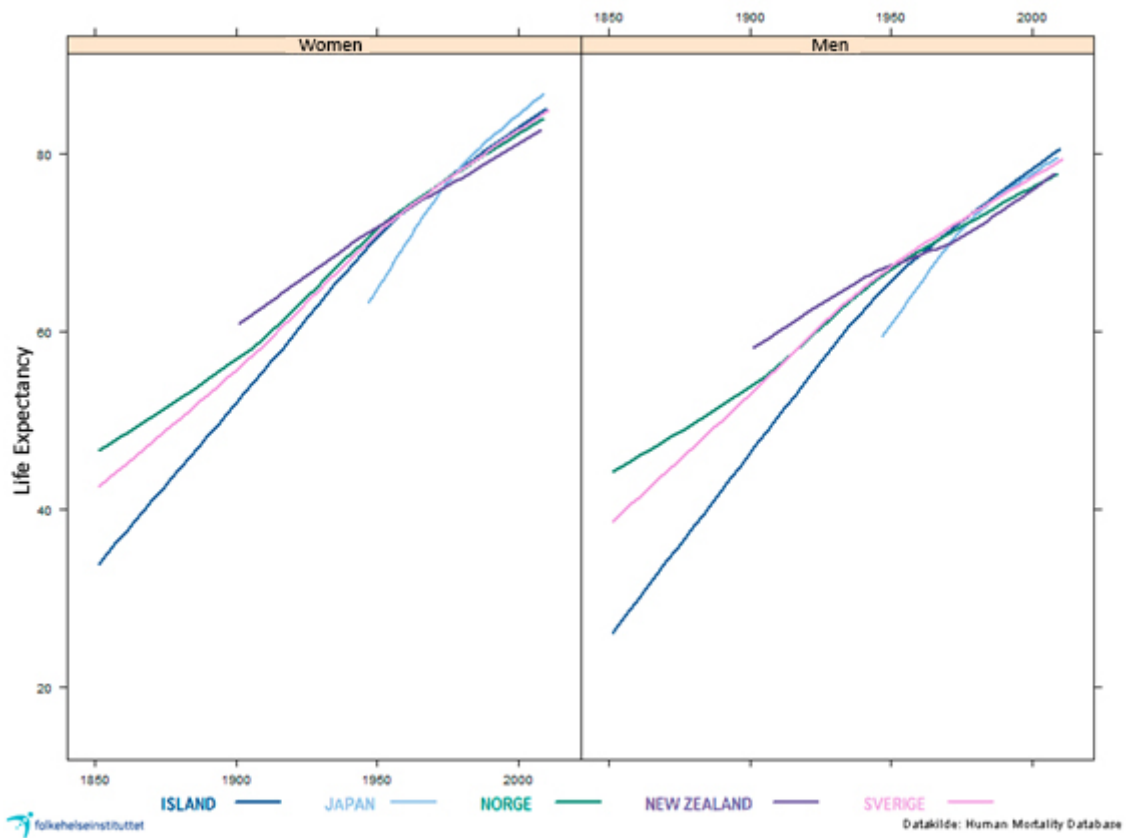


Figure 5. Life expectancy in countries which, for extended periods, have been among those with the highest known life expectancy in the world, 1850–2009. Source: Human Mortality Database.

Figures and diagrams for deaths and causes of death in different age groups

The figures and diagrams below present the most important causes of death in different age groups.

In 2016, more than 40,000 people died in Norway. Cardiovascular disease and cancer accounted for more than one half of the deaths ([Norwegian Cause of Death Registry](#)).

- 10,936 people died of cardiovascular disease.
- 10,814 people died of cancer.

Most deaths occur in the older age groups (9); see figure 6 which shows the causes of death for different age groups in 2016.

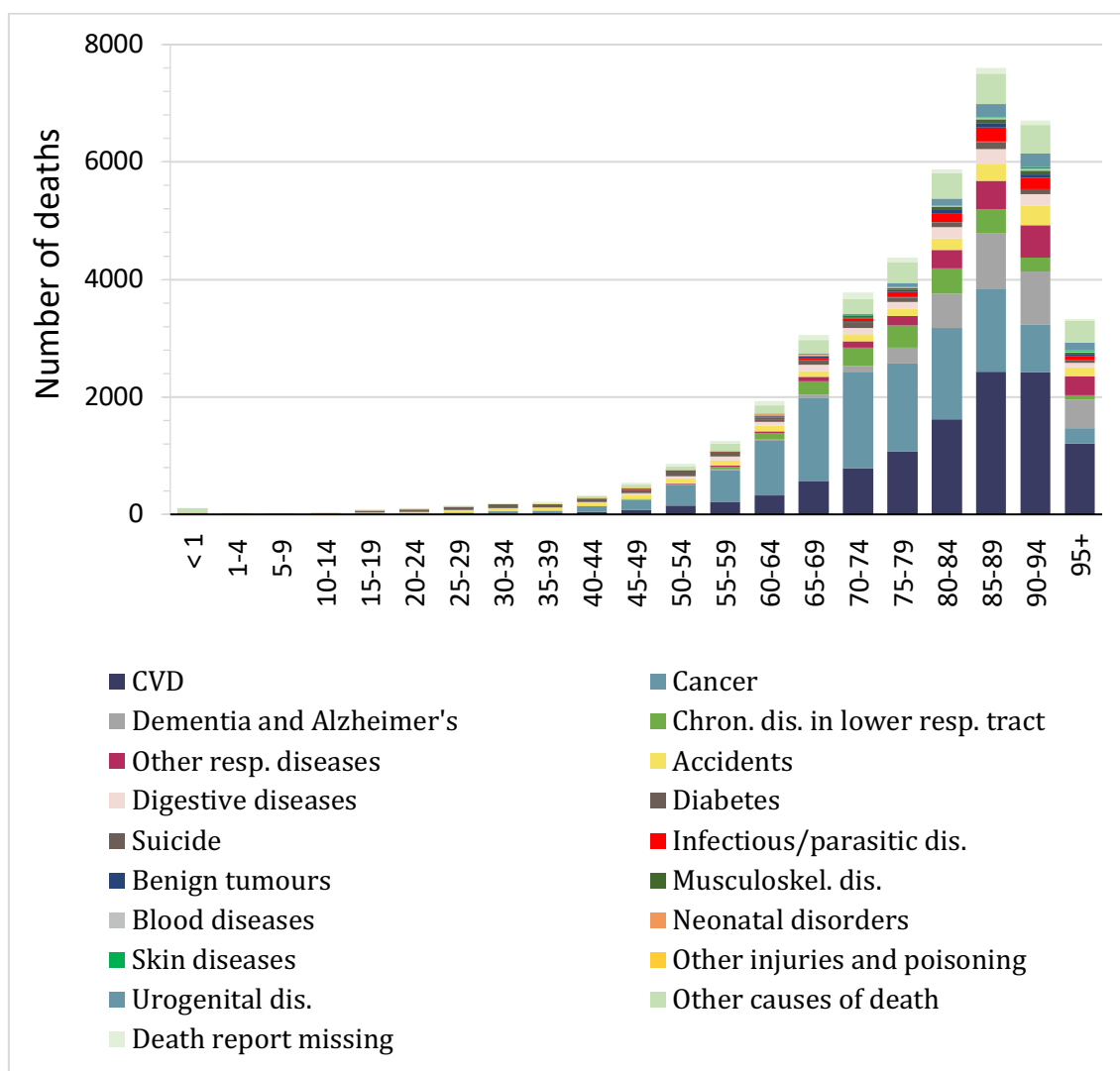


Figure 6. Number of deaths by cause in the different age groups in Norway, 2016. Source: Norwegian Cause of Death Registry, 9.5.2018.

Deaths before the age of 70

Only about two in ten deaths (22 per cent) occur before the age of 70.

In this age group, various forms of cancer are the main cause of death. Cardiovascular disease and COPD are also leading causes of death. Most of these deaths occur after the age of 50. Table 1 shows the figures for different causes of death for the under-70 age group in 2016.

Table 1. Deaths before age 70 in 2016. Source: Norwegian Cause of Death Registry, 7.5.2018.

Cause of death	Number of deaths before age 70	Percentage of all deaths before age 70
All causes of death	8,951	100
Cancer	3,644	41
Cardiovascular disease	1,408	16
Chronic diseases of the lower respiratory tract*	411	5
Other causes of death	3,488	38

* Primarily COPD

Cancer, cardiovascular disease, COPD and diabetes

In 2012, the World Health Organization (WHO) adopted a goal to reduce premature death (before the age of 70) caused by non-communicable diseases by 25 per cent from 2010 to 2025. In this context, non-communicable diseases refers to cardiovascular disease, cancer, diabetes and COPD. These four diseases have partially overlapping risk factors, including smoking.

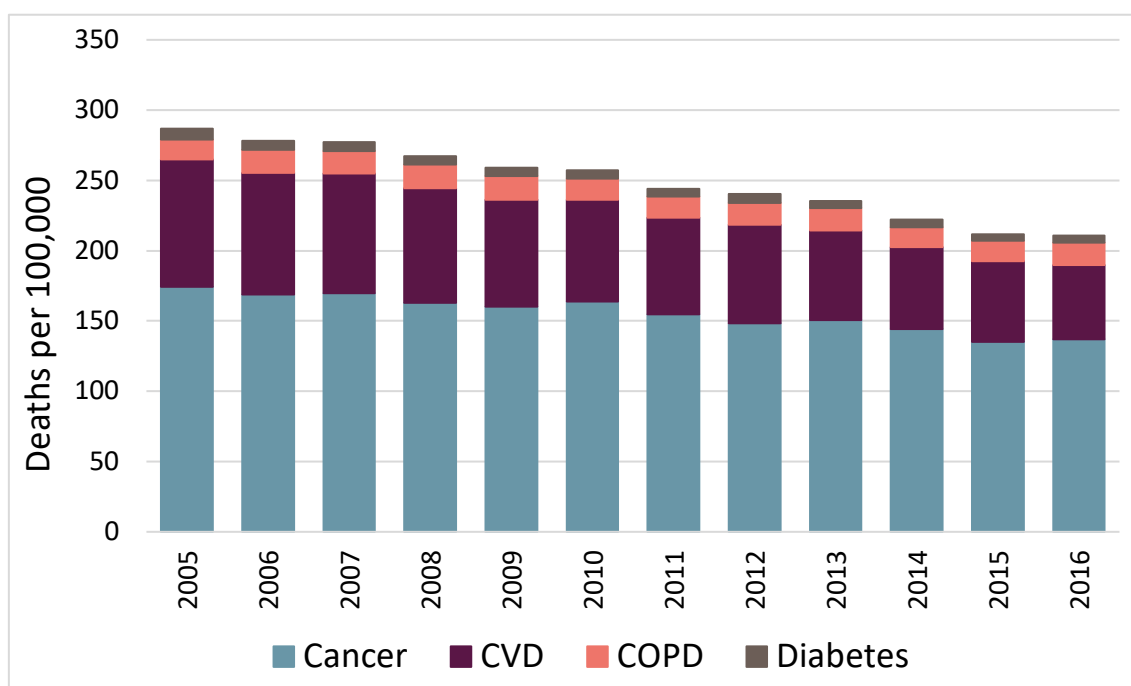


Figure 7. Mortality from cancer, cardiovascular disease, COPD and diabetes in the 30–69 year age group, for both sexes. Source: Norwegian Cause of Death Registry. See also [Premature death from non-communicable diseases](#) at fhi.no

In Norway, the number of premature deaths from the four diseases mentioned above fell from 257 per 100,000 inhabitants in 2010 to 211 in 2016 in the 30–69 year age group. This is equivalent to an 18 per cent drop; see figure 7. Thus, Norway is on track to achieve the goal of a 25 per cent reduction in premature deaths by 2025.

Every fifth death before the age of 70 is caused by smoking (10). With a continued decline in smoking and other risk factors, the number of premature deaths can be further reduced; see page 37.

Suicide, drug-induced deaths and accidents

Less than five per cent of all deaths occur before the age of 50. Table 2 shows the main causes of death in the 15–49 year age group.

Table 2. Main causes of death in the 15–49 year age group. Source: Norwegian Cause of Death Registry, 7.5.2018

Cause of death	Number of deaths in the 15–49 year age group
All causes of death	1,654
Cancer	386
Suicide	349
Drug-induced deaths	189
Cardiovascular disease	163
Road traffic accidents	65

Suicide

Every year, between 550 and 600 deaths are suicides. Two in three suicides are men.

The median age of suicide is 47 years, i.e. one half are older and one half are younger than 47 years (9).

From 1970 to 1990, the risk of suicide doubled, before decreasing again. In 2016, the rate was 12 per 100,000 inhabitants. This change is largely due to a reduction in the number of suicides among men. In 1970, there were almost three times as many suicides among men as among women, while the gender difference today is smaller; see StatBank [Norhealth: Suicide](#).

It is a common assumption that there are ten times more attempted suicides than actual suicides (11). An unknown number of suicides are concealed as accidents. Many deaths by undetermined intent could also be suicide.

Mental disorders, including substance use disorders, are regarded as the leading risk factors for suicide, with comorbidities producing a particularly elevated risk (12-14).

Each suicide bereaves between six and ten individuals. People bereaved by suicide are at considerably increased risk of reduced labour force participation, mental and somatic illnesses and higher mortality (15;16).

Drug-induced deaths

Since 2003, the average number of drug-induced deaths has been around 260 per year for all age groups combined (17). Nearly seven in ten drug-induced deaths occur in the under-50 age group.

80 per cent of drug-related deaths are caused by overdose. Heroin was previously the most prevalent cause of drug-induced deaths, but in 2016 this changed, and other opioids such as morphine, codeine and oxycodone became more prominent (17).

There are between 6,900 and 9,800 intravenous drug users, who are in the risk group for overdose (18).

Road traffic accidents

In recent decades, accidental deaths have been considerably reduced. However, accidents remain a leading cause of death in younger age groups (19).

The decrease in accident mortality is due to, among other things, a positive development of far fewer fatalities in road traffic accidents (19). Among men under the age of 45, road traffic fatalities were reduced from 21.4 per 100,000 in 1970 to 3.2 per 100,000 in 2016; see Statbank [Norhealth: Traffic accident fatalities](#).

65 people aged between 15 and 49 years died in road traffic accidents in 2016; 58 of them were men. (9).

Deaths among children and adolescents

In 2016, around 150 children and adolescents (aged 1–19) died. About half died from diseases and the other half from injuries ([Norwegian Cause of Death Registry](#)).

Among infants, mortality in both the first month of life and the first year of life has decreased over many decades.

- Infant mortality in Norway is currently about two per 1,000 live births. About 60,000 babies are born each year.
- Ten babies died in 2016 as a result of sudden infant death syndrome (SIDS).

An important contribution to changes in infant mortality is a decrease in SIDS deaths from the end of the 1980s. This decrease can be ascribed to the recommended sleeping position for newborns being changed from the prone position to the supine position.

Deaths after the age of 70

Most deaths occur after the age of 70; about eight in ten (78 per cent).

In total, more than 31,000 people died after the age of 70 in 2016. Around one half of the deaths were caused by cardiovascular disease and cancer; see table 3.

Other leading causes of death in the over-70s are COPD, dementia and pneumonia (9).

In 2016, the number of deaths resulting from dementia and Alzheimer's was around 3,300 in the over-70s. Few people die of these diseases before the age of 70.

If age-specific incidence does not change, the increase in life expectancy in Norway will lead to a two-fold increase in the number of people with dementia from 2015 to 2050. This is based on projections for a two-fold increase in Western Europe in the same period (20). See also page 40.

Pneumonia affects many older people who already have impaired health, causing around 1,500 deaths among the over-70s in 2016. This represents around five per cent of all deaths in this age group; see table 3.

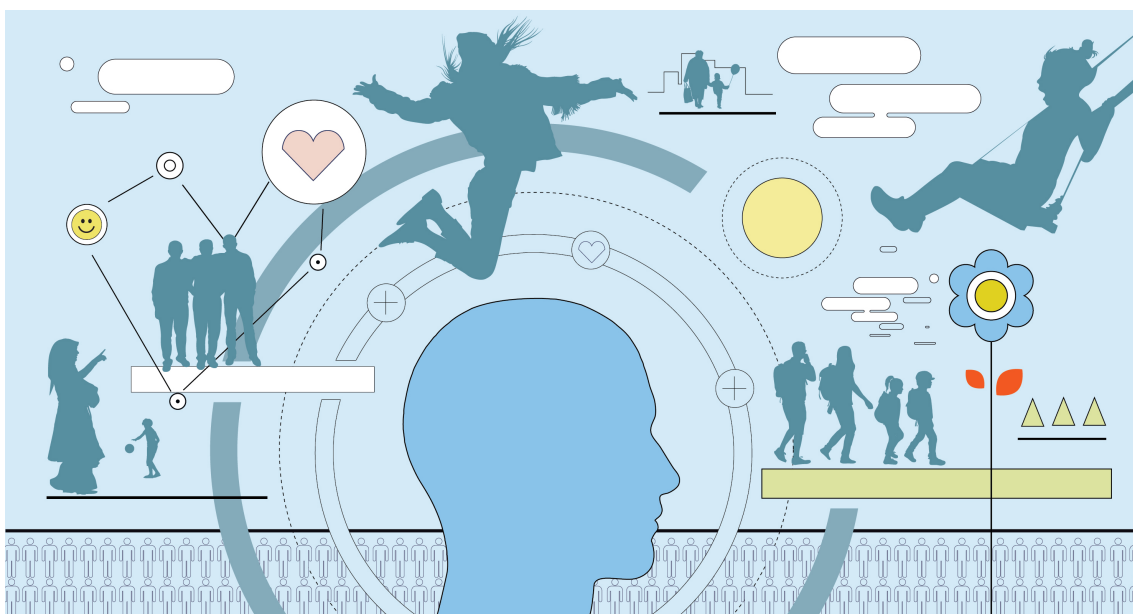
Calculations have shown that influenza is responsible for 900 deaths per influenza season in Norway, varying from 200 to 2,000, depending on the influenza virus in circulation (21). In 2016–2017, nine in ten influenza deaths were in the over-65 age group (22).

Table 3. Number and proportion of deaths in the over-70s, 2016. Source: Norwegian Cause of Death Registry.

Cause of death	Number of deaths, over-70s	Percentage of deaths, over-70s
All causes of death	31,658	100
Cardiovascular disease	9,528	30
Cancer	7,170	23
Dementia (incl. Alzheimer's)	3,301	10
Chronic diseases of the lower respiratory tract*	1,836	6
Pneumonia	1,487	5
Other causes of death	8,336	26

* Primarily COPD

Health and well-being



Norway is ranked among the world's top ten countries in terms of the happiness of its population, according to an international survey ([World Happiness Report 2018](#)).

Along with Denmark, Finland and Switzerland, it has occupied the top four slots in recent years. The difference between the ten top-ranking countries is minimal. In the survey, quality of life is measured as life satisfaction (Cantril Ladder).

Surveys from Norway show the following (23):

- The majority of adults are satisfied with life as a whole. 1 in 4 are very satisfied. 1 in 20 are dissatisfied or very dissatisfied.
- People who live alone and/or are not working are more likely to report lower quality of life than people who are cohabiting and working.
- Around one in four experienced minimal control and coping ability in daily life. The proportion is particularly high among the oldest old (over-80) (53 per cent).
- Life satisfaction varies relatively little between women and men and across age groups.
- 80–90 per cent of adolescents (aged 13-16) are happy with their lives and with their parents. The majority are optimistic and 7 out of 10 believe they will have a fulfilling and happy life.
- The Norwegian level of happiness has been relatively stable. The same applies to the general level of satisfaction.

