Child healthcare atlas for Norway

An overview and analysis of publicly funded somatic health services for children (0-16 years) in Norway in the period 2011-2014.

Helseatlas | SKDE

SKDE report	Num 5/2017
Main author	Atle Moen
Managing editor	Barthold Vonen
Editor in chief	Olav Helge Førde
Co-authors	Bård Uleberg, Frank Olsen, Arnfinn Hykkerud Steindal, Petter Otterdal, Trygve Deraas, Trine Magnus and Lise Balteskard
Awarding authority	Ministry of Health and Care Services, and Northern Norway Regional Health Authority
Date (Norwegian version)	September 2015
Date (English version)	September 2017
Translation	Allegro (Anneli Olsbø)
Version	September 6, 2017

Front page photo: Shutterstock

ISBN: 978-82-93141-27-3

Foreword, Northern Norway RHA

It is with great pleasure that I introduce a new publication on helseatlas.no: Child Healthcare Atlas for Norway. This edition is the first part of the national assignment that the Ministry of Health and Care Services gave the Northern Norway Regional Health Authority (RHA) and the Centre for Clinical Documentation and Evaluation (SKDE) in January 2015, and it will be developed in cooperation with the Western Norway RHA and the Norwegian Directorate of Health.

The Child Healthcare Atlas was initiated by Senior Consultant Atle Moen on behalf of the Norwegian paediatric medicine community. Moen is also the main author of the associated report. For an expert community to initiate such an analysis of national variation in the use of health services in their own area of practice is an unprecedented phenomenon and a great strength. Combined with SKDE's competence and existing infrastructure, this validates the legitimacy of the work carried out and the findings made. I hope that this will result in an even stronger cooperation on quality, prioritisation and resource utilisation in the medical field for the benefit of all children in need of healthcare.

It is very important for the regional health authorities that are responsible for providing good, adequate and equitable specialist health services to the population to have access to knowledge about the content of and distribution of the health services provided. A healthcare atlas is an important instrument in this respect, and I am looking forward to new editions with great anticipation.

Bodø, 24 September 2015

Lars Vorland
Managing Director,
Northern Norway RHA

Foreword, the Norwegian Society of Pediatricians

The Norwegian Society of Pediatricians (NBF) is committed to ensuring that children in Norway should have equitable access to health services regardless of where they live, and that the available resources be used in the best possible way to promote good children's health. The NBF therefore initiated an internal benchmarking study between paediatric departments in Norway that was carried out in 2012 and 2013. The intention behind this was that we can improve by learning from each other. The benchmarking study was supported by the biannual meeting of medical directors. This work revealed significant variations in activity and use of resources between comparable departments. The work was demanding in terms of resources, but there was general agreement that it was useful.

The Norwegian healthcare atlas for day surgery was launched in January 2015. The medical directors and NBF's board met shortly thereafter. The question of approaching SKDE to create a child healthcare atlas as a continuation of the benchmarking study was raised, and gained broad support from the group. We saw an opportunity to get population-based, quality-assured and up-to-date information about the use and distribution of paediatric health services in Norway. By actively participating in this work, we could also help to ensure that the most clinically relevant questions were asked and that attempts were made to answer them. The expert community would then also feel a sense of ownership of the results. The reference group from the benchmarking study continued to assist with this new project.

We are proud to have been involved in launching the first part of the Child Healthcare Atlas. It shows a considerable use of paediatric health services, both in primary healthcare and in the specialist health service, and with significant variation in distribution. This is in a country that has one of the healthiest child populations in the world. The results will be useful for people in positions of leadership as well as for healthcare professionals.

NBF will use the data to try to identify the reasons underlying these differences and determine how the service provision in different hospital referral areas can become more harmonised. Again: How can we learn from each other in order to improve health services and optimise resource utilisation? We must also look at the interaction with primary healthcare services, and also contribute to the population's general health education, enabling parents to feel more confident when children contract common illnesses that can be dealt with at home.

I would like to thank Senior Consultant Atle Moen from Oslo University Hospital's Department of Neonatology, who has, on behalf of NBF and in cooperation with SKDE, played a key role in the work on the Child Healthcare Atlas.

Bodø, 21 September 2015

Ingebjørg Fagerli
Head of the Norwegian Society of Pediatricians

Contents

Chapter 1

Summary

This report covers all publicly funded somatic health services for children (0–16 years) in Norway in the period 2011–2014. Child and adolescent psychiatry is not included. A review of all children's contacts with primary healthcare services (approx. 7.1 million consultations) and the specialist health service (approx. 3.5 million consultations and admissions) for the years 2011 to 2014 shows a significant scope and surprising geographical differences in the use of health services provided to what is assumed to be the healthiest child population in the world. One in three children are in contact with the specialist health service on an annual basis, while two thirds have at least one primary healthcare consultation.

Being admitted to hospital can be quite stressful for a child, and there is broad agreement, which is also reflected in regulations, that children should only be admitted when it is necessary in order to ensure good treatment.

There are surprisingly big geographical differences in hospital admissions of children. For example, children from Vestfold hospital referral area are admitted twice as often as children from Vestre Viken.

There are also considerable differences in the use of outpatient/day patient treatment for children. Forty per cent more children from Sørlandet hospital referral area attend outpatient consultations compared with children in the Stavanger area. Asthmatic children from Akershus hospital referral area have almost four times as frequent specialist health service consultations as children from Vestfold hospital referral area, and specialists in private practice cover 70–80% of all consultations for asthma in the areas with the highest usage rates.

Emergency care services is an important part of the specialist health service, and is crucial to the population's perceived safety. When the number of times patients have been in contact with the health service is analysed for a large number of acute diagnoses (29,000 consultations and 12,000 hospital admissions), considerable geographical differences emerge in this area as well. For example, children in the hospital referral areas of Vestre Viken and OUS are in emergency care contact with a hospital twice as often as children in Finnmark hospital referral area. Children from the hospital referral areas of Vestfold, Telemark and Sørlandet are admitted to hospital twice as often as children from the areas Vestre Viken and OUS. The only possible explanation for these variations in the use of emergency care services is that there are great differences in what is regarded as needing emergency care and hospital admission. There is no obvious medical explanation for these differences, which are most likely due to local tradition and habits.

There are no indications that there are significant geographical differences in overall morbidity

among children in Norway. Nevertheless, there are considerable differences in the use of hospital services. Nor does there appear to be any link between the distance to hospital and how often children are admitted. The extensive use of paediatric health services and the geographical differences identified give reason to ask whether there is an overuse of health services.

At the same time, there is also reason to ask whether extensive use of health services by essentially 'healthy' children with normal childhood illnesses take place at the expense of groups with chronic or life-threatening conditions that have an impact on their quality of life and health for the rest of their lives.

Both the extent of variation and the potential overuse of health services give reason to question whether children receive equitable health services and whether this affects quality and patient safety. Paediatric medicine is a discipline that has national treatment guides and guidelines for most common illnesses developed by the specialist community itself. They are in active use at all paediatric departments. The geographical variation identified suggests that these guidelines are applied differently in different hospitals.

This healthcare atlas for somatic health services describes an unwanted geographical variation and a potential overuse of children's health services. This new insight can be used to assess current priorities.

Chapter 2

Introduction

2.1 On variation in the use of health services

2.1.1 Background

In 1938, the English paediatrician James Alison Glover published a study that showed considerable geographical differences in the rate of tonsillectomy among English schoolchildren, and that both variations in the practice of surgeons and socioeconomic circumstances contributed to these differences (Glover 1938).

Research on variation in the use of health services continued, particularly in the milieu around Professor John Wennberg and Dartmouth College in Vermont, USA. In the late 1960s, Professor Wennberg was responsible for the introduction of the public health insurance scheme Medicare in Vermont, and he was concerned about whether all the residents were receiving the health services they were entitled to. Together with Alan Gittelsohn he started mapping the resource input and the population's health service coverage based on what have subsequently been called 'hospital referral areas', in Norwegian 'boområder', as defined in this report. Wennberg found unexpectedly big variations between hospital referral areas in the use of almost all kinds of health resources, including personnel and expenses. He also found a very high variation between nearby hospital referral areas in the rates of surgical procedures such as appendectomy (four times), tonsillectomy (twelve times) and several other procedures. The remarkable thing was that there was great variation between neighbouring areas just a few blocks apart, and that it was not possible to explain these differences by differences in morbidity. When Wennberg and Gittelsohn tried to publish their results in medical journals, they were rejected repeatedly, because the editors simply could not believe that the results could be correct. Finally, the reputable journal Science published the article because they found the method credible and the conclusions worthy of attention. The work was published in 1973 under the title 'Small area variation in healthcare delivery' (J. Wennberg and Gittelsohn 1973).

In the 1990s, the group published The Dartmouth Atlas of Health Care.[1] The atlas describes the variation in the use of health services for all parts of the American health service across several hundred hospital referral areas in the USA, and it has had an impact on the American health policy debate. Internationally, the atlas has become the prototype for a growing number

[1] http://www.dartmouthatlas.org

of national healthcare atlases that, interestingly, find a corresponding variation in the use of health services - regardless of how the health services are organised and funded.

Wennberg's research was met with both silence and criticism from parties involved in the health service, particularly from parts of the medical community. Yet it has also been published in some of the world's most prestigious medical journals. Its findings challenge the idea of doctors' rational and evidence-based choices in patient treatment. Other research communities, including some in Europe, have focused on studies of variation in the use of specialist health services, in addition to analyses carried out by e.g. Right Care in the UK and other analysis environments.

2.1.2 Variation in paediatric medicine

In 1989, Wennberg's group published the article 'Variations in rates of hospitalization of children in three urban communities' in the New England Journal of Medicine' (Perrin et al. 1989), together with paediatrician Donald Berwick, who later founded the Institute for Health Improvement (IHI), among others. The article describes great variation in rates of hospitalisation between the three hospital referral areas of Rochester, New Haven and Boston, all associated with some of the most highly ranked teaching hospitals in the USA. The rate of hospitalisation for children in Boston was more than twice as high as for Rochester, and varied by a factor of more than six for certain diagnosis groups. However, the doctors at the paediatric departments in the three areas studied were completely unaware of the existence of any differences in practice.

In recent years, articles have regularly been published describing variation in paediatric medicine in areas ranging from neonatal medicine to emergency care, asthma, diabetes, medication for behavioural disorders and many other conditions in children. A selection is included in the list of supplementary literature at the back of this report. In November 2014 the journal *Pediatrics* published an article entitled 'Overdiagnosis: How our compulsion for a diagnosis may harm children' (E. R. Coon et al. 2014). This article shines a critical light on the health service's search for the abnormal and its potentially adverse consequences on patients and resource use.

2.1.3 What are the mechanisms that create variation?

There could be many reasons why the use of health services varies between geographical areas. The variation may be due to factors such as differences in morbidity or the population's composition, differences in medical practice and service provision, or differences in patient preferences. Random variation may also play a part. This is particularly relevant in the case of analyses of areas with small populations or less common health services. Such random variation is natural and expected. However, there are no indications that there is any significant geographical variation in morbidity between the different health trusts' hospital referral areas in Norway. When figures are adjusted for differences in the population's composition, there is therefore no reason to expect a systematically skewed distribution of children's health services. The variations identified in this atlas are thus variations that cannot be explained by differences in needs and morbidity and that can be characterised as unwarranted variation.

In order to analyse and describe variation, Wennberg has defined three different categories of care with different degrees of variation (J. E. Wennberg 2010).

The first group comprises conditions with clear diagnostic criteria for which patients always seek healthcare, for which hospitalisation is the only treatment option, and for which known effective treatment exists. This group is characterised by the fact that the treatment rate reflects the actual

prevalence of these conditions in the population. It was estimated that approx. 10–15% of all treatment provided by the specialist health service concerns patients that fall within this group. Examples include hip fractures and colon cancer. If major variation between hospital referral areas is found for such conditions, there is reason to consider whether there are differences in morbidity or whether there is an actual undercapacity. Alternatively, the variation could be due to patients not receiving necessary care or receiving the wrong treatment.

The second category covers variation for preference-sensitive care. This describes variation in use of health services in cases where there are normally several treatment options and where the indications for and health benefit from the procedure may be unclear or controversial in the medical community. It is estimated that approx. 25% of all treatment provided by the specialist health service concerns this type of conditions. This is particularly the case in surgical disciplines, where the preferences and subjective judgement of the surgeon or department influence the choice of treatment, sometimes even conflicting with good evidence-based practice. There will often be greater variation in this category. Examples are well documented in the healthcare atlas 'Day Surgery in Norway 2011–2013' (Balteskard et al. 2015), which shows sometimes considerable variation between hospital referral areas in knee surgery, shoulder surgery, tonsillectomy and several other procedures that cannot be explained by underlying factors such as demographics and morbidity in the population. Ideally speaking, the patients' informed choices and preferences should have an effect on the choice of treatment when several options are available. However, there is good documentation to show that physician preferences have largely governed patient preferences. The variation observed in this category has largely been interpreted as provider-governed. Increased focus on patient participation, for example through shared decision-making, can change this situation. Shared decision-making makes patients more capable of making informed decisions regarding treatment options independently of provider preferences.[2]

The third category defined by Wennberg is variation in what he calls supply-sensitive care. Such variation is believed to be the most important reason for variation in the health service and accounts for 50–60% of the specialist health service's activity. It is characterised by the availability of health services in the form of hospital beds, ICU capacity, medical specialists and diagnostic imaging capacity in turn influencing the demand. When there is an increase in capacity, more patients will be treated until the capacity is filled, without this necessarily resulting in improved health either at an individual or at a population level.

2.1.4 What is unwarranted variation?

The factsheets and the report use the term unwarranted variation. What this means here is a variation in use of health services that cannot be explained by known differences in morbidity or general framework conditions such as level of education and economic differences. We have not been able to adjust for all these factors between hospital referral areas, since they are not fully known. However, there is little or nothing to indicate that there is a significant overall variation in child morbidity between the 18 hospital referral areas in Norway. A study carried out on the geographical distribution of asthma in children found no differences between urban and more rural hospital referral areas (Nystad et al. 1997).

One of few conditions where it is likely that there would be a difference in morbidity between hospital referral areas is infections triggered by Borrelia burgdorferi, as the deer tick is almost never found in Northern Norway. A variation between the northern and southern parts of Norway

[2] See e.g. http://minebehandlingsvalg.unn.no/

is to be expected, but the volume of such infections treated in hospital is so low that it would not have any effect on the general variation in usage and patient rates.

The distance to hospital could conceivably influence variation. In that case, one would expect more patients to be hospitalised in hospital referral areas with long travel distances, such as Nordland, Troms and Finnmark counties, compared with other areas. However, when we look at the actual variation pattern for hospital admissions in the three hospital referral areas, we see that they are spread across the whole range. The same pattern is seen for emergency admissions of children. On the other hand, we also find that neighbouring hospital referral areas in the central parts of Eastern Norway, such as Vestre Viken, Telemark, Akershus and Vestfold, represent the extremes of usage and patient rates both for admissions and outpatient services. In these areas, most of the population lives in core areas around the hospitals, and it thus seems that the travel distance to hospital has no systematic effect on the variation in usage rates.

Differences in (parents') education and economic circumstances can also influence the use of health services, but what effect, if any, they may have on variation is not obvious.

2.1.5 Variation and prioritisation

Unwarranted variation in the use of health services represents a lack of equality in the distribution of health resources and an inability to prioritise based on severity and need. The term health resources must be understood to encompass more than just funding, for example medical technology equipment (MR machines), professional staff (plastic surgeons, theatre nurses), hospital bed capacity (intensive care beds) or outpatient clinic appointments (specialist doctors).

If part of this variation is due to overuse that does not lead to a health gain, then scarce health resources are being used on the wrong patients, and this is displacing or delaying the treatment of patients that could have benefited more from treatment. Simply increasing the supply of resources in a situation with high unexplained variation maintains overuse at the same time as one is trying to increase treatment capacity. The result could be that overtreatment increases because the fundamental reasons underlying the incorrect prioritisation are not being addressed. In many situations, such as scarcity of healthcare professionals, it is not possible to increase capacity, because it takes between five and ten years to train doctors and nurses to fill specialist functions. This entails a risk that incorrect prioritisation will continue for a long time.

This is a real situation in the Norwegian health service, which is part of the reason for the need to introduce standard patient pathways for cancer. The availability of MR examinations was one of several limitations in this connection. The third Norwegian National Committee on Priority Setting in Health Care (NOU (2014:12)) received feedback from the specialist communities that there was an overuse of MR examinations for musculoskeletal problems without any bearing on treatment decisions on the one hand, and, on the other, an undercapacity for examinations of patients being assessed for cancer and multiple sclerosis.

Resource use will come under pressure in the near future from new cancer drugs that are expensive, but are expected to have a good effect. We may then also see a situation of unwarranted variation in treatment in serious and life-threatening illnesses in paediatric medicine.

It is therefore necessary to map unwarranted variation in the health service in order to make rational and evidence-based prioritisation decisions both at the micro- and macrolevel, and to ensure that the population has equitable access to health services.

2.1.6 Variation, quality of treatment and patient safety

Unwarranted variation represents a threat to quality and patient safety. If the variation is caused by some patient groups being allocated less resources or sub-optimal treatment, this also represents a threat to the goal of equitable health services.

If variation is caused by an overuse of health services, that entails a threat to patient safety. Any contact with the health service carries with it a certain risk of illness, complications or injuries, regardless of the original reason for the contact.

All paediatricians with some years' experience have seen patients being admitted to hospital with one viral infection and discharged with another due to infection being transferred during the hospital stay. It is even more serious that all admissions or consultations are associated with a risk of incorrect medication or treatment being administered or serious wound infections and complications arising from surgical or intensive medical treatment. If the patient could do more or less equally well without the treatment, that means that the not negligible risk of complications will result in a poorer outcome for the group overall than if no treatment had been provided.

It is now being discussed in the USA whether significant overdiagnosis and overtreatment in parts of the health sector are actually lowering the quality of the health service, i.e. whether the outcomes are poorer than they would have been with a less aggressive approach. This means that it is not sensible to examine, admit or treat patients to be on the safe side. On the contrary, it is generally safer not to if one is uncertain about whether the outcome will result in a significant improvement of the patient's health.

Mapping variation is therefore a necessary part of patient safety work, in order to ensure that patient groups that do not benefit much from a form of treatment or a procedure are not exposed to unnecessary risk. At the same time, variation caused by underdiagnosis and undertreatment will result in a poorer treatment outcome or level of function than could otherwise have been achieved.

Chapter 3

Children's health services in Norway

3.1 Structure

Health services for children in Norway are provided by different categories of healthcare professionals and a variety of medical specialists. All doctor's consultations for children up to 16 years of age are fully covered by the Norwegian Health Economics Administration (HELFO) with no patient charges.

Primary healthcare is the first-line service for children in Norway, and all children are registered with the same GP as their mother. Children are also seen by the municipal emergency primary healthcare service in case of acute illness. Before children can be referred to a specialist, they must be assessed by a primary care physician, who thus performs what has been called a gatekeeper function for the specialist health service, even for acute conditions.

Paediatric departments with doctors and nurses that specialise in children's diseases and the challenges that illness involves for children and their families form the core of the specialist health services for children. Most hospital referral areas have a paediatric department. For historical or geographical reasons, Møre og Romsdal, Sørlandet and Innlandet have two each. In Troms and Nordland, a higher percentage of children are treated in adult units at the nearest local hospital for uncomplicated conditions that require short-term hospitalisation than in other hospital referral areas. Some of these hospitals employ a paediatrician to run an outpatient clinic for children and see hospitalised children during the day. In hospital referral areas with long travel distances, such as Finnmark, Troms, Nordland and Vestre Viken, there are outpatient clinics outside the paediatric department which are staffed by visiting doctors from the department.

In addition to paediatric departments, there are paediatric specialists in private practice under public funding contracts in some, but not in all, hospital referral areas. The highest concentration of such specialists are found in the hospital referral areas of OUS, Vestre Viken, Ahus and St. Olavs, but there are also some specialists in private practice under public funding contracts in the areas of Østfold, Sørlandet, Bergen and Telemark. Children are also treated by other specialists in private practice. Such specialists are found in all the hospital referral areas. However, the percentage of children treated by doctors from other specialities is lower than the percentage treated by specialists in paediatrics.

Children who are injured, have surgical diagnoses or are in need of surgery are treated by sur-

geons. Most paediatric departments have a children's centre function whereby children are physically placed in the paediatric department and cared for by its nurses, even if they are treated by surgeons and are administratively speaking admitted to another department. Paediatric departments are adapted for children, and the nursing staff is trained to attend to the needs of children and their parents. There is usually good interdisciplinary cooperation at doctor level between paediatricians and surgeons, and they often discuss the treatment with each other. Although the Child Healthcare Atlas has defined a distinction between paediatric surgery and medicine, this is not an absolute distinction in day-to-day practice. There are only two paediatric surgery departments in Norway, one at St. Olavs Hospital and one at Oslo University Hospital (OUS). These departments primarily treat children with cancer and congenital abnormalities, and perform neonatal surgery.

Treatment of rare or highly demanding conditions such as cancer, congenital abnormalities or extremely premature babies is partially centralised to university hospitals with regional functions. Children with such conditions are treated in close collaboration between the regional department and the local paediatric department.

There is very little fully private medical treatment of children, i.e. treatment outside of the publicly funded health service. Volvat Medical Centre in Oslo has an outpatient clinic and an emergency primary healthcare service for children which is staffed by a specialist. This service mostly functions as an emergency primary healthcare clinic and performs simple medical assessments, and does not to any great extent replace hospitals' specialist outpatient clinics. Some ENT procedures are carried out in private hospitals with public funding, and these procedures are included when such procedures are analysed in this report.

3.2 Professional cooperation

The different departments within the paediatric speciality cooperate well. The Norwegian Society of Pediatricians organises professional meetings twice a year with participants from all the departments. In connection with these meetings, meetings are also held between medical directors. The paediatric community is relatively small, and many informal contacts and networks have been established across departmental boundaries. The Norwegian Society of Pediatricians has established sub-speciality interest groups that meet regularly to discuss professional matters and guidelines.

The Norwegian Association of Paediatric Surgery is a sub-group of the Norwegian Medical Association and works on specific issues relating to cancer surgery, congenital abnormalities and surgical treatment of newborns. The other surgical specialities, which treat most children in need of surgery, do not to the same extent have dedicated forums that specifically focus on surgical treatment of children. Surgical issues relevant to children fall under the scope of the individual surgical disciplines that also treat adults.

3.3 Professional guidelines

The Norwegian paediatric community established common national guidelines quite early. The first was the emergency medicine guide published in 1998, most recently revised in 2013, then came a general paediatrics guide that was published in 2006 and revised in 2011. Both guides are

in daily use at all paediatric departments and generally accepted by the professional community. They are now available as apps for smartphones.

Many departments have also prepared what are known as clinical pathways for frequent conditions such as bronchiolitis (viral infection of the respiratory tract) and obstipation (constipation). These are comprehensive documents intended to address all aspects of indications, treatment and follow-up of children based on scientific documentation. In many hospital referral areas, meetings and courses are organised in cooperation between the local paediatric departments and GPs. Both paediatric guides and local clinical pathways and guidelines have been made available.

3.4 Illness and morbidity among Norwegian children

Considerable differences have been found in life expectancy and morbidity in the adult population depending on people's background, education and where they live. These differences are largely lifestyle-related and have an increasing impact on health through life. Lifestyle factors will therefore be less important to morbidity among children. It cannot be ruled out completely that economic framework conditions are a cause of variations in morbidity, but the effect will be expected to be small in a Norwegian welfare system with small differences and unimpeded access to health services. The same would be expected for variation in conditions between hospital referral areas.

Relatively big differences have also been found between Norwegian municipalities in terms of the amount of resources spent on the childhood environment in general (KOSTRA[3]). However, so far there is nothing to indicate that these differences influence children's health. More research is required in this field before any conclusions can be reached.

Children's health services must take different circumstances into consideration than health services for adults. The unique thing about childhood is that it is a phase of rapid and continuous physical as well as mental development. Chronic or serious acute illness is a life event with the potential to disrupt this development. Therefore, long waiting times for assessment of illness and symptoms in children are more unacceptable than for adults.

Children depend completely on their parents or caregivers when they are ill. A lot of time must be spent taking care of and teaching parents how to care for their sick child. It is a great mental strain for the parents when a child falls ill. Often, a treatment team must be put together for the whole family, not just for the person defined as the patient.

Norwegian children are among the healthiest in the world. Child mortality (the number of children who die before the age of 5 years) was 18 per 1,000 live births in 1961, and in 2013 it was 2.8.[4] The figure has been falling throughout the period. Only Finland, Iceland and Luxembourg have lower child mortality rates. Most of the drop must be ascribed to preventive work outside of the specialist health service's area of responsibility. In 1970, 100 children under the age of 16 years were killed in traffic accidents. The corresponding figure for 2014 was 5. The development and support for the Norwegian childhood immunisation programme over time has prevented thousands of deaths and cases of serious illness with associated after-effects.

The number of children admitted to hospital varies through the year, with the winter season being the high season. Most children admitted need supportive care and medication until symptoms

[3] http://www.ssb.no/offentlig-sektor/kostra
[4] http://www.globalis.no/Statistikk/Barnedoedelighet

abate. Some conditions, such as breathing difficulties in small children or dehydration caused by gastroenteritis, can be life-threatening if adequate treatment is not administered quickly enough. Children with complex health problems and development disorders regularly need hospitalisation and assessment. Deaths among children admitted to children's departments are relatively rare.

The majority of children's outpatient contacts concern minor injuries, symptoms such as stomach ache or headache, issues relating to growth and development, respiratory tract symptoms and allergies, viral infections, clarification of incidental findings from medical examinations or a wish expressed by a health clinic, GP or parents for a second opinion of a symptom or condition. Many appointments are also follow-up appointments in connection with previous admissions or outpatient consultations.

Serious acute infections with septicaemia or meningitis are many parents' greatest fear, and probably an important reason why parents want to have children with a fever assessed by the health service. Before vaccination against haemophilus influenza was introduced in 1992, up to 200 cases a year of serious infection or meningitis caused by this bacterium were reported to the Norwegian Surveillance System for Communicable Diseases (MSIS). In recent years, none or only isolated cases have been reported.

Before the pneumococcus vaccine was introduced in 2006, 70–90 serious cases in children were reported each year. Approximately 35 cases of pneumococcal disease in children are still reported each year, but deaths or meningitis caused by pneumococcus are now very rare. Such infections can cause severe brain damage in survivors. The vaccine has also reduced the number of cases of pneumonia and middle ear infections.

Serious infections caused by bacteria that are not covered by the childhood vaccination programme also seem to have become more rare. The meningococcus epidemics in the 80s and 90s killed several children and young people every year. Since 2003, 11 children and young people have died from meningococcus disease. In the period 2011–2014, an average of 11 cases of meningococcal disease per year have been reported in children aged 0–15 years.[5]

Septicaemia or meningitis in children after the neonatal period have become so rare that even the big paediatric departments only see a few cases a year. It can be a challenge for paediatricians in training to get sufficient experience of assessing and treating such cases.

Each year, approx. 150 Norwegian children are diagnosed with cancer. They will need extensive treatment and follow-up, usually for a period of between one and four years. The two most common types of cancer are bone marrow cancer (leukaemia) and brain tumours. The rest of the cases are other and rarer forms of cancer. Many forms of cancer common among adults do not occur in children. About 80% of the children diagnosed with cancer survive, but some of them experience after-effects and persistent health problems. A few years ago, children with cancer would be hospitalised for several periods lasting weeks and months, but in recent years, treatment is to a greater extent provided in outpatient clinics and day patient units. This means that cancer does not have the same impact on the child and family's everyday life as it once did.

Each year, 350 children develop type 1 diabetes, and the incidence has increased over the past decade. A total of approx. 3,500 children under the age of 16 live with diabetes in Norway. This is a group of patients who will live with their disease for the rest of their lives, and the quality of follow-up and treatment they receive can make a huge difference in terms of life expectancy as well as health and quality of life in later life.

It has been stated that between 1,500 and 3,000 children per year are born with one or more

[5] Source: http://www.fhi.no/helseregistre/msis

abnormalities (Parelius and Aag 2008). Most of these are not serious and resolve spontaneously or are treated with simple surgical procedures. Some, however, require more extensive treatment and are of a nature that will affect the child's health and quality of life for the rest of his or her life.

Heart defects account for a large proportion of congenital abnormalities. About 500 children per year are born with a heart defect, and about 200 of them will require surgical treatment. Approximately 50–100 children per year will continue to live with a heart condition which will have a severe impact on their health and quality of life. These children need regular follow-up by the specialist health service.

Approx. 10% of all newborns are admitted to a neonatal department for a short or longer period. Most of them are discharged from hospital as healthy. However, some children, such as those who are extremely premature or have been harmed by a lack of oxygen during birth, will need further follow-up through their childhood years, and some also into adulthood.

Norwegian studies state that 20–25% of Norwegian children have or have had asthma by the age of 10 years (Carlsen et al. 2006), but the severity of the disease varies greatly. No geographical differences in the prevalence of asthma have been found (Nystad et al. 1997). As a result of better medical treatment, the proportion of children with severe asthma who need to be hospitalised has dropped (MacFaul 2004). Most children with asthma are mildly afflicted and only use medication when they experience symptoms or contract respiratory tract infections. Many children grow out of asthma after their toddler years. However, a small group of children with severe asthma remains, and these children will need regular contact with the specialist health service and close follow-up.

No other part of the Norwegian health service produces as many healthy life years as the treatment of children. With treatment, even children who are very seriously ill can enjoy a long life with good health and quality of life. Therefore, it should still be uncontroversial that health services for children are prioritised. However, this prioritisation does not justify either overuse of health services, if any, or unnecessary pathologisation. Finding the correct and medically well-grounded level of health service delivery to children is therefore an important task.

Chapter 4

Method

4.1 Data

SKDE holds a licence from the Norwegian Data Protection Authority and has been granted dispensation from the duty of confidentiality to analyse data unique to individuals on activity in the specialist health service from the Norwegian Patient Registry (NPR) for the period 2008–2014. Due to administrative changes such as changes to the code system, data will not be directly comparable over long periods. At the same time, it is important to look at data over several years because it represents an opportunity to look into any changes over time and because it provides stable average measurements of the use of health services. This atlas is based on data for the period 2011–2014. Data are structured as hospital stays.[6] The reason why we have not chosen to use data structured as department stays is that when children are registered with stays in more than one department per hospital stay, it is very often for the same problem. Children may be admitted to a surgical department with a suspected surgical problem, but it is often found during the stay that the condition does not require surgery/surgical expertise. In such cases, the child will be transferred to the paediatric department. The child has then had stays in two different departments, but has been admitted once for the same condition. Analysis based on stays by department would therefore count too many stays.

Data received from NPR have been checked by the registry after submission by the service providers. SKDE carried out some further adaptation before performing the analyses. This adaptation involved re-coding invalid values on the basis of logical checks and establishing a number of derived variables.

In addition to data unique to individuals from the health services, anonymous aggregate data for primary healthcare activities were obtained from the Norwegian Health Economic Administration (HELFO). The description of primary healthcare activity provided in this analysis is based on information about payment for GP and emergency primary healthcare consultations.

[6] Most contacts with the specialist health service concern a single department, but sometimes patients are treated by different departments during a hospital stay. When data are structured as hospital stays, contact with several departments for one person during the same period of time are merged into one hospital stay, which means that some medical information will be lost.

Disclaimer

Data from the Norwegian Patient Register has been used in this publication. The interpretation and reporting of these data are the sole responsibility of the authors, and no endorsement by the Norwegian Patient Register is intended nor should be inferred.

4.2 Sample

The analyses in this report cover all contact with primary healthcare and the specialist health service for all children aged 0–16 years in Norway in the period 2011–2014, except for contact in and outside labour and delivery/maternity units with a gynaecological primary diagnosis (code blocks N70–N99) or a primary diagnosis relating to pregnancy, childbirth and the puerperium (in code blocks O00–O99).

The data that SKDE has received from NPR contains only the year of birth. Ages are therefore calculated as the difference between the year of discharge and the year of birth. This means that we do not have the accurate age of all children for all contacts, and the volume will not be completely accurate. For example, the age of a child born in November 2010 in our analysis will be four years for all discharge dates in 2014. This means that about half of the children in each age group will be defined as being a year older than their actual age. This is generally not a problem, except for children under one year of age. The fact that we have no date of birth and use this way of calculating age means that about half of the children under the age of one year will be analysed as one-year-olds. In other words, the number of children under the age of one included in the analysis is only half the actual number of children in this age group.[7] We have an approximately correct volume for all age groups between 1 and 16. For example, of the 12-year-olds in the analysis, half are actually 11 years old and half are actually 12 years old. This also means that some 16-year-olds are not included in the analysis, namely those whose actual age is 16, but who turn 17 in the year of discharge.

4.2.1 Primary healthcare

Primary healthcare consultations have been counted on the basis of the number of reimbursement claims received and reimbursed by HELFO during the period in question. Only reimbursement claims for ordinary consultations involving direct contact between a doctor and patient in premises suitable for treatment are included (GP and emergency primary healthcare consultations covered by tariff codes 2ad and 2ak[8]).

4.2.2 Specialist healthcare

All contacts with the specialist health service in the form of outpatient consultations, day patient treatment and hospital admissions have been counted on the basis of reporting to NPR from hospitals and specialists in private practice under a public reimbursement contract. Contacts with specialists in private practice paid for in full by the patient or his/her parents/guardians are not reported to NPR and are thus not included in our sample.

[7] Because births are quite evenly distributed through the year, meaning that about half of all births in any year occur during the first six months.

