Carrying the Weight

Societal costs and challenges associated with back and neck complaints in Norway, the most important cause of disability and work absenteeism

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Norwegian Chiropractors' Association

The Norwegian Chiropractors' Association (NCA) was established in 1935 and is the only practitioner organization for chiropractors in Norway. NCA represents about 85 percent of all the country's practicing chiropractors. Chiropractors in Norway are public health professionals with the right to examine, diagnose, treat, refer to specialist care and provide sick leave. One of the main tasks of the NCA is to actively contribute to research and science-based knowledge dissemination on musculoskeletal health to its members and the general population, as well as various decision makers and public authorities.

NCA is the principal for the work. The work is funded by the European Chiropractors' Union (ECU) and the Norwegian Chiropractors' Continuing Education Fund.

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Summary

Each year, about 1.2 million Norwegians are affected by back and neck pain – most of these people are of working age, and more than half are women. Low back and neck pain are the main causes of years lived with disability in Norway, and the value of this health loss is estimated at NOK 165 billion. The conditions also constitute the main causes of absence in the workplace; the value of lost production amounts to NOK 50 billion. Back and neck complaints also pose a burden on the health care sector, and costs NOK 8.7 billion annually. They entail a considerable burden for patients, their relatives, employers, and the welfare system. There is a need for research-based knowledge on how to improve the diagnosis, treatment, and prevention of low back and neck pain in Norway.

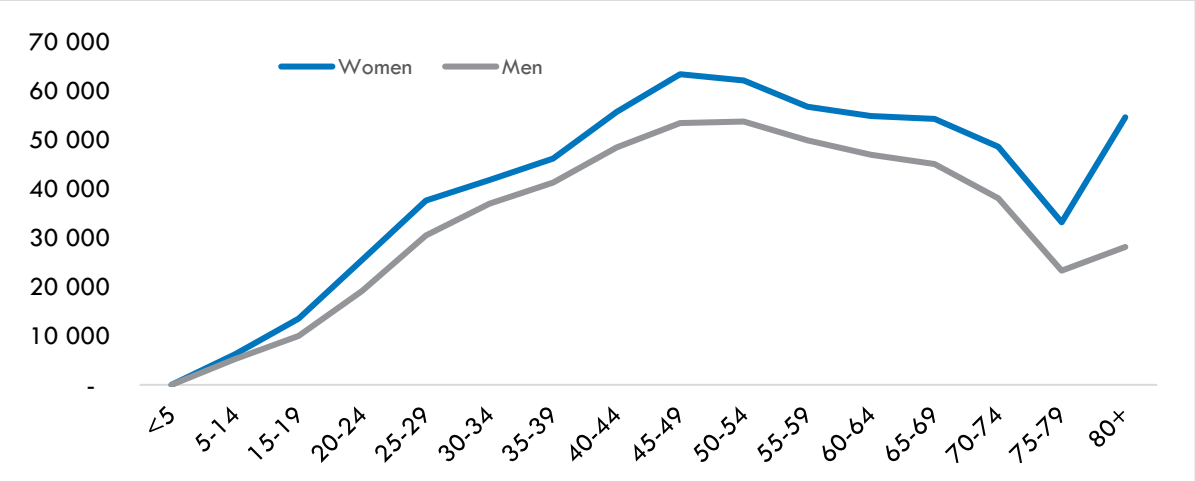
There is a need for a better understanding of the consequences of back and neck complaints

Back and neck complaints are widespread in the population and involve reduced functioning, pain, and reduced quality of life. Several studies have evaluated patient characteristics, treatment, and disease burden for the entire musculoskeletal area (Ihlebæk, et al., 2010; Lærum, et al., 2013). Approximately 1.2 million people are affected by low back and neck pain, and these conditions account for about 85 percent of people with musculoskeletal disorders (Global Burden of Disease, 2018). These factors alone imply that there is a need for an analysis that exclusively evaluates back and neck pain.

The purpose of the analysis is to increase the evidence related to patients with back and neck pain, their burden of disease, health care utilization and costs, as well as elucidate the impact of these conditions on absence from work and consequences for the Norwegian Labour and Welfare Administration (NAV). The analyses are based on existing research literature, registry data, and publicly available statistics. Registry-based analyses are based on information from the Norwegian Health Economics Administration (Helfo), the Norwegian Control and Distribution of Health Reimbursement Database (KUHR), the Norwegian Patient Registry (NPR), NAV, and Statistics Norway.

There is no clear definition of low back or neck complaints. In this analysis, we decided not to include back and neck complaints related to cancer, infections or rheumatic diseases outside the spine that are not directly associated with the back, or the neck. The estimates are therefore considered conservative.

Figure 1: Number of people with low back and neck pain, by age and gender, 2017



Data source: Global Burden of Disease Study

Most people are affected by low back and neck pain during their lifetime

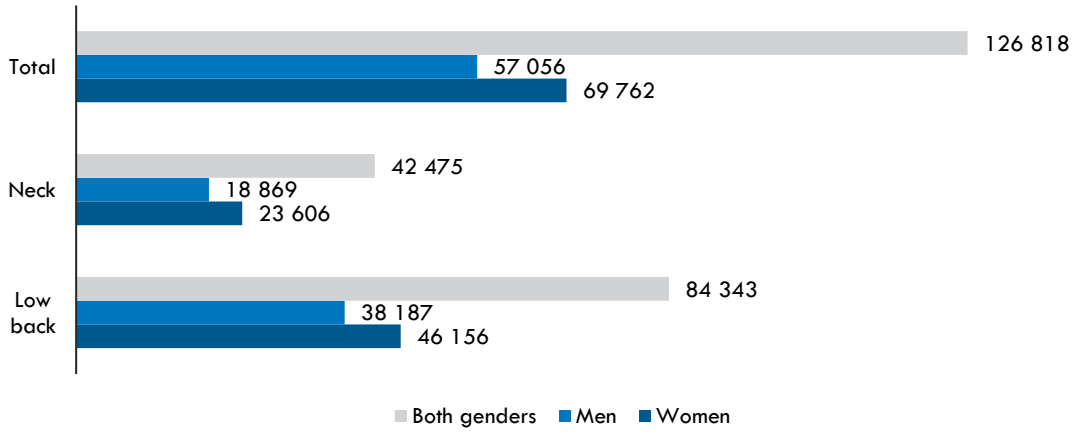
The cause of back and neck complaints is often unknown, and/or due to composite factors (Helsenorge, 2017). These can include biological, psychological, and social factors (Hartvigsen, et al., 2018). In addition, the type of work, or conditions, at the workplace constitute key risk factors for the development of back and neck disorders. Data from the Norwegian Survey on Income and Living Conditions (STAMI, NOA (SSB, LKU-A 2016), 2016) show that the prevalence of neck and shoulder pain amounts to about 40 percent in 2015, while the prevalence of

back pain was 37 percent in the same year. Back and neck pain is more common among women than among men; in the same survey, 50 percent of women reported that they experienced neck and shoulder pain, compared to 34 percent of men. For back pain, the proportion was 40 percent of women and 34 percent of men. The Global Burden of Disease Study estimates that nearly 1.2 million Norwegians were affected by low back and neck pain in 2017; around 650,000 women and 530,000 men. The incidence was highest in the 45-49 age group for both genders (Figure 1).

Low back and neck pain are the leading causes of years lived with disability in Norway

The Global Burden of Disease Study has estimated that the number of years lived with disability for people with low back and neck pain amounts to about 120,000 disability-adjusted life-years. This accounts for 82 percent of years lived with disability among musculoskeletal disorders overall, and 17 percent of the total number of years lived with disability in Norway. Low back and neck pain are thus the leading causes of years lived with disability in Norway.

Figure 2: Years lived with disability due to low back and neck pain in Norway, by gender, 2017



Data source: Global Burden of Disease study

People with low back and neck complaints are less likely to be part of the labor force

Prolonged or chronic back or neck pain constitutes a considerable burden for the patient, their next-of-kin, and society at large. For many patients, this type of pain has a considerable impact on their ability to work. People with back and neck complaints may find it more difficult to stay at work, while some fall out of work. This implies a production loss for society (i.e., a socioeconomic cost).

We identified a total of 149,820 unique patients on sick leave due to back and neck conditions during 2018, of which 77,971 were women and 71,849 men. A total of NOK 3.4 billion was paid in work assessment allowance for people with back and neck complaints in 2018. The annual expenditure on disability benefits for people with back and neck complaints amounted to NOK 7.8 million in 2015. In addition to absence from work, some employees with back and neck complaints are less productive when they are at work (e.g. because they produce less than what they could otherwise have done within a given time frame).

Health care services and welfare benefits

The use of health care services by people with low back and neck pain may involve the use of diagnostics, treatment, follow-up, rehabilitation, use of various aids, and assistance for ergonomic measures. Thus, back and neck complaints result in costs to the formal health care service, including primary care services (general practitioners and emergency services), physiotherapy, chiropractic services; as well as to the specialist health service (private practitioners and somatic hospitals).

Just under half a million people were in contact with the general practitioner/emergency ward health services during 2018. In the same year, about 145,000 people were in contact with a physiotherapist (with reimbursement from Helfo), 285,000 people were in contact with a chiropractor and more than 70,000 people were in contact with the specialist health service. More than 360,000 diagnostic imaging examinations related to back and neck complaints were carried out. Contacts with the health care service also entail a considerable cost for patients in terms of time and travel; about 11.8 million hours were spent in 2018.

Low back and neck complaints result in considerable costs for the patient, the health care service and society

Overall, low back and neck pain accounted for almost 126,818 disability-adjusted life years lost. Measured in NOK, this health loss amounts to NOK 165 (120-230) billion. Production loss due to sick leave, social security benefits, and reduced productivity for those who are still at work, amount to NOK 50 (46 -62) billion. The total health care costs associated with the diagnosis, treatment, and follow-up of patients with back and neck conditions are estimated at NOK 8.7 billion.

Back and neck complaints constitute a major challenge for the society

As this report highlights, low back and neck complaints have considerable consequences for patients, their next-of-kin, employers, and society in general. All relevant measures that can improve quality of life for patients suffering from these conditions should be considered and systematically evaluated. There is a need for evidence-based knowledge on how to improve diagnosis, treatment, and prevention of low back and neck pain in Norway.

Various forms of professional absenteeism entail a considerable cost for society. The employer can contribute by facilitating tailored work tasks and ways of organizing the work. Authorities should design tax and social security schemes in such a way that the individual is motivated to work when possible. A workplace to go to provides meaningful tasks and important social arenas. It is of great value for the individual to limit the length of their sick leave, since it can otherwise lead to persistent exclusion from the labor force.

The health service can contribute with correct and timely diagnosis and evidence-based treatment. It will be crucial to implement relevant measures to ensure that individuals can be able to recover from their back and neck complaints, and that sick leave is only provided when it is medically necessary. In recent years, the health service has increasingly focused on preventive measures as well. It will be important to strengthen preventive measures for low back and neck conditions, which mainly include lifestyle measures such as smoking cessation, physical activity, and a healthy diet.

1. Need for a better understanding of the consequences of low back and neck pain

It is well known that musculoskeletal disorders are the main cause of reduced health and work absenteeism in Norway. Earlier studies show that these conditions affect most people and are cost the most (Ihlebæk, et al., 2010; Lærum, et al., 2013). The majority, 85 percent of patients in this group, are affected by low back and neck pain.

The cause of low back and neck problems is complex and often unknown. Better knowledge about the causes of low back and neck conditions is important, not only as a basis for prevention and treatment for the individual patient but also to elucidate needs and opportunities from a societal perspective.

1.1 Study objective and methods

Low back and neck pain are widespread, reduce productivity, and result in reduced quality of life. Several studies, supported by the "Bone and Joint Decade" (currently called the Global Alliance for Musculoskeletal Health), have highlighted characteristics of patients, treatment and disease burden for the entire musculoskeletal area (see, inter alia (Ihlebæk, et al., 2010; Lærum, et al., 2013).

Low back and neck pain affect about 1.2 million people (Global Burden of Disease, 2018). This alone suggests that there is a need for analyzing back and neck complaints separately from other musculoskeletal disorders. As we go in-depth with registry data, we have not included low back and neck conditions caused by cancer and infections, or rheumatic diseases outside the spine that are not directly associated with low back and neck conditions.

Both physical and psychosocial conditions at the workplace may cause low back and neck pain. The connection between these factors is complex, and follow-up by the health service, the welfare service, and the employer seem to be very different, and often fragmented, with limited coordination between different levels of healthcare, professions, and educational programs.

The purpose of this analysis is to get a better understanding of patients with back and neck complaints, their burden of disease, health care utilization and associated costs, as well as elucidate the impact on work absenteeism and consequences for NAV.

The analysis illustrates that treatment costs and the value of lost production result in substantial costs, driven mainly by the fact that so many people are affected by low back and neck pain. This implies that we should consider all relevant measures that can contribute to better lives for those who are affected and reduce the burden on the welfare and health systems.

The analysis is based on existing research literature, registry data, and publicly available statistics. Data sources include the Helfo, KUHR, NPR, NAV, and Statistics Norway.

Estimates of the incidence of low back and neck complaints, and their associated health reductions, are based on the Global Burden of Disease Study (GBD), which are adapted to the Norwegian context by the Center for Disease Burdens at the Norwegian Institute of Public Health.

GBD estimates are based on scientific papers on disease occurrence and questionnaires, such as health and living conditions surveys. The GBD uses the following ICD codes for the definition of low back and neck pain: ICD-10 codes M54.3, M54.4, and M54.5 (ICD-9 code: 724) for low back pain, and M54.2 (ICD-9 code: 723.1) for neck pain.

Oslo Economics is responsible for the interpretation and presentation of the data provided. For some areas, we did not have access to diagnosis-specific data. In these cases, we present simplified estimates based on various key figures. These estimates are associated with considerable uncertainty yet are still useful to illustrate resource use.

The report has been prepared on behalf of the Norwegian Chiropractors' Association.

2. Most people are affected by low back and neck pain during life

Most people are affected by low back or neck pain during life. Population surveys and studies suggest that about 1.2 million Norwegians are affected by this each year, and about 40 percent report having been affected during the last month. The conditions are more common among women than men. The cause of back and neck conditions is often unknown and/or complex. Key risk factors include workplace conditions, physical and mental health, smoking, obesity, and physical inactivity.