Positive social support is regarded as a promoting factor for quality of life (23).

What is well-being and quality of life?

Subjective quality of life is about how the individual perceives life. It includes assessments of both life (for example, life satisfaction) and functioning in daily life (for example, perceived coping ability and purpose), as well as positive and negative emotions (such as happiness and sadness).

Subjective quality of life can be perceived as positive even during illness and despite health disorders and other types of strain.

Objective quality of life is about key aspects of the life situation – such as freedom, security, health, social bonds and self-development.

Status and key trends for the major disease groups

A general overview of public health requires knowledge not only of what causes loss of life, but also what causes loss of health through having to live with diseases.

Figure 8 on the next page shows the contribution from various diseases and injuries to the total burden of disease, measured in DALYs, in five-year age groups up to age 80.

Mental disorders and substance use disorders (marked in blue in figure 8) are common afflictions that affect many people even from an early age. With the exception of mortality caused by street drugs, these afflictions contribute primarily to the burden of disease through non-fatal loss of health.

From adulthood, an increasing share of the burden of disease comes from musculoskeletal disorders (brown colour in the figure), and these also primarily contribute through non-fatal loss of health.

From around age 60, the burden of disease increases as a consequence of COPD (grey), diabetes (light orange), dementia (orange), cancer (black) and cardiovascular disease (red). The burden of disease contributed by these conditions is largely due to the fact that they lead to many lost life years.

Burden of disease

Every year, the Global Burden of Disease study (GBD) makes calculations of the burden of disease for 195 countries, including Norway.

An important collective metric for the burden of disease in that context is disability-adjusted life-years (DALYs), which is the sum of the potential years of life lost due to premature death, and non-fatal loss of health. The latter is calculated by combining the number of cases of a given disease with the severity of that disease.

When the calculation is carried out for multiple diseases and for multiple countries over time, for both sexes and all age groups, the burden of disease can be compared.

The total burden of musculoskeletal disorders and mental disorders is comparable with that of cancer and cardiovascular disease (figure 8). In total, these four major disease groups represent 65 per cent of the Norwegian burden of disease.

The following pages discuss the trends in the various disease groups that contribute most to the burden of disease in Norway, followed by the trend in risk factors.

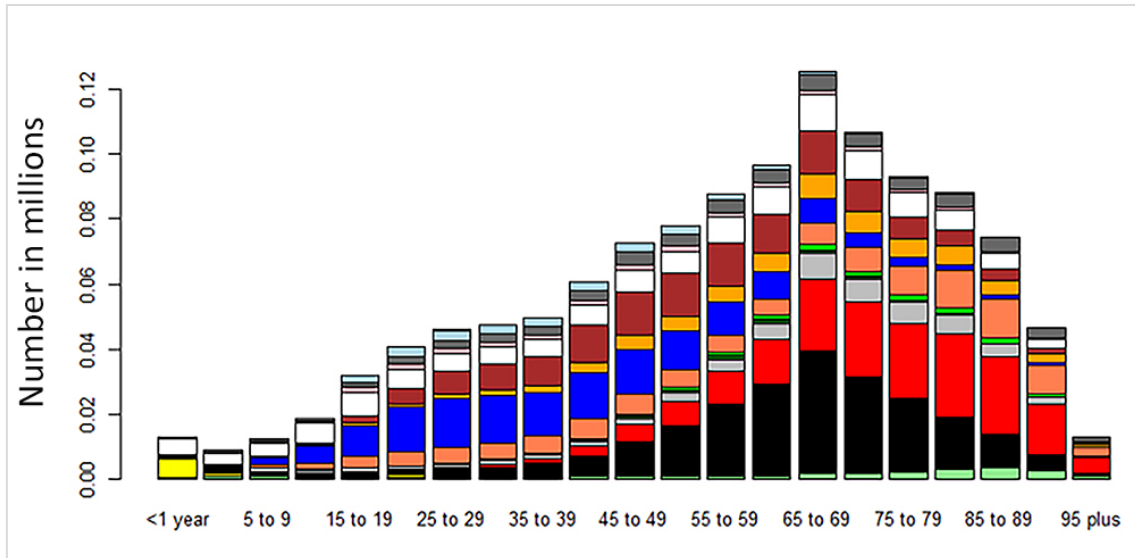


Figure 8. The burden of disease in Norway. The sum of non-fatal loss of health and lost life years. The number of years in different age groups in the population. Source: GBD2016 – healthdata.org.

HIV/AIDS & tuberculosis
Diarrhea/LRI/other
NTDs & malaria
Maternal disorders
Neonatal disorders
Nutritional deficiencies
Other group I
Neoplasms
Cardiovascular diseases
Chronic respiratory
Cirrhosis
Digestive diseases
Neurological disorders
Mental & substance use
Diabetes/urog/blood/endo
Musculoskeletal disorders
Other non-communicable
Transport injuries
Unintentional injuries
Intentional injuries
War & disaster

Musculoskeletal disorders

Musculoskeletal disorders include pain in the back and neck, rheumatic diseases (such as rheumatoid arthritis and osteoarthritis), as well as osteoporosis, which causes many hip fractures among the elderly.

The proportion who contacted their primary care physician or a casualty department concerning musculoskeletal disorders (excluding fractures and injuries), was stable in the period 2010–2015 for the 0–44 year age group. In the 45–74 year age group, the proportion was increasing; see figure 9.

Among adults of working age, musculoskeletal disorders are the most common reason for sickness absence and disability benefit. Pain in the back and neck is also the leading cause of non-fatal loss of health and the total burden of disease in Norway (10).

Together with other Scandinavian countries, Norway has the highest level of hip fractures in the world among women (24). The reasons for the high hip fracture frequency in Norway are largely unknown, but reduced bone density (osteoporosis) among the elderly is a common contributing factor.

With regard to osteoarthritis (degenerative joint disease) and osteoporosis, we have noted the following trends:

- The incidence of osteoarthritis appears to be increasing, which is believed to be associated with the increasing age of the population but also with the increasing incidence of overweight and obesity, and physical inactivity (25).
- The incidence of hip fractures in Norway has decreased somewhat in recent years, measured in the number per 100,000 within each age group. The number of hip fractures, on the other hand, is expected to increase in the future as the size of the elderly population increases; see figure 10 (26).

From a general perspective, many types of musculoskeletal conditions are associated with increasing age, a sedentary lifestyle and partly, also, overweight (27).

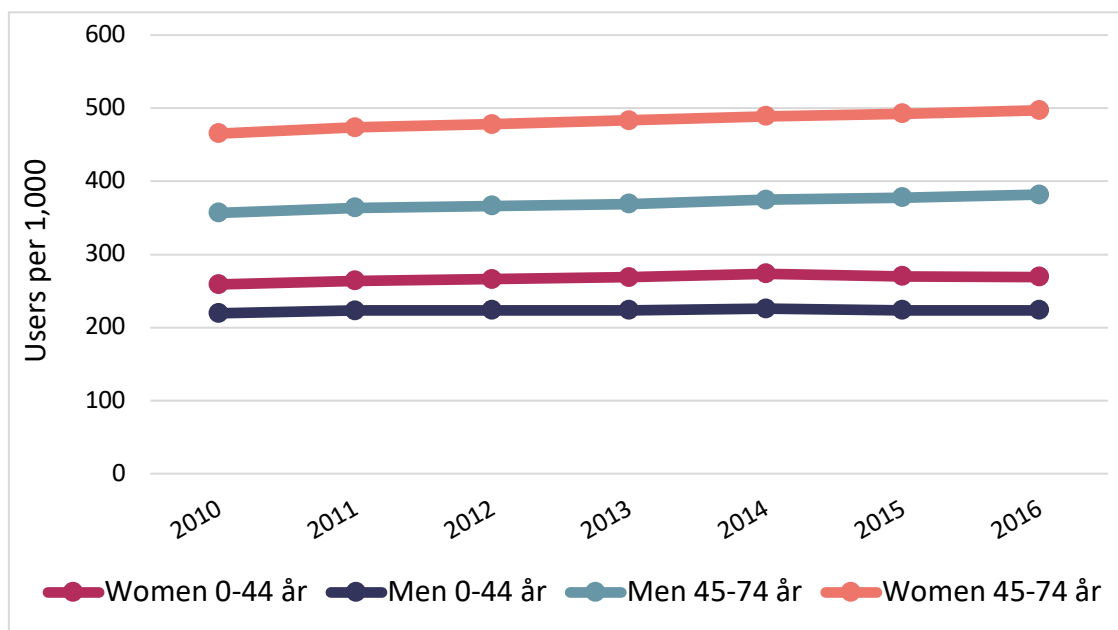


Figure 9. Users of general practitioner services for musculoskeletal conditions, 2010–2015. Source: Norway Control and Payment of Health Reimbursement (KUHR) Database.

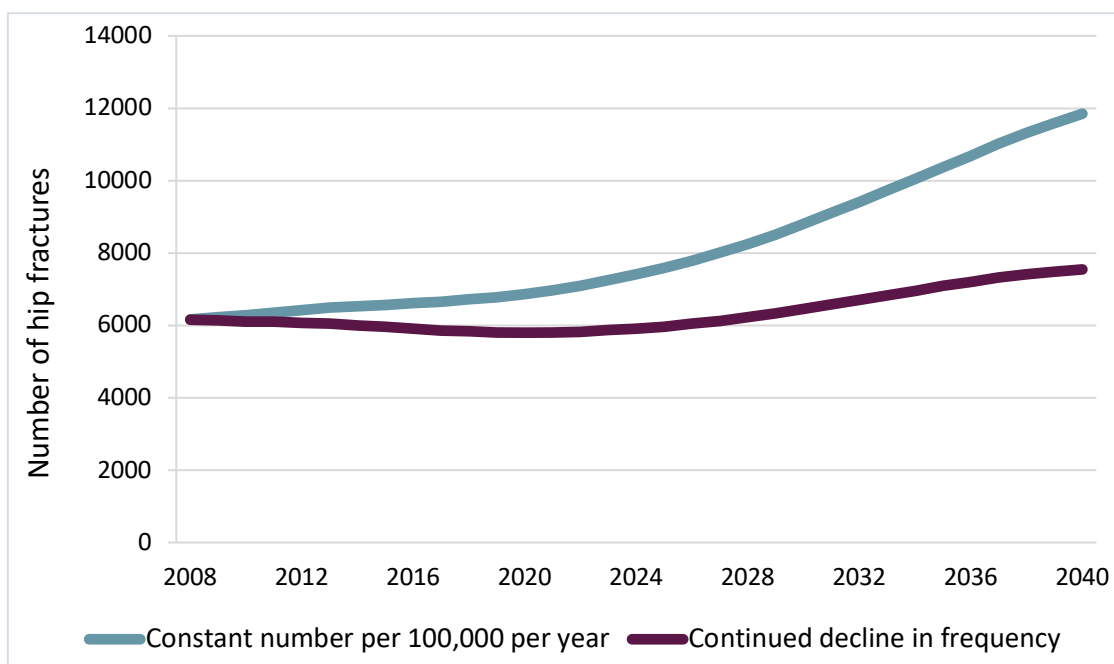


Figure 10. Two scenarios for the projected annual number of hip fractures for 2009–2040 among women aged 65 and older in Norway, based on the observed number of hip fractures from 1999–2008. The alternative “Constant number per 100,000 per year” is based on stable age-specific incidence rates throughout the entire period, corresponding to the observed rates in 2008. The alternative “Continued decrease in incidence” is based on the reduction in incidence rates of 1.4 per cent per year, corresponding to the observed decrease in 1999–2008. Source: Omsland & Magnus, 2014 (26). Incidence rate = number per 100,000 per year.

Mental disorders

Mental disorders, including substance use disorders, are by far the greatest cause of loss of health among children, young people and adults of working age; see figure 8. Unlike many physical diseases, the onset of mental disorders is usually before the age of 30 (28).

In any year, about 1 in 5 adults (16–22 per cent) will be affected by a mental disorder. The most common disorders are anxiety, depression and substance use disorders (see the fact box on the next page).

Previously, lifetime figures were often used to predict the incidence: 1 in 3 will experience an anxiety disorder over the course of their life, and 1 in 4 will experience a depression or other mood disorder. New international studies suggest that these lifetime figures are too low, because many people are unable to accurately recall the state of their health from several years earlier. See table 3 in Chapter [Mental health](#) in the Public Health Report at www.fhi.no/fhr/.

Depression and anxiety disorders are the two most common reasons for mental health consultations in the primary health service.

A mental disorder was the primary diagnosis among 1 in 3 people awarded disability benefit in 2014 (29). Those awarded disability benefit for a mental disorder are, on average, younger than those awarded disability benefit for another diagnosis. Anxiety and depression also increase the risk of being awarded disability benefit for other conditions (30;31).

The incidence in the health service was relatively stable between 2008 and 2015; see figure 11. Drug therapy for mental disorders among adults has also been largely stable over the last decade. Around 6 per cent take antidepressants (32).

We have insufficient knowledge of the specific developmental trajectories of mental disorders. Many mental disorders probably occur in an interaction between environmental and genetic risk factors. Some of the key risk factors are violence, abuse, bullying, as well as persistent psychosocial strain.

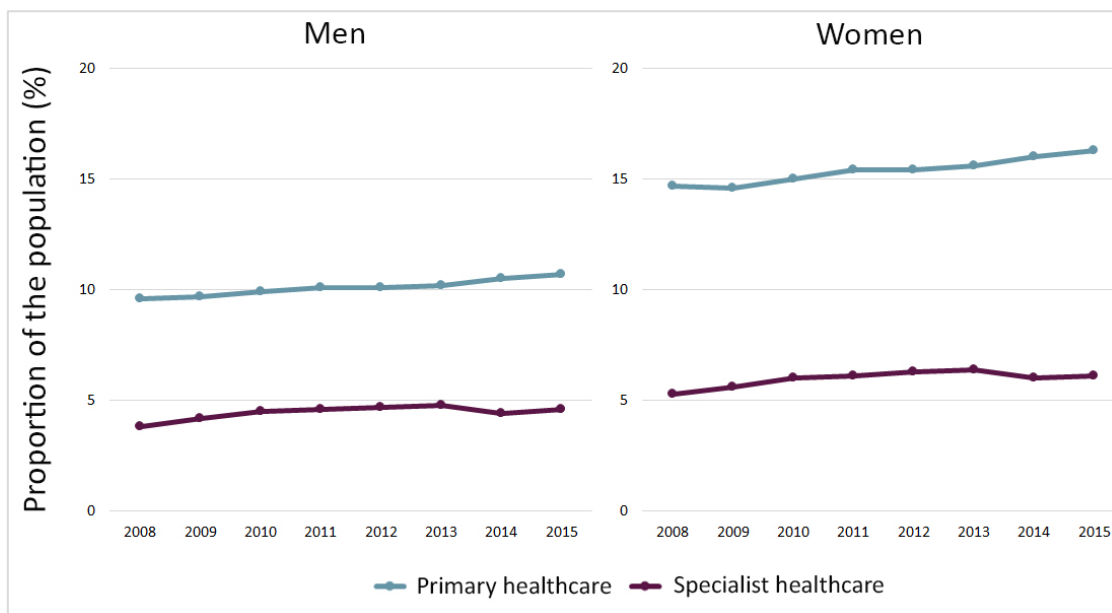


Figure 11. Proportion of the population aged 18–79 registered with psychological symptoms and mental disorders in primary healthcare and mental disorders and behavioural disorders in specialist healthcare, 2008–2015. Source: Norway Control and Payment of Health Reimbursement (KUHR) Database and Norwegian Patient Registry (NPR).

Harmful use or alcohol dependency is the most common substance use disorder in Norway. The latest measurements of the incidence in Norway were conducted in the mid-1990s. There is reason to believe that the incidence has increased since then, in line with the increase in the population's alcohol consumption (see page 32).

- The incidence of 12 months of harmful use of, or dependency on, alcohol is around eight per cent for men and three per cent for women.
- People with substance use disorders often have other mental disorders and somatic diseases.

Long-term and high alcohol consumption increase the risk of dependency and other mental health problems (33;34). Even moderate alcohol consumption can increase the risk of health damage and diseases, including several types of cancer (35;36).

Regarding drug-induced deaths, see page 19.

Substance use disorders

“Substance use disorders” is a general term for the harmful use of, and addiction to, drugs and alcohol.

Harmful use means that the use has caused demonstrable physical or mental health damage.

Source: [Mental Health in Norway](#). NIPH 2018.

Cardiovascular disease, cancer, COPD and diabetes

All age groups, regions and countries are affected by the increase in the four non-communicable diseases: cardiovascular disease, cancer, COPD and diabetes. Low and middle-income countries are the most affected.

In Norway, we are also seeing an undesirable trend in many of the risk factors for these diseases (37). Taken together, these four diseases are responsible for two in three deaths (10) as well as a high proportion of consultations in the health service.

Cardiovascular disease

- Each year, approximately 40,000 individuals are treated by the specialist health service for heart attack and angina, 16,000 for heart failure and 11,000 for stroke.
- In total, around 1.1 million Norwegians were treated with drugs to prevent or treat cardiovascular disease. See also figure 12 which illustrates the trend in the number and percentage of people on therapeutic drugs in different age groups.
- The proportion of the population with high blood pressure decreased in all age groups from the mid-1980s up to 2016. The proportion is now 25–36 per cent among women and men aged 40–79, based on blood pressure measurements of the population in Tromsø and Nord-Trøndelag counties (see [Indicators for non-communicable diseases](#) at fhi.no). The average cholesterol level has also decreased (38).

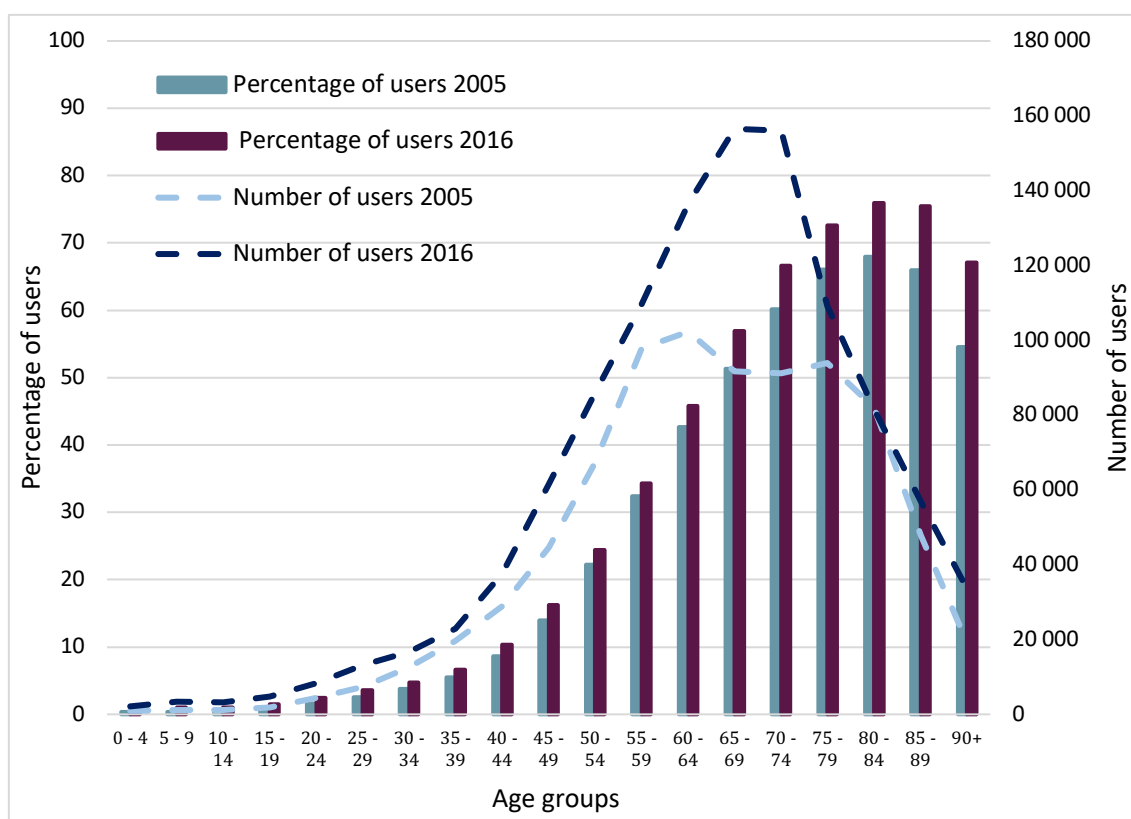


Figure 12. The number (dotted lines) and percentage of the population taking at least one form of medication to treat or prevent cardiovascular disease (ATC group C) from 2005 to 2016 distributed into five-year age groups. The figures for the oldest age groups underestimate medicines consumption as the Norwegian Prescription Database does not include figures for the number of people treated in institutions (for example, nursing homes). Source: Norwegian Prescription Database.