[8] The Norwegian Medical Association's normal tariff for GPs and emergency primary healthcare 2014–2015.

This analysis consistently applies two levels of contact; admissions and outpatient/day patient services. By admissions is meant incidents of contact with the specialist health service lasting at least 24 hours. All admissions included in the analysis were in public hospitals. By outpatient/day patient contact is meant contact classified as day patient treatment or admission lasting less than 24 hours, as well as outpatient consultations in hospital and specialist consultations with specialists in private practice under a public reimbursement contract.

The specialist health service contacts are divided into two main groups: contacts concerning medical conditions and contacts concerning surgical conditions. The purpose of this distinction is to provide separate descriptions of contacts treated/followed up by paediatricians or other medical specialities and contacts treated/followed up by surgical specialists.

4.2.3 Surgical and medical conditions

Contacts in hospital that are grouped together in a surgical diagnosis-related group (DRG) are in principle defined as surgical contacts, while contacts not assigned to a surgical DRG are defined as medical. In order to ensure that the samples are defined consistently, contacts without a surgical DRG that fall within the following diagnosis groups are also defined as surgical:

- Contact with ophthalmologists directly related to eye diseases, primary diagnosis in code blocks H00–H59
- Injuries, primary diagnosis in code blocks S00–S99, T0–T3, T79, T81, T84, T87, T90–T95 or T98
- Orthopaedic cases, primary diagnosis in code blocks M15–M19, M20–M25, M65–M68, M70–M79, M91–M94 or M95–M99
- Malformations, primary diagnosis in code blocks Q10–Q18, Q30 or Q68–Q74
- Nosebleeds, main diagnosis in code block R04
- Observation diagnoses, primary diagnoses Z00.4, Z00.6, Z00.8, Z01.0, Z01.2, Z01.4, Z01.6 Z01.7, Z01.8, Z04.0–Z04.8, Z09.4, Z46.0–Z46.8 or main diagnosis in code blocks Z10–Z13, Z30–Z39, Z40–42, Z44, Z47–48 or Z89

All specialist consultations with paediatricians and specialists in dermatology, internal medicine, neurology or rheumatology in private practice are defined as medical contacts. The same applies to consultations with ENT specialists in private practice where tariff codes K02a, K02b, K02c, K02d, K02e, K02f, K02g, 306, 308, 309, 310, 311a, 311c, 314, 315, 317b, 318a or 318b do not apply, and consultations with ophthalmologists in private practice where tariff codes K01a, K01d, K01e, 406a, 406b and 407 do not apply.

All consultations under the ENT and ophthalmology tariff codes specified are grouped as surgical, and all consultations with specialists in anaesthesiology, physical and rehabilitation medicine, surgery (general, orthopaedic, urological), orthopaedics, plastic surgery and radiology are grouped as surgical contacts. All specialist consultations, regardless of speciality, for which the tariff codes 100 (Minor surgical procedures) and 105 (Major surgical procedures) are used will be assigned to the group surgical conditions.

Within each of the two main groups (medical and surgical conditions), more specific sub-samples

have been defined on the basis of diagnosis codes (ICD-10[9]) and surgical procedure codes (NCSP[10]). The definitions of the different sub-samples are presented in the results chapter.

4.3 Other definitions

Concepts that are not related to the sampling, but that are important in the presentation and discussion of results, are presented here and in a separate factsheet available from the atlas.

4.3.1 Contacts

In this context, contacts is a collective term used for all events. A contact can be an outpatient consultation, a day patient treatment or a hospital admission.

4.3.2 Type of contact

In the analyses, contacts are divided into admissions and outpatient/day patient treatment. They are assigned to these categories on the basis of administrative coding. In the analyses, all contacts administratively coded as outpatient and day patient treatment and admissions with a duration of zero days are coded as outpatient/day patient treatment. All contacts administratively coded as admissions with a duration of more than zero days are defined as admissions. Outpatient/day patient treatment is referred to as consultations.

4.3.3 Hospital referral areas

Population areas/hospital referral areas are defined by municipality (for OUS and Akershus, by city district) on the basis of the patients' address and the health trusts' area of responsibility/catchment area. Since we are looking at the child population, the health trust's paediatric departments are used as the starting point for defining hospital referral areas. We do not distinguish between individual hospitals in each health trust. This means that health trusts that have more than one paediatric department, such as Sørlandet health trust, Møre og Romsdal health trust and Innlandet health trust, are defined as a single hospital referral area. Patients resident in the Helgeland region, who otherwise belong to Helgelandssykehuset health trust's catchment area, have been included in the catchment area of Nordlandssykehuset health trust, which is responsible for these children. Similarly, the catchment areas of Lovisenberg Deaconal Hospital and Diakonhjemmet Hospital in Oslo are included in Oslo University Hospital health trust's catchment area. The hospital referral areas are defined in Appendix C, page 113. Short versions of the names of the hospital referral areas are used in the report, in the fact sheets and in the atlas. Table 4.1 shows the hospital referral areas and the short names.

[9] ICD-10 is the tenth revision of the International Statistical Classification of Diseases and Related Health Problems, which is the system of codes used in the Norwegian specialist health service to describe medical conditions.

[10] NCSP is the abbreviation for the NOMESCO Classification of Surgical Procedures, and is the system of codes used in the Norwegian specialist health service to describe surgical interventions.

Table 4.1: Hospital referral areas with short names

Hospital referral area / catchment area for:	Short name, hospital referral area
Helse Finnmark health trust	Finnmark
UNN health trust	UNN
Helgeland and Nordlandsykehuset health trust	Nordland
Helse Nord-Trøndelag health trust	Nord-Trøndelag
St. Olavs Hospital health trust	St. Olavs
Helse Møre og Romsdal health trust	Møre og Romsdal
Helse Førde health trust	Førde
Helse Bergen health trust	Bergen
Helse Fonna health trust	Fonna
Helse Stavanger health trust	Stavanger
Østfold health trust	Østfold
Akershus health trust	Akershus
Oslo University Hospital health trust	OUS
Innlandet health trust	Innlandet
Vestre Viken health trust	Vestre Viken
Vestfold health trust	Vestfold
Telemark health trust	Telemark
Sørlandet health trust	Sørlandet

4.3.4 Reference area and reference value

The hospital referral areas with university hospitals, i.e. UNN, St. Olavs, Bergen, Stavanger, OUS and Akershus, are defined as reference areas for overall admissions. The usage rates for this reference area are used as reference values for scenario calculations.

4.3.5 Ratio and variation

By ratio is meant the relationship between the highest and lowest rates, i.e. highest rate / lowest rate. The rates can be usage rates, patient rates or bed day rates. The ratio is used as a measure of variation. The ratio is considered in relation to the variation in rates for individual years, i.e. stability over time. Because the element of random variation depends on the size of the patient sample, the interpretation of the ratio will also depend on the size of the patient sample. The smaller the sample, the greater the chance that the result is due to coincidence.

4.3.6 Rate

Rates are used to make hospital referral areas comparable so that what is compared is the use of health services per inhabitant rather than absolute consultation and admissions figures. The atlas uses rates per 100,000 children aged 0–16 years, except for admissions for bronchiolitis, for which the rates are calculated per 100,000 children aged 0–3 years. The rates are calculated for each hospital referral areas for each year and as an average for the period 2011–2014.

The rates' confidence intervals are calculated by assuming a normal distribution of events with a given average and variance. If the underlying data are Poisson/binomially distributed and we have a sufficiently big n ($n > 5$) in each age group in each hospital referral area, it is a good approach to assume normal distribution (Statistics Norway (SSB) 1997).

4.3.7 Age-adjusted rates

Younger children use a higher proportion of health services than older children. Since we want to compare the use of health services in geographical areas of different sizes and with different age compositions, we use age-adjusted rates. The rates have been adjusted using the direct method, with the national population composition in four age groups in 2014 as the reference population.[11] The age-adjusted rates for the population areas will then be the rates that the area would have had if the composition of its population were identical to that of the country as a whole, given the actual distribution of rates in each age group in the different geographical areas.

4.3.8 Usage rate

By usage rate is meant age-adjusted rates for the number of consultations or for the number of admissions for each hospital referral area. The usage rates for each hospital referral area are calculated per 100,000 population aged 0–16 years.

4.3.9 Patient rate

By patient rate is meant the age-adjusted rate for the number of patients, i.e. the number of unique patients per 100,000 population aged 0–16 years. The patient rate shows the proportion of the population in each hospital referral area that has been patients during a certain period of time.

4.3.10 Bed day rate

By bed day rate is meant the age-adjusted rate for the number of bed days, i.e. the number of bed days per 100,000 population aged 0–16 years.

4.3.11 Contact frequency

By contact frequency is meant the number of contacts per patient during a certain period of time. The number of contacts is either the number of consultations or the number of admissions, or both. The contact frequency shows how many contacts each patient has had, on average, with the health service over the course of a year.

4.4 Assessment of variation

The usage rate is influenced both by the patient rate and the contact frequency, and these factors can counteract each other or work together and reinforce each other. If a hospital referral area has a relatively low number of patients (low patient rate) and each of these patients has relatively infrequent contact with the health service (low contact frequency), then the two reinforce each other and the hospital referral area's usage rate will be low. If a hospital referral area has a relatively low number of patients (low patient rate) and each of these patients is in frequent contact

[11] The age groups are defined in such a way that there is about the same number of events/procedures in each age group. The age group division will consequently vary between patient samples.

with the health service (high contact frequency), then the patient rate and the contact frequency counteract each other. If a hospital referral area has a relatively high number of patients (high patient rate) and each of these patients is in frequent contact with the health service (high contact frequency), then the two reinforce each other and the hospital referral area's usage rate will be high.

Generally speaking, then, the proportion of the total variation that is due to random variation will be smaller the bigger the population, the bigger the number of patients in the patient sample, the more hospital referral areas and the smaller the differences between the populations of the different hospital referral areas. In this analysis, we consistently look at the same hospital referral areas, which means that the number of hospital referral areas and the size of the population are kept constant, while the size of the patient samples varies. The scope of random variation will therefore represent a general challenge when making comparisons between hospital referral areas with big and small populations, particularly when looking at small disease samples. With sufficiently big patient samples, the proportion of overall variation caused by random variation will be smaller. That is why we have made it a general requirement that each age group in each hospital referral area must contain a minimum of five observations.[12]

Variation is natural and only to be expected for several reasons, such as differences in morbidity, patient preferences and coincidence. It is difficult to determine how much is natural and how much is due to systematic differences relating to medical practice and service provision, and is thus considered undesirable or unwarranted. There are several statistical methods for estimating the proportion of random variation, but there are no generally recognised or consistently used statistical measurements.

This analysis covers all somatic healthcare provided to children in Norway over a four-year period. It is therefore not necessary to generalise the results to a bigger population, but it is in any case challenging to determine how much variation is natural and expected and how much is unexpected and considered undesirable or unwarranted. We look at the total service provision, but also sub-samples that describe diagnoses with a relatively low number of patients. It is therefore not possible to stipulate a universal or general rule for how much variation is permitted before it is considered undesirable or unwarranted. Generally speaking, the ratio that expresses an unwarranted level of variation is lower for bigger patient samples.

The different figures provide different information about the variation, such as annual rates and the number of contacts on which the rates are based, in addition to patient rates and the number of contacts per patient. Together, all this information says something about how the variation manifests itself and helps us to understand it. For example, if the variation between hospital referral areas with high and low usage rates remains stable over a four-year period, it is unlikely to be random and more likely to be an expression of systematic differences in treatment culture. The interpretations are based on looking at all the available information in conjunction.

[12] We have made an exception from this requirement for appendectomy, however, because we have fewer than 20 observations per year for Finnmark.

Chapter 5

Results, primary healthcare

Doctor's consultations for children under the age of 16 years are covered in full by the Norwegian Health Economics Administration (HELFO) with no patient charges. The GPs have primary responsibility for children's health services and refer them to the specialist health service if the GP or the parents want a specialist assessment. Children are seen by emergency primary healthcare services outside of ordinary working hours, and the emergency primary healthcare services are responsible for a high proportion of emergency care referrals to the specialist health service.

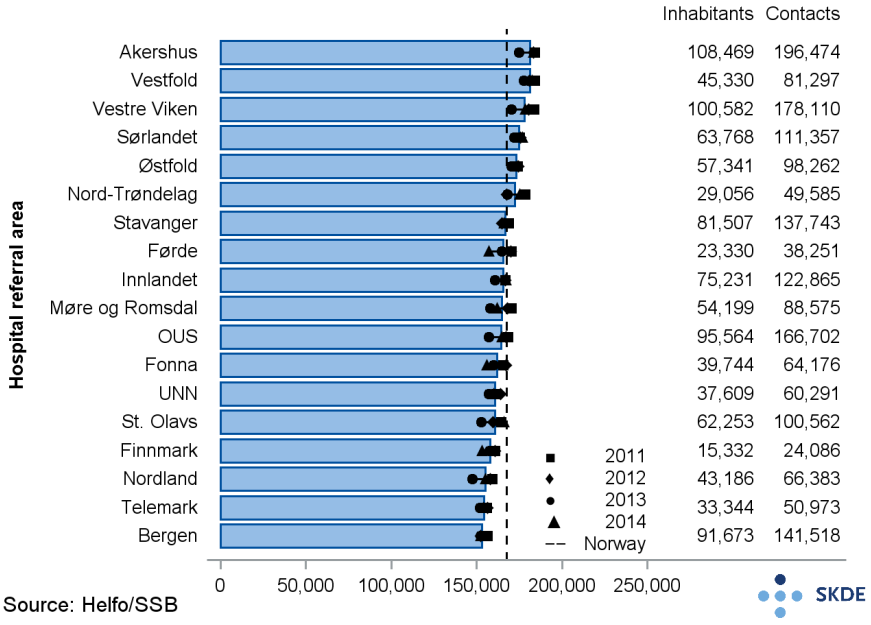

Figure 5.1: Primary healthcare consultations, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area, per year and as an average for the period 2011–2014.

Sample

The sample consists of children's daytime GP consultations or emergency primary healthcare consultations. Telephone consultations or routine visits to well baby clinics/public health centres are not included.

Comments

The Norwegian primary healthcare system delivers approx. 1.8 million consultations to children aged 0–16 years each year. This gives an annual usage rate of 168,000 consultations per 100,000 children. This means that, on average, each child has 1.7 primary healthcare consultations per year. Approximately 17% of these consultations are emergency primary healthcare consultations.

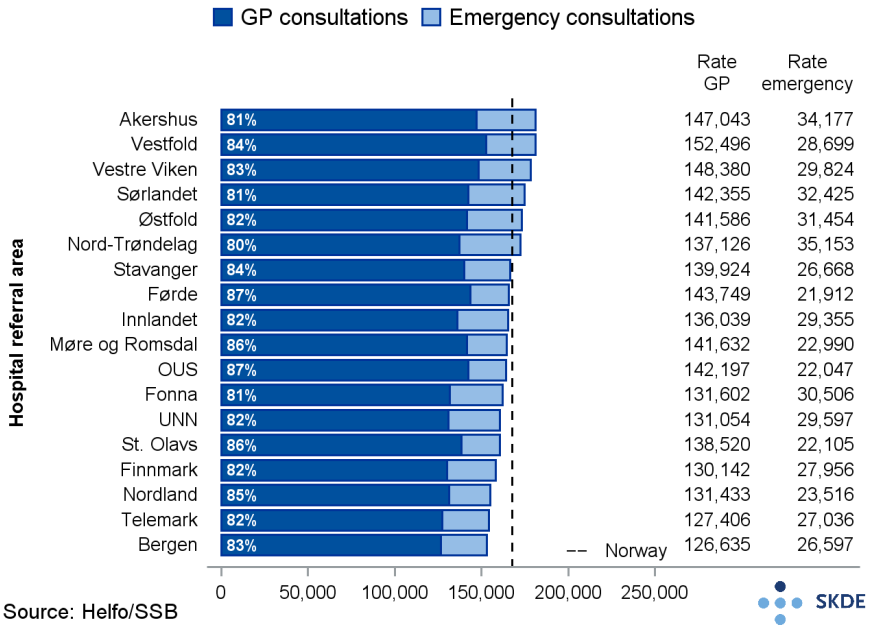

Figure 5.2: Primary healthcare consultations, daytime GP consultations and emergency primary healthcare consultations, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area and as an average for the period 2011–2014.

In 2014, 65% of all children had at least one primary healthcare consultation, which means that the average number of consultations for children who were in contact with the primary healthcare service this year was 2.6 consultations (see Table 5.1). Around 9% of the children had five

Table 5.1: Number and proportion of children with primary healthcare contacts, 2014

	Number	Proportion
No contacts	372,651	35%
1 contact	263,565	25%
2 contacts	165,323	16%
3 contacts	99,086	9%
4 contacts	59,105	6%
5 contacts	36,009	3%
6–10 contacts	55,280	5%
11 or more contacts	9,054	1%
Total	1,060,073	100%

consultations or more, and 1% saw a GP more than 11 times in the course of the year. The

number of consultations is highest among the youngest children (under four years of age), and slightly more boys than girls in the youngest age groups have primary healthcare consultations. From the age of 14 years, girls are more often in contact with the primary healthcare service.

Overall, there is little variation in usage rates between hospital referral areas. The primary healthcare usage rate for children is 17–18% higher in the hospital referral areas with the highest usage rates (Akershus and Vestfold) than in the areas with the lowest rates (Bergen and Telemark).

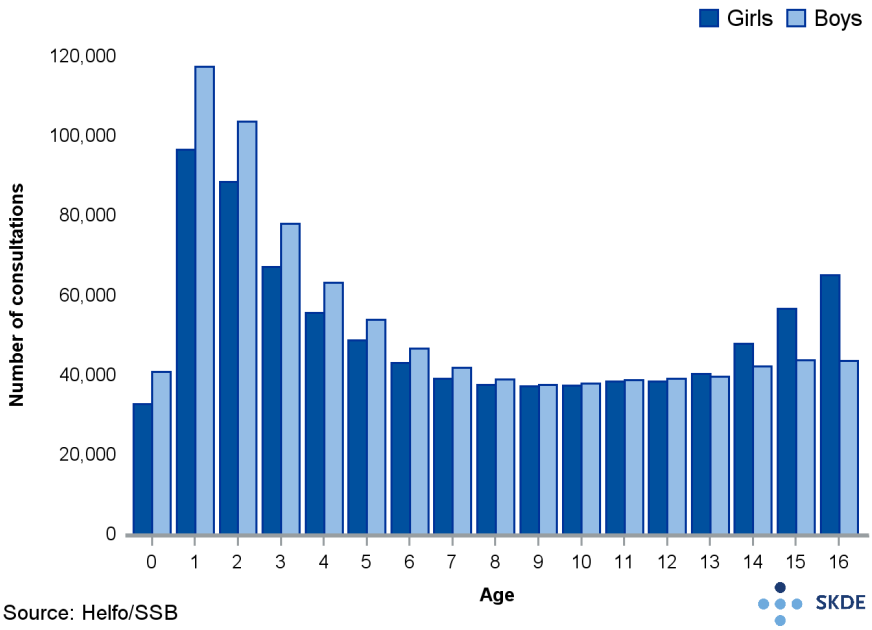

Figure 5.3: Primary healthcare consultations, number of treatments, age and gender, as an average for the period 2011–2014.

Although variation is low, there is reason to discuss whether the overall use of health services is proportional to the disease burden in the child population. It is probable that many of the children's primary healthcare consultations concern common conditions such as infections, mild eczema, allergies etc. Society's increasing focus on risk probably lowers the threshold for seeking medical attention. It is natural for parents of young children to feel uncertain when the child has a fever and is ill, but there is reason to ask whether the information provided to parents about how to assess sick children is adequate and balanced. Kindergartens and schools' demands for medical examinations probably also contribute to the high use of health services.

The use of primary healthcare services is not to any significant extent limited by availability or financial factors, and this probably contributes to the high use of primary healthcare services in a presumably healthy child population. Our figures show no tendency towards the primary healthcare service replacing specialist healthcare.

Chapter 6

Results, the specialist health service

6.1 The specialist health service overall

6.1.1 All contacts

This describes the overall use of somatic specialist health services for children aged 0–16 years in the course of a four-year period. All outpatient consultations, day patient treatments and admissions to Norwegian hospitals and specialists in private practice under public funding contracts are included in the figures. This shows the overall use of specialist health services for children in Norway.

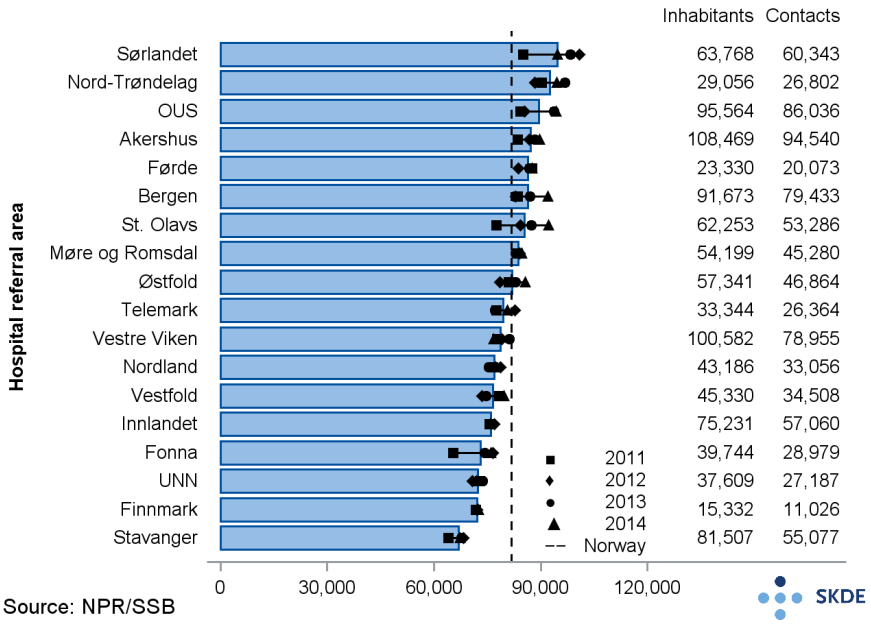

Figure 6.1: All contacts, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area, per year and as an average for the period 2011–2014.

Sample

The sample consists of all contacts (admissions, outpatient consultations and day patient treatment) for children in the somatic specialist health service, including specialists in private practice under public funding contracts.

Comments

Each year, 335,000 children aged 0–16 years undergo 865,000 admissions, outpatient consultations and day patient treatments in the Norwegian specialist health service. An increasing proportion of children have contacts both for surgical and medical conditions (up from 53,000 in 2011 to 62,500 in 2014).

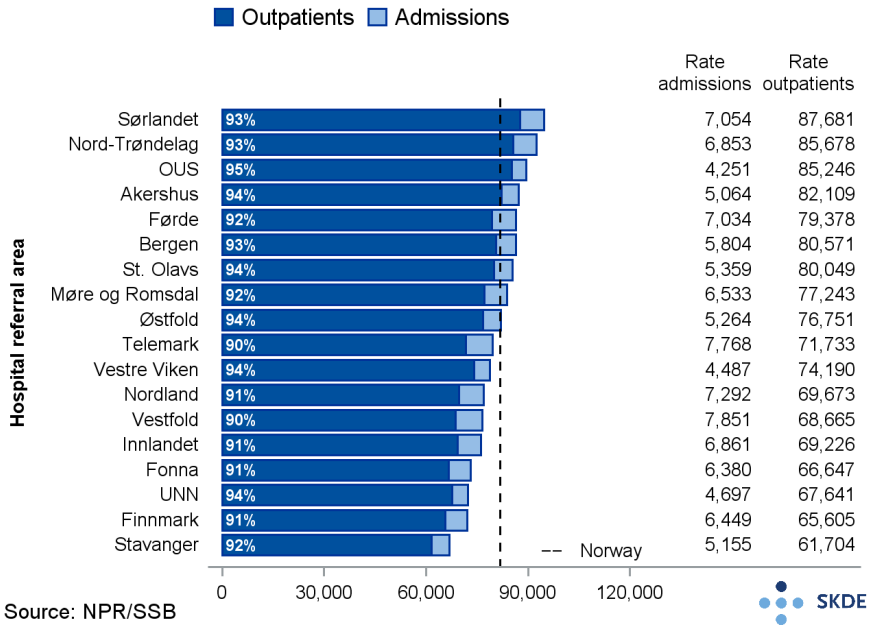

Figure 6.2: All contacts, by type of contact, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area, per year and as an average for the period 2011–2014.

The usage rate is 40% higher in the hospital referral area with the highest usage rate (Sørlandet) than in the areas with the lowest usage rate (Stavanger). Outpatient and day patient treatment dominates the picture. Such treatment is resource-intensive in terms of doctors, but not in terms of other resources. Although admissions represent only approx. 7% of the total number of patient contacts, they account for a considerable proportion of the specialist health service's total resource use relating to children.

Even though the variation can be described as moderate, the high number of contacts means that there is nevertheless considerable variation in resource use between hospital referral areas, and there is reason to question whether this variation is justified.

It is important that children in need of medical treatment receive it quickly and without impediment. When more than 30% of children aged 0–16 years have at least one contact with the specialist health service each year, there is reason to ask oneself whether this use of health services reflects the actual morbidity. There is no unambiguous definition of what is the medically

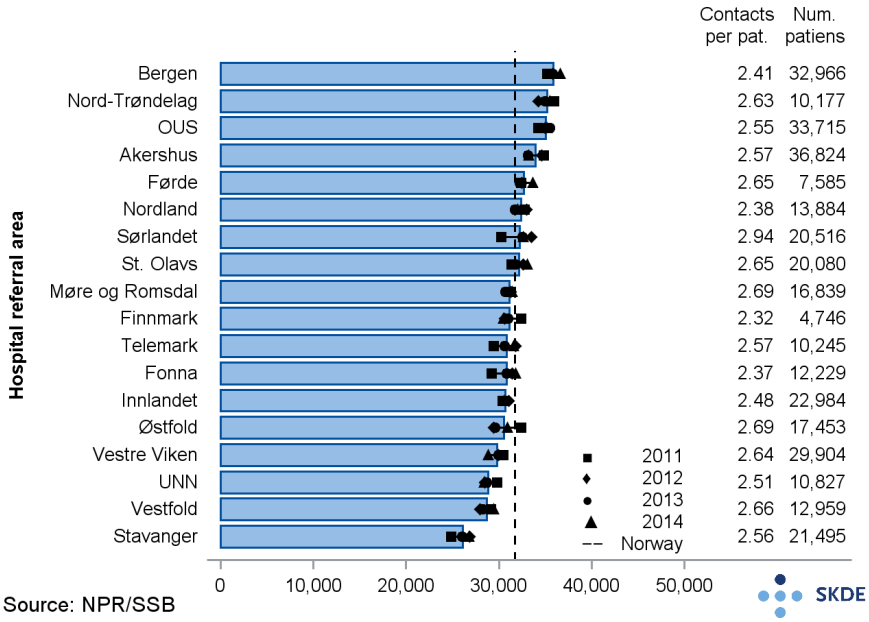

Figure 6.3: All contacts, age-adjusted patient rates per 100,000 children 0–16 year, per hospital referral area, per year and as an average for the period 2011–2014. Average number of contacts per patient (contact frequency) and number of patients.

correct level of use of health services for children. The level presented here should nevertheless raise questions about whether there is an overuse of specialist health services for children. Overuse can result in the medicalisation of childhood and, for some children and parents, the establishment of an illness identity that does not correspond to the child's actual state of health. It is during the first years of life that children are most frequently in contact with the specialist

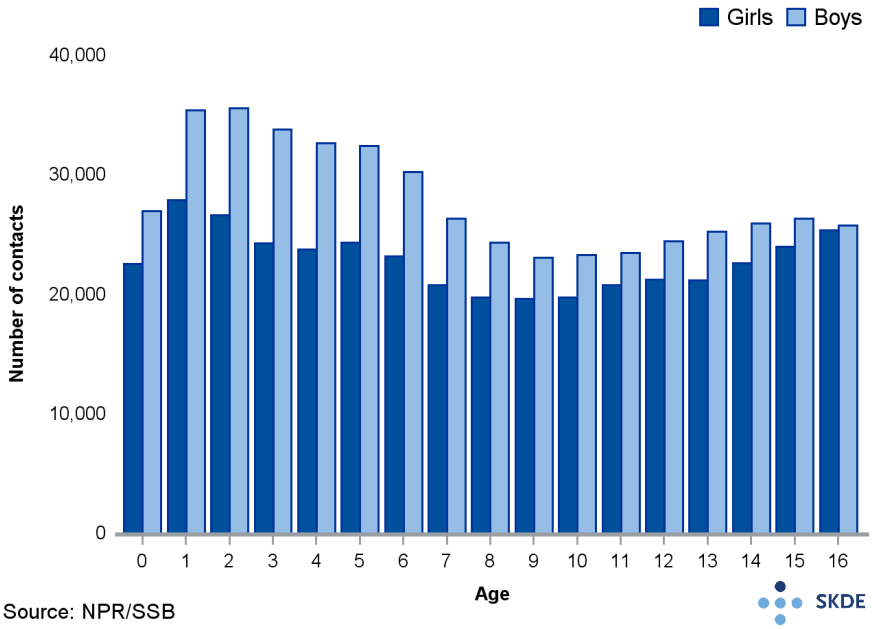

Figure 6.4: All contacts, the specialist health service, number of treatments, age and gender, as an average for the period 2011–2014.

health service, and boys have such contact more often than girls.

6.1.2 Admissions

The Regulations concerning Children's Hospital Stays Section 2 state that children 'shall only be admitted to healthcare institutions when it is medically necessary or when it is for other reasons in the child's best interests'. Hospital admission also entails a risk of injuries and complications. This indicates that no child should be admitted to hospital if the treatment is not expected to improve or prevent a deterioration in the child's health situation.

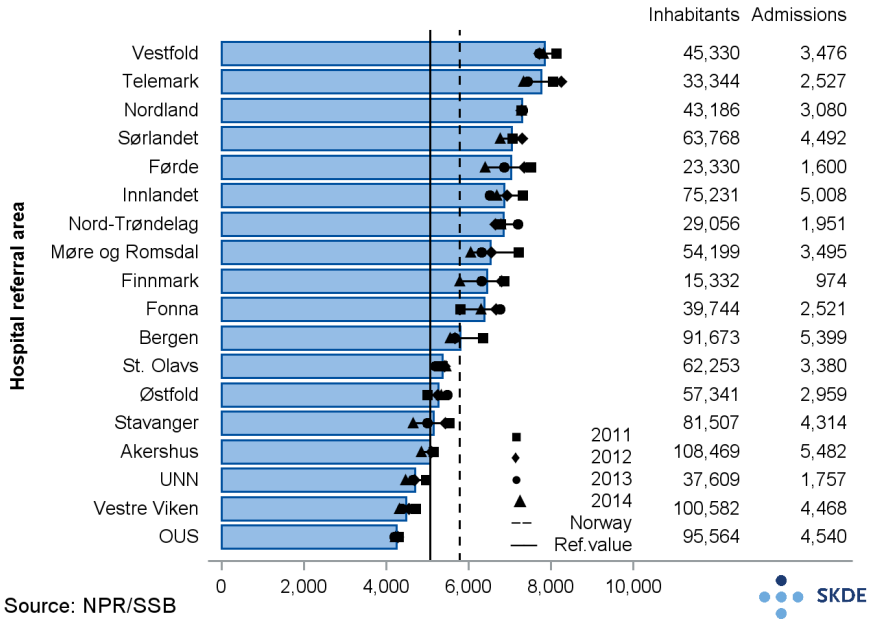

Figure 6.5: All admissions, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area, per year, reference value and an average for the period 2011–2014.

Sample

The sample consists of all somatic specialist health service admissions of children with a duration of at least 24 hours. The admission rate for children living in the hospital referral areas of the six university hospitals has been chosen as the reference value.

Comments

Each year, 46,000 children are admitted to Norwegian hospital in a total of approx. 61,000 admissions (64% emergency care admissions and 29% for surgical conditions). Just under 2,200 of these children have admissions both for medical and surgical conditions. The usage rate and patient rate in the hospital referral area of Vestfold are almost twice those of the OUS area (the ratios are 1.8 and 1.7, respectively), while there is relatively little variation in the proportion of emergency care cases. The contact frequency varies from 1.26 in the OUS area to 1.38 in the Sørlandet area. If all the hospital referral areas had had the same usage rate as the six university

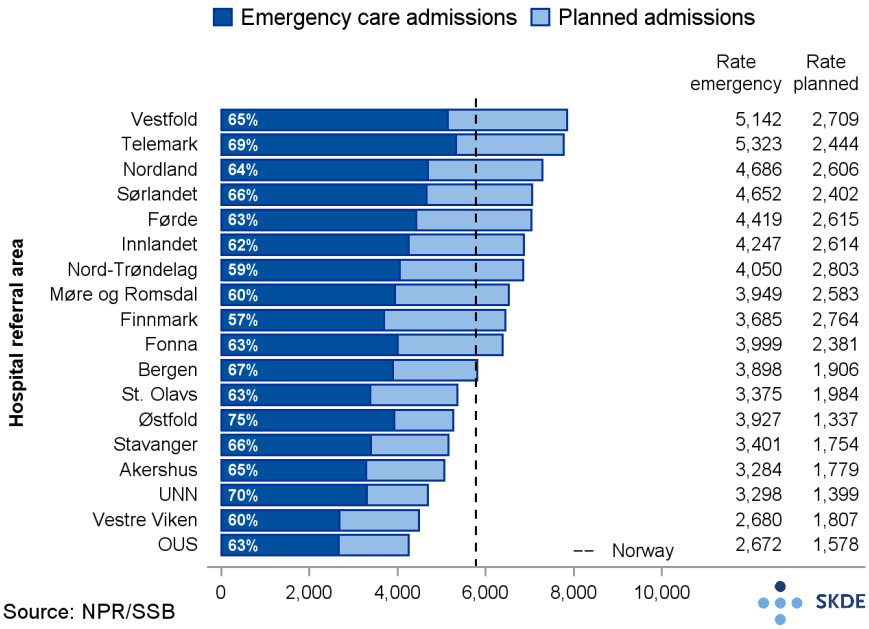

Figure 6.6: All admissions, by degree of urgency, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area and as an average for the period 2011–2014.

hospital's referral areas, the number of admissions would have been reduced by 13%.