2.1 What is meant by low back and neck pain?

Musculoskeletal disorders include many different types of pain and conditions. This includes pain in the back, the neck, osteoporosis, osteoporotic fractures, and rheumatic diseases (Ørstavik, et al., 2018). Low back and neck pain accounts for the largest proportion of people with musculoskeletal disorders; in the GBD study (described in section 3.2), people with low back and neck conditions accounted for 84 percent of all people with musculoskeletal disorders in Norway (Øverland, et al., 2018).

There are various definitions of what constitutes back and neck conditions. According to the Norwegian Medical Encyclopedia, back pain is a collective term for pain that is based on the vertebrae, intervertebral discs, spinal cord, nerves, tendons, or ligaments. Norwegian Health Informatics defines neck pain as pain in the neck region (upper back, upwards towards the head and out towards the shoulders). More specifically, neck pain can be defined as pain located in bony structures, joints, and muscles between the back of the head and the seventh neck vertebra, including the muscles behind the oblique neck muscle (Lærum, et al., 2013).

In the GBD study, there is a distinction between low back and neck pain and other musculoskeletal disorders (Øverland, et al., 2018). In this study, low back pain is defined as pain in the low back (with or without radiating pain in one or both legs) that lasts for at least one day. Neck pain is defined as pain in the neck (with or without radiating pain in the arms) that lasts for more than one day.

There is no well-defined distinction between conditions that should and should not be considered as low back and neck conditions. In this analysis, we have not included low back and neck conditions caused by cancer and infections, or rheumatic diseases outside the spine that are not directly associated with low back and neck conditions as defined above.

Figure 2-1: The spinal cord and location of back and neck pain.

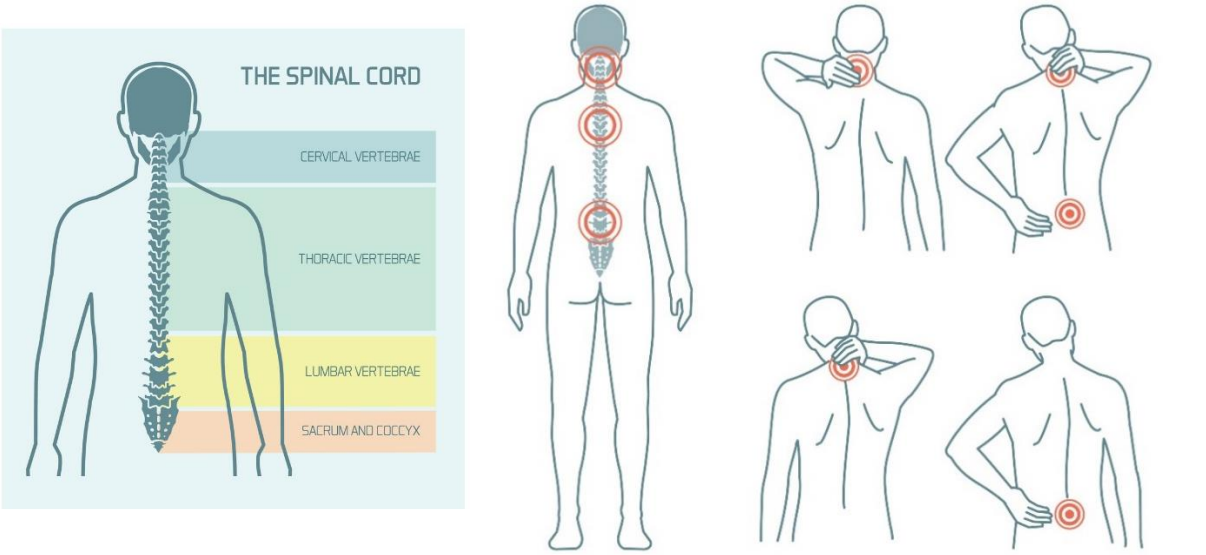


Illustration: iStockphoto.com

2.2 Common back and neck conditions and their causes

The cause of low back and neck conditions is often unknown and/or a composite of multiple factors (Helsenorge, 2017). Conditions can be acute, recurring, or chronic, and result in varying degrees of pain (Health Care, 2017). Low back pain can emerge from all the back structures, including vertebrae, intervertebral discs, spinal cord and nerves, tendons, ligaments, and muscles. Similarly, pain can occur in all the structures of the neck, consisting of seven vertebrae with intervertebral discs (Norsk Helseinformatikk, 2017).

Acute or persistent low back pain (acute/chronic lumbago) are common conditions, which, according to the Norwegian Medical Encyclopedia, account for more than 80 percent of cases of back pain. Lumbago is referred to as non-specific back pain as the pain in most cases cannot be linked to a particular disease or pain from nerve roots. This is different from specific back pain caused by trauma or nerve root pain.

Examples of other causes of back pain are (Helsenorge, 2017):

- Pulling of back muscles (e.g., due to heavy lifting)
- Wear and tear in the back (often in connection with the intervertebral discs drying out due to old age) – spondylosis
- Collapse of vertebrae due to osteoporosis
- Damage to the intervertebral discs – disc bulge or herniation
- Skewed back (scoliosis)
- Rheumatic diseases (e.g., Bechterew's disease – ankylosing spondylitis)

In addition, a wide range of other conditions and diseases may cause back pain, such as metastatic cancer.

Examples of common causes of neck pain are (Norsk Helseinformatikk, 2017):

- Tight and sore neck muscles, often due to workload, stress or vision problems
- Stress to the jaw (lack of movement in one or more of the neck joints)
- Disc herniation in the neck, caused by a bulging intervertebral disc that presses on the nerves
- Calcification of the neck (spondylosis), due to wear in the neck spine
- Whiplash, which is often caused by car collision
- Fibromyalgia

Examples of less frequent causes of neck pain are arthritis, ankylosing spondylitis, and rheumatic muscle inflammation.

2.2.1 Risk factors and prevention

Both biological, psychological, and social factors affect the risk of back and neck conditions (Hartvigsen, et al., 2018). In addition, systematic reviews show that lifestyle factors that generally cause poorer health, such as smoking (Shiri, et al., 2010), overweight (Zhang, et al., 2016; Shiri, et al., 2010) and physical inactivity (Shiri & Falah-Hassani, 2017), increase the risk of back pain. Studies also indicate that genetic factors affect the risk of low back pain (Hartvigsen, et al., 2009). Furthermore, aspects related to the work or the workplace constitute key risk factors for the development of back and neck conditions and are described in more detail in the next section.

Preventive measures thus involve facilitating good mechanical and psychosocial workplace conditions, as well as general measures to maintain good health, such as staying physically active, avoiding smoking, and keeping a healthy body weight.

Workplace conditions are key risk factors for back and neck conditions

Both physical and psychosocial conditions in the workplace may cause low back and neck pain. For example, working with arms raised above the head and working with a bent neck over a long period, can increase the risk of back and neck pain.

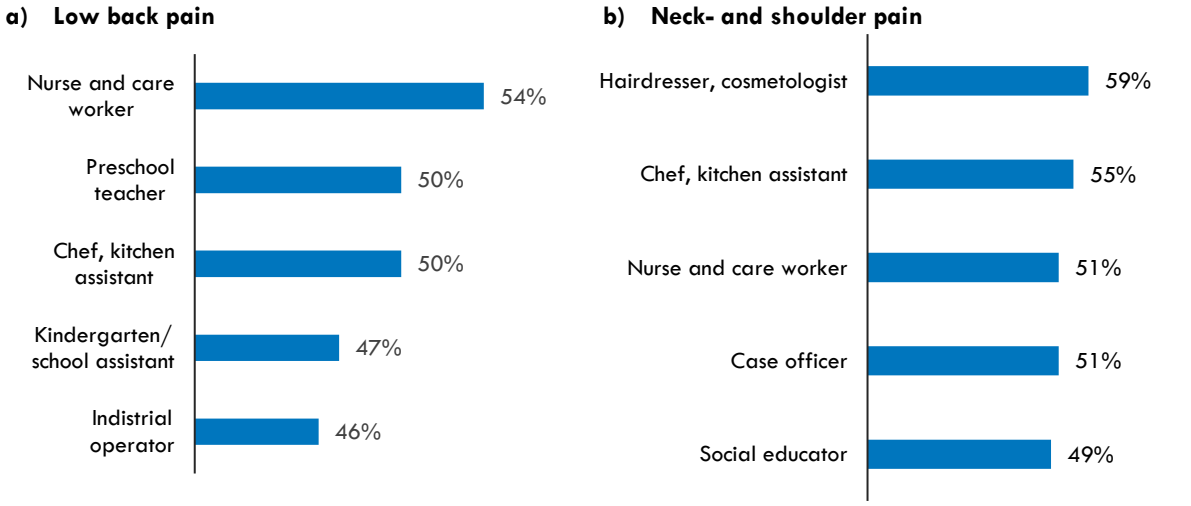
Studies based on data from the Norwegian Living Conditions Survey in 2006 and 2009 showed that conditions in the workplace were important risk factors for the development of back and neck pain. For example, a study from 2014 showed that the major risk factors for the development of neck and shoulder pain were high job requirements, low social support, and work involving inconvenient body positions and lifting, and that these factors accounted for 23 percent of all cases with severe neck and shoulder pain (Sterud, et al., 2014). Similarly, another study (Sterud & Tynes, 2013) showed that 42 percent of all cases of moderate to severe low back pain were related to different occupational exposures where the major mechanical risk factors for low back pain included lifting in uncomfortable positions, kneeling or squatting positions, as well as keeping a standing position most of the working day. Another study showed that increasing duration of work with the arms raised >60° and >90° during the working day was associated with shoulder pain (Hanvold, et al., 2013).

Regarding the importance of psychosocial factors for back and neck pain, a study (Christensen & Knardahl, 2010) identified the following as the most important risk factors; role conflict, low self-determination, and lack of authoritative management at work.

Figures from the Norwegian Living Conditions Survey show that some occupations are more susceptible to

back and neck pain than others. The occupations with the highest incidence of low back pain were nursing and care workers, preschool teachers, chef/kitchen assistants, kindergarten and school assistants, and industrial operators (Figure 2-2, panel a). In addition to chef/kitchen assistants and nursing and care workers, the occupations with the highest incidence of neck and shoulder pain constituted hairdresser/cosmetologist, case officer, and social educator (Figure 2-2, panel b).

Figure 2-2: Share of respondents reporting low back or neck pain among the five most affected occupations



Data source: STAMI, NOA (SSB, LKU-A 2016)

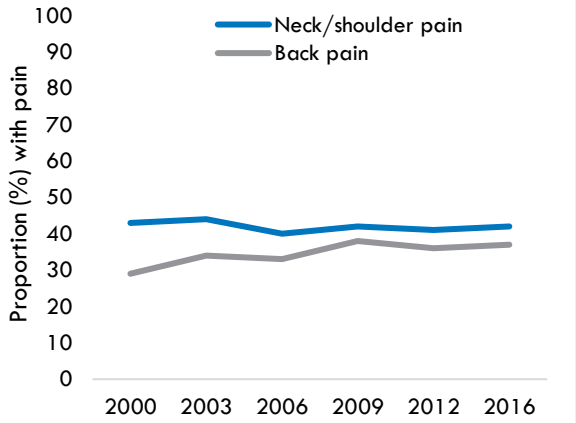
Related health-problems

People with neck and low back conditions often have other additional health problems (Hartvigsen, et al., 2013). For example, various back and neck conditions can cause headaches, dizziness, or pain and numbness in the legs or arms (Helsenorge, 2017). In a Norwegian study, the researchers found that most people who state that they have musculoskeletal pain, including pain in the back and neck, also state that they have pain in several other areas (Kamaleri, et al., 2008). Another Norwegian study showed that most Norwegian low back pain patients had several other conditions (Hagen, et al., 2006). Studies also indicate that people with persistent musculoskeletal disorders often experience mental conditions such as depression (Hagen, et al., 2006; Brage, et al., 2007).

2.3 Who and how many are affected?

Data from the Norwegian Living Conditions Survey (STAMI, NOA (SSB, LKU-A 2016)) show that the prevalence of neck and shoulder pain has been stable at about 40 percent since 2000 (Figure 2-3). The prevalence of back pain is somewhat lower than neck and shoulder pain and has increased over the period, from 29 percent in 2000 to 37 percent in 2015.

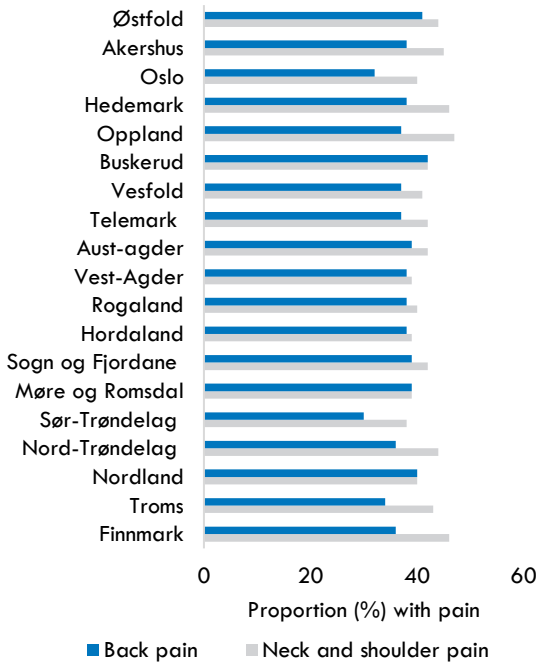
Figure 2-3: Proportion (percent) reporting low back and neck pain during 2000 and 2016



Data source: STAMI, NOA (SSB, LKU-A 2016)

The proportion of low back and neck pain varied between counties (Figure 2-4). The prevalence of back pain was lowest in Sør-Trøndelag with 38 percent, and highest in Oppland with 47 percent. The prevalence of neck and shoulder pain was also lowest in Sør-Trøndelag with 30 percent, while it was highest in Buskerud with 42 percent.