For cardiovascular disease, there are positive trends:

- The number of first-time heart attacks (myocardial infarction) has decreased and, of those affected, fewer have a major life-threatening heart attack.
- The reduction in smoking and better treatment account for much of the decrease in the number of first-time heart attacks.
- In the general population, mortality from cardiovascular disease has shifted to the higher age groups. Half of all deaths among men occur after age 83, and for women, after age 89.
- Mortality from stroke has decreased markedly among both women and men over several decades. The decrease is of the same magnitude as for heart attack.

In groups with low educational attainment, a higher proportion have heart attacks than in groups with high educational attainment (39).

In the years to come, the number of people with cardiovascular disease is expected to increase due to the increasing proportion of elderly people in the population.

In Norway, the favourable trend in the population as regards the risk factors of smoking, elevated cholesterol and blood pressure is being countered by the increase in the incidence of overweight and obesity (40). We do not know the implications of this for the future trend in cardiovascular disease. See also page 17.

Cancer

Lung cancer is largely attributable to smoking and is the form of cancer with the highest mortality.

- Over 32,000 new cases of cancer were diagnosed in Norway in 2016.
- The most common forms of cancer are lung cancer (see the trend in figure 13 on the next page), colon cancer, skin cancer and cancer of the bladder and urinary tract. In addition to which are prostate cancer in men and breast cancer in women.
- Among the Nordic countries, Norway has the highest incidence of colorectal cancer. The reason for the high incidence is unknown (41).
- There has been a decrease in stomach cancer over several decades. This may be related to diet and hygiene.

Future trends:

- More people will live with a cancer diagnosis in the future because more people survive the disease. Around 70 per cent of cancer patients survive their cancer for at least five years.
- A continuing increase in lung cancer in women is expected due to a substantial increase in smoking among women from 1927–1970. Widescale smoking cessation in the population aged over 50 would reduce the incidence of lung cancer considerably over a period of five to ten years (42).
- The incidence of melanoma is expected to increase in both women and men.
- Cervical cancer has decreased as a result of screening, and a further reduction is anticipated in the younger age groups who have received the vaccine against the HPV virus.

- Vaccination against hepatitis B has been introduced in the Norwegian Childhood Immunisation Programme. Combined with intensified treatment of chronic hepatitis C, this will prevent future cases of liver cancer caused by the hepatitis virus.

See also page 17.

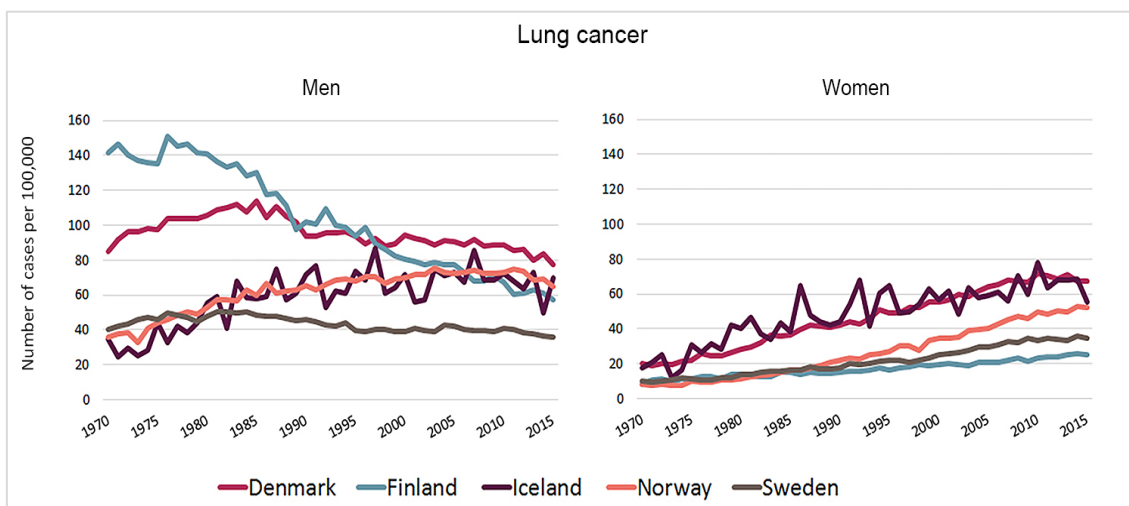


Figure 13. The trend in lung cancer for men and women from 1970–2015 in the Nordic countries. The incidence among men has begun to decrease in Norway, while it continues to increase among women. Illustration: The Norwegian Cancer Registry.

Chronic obstructive pulmonary disease (COPD)

COPD has become a widespread disease primarily due to the smoking epidemic. Chronic disease of the lower respiratory tract (which includes COPD) was the third most frequently registered cause of death in 2016 (9).

With regard to morbidity, we have noted the following:

- The latest Tromsø study indicated that around 6 per cent of the population aged over 40 has COPD. This is equivalent to 150,000 people in Norway. Most people have a mild form of the disease. However, COPD patients are at increased risk of contracting other diseases (43).
- More men than women have COPD (44), but gender differences are diminishing.
- Adjusted for changes in the age composition of the population, the proportion of people treated by the health service for COPD has been stable from 2008 to 2014.

In the years to come, it is expected that the number of people living with COPD will remain high because the number of elderly people is increasing. However, a reduction in the number of smokers in the population may offset this age effect. See also page 37.

Diabetes

About 245,000 Norwegians have diabetes. Most of them have type 2 diabetes. In addition, it is also estimated that many people have undiagnosed type 2 diabetes.

Health studies in Tromsø and Nord-Trøndelag counties indicate that among 40–79-year-olds, the proportion with diabetes has increased from four to seven per cent for men and from three to five per cent for women; see figure 14. This is almost a two-fold increase from 2007–2008 to 2015–2016.

Both the number of new cases and the number of persons living with the disease increase considerably with age. Among people over 60 years of age, 10–15 per cent have diabetes; see figure 14.

The key risk factors for type 2 diabetes are overweight and obesity, physical inactivity, diet, smoking and previous gestational diabetes. We know little about the risk factors for type 1 diabetes.

The increased incidence of diabetes could be due to previously unknown cases being diagnosed, or the fact that those diagnosed with diabetes live for longer.

In the years to come, the number of people living with diabetes will increase, although the number of new cases of diabetes appears to be levelling out (45).

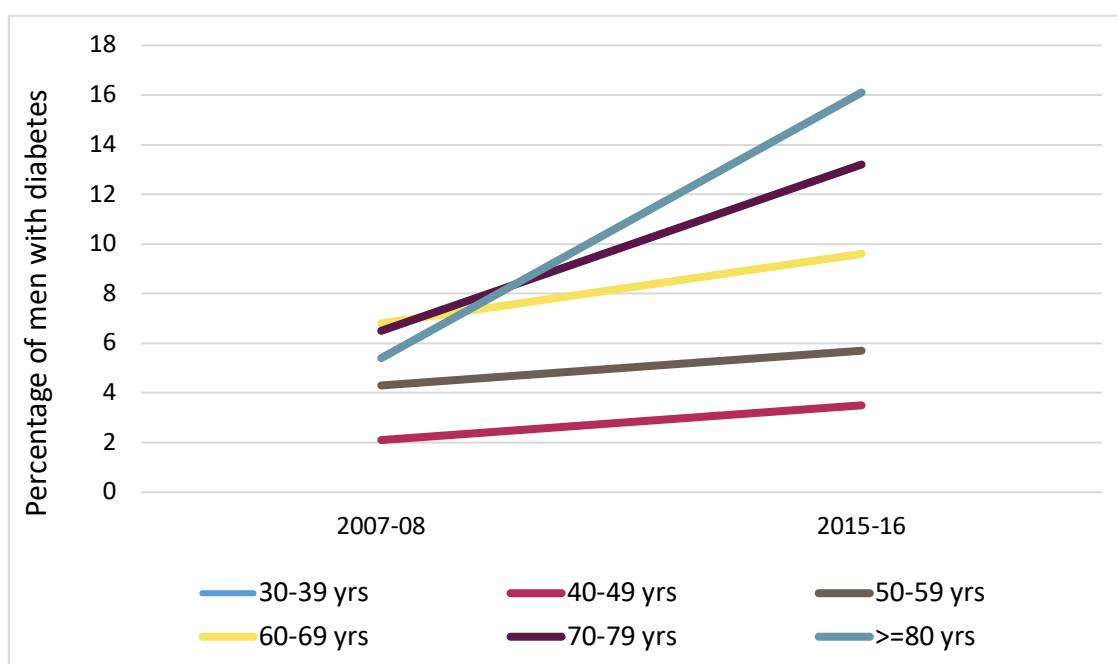


Figure 14. The percentage of men with diabetes in 10-year age groups in Tromsø, in 2007–2008 and 2015–2016. Source: Tromsø study.

Status and trends in lifestyle factors

Smoking, diet and physical activity are important risk factors for cardiovascular disease, cancer, diabetes and COPD.

The risk factors are also important for musculoskeletal disorders and mental health. They also affect the incidence of overweight and obesity, high blood pressure, blood glucose and blood cholesterol. The increase in life expectancy observed both in Norway and other countries in recent years could be counteracted by the obesity epidemic (35).

Lower consumption of alcohol and other substances in the population could provide a substantial public health benefit and contribute to reducing social inequality in health (46).

The following pages describe the status of, and trend in, lifestyle factors.

What determines a person's lifestyle factors?

Healthy eating and physical activity is a challenge in an obesity-promoting society. For example, ready-made meals of low nutritional quality and sugary drinks are always available. Many people have sedentary jobs. More time is spent on sedentary activities at work or at home.

Family, our childhood environment, education and financial situation can either weaken or strengthen our ability to look after our health. Such factors are often referred to as "health determinants" and include income and employment, childhood environment and education, social support networks, residential and local community, culture, health services and personal health habits.

Education is an example of an underlying factor that is important for health throughout life. Around three in four pupils at upper secondary school complete their education within five years (1;2). Dropping out of upper secondary school reduces opportunities in the labour market, increases the likelihood of receiving disability benefit and results in poorer living conditions and health (3;4).

Smoking and snus use

Since 2000, the number of people who smoke in Norway has fallen equally for both men and women. However, the use of snus has increased during the same period, and since 2014 daily use of snus has become more common than daily smoking among Norwegian men; see figure 15 on the next page.

- 11 per cent are daily smokers, and 8 per cent are occasional smokers.
- 12 per cent are daily snus users and 4 per cent are occasional snus users.

Daily smoking is most common in groups with low educational attainment; see the section on social inequalities in health on page 48. Snus is currently the predominant form of tobacco among younger age groups. Among 16–24-year-olds, daily snus use has been at a high, stable level in recent years, and is highest among men (1); see Table 4 next page.

Among adolescents, only two per cent currently smoke on a daily basis, and smoking seems to be on its way to disappearing among Norwegian youth.

Table 4. Daily use of snus among younger age groups from 2014–2017. Source: [Statistics Norway 2018](#).

Age	2014		2015		2016		2017	
	Men	Women	Men	Women	Men	Women	Men	Women
16–24 yrs	23 %	12 %	20 %	13 %	21 %	17 %	25 %	14 %
25–34 yrs	23 %	8 %	23 %	8 %	21 %	15 %	32 %	12 %
35–44 yrs	18 %	2 %	17 %	1 %	16 %	3 %	19 %	5 %

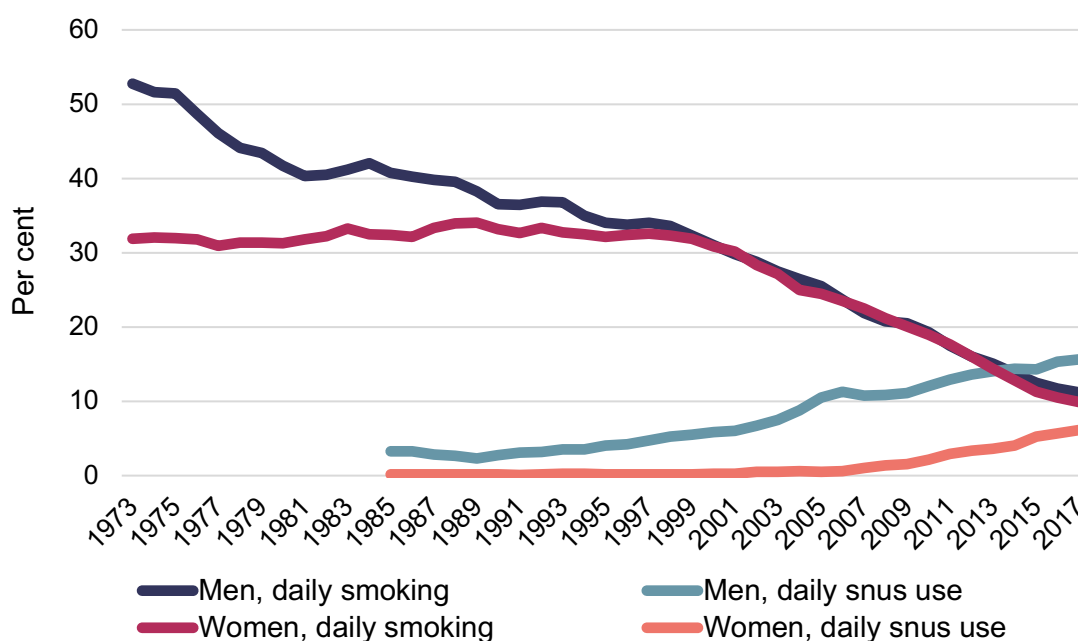


Figure 15. Proportion who smokes or use snus on a daily basis, all age groups combined. Source: Statistics Norway.

Alcohol consumption

When average consumption increases, the extent of both risky alcohol consumption and alcohol damage increases, and conversely – the extent of alcohol-related damage is reduced when consumption decreases (47;48).

- On average, Norwegians consume almost seven litres of pure alcohol per year, calculated per capita aged 15 and older.
- The registered consumption increased until 2008 and then decreased somewhat; see figure 16 on the next page.
- Men drink approximately twice as much as women. Binge drinking is more prevalent in younger age groups and among men (18).
- Among the elderly, the last decades saw an increase in both the proportion who drank alcohol and in the frequency of drinking (18).

Among adolescents (15–16-year-olds), alcohol consumption increased from the mid-1990s and then decreased from the early 2000s (49).

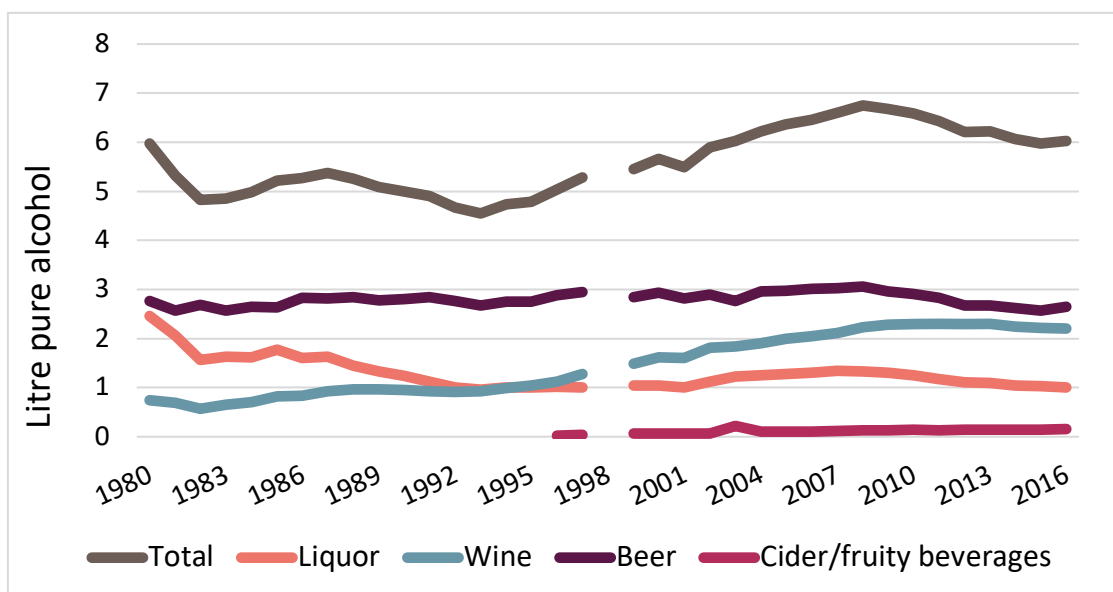


Figure 16. Annual registered alcohol consumption per capita aged 15 and older (litres of pure alcohol), 1980–2016 (Statistics Norway did not publish sales figures for 1998). Source: Statistics Norway/Norwegian Institute of Public Health.

Diet

Most children and adults have a varied diet, although the consumption of whole grains, fish, vegetables and fruit is lower than recommended.

A large proportion of the diet consists of sweet, fatty and salty foods of low nutritional value (50). These foods take the place of healthier foods and can also contribute to high energy intake and weight gain. High salt intake can lead to high blood pressure.

The intake of soft drinks and confectionery contributes to high sugar intake and the consumption figures show the following:

- The consumption of confectionery and other sugary products was 14.5 kg per person in 2016, while in 1960 it was less than one third of this (4.6 kg) (51).
- The average consumption of soft drinks with added sugar was 54 litres per capita. This is a marked reduction since 2000, when consumption was 90 litres, but consumption is still too high.

From 2000 to 2016, the added sugar content in the diet decreased from 17 per cent to 12 per cent of total energy intake. This is still higher than the recommended maximum energy percentage (E%) of 10.

The average salt intake is estimated to be around 10 grams per person per day, and this is twice as high as recommended.

Nutritional deficiencies

Children and adolescents require an extra amount of certain vitamins and minerals for their growth and development. Young women who are planning a pregnancy should have a good nutritional status to ensure healthy foetal development. Nutritional deficiencies are a problem for young women in particular:

- The Tromsø study registered that the vitamin D status of 1 in 6 tested in the 15–18 year age group was so low as to be characterised as a deficiency (52).
- A low intake of iodine, folate and iron was also registered in young women (53;54).

Physical activity

The majority of children under 10, but only around half of 15-year-olds, meet the Norwegian health authorities' recommendations for physical activity. The recommendation is moderate or high intensity for a minimum of 60 minutes per day (55).

Among adults, around 30 per cent meet the recommendations for physical activity when registered using an activity tracker; see figure 17 on the next page. Activity trackers provide more reliable survey data than questionnaires.