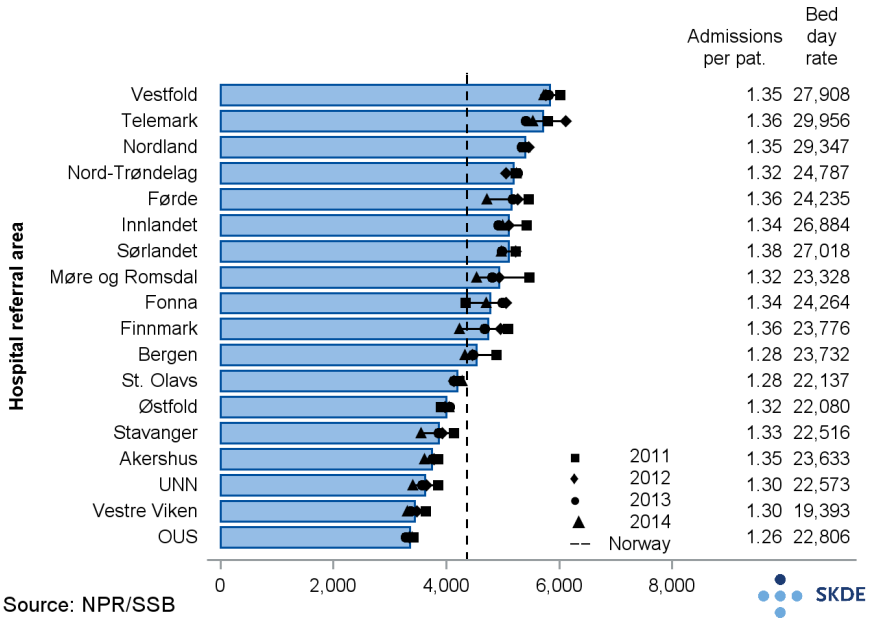

Figure 6.7: All admissions, age-adjusted patient rates per 100,000 children 0–16 year, per hospital referral area, per year and as an average for the period 2011–2014. Average number of admissions per patient (contact frequency) and bed day rate.

There are no indications that these different rates can be explained by differences in morbidity or framework conditions between hospital referral areas. Based on the distribution of hospital referral areas with high and low admission rates, no pattern emerges that indicates that the distance to hospital has any significant effect on variations in usage rates between hospital referral areas.

There is considerable variation between hospital referral areas' usage and patient rates. It may be questioned whether the intention behind the Regulations on Children's Hospital Stays is being fulfilled.

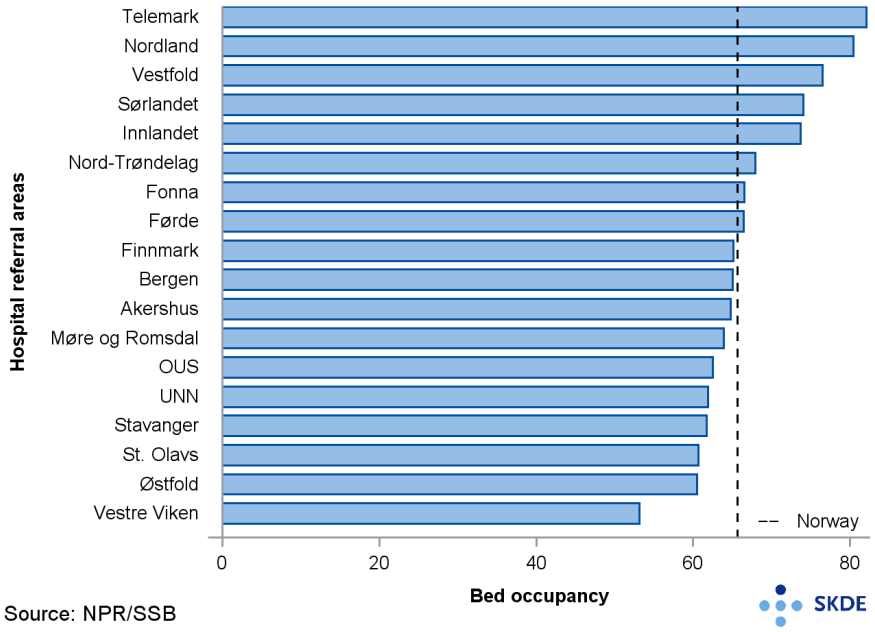

Figure 6.8: Bed occupancy per day per 100 000 children at age 0–16 years for admissions, as an average for the period 2011–2014.

Bed occupancy per day is an alternative measurement of the use of health services that shows the average bed use through the year. Bed occupancy per day per 100,000 children is calculated in the following manner: bed day rate/365. The bed occupancy per day per 100,000 children is 1.5 times higher in Telemark hospital referral area than in Vestre Viken.

6.1.3 Outpatient/day patient services

Most conditions in children that need specialist health service assessment, surgical as well as medical, can be treated through outpatient consultations or day treatment. Asthma, ear grommet insertion, treatment of children with chronic bowel conditions and chemotherapy for cancer are examples of conditions that are usually treated in outpatient clinics or as day patient treatment. Other conditions where GPs see a need for assessment by the specialist health service come in addition to this.

Sample

The sample consists of all outpatient consultations and day patient treatments (lasting less than one day) for children in the somatic specialist health service, including specialists in private practice under public funding contracts.

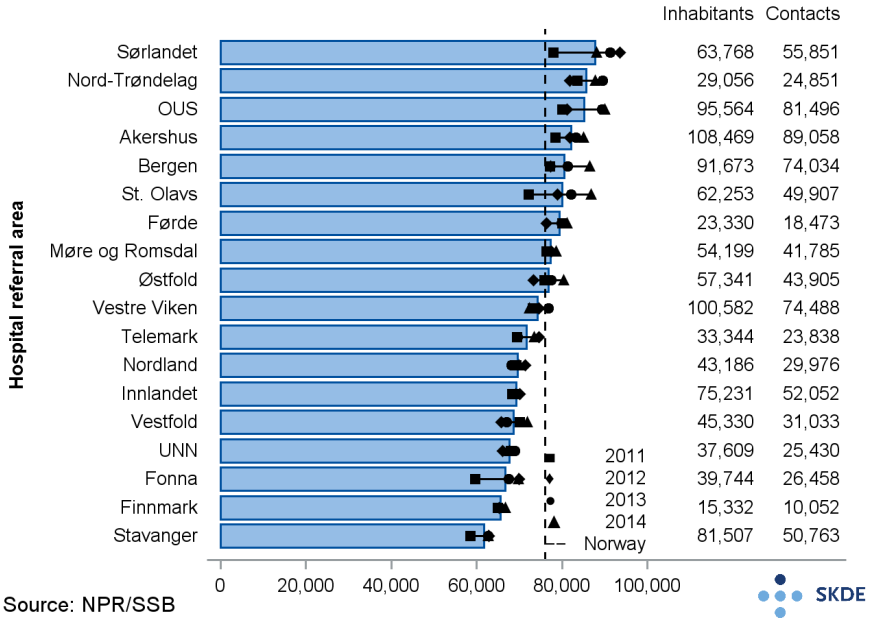

Figure 6.9: All outpatient/day patient services, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area, per year and as an average for the period 2011–2014.

Comments

Each year, approx. 320,000 children had a total of 800,000 outpatient and day patient consultations. Of these children, 52,000 have consultations both at medical and surgical outpatient clinics. Usage and patient rates are approx. 40% higher in the hospital referral areas of Sørlandet (consultations) and Bergen (patients) than in Stavanger (lowest rates). In the hospital referral areas of Førde and Møre og Romsdal, 5% of these consultations are with specialists in private practice under public funding contracts. The corresponding proportion for the hospital referral areas of Akershus and Østfold are 35%.

Each year, 30% of all Norwegian children have one or more consultations at specialist outpatient clinics or day treatment units. The contact frequency for these children is 2.23 for Finnmark hospital referral area and 2.85 for Sørlandet. The differences in contact frequency mean that there are 620 more consultations per 1,000 children treated in Sørlandet hospital referral area than in Finnmark.

Based on the above, we find reason to ask whether there is unwarranted variation in usage rates. There is relatively high variation between hospital referral areas, both in terms of the number of patients treated and the average number of consultations per patient. Whether this indicates an overuse of specialist health services for children is something the specialist communities should discuss.

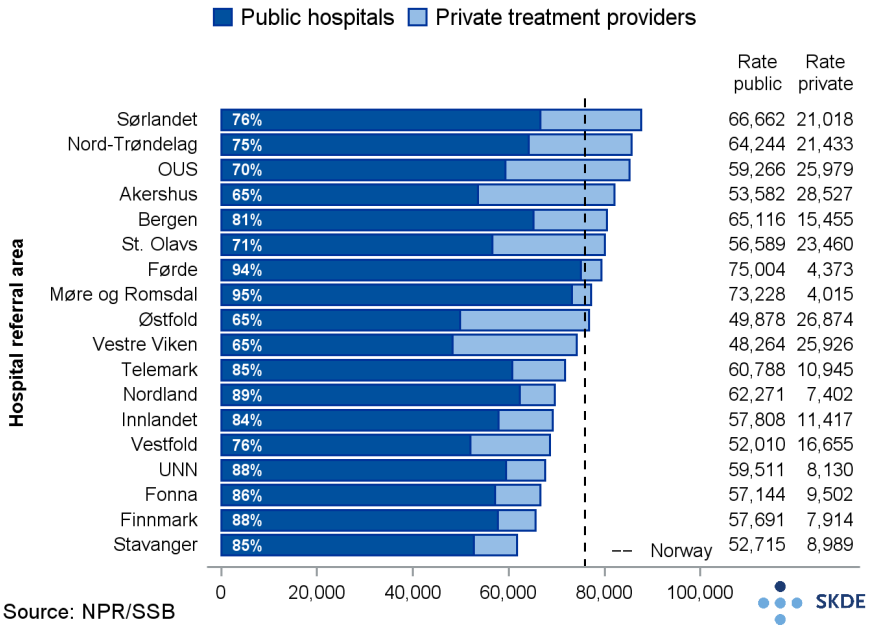

Figure 6.10: All outpatient/day patient services, broken down by public or private treatment providers, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area, per year and as an average for the period 2011–2014.

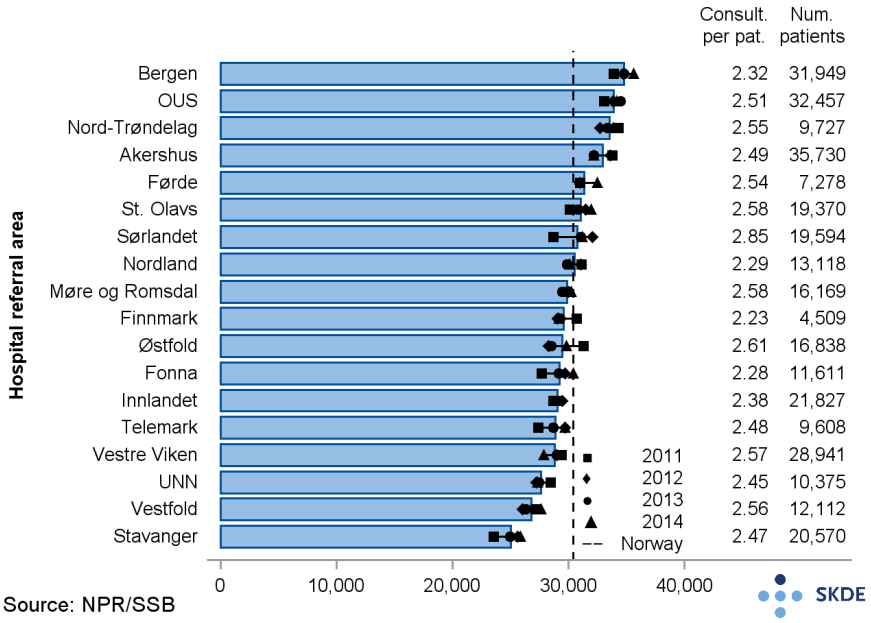

Figure 6.11: All outpatient/day patient services, age-adjusted patient rates per 100,000 children 0–16 year, per hospital referral area, per year and as an average for the period 2011–2014. Average number of contacts per patient (contact frequency) and number of patients.

6.2 Medical conditions

6.2.1 All contacts

Some children have diseases that will affect their health situation for the rest of their lives, such as cancer, diabetes, development disorders, rare metabolic disorders and congenital abnormalities. For these and similar patient groups, good follow-up and treatment is crucial both to their life expectancy and quality of life, and they should be given high priority and access to the necessary resources. However, serious or life-threatening illness is rare, and Norwegian children are, generally speaking, among the healthiest child populations in the world. Many symptoms will also improve or disappear with time even without treatment.

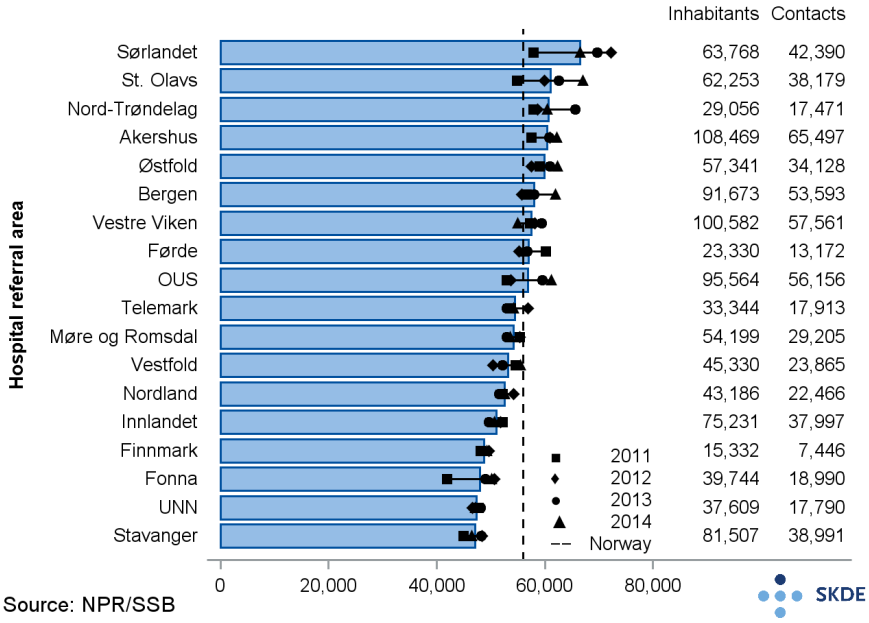

Figure 6.12: All contacts, medical conditions, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area, per year and as an average for the period 2011–2014.

Sample

The sample consists of all medical contacts (admissions, outpatient consultations and day patient treatment) for children in the somatic specialist health service, including specialists in private practice under public funding contracts. By medical contacts is meant contacts concerning conditions that are normally treated by an internal medicine department, see Chapter 4.2.3 on page 25 for a more detailed definition.

Comments

Medical conditions in children are behind nearly 600,000 outpatient consultations, day patient treatments and admissions per year divided between 235,000 children. Twenty-two per cent of all children are in contact with the specialist health service for a medical condition, and each of

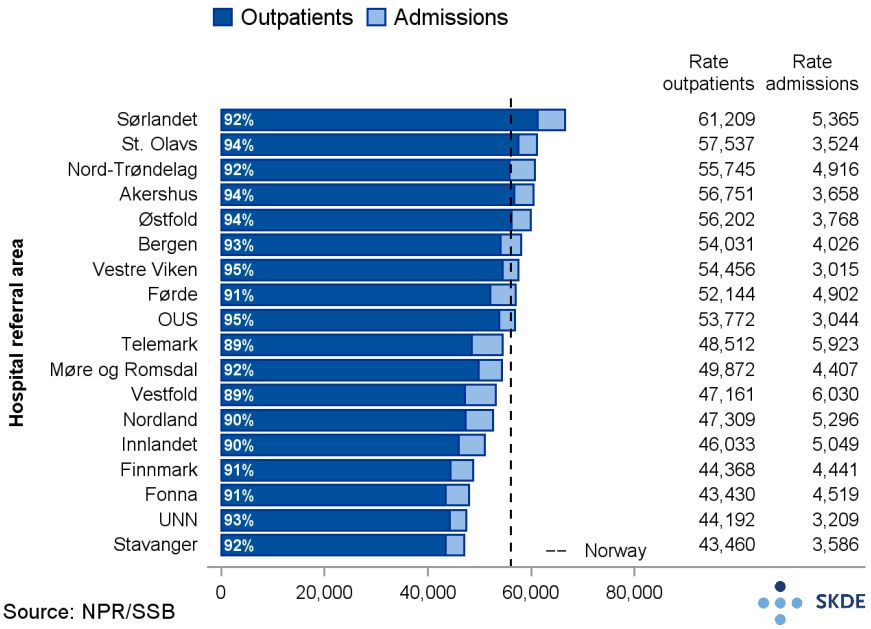

Figure 6.13: All contacts, medical conditions, by type of contact, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area and as an average for the period 2011–2014.

these children has an average of 2.5 contacts per year. The usage rate is 1.4 times higher for the population of Sørlandet hospital referral area than for Stavanger. The patient rate is 1.2 times higher for Bergen hospital referral area than for Stavanger. The rates seem to vary somewhat more from year to year in the hospital referral areas with the highest usage rates, but there does not appear to be any systematic change through the period.

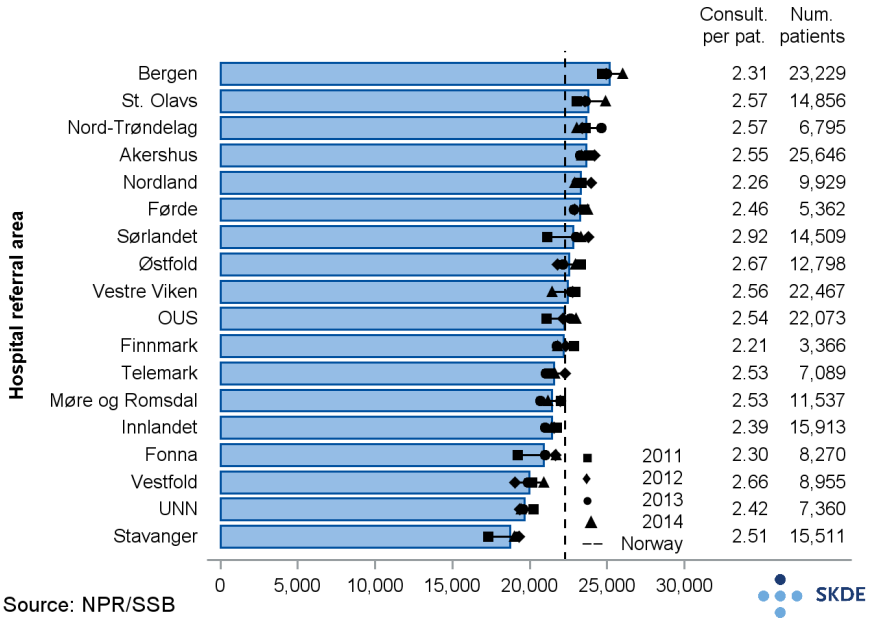

Figure 6.14: All contacts, medical conditions, age-adjusted patient rates per 100,000 children 0–16 year, per hospital referral area, per year and as an average for the period 2011–2014. Average number of contacts per patient (contact frequency) and number of patients.

Outpatient and day patient services account for 93% of all patient contacts, but admissions nevertheless take up a considerable proportion of the total resources due to the need for round-the-clock nursing staff and several teams of doctors. The contact frequency varies from 2.21 (Finnmark) to 2.92 (Sørlandet). If the hospital referral area with the highest number of contacts per patient had reduced this number to the level of the area with the lowest contact frequency, that would have resulted in a reduction of 710 contacts per 1,000 patients treated per year. Children have the most

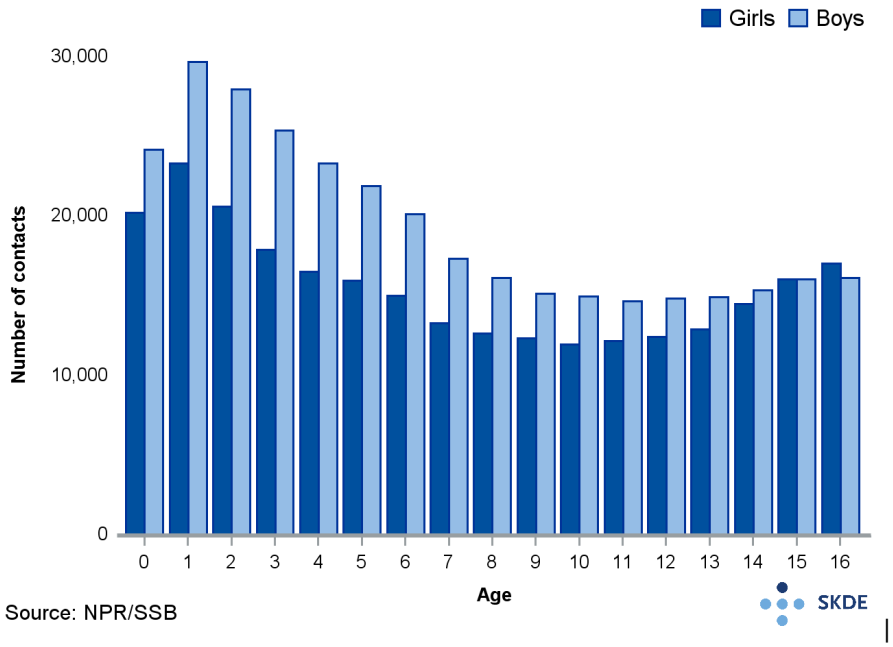

Figure 6.15: All contacts, medical conditions, number of treatments, age and gender, as an average for the period 2011–2014.

contacts for medical conditions between the ages of 0 and 4 years. Boys have more contacts than girls throughout childhood, while girls have more contacts at the age of 15–16 years.

The volume and variation in usage rates give reason to discuss whether the use of specialist health services for children are proportional to their morbidity.

6.2.2 Admissions

Medical admissions of children are used for conditions where the patient does not undergo surgery and is mostly assessed and treated by paediatric specialists. Most children who are admitted to hospital are placed in special paediatric departments, but in some areas where such departments are a long way away, such as Nordland and Troms, children are also admitted to adult medical departments at the nearest local hospital. Common causes for admission of children include respiratory tract infections, vomiting and diarrhoea, diabetes and epilepsy.

Sample

The sample consists of all medical admissions of children in the somatic specialist health service with a duration of at least 24 hours. By medical admissions is meant admissions for conditions that are normally treated by an internal medicine department, see Chapter 4.2.3 on page 25 for a

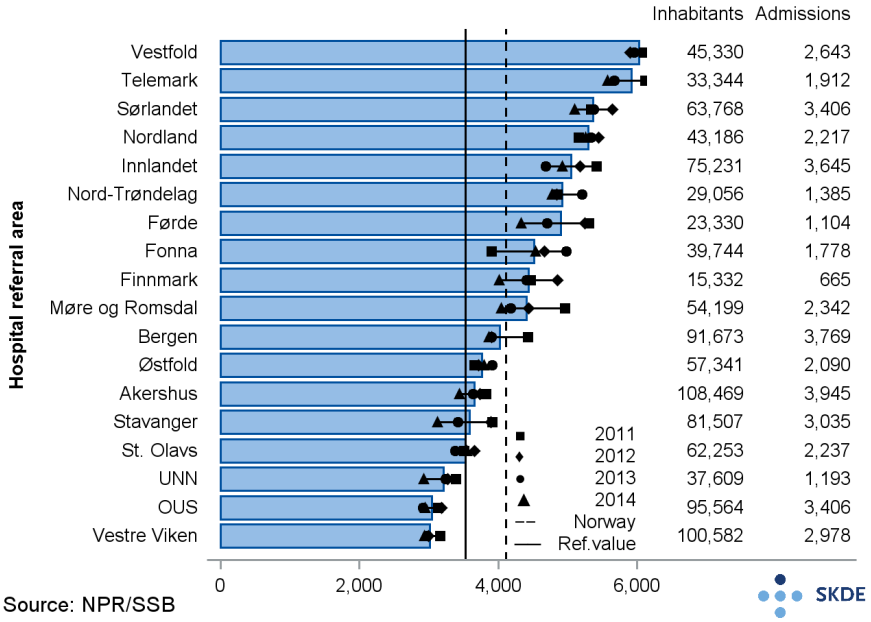

Figure 6.16: Medical admissions, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area, per year, reference value and an average for the period 2011–2014.

more detailed definition. The admission rate for children living in the hospital referral areas of the six university hospitals has been chosen as the reference value.

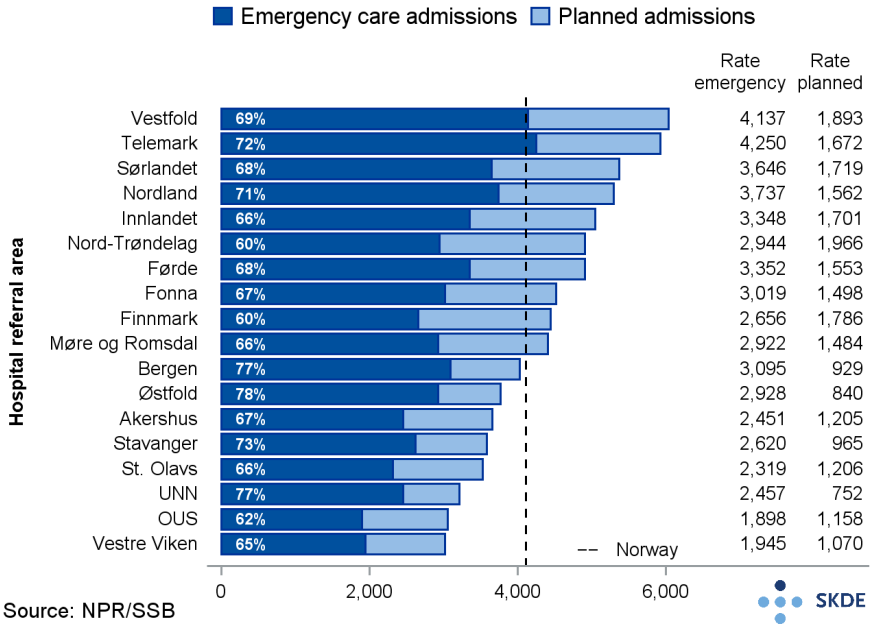

Figure 6.17: Medical admissions, by degree of urgency, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area and as an average for the period 2011–2014.

Comments

Each year, 32,000 children are admitted to Norwegian hospitals a total of 44,000 times for medical diagnoses. Admissions for medical conditions account for 71% of all somatic hospital admissions of children aged 0–16 years. Emergency care admissions make up 68% of the admissions.

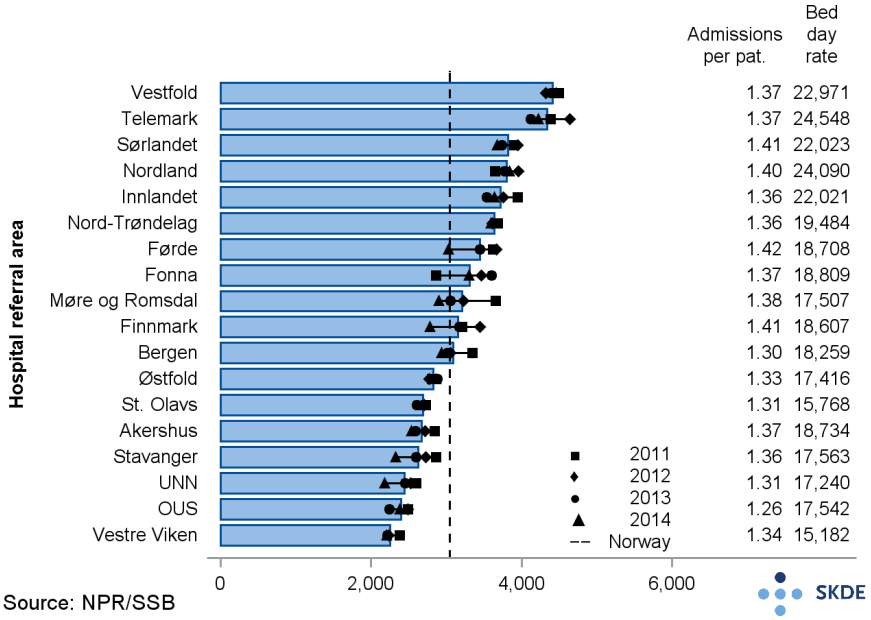

Figure 6.18: Medical admissions, age-adjusted patient rates per 100,000 children 0–16 year, per hospital referral area, per year and as an average for the period 2011–2014. Average number of admissions per patient (contact frequency) and bed day rate.

Vestfold hospital referral area has twice as many admissions and twice as many patients admitted (per 100,000 children) as Vestre Viken. The contact frequency varies from 1.26 in OUS hospital referral area to 1.42 in Førde. The hospital referral areas of Vestre Viken and Vestfold are neighbouring areas with paediatric departments in Tønsberg and Drammen, respectively. Vestre Viken covers a larger geographical area than Vestfold, and is more similar to the hospital referral areas of Telemark and Sørlandet, whose rates are at the same level as Vestfold's. This means that the travel distance to hospital in the hospital referral areas can probably not explain the identified variation in usage rates.

If all the hospital referral areas had had the same usage rate as the six university hospital's referral areas, the number of medical admissions would have been reduced by 6,500 (15%). There is reason to ask whether there is an unwarranted variation in children's medical admissions between hospital referral areas.

Bed occupancy per day is an alternative measurement of the use of health services that shows the average bed use through the year. Bed occupancy per day per 100,000 children is calculated in the following manner: bed day rate/365. The bed occupancy per day per 100,000 children is 1.5 times higher in Telemark hospital referral area than in Vestre Viken.

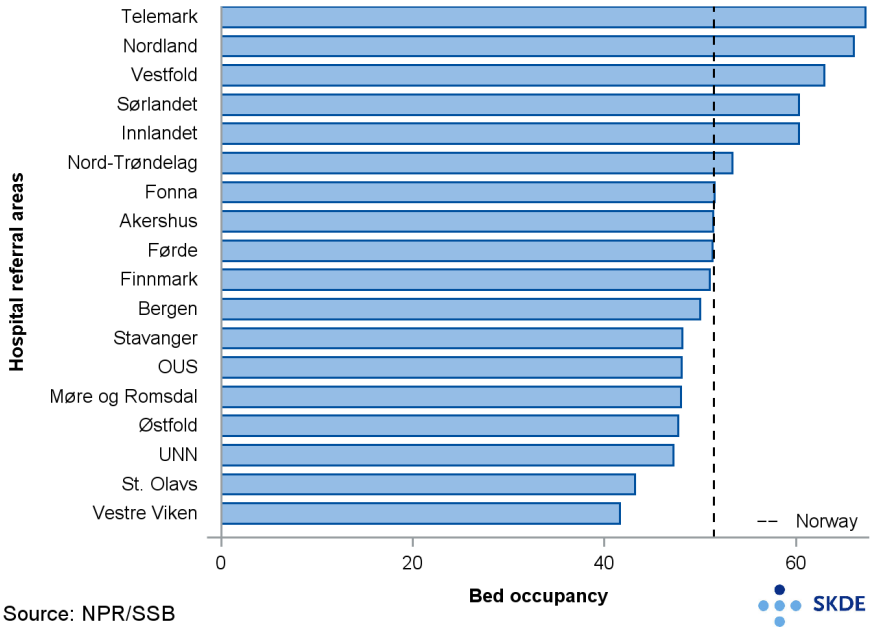

Figure 6.19: Bed occupancy per day per 100,000 children at age 0–16 years for medical admissions, as an average for the period 2011–2014.

6.2.3 Outpatient/day patient services

Most children with medical conditions are treated as outpatients in children's departments or by specialists in private practice under public funding contracts. Children's departments with big geographical catchment areas often provide a mobile service where paediatricians from the paediatric department travel to the more remote areas to provide as equitable specialist health services as possible regardless of where patients live.

Sample

The sample consists of all medical contacts (outpatient and day patient services) for children in the somatic specialist health service, including specialists in private practice under public funding contracts. By medical consultations is meant consultations for conditions that are normally treated by an internal medicine department, see Chapter 4.2.3 on page 25 for a more detailed definition.

Comments

Almost 550,000 outpatient and day patient consultations for medical conditions are provided to just under 225,000 children each year. Consultations concerning medical conditions account for 68% of all children's outpatient and day patient treatments. The usage rate is 40% higher in Sørlandet than in Fonna hospital referral area. The patient rate is 40% higher for Bergen hospital referral area than for Stavanger.