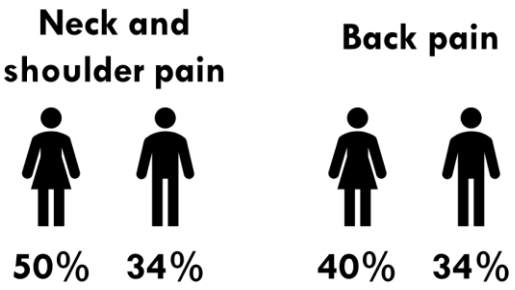
Figure 2-4: Proportion (%) of employed people with back, neck or shoulder pain, by county, 2016



Data source: STAMI, NOA (SSB, LKU-A 2016)

Back and neck pain is more common among women than among men (Figure 2-5). In the Norwegian Living Conditions Survey, 50 percent of the women reported that they experienced neck and shoulder pain, compared to 34 percent of men. For back pain, the proportion was 40 percent for women and 34 percent for men.

Figure 2-5: Proportion with back and neck pain, by gender, 2016



Data source: STAMI, NOA (SSB, LKU-A 2016)

2.3.1 Prevalence of neck and back pain according to the Global Burden of Disease Study

The GBD study was developed in the early 1990s with the aim of developing a system for comparing disease burden caused by various diseases and injuries. The purpose was to establish a system that could quantify health loss in such a way that the contribution from diseases and injuries with non-fatal outcomes could be measured and compared. GBD is based on a survey of the severity of various diseases, as well as a weighing of lost years of life compared to living with a less or more severe disease over shorter or longer periods. The GBD project published updated disease burden calculations for the years 1990-2016 in 2018. The Center for Disease Burden at the Norwegian Institute of Public Health publishes the Norwegian version of the report on the burden of disease in Norway (Øverland, et al., 2018).

The figures from GBD are based on scientific articles on disease occurrence and questionnaires, such as health and living conditions surveys. However, the figures are uncertain, as Norway does not have any comprehensive reporting of such data and the calculations thus are partly based on data from the Nordic countries and other comparable countries. GBD uses the following ICD codes in its definition of low back and neck pain: ICD-10 codes M54.3, M54.4 and M54.5 (ICD-9 code: 724) for low back pain, and M54.2 (ICD-9 code: 723.1) for neck pain.

1.2 million Norwegians are affected annually

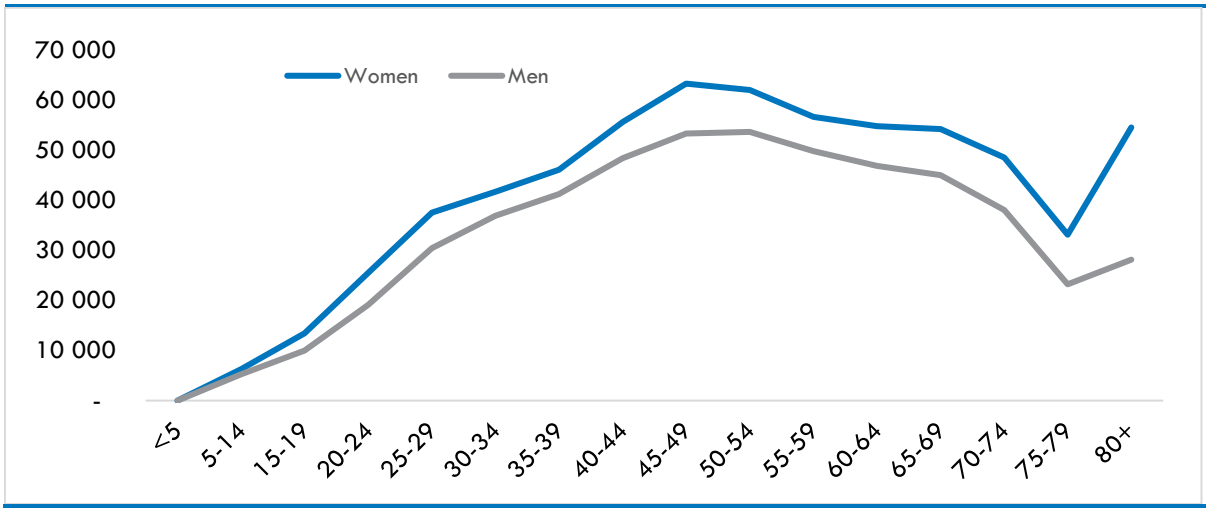
The GBD study estimates that nearly 1.2 million Norwegians were affected by low back and neck pain in 2017, with an uncertainty range between 1 million and 1.3 million (Table 2-1). Incidence was higher among women than men; about 650,000 women and 530,000 men were affected. Incidence was highest in the 45-49 age group for both genders (Figure 2-6).

Table 2-1: Estimated number of people with low back and neck pain in 2017 (GBD)

	Women	Men	Both genders
Base case	654 400	530 350	1 184 750
Low	578 539	467 006	1 048 457
High	737 977	597 097	1 330 619

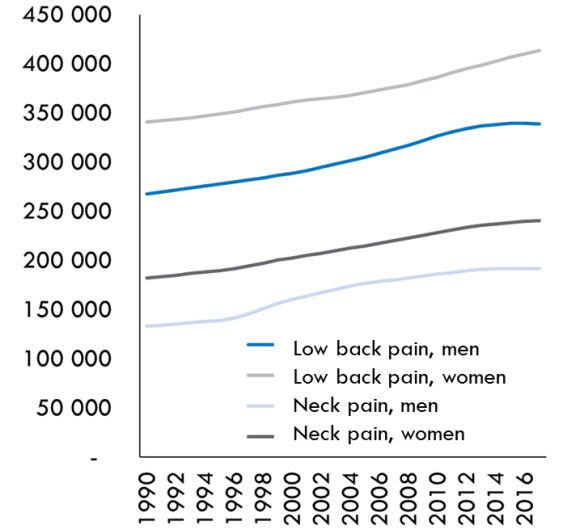
Data source: IHME GBD database

Figure 2-6: Prevalence of low back and neck pain by age and gender, 2017



Data source: GBD study

Figure 2-7: Prevalence of low back and neck pain during 1990 and 2017



Data source: GBD study

The number of people affected by low back and neck pain in Norway has increased from 1990 until 2017 (Figure 2-7), yet, the age-standardized rate remains unchanged (Global Burden of Disease, 2018).

2.4 Treatment

Treatment for back and neck complaints often involves a combination of different therapies. Recent studies and clinical guidelines recommend a biopsychosocial approach in cases where non-pharmacological treatment should be initiated first (Foster, et al., 2018; National Institute for Health and Care Excellence, 2016; Kjaer, et al., 2017). For patients with recurrent and/or persistent back and neck conditions, health care providers are encouraged to provide the patient with research-based information on neurological and physiological mechanisms that may cause or maintain pain. In addition, it is recommended to provide advice, guidance, and information about the normal course of the conditions, prognosis, and red flags. Furthermore, it is recommended to encourage the patient to maintain normal and preferably gradually progressive physical activity. If "yellow flags" are present, cognitive behavioral therapy may be attempted. Manual treatment can be initiated in parallel with the advice described above, including mobilization and/or manipulation therapy, but only concurrently with exercise therapy. Chiropractors, physiotherapists and manual therapists can perform manual treatment. The different forms of treatment are described below.

Chiropractors evaluate, treat and prevent musculoskeletal disorders. Chiropractors can refer patients to medical specialists and imaging. The costs of chiropractic services are not accounted for in the maximum out-of-pocket payment patients pay for health services in Norway, yet patients can receive reimbursement for part of the treatment expenses from Helfo[1]. As of 2019, the reimbursement amounts to NOK 147 for the first consultation and NOK 68 for each of the subsequent consultations.

A manual therapist is a physiotherapist with additional education (master's degree) in musculoskeletal disorders. Both physiotherapists and manual therapists work with musculoskeletal conditions, both before and after surgery, in the rehabilitation of acute or chronic injuries, and as part of more general exercise and in preventative work.

[1] https://helsenorge.no/betaling-for-helsetjenester/betaling-hos-kiropraktor

3. Disability and reduced quality of life

The Global Burden of Disease Study estimates that the total number of years lost due to disability for people with back and neck pain amounts to about 120,000 disability-adjusted life-years. This accounts for 82 percent of years lived with disability associated with musculoskeletal disorders overall and 17 percent of the total years lived with disability in Norway. Low back and neck pain are thus the leading causes of years lived with disability in Norway.

3.1 Back and neck conditions reduce health-related quality of life

There are large individual differences in the severity of back and neck conditions, from moderate to severe. In addition to pain and discomfort, the conditions can in some cases lead to reduced participation, both socially and in working life. Overall, the conditions reduce people's quality of life and health status.

Many people with back and neck conditions experience the body as fragile and react with sedation and inaction, despite the recommendation of activity and exercise. For example, one study showed that people with back and neck pain experienced the body as fragile and that they were afraid to inflict additional damage to the body, e.g., through physical exercise (Stenberg, et al., 2014).

3.2 How to measure burden of disease?

The purpose of disease burden calculations is to elucidate how different diseases, injuries, and risk factors affect the population in the form of years lived with disability (morbidity) and mortality. The burden of disease due to an injury or illness is determined by its severity in terms of years of life lost (YLL) due to premature mortality in the population and years lived with disability (YLD), as well as how many it affects, the age of those affected and its duration. GBD, as described in chapter 2.3.1, is a major international research project initiated in the early 1900s. The purpose of the project is to describe the evolution of the burden of disease over time for more than 300 diseases/conditions and almost 80 risk factors for almost 200 countries and areas.

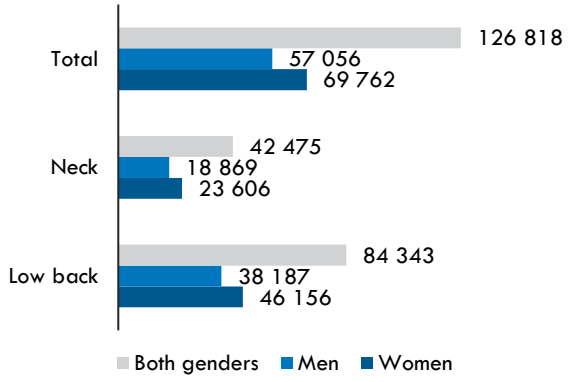
A common measure of disease burden is disability-adjusted life-years (DALYs). DALY is the sum of YLL and YLD. YLD refers to the lost health-related quality of life for people living with an illness or condition and its consequences. In GBD, YLL is calculated from a standard mortality table, where, for example, a death of a 50-year-old contributes 37 lost years of life and a death of a newborn contributes with 86 lost years of life. YLD estimates the burden of living with a disease, calculated by multiplying the incidence of diseases, injuries, and sequelae with associated severity weights. The severity weights are based on extensive population surveys, which provide the basis for a severity weight between 0 (zero health loss) and 1 (death).

3.3 Disability associated with neck and back conditions

Low back and neck pain were the main causes of disability-adjusted life years in Norway in 2016. This is in its entirety a result of YLD and not YLL. The YLD associated with low back and neck pain amounted to 84,343 and 42,475 in 2017, respectively.

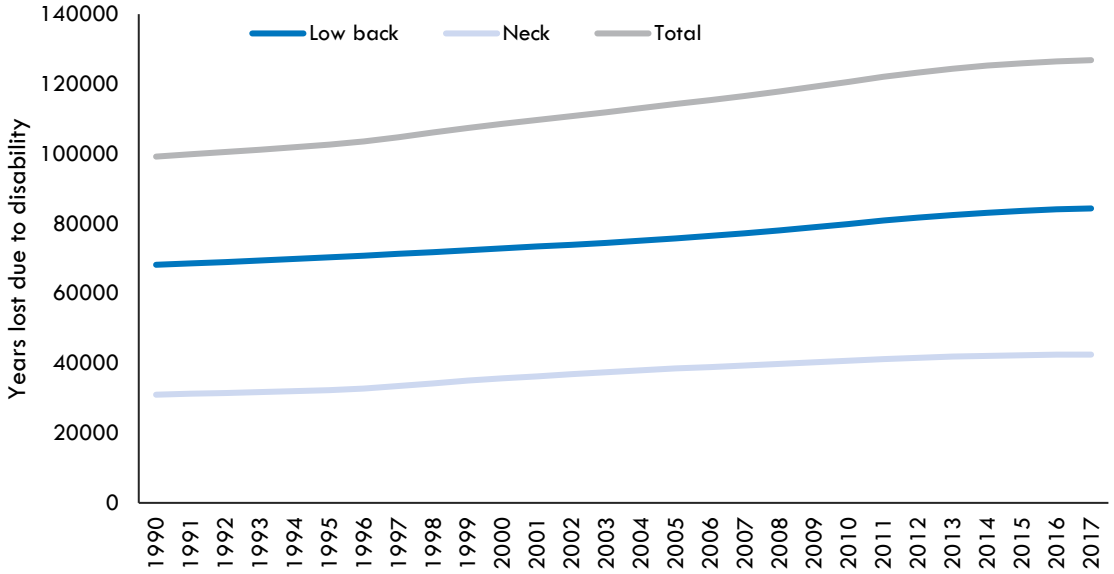
The YLD associated with low back and neck pain accounted for 82 percent of the YLD associated with musculoskeletal disorders overall and 17 percent of the total YLD across all conditions in Norway. The loss of health is particularly driven by the high prevalence of back and neck conditions in the population, corresponding to 1.2 million people (described in more detail in section 2.3.1).

Figure 3-1: Years lived with disability due to low back and neck pain, by gender, 2017



Data source: GBD study

Figure 3-2: Years lived with disability due to low back and neck pain during 1990 and 2017



Data source: GBD study

The YLD due to low back and neck pain has increased from 99,200 in 1990 to 126,800 in 2017 (Figure 2-7). In the same period, the YLD associated with low back pain has increased from 68,200 to 84,300, while the YLD due to neck pain has increased from 31,000 to 42,500.