The recommendation for adults is moderate physical activity for at least 150 minutes per week, i.e. a minimum of 30 minutes per day, five days per week (56–58). For those who are sedentary for more than eight hours per day in connection with work, transport, etc., a minimum of one hour of moderate activity is recommended per day (59).

Adults currently spend an average of nine hours per day seated. On average, men spend more time on sedentary activities than women.

Overweight and obesity

A body mass index (BMI) over 25 kg/m² is considered overweight, and obesity is a BMI over 30 kg/m². Obesity in particular is associated with a considerably increased risk of illness and impaired health. See also the text box on page 37.

Among children, the incidence of overweight probably increased up until the 2000s, but appears to have changed slightly in the last decades; see figure 18 on the next page. Around 14 per cent of girls and 11 per cent of boys in the third year of school (ages 8-9) are overweight, while 3 per cent of girls and 2 per cent of boys are obese (60).

The proportion of overweight adolescents has increased in recent decades. This is an alarming trend. The average weight and proportion of overweight or obese adolescents increased in Nord-Trøndelag county from 1995–1997 to 2006–2008 (61). The Tromsø study “Fit futures 2” shows that in the period 2012–2013, 21 per cent of young women and 28 per cent of young men aged 18–20 were overweight or obese (62).

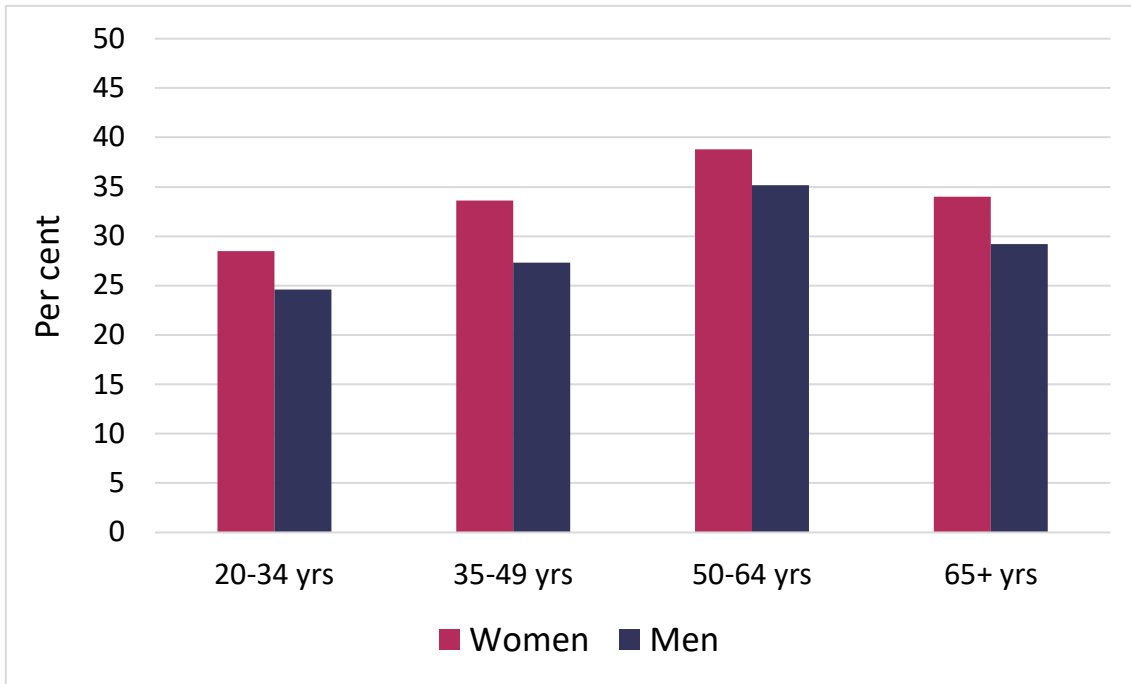


Figure 17. The proportion of adult men and women who meet the recommendation for 150 minutes of moderate physical activity per week. Source: Norwegian Directorate of Health (57).

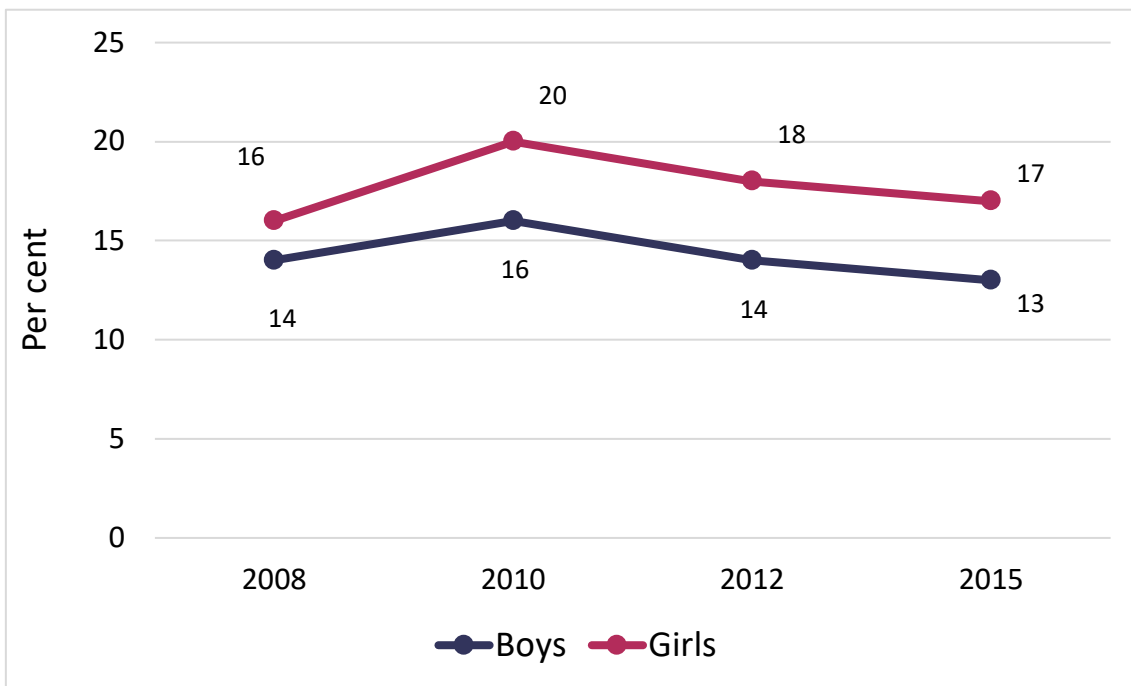


Figure 18. The proportion of 8–9-year-olds who were overweight or obese in the period 2008–2015. Source: Child Growth Study, Norwegian Institute of Public Health.

The proportion of adults with overweight or obesity increased significantly from the mid-1960s among men and from the mid-1980s among women. The proportion with normal weight is decreasing.

Studies from Tromsø and Nord-Trøndelag counties in the period 2006–2008 (63;64) and 2016 (unpublished figures from Jacobsen) show that:

- The minority, around 25 per cent of men and 40 per cent of women, are of normal weight.
- Around 25 per cent of men and 21 per cent of women aged 40–69 are obese; see figure 19. In total, the majority are overweight or obese, and the proportion is highest among men.

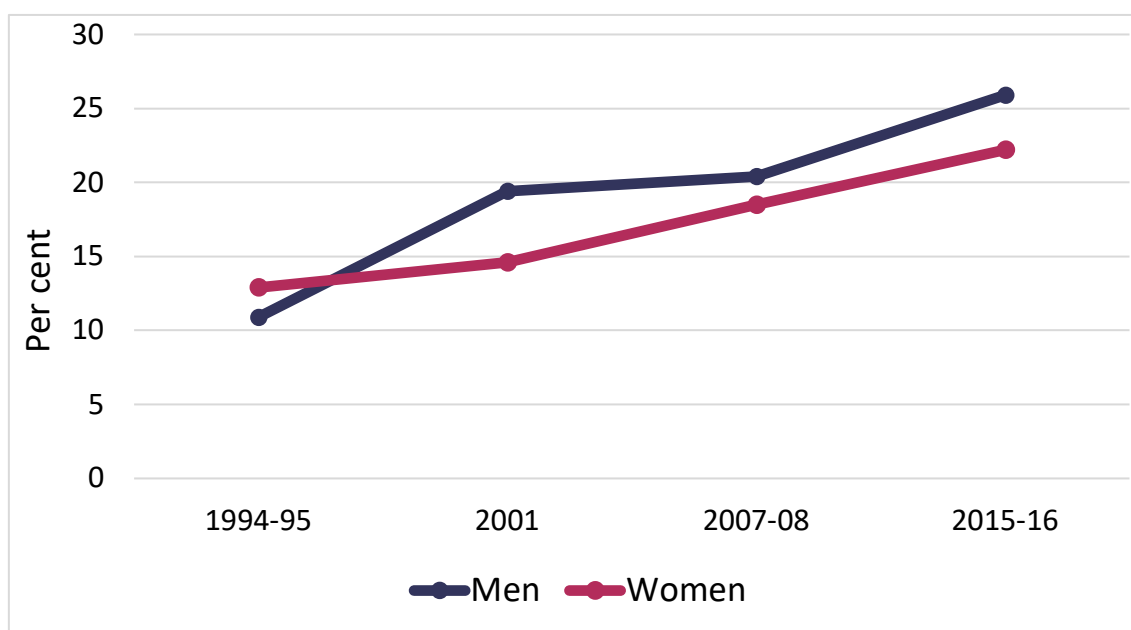


Figure 19. The proportion of obese adults (BMI ≥ 30 kg/m²) in the Tromsø studies. Men and women aged 40–69, age-adjusted figures. The proportion who are overweight are not shown here. Source: Koster Jacobsen, unpublished data.

Is Norway achieving the goals for changes in lifestyle factors and improvements in biological risk factors?

WHO has established nine goals to combat premature death before the age of 70 from cardiovascular disease, cancer, COPD, and diabetes. Six of these goals concern four partially overlapping risk factors for diet, physical activity, tobacco and alcohol. Two of the goals concern blood pressure control and obesity; see figure 20.

Progress is being made on most of the goals, but in terms of halting the increase in obesity and diabetes, Norway is heading in the wrong direction (38).

At present, we have no data showing trends over time for the amount of salt in the diet. We also require better data to follow the trend in physical activity among children, and it will be important to monitor trends among the different groups in society.

For more information, see <https://www.fhi.no/nettpub/ncd/> and the Norwegian Government's [National NCD strategy for the period 2013–2017](#).







	Goals for combating cardiovascular disease, cancer, COPD and diabetes 2010–2025	Status
	Alcohol: At least a 10% reduction in harmful use	Heading in the right direction: 0–8% decrease
	Physical inactivity: 10% reduction	Tendency in the right direction for adults. Lack of data for children.
	Salt intake: 30% reduction	No figures for Norway over time
	Tobacco use (smoking and snus): 30% reduction	Heading in the right direction: 10–22% decrease
	High blood pressure: 25% reduction in the proportion of people with high blood pressure	Almost there
	Stop the increase in the proportion of people with obesity and diabetes	Heading in the wrong direction

Figure 20. WHO's goals for changes in lifestyle factors and biological risk factors and status of goal attainment in Norway, based on current figures. The goals have been set to combat premature death before the age of 70 from cardiovascular disease, cancer, COPD, and diabetes.

Health among children and adolescents

The health status of children and adolescents in Norway is generally good.

Mental health: Around seven per cent of preschool and school age children have symptoms consistent with a mental disorder when examined (65;66). The most common mental disorders during childhood are behavioural disorders, depression and anxiety disorders. The incidence of anxiety and depression increases during adolescence. Among girls aged 15–17, the proportion diagnosed by the Children's and Young People's Psychiatric Out-Patient Clinic rose from five to seven per cent over a five-year period from 2011 to 2016.

Physical health: Participation in the Norwegian Childhood Immunisation Programme is very high, and the spread of the serious infectious childhood diseases is rare (67).

The most common chronic diseases among children are asthma, allergies and atopic eczema, which occur in about a quarter of all children during childhood.

Norway is one of the countries in the world with the highest incidence of type 1 diabetes in children under 15. There has been a gradual increase in the number of new cases. In the under-15 age group, more than 2,000 children have type 1 diabetes, and around 350 new cases are diagnosed every year (45).

Around 200 children and adolescents under the age of 18 are diagnosed with cancer each year. The most common forms of cancer among children are leukaemia and lymphoma (68).

Injuries: Annually, around 600,000 patients with one or more injuries are treated by the primary and specialist health services. Every fourth injury that is treated is registered for a child or adolescent under 18. This is shown in analyses of data from the Norwegian Patient Register and reimbursement data from the primary health service for the period 2009–2011 (19). In the 10–17 year age group, superficial injuries, sprains and fractures are the most common types of injury. Together, these are responsible for around 60 per cent of all injuries in this age group (19).

Changes in family structure and fertility

In recent decades, there have been major changes in fertility patterns and family structures in the wealthy, industrialised nations (1). Both women and men have fewer children.

- In 2017, age at first birth was approximately 29 years for women and 32 years for men.
- Around one in four men and one in seven women will be childless.

The use of assisted reproductive technology has increased. Currently, around 4 per cent of children in Norway are born following assisted fertilisation.

Increasingly, more people are separating, which is often followed by a new relationship. Such changes contribute both to an increase in the number of years a person lives without a partner, and to a greater proportion of the population now living in blended families.

These changes in family patterns and fertility influence the health of both children and adults through social and biological mechanisms.

Health among the elderly

From 2002 to 2015, three in four in the 65–79 year age group reported good or very good health (69). More elderly people in good health is desirable, but will pose challenges for Norwegian society (70).

Recent studies suggest that there has been some improvement in cognitive function among the elderly (71;72) and a reduction in the incidence of age-specific dementia over the last two decades (73;74). However, studies of physical functioning do not show the same positive trend (72;75;76), especially for women (77;78).

With increasing age, the risk of chronic diseases increases (79). Cardiovascular disease and cancer are common diseases among the elderly. Both the prevalence and incidence of type 2 diabetes increase considerably with age, peaking at around age 80. In 2012, almost 11 per cent of 80-year-olds were taking blood-glucose-lowering drugs (45).

Overall, impaired musculoskeletal health is more common among middle-aged persons and older people than among younger people. Hip fractures in particular affect many older people.

Sight and hearing

Impaired sight and hearing are common among the elderly and for many this will impact their everyday functioning and social contact. Currently, almost one in ten people over the age of 66 say they have problems with their eyesight, even when wearing glasses (69).

Close to one half of the population over the age of 65 and around three in four of those over 74 have a hearing impairment that impacts their ability to communicate (80).

Dementia and mental health

In Norway and globally, the number of people suffering from dementia has risen and is expected to increase considerably in the coming years due to a higher proportion of elderly people in the population. Globally, it is estimated that the number of people with dementia will triple by 2050 (20).

- An estimated 80,000-100,000 people suffer from dementia in Norway today (23).
- In Norway, around 300,000 people are close relatives of someone with dementia (23).

There are currently around 40,000 nursing home placements in Norway. Around 80 per cent of the residents have dementia (81;82).

While genetics play a role in the risk of dementia, the same factors that, throughout life, increase the risk of cardiovascular disease also seem to increase the risk of dementia. This means that many cases of dementia are preventable (83).

In 2007, the incidence of depressive disorders among men and women in the 60–80 year age group was 10 per cent and 15 per cent, respectively. This is shown by figures from the NorLAG study (84;85). We lack data to indicate the trend over time in Norway.

Therapeutic drug use

Because the elderly often have more diseases, they also take several drugs at the same time. They primarily take drugs for cardiovascular disease, infections, pain, anxiety, depression and insomnia. A high number of elderly people take drugs that increase the risk of falls.

- In 2016, 90 per cent of all people over the age of 65 were prescribed at least one therapeutic drug (87).
- Figures from the Norwegian Prescription Database indicate that two in three people over 65 take five or more therapeutic drugs (polypharmacy).
- In the over-90 age group, 81 per cent of women and 78 per cent of men had polypharmacy; see figure 21.

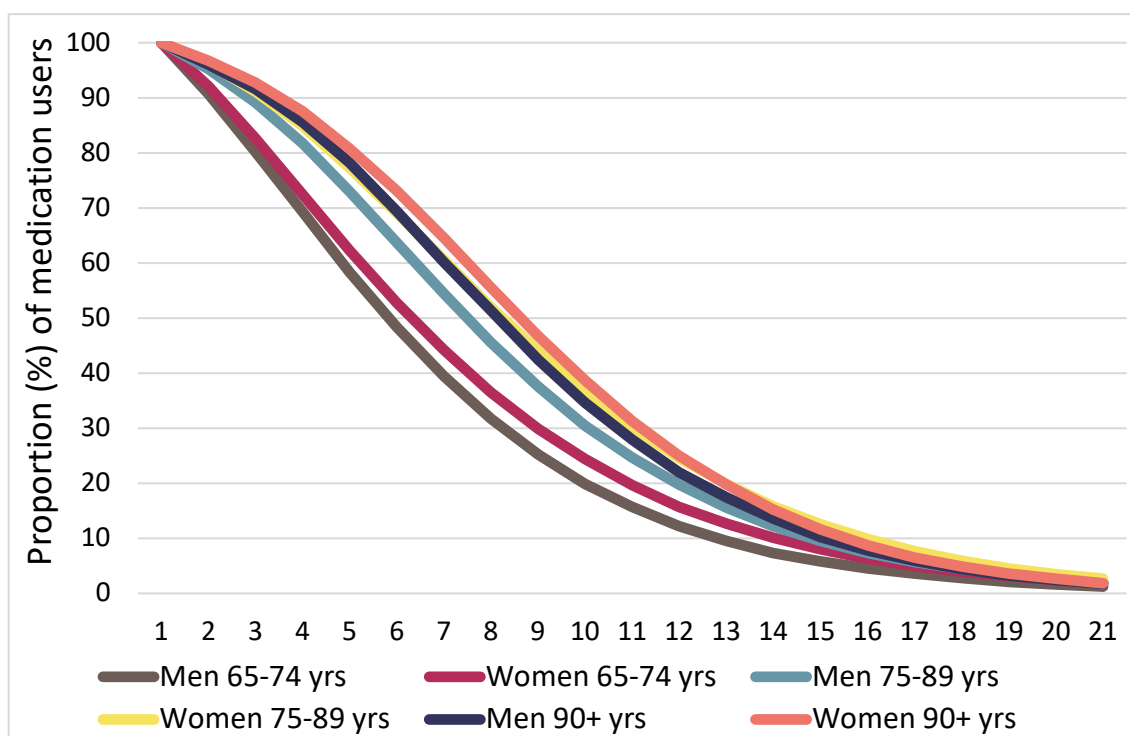


Figure 21. The proportion of people taking from 0 to 21 different therapeutic drugs in 2016, in three age groups for men and women.

Increasingly more 90-year-olds

Considerable growth will be seen in the coming years in the number of elderly people over 80 and 90 years of age. The proportion of people of working age (aged 20–66) will decrease, so that by 2040, there will be 2.86 active workers per person aged over 67, according to the main projection. The current figure is 4.24.

Table 5. The number in the population aged over 67, 80 and 90 years in 2017 and according to the main alternative for population projection. Source: [Statistics Norway](#).

	2017	2040
Total size of population	5,271,000	6,331,000
Number aged 67+	790,000	1,280,000
Number aged 80+	220,000	470,000
Number aged 90+	45,000	100,000

Health in the immigrant population

In 2017, immigrants and the children of immigrants constituted around 17 per cent of the population of Norway, a total of around 920,000 people (88). Around 49 per cent had a background from Europe (excluding Turkey), while 46 per cent had backgrounds from Africa or Asia.