In the hospital referral areas of Førde and Møre og Romsdal, 3% and 4% of consultations, respectively, are provided by specialists in private practice under public funding contracts, while the

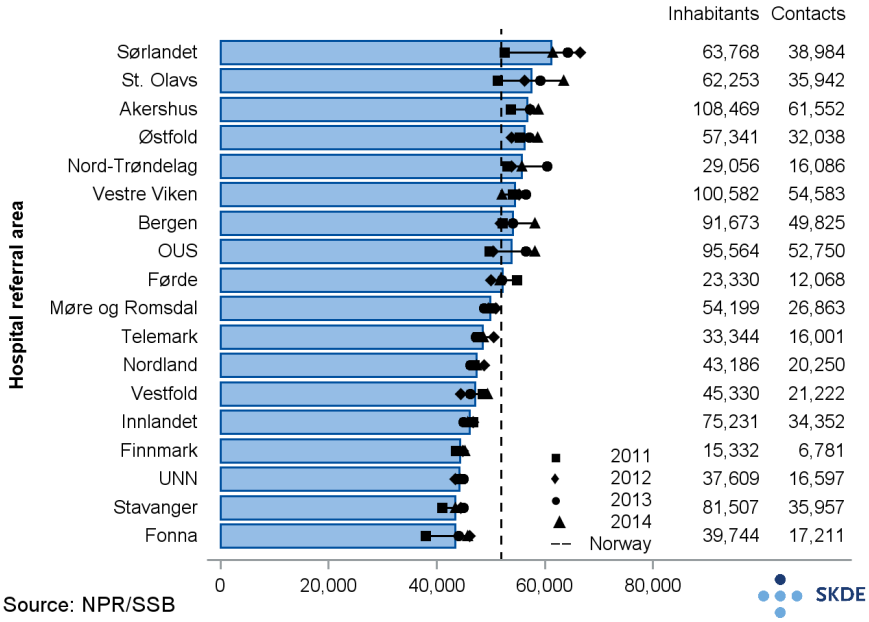

Figure 6.20: Outpatient services, medical conditions, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area, per year and as an average for the period 2011–2014.

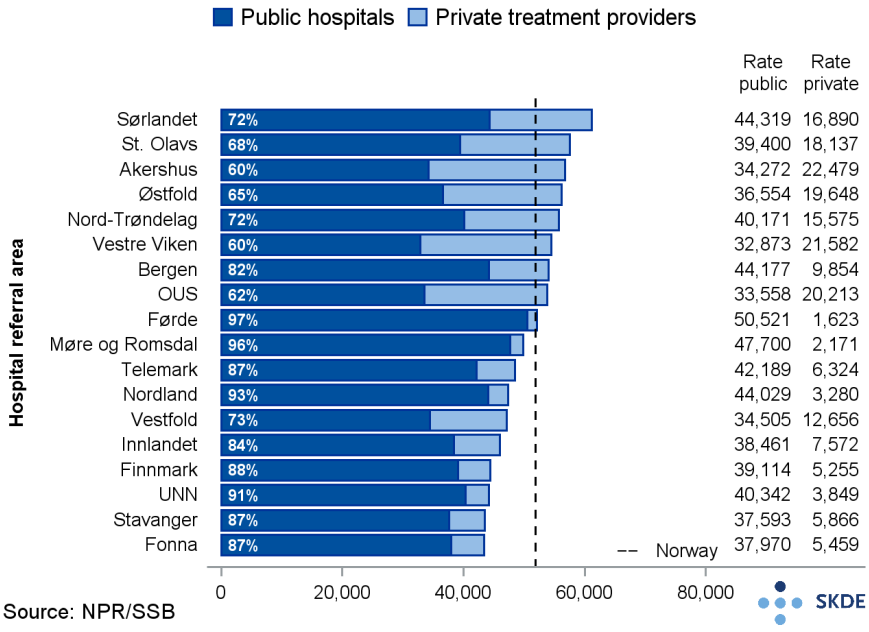

Figure 6.21: Outpatient services, medical conditions, broken down by public or private treatment providers, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area and as an average for the period 2011–2014.

corresponding figures for OUS and Akershus are 37% and 39%. Usage rates seem to be somewhat higher in areas with more specialists in private practice than in areas where fewer specialists are available outside hospitals.

Each year, 21% of all Norwegian children aged 0–16 years have one or more consultations at specialist outpatient clinics or day treatment units. The contact frequency varies from 2.14 in

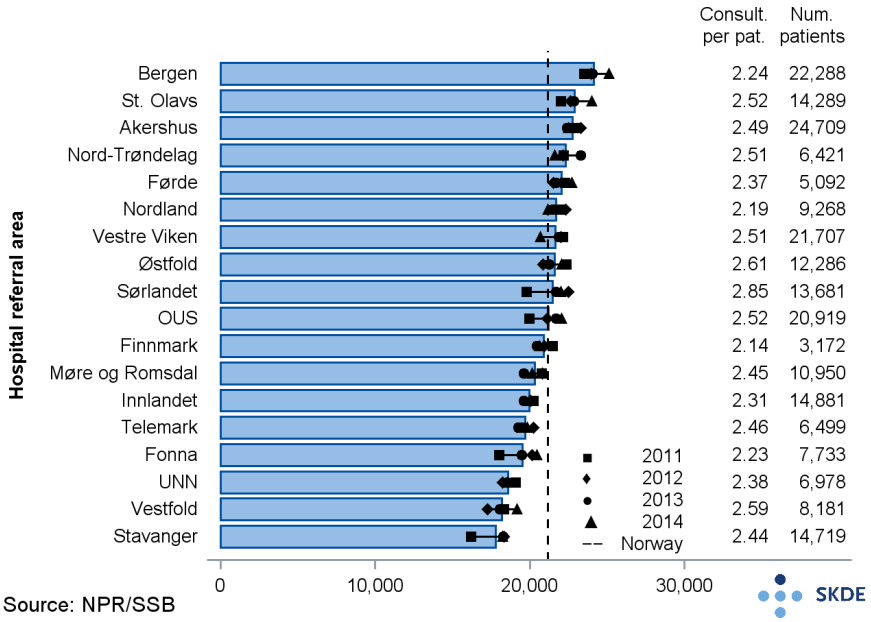

Figure 6.22: Outpatient services, medical conditions, age-adjusted patient rates per 100,000 children 0–16 year, per hospital referral area, per year and as an average for the period 2011–2014. Average number of contacts per patient (contact frequency) and number of patients.

Finnmark to 2.85 for Sørlandet. This difference corresponds to 710 more consultations per 1,000 patients treated.

Some patient groups need frequent check-ups, for example cancer patients receiving active treatment or epilepsy patients with poor seizure control. These groups make up a small proportion of the total patient volume, and there is no known geographical variation in the prevalence of these conditions. There is good evidence from other areas that patient-controlled follow-up appointments based on need reduce the total number of follow-up appointments while improving satisfaction with the health services. In future, it may be possible to base follow-up appointments on changes in/deterioration of a patient's clinical condition rather than on the calendar.

Most symptoms in children are not caused by serious illness, and many will pass without treatment. There is reason to ask whether the total volume of children's outpatient consultations and day patient treatment for medical conditions represent an overuse with no accompanying health gain.

6.2.4 Acute diagnoses

Emergency care admissions make up 68% of all children's medical admissions. Most of these cases are referred from emergency primary healthcare services or GPs. When a patient is referred to hospital, the hospital department has an independent responsibility to assess whether there is a medical basis for admission or whether the patient can be sent home after an outpatient assessment. Contacts with acute diagnoses can be interpreted as emergency care referrals from primary healthcare, and are used here to elucidate the variation in cooperation between primary healthcare services and the specialist health service, as well as the geographical variation in assessments of the need for hospitalisation.

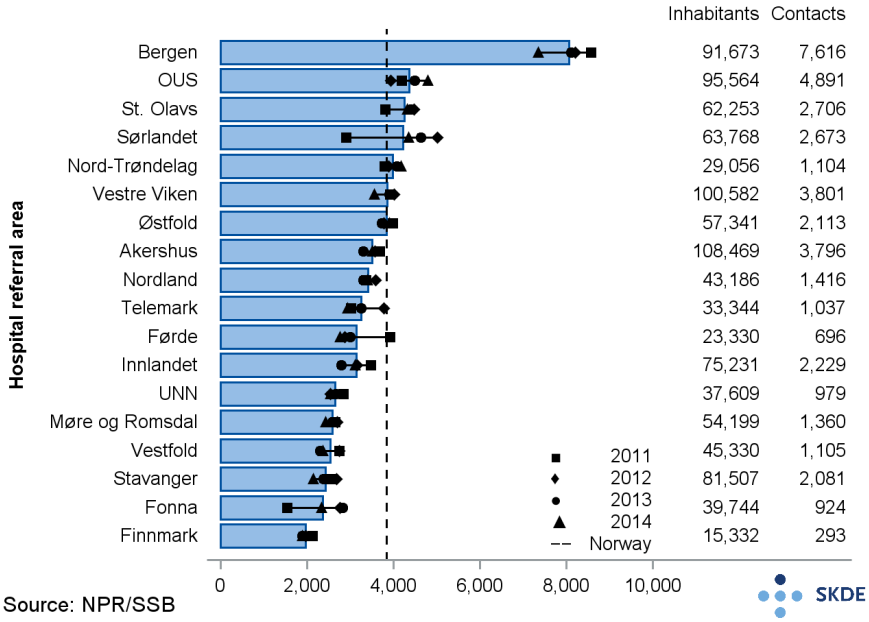

Figure 6.23: All contacts, acute diagnoses, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area, per year and as an average for the period 2011–2014.

Sample

The sample consists of contacts (admissions, outpatient consultations and day patient treatment) concerning selected medical conditions that are often treated as emergency care cases for children in the somatic specialist health service, not including specialists in private practice under public funding contracts. Selected acute diagnoses are primary or secondary diagnoses (ICD-10) in code blocks A08–09, A40–41, A49, B34, E86, J00–01, J04, J09–13, J15–16, J18, J20–22, N10, N30, R55–56, T4n, T41, T50–56, T66, T67, T75 or T78.

Comments

The sample consists of nearly 41,000 contacts with selected acute diagnoses, of which 29,000 are outpatient consultations or day patient treatments and 12,000 are admissions.

Since primary healthcare referrals are required in order to access specialist health services, and because SKDE does not have access to referral data, specialist health service contacts concerning acute diagnoses are used as a measurement of emergency care referrals from the primary healthcare services. Haukeland University Hospital has a specialist out-of-hours clinic that does not require referrals from primary healthcare services. This arrangement makes the total rate significantly higher for Bergen than for other hospital referral areas. Bergen hospital referral area is therefore not included in the discussion of the variation in usage rates for all contacts and outpatient/day patient treatment.

The usage rate for contacts concerning acute diagnoses is 2.2 times as high for OUS hospital referral area as for Finnmark. This most likely reflects differences in cooperation between GPs/emergency primary healthcare services and hospitals. The same general pattern is found in the usage rate for outpatient consultations (not shown in the figure), but the differences between the second highest and the lowest rate is 3.6.

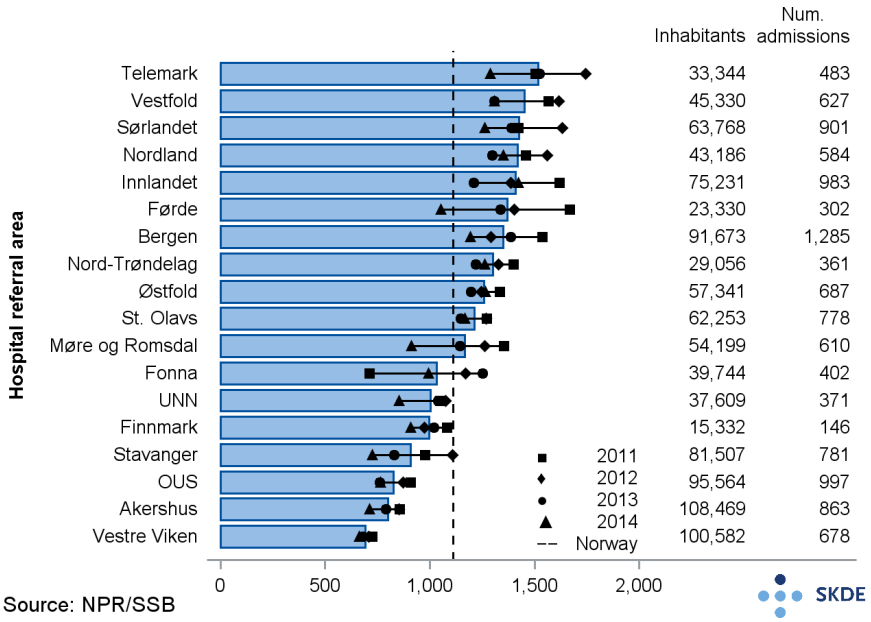

Figure 6.24: Admissions, acute diagnoses, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area, per year and as an average for the period 2011–2014.

Another pattern emerges when we consider usage rates for admissions. The hospital referral areas of Vestfold, Telemark and Innlandet, all below the national average for overall contacts, nevertheless have high usage rates for admissions. The hospital referral areas of Vestre Viken, Akershus and OUS, which have high usage rates for all contacts, have the lowest usage rate for admissions. Stavanger has low usage rates both for overall contacts and for admissions.

The number of referrals for emergency care assessment from primary healthcare services to the specialist health service does not indicate a strong connection with the number of emergency care admissions. The variation in usage rates also shows that assessments of need for emergency care admissions are not uniform across hospital referral areas. The usage rate pattern for emergency care admissions between hospital referral areas largely corresponds to the usage rate pattern for all admissions for medical conditions.

6.3 Medical admissions

6.3.1 Epilepsy

Epilepsy represents a wide range of illness in children. Some have only experienced one or two seizures and are not on permanent medication. Others have complicated and complex conditions where epilepsy can be one of several symptoms of the child's underlying illness. Many children can be followed up as outpatients. Children with difficult-to-control epilepsy will nevertheless require emergency care admissions in connection with seizures and planned admissions for adjustment of medication and interdisciplinary assessments of the child's medical and social situation and level of functioning.

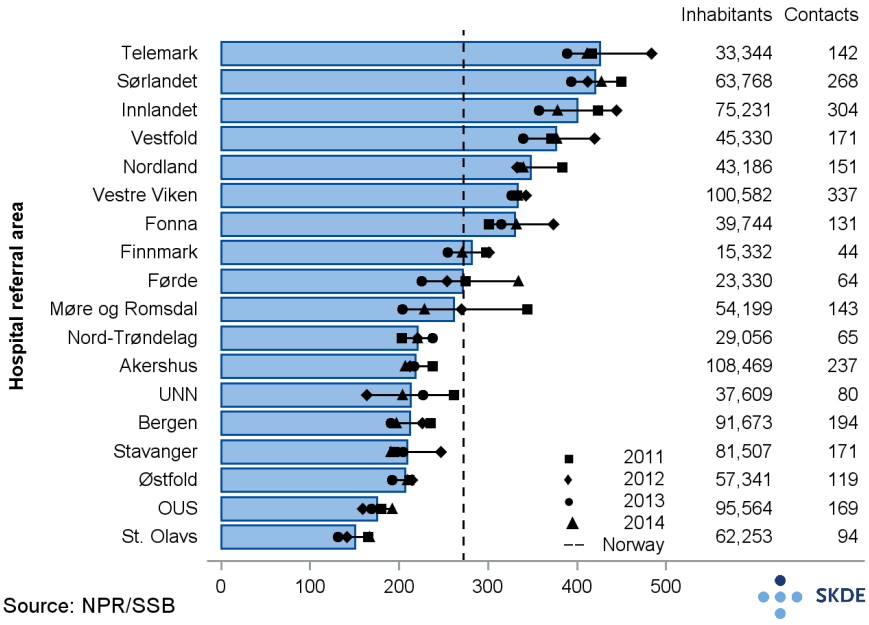

Figure 6.25: Epilepsy, admissions, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area, per year and as an average for the period 2011–2014.

Sample

The sample consists of children's admissions for epilepsy in the somatic specialist health service with a duration of at least 24 hours. Epilepsy is defined by a primary or secondary diagnosis (ICD-10) in code blocks G40–41. The sample also includes children being followed up by the habilitation service and Oslo University Hospital's Department of Complex Epilepsy, National Centre for Epilepsy (SSE).

Comments

Children with epilepsy account for 6–7% of all children's admissions for medical diagnoses in Norwegian hospitals. There are 2.8 times more admissions and 2.6 times more patients in Telemark than in St. Olavs hospital referral area. Between 50% and 75% of admissions are planned.

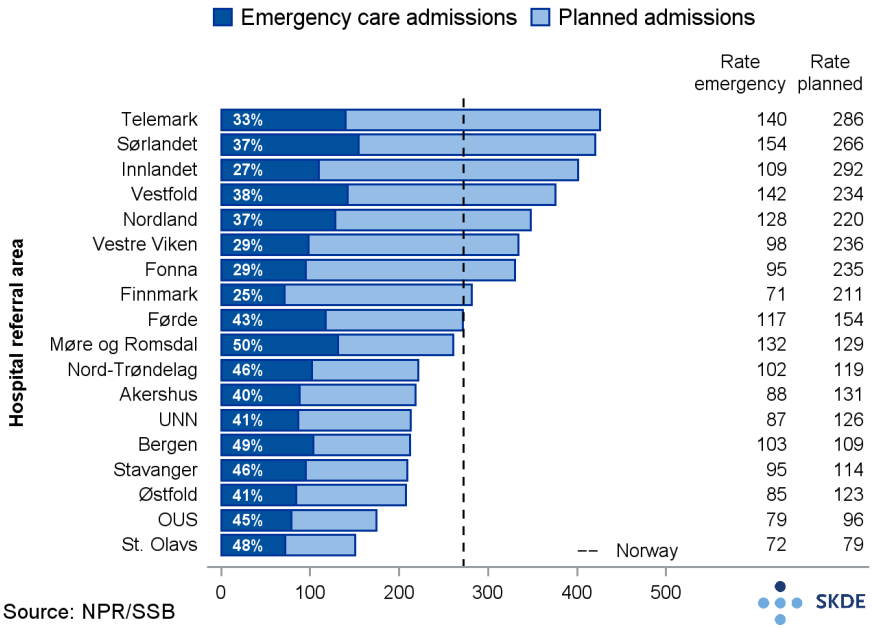

Figure 6.26: Epilepsy, admissions, by degree of urgency, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area and as an average for the period 2011–2014.

The contact frequency varies from 1.43 (UNN hospital referral area) to 2.02 (Førde hospital referral area), which reflects that this is a group of patients who need regular admissions. The

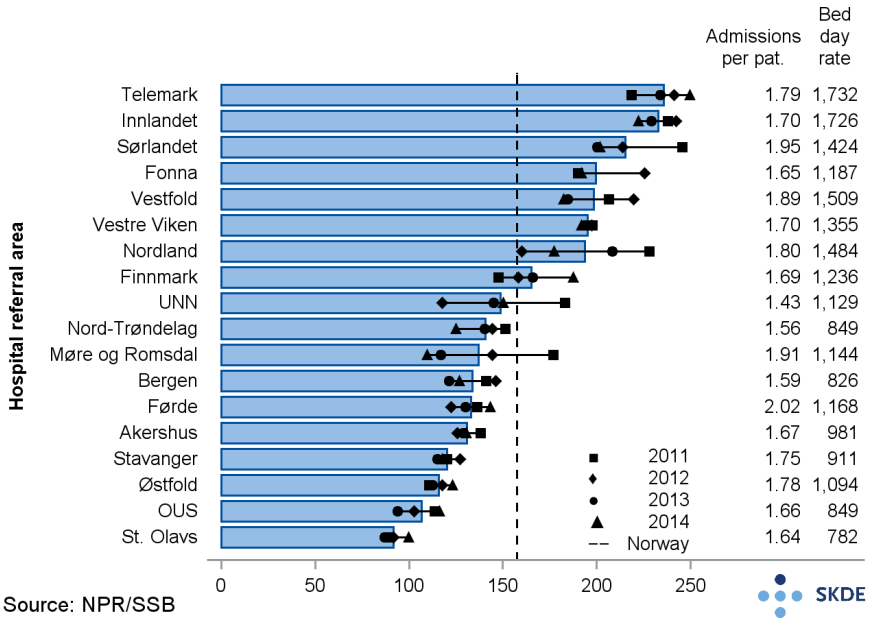

Figure 6.27: Epilepsy, admissions, age-adjusted patient rates per 100,000 children 0–16 year, per hospital referral area, per year and as an average for the period 2011–2014. Average number of admissions per patient (contact frequency) and bed day rate.

differences in usage rates between hospital referral areas with high and low rates are mainly caused by the fact that more patients are admitted in areas with high usage rates. There was no systematic change in usage rates from 2011 to 2014.

There are no known differences in morbidity that would explain this variation. There is reason to ask whether there is unwarranted variation in usage and patient rates between hospital referral areas.

6.3.2 Constipation

Periods of infrequent bowel movements and constipation are a normal phenomenon in many children. However, in some children this becomes a chronic condition that leads to stomach ache, paradoxical diarrhoea with bowel incontinence, difficulties eating and generally feeling unwell. Chronic constipation can be caused by diseases and abnormalities of the bowels as well as by psychosocial and dietary factors. Treatment involves using laxatives and enemas, in addition to dietary advice. In most cases, the problem can be resolved by a GP or outpatient consultation, but some children have to be admitted in order to completely empty their bowel. Children are also admitted for assessment of vague stomach symptoms that often end up being diagnosed as constipation.

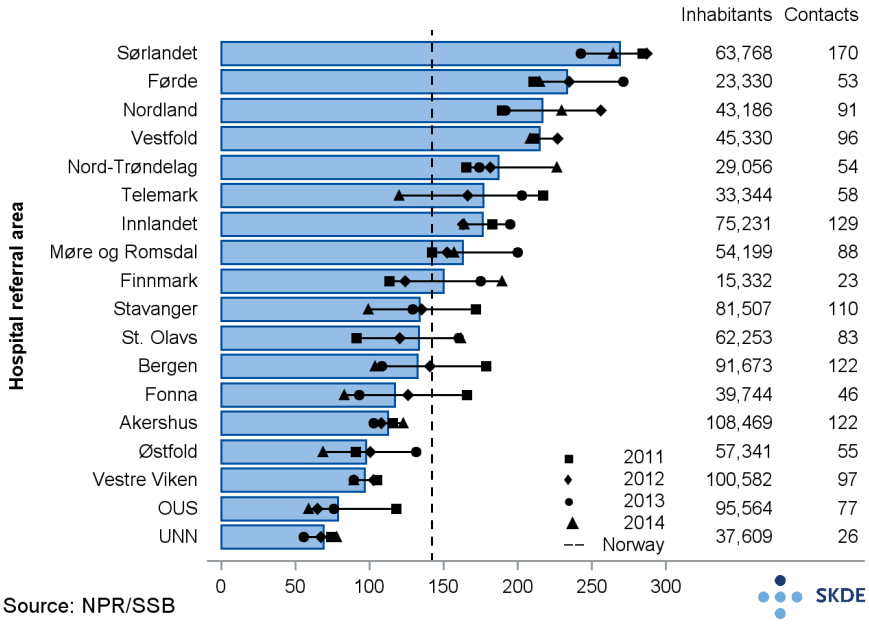

Figure 6.28: Constipation, admissions, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area, per year and as an average for the period 2011–2014.

Sample

The sample consists of children's admissions for constipation in the somatic specialist health service with a duration of at least 24 hours. Constipation is defined by a primary or secondary diagnosis (ICD-10) of F98.1 or in code block K59. Since constipation can manifest as different symptoms, all the sub-diagnoses in K59 are included, including functional diarrhoea.

Comments

Children with constipation account for 3–4% of all children's admissions for medical diagnoses in Norwegian hospitals. Of children with these diagnoses, 12% are admitted while 88% receive

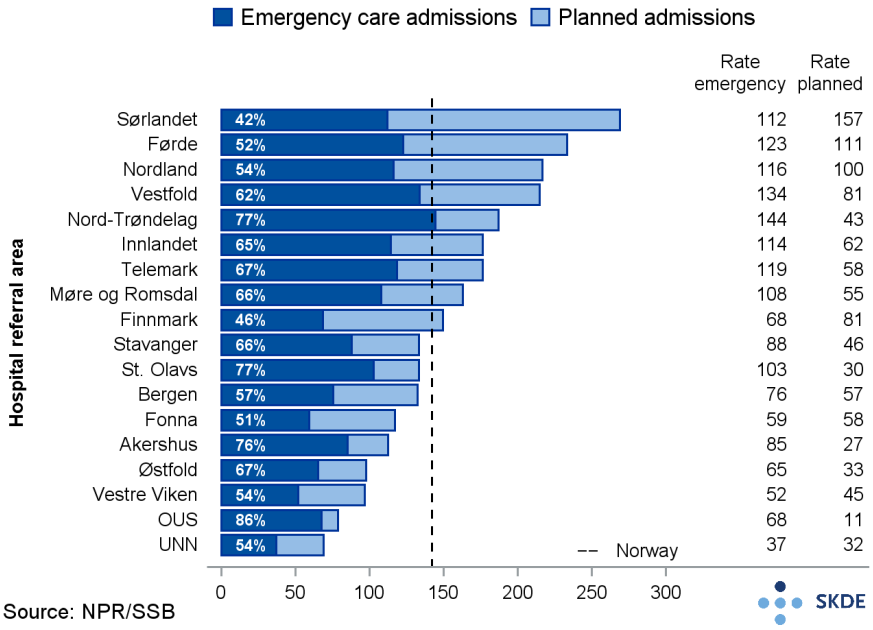

Figure 6.29: Constipation, admissions, by degree of urgency, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area and as an average for the period 2011–2014.

outpatient treatment (see separate chapter on outpatients, page 36).

Children with constipation who live in Sørlandet hospital referral area are admitted 3.9 times as often as children living in the UNN area. In the OUS area, 86% of admissions are emergency care admissions, while the corresponding figure for Sørlandet is 42%. There appears to be no systematic differences in contact frequency, which is consistently low, between hospital referral areas with high and low usage rates. From 2011 to 2014, the usage rate has fallen in many, but not all, hospital referral areas.

Constipation is a condition for which it may be expedient to admit some children for planned emptying of the bowel by means of an enema before an emergency care admission becomes necessary. Therefore, it is not a given what the usage rates for admissions or outpatient/day patient treatment should be or which emergency care proportion represents an ultimate balance. It is worth noticing that several health trusts, including Sørlandet hospital health trust, Sykehuset Østfold health trust HF and Vestre Viken health trust, have developed evidence-based treatment guidelines for this patient group. Despite this, usage rates vary considerably, including between the above-mentioned hospital referral areas. This could also have something to do with the fact that admissions for vague stomach pain could end up in a constipation diagnosis.

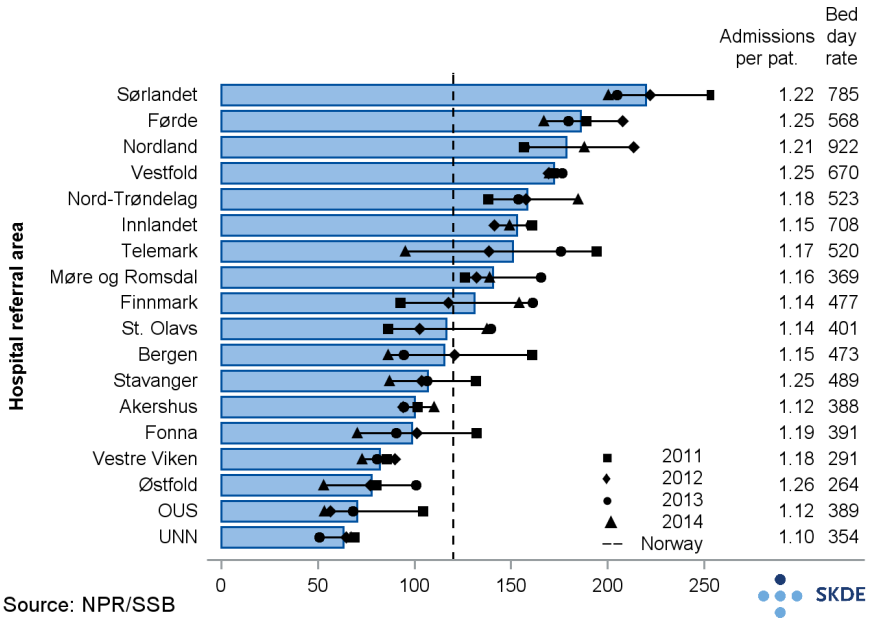

Figure 6.30: Constipation, admissions, age-adjusted patient rates per 100,000 children 0–16 year, per hospital referral area, per year and as an average for the period 2011–2014. Average number of admissions per patient (contact frequency) and bed day rate.

6.3.3 Bronchiolitis

Bronchiolitis is a viral infection in the small airways that affects young children. Many children manage without being admitted to hospital, but the condition can cause severe breathing difficulties that may require extra oxygen and breathing support. Antibiotics are not effective against a viral infection. Studies have shown that long-term hospitalisation with monitoring and inhalation treatment does not improve treatment outcomes compared with less extensive treatment over a shorter period.

Sample

The sample consists of admissions of children aged 0–3 years for bronchiolitis in the somatic specialist health service with a duration of at least 24 hours. Strictly speaking, the diagnosis bronchiolitis should be reserved for children under two years of age, but it is also used for older children. The clinical distinctions are not clear-cut, and we have therefore set a pragmatic upper limit at the age of three. Bronchiolitis is defined by a primary or secondary diagnosis (ICD-10) in code blocks J12 or J20–22.

Comments

Bronchiolitis accounts for 6–7% of all children's admissions for medical diagnoses in Norwegian hospitals. Of children diagnosed by the specialist health service, 53% are admitted while the rest are treated as outpatients.

The usage rate in Innlandet hospital referral area is 2.6 times higher than in Vestre Viken. The variation in usage rates are largely due to the fact that more patients are admitted in the areas

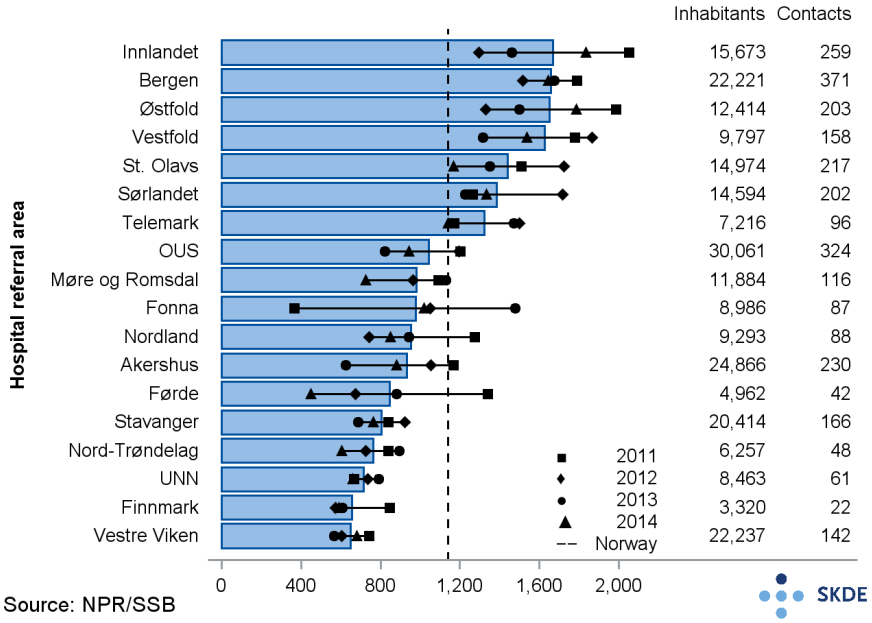

Figure 6.31: Bronchiolitis, admissions, age-adjusted usage rates per 100,000 children 0–3 year, per hospital referral area, per year and as an average for the period 2011–2014.

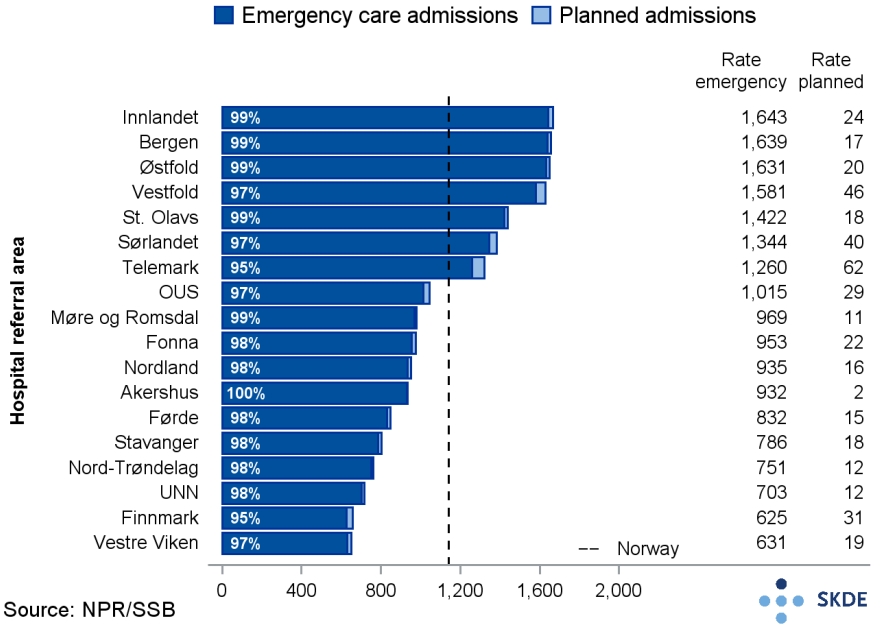

Figure 6.32: Bronchiolitis, by degree of urgency, age-adjusted usage rates per 100,000 children 0–3 year, per hospital referral area and as an average for the period 2011–2014.

with high usage rates. Nearly all patients in this diagnosis category are admitted as emergency care cases.