3.4 Reduced quality of life for next-of-kin

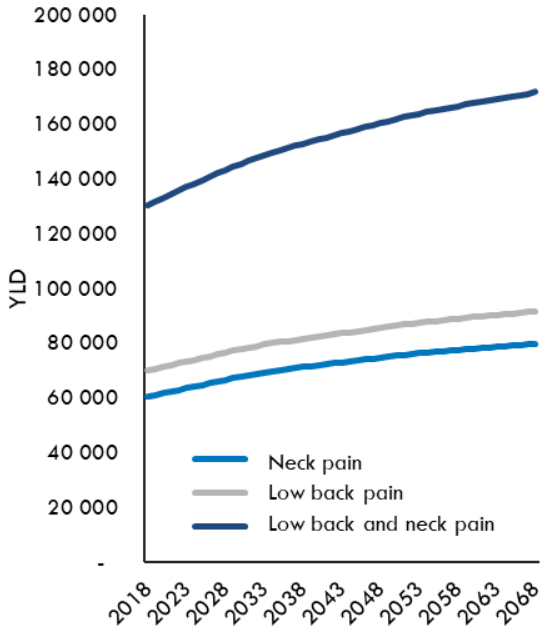
In many cases, back and neck conditions also constitute a burden for people who are close to the affected person. This is especially true for relatives of people with persistent pain. Costs for the relatives may involve travel expenses and production loss associated with care and attendance to and from consultations and treatment, but also lost quality of life in terms of increased concerns and less leisure time. However, lost quality of life among relatives of neck and back patients is perceived to be limited, compared to more invasive conditions and diseases. Consequently, we have not included a monetary value of the reduced quality of life for next-of-kin in this analysis.

3.5 Prognoses for disability

To illustrate how the disability associated with back and neck conditions is likely to develop in the coming years, we have projected the average YLD per person based on age-specific figures from GBD. Furthermore, we have used data from Statistics Norway's population projection (Statistics Norway table 07459). We have assumed that age-specific average YLD per person is kept constant over the period such that the changes are driven by changes in the population structure.

Our simplified projections show that the YLD will increase by 36 percent from 2017 to 2068 (Figure 3-3). The forecasts indicate that the YLD in 2068 will amount to 79,771 for low back pain and 91,842 for neck pain, which amounts to 171,864 for low back and neck pain overall.

Figure 3-3: Projected YLD, 2018-2068



Data source: GBS study and SSB Table 07459.

4. Increased sick leave and work absenteeism

For the society, back and neck conditions cause considerable indirect costs, including a production loss. Patients with back and neck conditions have reduced work participation and increased sick leave, while some are less productive when they are working. Increased social security benefits also have an impact on public budgets.

Persistent or chronic back and neck conditions pose a considerable burden on the affected person, their relatives, and the society at large. For many people, this type of pain markedly impacts their ability to work. People with back and neck conditions tend to find it more challenging to work, while some fall entirely out of the work-life. This implies a production loss for society (a societal cost). Production loss indicates that we, as a society, produce less than what we could otherwise have done. The production loss includes both the loss resulting from the fact that some people do not work (sick leave and disability pension) and that someone is at work yet works less efficiently than they would otherwise (lower productivity). In addition to lost production, the fact that people are away from work or fall outside the workforce, results in expenses for the public sector (budgetary consequences) in the form of sickness benefits, work assessment allowance and disability pension.

4.1 Work participation and sick leave

Traditionally, musculoskeletal disorders have been the most frequent medical cause of sick leave and disability pension in Norway, including back and neck pain. Musculoskeletal disorders remain the single most important cause for illness-related absences from work in Norway, with 2.7 million lost workdays in 2018 (NAV, 2019). For the fourth quarter of 2018, musculoskeletal disorders accounted for 31.5 percent of all cases of sick leave in Norway. Overall, musculoskeletal disorders are most common in middle-aged and older people, but there are substantial differences between the various sub-diagnoses. Neck pain is common in younger women. Back pain is about as common for women as for men.

In 2011, mental disorders passed musculoskeletal disorders as the most common cause of disability pension in Norway. The same development is found for work assessment allowance and sick leave. However, as of June 2015, musculoskeletal conditions still accounted for 28 percent of all people receiving disability pension in Norway, and 11 percent included people with back pain. The diagnosis of people with disability pension varies by gender and age. Among young people, most have mental disorders, while most older people have musculoskeletal conditions. Among women, most of those with disability pension have a musculoskeletal disorder (34 percent), while mental illness is the most common cause among men (40 percent).

Modern treatment of back and neck conditions emphasizes maintaining normal activity and that the patient should return to work as soon as possible. This may be one of the reasons why we have seen a marked decrease in the number of cases of sick leave and disability pension due to back and neck conditions in Norway and other European countries (Ihlebæk, et al., 2010). At the same time, it is known that several patients with musculoskeletal pain also experience psychological pain. The development can therefore also be due to changes in the use of psychiatric diagnoses, in which patients who previously would have been diagnosed with a musculoskeletal condition instead are diagnosed with a psychiatric condition due to more openness about mental disorders.

Among the musculoskeletal disorders, back pain without radiating pain is most impactful on sick leave, while sciatica and lumbar herniation are more important in terms of long-term benefits (Ihlebæk, et al., 2010).

4.1.1 Sick leave

From KUHR, we have information on the number of bills with fee L1 (sick leave) and fee L4 (in-depth information at 7 (8), 17, and 39 weeks of illness after diagnosis). For each bill, we also have information about the patient's diagnosis, as well as the authorization of the practitioner who issued the bill. In addition to doctors, manual therapists and chiropractors have the right to document disability (approve sick leave). Manual therapists and chiropractors are only allowed to document incapacity to work for a period of up to twelve weeks from the first day of sick leave. Therefore, these provider groups can trigger tariff L4 only in the case of more detailed questions at 7 (8) weeks sick leave in connection with patients whom they provide sick leave for.

A total of 149,820 unique patients were on sick leave due to back and neck conditions during 2018. The diagnoses with the most cases of sick leave included radiating back pain (L86), low back symptoms (L03) and back symptoms (L02). Table 4-1 shows an

overview of the number of bills with fee L1 (sick leave) by diagnosis.

Table 4-1: Number of bills with fee L1 (sick leave) or L4 (in-depth information at 7(8), 17- and 39-weeks sick leave) by diagnosis, 2018

Diagnose	Number of bills
Neck symptoms (L01)	39 017
Back symptoms (L02)	54 946
Low back symptoms (L03)	69 714
Neck syndrome (L83)	33 527
Back syndrome without radiating pain (L84)	54 276
Acquired deformity of the spine (L85)	1 038
Radiating back pain (L86)	75 436
Total	327 954

Data source: KUHR

Table 4-2 shows the number of bills with fee rate L1 (sick leave) after diagnosis and the provider's authorization. There is a considerable difference between the number of manual therapists, chiropractors and medical doctors, and the patient population for the different provider groups are likely to different from each other. The numbers in the table should therefore be interpreted with caution.

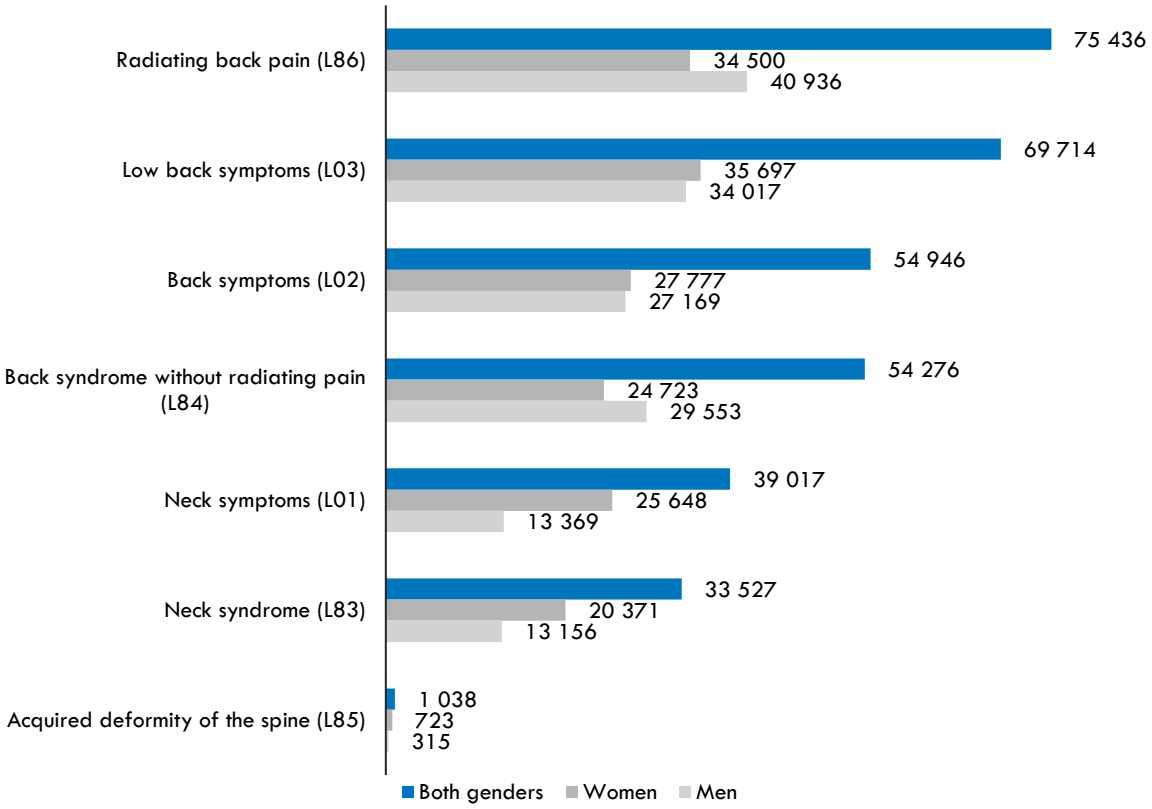
Table 4-2: Number of bills with fee L1 (sick leave) by diagnosis and provider, 2018

Diagnosis	Physio-therapists*	Chiro-practors	Medical doctors
L01	879	4 606	33 532
L02	666	4 503	49 777
L03	408	7 822	61 484
L83	229	3 047	30 251
L84	135	8 424	45 717
L85	-	30	1 008
L86	211	5 175	70 050
Total	**2 528**	**33 607**	**291 819**

*** Among physiotherapists, only manual therapists are authorized to provide sick leave**
Data source: KUHR

In 2018, 77,971 unique women and 71,849 unique men were on sick leave due to back and neck conditions. The total number of bills with sick leave was 169,439 for women and 158,515 for men, indicating that people with back and neck conditions were repeatedly on sick leave during the year. Figure 4-1 shows the number of bills with fee L1 by diagnosis and gender.

Figure 4-1: Number of bills with fee L1 (sick leave) by diagnosis and gender, 2018



Data source: KUHR

Statistics from NAV show that musculoskeletal disorders were the cause of 10,387,941 lost full-time equivalents and 643,841 cases of sick leave in 2018. Women accounted for 354,623 of the cases of sick leave, while men accounted for 248,727 cases. The average lenght of each case of sick leave was 16.1 days. Assuming that the average duration is the same for sick leave related to back and neck conditions and that the number of medical certificates for sick leave was 327,954, we find that 5,291,000 working days were lost in 2018 due to back and neck conditions. It is nevertheless important to emphasize that there will be considerable variations in the duration of each sick leave, which will depend, among other things, on diagnosis, access to health services, treatment trajectory, welfare schemes, and cultural factors. In some cases, sick leave may also be a way into early retirement.

In addition to days of sick leave with a medical certificate (issued by an authorized health care provider), we assume that the individual self-declares sick leave (without a medical certificate) in connection with the start-up of the certified sick leave. The scope of self-declared sick leave is uncertain, but generally, three self-declared days of sick leave are allowed before a medical certificate is required. Companies that are affiliated with the Inclusive Working Life Agreement (the IA agreement) give their employees the right to up to eight subsequent self-declared days of sick leave. The entire public sector, in addition to many private companies, is covered by the IA agreement. If we assume an average of three lost working days due to self-declared sick leave per case of sick leave with a medical certificate, this amounts to 984,000 working days. The total number of lost days will then be 6,275,000.

4.1.2 Work assessment allowance

Persons with less than 50 percent work capacity can apply for a work assessment allowance from NAV after the period of sick leave has expired. In December 2018, a total of 12,041 people received work assessment allowance due to back or neck conditions (Table 4-3). The diagnosis with the most people on work assessment allowance in December 2018 included radiating back pain (4,269 people) followed by neck syndrome (2,255 people).

In total, just under NOK 3.4 billion was paid in work assessment allowance for people with back and neck conditions in 2018.

Table 4-3: Number of people on work assessment allowance by ICPC-2 diagnosis, per December 2018

Diagnosis	Number
Neck symptoms (L01)	905
Back symptoms (L02)	1 245
Low back symptoms (L03)	1 505
Neck syndrome (L83)	2 255
Back syndrome without radiating pain (L84)	1 702
Acquired deformity of the spine (L85)	160
Radiating back pain (L86)	4 269
Total	**12 041**

Data source: NAV

4.1.3 Disability benefits

At the time of writing, only diagnosis-specific disability figures from NAV for the first half of 2015 have been published. In June 2015, a total of 33,104 people with back and neck conditions received disability pension. Of these, 25,369 people had a disability pension rate of 100 percent (Table 4-4).

In total, the annual expenditure on disability pension for people with back and neck conditions was NOK 7.8 billion in 2015.

Table 4-4: Average monthly payment (June 2015) for people with back and neck conditions receiving disability pension

Disability pension rate	Number of people	Average monthly payment (NOK)
Below 100 %	7 945	12 900
100 %	25 369	21 600

Data source: NAV

4.2 Reduced productivity

Back and neck conditions not only have negative effects on people's ability to work but may also affect their productivity. Reduced productivity means that the workers either produce less than they could otherwise do within a given timeframe, or that they spend longer time on their tasks than they would have had they not been affected by these conditions. Challenges at the workplace may be linked to pain, headaches, and the need to change work habits.

To our knowledge, there are no good estimates of the productivity loss associated with back and neck conditions in Norway. Consequently, the extent of this welfare loss is very uncertain. There is also a scarcity of research on how much this welfare loss can be reduced if all patients with back and neck conditions would receive optimal follow-up and the workplaces were adequately adapted. However, several studies point to the negative correlation between back and neck conditions and productivity (d'Errico, et al., 2013). A recent report on "Smart exercise in working life in Norway" (Dalager, et al., 2019) refers to several studies documenting that exercise in the workplace can lead to increased ability to work, both in general and especially for people with back and neck problems.