Immigrants are as satisfied with life as the general population is, and immigrants are less ill and use health services to a lesser extent than the general population (89). However, there are major differences between groups. Health varies with country of origin, reason for immigration and length of stay in Norway.

Mental health

Refugees consult GPs for mental disorders to a somewhat higher extent than the general population (90). Around half of unaccompanied refugee minors have symptoms of post-traumatic stress disorder upon or after arrival in Norway (91;92).

Physical health

Physical diseases among immigrants, as for the general population, are primarily non-communicable diseases. Certain groups are particularly at risk:

- Diabetes is widespread among immigrants from Sri Lanka and Pakistan, with 20–24 per cent of adults aged 30–59 affected, compared to 3–6 per cent in the general population (93). Women from countries with a high incidence of diabetes have an especially high risk of developing gestational diabetes (94).
- Immigrants from Eastern Europe have a higher risk of developing lung cancer and stomach cancer than the general population (95).
- Cardiovascular disease is more widespread among immigrants from Southern Asia and the Balkans than in the general population (96;97). Around 20–25 per cent of immigrants from Turkey, Iraq and Pakistan are obese. The same applies to Somalian women, according to self-reported figures for height and weight (98).
- Vitamin D deficiency is widespread among immigrants from countries outside Europe, especially the Middle East, Sub-Saharan Africa and South Asia, where around three in five people have vitamin D deficiency (99).

Some immigrant groups have a higher incidence of certain infectious diseases than the general population, of which the majority are infected in their country of origin. Most of the new annual cases of tuberculosis and hepatitis B occur among immigrants. The same also applies to one half of new HIV cases (100).

Lifestyle factors

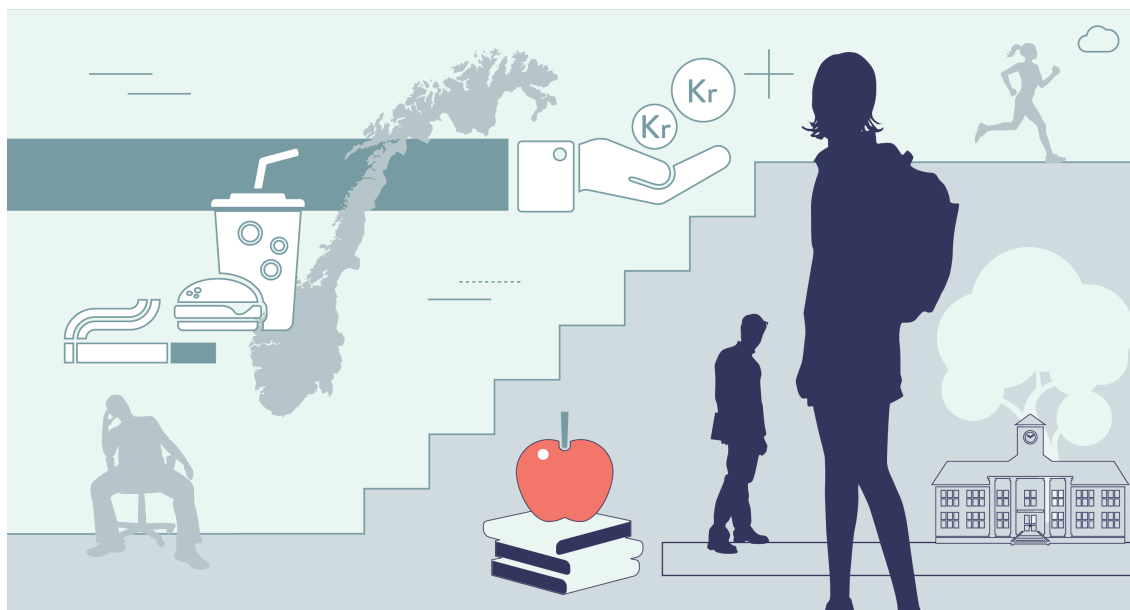
Immigrants and the adult children of immigrants from countries outside Europe drink less alcohol than the general population. For example, one in five young people in Oslo with an immigrant background had consumed beer in the last month compared to about one half of young people without an immigrant background (101).

In several immigrant groups, there is still a considerable proportion who smoke on a daily basis. The average among immigrant men was 36 per cent, compared to 22 per cent

among men in the general population, according to figures from Statistic Norway's survey. Around 45 per cent of immigrant men from Poland, Kosovo, Turkey and Vietnam smoked on a daily basis. Among women, the figures are somewhat lower (98).

Knowledge of immigrant health and use of health services has increased in recent years, but is still lacking.

Social inequality in health



Systematic inequalities in health are identified by comparing different groups in society. The higher the educational attainment and income of a group, the higher the proportion of people with good health in that group (102;103). This is known as social inequality in health.

Health improves for each rung of the socioeconomic ladder. The higher a person's educational attainment, the better their health will be. The same applies to income. Not only do the second poorest have better health than the very poorest, we also note that the very richest on average have slightly better health than the second richest.

Social health determinants

Factors that influence health are often referred to as "health determinants" and include income and employment, childhood environment and education, social support networks, residential and local community, culture, health services and personal health habits. See figure 24 on page 47.

A strong association between education and health has been reported in a number of countries, including Norway (104). Education provides skills and abilities and promotes the ability to convert health information into health-promoting behaviour such as a healthy diet, physical activity and not smoking. It is well documented that dropping out of upper secondary school is linked to subsequent health problems (105); see also the report Health and dropping out of upper secondary school (106).

The following pages present specific examples of social inequality in Norway.

Social inequalities in life expectancy

- Life expectancy is 5–6 years higher among people who completed university or college education compared to those who only completed lower secondary education; see figure 22.
- If someone is married, has a university or college education and has a spouse with the same level of education, their life expectancy is 8–9 years higher than for unmarried people who have only completed lower secondary education (107).
- Life expectancy inequalities not only apply from birth but persist throughout life. For example, a 95-year-old with high educational attainment has a greater life expectancy than a 95-year-old with low educational attainment (108).

Social inequalities in life expectancy have increased

Women and men with a tertiary education (university, trade schools and colleges) had the highest life expectancy throughout the period from 1961 to 2015; see figure 23, which shows the life expectancy for 35-year-old men and women in different education groups from 1961 to 2015.

- Among men, the difference between the groups with low and high educational attainment was 1.9 years in 1961. By 2015, this had increased to 6.4 years.
- Among women, the difference increased from 1.4 years in 1961 to 5 years in 2015.

Women with low educational attainment showed the least favourable trend both in the period 1960–1970 and later (109).

In order to explain the social inequalities in health, mortality and life expectancy, we must look at both disease patterns and lifestyle factors:

Differing smoking habits and thereby differences in mortality from smoking-related diseases are probably a major reason underlying the social inequalities in mortality and life expectancy in Norway (104;112). Women and men with high educational attainment were the first to quit smoking, and the decrease in mortality from cardiovascular disease, lung cancer and COPD therefore began in these groups (18).

As the groups with lower educational attainment eventually change their smoking habits, we expect these to follow a positive trend, and the gap to the groups with medium and high educational attainment to reduce.

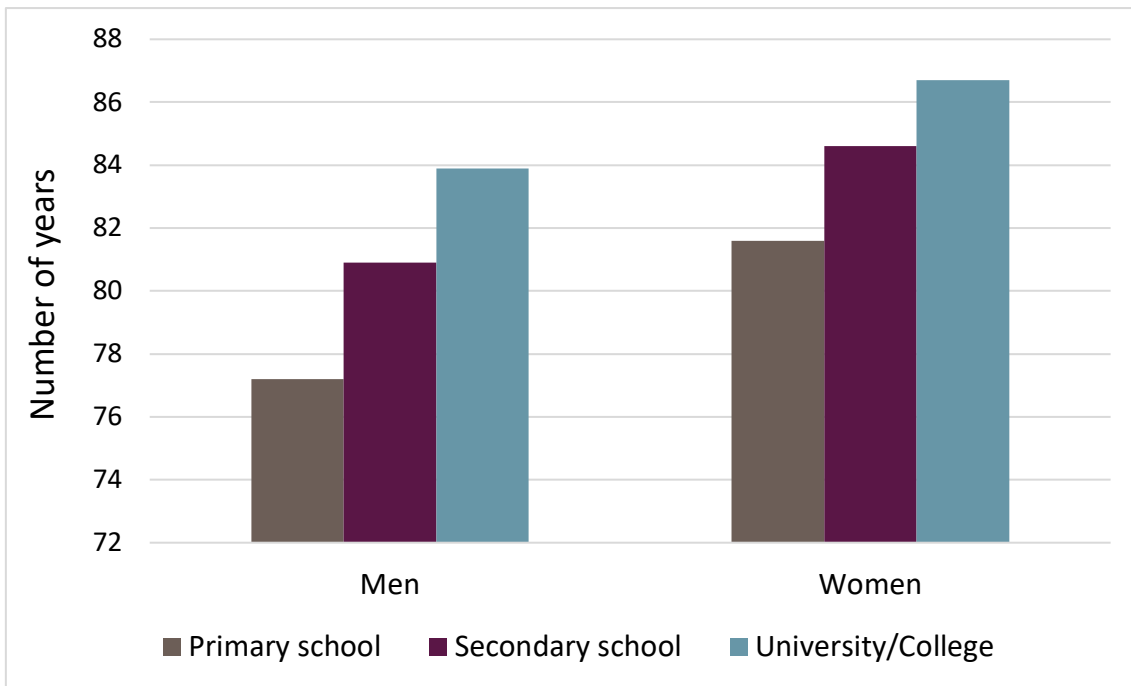


Figure 22. Life expectancy for 30-year-olds by highest level of educational attainment, average for 2009–2015. Source: [Norhealth](#), Statistics Norway.

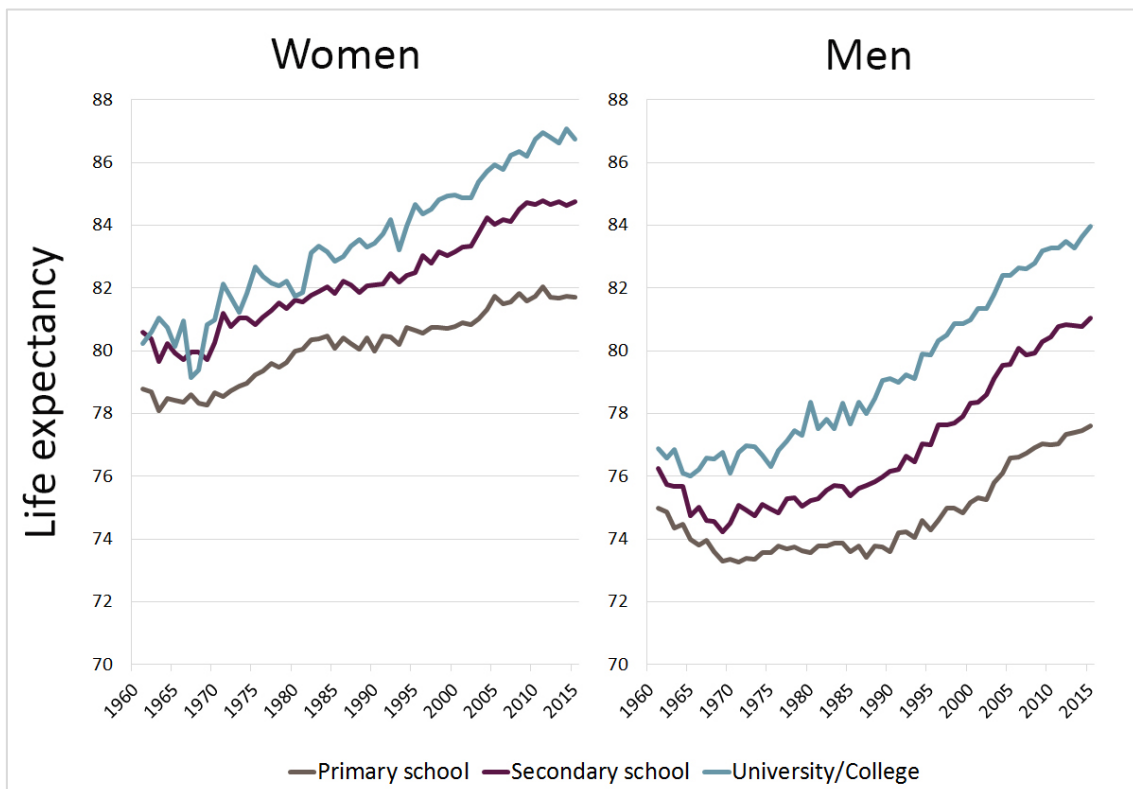


Figure 23. Life expectancy for women and men aged 35 in Norway, 1961–2015, grouped according to level of educational attainment. We note that those who completed tertiary education had the highest life expectancy throughout the entire period.

Source: 1961–1989: Steingrimsdottir (2012), 1990–2015: Statistics Norway/[Norhealth](#). The level of the figures from Steingrimsdottir (2012) has been slightly adjusted for comparability.

Geographical inequalities reflect socioeconomic inequalities

Major inequalities exist between municipalities, districts and counties in terms of life expectancy and other health-related indicators.

- There is a difference in life expectancy of up to 10–12 years between men living in the municipalities with the highest and lowest life expectancies, respectively. For women, the corresponding difference is up to 8–10 years.
- Within Oslo, the difference between districts is up to 8 years for men, and 5 years for women.

There may be several reasons for geographical inequalities in health (110):

- In some municipalities, there may be many people with high educational attainment, while in other municipalities there are few. This probably has a two-fold effect: an individual's health might be influenced not only by the level of their own educational attainment and income, but also by that of the municipality since this level has consequences for other people's lifestyle, which may influence the individual.
- There are inequalities in the man-made environment such as workplaces, schools, health services, sports facilities, pollution and noise. These environmental factors impact education and income, yet also result from them. Equally, they are the result of local and national policies, and of political decisions locally and nationally and the "unalterable physical environment" (see below). The man-made environment is also a health determinant in terms of whether it provides access to good health services and sports amenities.
- Proximity to natural resources, climate, UV radiation and distance to urban centres are examples of the "unalterable physical environment", and which may vary between municipalities. This environment is a key factor for the man-made environment in that it influences access to good jobs and health services, and may also impact public health and mortality more directly.

A study of geographical inequalities in mortality demonstrated that level of educational attainment and income, along with other sociodemographic factors, could account for 80 per cent of the geographical variations in mortality among men (110). The corresponding figure for women was 73 per cent.

Social inequalities in health and disease

The social inequalities in health apply to virtually all diseases, injuries and disorders (104).

- Cancer: total cancer mortality is higher among those with low educational attainment (111;112).
- COPD: for those who have only completed lower secondary education, the risk of COPD is three times that of those with a university education. This still applies when smoking habits and occupation are taken into account (113–115).
- Heart attack: acute myocardial infarction or heart attack occurs more often among people with low educational attainment than among those with high educational attainment (39). Patients with low educational attainment are also at high risk of dying following a heart attack, both within 28 days and within one year of the heart attack (116).
- Mental disorders: people with low socioeconomic status have a higher risk of mental disorders (117).
- Adolescents from families with high socio-economic status are more likely to report higher quality of life, better health and fewer mental disorders than their age-peers from families with low socio-economic status (118).
- The incidence of injuries and accidents is higher among groups with low educational attainment than among groups with high educational attainment (119).

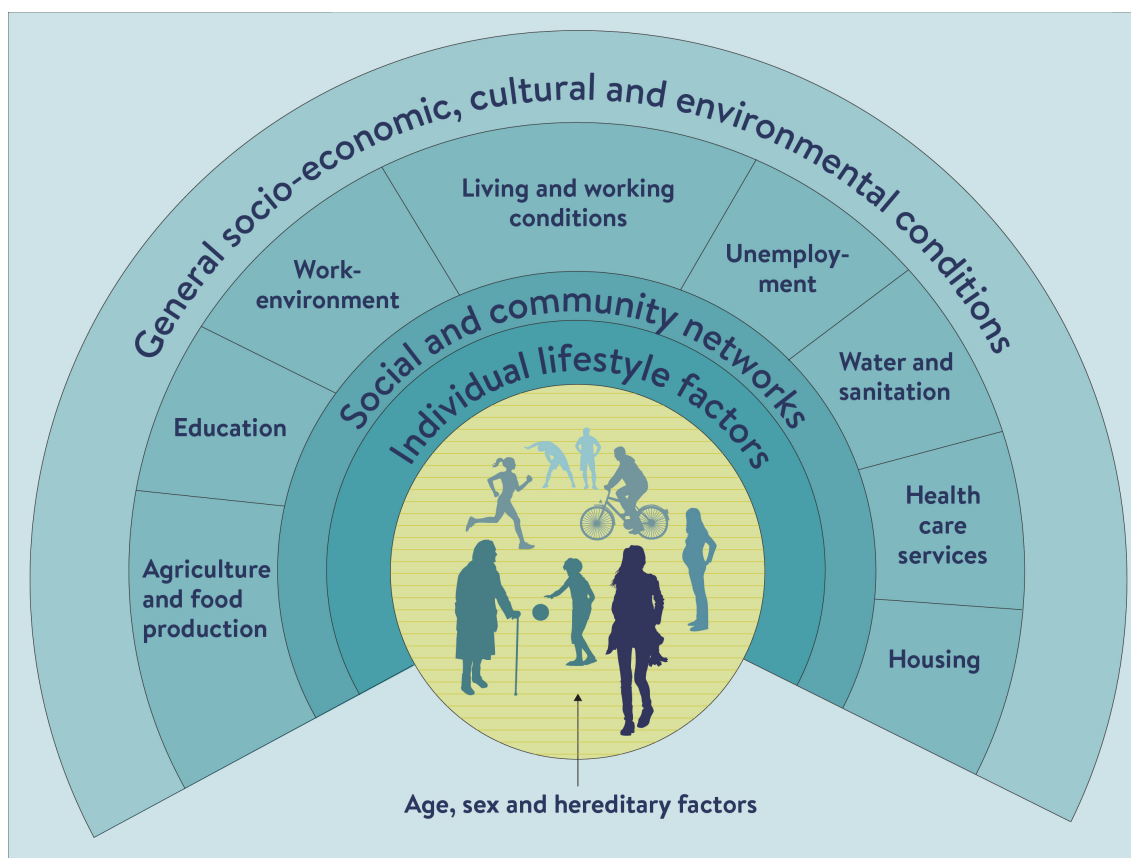


Figure 24. Underlying factors can promote health or increase the risk of disease. Illustration according to Whitehead and Dahlgren, 1991.

Social inequalities in lifestyle factors

Major social inequalities in lifestyle factors and other health determinants persist in Norway. Many chronic diseases are largely a result of the population's lifestyle factors over time. Lifestyle factors are heavily influenced by childhood environment, living conditions and culture, and the social inequalities in lifestyle factors account for many of the social inequalities in morbidity and mortality.

Educational disparities in smoking habits are considered to be one of the main causes of social inequality in life expectancy (120).

The proportion of smokers in the group who only completed lower secondary education is 24 per cent, but just 5 per cent in the group who completed tertiary education; see figure 25.

We have also noted social inequalities for other lifestyle factors:

- The proportion of physically active people is highest among those with high educational attainment; see figure 26.
- Alcohol consumption is highest among higher-status socioeconomic groups, while risky alcohol consumption is less prevalent in these groups (121). The drinking habits of adolescents from families with low social status (parents with low educational attainment or not working) are also more risky; they start drinking alcohol at an earlier age, drink more frequently and are intoxicated more often than their age-peers (122).