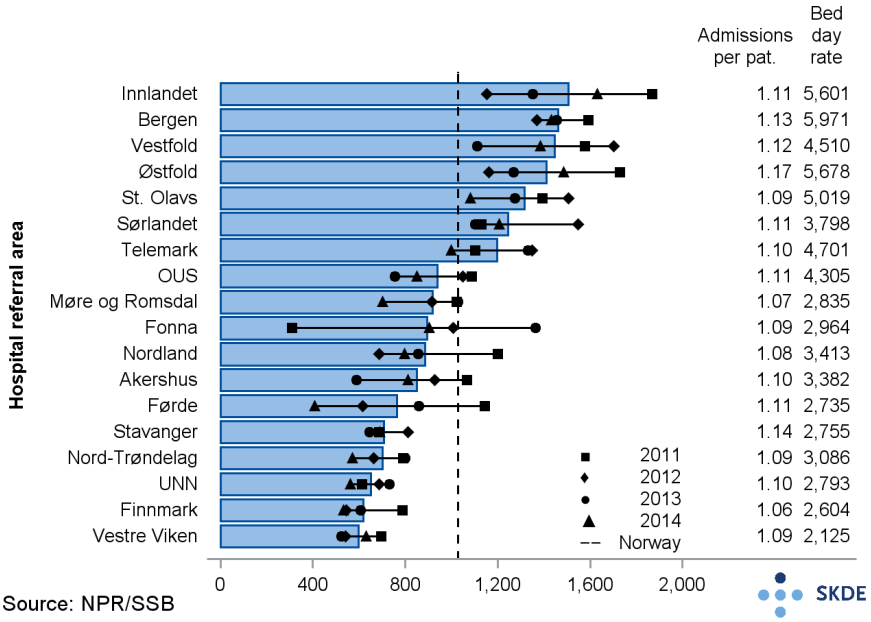

Figure 6.33: Bronchiolitis, admissions, age-adjusted patient rates per 100,000 children 0–3 year, per hospital referral area, per year and as an average for the period 2011–2014. Average number of admissions per patient (contact frequency) and bed day rate.

The prevalence of respiratory tract viruses that cause bronchiolitis vary over time as well as geographically, but this variation will probably even out when the four-year period is considered as a whole. It is therefore unlikely that the identified variation in usage rates between hospital referral areas is due to differences in morbidity. There is reason to question whether there is an unwarranted variation in usage rates for admissions between hospital referral areas.

6.3.4 Viral and respiratory tract infections

Infections are an important reason for admission to Norwegian paediatric departments. Here we will describe the prevalence and variation, primarily of viral infections (except viral gastroenteritis), but also of some bacterial respiratory tract infections. Most infections described in this sample are self-limiting and will resolve without antibiotics, but they can affect a child's general state of health to such an extent that supportive treatment with intravenous fluids and nutrition or oxygen treatment/breathing support is required.

Sample

The sample consists of children's admissions for viral and respiratory tract infections in the somatic specialist health service with a duration of at least 24 hours. Viral and respiratory tract infections are defined by a primary or secondary diagnosis (ICD-10) in code blocks B00–02, B08, B15–19, B25, B27, B33–34, J02–06, J13–14 or J18. Children aged 4–16 years who are diagnosed with bronchiolitis (J12 or J20–22) are also included here.

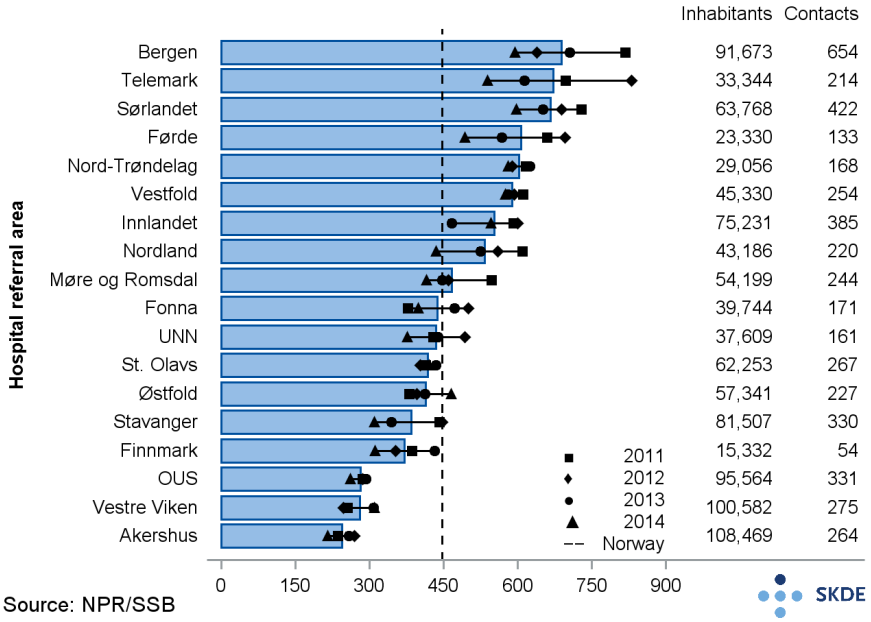

Figure 6.34: Viral and respiratory tract infections, admissions, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area, per year and as an average for the period 2011–2014.

Comments

Viral and respiratory tract infections account for approx. 11% of all children's admissions for medical diagnoses in Norwegian hospitals. The usage and patient rates for Bergen hospital re-

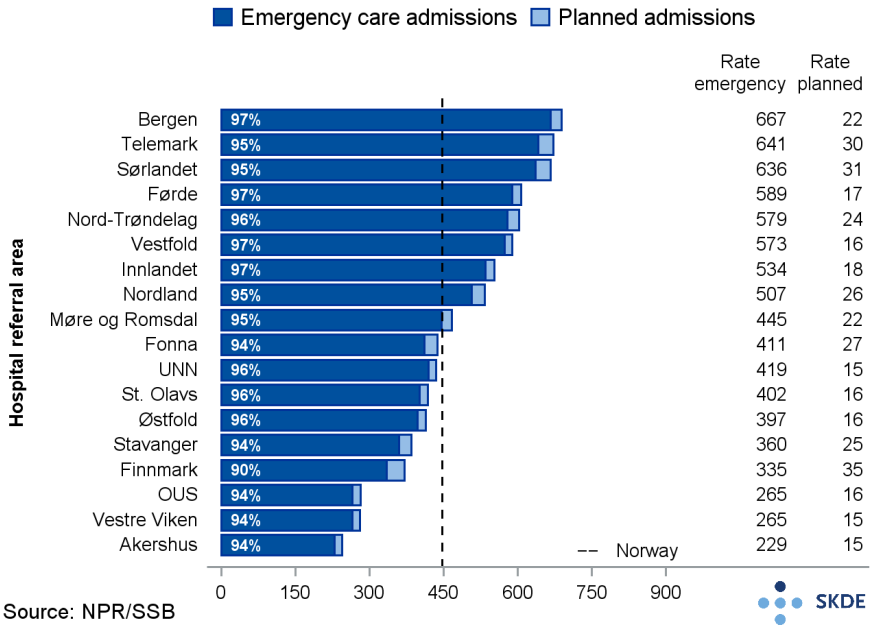

Figure 6.35: Viral and respiratory tract infections, admissions, by degree of urgency, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area and as an average for the period 2011–2014.

ferral area are 2.8 times higher than for Akershus. There is no significant difference in contact frequency between the hospital referral areas, and most children are only admitted once. Patients

with these diagnoses are almost always admitted as emergency care cases.

There is a tendency towards falling admission rates from 2011 to 2014, particularly in the hospital referral areas with the highest rates. The three hospital referral areas with the lowest rates showed little variation during the period. There are no known differences in morbidity or framework

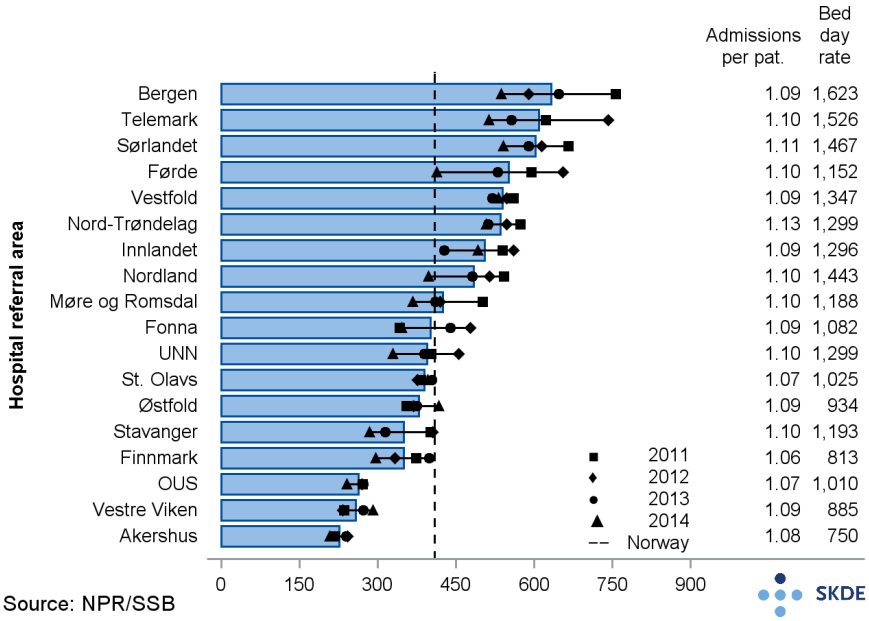

Figure 6.36: Viral and respiratory tract infections, admissions, age-adjusted patient rates per 100,000 children 0–16 year, per hospital referral area, per year and as an average for the period 2011–2014. Average number of admissions per patient (contact frequency) and bed day rate.

conditions that would explain this variation. There seems to be a trend towards lower usage rates in the hospital referral areas that had the highest rates at the beginning of the period, but there is still reason to ask whether unwarranted variation in usage rates between areas persists.

6.3.5 Viral gastroenteritis

Viral infections in the stomach and digestive system with vomiting, diarrhoea and stomach pain are an important cause of children being admitted to hospital. This condition is much more common in winter than in summer, which contributes greatly to the considerable seasonal variation in admissions to Norwegian paediatric departments. There are a number of different viruses that cause the same set of symptoms. Adenovirus, norovirus and rotavirus are some of the most common ones. There is no effective treatment against these viruses, but if the child cannot drink enough fluids they may need to be treated with fluids either via a tube to the stomach or intravenously. A rotavirus vaccine was introduced in 2014 for the reason that it would reduce the amount of such infections and the number of hospital admissions.

Sample

The sample consists of children's admissions for viral gastroenteritis in the somatic specialist health service with a duration of at least 24 hours. Viral gastroenteritis is defined by a primary or secondary diagnosis (ICD-10) in code blocks A08–09 or R10–11.

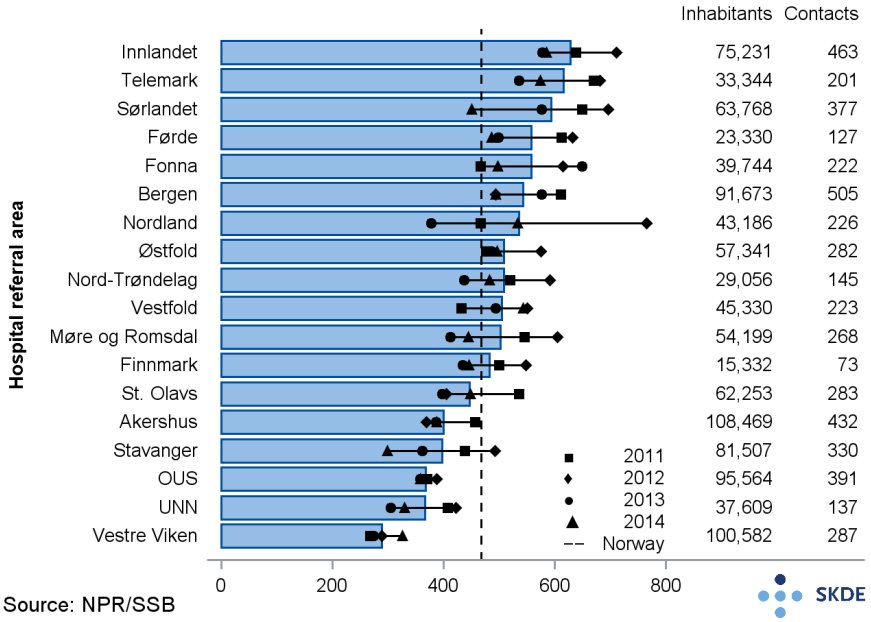

Figure 6.37: Viral gastroenteritis, admissions, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area, per year and as an average for the period 2011–2014.

Comments

This patient group accounts for approx. 11% of all children's admissions for medical diagnoses in Norwegian hospitals. The usage rate of Innlandet hospital referral area is more than twice that

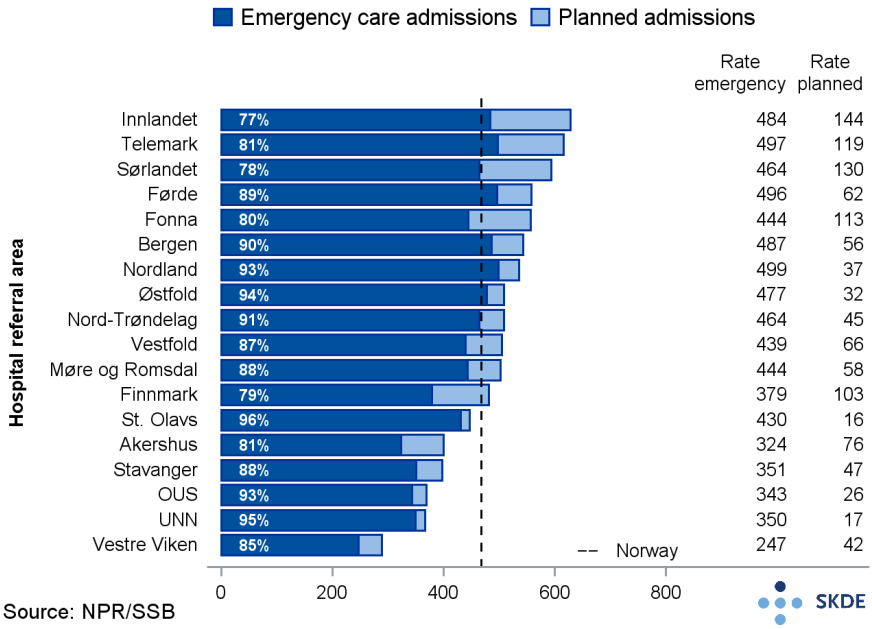

Figure 6.38: Viral gastroenteritis, admissions, by degree of urgency, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area and as an average for the period 2011–2014.

of Vestre Viken. Between 77% and 96% of patients in this diagnosis category are admitted as emergency care cases.

There is no clear difference in the number of admissions per patient (contact frequency) between hospital referral areas with high and low usage rates; it is the number of patients admitted for these diagnoses that varies. There is a tendency towards falling admission rates from 2011 to 2014.

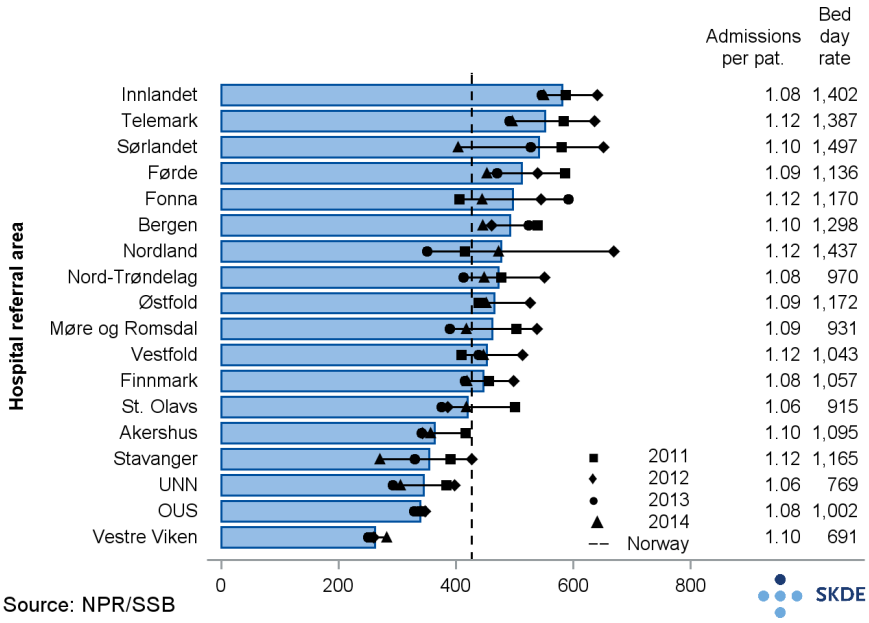

Figure 6.39: Viral gastroenteritis, admissions, age-adjusted patient rates per 100,000 children 0–16 year, per hospital referral area, per year and as an average for the period 2011–2014. Average number of admissions per patient (contact frequency) and bed day rate.

There are no known differences in morbidity or framework conditions that would explain the variation between hospital referral areas. There seems to be a trend towards lower usage rates for viral gastroenteritis during the period. There is reason to ask whether there is unwarranted variation between hospital referral areas.

6.4 Medical outpatient services

6.4.1 Epilepsy

Epilepsy is a condition that can manifest itself in a broad range of different ways. Some patients have few symptoms or light seizures, while other patients may have complex and difficult-to-control seizures that cause considerable functional impairment and need for assistance. Most children with epilepsy are diagnosed and have check-ups with a paediatrician with special expertise in neurology and epilepsy.

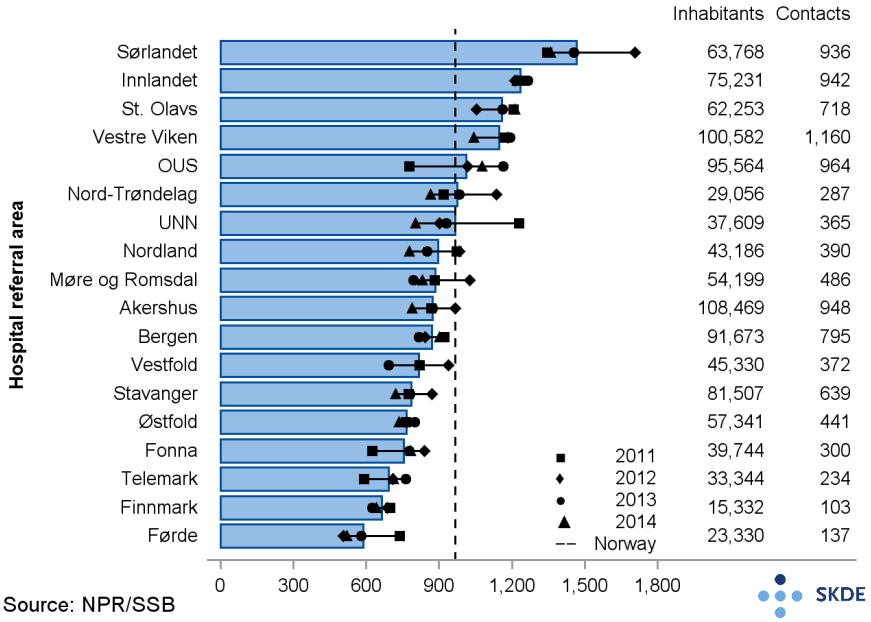

Figure 6.40: Epilepsy, outpatient services, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area, per year and as an average for the period 2011–2014.

Sample

The sample consists of consultations (outpatient/day patient services) for epilepsy for children in the somatic specialist health service, including specialists in private practice under public funding contracts. Epilepsy is defined by a primary or secondary diagnosis (ICD-10) in code blocks G40–41. The sample also includes children being followed up by the habilitation service and Oslo University Hospital's Department of Complex Epilepsy, National Centre for Epilepsy (SSE).

Comments

Each year, approx. 4,000 patients have a total of approx. 10,000 consultations for epilepsy. This makes up 1.9% of all medical outpatient consultations for children, and 1.8% of all children seen in medical outpatient clinics have this diagnosis. A small proportion of consultations are with specialists in private practice.

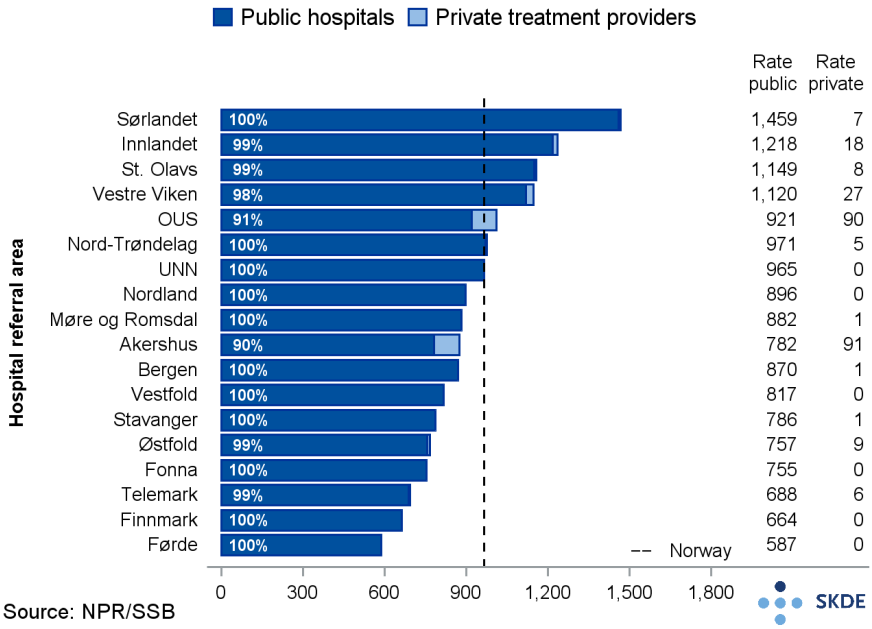

Figure 6.41: Epilepsy, outpatient services, broken down by public or private treatment providers, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area and as an average for the period 2011–2014.

Sørlandet hospital referral area has a 2.5 times higher usage rate and a 1.7 times higher patient rate than Førde. The contact frequency varies from 1.69 (Fonna hospital referral area) to 3.18

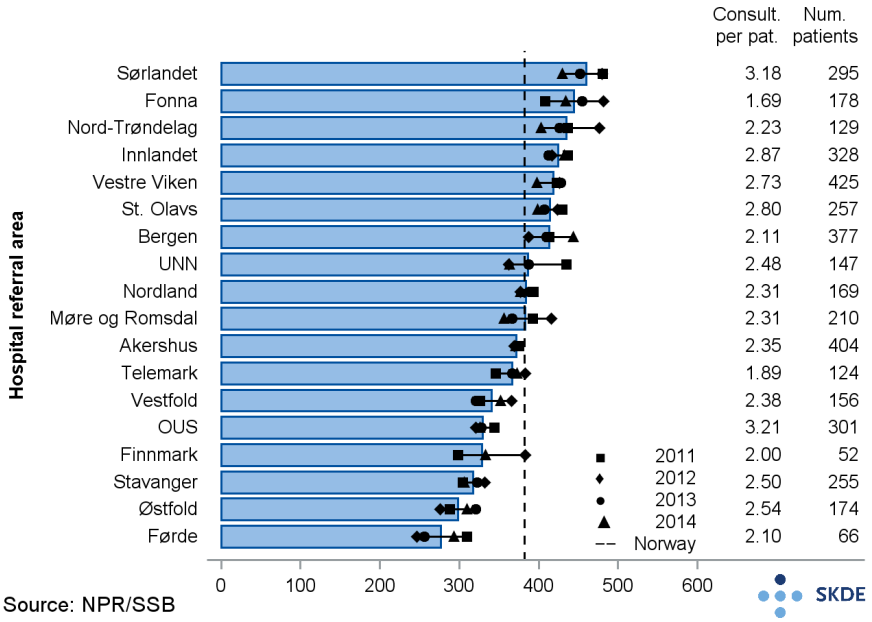

Figure 6.42: Epilepsy, outpatient services, age-adjusted patient rates per 100,000 children 0–16 year, per hospital referral area, per year and as an average for the period 2011–2014. Average number of contacts per patient (contact frequency) and number of patients.

(Sørlandet hospital referral area). This difference in contact frequency corresponds to 1,490 more consultations per 1,000 patients treated. The number of consultations as well as usage and patient

rates have remained relatively stable in each hospital referral area during the period.

There does not seem to be any clear connection between usage rates for outpatient care and admissions. The two hospital admission areas with the highest usage rates for outpatient care (Sørlandet and Innlandet) also have high usage rates for admission, while the hospital referral areas of St. Olavs and OUS, which also have relatively high numbers of outpatient consultations, have the lowest usage rate for admissions (see Epilepsy - admissions, page 53).

There are no indications that these different rates can be explained by differences in morbidity or framework conditions. There is reason to ask whether there is unwarranted variation between hospital referral areas in usage rates for outpatient consultations for epilepsy.

6.4.2 Constipation

Periods of infrequent bowel movements and constipation are a normal phenomenon in many children. However, in some children this becomes a chronic condition that leads to stomach ache, paradoxical diarrhoea with bowel incontinence, difficulties eating and generally feeling unwell. Chronic constipation can be caused by diseases and abnormalities of the bowels as well as by psychosocial and dietary factors. Treatment involves using laxatives and enemas, in addition to dietary advice. In most cases, the problem can be resolved by a GP or outpatient consultation, but some children have to be admitted in order to completely empty their bowel.

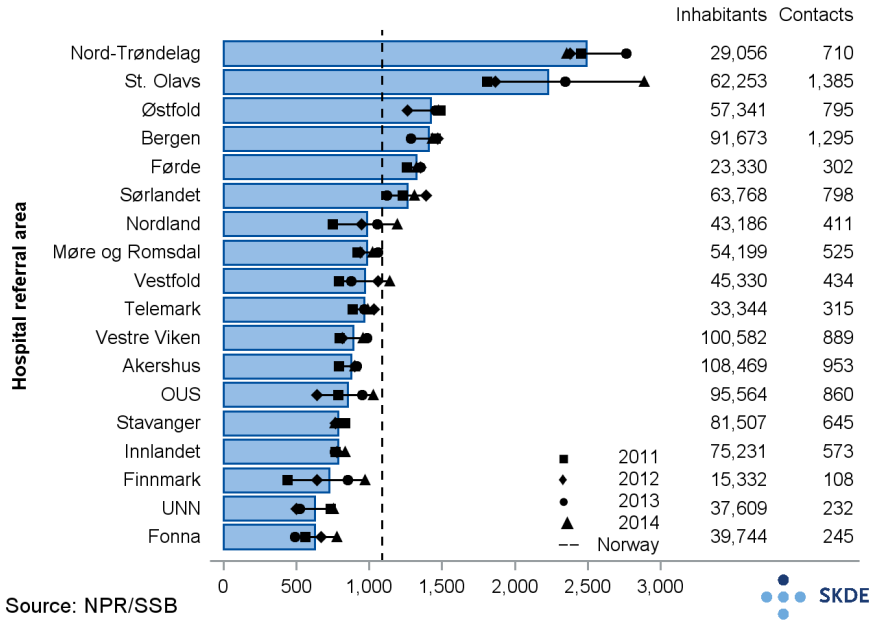

Figure 6.43: Constipation, outpatient services, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area, per year and as an average for the period 2011–2014.

Sample

The sample consists of consultations (outpatient/day patient services) for constipation for children in the somatic specialist health service, including specialists in private practice under public funding contracts. Constipation is defined by a primary or secondary diagnosis (ICD-10) of

F98.1 or in code block K59. Since constipation can manifest as different symptoms, all the sub-diagnoses in K59 are included, including functional diarrhoea.

Comments

Consultations for constipation make up approx. 2% of all children's consultations in Norwegian hospitals. Out of all contacts concerning these diagnoses, 88% are outpatient contacts. Children

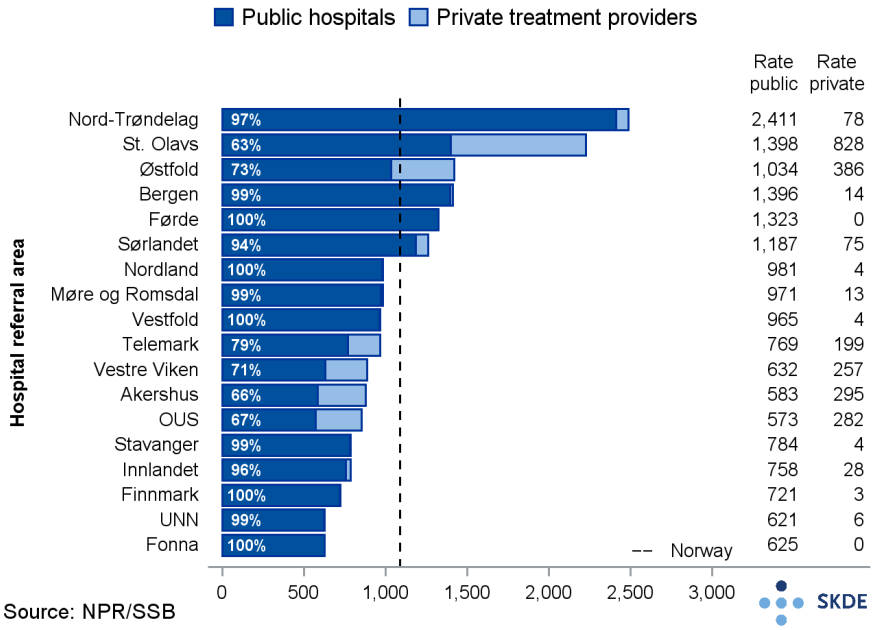

Figure 6.44: Constipation, outpatient services, broken down by public or private treatment providers, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area and as an average for the period 2011–2014.

living in Nord-Trøndelag have about four times as many outpatient consultations for constipation per 100,000 population as children in Fonna hospital referral area. The contact frequency is approx. 1.5 times higher in Østfold hospital referral area than in Finnmark. This corresponds to 650 more consultations per 1,000 patients treated. The contact frequency appears to be somewhat higher in hospital referral areas with high patient rates than in areas with low patient rates. The usage rate has remained stable from 2011 to 2014, with relatively little variation between years.

Constipation is a condition where early intervention may be important, and both health visitors and GPs have an important role to play in the early stages. Two of the hospital referral areas have significantly higher usage and patient rates than the other areas, but even when these two are excluded, there is considerable variation between hospital referral areas. Østfold hospital referral area, which has the third highest usage rate, has twice the rate of Finnmark, which has the third lowest usage rate. It is not a given what is the correct usage rate for health services to children with constipation, but the geographical variation is considerable.

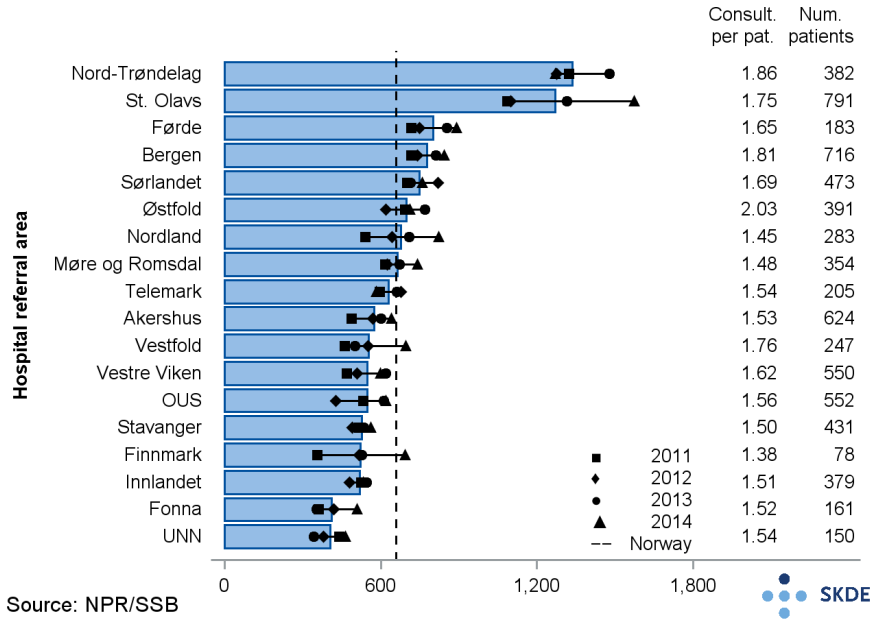

Figure 6.45: Constipation, outpatient services, age-adjusted patient rates per 100,000 children 0–16 year, per hospital referral area, per year and as an average for the period 2011–2014. Average number of contacts per patient (contact frequency) and number of patients.

6.4.3 Asthma

Asthma is a chronic inflammation of the airways that can be triggered by different factors. Asthma used to be a disease that often resulted in hospital admission and also some deaths, both among children and adults. New drugs have changed the lives of many asthmatic children. Many children with asthma can be followed up by their GPs, and it is not uncommon for children to grow out of the disease in childhood.

Sample

The sample consists of consultations (outpatient/day patient services) for asthma for children in the somatic specialist health service, including specialists in private practice under public funding contracts. Asthma is defined by a primary or secondary diagnosis (ICD-10) in code blocks J45–46.

Comments

Each year, a total of 22,000 children have approx. 40,000 specialist health service consultations for asthma. This accounts for 7% of all consultations and 10% of all children under outpatient follow-up by the specialist health service each year. Akershus hospital referral area has a usage rate 3.8 times higher than that of Vestfold, and a patient rate 3.1 times higher than Stavanger's.