5. Health care services and benefits

Back and neck complaints result in considerable health care service costs, and just under half a million people were in contact with the general practitioner/emergency ward health services during 2018. In the same year, about 145,000 people were in contact with a physiotherapist (with operating subsidies), 285,000 people were in contact with a chiropractor, and more than 70,000 people were in contact with somatic hospitals. More than 360,000 imaging diagnostics related to back and neck conditions were conducted. The contacts with the health care service involve considerable time and travel expenses, and about 11.8 million hours were lost in 2018.

The use of healthcare services for people with back and neck pain includes the use of diagnostics, treatment, follow-up, rehabilitation, use of various aids and assistance for ergonomic efforts. Back and neck conditions involve costs in the formal health care service, including the primary care service (general practitioners and emergency services), physiotherapy and chiropractic services, as well as the specialist health service (private practitioners and somatic hospitals). Table 5-1 shows an overview of the number of physicians, physiotherapists, chiropractors, and occupational therapists employed in 2018.

Table 5-1: Number of employed health providers, 2018

Provider type	Number of employees, all sectors	Number of employees, health and care
Physician w/o specialization	13 579	11 638
Physician w/ specialization	15 715	13 956
Physiotherapist	13 104	10 360
Chiropractor	906	810
Occupational therapist	5 067	3 862

Data source: SSB table 07941

Part of the diagnoses used in the primary care service are so general that they may include pain located in several parts of the body, including the back and neck. For example, the ICPC-2 diagnosis of osteochondrosis (L94) may be located in the back, but the disease also occurs in the knee. There is an enriched ICPC-2 classification scheme developed based on the need to be able to record more detailed diagnostic information in the primary health service, and the diagnoses in this scheme may be linked to the ICD-10 codes in the specialist health service. However, the ICPC-2 enrichment is not mandatory nor currently available in the health statistics of the primary care service. This gives some unavoidable limitations in the data from the primary care service.

An overview of the ICPC-2 diagnoses included in the analysis is presented in the appendix (attached at the end of this report). We opted to restrict the analysis to include the ICPC-2 diagnoses that are only related to the back and neck. Diagnoses that may apply to multiple sites in the body, as well as the back and neck, are excluded from the analysis, such as osteoporosis and osteochondrosis.

The costs associated with back and neck conditions in the primary care service include costs for the primary medical services (general practitioners and emergency services), physiotherapists, and chiropractors. The KUHR's registry provides information on the reimbursements received by GPs, physiotherapists, and chiropractors, as well as which diagnostic code each contact is related to. For general practitioners and physiotherapists, KUHR also provides information on deductibles paid out-of-pocket by the patients. We obtained the available information on contacts, deductibles, and reimbursements for all contacts with GPs, emergency services, physiotherapists, and chiropractors, where the provider has registered a diagnostic code related to back or neck conditions.

In addition to the costs associated with contacts with authorized health personnel, some patients seek alternative treatment options (e.g., naprapathic or osteopathic services). We did not estimate costs related to such alternative treatment options.

Since we excluded certain ICPC codes, which in some cases would relate to back and neck conditions, as well as the costs of alternative medicine, we consider the cost estimates to be very conservative.

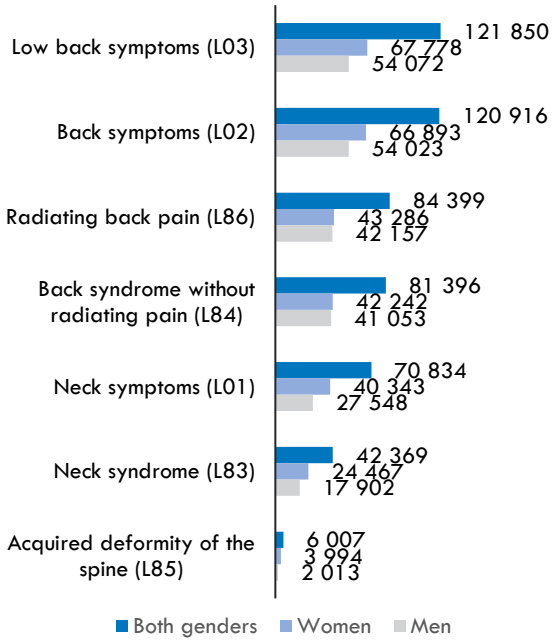
5.1 Primary care services

In 2018, 448,815 unique patients were in contact with the primary care service in connection with back or neck conditions. Of these, 202,842 were men and 245,973 were women, and these patients accounted for a total of 1,424,651 contacts in 2018.

Figure 5-1 shows the number of patients in contact with the primary care service due to back or neck

conditions by diagnosis. Most patients were in contact with the primary care service due to low back symptoms (L03), followed closely by back symptoms (L02).

Figure 5-1: Number of patients who were in contact with the primary care service due to back and neck conditions, by diagnosis, 2018

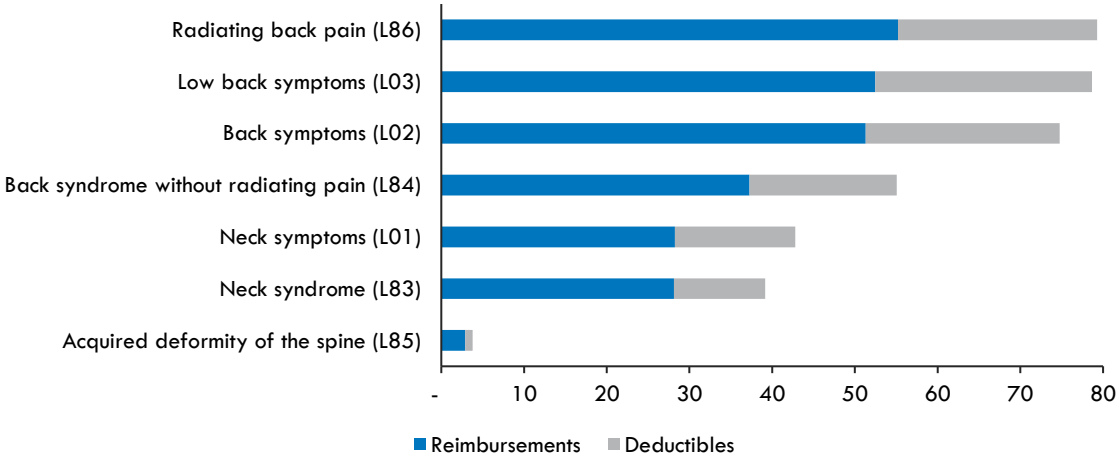


Data source: Helfo. Note: A single patient could have contacted the health care service due to one or more diagnoses and may therefore be included in several of the diagnoses included in the figure.

In total, GPs and emergency services received NOK 246.7 million in reimbursements related to contacts due to back and neck pain in 2018. In the same year, these patients paid NOK 115.0 million in deductibles. In the period 2013 to 2018, the reimbursements increased by 14.6 percent (2.8 percent annual growth), while the growth in deductibles was 8.0 percent (1.5 percent annual growth).

The cost was highest related to radiating back pain (ICPC-2 code L86) with NOK 55.2 million in reimbursements and NOK 24.1 million in deductibles (Figure 5-2). There were also significant deductibles and refunds associated with low back symptoms (ICPC-2 code L03) and back symptoms (ICPC-2 code L02).

Figure 5-2: Reimbursements and deductibles related to contacts with the primary care service due to back and neck conditions in 2018, million kroner.



Data source: Helfo. Note: A consultation may include multiple diagnostic codes. For 96 percent of the consultations, only one diagnostic code was registered. The numbers in the figure reflect reimbursement and deductible associated with each specific diagnosis. Total reimbursement and deductibles for unique consultations in which the patient is registered with one or more of the diagnostic codes in the figure (L01, L02, L03, L83, L86, L84 og L85) amounts to respectively 246,7 og 115,0 million kroner.

5.1.1 Physiotherapists and chiropractors

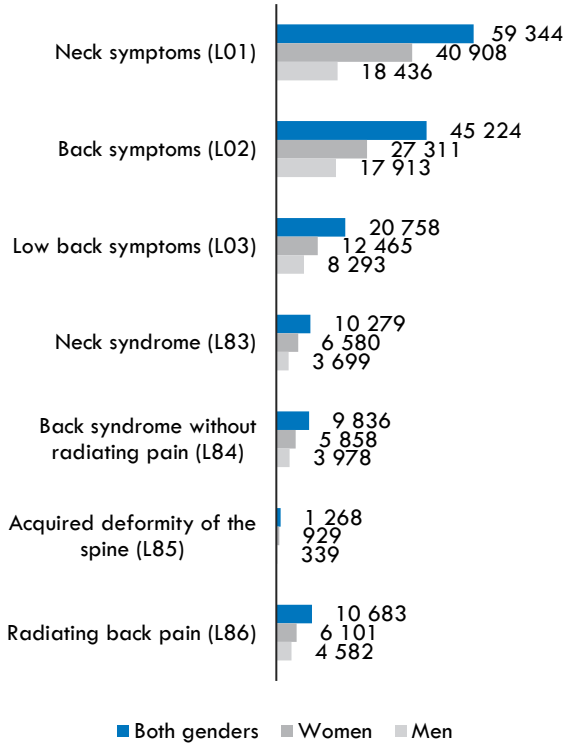
From the KUHR registry, we have information about physiotherapists, manual therapists, psychomotor physiotherapists, as well as candidates undergoing education within these areas. The KUHR registry only contains information about those who receive reimbursement from Helfo. Manual therapy and psychomotor physiotherapy are postgraduate education programs in physiotherapy, and these therapist groups are therefore grouped as physiotherapists.

Physiotherapists with an agreement on operating subsidies with the municipality receive reimbursement from Helfo, but many physiotherapists operate without having such an arrangement. If you choose to go to a physiotherapist without an operating subsidy, you must pay all expenses related to the consultation out-of-pocket.

In 2018, a total of 147,094 unique patients with back and neck conditions were in contact with a physiotherapist with an operating subsidy. These patients had a total of 2,029,803 contacts.

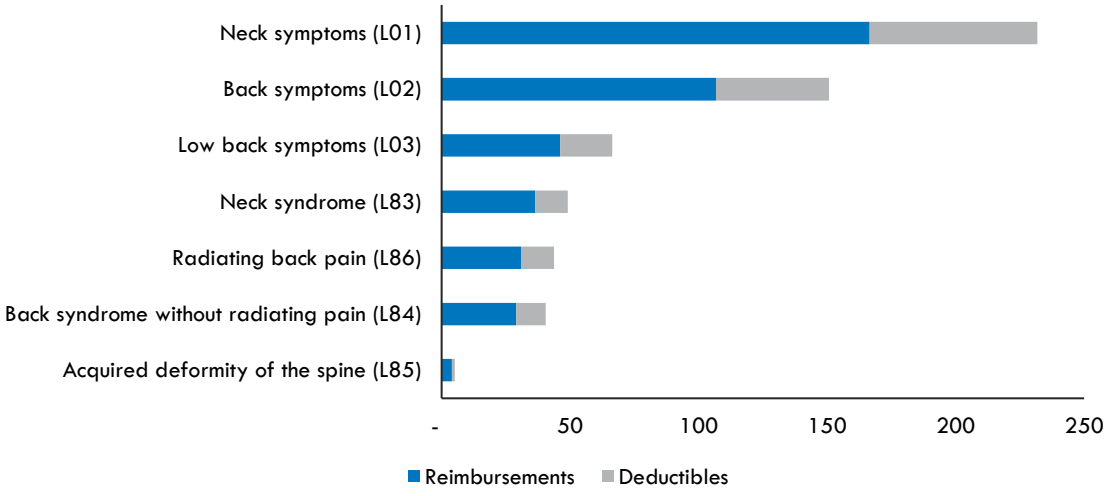
The physiotherapists received a total of NOK 414.6 million in reimbursement in 2018, and the patients paid NOK 166.6 million in deductibles (Figure 5-4). The costs were highest related to ICPC-2 code L01 (neck symptoms) with 166.5 million in refunds and 66.3 million in deductibles, followed by L02 (back symptoms) with 106.7 million in reimbursements and 44,0 million in deductibles.

Figure 5-3: Number of patients in contact with a physiotherapist due to back and neck conditions, by diagnosis, 2018



Data source: Helfo. Note: A single patient could have contacted the health care service due to one or more diagnoses and may therefore be included in several of the diagnoses included in the figure.

Figure 5-4: Reimbursements and deductibles for contacts with physiotherapists related to back and neck conditions, 2018, million kroner.



Note: A consultation may include multiple diagnostic codes. The numbers in the figure reflect reimbursement and deductible associated with each specific diagnosis. Total reimbursement and deductibles for unique consultations in which the patient is registered with one or more of the diagnostic codes in the figure (L01, L02, L03, L83, L86, L84 og L85) amounts to respectively 414,6 og 166,6 mill. kroner.

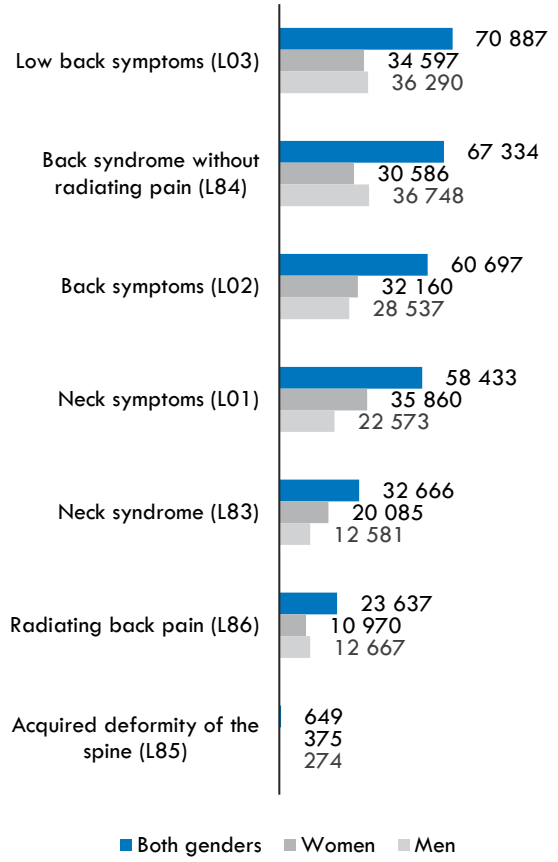
The figures from Helfo only provide information about the physiotherapists with an operating subsidy. Physiotherapists with an operating agreement account for about 58.1 percent of all physiotherapy full-time-equivalents in the primary care service (the Norwegian Directorate of Health, 2016), and a significant proportion of the physiotherapists are therefore not included in the analysis.