The proportion of overweight individuals is 30 per cent higher among the children of mothers with low educational attainment than among children of mothers with high educational attainment. The proportion of individuals with abdominal obesity follows the same pattern (123). The proportion of overweight and obese individuals is also highest among adults in groups with lowest educational attainment; see figure 27.

With regard to general practitioner services and hospital admissions, there are no major social inequalities, but groups with high socioeconomic status are more likely to consult specialists in private practice, dentists and public out-patient clinics (124;125).

Cancer patients with high educational attainment and income consistently have a better survival rate for the most common forms of cancer, compared to patients with lower educational attainment and income (126;127). The reasons for this are unknown, but studies indicate that groups with lower socioeconomic status receive intensive treatment, such as surgery, to a lesser extent than groups with high status (128).

Recent studies also demonstrate that heart patients with high educational attainment receive better treatment and have better health outcomes than heart patients with low educational attainment (129;130).

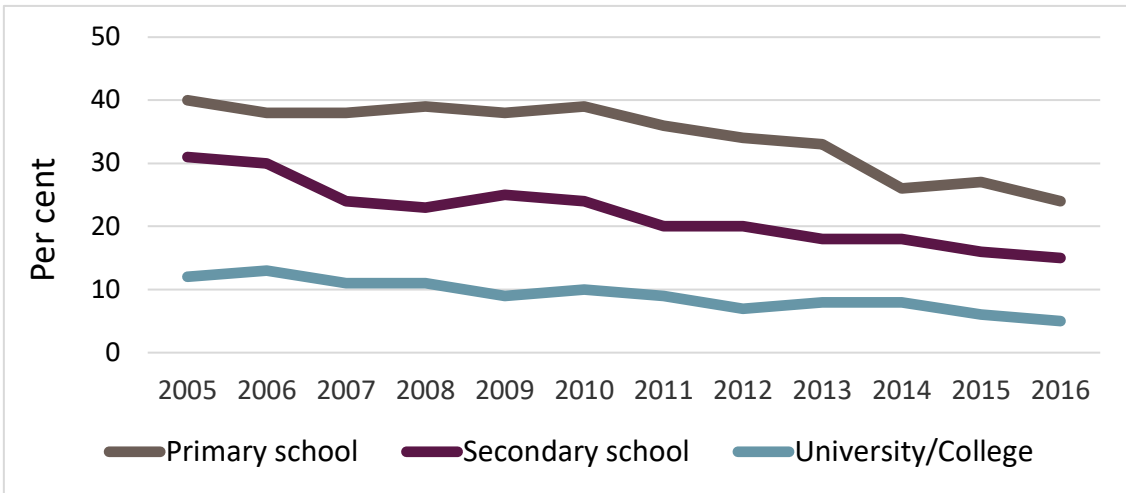


Figure 25. Use of tobacco in different educational attainment groups. Percentage, standardised. Both sexes, aged 25–79. Source: [Norhealth](#), Statistics Norway.

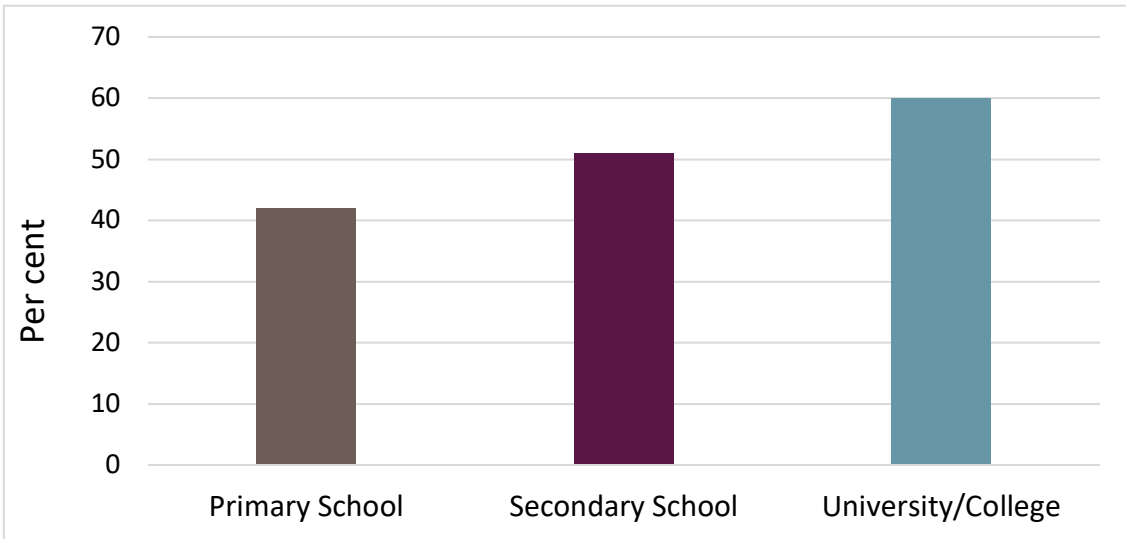


Figure 26. The proportion of individuals who report that in their leisure time they usually engage in physical activity for more than 2.5 hours per week in which they perspire and become short of breath. Both sexes, aged 25–79. Percentage, standardised. Source: [Norhealth](#), Statistics Norway.

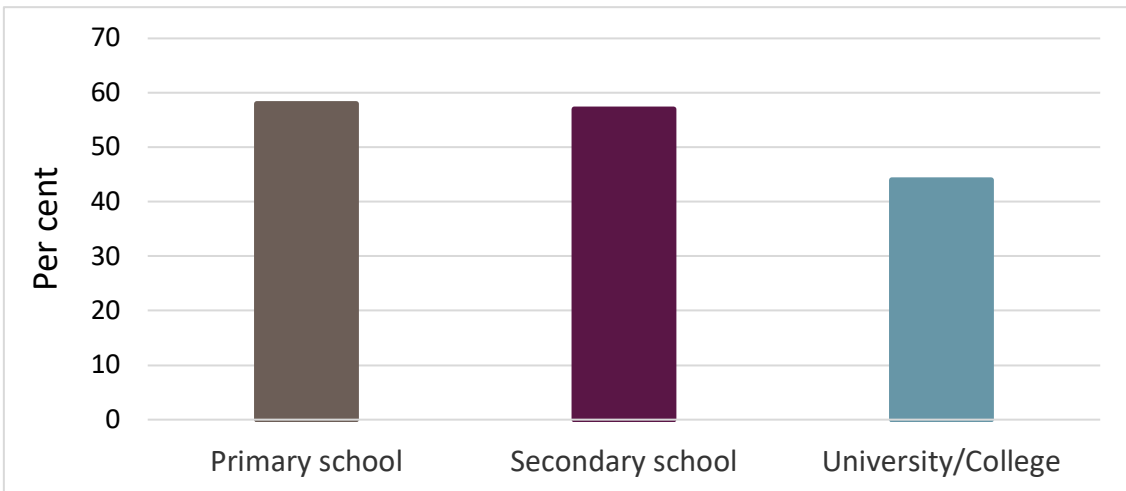


Figure 27. Overweight and obesity in different educational attainment groups. Based on self-reported height and weight. Percentage, standardised. Both sexes, aged 25–79. Source: [Norhealth](#), Statistics Norway.

Social inequalities create health inequalities

Basically, all factors that influence public health and which are socially disparate are instrumental in creating and perpetuating social inequalities in health.

In order to even out health inequalities, all of the underlying factors can be taken as a starting point; see figure 28. Fundamental social factors affect the entire causal chain.

Lifestyle factors, social support and other physical and social environmental factors directly influence health.

Health services can counter the inequalities that are created earlier in the causal chain. Employment and adapted training also help to counter the inequalities.

One of the goals of public health work is to create a society that promotes health for the entire population and reduces social inequalities in health.

The challenge in the coming years will be to close the health gap between the groups with low and high socioeconomic status.

Efforts to improve living conditions, such as employment, education and residential environment, could help to improve health. This will also reduce social inequalities in health and increase life expectancy in all groups. The major inequalities in health and lifestyle factors seen in Norway are a societal problem and, as such, can potentially be reduced (104).

Reduced social inequalities in health are also an important aim of public health work. Levelling out the social inequalities in health represents a huge potential for improving public health.

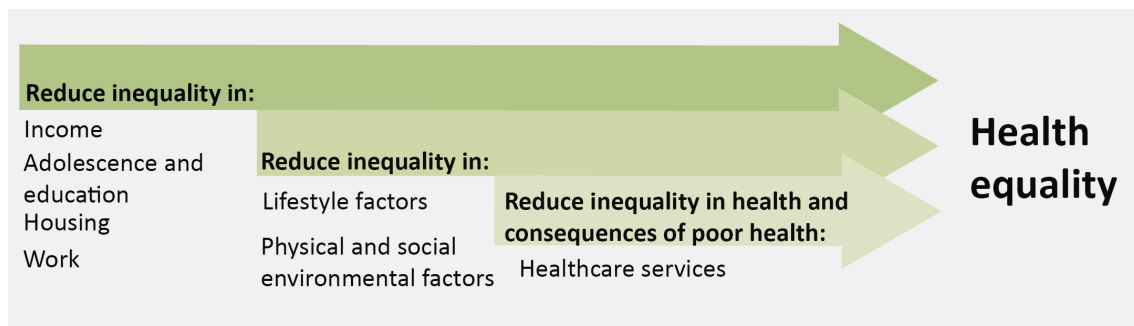


Figure 28. Examples of areas in which interventions can reduce social inequalities in health. On the far left are the fundamental factors that influence the entire causal chain.

Challenges and preparedness in infectious disease control and environmental health protection



Infectious diseases and antimicrobial resistance

Infectious diseases constitute a small proportion of the burden of disease in Norway today. Diseases are largely limited by high vaccination coverage and other preventive measures. Vaccination coverage in the Norwegian Childhood Immunisation Programme is high, so there is currently a low incidence of the diseases included in the Programme (67). However, we also face some challenges:

- At least one in 20 patients in healthcare institutions has, at any time, a hospital-acquired infection (131).
- An estimated 25,000–35,000 people have a chronic infection caused by the hepatitis B or C virus. A high proportion of these people will need treatment in the years ahead (132;133).
- The incidence of gonorrhoea and syphilis has increased in recent years, according to reports to the Norwegian Surveillance System for Communicable Diseases (MSIS). The incidence of antibiotic-resistant gonococci is increasing (133). In 2017, 1,399 cases of gonorrhoea were diagnosed in Norway (134).

The situation could change rapidly if preventive measures are no longer prioritised. It is important to bear in mind that measles is still one of the leading global causes of infant death.

New infectious diseases, such as a new strain of influenza, can arise and spread. Human interaction in previously undisturbed ecosystems is leading to more contact between animals and humans and exposure to new infectious agents. Since 1940, more than 300 new infectious diseases have been discovered (135). Around two thirds of all new

infectious diseases are transmitted from animals to humans. International trade in food and animals, migration and travel result in increased infection pressure, including in Norway.

Susceptibility to infections is increasing in the population, partly due to increased use of immunosuppressive drugs. Increased life expectancy will also result in more people being susceptible to infectious diseases, because the immune system weakens with age.

Experience from the Ebola epidemic in West Africa in 2014 demonstrated that the global community was not prepared to deal with such threats, and that a coordinated global response is necessary. Every country must have the preparedness, competence and capacity to respond rapidly to health crises.

Antimicrobial resistance – a mounting challenge

It is estimated that resistance results in 700,000 deaths globally each year, and that 10 million people will die annually of infections caused by antibiotic-resistant bacteria by 2050 if we do not identify solutions to limit this trend (136).

Norway has so far managed to control the incidence of antimicrobial resistance through, for example, comprehensive infectious disease control measures in healthcare institutions and responsible use of antibiotics. However, infection pressure and the incidence of resistance may eventually be so great that such measures are no longer sufficient. Infections might become incurable, and surgical procedures and cancer treatment difficult to carry out.

Some examples of the trends in Norway (Norwegian Surveillance System for Communicable Diseases (MSIS)):

- Since 2010, there has been a significant increase in community-associated MRSA (cases that have neither been admitted to hospital, worked in a healthcare institution nor reported as being infected abroad) and MRSA contracted abroad. See figure 29.
- Vancomycin-resistant Enterococcus (VRE) is an increasing threat in Norwegian hospitals. Before 2010, virtually no cases had been reported but since then several outbreaks have been reported in hospitals throughout Norway. In 2017, MSIS received notification of 384 new cases of VRE – the highest number ever reported in one year.
- It is of particular concern that bacteria with the ESBLCARBA resistance mechanism have spread to Norwegian healthcare institutions. In 2015, 45 cases of infection with such bacteria were diagnosed, compared to 10 cases in 2012, the majority among patients who had been treated abroad. Increasingly more outbreaks of these infections are being reported internationally and the mortality rate is high (137).
- The incidence of antibiotic-resistant gonococci is increasing. In 2017, 1,399 cases of gonorrhoea were diagnosed in Norway, and there are now only a few treatment options available that the bacteria are not resistant to or have reduced susceptibility to.

Overconsumption of antibiotics increases the risk of the development of antimicrobial resistance. One of the goals of the Norwegian Government's health policy strategy is to

reduce antibiotic use by 30 per cent from 2012 until the end of 2020. There is every indication that we are heading in the right direction. For example, total antibiotic consumption among children changed little from 2005 to 2012, but fell by 24 per cent from 2012 to 2016 (138).

The combination of an increasing incidence of antimicrobial resistance and the development of few new antibiotics has caused WHO and other international bodies to regard antimicrobial resistance as a serious threat to future medical treatment.

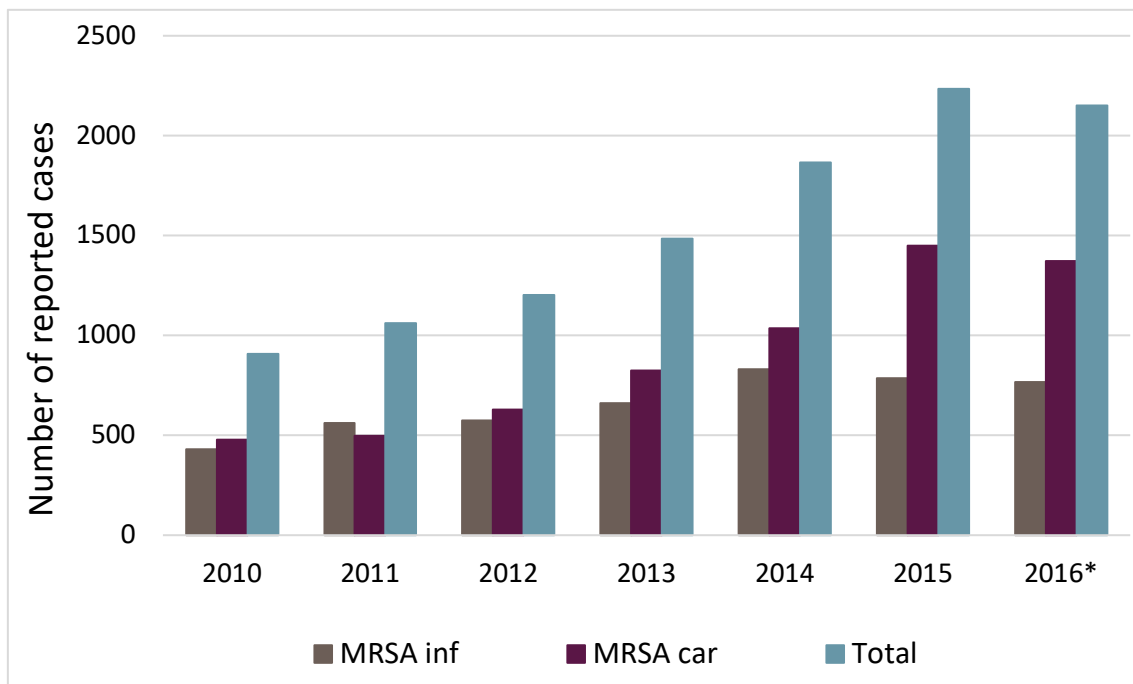
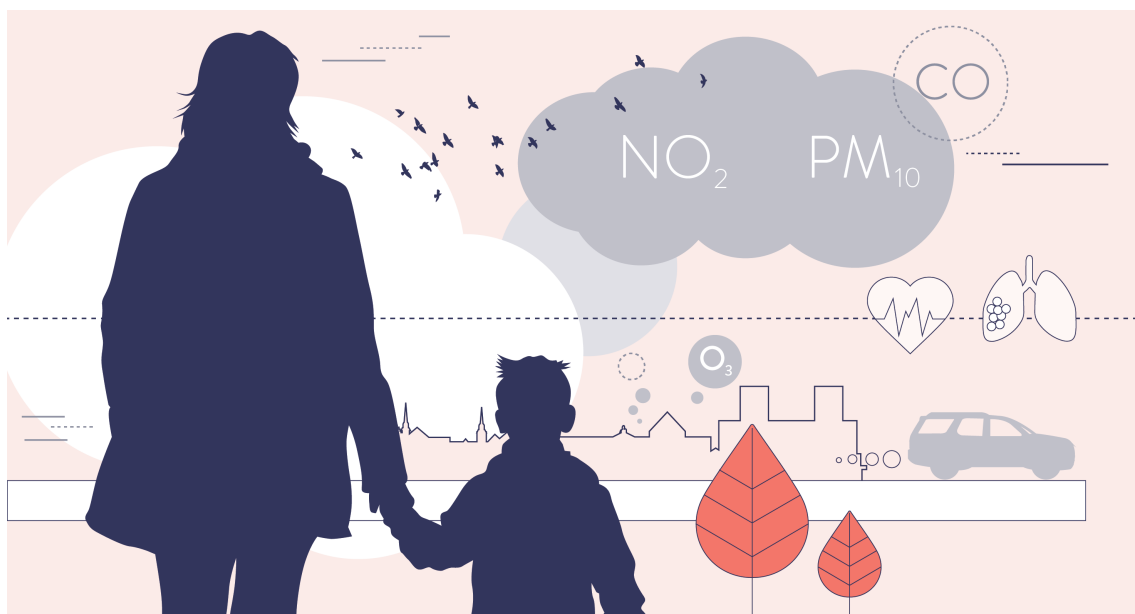


Figure 29. Trends in the number of reported cases of MRSA infection and carrier state 2010–2016. *Up to and including 23 November 2016. Source: MSIS.no

Air pollution and environmental pollutants



Air, water and soil pollution is a major global problem.

- Burden of disease studies indicate that particulate matter and ozone exposure contribute to around 1,500 deaths in Norway every year. Air pollution has also been shown to be one of the 10 most prominent risk factors for the burden of disease in Norway (10).
- Air pollution, however, has decreased in Norway within the last decade.

Also, with regard to exposure to persistent environmental pollutants such as dioxins and PCB, exposure is lower today than it was in the 1970s. However, a number of new substances have emerged.

The population is exposed to multiple environmental pollutants simultaneously on a daily basis. This can lead to an increased risk of adverse health effects. For example, foetal and infant exposure could increase the risk of impaired health in later life.

On a global scale, the harmful effects of pollution and environmental pollutants on health have been substantially underestimated, according to the Lancet Commission on Pollution and Health (139) and WHO's report from 2016 (140). We lack large data sets on exposure and know little about the relationship between exposure and the development of disease, for environmental factors other than particulate matter and ozone.

A reduction in harmful substances is essential for achieving the global sustainable development goals (SDGs) adopted by the UN Member States.

Environmental noise pollution

Noise is the form of environmental pollution to which most Norwegians are exposed.

Densification and urbanisation pose challenges, and the number of people exposed to high levels of noise outside their homes is increasing (141;142). In Norway, road traffic is the main source of noise and noise disturbance.