In the five hospital referral areas with the highest number of paediatric specialists in private practice, such specialists account for between 72% and 89% of all consultations. This could indicate a managed transfer from hospitals to specialists in private practice in these areas. The overall usage rate is higher than in other hospital referral areas for four out of these five areas.

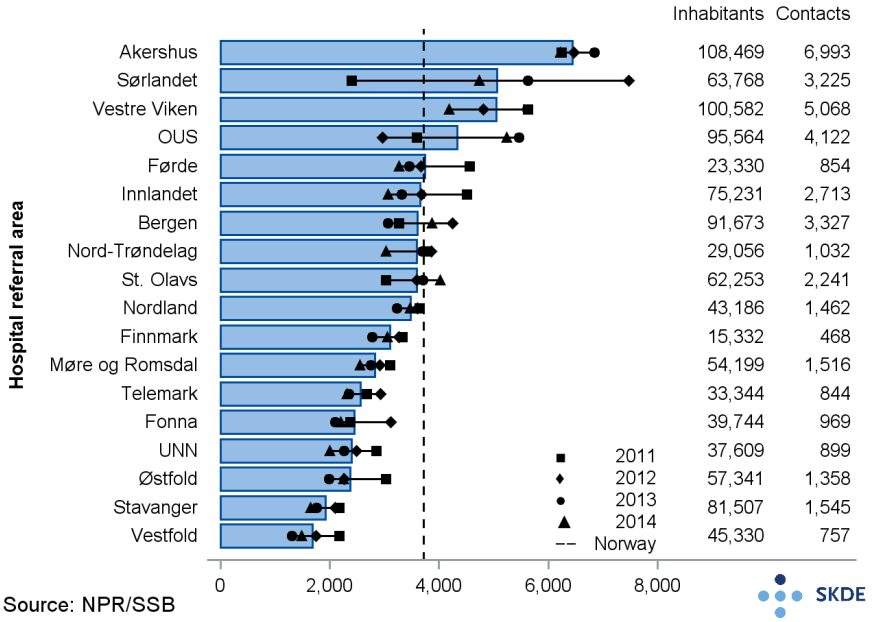

Figure 6.46: Asthma, outpatient services, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area, per year and as an average for the period 2011–2014.

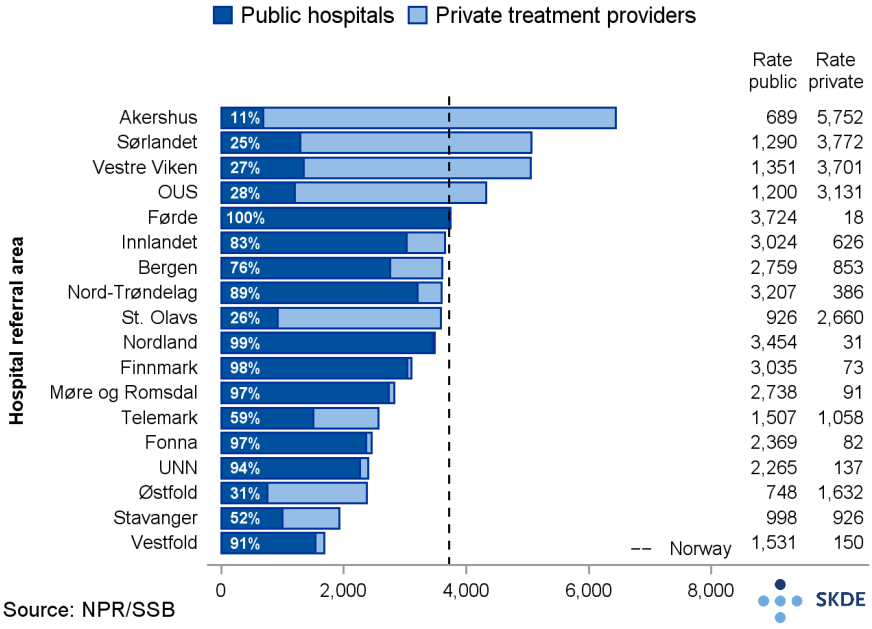

Figure 6.47: Asthma, outpatient services, broken down by public or private treatment providers, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area and as an average for the period 2011–2014.

While the contact frequencies for the five hospital referral areas with a high proportion of private activity are between 1.76 and 2.14, the areas with the lowest proportion of private activity have significantly lower contact frequencies. This indicates that each patient has more frequent check-ups with specialists in private practice than at outpatient clinics in the rest of the country. The difference between the highest and lowest contact frequencies corresponds to 740 more

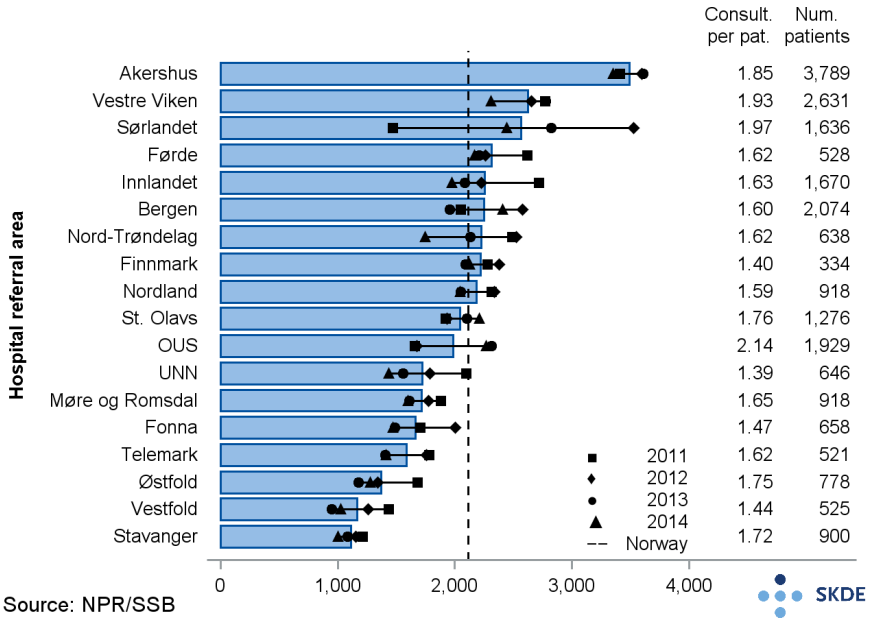

Figure 6.48: Asthma, outpatient services, age-adjusted patient rates per 100,000 children 0–16 year, per hospital referral area, per year and as an average for the period 2011–2014. Average number of contacts per patient (contact frequency) and number of patients.

consultations per 1,000 patients treated.

Norwegian studies provide no basis for assuming that the variation is due to differences in the prevalence of asthma between hospital referral areas (Nystad et al. 1997). There is reason to believe that there is unwarranted variation that could be a manifestation of differences in patient services and cooperation between hospitals, specialists in private practice and GPs on the follow-up of children with asthma.

Based on the high level of variation, neither an overuse nor an underuse of specialist health services for children with asthma can be ruled out. It may appear that specialists in private practice have a somewhat different practice for the follow-up of children with asthma than hospitals' outpatient clinics. It may also be expedient to discuss what the GPs' role should be in the treatment of asthma in children.

6.4.4 Cardiac medicine

Approx. 1% of all children are born with a heart defect. The heart defect resolves itself without medical treatment in 40–50% of the children. Approximately one third need surgery, and some of them have complex heart defects with a severely abnormal anatomy. Children who develop arrhythmias and rare heart muscle diseases also fall within the scope of this discipline. In addition, some children are referred to have heart murmurs assessed. Heart murmurs are often detected by accident in examinations of children with no other symptoms of heart disease.

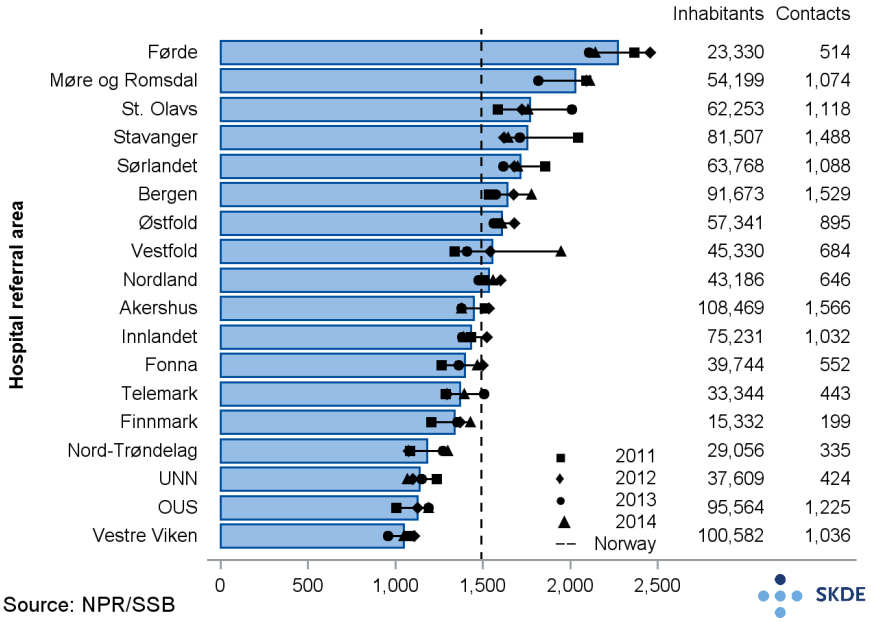

Figure 6.49: Cardiac medicine, outpatient services, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area, per year and as an average for the period 2011–2014.

Sample

The sample consists of cardiac medicine consultations (outpatient/day patient services) for children in the somatic specialist health service, including specialists in private practice under public funding contracts. Cardiac medicine is defined by a primary or secondary diagnosis (ICD-10) in code blocks I20–52, Q20–28 or R01.

Comments

Each year, approx. 10,000 patients have a total of nearly 16,000 cardiac medicine consultations. This makes up 3% of all medical consultations for children, and 4.5% of all children seen in medical outpatient clinics. Approximately 3,800 of the consultations concern children with heart murmurs who are not diagnosed with any heart disease. This means that as many as 24% of the cardiac medicine consultations are ultrasound examinations of the heart based solely on a murmur detected by chance. Since most patients with this diagnosis are only examined once, this means that a significant proportion of the Norwegian child population undergoes an unnecessary examination.

The usage rate in Førde hospital referral area is 2.2 times higher than for Vestre Viken. The patient rate for Møre og Romsdal hospital referral area is 1.8 times higher than for the UNN area. The contact frequency varies from Vestre Viken (1.37) to Førde (1.88). This difference corresponds to 510 more consultations per 1,000 patients treated.

The Section of Paediatric Cardiology at Oslo University Hospital (OUS) is in a unique position in Norway with its big specialist community and its coordination and national functions for children with complex congenital heart defects. It may therefore be relevant to compare usage rates for the other hospital referral areas with the rate for the OUS area. Child cardiologists perform ultrasound examinations of the heart. This is a technical examination that requires experience.

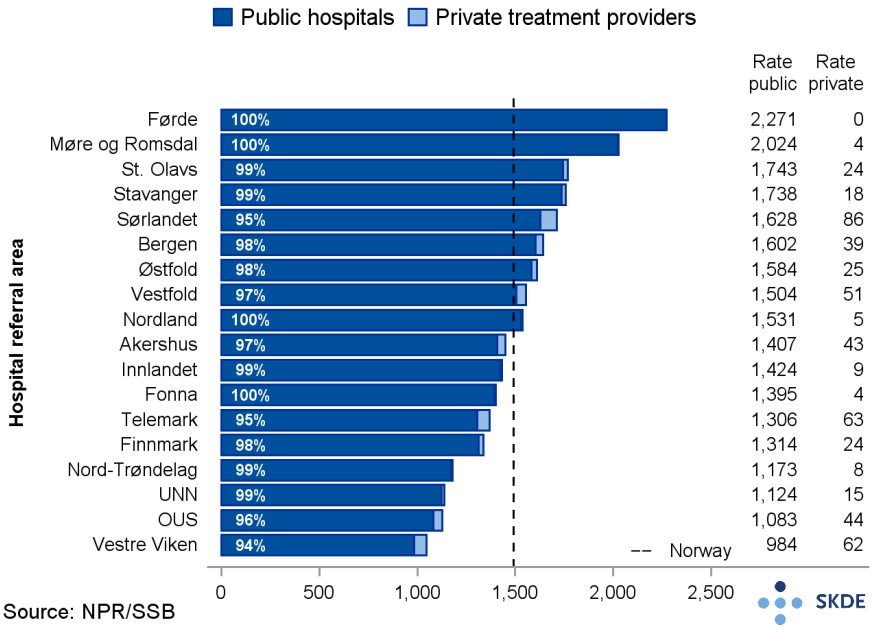

Figure 6.50: Cardiac medicine, outpatient services, broken down by public or private treatment providers, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area, per year and as an average for the period 2011–2014.

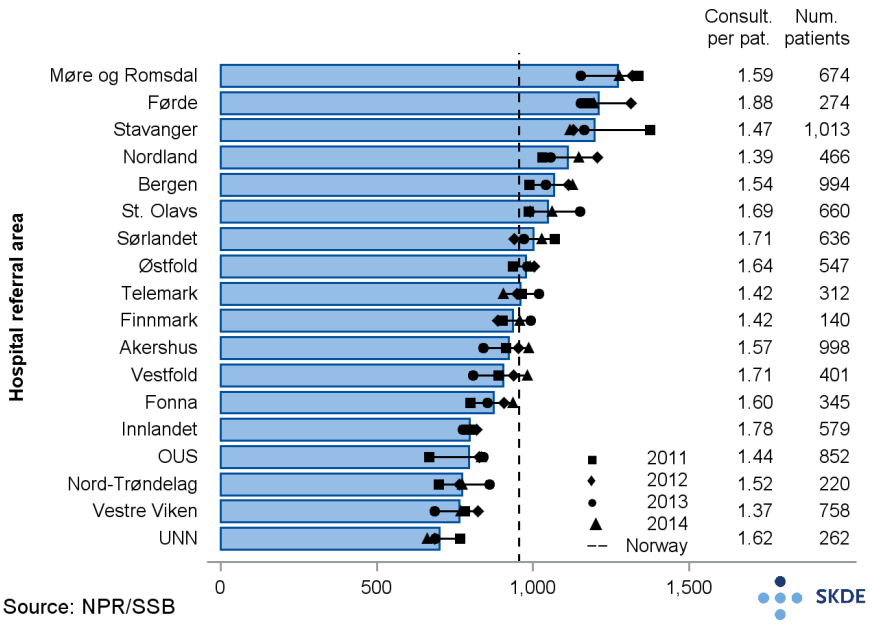

Figure 6.51: Cardiac medicine, outpatient services, age-adjusted patient rates per 100,000 children 0–16 year, per hospital referral area, per year and as an average for the period 2011–2014. Average number of contacts per patient (contact frequency) and number of patients.

Varying levels of experience and patient volumes for cardiologists in other hospital referral areas could explain some of the variation. There are no indications that morbidity varies between hospital referral areas.

The usage rates for outpatient paediatric cardiology consultations vary considerably, however.

Both GPs and paediatricians should engage in discussions about whether it is necessary for otherwise healthy children showing no other symptoms to undergo ultrasound examinations for heart murmurs.

6.4.5 Gastrointestinal diseases

Gastrointestinal symptoms are very common and account for a considerable proportion of consultations at specialist outpatient clinics for children. Most of these symptoms are transient or harmless and require no treatment. Sometimes, such symptoms are signs of relatively rare gastrointestinal diseases that will significantly affect the child's health and quality of life. Examples include chronic inflammatory bowel disease and coeliac disease.

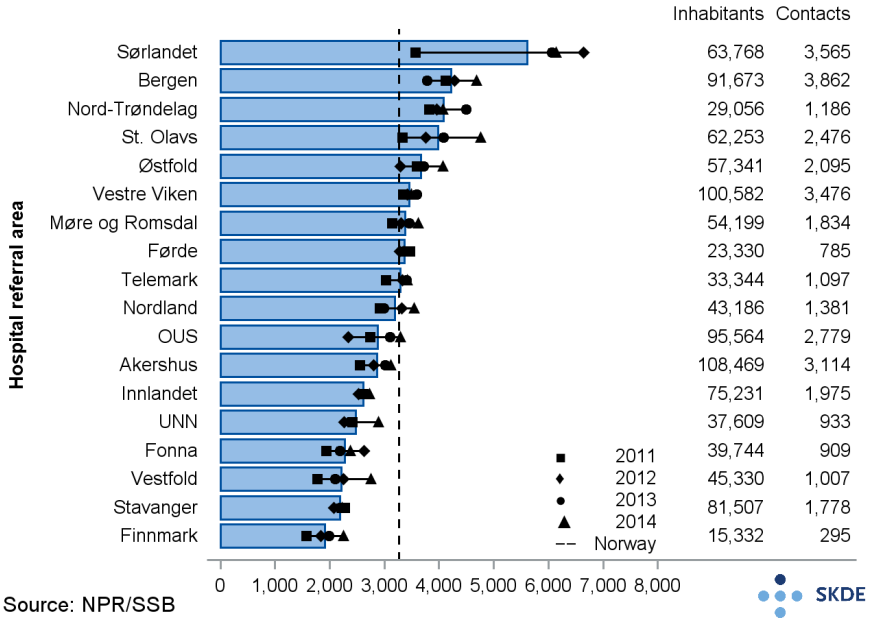

Figure 6.52: Gastrointestinal diseases, outpatient services, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area, per year and as an average for the period 2011–2014.

Sample

The sample consists of consultations (outpatient/day patient services) for gastrointestinal diseases for children in the somatic specialist health service, including specialists in private practice under public funding contracts. Gastrointestinal diseases are defined by a primary or secondary diagnosis (ICD-10) of K90.0, K21.0, K21.9 or in code blocks I50–51, K59 or R10.

Comments

Each year, 19,000 children with these diagnoses have a total of approx. 35,000 consultations. This accounts for just over 6% of all medical outpatient consultations and nearly 9% of all medical patients that receive outpatient treatment. Sørlandet hospital referral area has a 2.9 times higher usage rate than Finnmark and a 2.2 times higher patient rate than UNN hospital referral area. The

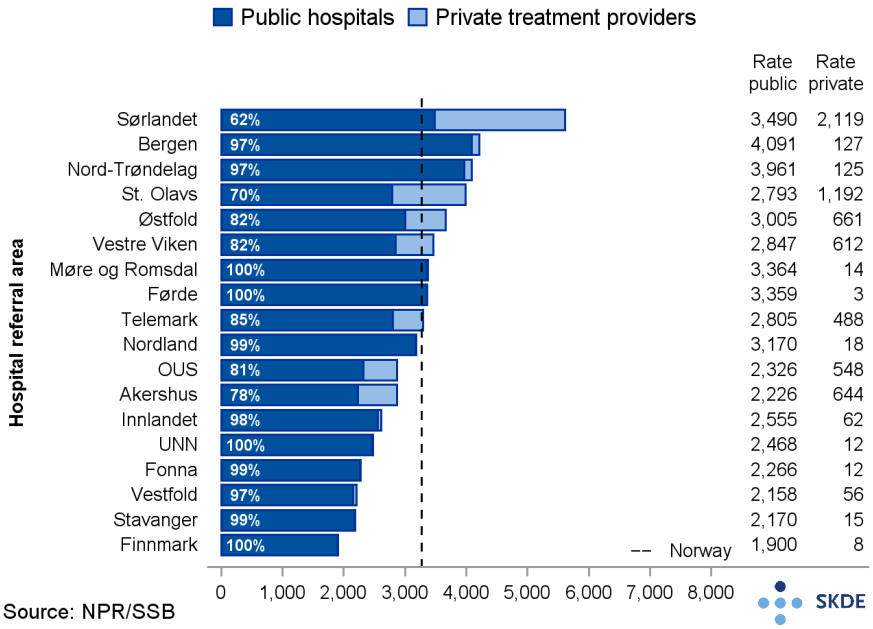

Figure 6.53: Gastrointestinal diseases, outpatient services, broken down by public or private treatment providers, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area and as an average for the period 2011–2014.

contact frequency varies from 1.45 in Finnmark hospital referral area to 1.96 in the Sørlandet area. This corresponds to a difference of 510 consultations per 1,000 patients treated.

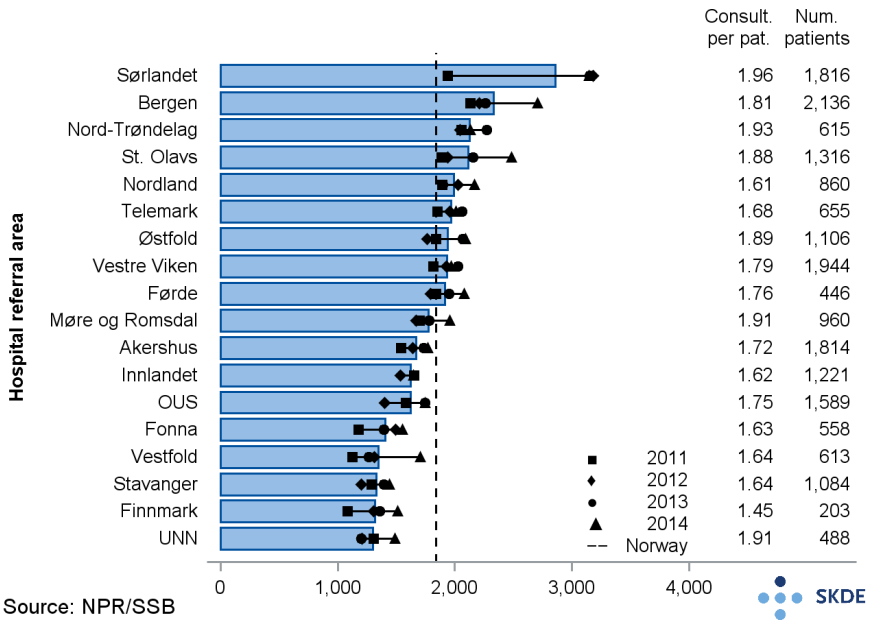

Figure 6.54: Gastrointestinal diseases, outpatient services, age-adjusted patient rates per 100,000 children 0–16 year, per hospital referral area, per year and as an average for the period 2011–2014. Average number of contacts per patient (contact frequency) and number of patients.

Sørlandet has the highest usage rate and also has a higher proportion of private practice consultations than any other hospital referral area. Nevertheless, there does not appear to be any

consistent link between overall usage rates and the number of specialists in private practice in different hospital referral areas. There are no indications of differences in morbidity between hospital referral areas, and this gives reason to ask whether there is an unwarranted variation in the use of outpatient consultations for gastrointestinal diseases.

6.4.6 Bedwetting and urinary incontinence

Bedwetting is considered normal up to the age of six or seven years, and most children grow out of it. Between five and ten per cent of all children still wet their bed at least once a week at the age of six or seven. Urinary incontinence during the day is somewhat more often associated with pathological processes in the urinary or nervous system, although immaturity is the most common cause. Unless symptoms indicate otherwise, referral to a specialist is not recommended until the child is six or seven years old.

Sample

The sample consists of consultations (outpatient/day patient services) for bedwetting and urinary incontinence for children in the somatic specialist health service, including specialists in private practice under public funding contracts. Bedwetting and urinary incontinence are defined by a primary or secondary diagnosis of N39.3–39.4, F98.0 or in code block R32.

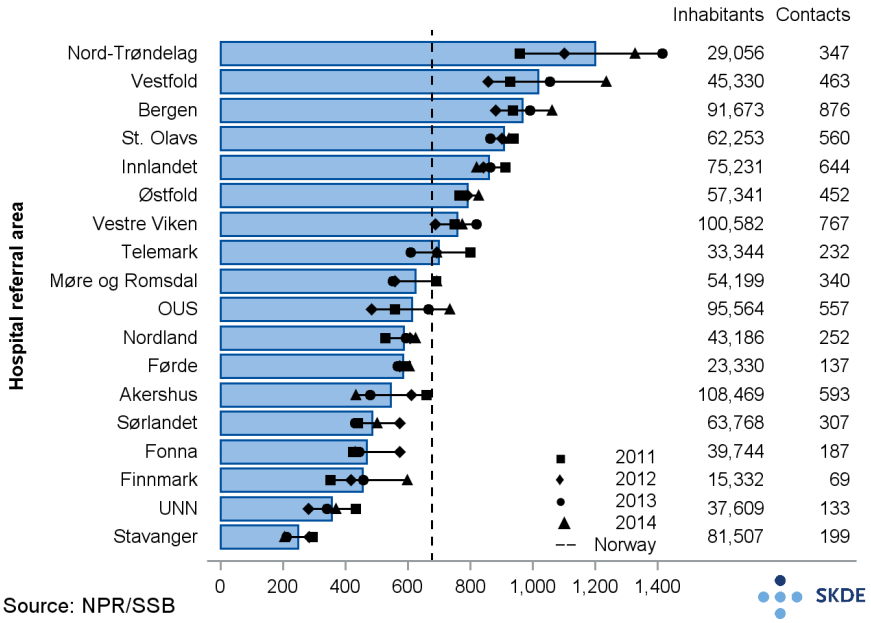

Figure 6.55: Bedwetting and urinary incontinence, outpatient services, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area, per year and as an average for the period 2011–2014.

Comments

Each year, approx. 3,900 children have a total of 7,100 consultations for bedwetting and urinary incontinence. The usage and patient rates are 4.8 and 3.5 times higher, respectively, for Nord-

Trøndelag hospital referral area than for Stavanger. The contact frequency varies from 1.29 in

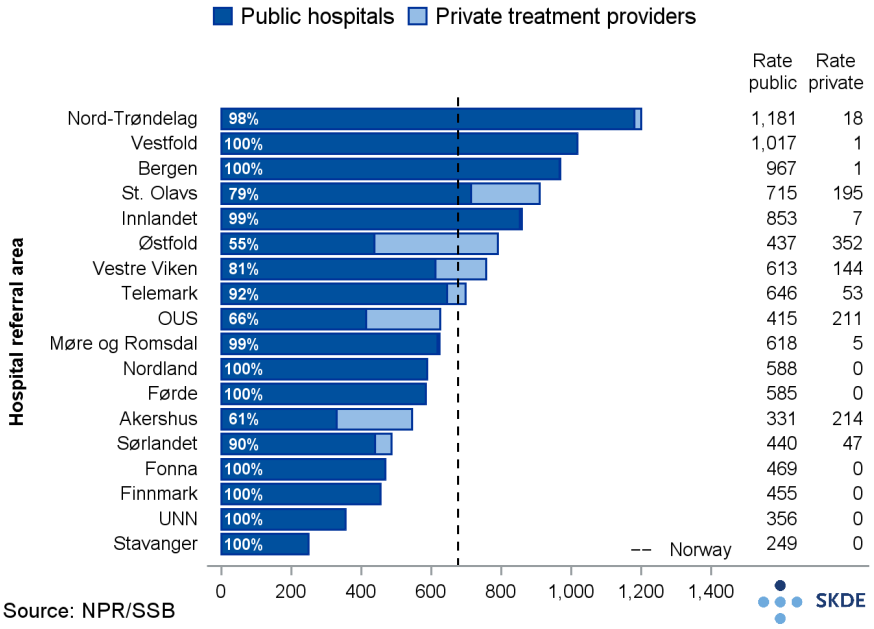

Figure 6.56: Bedwetting and urinary incontinence, outpatient services, broken down by public or private treatment providers, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area and as an average for the period 2011–2014.

Telemark hospital referral area to 2.74 in Bergen. This corresponds to 1,450 consultations per 1,000 patients treated. Approx. 6% of patients are younger than six years old at the time of the consultation.

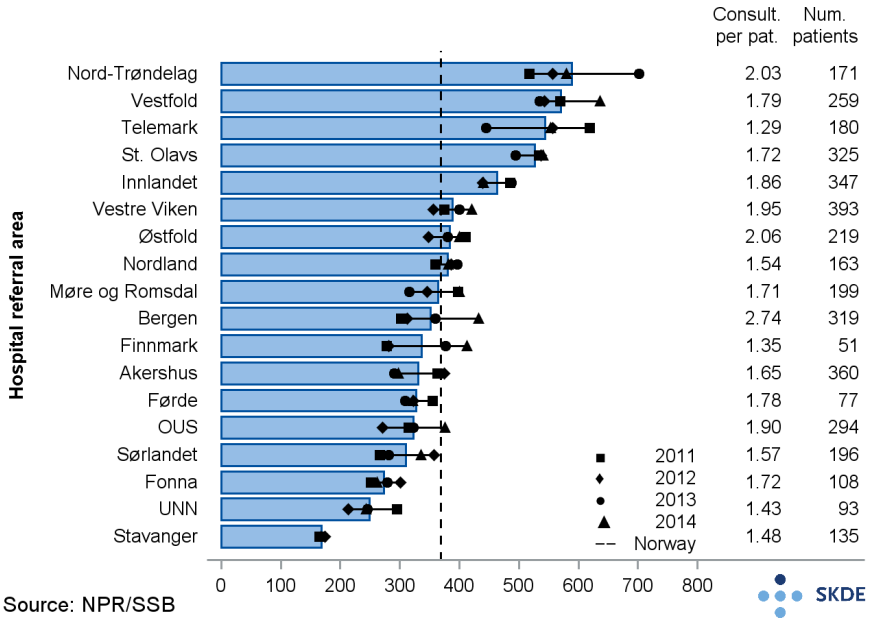

Figure 6.57: Bedwetting and urinary incontinence, outpatient services, age-adjusted patient rates per 100,000 children 0–16 year, per hospital referral area, per year and as an average for the period 2011–2014. Average number of contacts per patient (contact frequency) and number of patients.

The differences in usage and patient rates are too high to be due to random variation alone. There appear to be differences in the treatment focus for this patient group. There seems to be an unwarranted variation in the use of outpatient consultations for bedwetting and urinary incontinence. There is also reason to ask whether there is overuse in the hospital referral areas with the highest usage rates.

6.5 Surgery

6.5.1 All contacts

Surgical conditions cover the treatment of congenital abnormalities of various organs, fractures and injuries, appendicitis, maldevelopment of the musculoskeletal system, and diseases of the ear, nose and throat and the central nervous system. All surgical specialities treat children. Only St. Olavs Hospital and Oslo University Hospital (OUS) have a paediatric surgery speciality. Those departments treat congenital gastrointestinal, lung and urinary tract abnormalities, acute conditions in newborns and cancer that requires surgery. However, most children are treated by surgeons employed by surgical departments for adults.

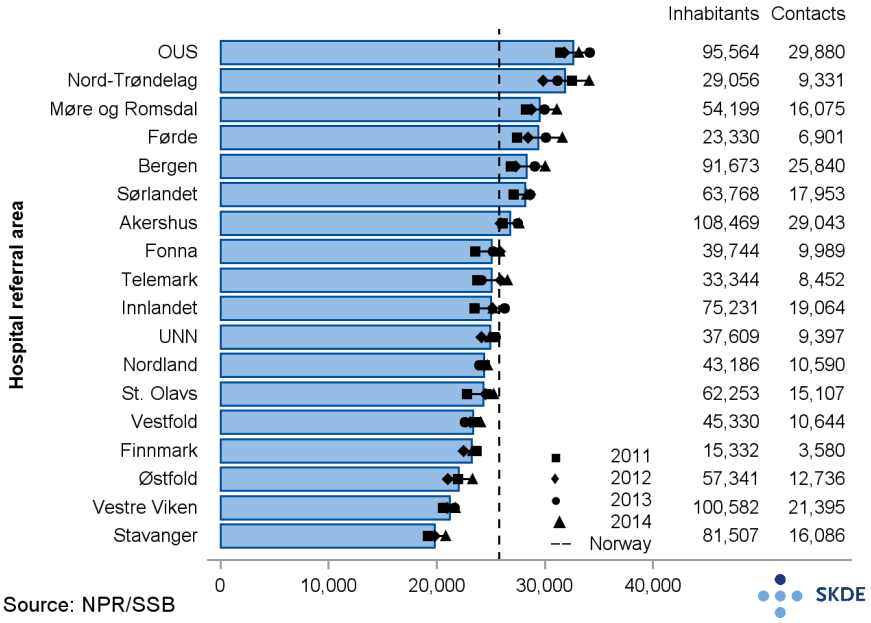

Figure 6.58: All contacts, surgical conditions, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area, per year and as an average for the period 2011–2014.

Sample

The sample consists of all contacts (admissions, outpatient consultations and day patient treatment) for children in the somatic specialist health service, including specialists in private practice under public funding contracts. By surgical contacts is meant contacts concerning conditions that are normally treated by a surgical department, see Chapter 4.2.3 on page 25 for a more detailed definition.

Comments

Surgical conditions in children generate approx. 270,000 consultations and admissions for 160,000 children each year. The population in OUS hospital referral area's usage and patient rates are 1.7 and 1.6 times higher, respectively, than those of the population in Stavanger hospital referral area.