Physiotherapists without an operating agreement set the prices themselves, thus it is difficult to know to what extent these physiotherapists treat the same patients as the physiotherapists with an operating agreement. Consequently, estimating the extent and cost of treatment associated with back and neck conditions among these physiotherapists remains a challenge.

Helfo also provides reimbursement for treatment of muscular or skeletal pain by a chiropractor, with fee-based reimbursement. For the first consultation, the reimbursement is NOK 147 as of 2019, while each subsequent consultation receives a reimbursement of NOK 68. The reimbursement constitutes only a small proportion of the total cost related to people who choose to visit a chiropractor, and the expenses for treatment at the chiropractor does not entitle the person to an exemption card for health services. Because chiropractors are free to set prices themselves, Helfo does not have information about patients' deductibles.

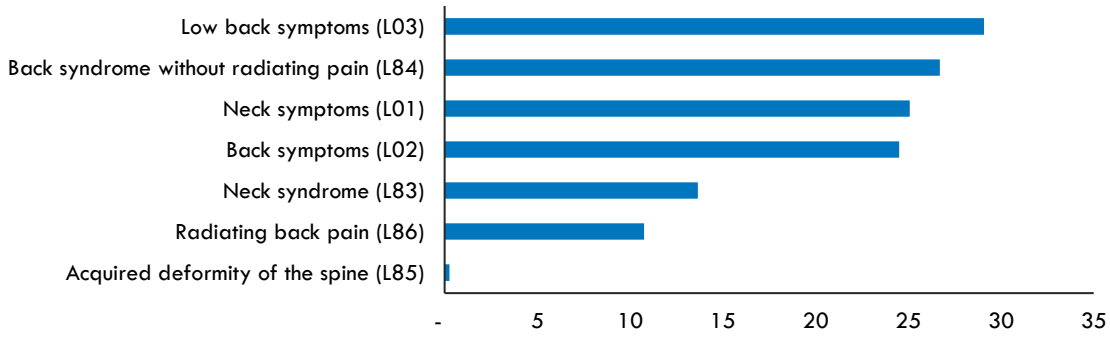
In 2018, 285,275 unique patients were in contact with a chiropractor due to back or neck conditions. These patients had a total of 1,648,625 contacts, which corresponds to each patient having on average of just under six contacts in 2018. The chiropractors received a total of NOK 127.8 million in reimbursement from Helfo in 2018.

Figure 5-5: Number of patients in contact with a chiropractor due to back and neck conditions, by diagnosis, 2018



Data source: Helfo Note: A single patient could have contacted the health care service due to one or more diagnoses and may therefore be included in several of the diagnoses included in the figure.

Figure 5-6: Reimbursement for contacts with a chiropractor related to back and neck conditions, 2018, MNOK



Data source: KUHR. Note: A consultation may include multiple diagnostic codes. The numbers in the figure reflect reimbursement associated with each specific diagnosis. Total reimbursement and deductibles for unique consultations in which the patient is registered with one or more of the diagnostic codes in the figure (L01, L02, L03, L83, L86, L84 og L85) amounts to 127,8 million kroner.

5.2 The specialist health service

Costs in the specialist health service related to back and neck conditions include diagnosis and treatment by private practitioners and somatic hospitals.

In 2018, there were 171,425 contacts with the specialist health service related to back and neck conditions. Most of these contacts were in somatic hospitals.

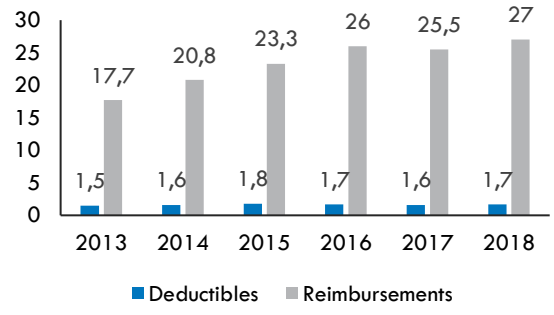
In addition to reimbursements and deductibles, private practitioners receive operating subsidies from the regional health enterprise. We assume that reimbursements and deductibles constitute about 60 percent of the total funding.

Private practitioners

We have obtained data from Helfo about costs related to contacts with private practitioners due to back or neck conditions. Reimbursements and deductibles from 2013 to 2018 related to treatment by private practitioners who receive reimbursement from Helfo are presented in Figure 5-7.

In 2018, 3,462 unique patients were in contact with private practitioners due to back and neck conditions, and these accounted for a total of 15,795 contacts. The patients paid NOK 1.6 million in deductibles, while the private practitioners received approximately NOK 26.1 million in reimbursement from Helfo. Patients' deductibles increased by 14.8 percent from 2013 to 2018 (2.8 percent annual growth), while reimbursements increased by 52.3 percent (8.8 percent annual growth) in the same period.

Figure 5-7: Deductibles and reimbursements to private practitioners related to back and neck conditions, mill. kroner.



Data source: Helfo

Somatic hospitals

All treatment episodes in somatic hospitals (i.e., outpatient/inpatient consultations, day treatments) are classified according to the DRG system (diagnostic-related groups). The DRG system is used both to measure efficiency and as a basis for hospital financing.

By calculating the average cost per treatment episode for each DRG, all DRGs are given a "cost weight". The weights reflect the activity in the hospitals and can be used to highlight the use of resources related to various diagnoses.

Using data from the NPR, we extracted information about relevant hospital contacts due to the treatment of back and neck conditions. We selected DRGs that were frequently used for the treatment of back and neck conditions and only included episodes where this was registered as a diagnosis. In the analyses, we have distinguished between outpatient and inpatient stays.

A total of 14,947 people had a 24-hour stay at a somatic hospital related to back and neck conditions in 2018. Furthermore, 2,421 people received day treatment and 71,228 persons had an outpatient consultation. These patients accounted for a total of 155,630 contacts.

Among the outpatient contacts related to back and neck conditions, DRG 908F (outpatient consultation due to conditions and injuries in the back and neck) was the most resource-intensive in 2018 with 87,962 stays and 0,047 DRG points. Furthermore, DRG 808H (outpatient treatment of rheumatoid arthritis with infusion of specific drugs) was associated with 7,927 stays and 0,287 DRG points.

Among the admissions in 2018, DRG 215C (surgery in the column excluding spondylodesis without comorbidities) was the most resource-intensive with 4,864 stays and 1,465 DRG points. Furthermore, DRG 243 (back pain, traumatic conditions, and back symptoms) was the second most resource-intensive and was the DRG code with the most admissions related to back and neck pain in 2018 with 7,600 admissions.

DRG 214A (combined anterior/posterior spondylodesis) was the third most resource-intensive in 2018. This treatment is also relatively resource-intensive and has a DRG weight of 4.833, which means that it is nearly five times as costly as an average treatment episode (in which case the weight is equal to 1). A total of 135,047 admissions related to back and neck pain were registered in 2018.

5.3 Imaging diagnostics

Imaging diagnostics is a widely used examination method for back and neck conditions. Common examination methods include CT, MRI, X-ray, and ultrasound, and the KUHR registry contains information on all such consultations where a reimbursement claim has been reported to the Norwegian Health Economics Administration. In addition, some ultrasound examinations are performed without a referral;

therefore, the use of these examinations is higher than what is reflected in this analysis. The NCRP classification scheme is used to report these reimbursement requirements, and diagnostic codes for imaging are rarely recorded. On the bills, the health personnel number ("HPR number") of the provider who has requested the examination may be reported, but this is not mandatory, and the data is therefore somewhat deficient.

We have obtained data from Helfo by selecting NCRP codes that are relevant to back and neck conditions and a complete list of these codes is presented in the appendix (attached at the end of the report). The KUHR registry records information about the patient's deductible, reimbursement paid, and the amount paid in reimbursement for the deductible that the patient is exempt from paying. The NCRP codes are sometimes sent at their own expense, while the deductible rate is sent on another bill. Thus, for some bills, it is neither registered a deductible nor a reimbursement for a deductible for patients who are exempt from deductibles. We assume that a deductible has been issued for these bills which it is not possible to include in the data.

In 2018, a total of 360,514 referrals for imaging diagnostics were issued with a NCRP code associated with back and neck pain, across 287,035 unique patients. Helfo paid in excess of NOK 157.7 million for diagnostic imaging to private and public institutions, while patients paid NOK 22.6 million in deductibles. Almost half (48.6 percent) of the consultations were at a public institution.

Table 5-2 presents the number of referrals to imaging diagnosis due to back and neck pain that were registered by respectively doctors, chiropractors, and physiotherapists in 2018. Several other providers also have referral rights, and referrals from these are included in the total numbers. Among physiotherapists, only people with postgraduate education in manual therapy (manual therapists) have the right to refer. In 2018, a total of 92,252 of the bills with relevant NCRP codes were declared with an HPR number; in other words, only one quarter of all bills with relevant NCRP codes. For the bills where the referring practitioner has two different authorizations, the same bill is registered twice. This amounted to a total of 3,768 bills in 2018.

Table 5-2: Number of referrals for imaging due to back and neck conditions, by provider type, 2018.

	Number of referrals
Medical doctors	86,500
Chiropractors	1,533
Physiotherapists	1,173

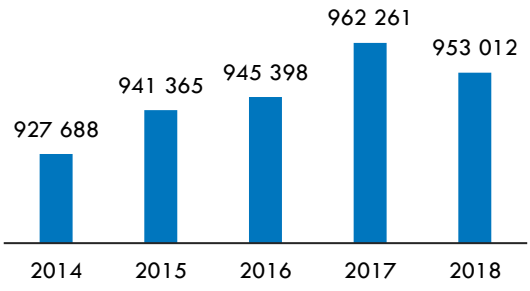
Data source: KUHR

5.4 Pharmaceuticals

Patients with low back and neck conditions use a variety of drugs to reduce their pain and discomfort. In a study from the United States, the authors find that 80 percent of patients with low back pain received drug treatment in general practice, and more than one in three received more than one drug (Cherkin, et al., 1998). Common treatment includes painkillers, anti-inflammatory drugs, muscle relaxants, and opioids.

Most of the drugs are delivered to the patient from the pharmacy, but some of the drug use takes place in hospitals and nursing homes. The Norwegian Prescription Database (NorPD) contains information on all redemptions of prescription drugs in Norway. Data from NorPD show that about 950,000 patients redeemed at least one drug in ATC group M (Muscles and skeleton) in 2018. The number of unique users from 2014 to 2018 is illustrated in Figure 5-8.

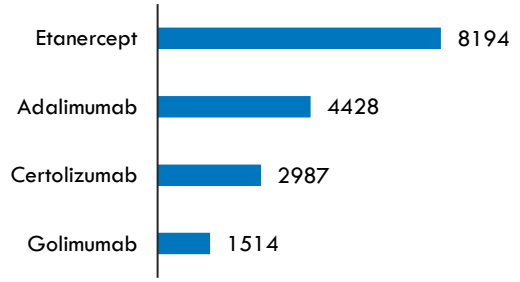
Figure 5-8: Number of unique users of drugs in ATC-group M (muscles and skeleton), 2014-2018



Data source: NorPD

In addition to the drugs in ATC group M, several patients are treated with anti-inflammatory drugs (TNF inhibitors) in ATC group L. This includes, among others, etanercept, infliximab, adalimumab, certolizumab, and golimumab. Several of these drugs also have other indications, such as psoriasis and anti-inflammatory bowel diseases, and only parts of the treatment are associated with patients with back and neck disorders. Among TNF inhibitors delivered in pharmacies, etanercept (Enbrel) was the most frequently used in 2018 (8,194 unique patients) (Figure 5-9).

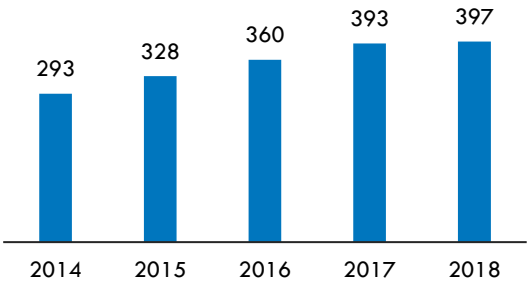
Figure 5-9: Number of TNF inhibitors users in 2018



Data source: NorPD. Note: Infliximab is excluded from the statistics due to few observations.

NorPD also contains information about the costs associated with pharmaceuticals delivered at pharmacies (maximum allowed price incl. VAT). Overall, the prescription drugs in ATC group M represented a cost of just under NOK 400 million in 2018 (maximum allowed price excl. VAT) (Figure 5-10).

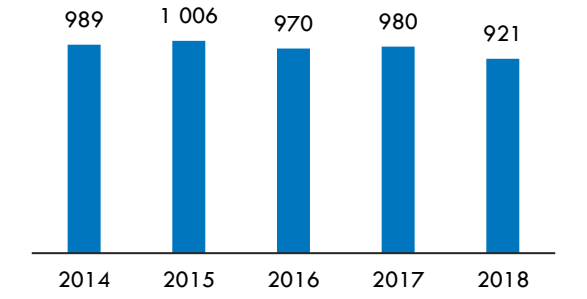
Figure 5-10: Costs associated with pharmaceuticals in ATC-group M (muscles and skeleton), maximum allowed price excl. VAT, 2014-2018



Data source: NorPD. Note: VAT is subtracted from the cost estimates because it does not represent a societal cost.

For the TNF inhibitors, a proportion of the cost is treatment of patients with back and neck disorders. Due to increased competition and the introduction of bio-similar drugs, the price of these drugs has fallen in recent years. The cost of the mentioned TNF inhibitors amounted to NOK 921 million (maximum allowed price excl. VAT) in 2018, a reduction from NOK 1,006 million in 2015 (Figure 5-11).

Figure 5-11: Costs associated with TNF inhibitors, maximum allowed price excl. VAT, 2014-2018



Data source: NorPD. Note: Includes etanercept, adalimumab, certolizumab and golimumab. Infliximab is excluded from the statistics due to few observations. VAT is subtracted from the cost estimates because it does not represent a societal cost.