- The figures for 2014 indicate that 2 million Norwegians are exposed to environmental noise above recommended levels (142).

According to WHO, one million healthy life years (DALYs) are lost every year from traffic-related noise in Western Europe (143).

Effective and integrated spatial planning is necessary to avoid new noise conflicts in residential areas and to prevent health disorders caused by environmental noise. This is particularly important in susceptible areas with major population growth. Environmental noise pollution can cause many disorders and stress, sleep disturbance and cardiovascular disease (143). Noise at night, especially, is a cause of impaired health. Aircraft noise close to schools is associated with impaired reading ability and recall among pupils (144).

Persistent, intense noise stress levels above 80–85 dB, or brief, intense bursts of noise can also cause permanently damage hearing.

- Some 15 per cent of the population over the age of 20 reported that they have tinnitus (145).

Workplace noise represents the largest risk of hearing loss and hearing impairment such as tinnitus. Hearing impairment tops the Norwegian Labour Inspection Authority's statistics of reported occupational injuries.

Music, wearing headphones, the use of DIY power tools and other leisure noise appear to have a lesser negative effect on hearing in the general population (146).

Climate change, extreme weather and natural disasters

Climate change in the form of increased temperature and pollution affects public health both directly and indirectly. Global warming has been described by WHO, for example, as the most serious threat to global health in the 21st century (147). The global temperature has increased in line with CO₂ concentrations and other gases in the atmosphere, and the forecast for greenhouse gas emissions makes it highly improbable that we will achieve the target of a limited temperature increase of 2 °C (148).

Climate change could result in failing water supply and food production, more extreme weather, drought, heatwaves, floods, rising sea levels and migration.

In Norway, the increase in temperature could result in spring floods from snowmelt occurring earlier. In recent decades, there has also been an increase in the frequency of flash floods. This is linked to an increase in extreme levels of precipitation (149). As well as flooding and extreme weather causing physical harm to people and infrastructure, it could cause severe mental strain for those affected.

Rising temperatures could lead to an increased incidence of tick-borne diseases and a risk of new insect-borne diseases becoming established in Norway.

The spread of existing and new pollen-producing plants and an extended pollen season could increase the incidence of pollen allergy.

As a consequence of hotter and wetter climates, there is also a risk that the incidence of natural toxins could increase, for example, mould fungus toxins in grains (150).

Effective surveillance and channels for alerting and notifying citizens will be key measures in readying Norway for the changes. The most important challenge is to achieve a global reduction in greenhouse gas emissions.

Safe drinking water

An adequate supply of clean drinking water is crucial for good public health. In Norway, we have fallen behind on vital maintenance of the water pipeline network. Leaks pose the risk that contaminated water could be drawn into clean water pipes if pressure drops. This could spread water-borne infections.

At the present rate of replacement of the water pipeline network, it is estimated that it will take around 145 years for the entire network to be upgraded to a satisfactory standard.

References

1. Statistics Norway. Statistics bank [database]. Oslo: Statistics Norway (SSB). Retrieved from: <https://www.ssb.no/statbank/>
2. NIPH. Norhealth statistics bank [database]. Oslo: Norwegian Institute of Public Health. Retrieved from: <http://www.norgeshelsa.no/norgeshelsa/>
3. Falch T, Nyhus OH. Frafall fra videregående opplæring og arbeidsmarkedstilknytning for unge voksne Trondheim: Senter for økonomisk forskning AS; 2009. Retrieved from: http://www.sof.ntnu.no/SOF%20R_07_09.pdf
4. De Ridder KA, Pape K, Cuypers K, Johnsen R, Holmen TL, Westin S, et al. High school dropout and long-term sickness and disability in young adulthood: a prospective propensity score stratified cohort study (the Young-HUNT study). *BMC Public Health* 2013;13:941.
5. Meld. St. 34. Oslo: Helse- og omsorgsdepartementet; 2013. Folkehelsemeldingen God helse – felles ansvar. Retrieved from: <https://bit.ly/2HVfi37>
6. Meld. St. 19. Oslo: Helse- og omsorgsdepartementet; 2014. Folkehelsemeldingen Mestring og muligheter. Retrieved from: <https://bit.ly/2JLS2dN>
7. Lund I, Lund KE. Lifetime smoking habits among Norwegian men and women born between 1890 and 1994: a cohort analysis using cross-sectional data. *BMJ open* 2014;4(10):e005539.
8. McCartney G, Mahmood L, Leyland AH, Batty GD, Hunt K. Contribution of smoking-related and alcohol-related deaths to the gender gap in mortality: evidence from 30 European countries. *Tobacco control* 2011;20(2):166-8.
9. NIPH. Cause of Death Registry statistics bank [database]. Oslo: Norwegian Institute of Public Health 2017. Retrieved from: <http://statistikkbank.fhi.no/dar/>
10. Knudsen AK, Tollånes MC, Haaland ØA, Kinge JM, Skirbekk V, Vollset SE, ed. NIPH. Sykdomsbyrde i Norge 2015. Resultater fra Global Burden of Diseases, Injuries, and Risk Factors Study 2015 (GBD 2015) [report]. Oslo: Norwegian Institute of Public Health; 2017. Retrieved from: <https://www.fhi.no/publ/2017/sykdomsbyrde-i-norge-2015/>
11. Mykletun A, Knudsen AK, Mathiesen KS, ed. NIPH. Psykiske lidelser i Norge: et folkehelseperspektiv [report]. Oslo: Norwegian Institute of Public Health; 2009. Retrieved from: <https://bit.ly/2tehteJ>
12. Nordentoft M, Mortensen PB, Pedersen CB. Absolute risk of suicide after first hospital contact in mental disorder. *Arch Gen Psychiatry* 2011;68(10):1058-64.
13. Schneider B. Substance use disorders and risk for completed suicide. *Archives of suicide research: official journal of the International Academy for Suicide Research* 2009;13(4):303-16.
14. Yoshimasu K, Kiyohara C, Miyashita K. Suicidal risk factors and completed suicide: meta-analyses based on psychological autopsy studies. *Environmental health and preventive medicine* 2008;13(5):243-56.
15. Wilcox HC, Kuramoto SJ, Lichtenstein P, Langstrom N, Brent DA, Runeson B. Psychiatric morbidity, violent crime, and suicide among children and adolescents exposed to parental death. *Journal of the American Academy of Child and Adolescent Psychiatry* 2010;49(5):514-23; quiz 30.
16. Pitman A, Osborn D, King M, Erlangsen A. Effects of suicide bereavement on mental health and suicide risk. *The lancet Psychiatry* 2014;1(1):86-94.
17. Gjersing L. Narkotikautløste dødsfall i Norge i 2016 [news article]. Oslo: Norwegian Institute of Public Health. Retrieved from: <https://www.fhi.no/hn/statistikk/rusmiddelstatistikk/narkotikautloste-dodsfall-i-norge-i-2016/>
18. Skretting A, Bye EK, Vedøy TF, Lund KE, ed. FHI. Rusmidler i Norge 2016: Alkohol, tobakk, vanedannende legemidler, narkotika, sniffing, doping og tjenestetilbudet. [report]. Oslo: Norwegian Institute of Public Health; 2016. Retrieved from: <https://www.fhi.no/publ/2017/rusmidler-i-norge-2016/>
19. Myklestad I, Alvær K, Madsen C, Ohm E, Hesselberg Ø, Bævre K, et al., ed. NIPH. Skadebildet i Norge: Hovedvekt på personskader i sentrale registre [report]. Oslo: Norwegian Institute of Public Health; 2014. Retrieved from: <http://www.fhi.no/dokumenter/8558040d0a.pdf>
20. Prince M, Wimo A, Guerchet M, Ali GC, Wu YT, Prina M, ed. ADI. World Alzheimer Report 2015: The Global Impact of Dementia [report]. London, UK: Alzheimer's disease international (ADI); 2015. Retrieved from: <https://www.alz.co.uk/research/WorldAlzheimerReport2015.pdf>

21. Gran JM, Iversen B, Hungnes O, Aalen OO. Estimating influenza-related excess mortality and reproduction numbers for seasonal influenza in Norway, 1975-2004. *Epidemiology and Infection* 2010;138(11):1559-68.
22. EuroMOMO. The FluMOMO model [internet page]. København, Danmark: European monitoring of excess mortality for public health action (EuroMOMO)/Statens Serum Institut. Retrieved from: <http://www.euromomo.eu/methods/flumomo.html>
23. Reneflot A, Aarø L, Aase H, Reichborn-Kjennerud T, Tambs K, Øverland S, ed. NIPH. Psykisk helse i Norge [report]. Oslo: Norwegian Institute of Public Health; 2018. Retrieved from: <https://www.fhi.no/publ/2018/psykisk-helse-i-norge/>
24. Lofthus CM, Osnes EK, Falch JA, Kaastad TS, Kristiansen IS, Nordsletten L, et al. Epidemiology of hip fractures in Oslo, Norway. *Bone* 2001;29(5):413-8.
25. Slatkowsky-Christensen B, Grotle M. Artrose i Norge. *Norsk Epidemiol* 2008;18(1):99-106.
26. Omstand TK, Magnus JH. Forecasting the burden of future postmenopausal hip fractures. *Osteoporosis international : a journal established as result of cooperation between the European Foundation for Osteoporosis and the National Osteoporosis Foundation of the USA* 2014;25(10):2493-6.
27. Silverwood V, Blagojevic-Bucknall M, Jinks C, Jordan JL, Protheroe J, Jordan KP. Current evidence on risk factors for knee osteoarthritis in older adults: a systematic review and meta-analysis. *Osteoarthritis and cartilage* 2015;23(4):507-15.
28. Kessler RC, Amminger GP, Aguilar-Gaxiola S, Alonso J, Lee S, Ustun TB. Age of onset of mental disorders: a review of recent literature. *Curr Opin Psychiatry* 2007;20(4):359-64.
29. Utviklingen i uførediagnoser per 31. desember 2014. NAV statistikknotat [press release]. 2017.
30. Mykletun A, Øverland S. Mentale lidelser undervurderes som årsak til uføretrygning. *Tidsskrift for Norsk Lægeforening* 2006;126(11).
31. Knudsen AK, Overland S, Aakvaag HF, Harvey SB, Hotopf M, Mykletun A. Common mental disorders and disability pension award: Seven year follow-up of the HUSK study. *J Psychosom Res* 2010;69(1):59-67.
32. NIPH. Legemiddelbrukere 0-74 år [database]. Oslo, [Norhealth statistics bank](https://bit.ly/2JYpY2z): <https://bit.ly/2JYpY2z> Norwegian Institute of Public Health 2018.
33. Regier DA, Farmer ME, Rae DS, Locke BZ, Keith SJ, Judd LL, et al. Comorbidity of mental disorders with alcohol and other drug abuse. Results from the Epidemiologic Catchment Area (ECA) Study. *Jama* 1990;264(19):2511-8.
34. Conway KP, Swendsen J, Husky MM, He JP, Merikangas KR. Association of Lifetime Mental Disorders and Subsequent Alcohol and Illicit Drug Use: Results From the National Comorbidity Survey-Adolescent Supplement. *Journal of the American Academy of Child and Adolescent Psychiatry* 2016;55(4):280-8.
35. Nasjonalt råd for ernæring. Kostråd for å fremme folkehelsen og forebygge kroniske sykdommer [report]. Oslo: Norwegian Directorate of Health; 2011. Retrieved from: <https://bit.ly/1Mr9mKC>
36. WCRF. Alcohol and cancer [internet page]. London, Great Britain: World Cancer Research Fund International [lest 6. May 2018]. Retrieved from: <https://bit.ly/2yluLd3>
37. NIPH. Mål og indikatorer for ikke-smittsomme sykdommer (NCD) - oversikt [internet page]. Oslo: Norwegian Institute of Public Health, 2017. Retrieved from: <https://www.fhi.no/nettpub/ncd/sammendrag/oversikt-indikatorer2/>
38. NIPH. Indikatorer for ikke-smittsomme sykdommer (NCD) [electronic publication]. Oslo: Norwegian Institute of Public Health; 2017. Retrieved from: <https://www.fhi.no/nettpub/ncd/kosthold/salt/>
39. Igland J, Vollset SE, Nygard OK, Sulo G, Ebbing M, Tell GS. Educational inequalities in acute myocardial infarction incidence in Norway: a nationwide cohort study. *PLoS One* 2014;9(9):e106898.
40. Mannsverk J, Wilsgaard T, Mathiesen EB, Lochen ML, Rasmussen K, Thelle DS, et al. Trends in Modifiable Risk Factors Are Associated With Declining Incidence of Hospitalized and Nonhospitalized Acute Coronary Heart Disease in a Population. *Circulation* 2016;133(1):74-81.
41. Cancer Registry. Cancer in Norway 2011: Nordmenn har den høyeste forekomsten av tykktarmskreft i Norden [internet page]. Oslo: Cancer Registry. Retrieved from: <https://bit.ly/2MCaJ15>
42. Cancer Registry. Årsrapport 2016 med resultater og forbedringstiltak fra Nasjonalt kvalitetsregister for lungekreft [report]. Oslo: Cancer Registry; 2017. Retrieved from: <https://bit.ly/2yqIxxk>
43. Rabe KF, Wedzicha JA, Wouters EFM, ed. COPD and Comorbidity Introduction 2013. *European Respiratory Monograph* 59. Retrieved from: <http://reader.erspublications.com/copd-and-comorbidity/2>

44. Leivseth L. Chronic obstructive pulmonary disease: lung function, respiratory symptoms, and mortality: the HUNT Lung Study 1995-97 [Doktoravhandling]. Trondheim: Norges teknisk-naturvitenskapelige universitet; 2013. Retrieved from: <http://bit.ly/2JVuoHC>
45. Strøm H, Selmer R, Birkeland KI, Schirmer H, Julsrud Berg T, Jenum AK, et al. No increase in new users of blood glucose-lowering drugs in Norway 2006-2011: a nationwide prescription database study. *BMC Public Health* 2014;14:520.
46. NIPH. Alkohol, narkotika og folkehelse [internet page]. Folkehelseprofiler for kommunene, Oslo: Norwegian Institute of Public Health. Retrieved from: <https://www.fhi.no/hn/helse/alkohol-og-narkotika/>
47. Rossow I, Mäkelä P, Kerr W. The collectivity of changes in alcohol consumption revisited. *Addiction* 2014;109(9):1447-55.
48. Norström T, Norström T, Ramstedt M, Norström T, Ramstedt M. Mortality and population drinking: a review of the literature. *Drug and alcohol review* 2005;24(6):537-47.
49. NIPH. Bruk av rusmidler blant 15–16-åringene. Resultater fra ESPAD 1995-2015 [report]. Oslo: Norwegian Institute of Public Health; 2017. 06.2017. Retrieved from: <https://www.fhi.no/publ/2017/bruk-av-rusmidler-blant-15-16-aringer/>
50. Norwegian Directorate of Health. Utviklingen i norsk kosthold 2016 [report]. Oslo: Norwegian Directorate of Health. Retrieved from: <http://bit.ly/2I1WI9o>
51. Norwegian Directorate of Health. Utviklingen i norsk kosthold 2017 [report]. Oslo: Norwegian Directorate of Health; 2017. Retrieved from: <http://bit.ly/2LZQysM>
52. Öberg J, Jorde R, Almas B, Emaus N, Grimnes G. Vitamin D deficiency and lifestyle risk factors in a Norwegian adolescent population. *Scand J Public Health* 2014;42(7):593-602.
53. Nasjonalt råd for ernæring. Risiko for jodmangel i Norge: Identifisering av et akutt behov for tiltak [report]. Oslo: Norwegian Directorate of Health; 2016. Retrieved from: <http://bit.ly/2JZ33Yu>
54. Brantsæter AL, Knutsen HK, Johansen NC, Nyheim KA, Erlund I, Meltzer HM, et al. Inadequate Iodine Intake in Population Groups Defined by Age, Life Stage and Vegetarian Dietary Practice in a Norwegian Convenience Sample. *Nutrients* 2018;10(2).
55. Kolle E, ed. Norwegian Directorate of Health. Fysisk aktivitet blant 6-, 9- og 15-åringene i Norge: resultater fra en kartlegging i 2011 [report]. Oslo: Norwegian Directorate of Health; 2012. Retrieved from: <http://bit.ly/2MBXoWP>
56. Norwegian Directorate of Health. Fysisk aktivitetsnivå blant voksne og eldre i Norge: oppdaterte analyser basert på nye nasjonale anbefalinger i 2014 [report]. Oslo: Norwegian Directorate of Health; 2014. Retrieved from: <http://bit.ly/2JVwkOx>
57. Norwegian Directorate of Health. Fysisk aktivitet og sedatid blant voksne og eldre i Norge: Nasjonal kartlegging 2014-2015 [report]. Oslo: Norwegian Directorate of Health; 2015. Retrieved from: <http://bit.ly/2t4DKKK>
58. Norwegian Directorate of Health. Fysisk aktivitet; omfang, tilrettelegging og sosial ulikhet [report]. Oslo: Norwegian Directorate of Health; 2017. Retrieved from: <http://bit.ly/2ymndH2>
59. Ekelund U, Steene-Johannessen J, Brown WJ, Fagerland MW, Owen N, Powell KE, et al. Does physical activity attenuate, or even eliminate, the detrimental association of sitting time with mortality? A harmonised meta-analysis of data from more than 1 million men and women. *Lancet* 2016;388(10051):1302-10.
60. NIPH. Overvekt og fedme, 8-åringene [database]. Oslo: Norwegian Institute of Public Health, 2017. Retrieved from [Norhealth](http://www.norhealth.no): <https://bit.ly/2lhBjAo>
61. Krokstad S, Knudtsen M.S, ed. HUNT forskningssenter. Folkehelse i endring. Helseundersøkelsen Nord-Trøndelag. HUNT 1 (1984-86) – HUNT 2 (1995-97) – HUNT 3 (2006-08) [report]. Levanger: Institutt for samfunnsmedisin, Det medisinske fakultet, NTNU; 2011. Retrieved from: <http://bit.ly/2JVwx6h>
62. Evensen E, Emaus N, Kokkvoll A, Wilsgaard T, Furberg AS, Skeie G. The relation between birthweight, childhood body mass index, and overweight and obesity in late adolescence: a longitudinal cohort study from Norway, The Tromsø Study, Fit Futures. *BMJ Open* 2017;7(6):e015576.
63. Jacobsen BK, Aars NA. Changes in body mass index and the prevalence of obesity during 1994-2008: repeated cross-sectional surveys and longitudinal analyses. The Tromsø Study. *BMJ Open* 2015;5(6):e007859.
64. Midthjell K, Lee CM, Langhammer A, Krokstad S, Holmen TL, Hveem K, et al. Trends in overweight and obesity over 22 years in a large adult population: the HUNT Study, Norway. *Clinical obesity* 2013;3(1-2):12-20.