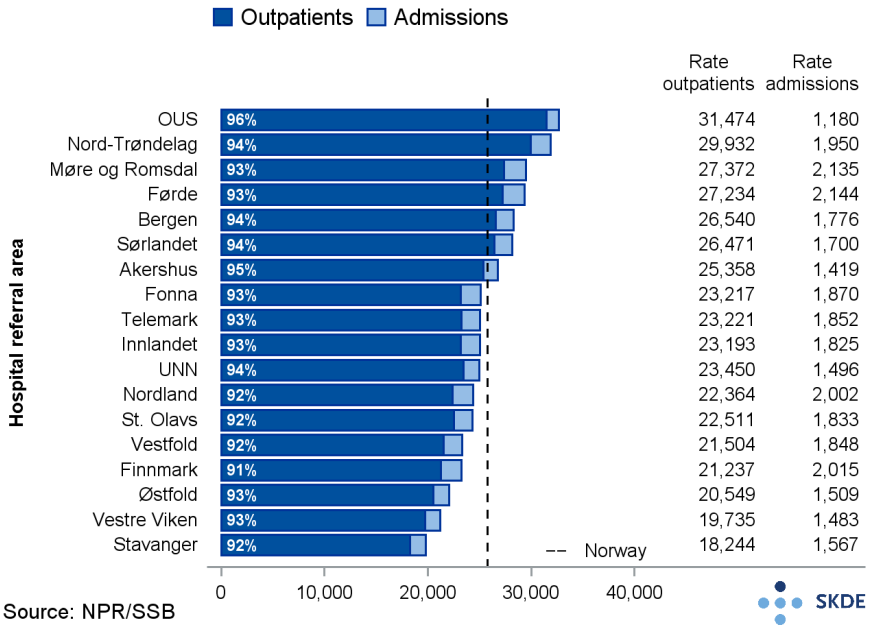

Figure 6.59: All contacts, surgical conditions, by type of contact, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area and as an average for the period 2011–2014.

All hospital referral areas have little variation from year to year, but there may appear to be a trend towards somewhat higher rates in the last part of the period.

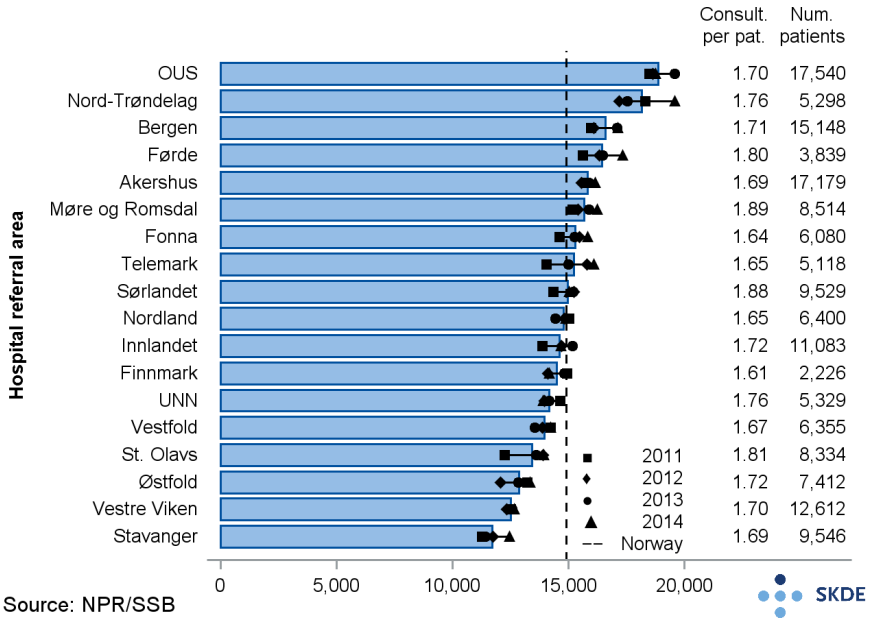

Figure 6.60: All contacts, surgical conditions, age-adjusted patient rates per 100,000 children 0–16 year, per hospital referral area, per year and as an average for the period 2011–2014. Average number of contacts per patient (contact frequency) and number of patients.

Outpatient and day patient treatment make up 94% of all surgical patient contacts. Children who are in contact with the specialist health service have an average of between 1.61 and 1.89 contacts

per year. There are no known differences in morbidity between hospital referral areas. There are

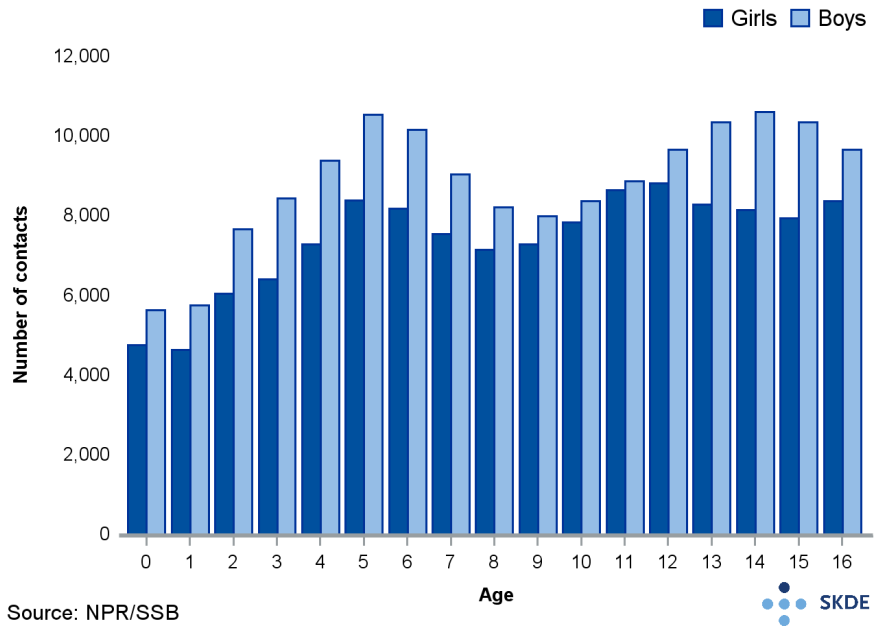

Figure 6.61: All contacts, surgical conditions, number of treatments, age and gender, as an average for the period 2011–2014.

more contacts for surgical conditions for boys than for girls, and children in the age groups 4–7 and 12–16 years have the highest number of contacts. Children's contacts often concern injuries and poisonings, as well as eye diseases.

There is reason to ask whether there is unwarranted variation in the use of surgical treatment of children.

6.5.2 Admissions

Surgical treatment of children includes the treatment of congenital abnormalities, fractures and injuries, maldevelopment of the musculoskeletal system and tonsillectomies and appendectomies. Different surgical specialities treat children, and children are admitted for surgical treatment both to children's departments and to surgical wards for adults.

Sample

The sample consists of all surgical admissions of children in the somatic specialist health service with a duration of at least 24 hours. By surgical admission is meant admissions for conditions that are normally treated by a surgical department, see Chapter 4.2.3 on page 25 for a more detailed definition. The admission rate for children living in the hospital referral areas of the six university hospitals has been chosen as the reference value.

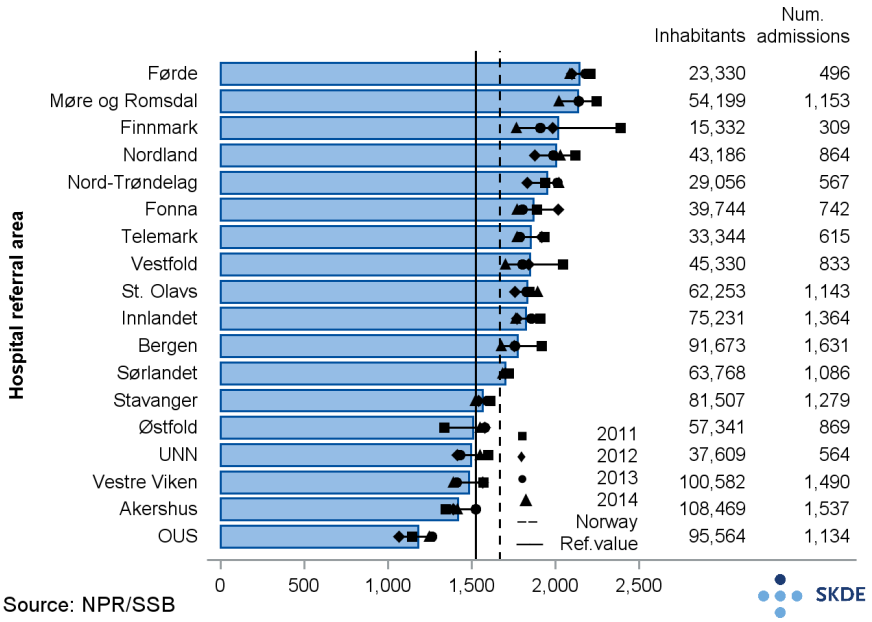

Figure 6.62: Surgical admissions, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area, per year, reference value and an average for the period 2011–2014.

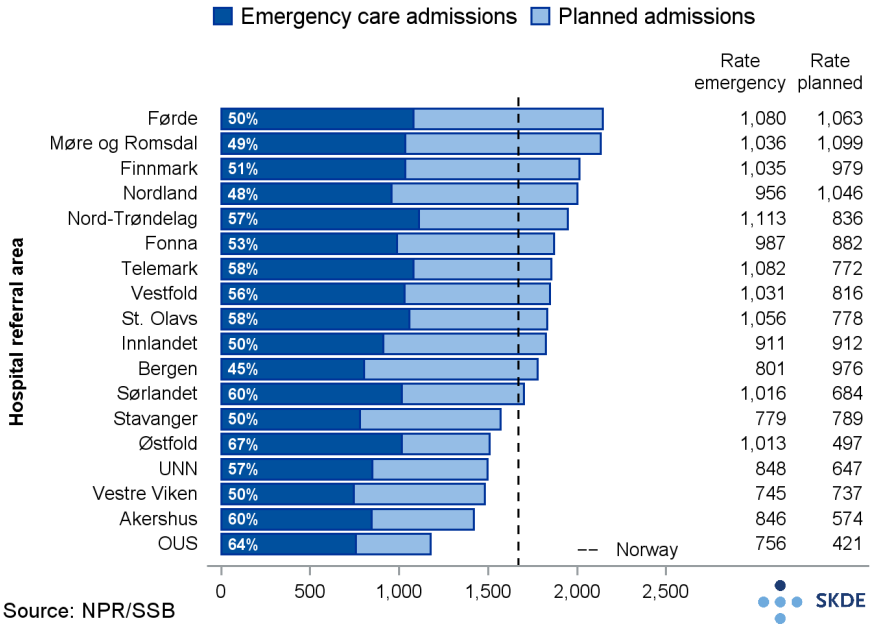

Figure 6.63: Surgical admissions, by degree of urgency, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area and as an average for the period 2011–2014.

Comments

Each year, 16,000 children are admitted to Norwegian hospitals a total of 18,000 times for surgical conditions. This accounts for 29% of all somatic hospital admissions of children aged 0–16 years. Emergency care admissions make up 54% of these admissions. Both the usage and patient rates for children admitted with a surgical diagnosis are 1.8 times higher for Førde than for OUS

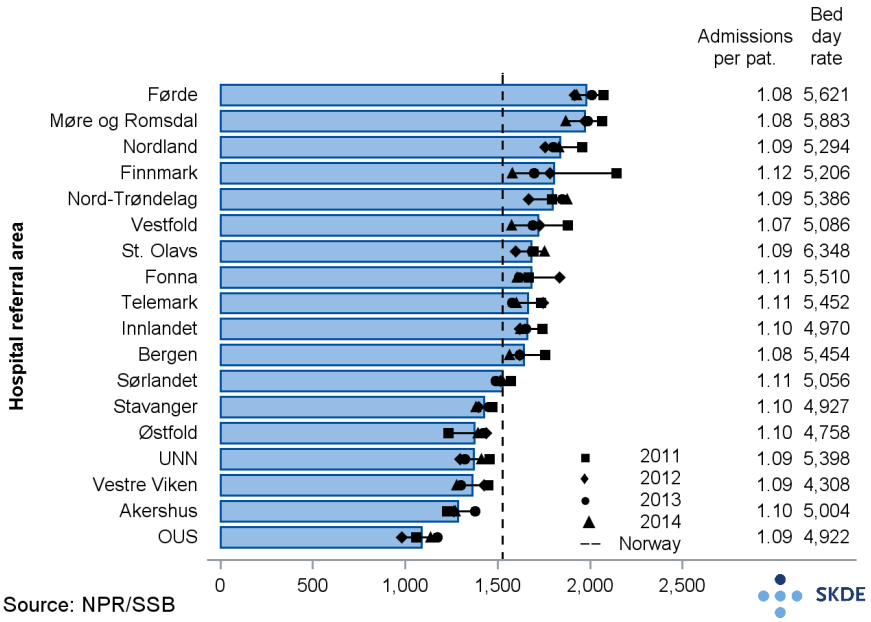

Figure 6.64: Surgical admissions, age-adjusted patient rates per 100,000 children 0–16 year, per hospital referral area, per year and as an average for the period 2011–2014. Average number of surgical admissions per patient (contact frequency) and bed day rate.

hospital referral area.

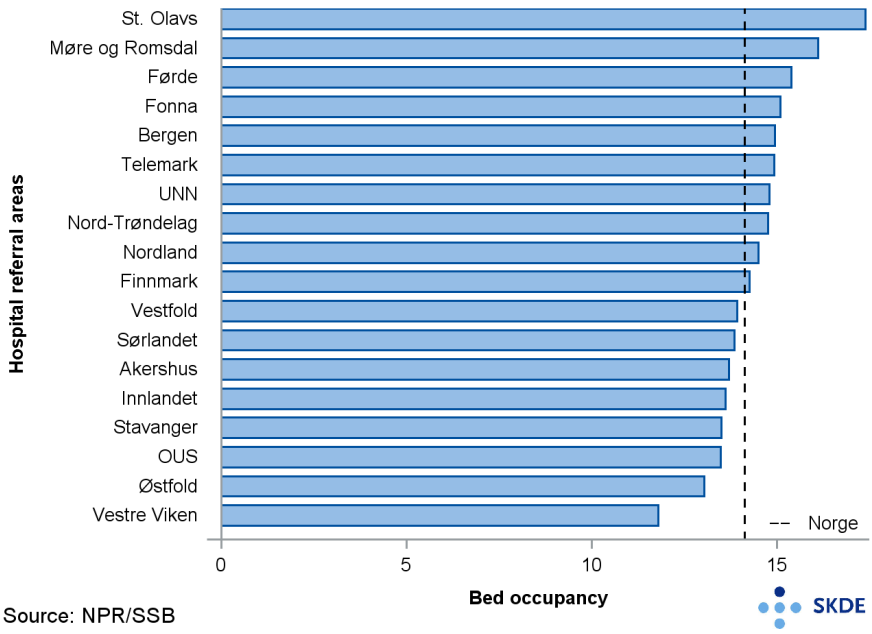

Figure 6.65: Bed occupancy per day per 100,000 children at age 0–16 years for surgical admissions, as an average for the period 2011–2014.

There are no indications that this variation in usage rates can be explained by differences in morbidity or framework conditions between hospital referral areas. However, the usage rates for surgery must be considered in light of geographical conditions that can influence the use of day

surgery.

The five hospital referral areas with the highest usage rates all have challenging geographical conditions that could play a role in making it more difficult to use day surgery. Of the five hospital referral areas with the lowest usage rates for admissions, two also have low outpatient rates (Vestre Viken and Østfold). OUS hospital referral area has the lowest usage rate for admissions and the highest for outpatient treatment. If all hospital referral areas had a usage rate equal to the reference value (the usage rate for the population of the six university hospitals' referral areas), the number of admissions could be reduced by 1,500 per year (9%).

Bed occupancy per day is an alternative measurement of the use of health services that shows the average bed use through the year. Bed occupancy per day per 100,000 children is calculated in the following manner: bed day rate/365. The bed occupancy per day per 100,000 children is 1.5 times higher in St. Olavs hospital referral area than in Vestre Viken.

6.5.3 Outpatient/day patient services

Outpatient and day patient treatment of children with surgical conditions is performed by oto-laryngologists, ophthalmologists, orthopaedist and surgeons from various surgical specialities. All hospital referral areas have specialists in private practice in several of the surgical areas in addition to hospital outpatient clinics. Much of the surgical outpatient and day patient treatment of children concern treatment of injuries, but surgical outpatient clinics also insert ear grommets, perform tonsillectomies and provide check-ups after surgery for congenital abnormalities.

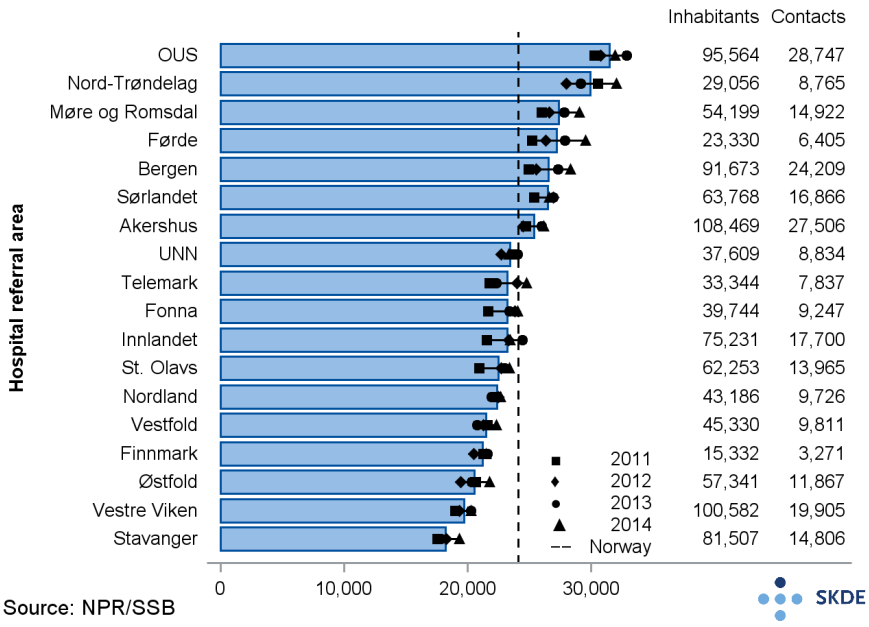

Figure 6.66: Outpatient services, surgical conditions, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area, per year and as an average for the period 2011–2014.

Sample

The sample consists of all surgical contacts (outpatient and day patient services) for children in the somatic specialist health service, including specialists in private practice under public funding contracts. By surgical consultations is meant consultations for conditions that are normally treated by a surgical department, see Chapter 4.2.3 on page 25 for a more detailed definition.

Comments

Each year, 150,000 children have a total of just over 250,000 outpatient and day patient consultations. This accounts for 32% of the total use of children's outpatient and day patient treatment. The usage and patient rates for OUS hospital referral area are 1.7 times higher than for Stavanger. The contact frequency varies from 1.58 in Finnmark hospital referral area to 1.87 in the Sørlandet area. The differences in contact frequency mean that there are 290 more consultations per 1,000 patients per year in Sørlandet hospital referral area than in Finnmark.

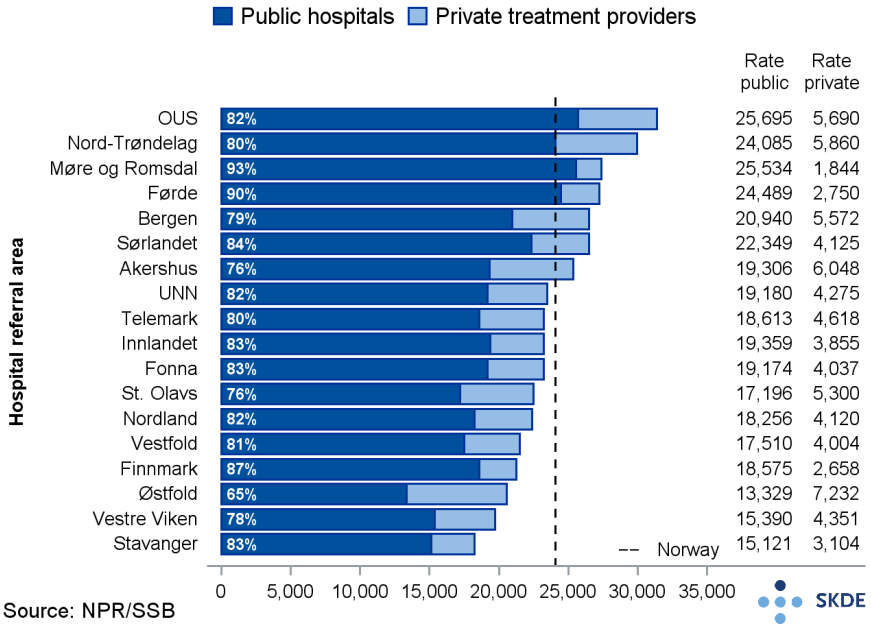

Figure 6.67: Outpatient services, surgical conditions, broken down by public or private treatment providers, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area and as an average for the period 2011–2014.

Between 7% and 36% of all surgical consultations take place with specialists in private practice under public funding contracts. The distribution between specialists in private practice and hospitals does not appear to have any effect on the overall use of such health services. The variation in usage and patient rates are not negligible and should give reason for further studies and discussion in the specialist communities.

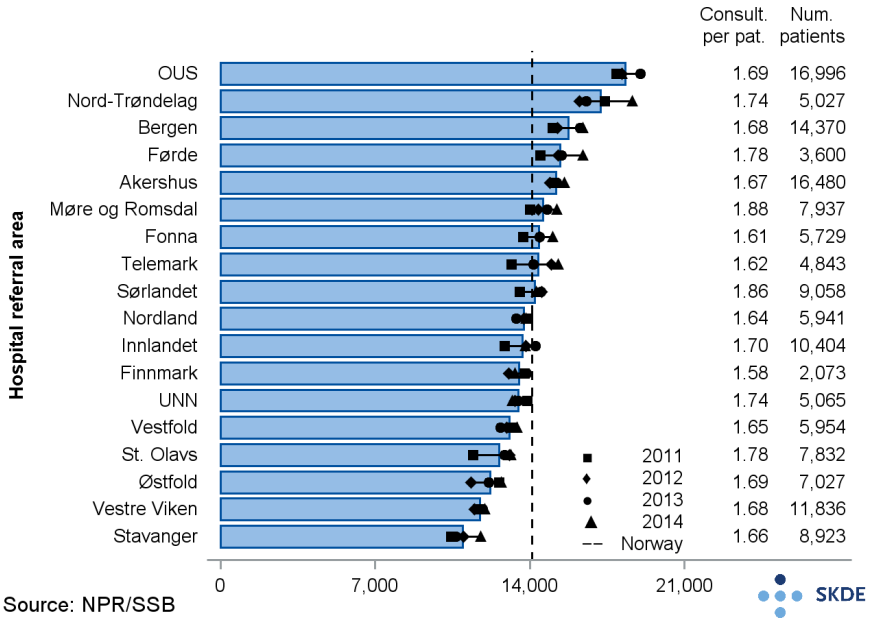

Figure 6.68: Outpatient services, surgical conditions, age-adjusted pasient rates per 100,000 children 0–16 year, per hospital referral area, per year and as an average for the period 2011–2014. Average number of contacts per patient (contact frequency) and number of patients.

6.5.4 Tonsillectomy

Tonsillectomy is one of the operations most commonly performed on children. According to the applicable guidelines, it can be performed on patients with recurring throat infections for at least two years, recurring peritonsillar abscesses or ear infections, and enlarged tonsils that cause problems with breathing or swallowing.

Sample

The sample consists of all contacts (admissions, outpatient consultations and day patient treatment) involving tonsillectomies for children in the somatic specialist health service, including specialists in private practice under public funding contracts. Tonsillectomy is defined by a primary or secondary diagnosis of (ICD-10) H65.2, H65.3 or in category block J35, in combination with procedure codes (NCSP) EMB10, EMB12, EMB15, EMB20, EMB30 or EMB99 for hospitals with activity-based funding. Specialists in private practice under public funding contracts use the same diagnosis codes in combination with tariff codes K02a, K02b, K02d, K02e, K02f or K02g.

Comments

The usage rate for tonsillectomy is twice as high for children who live in Finnmark hospital referral area as for children in the St. Olavs area. On average, 9,200 procedures are performed each year. The rates vary quite a lot from year to year for most hospital referral areas. There was an overall decrease of about 400 procedures in 2014 compared with the preceding year. Nearly half the hospital referral areas have a division of work between private and public treatment providers.

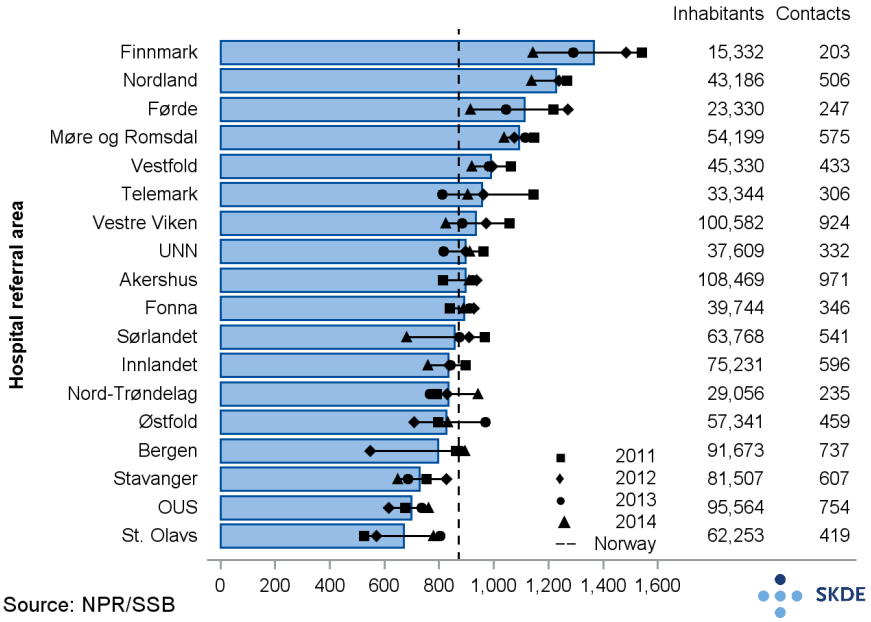

Figure 6.69: Surgery, tonsillectomy, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area, per year and as an average for the period 2011–2014.

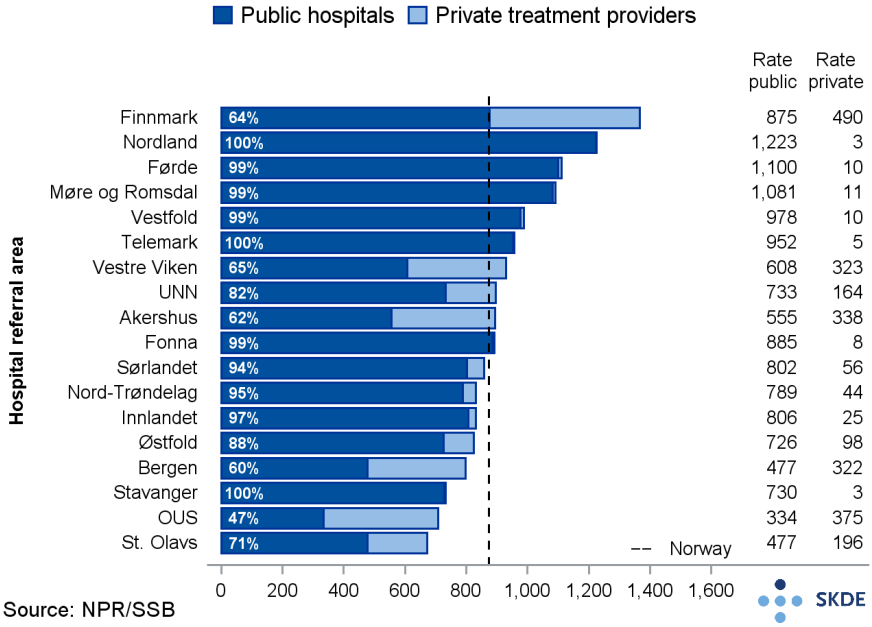

Figure 6.70: Surgery, tonsillectomy, broken down by public or private treatment providers, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area and as an average for the period 2011–2014.

OUS hospital referral area has the highest proportion of private practice surgery (53%). There does not appear to be any connection between the proportion of private surgery and the total rate.

Tonsillectomies are most commonly performed on children between the ages of two and six years, and more often on boys than on girls. There is considerable variation in the tonsillectomy usage

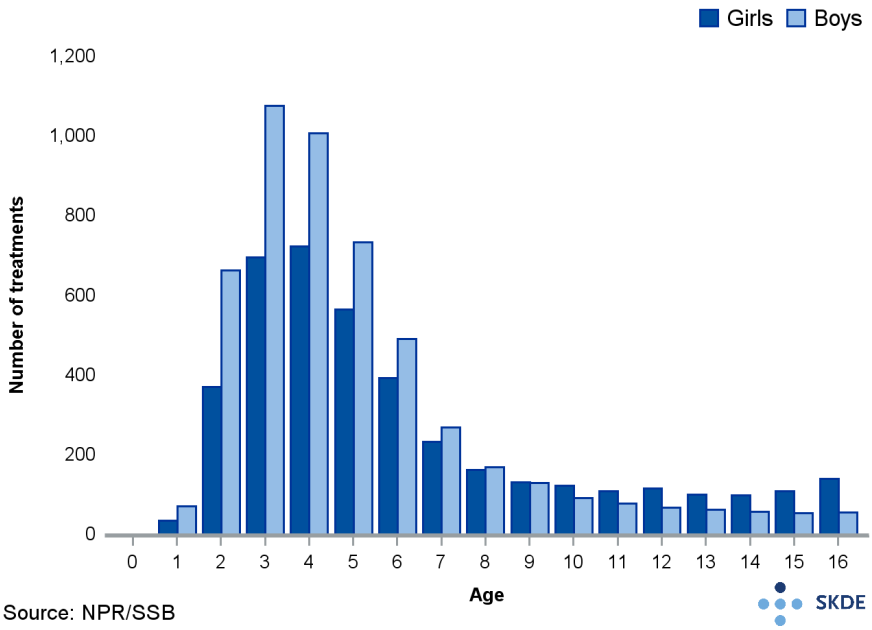

Figure 6.71: Surgery, tonsillectomy, number of treatments, age and gender, as an average for the period 2011–2014.

rates between hospital referral areas. However, there is no known geographical variation in the prevalence of the underlying conditions (recurrent throat and ear infections). The variation in usage rates can therefore be interpreted as expressing differences in medical practice as regards the referral, assessment and prioritisation of patients with these conditions.

6.5.5 Ear grommet insertion

Fluid in the middle ear is a common complication following a cold or ear infection, but can also arise in the absence of such causes. The condition can lead to impaired hearing and delayed language development in children, and is treated by inserting a ventilation tube in the eardrum. Whether this treatment speeds up language development is disputed, however.

Sample

The sample consists of all contacts (admissions, outpatient consultations and day patient treatment) involving ear grommet insertion for children in the somatic specialist health service, including specialists in private practice under public funding contracts. Insertion of ear grommets is defined by the procedure code (NCSP) DCA20 for hospitals with activity-based funding, and the tariff codes K02c, K02d, K02e or K02g for specialists in private practice under public funding contracts.

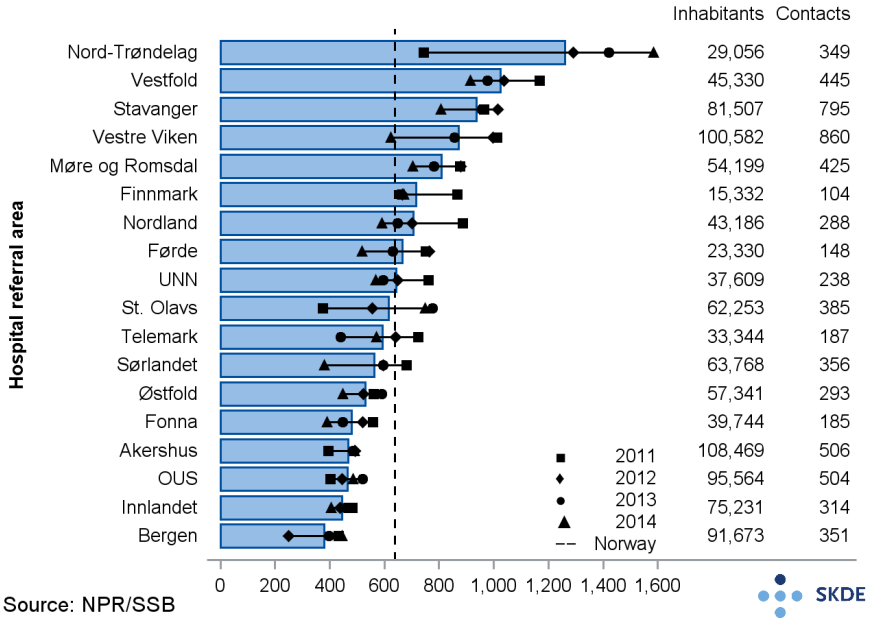

Figure 6.72: Surgery, ear grommet insertion, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area, per year and as an average for the period 2011–2014.