NorPD does not include data on drugs purchased by patients without a prescription. In addition to the drugs presented above, many patients with back and neck conditions use non-prescription drugs (e.g. painkillers). In 2016, the non-prescription drugs accounted for about 10 percent of the total revenue for pharmaceuticals in Norway (Apotekforeningen, 2017).

The costs associated with drug treatment at hospitals are also not included in the data from NorPD but are included in the DRG weights and are therefore included in the cost estimates presented in the sub-chapter above.

5.5 Aids and ergonomic interventions

Aids and ergonomic measures can help prevent back and neck pain and reduce associated sick leave.

Aids can be used to relieve and prevent back and neck pain, and people with short- and long-term pain can benefit from aids. People with a permanent and significantly reduced functional capacity can apply for aids from NAV. If you have a short-term and temporary need for aids, you can apply for support elsewhere, for example in the municipality. Some simple aids can also be purchased in regular stores.

Ergonomic measures are often initiated by the occupational health service. The occupational health service can assist with mapping of ergonomic conditions and design of the workplace. Ergonomic workplace measures can be measures that provide employees with better work positions, relief during the workday, lifting techniques, or provide equipment recommendations that make it easier to perform common workplace tasks. The occupational health service can also assist with individual follow-up of employees when needed, e.g. exercise guidance to prevent back and neck pain. As such, the occupational

health service contributes to the prevention of back and neck pain and reducing associated sickness absence. The occupational health service overall has a positive net social benefit (Oslo Economics, 2018), and the costs and incidence of back and neck pain would probably have been higher without the occupational health service.

From 2020, all municipalities are required to have appointed an occupational therapist, and these can help with facilitation in the home and at school.

The statistical basis is too uncertain to provide reliable estimates of the costs of aids and ergonomic measures related to back and neck conditions. However, these measures are likely to require considerable costs.

5.6 Basic and attendance benefits

People who have additional expenses related to their health condition (that healthy people do not have) may receive basic benefit from NAV to cover necessary additional expenses. This benefit will cover necessary additional expenses due to permanent injury, illness, disability, or congenital malformations. In 2017, a total of 4,662 people with back and neck pain received basic benefit from NAV. In total, these people received NOK28.6 million.

The attendance benefit scheme from NAV is for people who, due to their medical condition, need supervision and care. This means that you need help with personal tasks that healthy people do not need. The need for help also includes stimulation and training. In order to receive assistance, the costs of care and supervision must at least cost 2 - 2.5 hours of private assistance per week. 2,802 people with back and neck pain received attendance benefit from NAV in 2017. These received a total of NOK 19.4 million.

5.7 Time and travel costs

People with back and neck pain who are in contact with the specialist or primary health care service have time and travel expenses associated with these contacts. Time has a societal cost because it has alternative uses, while travel costs are a direct cost related to transportation.

To estimate time and travel costs, we have assumed that time costs are equal to two hours for each contact with the primary care service and three hours for each contact with the specialist health service (Moger & Kristiansen, 2012). We have assumed that unit costs per contact with the primary care service are NOK 405 for time spent and NOK 198 for travel (both in 2017 NOK). We assume equal time spent on GP services and other primary health services.

For the specialist health service, the estimated time cost is NOK 612 and the travel cost NOK 306 (both in 2017 NOK) (Bugge, et al., 2018). In 2018, there were a total of 1,424,651 visits to the primary care service related to back and neck pain, and this resulted in a total of 2,849,302 hours of lost time. For the specialist health service, the corresponding figures were 155,630 visits and 466,890 hours.

Table 5-3: Number of visits related to back and neck conditions, 2018

	Number of visits	Time loss (hours)
Primary care service	1 424 651	2 849 302
Private practicing specialists	15 795	47 385
Somatic hospitals	155 630	466 890
Chiropractor	1 648 625	3 297 250
Physiotherapist	2 029 803	4 059 606
Imaging	360 514	1 081 542
Total	**5 635 018**	**11 801 975**

Data source: Helfo, NPR

6. Societal costs associated with neck and back conditions

Overall, low back and neck pain accounts for almost 126,818 disability-adjusted life years. Following Norwegian guidelines for economic evaluation of health services, the associated health losses amount to NOK 165 (120-230) billion.

Production losses due to illness-related absence, social security benefits, and reduced labor productivity for those who are still working, amount to NOK 50 (46 -62) billion.

Total health care costs associated with the diagnosis, treatment, and follow-up of patients with low back and neck conditions are estimated at NOK 8.7 billion.

6.1 Framework for estimating societal costs

Back and neck complaints affect many people, and patients experience varying degrees of pain. People with significant pain are affected in many ways and may have social, physical, and financial challenges. People suffering from milder forms of back and neck complaints often have minor challenges, but even then, the disadvantages can be significant. Furthermore, this constitutes a larger group, which means that the costs for society become substantial. The social costs associated with back and neck conditions are affected by several factors. First, the number and degree of discomfort are crucial. Furthermore, the costs are affected by how the individual is affected. In the following, we will quantify the various cost components and present estimates for social costs.

The various cost elements are calculated using different methods. For the elements where we have had access to registry data, we have used activity data and market prices, while for other areas, we have estimates are based on scientific literature and simple assessments. In the following, the calculation of the various cost elements is described in detail.

6.2 Value of health loss

Many people with back and neck conditions experience reduced quality of life - often referred to as health loss. The cost of lost quality of life is not something the community will register in any public budgets but is nevertheless considered to have a value. In this sub-chapter, the cost associated with lost quality of life is calculated beyond the production loss calculated above. The costs associated with reduced quality of life for next-of-kin are not priced.

In Norway, there has been disagreement on how to value lost years of life. In health-economic analyses (for interventions in the health sector), the Norwegian Directorate of Health assumes that a good year of life (QALY) has a value of 588,000 2012-NOK. Recently, the Norwegian Directorate of Health published a draft guide for health effects in socioeconomic analyses. This guide encompasses interventions that have health implications for healthy population groups and include interventions where the analyses are done in a social perspective. The guide states that a quality-adjusted life-year (QALY) in 2018 will be valued at NOK 1,504 million with production losses, and NOK 1,304 million without production losses.

Like the Norwegian Directorate of Health's report on the social costs of diseases and accidents (Norwegian Directorate of Health, 2016), we have chosen to use a value of NOK 1.3 million per QALY in this analysis. As the analysis is done in a social perspective and does not include an intervention for consideration solely in the health care sector, we have chosen to use this value.

As described in chapter 3, the health loss associated with low back pain and neck pain was 84,343 and 42,475 disability-adjusted life years, respectively, in 2017. Overall, low back and neck pain accounted for 126,818 disability-adjusted life years (uncertainty range: 89 941– 173 985). Measured in NOK, health losses amounted to about NOK 165 billion (120-230).

6.3 Production loss

Production loss means that we, as a society, produce less than we could have done otherwise. The loss of production is linked to the fact that some people affected by low back and neck pain are unable to work, and some people can work but are less productive at it.

We have previously estimated that 6,275,000 working-day-equivalents are lost due to sick leave, and the value of these lost working-days is the value of lost production. Production is valued at the average salary per normal full-time-equivalent, with a premium for holiday pay, occupational pension, payroll tax, insurance, and profits, corresponding to 40 percent of the salary. We have calculated an average annual salary of NOK 494,693 based on data from Statistics

Norway. Furthermore, we have assumed that a full-time-equivalent equals 230 working-days, which means that a working-day is priced at NOK 3,011. Given these assumptions, the production loss related to sickness absence amounts to NOK 18.9 billion. Several factors affect sick leave, including cultural and economic factors. For example, a study shows that sick leave has a "contagious effect" on colleagues, and that the effects of interventions to reduce sick leave will thus have consequences beyond those directly affected (Godøy & Dale-Olsen, 2018).

In 2018, NOK 3.4 billion was paid in work assessment allowance. We assume that the job settlement payout amounts to 66 percent of the recipient's income. This means that the people who received work assessment allowance in 2018 would have had NOK 5.1 billion in salary in 2018 if they had been employed. A premium of 40 percent as a result of lost basis for holiday pay, occupational pension, payroll tax, etc. implies that the production loss associated with this group amounts to NOK 7.1 billion.

Furthermore, we assume that the disability pension constitutes 66 percent of the income and estimates that disabled people would have had a total income of NOK 11.8 billion in 2015 if they had been employed. A 30 percent premium as a result of occupational pensions, payroll tax, insurance, and profits results in a loss of production due to back and neck related disability of NOK 15.4 billion.

To elucidate the costs associated with lower productivity, we have prepared a simplified estimate based on the following assumptions:

- People with back and neck pain are on average 2 (1-5) percent less effective than they would be without the symptoms
- Productivity loss applies to people with back and neck conditions of working age (925,000 people in 2018)
- The average employment rate is 65 percent
- A normal full-time equivalent of 1,700 hours
- A working day of 7.5 hours
- Cost per lost working day of NOK 3,011

Two percent lower efficiency means that these patients spend less than an hour more per week completing the same tasks as a person without these conditions, an estimate we perceive as conservative.

Given these assumptions, the productivity loss amounts to 2.7 million lost working days. This corresponds to a production loss of NOK 8.2 billion.

In total, the production loss is estimated at NOK 49.7 billion per year. The estimate of lost productivity is particularly uncertain and must be interpreted with caution.

Table 6-1: Production loss associated with back and neck conditions, 2018

Type of cost	Cost (MNOK) (uncertainty range)
Sickness absence	18 900
Work assessment allowance	7 100
Disability pension	15 400
Productivity loss	8 200 (4 100 – 20 500)
Total	**49 600 (45 500 – 61 900)**

Data source: NAV

6.4 Health care costs

Societal costs associated with back and neck conditions include costs in primary care (general practitioner / emergency primary care center), physiotherapists and chiropractors, in specialist health care (private practicing specialists and somatic hospitals), outpatient imaging, and pharmaceuticals redeemed at pharmacies.

6.4.1 Primary care services

In addition to reimbursements and deductibles, GPs and doctors working in emergency primary care sectors are financed through subsidies from municipalities. Consequently, data from Helfo only provides information about a certain proportion of the costs in the GP service. We use accounting data to estimate reimbursement and other costs in the primary care service in the same way as in the Directorate of Health's report on community costs of illness and accidents (Helsedirektoratet, 2016). Reimbursements and deductibles are estimated to amount to just under 30 percent of the total costs of the GP service. The total cost of this patient group amounts to about NOK 1.5 billion in the GP service.

6.4.2 Physiotherapists and chiropractors

Data on costs of physiotherapists and chiropractors are limited. Statistics Norway's health accounts show that costs related to physiotherapy and chiropractic treatment, as well as other medical treatment, amounted to NOK 11.8 billion in 2018. This includes funding from public administration and the household's own payment. As an estimate, we have assumed that 70 percent of these costs are related to physiotherapists (NOK 7.6 billion) and chiropractors (NOK 0.65 billion). The distribution between the two groups is based on the number of employees in health and social services in 2018 from Statistics Norway. In a report from the Norwegian Directorate of Health

(Helsedirektoratet, 2016), it appears that people with conditions related to the musculoskeletal system make up the largest recipient group of physiotherapy, with 76 percent. If we use this proportion, and that 60 percent of these treatments are related to back and neck pain, the cost is NOK 3.5 billion. One study shows that back and neck pain was the reason people sought out a chiropractor in 72.5 percent of cases (Beliveau, et al., 2017). If we also consider other back and neck conditions (not just pain) and assume that 80 percent of the cases are due to these conditions, the cost of chiropractors amounts to NOK 517 million.

6.4.3 The specialist health service

The costs in the specialist health service include costs for private practitioners and costs in somatic hospitals.

In addition to reimbursements and deductibles, private practicing specialists receive operating subsidies from the regional health authorities. We assume that reimbursements and deductibles make up about 60 percent of total funding. Thus, the cost associated with private practicing specialists related to treatment of back and neck conditions amounts to about NOK 50 million.

The costs in somatic hospitals are calculated based on the treatment episodes' DRG weight and the hospitals' cost per DRG point. The DRG weight for each treatment episode is based on actual expenses from the hospitals' accounts and is a measure of how resource-intensive hospital stay is assumed to be.

The cost per DRG point is based on analyses conducted by the Norwegian Directorate of Health (SAMDATA 14/2018). This unit price is limited to costs that can be related to the hospitals' patient care, and where patient data is reported in the form of DRG points, stays, or outpatient contacts. Unit prices are presented in Table 6-2. The number of DRG points for patient contacts associated with back and neck conditions is estimated at around 40,000, corresponding to a total cost of NOK 2.1 billion.

Tabell 6-2: Cost per DRG point, 2013-2017

Year	Cost per DRG point (NOK)	
	Incl. VAT	Excl. VAT
2013	52 851	50 690*
2014	53 333	51 153*
2015	52 124	49 993*
2016	52 645	50 493*
2017	52 442	50 298

Source: SAMDATA (14/2018). *We assume the same VAT rate in 2013-2016 as in 2017. Prices have been adjusted using Statistics Norway's index for inflation in public health services.

Costs that are not included in this unit price include non-activity-based-funded services (outpatient radiology and laboratory activities), research and development, hospital prescription drugs that are not registered as activity in the medical record, subsidies for municipal collaboration, and patient injury compensation. These costs (in addition to outpatient imaging) are not included in our cost estimates as they likely constitute a modest proportion of the health care costs associated with back and neck conditions.

6.4.4 Outpatient imaging

As previously mentioned, Helfo paid about NOK 160 million in reimbursements for imaging for patients with back and neck conditions, while patients paid NOK 22.6 million in deductibles. If we assume that this represents 40 percent of the actual costs, the cost associated with patients with back and neck conditions will be approximately NOK 450 million.

6.4.5 Pharmaceuticals redeemed in pharmacies

About 950,000 patients redeemed at least one prescription drug for the treatment of musculoskeletal disorders (ATC Group M) in 2018. The total cost of these drugs was NOK397 million (maximum allowed price excluding VAT). If we assume that 85 percent of this cost is related to the treatment of back and neck conditions, this corresponds to NOK 337 million.

As discussed earlier, a proportion of the cost of TNF inhibitors (biological drugs) represents treatment of patients with back and neck conditions. Previous analyses of data from NorPD conducted by Oslo Economics show that patients with back and neck conditions (ICD10 codes M45 and M46) accounted for about 17.5 percent of patients treated with these drugs in 2014. If we take this into account, the costs related to TNF inhibitors for back and neck conditions amount to about NOK 160 million in 2018.