65. Heiervang E, Stormark KM, Lundervold AJ, Heimann M, Goodman R, Posserud MB, et al. Psychiatric disorders in Norwegian 8- to 10-year-olds: an epidemiological survey of prevalence, risk factors, and service use. *Journal of the American Academy of Child and Adolescent Psychiatry* 2007;46(4):438-47.
66. Wichstrøm L, Berg-Nielsen TS, Angold A, Egger HL, Solheim E, Sveen TH. Prevalence of psychiatric disorders in preschoolers. *Journal of child psychology and psychiatry, and allied disciplines* 2012;53(6):695-705.
67. NIPH. Barnevaksinasjonsprogrammet i Norge [report]. Oslo: Norwegian Institute of Public Health; 2017. Retrieved from: <https://www.fhi.no/publ/2017/barnevaksinasjonsprogrammet-i-norge/>
68. Cancer Registry. Cancer in Norway 2016 - Cancer incidence, mortality, survival and prevalence in Norway [report]. Oslo: Cancer Registry of Norway; 2017. Retrieved from: <http://bit.ly/2M2x1rY>
69. Statistics Norway. Helseforhold: Levekårsundersøkelsen 2015 [database]. Oslo: Statistics Norway. Retrieved from: <https://www.ssb.no/helse/statistikker/helseforhold>
70. Brunborg H. Increasing life expectancy and the growing elderly population. *Norsk Epidemiologi* 2012;22(2):75-83.
71. Llewellyn DJ, Matthews FE. Increasing levels of semantic verbal fluency in elderly English adults. *Neuropsychology, development, and cognition Section B, Aging, neuropsychology and cognition* 2009;16(4):433-45.
72. Christensen K, Thinggaard M, Oksuzyan A, Steenstrup T, Andersen-Ranberg K, Jeune B, et al. Physical and cognitive functioning of people older than 90 years: a comparison of two Danish cohorts born 10 years apart. *Lancet* 2013;382(9903):1507-13.
73. Matthews FE, Stephan BC, Robinson L, Jagger C, Barnes LE, Arthur A, et al. A two decade dementia incidence comparison from the Cognitive Function and Ageing Studies I and II. *Nature communications* 2016;7:11398.
74. Langa KM, Larson EB, Crimmins EM, Faul JD, Levine DA, Kabeto MU, et al. A Comparison of the Prevalence of Dementia in the United States in 2000 and 2012. *JAMA internal medicine* 2017;177(1):51-8.
75. Fors S, Lennartsson C, Agahi N, Parker MG, Thorslund M. Interview study on the living conditions of the very old. Elderly acquire more health problems, but they manage everyday life better. *Lakartidningen* 2013;110(32-33):1403-5.
76. Parker MG, Thorslund M. Health trends in the elderly population: getting better and getting worse. *The Gerontologist* 2007;47(2):150-8.
77. Freedman VA, Wolf DA, Spillman BC. Disability-Free Life Expectancy Over 30 Years: A Growing Female Disadvantage in the US Population. *American journal of public health* 2016;106(6):1079-85.
78. Kingston A, Wohland P, Wittenberg R, Robinson L, Brayne C, Matthews FE, et al. Is late-life dependency increasing or not? A comparison of the Cognitive Function and Ageing Studies (CFAS). *Lancet* 2017.
79. Beard JR, Officer A, de Carvalho IA, Sadana R, Pot AM, Michel J-P, et al. The World report on ageing and health: a policy framework for healthy ageing. *The Lancet* 2016;387(10033):2145-54.
80. Engdahl B, Tambs K, Borchgrevink HM, Hoffman HJ. Screened and unscreened hearing threshold levels for the adult population: results from the Nord-Trøndelag Hearing Loss Study. *Int J Audiol* 2005;44(4):213-30.
81. Selbæk G, Kirkevold Ø, Engedal K. The prevalence of psychiatric symptoms and behavioural disturbances and the use of psychotropic drugs in Norwegian nursing homes. *Int J Geriatr Psychiatry* 2007;22(9):843-9.
82. Bergh S, Holmen J, Saltvedt I, Tambs K, Selbæk G. Dementia and neuropsychiatric symptoms in nursing-home patients in Nord-Trøndelag County. *Tidsskr Nor Legeforen* 2012;132(17):1956-9.
83. Livingston G, Sommerlad A, Orgeta V, Costafreda SG, Huntley J, Ames D, et al. Dementia prevention, intervention, and care. *The Lancet* 2017;390(10113):2673-734.
84. NOVA. NorLag: Den norske studien av livsløp, aldring og generasjon. OsloMet (Høgskolen i Oslo og Akershus) 2017.
85. Hansen T, Slagsvold B. The East–West divide in late-life depression in Europe: Results from the Generations and Gender Survey. . *Scandinavian Psychologist*, 4, e4 2017.
86. Solhaug HI, Romuld EB, Romild U, Stordal E. Increased prevalence of depression in cohorts of the elderly: an 11-year follow-up in the general population - the HUNT study. *Int Psychogeriatr* 2012;24(1):151-8.
87. Rønning; M, Berg; C, Blix; HS, Devold; HM, Litleskare; I, Mahic; M, et al., ed. NIPH. Reseptregisteret 2007–2011 / The Norwegian Prescription Database 2007–2011. Tema: Legemidler og eldre. Oslo: Norwegian Institute of Public Health; 2012. Legemiddelstatistikk. Retrieved from: <http://bit.ly/2HYg7Im>

88. Statistics Norway. Nøkkeltall for innvandring og innvandrere [database]. Oslo: Statistics Norway 2018. Retrieved from: <http://bit.ly/2tekyJP>
89. Statistics Norway. Innvandreres bruk av fastlege, etter alder og landbakgrunn [database]. Oslo-Kongsvinger: Statistics Norway 2018. Retrieved from: <http://bit.ly/2HXdHKd>
90. Straiton ML, Reneflot A, Diaz E. Mental Health of Refugees and Non-refugees from War-Conflict Countries: Data from Primary Healthcare Services and the Norwegian Prescription Database. *J Immigr Minor Health* 2016.
91. Jakobsen M, Demott MAM, Heir T. Prevalence of psychiatric disorders among unaccompanied asylum-seeking adolescents in Norway. *Clin Pract Epidemiol Ment Health* 2014;10:53-8.
92. Jensen TK, Fjermestad KW, Granly L, Wilhelmsen NH. Stressful life experiences and mental health problems among unaccompanied asylum-seeking children. *Clinical child psychology and psychiatry* 2015;20:106-16.
93. Jenum AK, Diep LM, Holmboe-Ottesen G, Holme IM, Kumar BN, Birkeland KI. Diabetes susceptibility in ethnic minority groups from Turkey, Vietnam, Sri Lanka and Pakistan compared with Norwegians - the association with adiposity is strongest for ethnic minority women. *BMC Public Health* 2012;12:150.
94. Jenum AK, Morkrid K, Sletner L, Vangen S, Torper JL, Nakstad B, et al. Impact of ethnicity on gestational diabetes identified with the WHO and the modified International Association of Diabetes and Pregnancy Study Groups criteria: a population-based cohort study. *European journal of endocrinology / European Federation of Endocrine Societies* 2012;166(2):317-24.
95. Hjerkind KV, Qureshi SA, Moller B, Weiderpass E, Deapen D, Kumar B, et al. Ethnic differences in the incidence of cancer in Norway. *International journal of cancer* 2017;140(8):1770-80.
96. Rabanal KS, Lindman AS, Selmer RM, Aamodt G. Ethnic differences in risk factors and total risk of cardiovascular disease based on the Norwegian CONOR study. *European journal of preventive cardiology* 2013;20:1013-21.
97. Rabanal KS, Selmer RM, Igland J, Tell GS, Meyer HE. Ethnic inequalities in acute myocardial infarction and stroke rates in Norway 1994-2009: a nationwide cohort study (CVDNOR). *BMC Public Health* 2015;15:1073.
98. Statistics Norway. Levekår blant innvandrere i Norge 2016 [report]. Oslo-Kongsvinger: Statistics Norway; 2017.
99. Eggemoen AR, Knutsen KV, Dalen I, Jenum AK. Vitamin D status in recently arrived immigrants from Africa and Asia: a cross-sectional study from Norway of children, adolescents and adults. *BMJ Open* 2013;3:e003293.
100. Blystad H (editor), ed. NIPH. Smittevernveileder for helsepersonell [electronic publication]. Oslo: Norwegian Institute of Public Health; 2016. Retrieved from: <http://www.fhi.no/publikasjoner-og-haandboker/smittevernveileder>
101. Øia T, ed. NOVA. Ung i Oslo 2012: Nøkkeltall [Notat]. Oslo: NOVA; 2012. 7/2012. Retrieved from: <http://bit.ly/2t4oA8b>
102. Norwegian Directorate of Health. Gradientutfordringen. Sosial- og helsedirektoratets handlingsplan mot sosiale ulikheter i helse. [report]. Oslo: Norwegian Directorate of Health; 2005.
103. Huisman M, Kunst AE, Bopp M, Borgan JK, Borrell C, Costa G, et al. Educational inequalities in cause-specific mortality in middle-aged and older men and women in eight western European populations. *Lancet* 2005;365(9458):493-500.
104. Dahl E, Bergsli H, van der Wel KA. Sosial ulikhet i helse: En norsk kunnskapsoversikt (Hovedrapport). Oslo: Høgskolen i Oslo og Akershus; 2014. Retrieved from: <http://bit.ly/2t4Ffsm>
105. NOU 2009:10, kap 9 [report]. Oslo: Finansdepartementet 2009. Retrieved from: <https://www.regjeringen.no/no/dokumenter/nou-2009-10/id558836/sec1>
106. Bergsli H. Helse og frafall i videregående opplæring. Underlagsrapport til Sosial ulikhet i helse: En norsk kunnskapsoversikt [report]. Oslo: OsloMet, tidl. Høgskolen i Oslo og Akershus (HiOA); 2013. Retrieved from: <http://bit.ly/2lg00wQ>
107. Kravdal Ø. Large and Growing Social Inequality in Mortality in Norway: The Combined Importance of Marital Status and Own and Spouse's Education. *Population and Development Review* 2017;43(4):645-65.
108. Kinge JM, Steingrimsdottir OA, Moe JO, Skirbekk V, Naess O, Strand BH. Educational differences in life expectancy over five decades among the oldest old in Norway. *Age and ageing* 2015;44(6):1040-5.
109. Steingrimsdottir OA, Naess O, Moe JO, Groholt EK, Thelle DS, Strand BH, et al. Trends in life expectancy by education in Norway 1961-2009. *European journal of epidemiology* 2012;27(3):163-71.
110. Kravdal O, Alvaer K, Baevre K, Kinge JM, Meisfjord JR, Steingrimsdottir OA, et al. How much of the variation in mortality across Norwegian municipalities is explained by the socio-demographic characteristics of the population? *Health & place* 2015;33:148-58.

111. Menvielle G, Kunst AE, Stirbu I, Strand BH, Borrell C, Regidor E, et al. Educational differences in cancer mortality among women and men: a gender pattern that differs across Europe. *British Journal Of Cancer* 2008;98:1012.
112. Strand BH, Steingrimsdottir OA, Groholt EK, Ariansen I, Graff-Iversen S, Naess O. Trends in educational inequalities in cause specific mortality in Norway from 1960 to 2010: a turning point for educational inequalities in cause specific mortality of Norwegian men after the millennium? *BMC Public Health* 2014;14:1208.
113. Bakke PS, Hanoa R, Gulsvik A. Educational level and obstructive lung disease given smoking habits and occupational airborne exposure: a Norwegian community study. *Am J Epidemiol* 1995;141(11):1080-8.
114. Johannessen A, Omenaas ER, Bakke PS, Gulsvik A. Implications of reversibility testing on prevalence and risk factors for chronic obstructive pulmonary disease: a community study. *Thorax* 2005;60(10):842-7.
115. Næss O, Claussen B, Thelle DS, Davey Smith G. Cumulative deprivation and cause specific mortality. A census based study of life course influences over three decades. *Journal of epidemiology and community health* 2004;58(7):599-603.
116. Igland J, Vollset SE, Nygard OK, Sulo G, Sulo E, Ebbing M, et al. Educational inequalities in 28 day and 1-year mortality after hospitalisation for incident acute myocardial infarction--a nationwide cohort study. *International journal of cardiology* 2014;177(3):874-80.
117. World Health Organization and Calouste Gulbenkian Foundation. *Social determinants of mental health*. Geneva: World Health Organization; Organization WH; 2014.
118. Anders Bakken, Lars Roar Frøyland, Mira Aaboén Sletten, ed. NOVA. *Sosiale forskjeller i unges liv. Hva sier Ungdata-undersøkelsene?* [report]. NOVA rapport 3/16. Oslo: NOVA; 2016.
119. Madsen C, Ohm E, Alver K, Grøholt EK, ed. NIPH. *Ulykkesskader i Oslo - Geografisk og sosial ulikhet i skader behandlet ved Oslo skadelegevakt* [report]. Oslo: Norwegian Institute of Public Health; 2017. Retrieved from: <https://www.fhi.no/publ/2017/ulykkesskader-i-oslo/>
120. Gregoraci G, van Lenthe FJ, Artnik B, Bopp M, Deboosere P, Kovacs K, et al. Contribution of smoking to socioeconomic inequalities in mortality: a study of 14 European countries, 1990-2004. *Tobacco control* 2017;26(3):260-8.
121. Norwegian Directorate of Health. *Sosial ulikhet i alkoholbruk og alkoholrelatert sykkelighet og dødelighet* [report]. Oslo: Norwegian Directorate of Health; 2016. Retrieved from: <http://bit.ly/2t6RaWu>
122. Pape H, Norström T, Rossow I. Adolescent drinking—a touch of social class? *Addiction* 2017;112(5):792-800.
123. Biehl A, Hovengen R, Groholt EK, Hjelmesaeth J, Strand BH, Meyer HE. Adiposity among children in Norway by urbanity and maternal education: a nationally representative study. *BMC Public Health* 2013;13:842.
124. Finnvold JE, ed. Norwegian Directorate of Health. *Likt for alle? Sosiale skilnader i bruk av helsetjenester* [report]. Oslo: Norwegian Directorate of Health; 2009. Retrieved from: <http://bit.ly/2LZDm7b>
125. Godager G, Iversen T, ed. University of Oslo. *Empirisk litteratur om sosial ulikhet i bruk av helsetjenester i Norge* [report]. Oslo, Institutt for Helse og samfunn: University of Oslo; 2013.
126. Kravdal H. Widening educational differences in cancer survival in Norway. *Eur J Public Health* 2014;24(2):270-5.
127. Skyrud KD, Bray F, Eriksen MT, Nilssen Y, Moller B. Regional variations in cancer survival: Impact of tumour stage, socioeconomic status, comorbidity and type of treatment in Norway. *International journal of cancer* 2016;138(9):2190-200.
128. Nilssen Y, Strand TE, Fjellbirkeland L, Bartnes K, Brustugun OT, O'Connell DL, et al. Lung cancer treatment is influenced by income, education, age and place of residence in a country with universal health coverage. *International journal of cancer* 2016;138(6):1350-60.
129. Sulo E, Nygard O, Vollset SE, Igland J, Sulo G, Ebbing M, et al. Coronary angiography and myocardial revascularization following the first acute myocardial infarction in Norway during 2001-2009: Analyzing time trends and educational inequalities using data from the CVDNOR project. *International journal of cardiology* 2016;212:122-8.
130. Sulo G, Nygard O, Vollset SE, Igland J, Ebbing M, Sulo E, et al. Higher education is associated with reduced risk of heart failure among patients with acute myocardial infarction: A nationwide analysis using data from the CVDNOR project. *European journal of preventive cardiology* 2016;23(16):1743-50.
131. Espenhein L, Alberg T, Holen Ø, Astrup E, Elstrøm P, Kacelnik O, et al., ed. NIPH. *ÅRSRAPPORT 2016: Helsetjenesteassosierte infeksjoner, antibiotikabruk (NOIS), antibiotikaresistens (MSIS) og Verdens håndhygienedag*. Oslo: Norwegian Institute of Public Health; 2017.

132. Meijerink H, White RA, Lovlie A, de Blasio BF, Dalgard O, Amundsen EJ, et al. Modelling the burden of hepatitis C infection among people who inject drugs in Norway, 1973-2030. *BMC Infectious Diseases* 2017;17 (1), 541.
133. Nilsen Ø, Blystad H, Kløvstad H, Barlind R. Blod- og seksuelt overførbare sykdommer i Norge 2016. Årsrapport. Delrapport 1 av smittsomme sykdommer i Norge 2016. Norwegian Institute of Public Health; 2017.
134. NIPH. MSIS-statistikk [database]. Oslo: Norwegian Institute of Public Health. Retrieved from: <http://www.msis.no/>
135. Jones KE, Patel NG, Levy MA, Storeygard A, Balk D, Gittleman JL, et al. Global trends in emerging infectious diseases. *Nature* 2008;451(7181):990-3.
136. Review on Antimicrobial Resistance. Antimicrobial Resistance: Tackling a crisis for the health and wealth of nations. The Review on Antimicrobial Resistance Chaired by Jim O'Neill [report]. UK: Review on Antimicrobial Resistance; 2014. Retrieved from: <http://bit.ly/2IX4E0H>
137. Souli M, Galani I, Antoniadou A, Papadomichelakis E, Poulakou G, Panagea T, et al. An outbreak of infection due to beta-Lactamase Klebsiella pneumoniae Carbapenemase 2-producing K. pneumoniae in a Greek University Hospital: molecular characterization, epidemiology, and outcomes. *Clinical infectious diseases: an official publication of the Infectious Diseases Society of America* 2010; 50(3): 364-73.
138. Størdal K, Mårild K, Blix HS. Bruk av antibiotika hos barn i perioden 2005 – 16. *Tidsskr Nor Lægeforen* 2017.
139. Landrigan PJ, Fuller R, Acosta NJR, Adeyi O, Arnold R, Basu NN, et al. The Lancet Commission on pollution and health. *Lancet* 2017.
140. WHO. The Public Health Impact of Chemicals: Knowns and Unknowns. 2016.
141. Miljødirektoratet. Støy [internet page]. Oslo: Miljødirektoratet 2017. Retrieved from: <http://www.miljostatus.no/tema/stoy/>
142. Statistics Norway. Støyeksponering og støyplage i Norge 1999 – 2014: Flere nordmenn utsatt for støy [internet page]. Oslo: Statistics Norway, 2016. Retrieved from: <http://bit.ly/2HZyn49>
143. WHO, European Commission. Burden of disease from environmental noise: Quantification of healthy life years lost in Europe [report]. Bonn: World Health Organization; 2011. Retrieved from: <http://www.euro.who.int>
144. Basner M, Clark C, Hansell A, Hileman JJ, Janssen S, Shepherd K, et al. Aviation noise impacts: State of the science. *Noise & Health* 2017; 19(87): 41-50.
145. Krog NH, Engdahl B, Tambs K. The association between tinnitus and mental health in a general population sample: results from the HUNT Study. *J PsychosomRes* 2010; 69(3): 289-98.
146. Lie A, Skogstad M, Tynes T, Johannessen HA, Nordby K-C, Mehlum IAS, et al., ed. STAMI. Støy i arbeidslivet og helse [report]. Oslo: Statens arbeidsmiljøinstitutt (STAMI); 2013. 14. Retrieved from: <http://bit.ly/2K3RBuI>
147. WHO. WHO calls for urgent action to protect health from climate change [internet page]. Geneva, Switzerland: World Health Organization [lest 3. mai 2018]. Retrieved from: <http://www.who.int/globalchange/global-campaign/cop21/en/>
148. Core Writing Team, Pachauri. RK, Meyer. LA, ed. IPCC. Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Geneva, Switzerland: Intergovernmental Panel on Climate Change (IPCC); 2014. Retrieved from: <http://www.ipcc.ch/report/ar5/>
149. NKSS. Klima i Norge 2100: Kunnskapsgrunnlag for klimatilpasning [report]. Oslo: Norsk Klimaservicesenter (NKSS); 2015. Retrieved from: <http://bit.ly/2t5QrVN>
150. Vitenskapskomiteen for mattrygghet; VKM. [Risikovurdering av mykotoksiner \(soppgifter\) i korn](#) [report] Rapportnr: 2013:21. Retrieved from: <http://bit.ly/2I673Bu>

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