There are no data on the use of non-prescription drugs by patients with back and neck conditions. Total figures from the Norwegian Pharmacists' Association for the sale of pharmaceuticals in Norway show that non-prescription drugs accounted for about ten percent of total drug sales. As a rough estimate of the cost associated with non-prescription drugs for the treatment of back and neck conditions, we have assumed a 10 percent share of the cost of prescription drugs, which corresponds to NOK 50 million in 2018.

Table 6-3: Estimates of costs associated with pharmaceuticals redeemed at pharmacies for treatment of back and neck conditions, maximum allowed price excl. VAT 2018

	Costs (MNOK)
Prescription drugs in ATC-group M*	337
Prescription drugs in ATC-group L**	163
Non-prescription drugs***	50
Total	**550**

Analysis Oslo Economics. *85% of costs for pharmaceuticals in group M **17,5% of costs for TNF inhibitors ***Estimated at 10% of costs of prescription drugs. Note that pharmaceuticals provided in hospitals are included in the specialist health service cost and is not included in this table.

6.4.6 Total health care costs

The total health care costs associated with the diagnosis, treatment, and follow-up of patients with back and neck conditions are estimated at NOK 8.7 billion (Table 6-4).

Table 6-4: Estimated health care costs associated with back and neck conditions

	Cost (MNOK)
Primary care service	1 500
Physiotherapists and chiropractors	4 053
Private practicing specialists	50
Somatic hospitals	2 100
Outpatient imaging	450
Pharmaceuticals redeemed at pharmacies	550
Total	**8 703**

Analysis Oslo Economics.

6.5 Time and travel costs

We have assumed that unit costs per contact with the primary medical service are NOK 405 for time use and NOK 198 for travel (both NOK 2017). We assume equal use of time in the GP service and other primary care services. For the specialist health service, time costs are NOK 612 and travel costs are NOK 306 (both 2017 NOK) (Bugge, et al., 2018).

The number of hours spent on time and travel is presented in section 5.7. Based on these projections and unit costs for time and travel costs, the total time and travel costs for back and neck pain are NOK 2.5 and NOK 1.2 billion respectively (Table 6-5).

Table 6-5: Time and travel costs for back and neck conditions, 2018

	Time costs	Travel costs
Primary care service	592 562 214	289 697 082
Private practicing specialists	9 927 537	4 963 768
Somatic hospitals	97 817 190	48 908 595
Chiropractors	685 720 839	335 241 299
Physiotherapists	844 266 111	412 752 321
Imaging	226 591 701	113 295 851
Total	**2 456 885 592**	**1 204 858 916**

Analysis Oslo Economics

6.6 Basic and attendance benefits

For both basic and attendance benefits, diagnosis is missing for 15-17 percent of the recipients in the diagnosis database, and the payments to persons with back and neck conditions are therefore probably higher than the statistics show. There is also uncertainty about the update of the diagnosis data and whether all are registered with the last diagnosis.

In 2017, people with back and neck conditions received just over NOK 28.6 million in basic support from NAV. In the same year, NOK 19.4 million was paid in attendance benefit to people with back and neck conditions.

Tabell 6-6: Basic and attendance benefit

Benefit type	Amount (2017 MNOK)
Basic benefit	28,6
Attendance benefit	19,4

Source: NAV

6.7 Tax financing costs

If interventions or transfers are financed by taxes, a socioeconomic cost will arise as a result of reduced incentives to work due to tax and the costs associated with collecting the tax. This cost is often referred to as the tax financing cost.

According to the Ministry of Finance's report on principles and requirements when preparing socioeconomic analyses (Finansdepartementet, 2014), the tax financing cost constitutes 20 percent of publicly funded costs.

About 85 per cent of healthcare services are financed from public budgets. We have therefore calculated a 20 percent tax financing cost for this proportion of health and care costs related to back and neck pain. For 2018, we find that total health care costs related to back and neck pain amount to NOK 8.7 billion; consequently, the tax financing cost amounts to NOK 1.7 billion.

In addition, public expenses for sickness benefits, work assessment allowance, and disability pension amount to NOK 37.6 billion, which corresponds to a tax financing cost of NOK 7.5 billion.

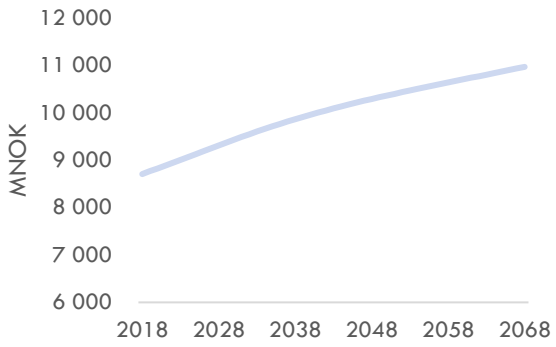
The total tax financing cost for back and neck conditions in 2018 is thus estimated at NOK 9.2 billion.

6.8 Prognoses for health care costs

To illustrate how health care costs related to back and neck pain are likely to increase in the years to come, we have calculated the average health service cost per person based on the estimated health service costs for 2018. Furthermore, we have used data from Statistics Norway's population projection (Statistics Norway table 07459). We have assumed that the average health care cost per person is kept constant over the period so that the changes are driven by an altered population composition. There is reason to believe that health care and healthcare costs will change significantly over the next 50 years, and the forecast should therefore be interpreted with caution.

Our simplified projections show that healthcare costs will increase by 25.9 percent from 2017 to 2068 (Figure 6-1).

Figure 6-1: Prognosis for health care costs, 2018-2068, 2018-NOK.



Source: Oslo Economics

7. A societal challenge

This report highlights that musculoskeletal pain has significant implications for patients and their relatives, employers, and the welfare society. All relevant measures that can improve functional ability and quality of life should be evaluated and systematically piloted. Research-based knowledge is needed on how to better diagnose, treat, and prevent back and neck conditions in Norway.

Back and neck conditions are characterized by the causes being unclear, diverse, and complex. Compound and everyday conditions have limited prestige and are under-prioritized in both research and treatment.

Back and neck conditions are not dramatic in the sense that it causes early death to a large extent. However, these conditions constitute a widespread societal problem affecting many and reducing their quality of life and ability to work. A number of measures should be considered, both in the health service, working life and in the production of evidence.

7.1 Patient care pathways, increased multidisciplinary work and improved coordination

The health service already has a comprehensive service provision, but there is still a need to strengthen the service's ability to diagnose and treat back and neck conditions and ensure the right health care for the right disease problem.

Several, including the Government in their "Granavold platform", have pointed to the development of care pathways for patients with musculoskeletal disorders as a measure to improve quality and ensure better use of resources. This can potentially also strengthen the role of primary health care and prevent overdiagnosis and overtreatment.

Back and neck conditions often do not have one specific cause, but a combination of risk factors that can be psychosocial, lifestyle and occupational and genetic (Hartvigsen, et al., 2018). Knowledge about causes, prevention and treatment is increasing, but there is still a need for better knowledge and better coordination.

The Norwegian Directorate of Health has emphasized that the municipalities must take greater responsibility for patients with musculoskeletal disorders and that this requires interdisciplinary measures and interaction between the health service levels. This includes increased interaction between the public and private actors in the primary health service.

7.2 Coping, activity and work participation

Absence from working life (absenteeism) in the form of sick leave or transfer to work assessment allowance or disability pension entails very high costs for society. Similarly, we have highlighted the costs in the form of ineffective work as a result of back and neck pain (presenteeism). The employer can help with the organization of work tasks and the organization of the work, both to prevent pain in the first place and to make it possible to stay at work even if you experience pain and symptoms. In the organized working life, this is already happening to a large extent.

Furthermore, the authorities should design the tax and social security schemes so that the individual is motivated to work as long as it is justifiable. A workplace to go to provides meaningful tasks and important social arenas. For the individual, it is of great value to limit sick leave that can quickly lead to persistent absence from work.

The health service can contribute with accurate diagnosis and rapid clarification and knowledge-based treatment. It will be crucial to initiate measures such that individuals can cope with the back and neck conditions, such that sick leave is only used when this is medically necessary.

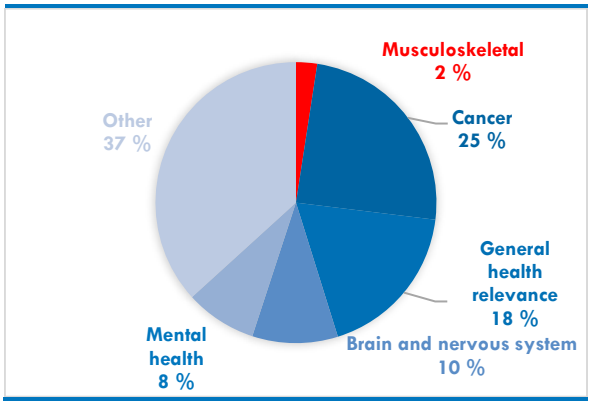
In recent years, the health service has increasingly focused on preventive measures. It will be essential to strengthen preventive measures for back and neck conditions, which mainly include lifestyle measures such as smoking cessation, physical activity, and diet.

7.3 Can societal challenges be solved through increased knowledge?

To improve the prevention, diagnosis and treatment of back and neck conditions, research-based knowledge of these conditions is needed. Still figures from Health

Research Classification System (HRCS)[2] show that the proportion of research funding for musculoskeletal disorders only accounted for 2 percent of the total funding for health research projects (a total of NOK 2.6 billion) from the regional health enterprises, the Research Council, the Cancer Society and the EU in 2017. Funds for research related to back and neck conditions have also been granted from the ExtraStiftelsen.

Figure 7-1: Research grants from regional health enterprises, the Norwegian Research Council, the Cancer Society and EU, 2017.



Source: Health Research Classification System

[2]Health Research Classification System (HRCS) classifies health research projects in the type of research conducted, research activity, and the relevance of the research to health and disease, health category. Available at: https://www.helseomsorg21monitor.no/figur/43?chartType=bar-stacked&Kategori=Helsekategori&%C3%85rstall=2017.

8. References

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Appendix

Appendix Table 0-1: Diagnostic codes included in the analysis

ICPC-2	ICD-10					ICD-9		
L01	G55.1	M46.0	M50.2	M99.1	S32.8	353.8	723.3	737.29
L02	G55.2	M46.1	M50.3	M99.2	S33.0	718.38	723.4	737.30
L03	G55.3	M46.2	M50.8	M99.3	S33.1	720.1	723.5	737.31
L83	M40.0	M46.3	M50.9	M99.4	S33.2	720.2	723.6	737.32
L84	M40.1	M46.4	M51.0	M99.5	S33.3	720.81	723.8	737.33
L85	M40.2	M46.5	M51.1	M99.6	S33.5	720.89	724.00	737.34
L86	M40.3	M46.8	M51.2	M99.7	S33.6	720.9	724.01	737.39
	M40.4	M46.9	M51.3	Q67.5	S33.7	721.0	724.02	737.41
	M40.5	M47.0	M51.4	Q76.0		721.1	724.09	737.42
	M41.0	M47.1	M51.8	Q76.1		721.2	724.1	737.43
	M41.1	M47.2	M51.9	Q76.2		721.3	724.2	737.8
	M41.2	M47.8	M53.0	Q76.3		721.41	724.4	738.4
	M41.3	M47.9	M53.1	Q76.4		721.42	724.5	754.2
	M41.4	M48.0	M53.2	S14.0		721.5	724.6	756.12
	M41.5	M48.1	M53.3	S14.1		721.6	724.70	756.16
	M41.8	M48.2	M53.8	S14.2		721.7	724.9	756.17
	M41.9	M48.3	M53.9	S14.3		721.8	729.2	839.00
	M42.0	M48.4	M54.1	S14.4		721.90	730.28	839.20
	M42.1	M48.5	M54.2	S14.5		721.91	730.98	839.21
	M42.9	M48.8	M54.3	S14.6		722.80	732.0	839.42
	M43.0	M48.9	M54.4	S22.0		722.81	732.8	839.69
	M43.1	M49.0	M54.5	S22.1		722.90	732.9	
	M43.2	M49.1	M54.6	S23.0		722.91	737.0	
	M43.3	M49.2	M54.8	S23.1		722.92	737.10	
	M43.4	M49.3	M54.9	S23.2		722.93	737.11	
	M43.5	M49.4	M96.1	S23.3		723.0	737.12	
	M43.6	M49.5	M96.2	S32.0		723.01	737.19	
	M43.8	M49.8	M96.3	S32.1		723.02	737.20	
	M43.9	M50.0	M96.4	S32.2		723.1	737.21	
	M45*	M50.1	M96.5	S32.7		723.2	737.22	

***M45 is not included in the estimates for private practicing specialists (data from KUHR) and estimates for benefits from NAV.**

Appendix Table 0-2: DRG codes and imaging codes (NCRP-codes) included in the analysis.

DRG (I)	DRG (II)	NCRP (I)	NCRP (II)
4	215B	SNE0BD	SNA0KA
8	215C	SNB0BD	SNB0BK
9	215O	SNA0AD	SNA0AK
18	234O	SNA0BD	NAI30A
19	475A	SNA0ED	NAI30D
76	801R	SNA0GD	NAI31A
77	801W	SNA0JD	NAI31D
83	801X	SNA0KD	NAI32A
84	808H	SNE0BG	NAI32D
101	808U	SNB0BG	NAI33A
102	877O	SNA0AG	NAI33D
212	901C	SNA0BG	
223	901E	SNA0EG	
231	901O	SNA0FG	
234	904O	SNA0GG	
236	908A	SNA0HG	
237	908C	SNA0SG	
243	908F	SNA0JG	
244	908H	SNA0KG	
245	908O	SNB0EA	
256	980A	SNE0BA	
475	980D	SNE0CA	
477	980H	SNB0BA	
483	981X	SAB0CA	
486	996P	SAB0EA	
487	997O	SAB0GA	
209D	998O	SNA0AA	
210A		SNA0BA	
210N		SNA0CA	
211A		SNA0FA	
214A		SNA0GA	
214B		SNA0HA	
214C		SNA0JA	

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