Comments

On average, 6,700 procedures have been performed each year on children aged 0–16 years. The number of procedures performed in Norway remained relatively stable during the period

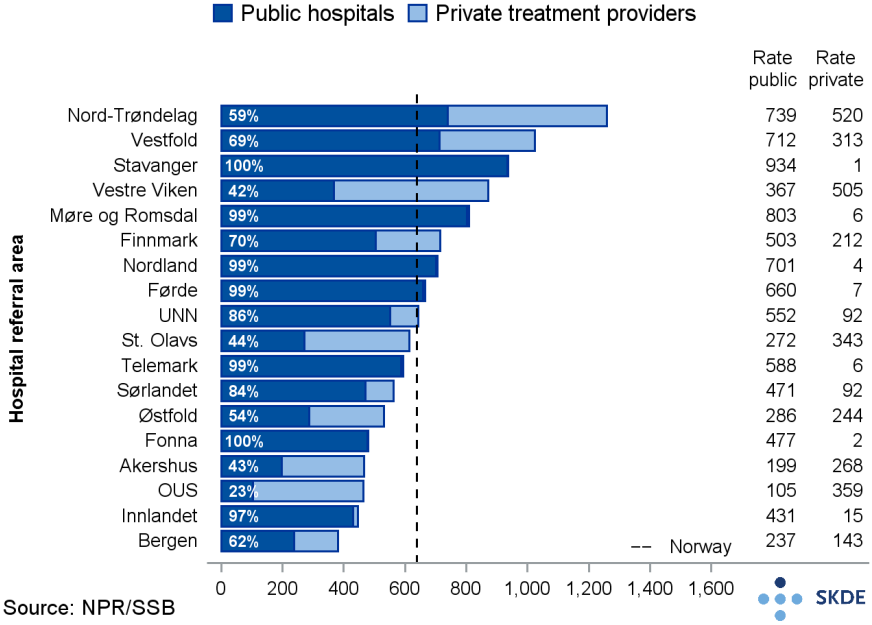

Figure 6.73: Surgery, ear grommet insertion, broken down by public or private treatment providers, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area and as an average for the period 2011–2014.

2011–2013, but decreased in 2014. The procedure is performed 3.3 times as often on children

living in Nord-Trøndelag hospital referral area as on children living in the Bergen area. In OUS hospital referral area, 77% are treated by private treatment providers, while none are treated privately in Stavanger and Fonna hospital referral areas.

Ear grommets are most often inserted in children aged 2–6 years, and are more common in boys than in girls. There is no known geographical variation in morbidity, but high variation in usage

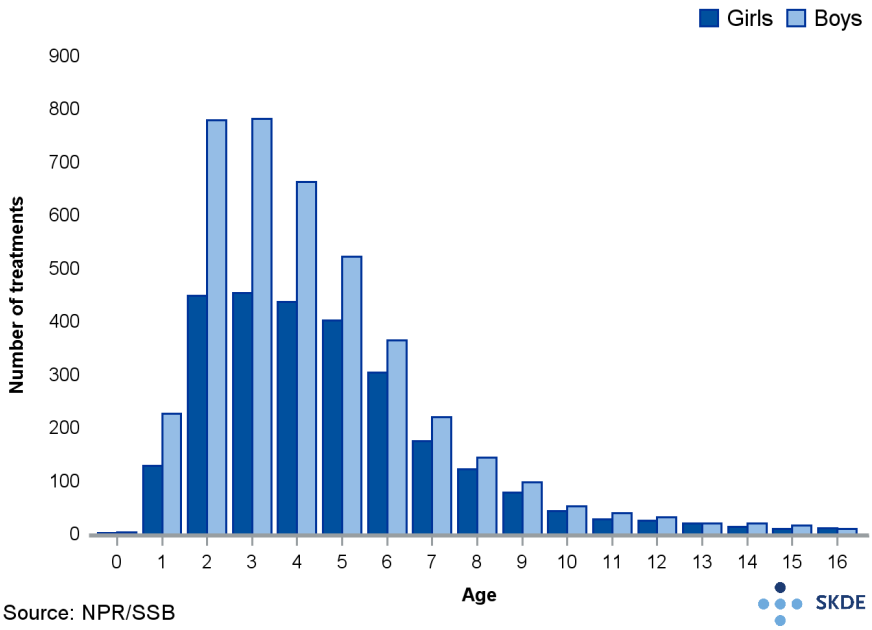

Figure 6.74: Surgery, ear grommet insertion, number of treatments, age and gender, as an average for the period 2011–2014.

rates. The variation observed is probably due to differences in medical practice, in combination with different priorities and elements of random variation.

6.5.6 Appendectomy

Appendectomy on children is a procedure carried out at all Norwegian hospitals with a surgical department. Suspected acute appendicitis is the reason for most appendectomies. When patients are operated on for suspected acute appendicitis, the appendix is always removed during open surgery, and sometimes also during keyhole surgery if no other reason for the patient's condition is identified. It can be difficult to make the diagnosis, and all surgeons with some years' experience have experienced both waiting too long to operate, resulting in a burst appendix, and removing appendixes that were not infected.

Sample

The sample consists of all contacts (admissions, outpatient consultations and day patient treatment) involving appendectomies for children in the somatic specialist health service. Appendectomy is defined by the procedure codes (NCSP) JEA00, JEA01 or JEA10. Such procedures are only carried out by public hospitals.

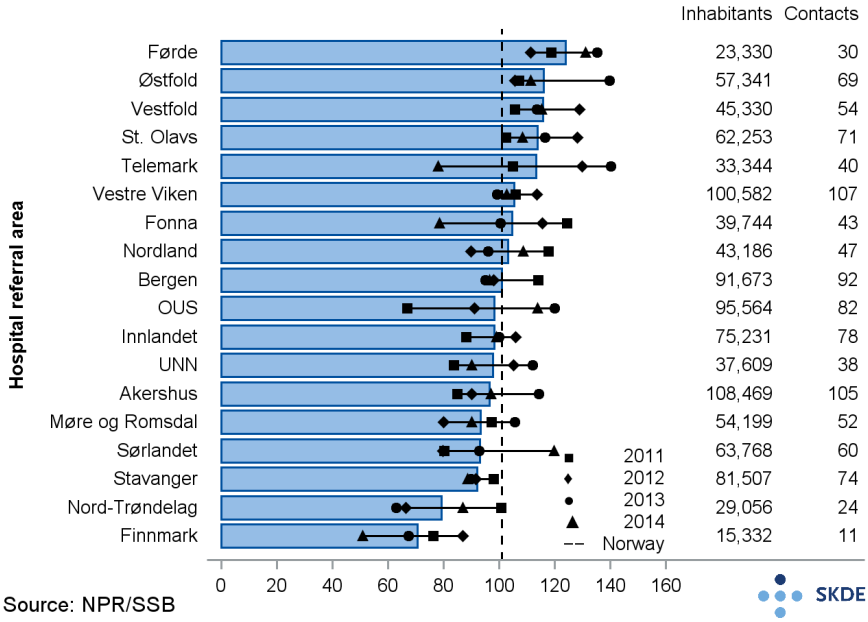

Figure 6.75: Surgery, appendectomy, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area, per year and as an average for the period 2011–2014.

Comments

Each year, just over 1,000 children under the age of 17 years (0.1% of children) have their appendixes removed, most as emergency care cases. The usage rate for the procedure increases steadily with increasing age. The procedure is performed 1.7 times more often on children in Førde hospital referral area than on children in Finnmark. The random variation in Finnmark hospital referral area may be high, since only a small number of procedures is carried out each year. The usage rate for Østfold hospital referral area (second highest rate) is 1.5 times higher that of Nord-Trøndelag (second lowest rate).

Appendectomy is a procedure that can only be performed once. The number of acutely infected appendixes that are not removed surgically is extremely small. There is therefore no reason to believe that too few patients are treated in the hospital referral areas that have the lowest usage rates. However, the usage rates will be higher than the actual number of appendicitis cases in all hospital referral areas because it is difficult to make an exact diagnosis and some appendixes are removed despite not being infected.

It must be noted that the number of procedures per year is low in some hospital referral areas, and that it varies from year to year. This indicates a relatively big element of random variation. At the same time, the variation in usage rates in Norway corresponds to similar studies from other countries with considerably bigger patient samples. It can therefore not be ruled out that there is a certain variation in medical practice and diagnostic precision between hospital referral areas. There may be reason to examine whether there are significant differences between the hospital referral areas in the proportion of uninfected removed appendixes.

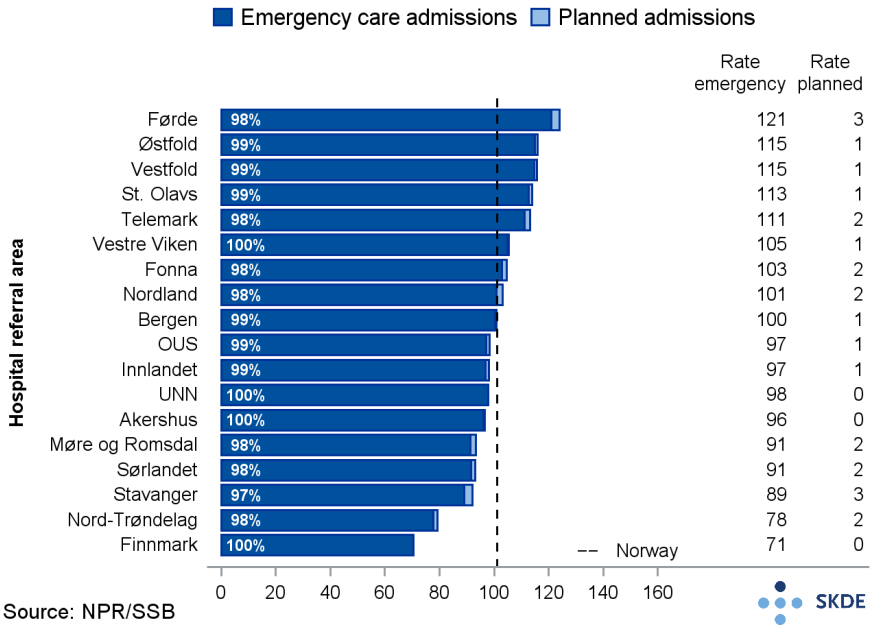

Figure 6.76: Surgery, appendectomy, by degree of urgency, age-adjusted usage rates per 100,000 children 0–16 year, per hospital referral area and as an average for the period 2011–2014.

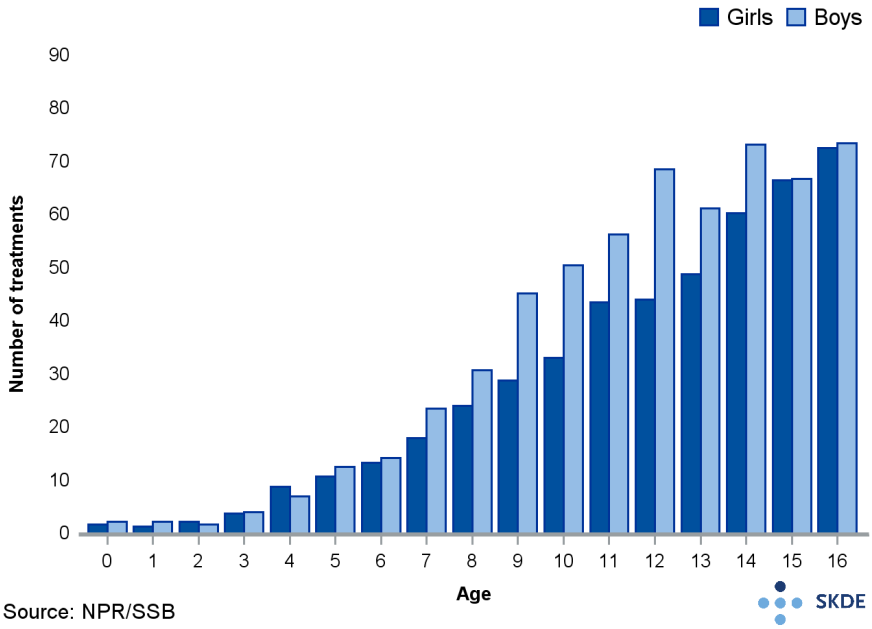

Figure 6.77: Surgery, appendectomy, number of treatments, age and gender, as an average for the period 2011–2014.

Chapter 7

Discussion

7.1 Main findings

For the first time in Norway, this report presents a review of all medical somatic contacts for children with primary healthcare services (approx. 1.8 million consultations per year) and the specialist health service (approx. 865,000 consultations and admissions per year) for the years 2011–2014. Routine check-ups at well baby clinics/public health clinics and in the school health service are not included.

The analysis shows a considerable scale and surprising geographical differences in the health services provided to what is assumed to be the one of the world's healthiest child populations. One in three children are in contact with the specialist health service annually, while two thirds have at least one primary healthcare consultation. There are also considerable differences in the use of outpatient and day patient treatment for children. For example, forty per cent more children from Sørlandet hospital referral area attend outpatient consultations compared with children in the Stavanger area. Asthmatic children from Akershus have almost four times as many specialist health service consultations as those from Vestfold, and specialists in private practice cover 70–80% of all consultations for asthma in the areas with the highest usage rates.

Emergency care services are an important part of the specialist health service, and are crucial to the population's safety. When the number of times patients have been in contact with the health service is analysed for a large number of acute diagnoses (29,000 consultations and 12,000 hospital admissions), considerable geographical differences emerge in this area as well. Children in the hospital referral areas of Vestre Viken and OUS are referred for emergency care assessments at hospital twice as often as children from Finnmark hospital referral area. At the same time, children in these hospital referral areas have some of the country's lowest admission rates for emergency care, and only half the rate of children from the hospital referral areas of Vestfold, Telemark and Sørlandet.

7.2 Strengths of the report/analyses

In an international perspective, being able to present a complete overview of health services provided to an age group in a country is not something that can be taken for granted. We can present highly reliable usage and patient rates for public and private service providers combined at an

overall national level. That is the great strength of this report. Few countries have so much data material unique to individuals. Excerpts from the Norwegian Patient Registry (NPR) at the overall level describing 'Total use', as well as medical and surgical contacts, represent all contacts that the specialist health service has reported to NPR. This reporting is based on contacts registered in the hospitals' patient administration systems. The data material is deemed to provide a complete overview of all consultations in the specialist health service. The variation that describes the general categories 'Total', 'All medical' and 'All surgical' is therefore not sensitive to differences in coding practice.

The description of variation based on diagnosis groups is prone to be influenced by differences in how diagnoses are made. Considering the focus in recent years on proper diagnosis and the establishment of internal procedures in all departments to ensure adequate and correct diagnosis, we can assume that the quality of diagnosis has improved and is relatively good. However, we cannot rule out the possibility that local coding cultures may have influenced the results, even though we have tried to minimise this possibility by grouping code selections together.

7.3 Weaknesses of/uncertainty associated with the report/analyses

The diagnosis groups were defined to include diagnoses that together are assumed to cover the condition or groups of diseases described. In cases where a contact has more than one diagnosis covered by the selection, the contact will only be counted once because the diagnosis search is defined as an either/or search. Any differences in diagnostic practice may influence the variation identified. If the selection is too narrow, there will be a possibility that other diagnoses have been used that will produce an artificially low prevalence and a variation caused by omitted diagnoses. If too many and too unspecific diagnoses are included, we risk describing a variation caused by local coding practices. Here we have chosen the diagnoses that are deemed to cover the condition we wish to describe by reviewing the ICD-10 classification system. Diagnosis selections have also been reviewed by the Norwegian Society of Pediatricians' reference group. For many conditions, the selection should be uncontroversial. If a patient comes to the outpatient clinic for epilepsy or asthma, it will constitute a coding error if these diagnoses are not included when the final diagnosis is made.

Admissions for viral gastroenteritis illustrate how it can sometimes be more complicated to make the right selection. Diagnosis E86 volume depletion was included in the first version, but this code can also be used to describe many other admission diagnoses unrelated to gastroenteritis, and we therefore removed it. That reduced the sample size by several thousand contacts, but if coding is done correctly, a child with volume depletion should also have a more specific diagnosis that describes gastroenteritis. The diagnoses nausea and abdominal pain were not included originally, but it was found that some hospital referral areas had remarkably low rates of viral gastroenteritis (A08 and A09), while the same health trusts had high rates of the diagnoses abdominal pain and nausea (R10 and R11). We therefore decided to include all four diagnoses, although it is highly likely that this will result in the inclusion of some children who are admitted for reasons other than infectious viral gastroenteritis. The possibility that local variation in diagnostic practices could have a certain effect on the rates for diagnosis groups composed in this way cannot be ruled out. When rates are compared at diagnosis level and at the overall level, which is not diagnosis-related, the same ranking of rates are found in many of the selections, which indicates that the diagnosis selections mostly reflect actual variation.

7.4 Discussion of results with comparisons with literature

Table 7.1 shows a comprehensive overview of the activities described in this report, with total volume during the period and different measurements of variation between hospital referral areas. The variation is striking for many usage rates in the specialist health service. The ratios for the different types of contact are not extreme, but when they are translated into resource use, the differences become pronounced and challenging. The variation is significantly higher for several of the medical conditions. Literature in the field does not include many analyses of the use of paediatric services at population level. The most natural basis for comparison is Right Care's 'NHS atlas of variation in health care to children and young people'[13].

Table 7.1: Average number of contacts for Norway during the period 2011–2014 (n), ratios for usage rates in the patient samples (FT, FT2, FT3)[†], and a measurement of variation over time (Δ)[‡]

			n	FT	FT2	FT3	Δ
Children 0–16 years, total	Primary healthcare	All contacts	1,777,206	1.18	1.17	1.15	5.1 %
	Specialist health service	All contacts	864,867	1.42	1.28	1.24	7.4 %
		Admissions	61,420	1.85	1.73	1.55	9.6 %
		Outpatient/day patient services	803,447	1.42	1.31	1.28	8.1 %
Medical conditions, the specialist health service	Type of contact	All contacts	591,628	1.41	1.29	1.26	8.9 %
		Admissions	43,747	2.00	1.95	1.67	11.9 %
		Outpatient/day patient services	547,881	1.41	1.32	1.28	9.3 %
		Selected acute diagnoses	40,792	4.09	1.84	1.74	17.7 %
	Medical admissions	Epilepsy	2,881	2.81	2.40	1.94	19.6 %
		Constipation (obstipation)	1,499	3.90	2.95	2.23	31.3 %
		Bronchiolitis, children 0–3 years	2,830	4.21	3.16	2.67	34.8 %
		Viral and respiratory tract infections	4,771	2.81	2.39	2.37	21.2 %
		Viral gastroenteritis	4,971	2.17	1.68	1.61	25.1 %
	Medical outpatient services	Epilepsy	10,216	2.50	1.86	1.67	19.9 %
		Constipation (obstipation)	11,471	3.98	3.56	1.96	23.0 %
		Asthma	39,288	3.83	2.63	2.16	28.4 %
		Cardiac medicine	15,841	2.17	1.80	1.55	14.8 %
		Gastrointestinal diseases	34,543	2.94	1.93	1.85	20.1 %
		Bedwetting and urinary incontinence	7,113	4.82	2.86	2.13	23.0 %
Surgical conditions, the specialist health service	Type of contact	All contacts	273,239	1.67	1.50	1.32	8.9 %
		Admissions	17,673	1.82	1.50	1.36	11.2 %
		Outpatient/day patient services	255,566	1.75	1.51	1.32	9.7 %
	Selected procedures	Tonsillectomy	9,190	2.04	1.76	1.53	21.1 %
		Ear grommet insertion	6,732	3.30	2.30	2.02	31.2 %
		Appendectomy	1,075	1.75	1.47	1.26	26.2 %

[†] The ratio between the highest and lowest (FT), the second highest and second lowest (FT2), and the third highest and third lowest (FT3) usage rates.
[‡] See equation 7.1 in Chapter 7.5 (page 96) for definition.

Three of the conditions/procedures shown in this report are also included in the Right Care atlas. For bronchiolitis, the ratio between the highest and lowest rates is 14.6 and 5.6 when the hospital referral areas with the five highest and five lowest rates are excluded. The corresponding figures for tonsillectomy and ear grommet insertion are 6.0 and 2.9 and 8.0 and 4.6, respectively, which are higher than in the Norwegian material. A report from the EU project 'European Collaboration for healthcare optimization' compares the tonsillectomy rates for five European countries. The rates vary by a ratio of 5 between countries, and all the countries had systematic internal variation.[14] Variation in service volume, practices and use of health services are thus also an internationally recognised phenomenon (Peiró and Maynard 2015; Bernal-Delgado et al. 2015; Thygesen et al. 2015).

[13] http://www.sepho.org.uk/extras/maps/NHSatlasChildHealth/atlas.html
[14] http://echo-health.eu/echo-atlases

7.5 Interpretation of results

Although many measurements of variation have been developed in the research field of small area variation, no method has currently been agreed upon to determine how much variation in rates is required to conclude that the variation is systematic, i.e. that there is real variation (Ibáñez et al. 2009). That is why we have based our interpretation of the results on discretionary judgement based on a combination of medical insight and the size of the following three units of measurement:

1. The number of contacts in the patient sample (n in Table 7.1)
2. The ratio between the highest and lowest rates, between the second highest and second lowest rates, and the between the third highest and third lowest rates (Table 7.1: FT, FT2 and FT3)
3. The variation in rates in hospital referral areas over time (Δ in Table 7.1, see equation 7.1)

The number of contacts in the patient sample (n) is important in relation to the size of random variation. In this discussion of variation in the use of health services, it is the systematic variation we are interested in, and therefore it is important to ensure that as little as possible of the variation observed is random variation. The proportion of the total variation that is due to random variation decreases as the number of observations/contacts (n) in the patient sample increases. The ratios show the total variation, but looking only at the extreme values (highest and lowest rates) is not enough, and that is why the three ratios are considered in relation to each other. Big differences in the three types of ratios could suggest a big element of random variation.

The variation in rates for each hospital referral area over time shows how stable the rates for each area are. The more stable the rates are over time for each hospital referral area, the smaller the element of random variation. The ratios were calculated for the rates for the period 2011–2014, and thus hide the variation from year to year. The measure of variation over time (Δ in Table 7.1) is calculated as an average of the variation from year to year for each hospital referral area in accordance with the following equation:

$$\Delta = \left(\sum_{i=1}^{18} \frac{r_{\max,i} - r_{\min,i}}{r_{\max,i}} \right) \Big/ 18 \tag{7.1}$$

where the amount i covers all 18 hospital referral areas, and $r_{\max,i}$ is the highest and $r_{\min,i}$ is the lowest rate in the period 2011–2014 for hospital referral area i. The total variation over time (Δ) is the average of the variation from year to year for the hospital referral areas, and thus expresses the distribution the hospital referral areas' rates over time. The higher the figures for variation over time, the bigger the element of random variation. If there is a systematic trend of decreasing or increasing rates over time, however, a high figure for variation from year to year will not indicate a big element of random variation.

There are no indications that there are big geographical differences in overall morbidity among the Norwegian child population. This means that it is difficult to find any other explanation for the systematic variations in the use of services identified by our analysis than that there are considerable differences in what is deemed to require healthcare. There is no obvious medical explanation for these differences, which are most likely due to practice profiles, local tradition and capacity. It is not uncommon to believe that children are admitted to hospital as compensation for or as a result of long travel distances. Our analysis shows no such pattern.

If there is systematic and unwarranted variation, that also gives reason to question whether children in Norway have equitable access to health services, and whether usage rates and variation affects quality and patient safety. Paediatric medicine is a discipline that has national treatment guides and guidelines for most common illnesses developed by the specialist community itself. They are in active use at all paediatric departments. The geographical variations found could indicate that these medical guidelines are not precise enough, particularly when it comes to indications, and that they may also be used differently at different hospitals.

7.6 What is the 'correct' scope and level of health services?

The extensive use of paediatric health services and the geographical differences identified give reason to ask whether there is an overuse of health services for children. Using terms such as overtreatment and undertreatment or overdiagnosis and underdiagnosis seems to suggest that we know what the correct level is. Unfortunately, things are not that simple. There is little knowledge about what the correct amount of health services should be, and even in areas where there is such knowledge (for example for knee surgery), we see considerable variation (Balteskard et al. 2015). There is almost no knowledge about what the correct number of check-ups is for a certain condition or whether a patient's outcome will be as good with primary healthcare follow-up as with continued follow-up at a specialist outpatient clinic.

There are studies that indicate that higher admission rates will not result in better outcomes than lower rates, (Fisher et al. 2003a; Yasaitis et al. 2009a), and in some cases high admission rates seem to be associated with poorer treatment outcomes and reduced patient satisfaction (Fisher et al. 2003b). The Norwegian health economist Jan Abel Olsen has described how the health gain from an increased use of health services depends on the level of use before the increase (Olsen 1993). The same phenomenon is discussed for the section of the American health service that serves users with good insurance coverage, where it is now claimed that, for some treatment categories, a level has been reached where the health gain from increased use of health services is not only decreasing, but is actually becoming negative.

There is a well-documented example of how a reduction in health service volume can lead to improvement in health indicators, improved patient satisfaction and a considerable reduction in resource use (Rejler et al. 2007; Rejler et al. 2012a; Rejler et al. 2012b). Høylandet Hospital in Eksjø in Sweden had major problems with follow-up capacity for patients with chronic inflammation of the small or large intestine (Crohn's disease and ulcerative colitis). The hospital therefore decided to restructure the whole service and discontinued the practice of scheduling annual check-ups with a specialist. Instead, patients were given a phone number where they could contact a nurse with special expertise directly with questions during office hours. If there was any suspicion that a patient's condition was starting to deteriorate, they would be given an appointment on the following day at the latest to be assessed by a doctor and have their treatment adjusted. This was made possible because capacity was freed up when the routine check-ups were discontinued. All patients took a standard set of blood tests once a year that was assessed by a doctor. Patients with normal test results were contacted by a nurse for a standardised interview, and if no symptoms that required follow-up by a doctor emerged during this interview, the contact ended without a consultation. Patients with abnormal test results or whose conditions were suspected to be deteriorating based on the interview were given a doctor's appointment within two days.

The result of this restructuring was increased patient satisfaction, capacity for quick and immedi-

ate intervention in the event of deterioration, quality indicator scores among the best in Sweden, and a major reduction in the need for emergency care admissions of patients whose condition had deteriorated. A few years later, a gastrointestinal ward was closed because there were no longer enough patients being admitted. This project was documented in a PhD thesis (Rejler 2012) and has been described and used as a case study at Harvard Business School (Porter et al. 2010). It does not seem to be well known in the Norwegian and Scandinavian specialist health services, however.

7.7 Are we using too much or not enough resources in children's health services?

On the basis of the use of health services documented in this report, it is relevant to ask whether there is a general overuse of children's health services in Norway. It is normal for children to get infections, fevers and vague and transient symptoms, and they very rarely represent a threat to the child's life and health. We are probably using too much resources on examining and assessing children with 'normal' symptoms and conditions that are an inevitable part of a normal childhood. At the same time, most people who work in paediatric healthcare know that there are groups of children who are not receiving the services they need to optimise their state of health and developmental possibilities. The truly resource-demanding and seriously ill children are being pushed aside by the high number of normal and 'healthy' children. Groups of seriously ill children are too small in number to be highlighted through the selections in this atlas, however.

Children who are neglected and abused and children with lifelong chronic diseases are examples of groups that are not given sufficient priority in the specialist health service, despite widespread agreement that this is the situation. These children often have complex health problems that require extensive teamwork and considerable resources. Examples of chronic diseases and conditions include cancer, particularly follow-up after the cancer is cured, physical and mental development disorders, chronic inflammation of the skeletal or gastrointestinal system, diabetes, complex congenital abnormalities, premature children with neurological or lung problems and congenital metabolic disorders. There are also many other rare conditions and syndromes that each only affect a small number of children. There are no reliable figures to show how many children this concerns.

In order to highlight this need, quality registers should be established modelled on the four quality registers for children already in existence: the Cerebral Palsy Register of Norway, the Norwegian Neonatal Network, the Childhood Cancer Registry of Norway and the Norwegian Childhood Diabetes Registry. Phase 2 of the Child Healthcare Atlas aims to map, in collaboration with these registers, the use of health services and outcomes in smaller groups of children with severe chronic or life-threatening diseases. Reports that have already been published from these registers indicate that the treatment offered and the treatment results vary in a way that could have a negative effect on future health and quality of life, and there are indications of underuse of resources for children in these groups.

Considering the variation described both for admissions and outpatient/day patient treatment, it is probably not the case that all levels express a correct or necessary usage rate. There are no indications that a low admission rate leads to more complications or undesirable incidents than a higher rate. However, the bed occupancy rate already appears to be low in some hospital referral areas. There is a difference in bed use (which is a result of the number of admissions and the length of stay) between hospital areas of 55%. There is no indication that areas with

lower bed use do not have satisfactory hospital bed coverage, but any further regulation of bed capacity should take into consideration the hospital referral area's usage rate compared with other areas. Without such knowledge, there is a risk that the capacity in areas with low usage rates may be reduced to levels that entail a risk of undesirable incidents and inadequate capacity to fulfil the regional health authorities' responsibility to provide healthcare. We have figures from the Norwegian Society of Pediatricians' benchmarking study[15] that show that variation in the number of staffed beds correlates quite well with the admission rates. The actual number of staffed beds in paediatric departments as reported by the departments varied between 41 and 107 beds per 100,000 children. This suggests that bed capacity is a factor that should be taken into consideration when seeking an explanation for the variation in admission rates.

In order to highlight the consequence of an alternative usage rate for admissions, we have calculated the potential change in number of admissions at the national level if the usage rates of the six university hospitals' referral areas were deemed to constitute a safe lower limit and all the hospital referral areas adjusted their practice accordingly. This scenario could free up resources corresponding to a reduction of 15% of all admissions. However, there is no evidence that this level is more correct than an even lower or a higher rate. The same calculation basis is less suitable as an example of a lower safety limit for evaluating usage rates for outpatient services. Several of the university hospitals' referral areas have some of the highest usage rates for outpatient clinics with many specialists available, and this is probably a supply-sensitive high level of use that is not primarily based on medical factors. It is also possible that the lower limit for a medically satisfactory and safe outpatient clinic service is below the lowest usage rate found in this atlas. If we were to use the rates in the hospital referral area with the lowest outpatient clinic usage rates that also has a low admission rate as a safe lower level and all the hospital referral areas adjusted their practice accordingly, that could free up capacity nationwide corresponding to 19%, or 150,000 outpatient consultations. It is emphasised that we have no data in this atlas that can show whether this would be a satisfactory level or not. We will investigate any links between usage rates and quality data in part two of the Child Healthcare Atlas, which is scheduled to be published in 2016. If this is successful, it will enable us to obtain far stronger evidence of what could be a satisfactory lower usage rate level for admissions and outpatient care.

The vast majority of patient contacts take place in outpatient clinics. A benchmarking study carried out under the auspices of the Norwegian Society of Pediatricians in 2013 based on data reported by paediatric departments[15] showed that between 20% and 40% of consultations concerned new referrals. The remaining consultations were check-ups of patients who had already had at least one consultation. Although there has not been so much media attention on breaches of waiting list guarantees for paediatric medicine, and most deadlines are being met, running a good outpatient clinic service is a challenge when administrative requirements to comply with the waiting list guarantee for new referrals come into conflict with allocating sufficient resources to chronically ill children.

Most new referrals come from GPs and concern relatively healthy children with less serious symptoms or incidental findings that are probably not a sign of a condition that requires treatment. The report documents that approx. 25% of all paediatric cardiac medicine consultations are used to determine that a heart murmur is what is known as a physiological murmur, i.e. a normal phenomenon that does not require any kind of action. The probability that an otherwise completely health child over 1–2 years of age who has a murmur that seems physiological in nature actually has a heart condition that requires treatment is very slight.

[15]Internal benchmarking of Norwegian paediatric departments based on self-reporting of data, the Norwegian Society of Pediatricians, 2013.

It is not the same hospital referral areas that have the highest usage rates for outpatient services and for admissions. Hospital referral areas in and around the big cities have high usage rates for outpatient services, but low admission rates. We do not have exact figures for specialist coverage, but it is a well-known fact that the number of specialists practising is, relatively speaking, higher in some of the areas with a high population concentration than in smaller hospital referral areas. The small hospital referral areas, on the other hand, appear to have higher hospital bed use. We also see that the usage rates for outpatient services are high in hospital referral areas with a high number of specialists in private practice. Some of this could be due to a lack of coordination between hospitals and specialists in private practice, but for asthma in particular, the highest usage rate is found in a hospital referral area where almost none of the asthma consultations take place at public hospitals.

Specialists in private practice represent a useful supplement to the specialist health service, but there is reason to call for a clearer coordination of tasks between hospital outpatient clinics, specialists in private practice and GPs. There is also reason to take a closer look at the number of check-ups and the patient group composition, both at outpatient clinics and in private specialist practices. Whether some of these check-ups could be carried out by the patients' GPs should be discussed in the specialist networks and in cooperation with local GP representatives or practice consultants.

There are indications that some of the variation that emerges in the Child Healthcare Atlas represents variation for supply-sensitive health services related to bed and outpatient clinic capacity as well as the number of specialists.

7.8 How to continue the work to further reduce unwarranted variation

It is an obvious temptation for people responsible for budgets to make cuts in the number of beds and outpatient clinic capacity immediately. There are several reasons why this temptation should be resisted for the time being. Even though we can see a general overuse of children's health services, that does not automatically mean that there is a cost-cutting potential. If there is an underuse of specialist health services among chronically ill children as a result of misprioritisation, resources freed up should first be reallocated to these groups before any capacity cuts are made.

The current practice has become established over the course of many years. Implementing over-ambitious cuts in a short-term perspective could result in undesirable consequences and, in a worst-case scenario, even harm to patients. If it is concluded that there is a potential for reducing the use of health services, this reduction should take place gradually over time and in agreement with the medical communities that are to implement the cuts and take responsibility for the outcome.

Although there are no indications that low usage rates result in poorer treatment than high rates, the effects of these differences in a health system such as ours have not been subjected to systematic study. Due to the way in which the Norwegian health service is organised, the close professional networks and relatively uniform medical guidelines, it is possible to conduct large-scale projects in paediatrics to describe the effect of differences in usage rates on treatment outcomes. This could help to make the day-to-day practice more evidence-based and less based on the individual doctor's judgement.

If mapping the variation in paediatrics leads decision-makers to transfer resources to other areas

where variation has not been mapped, then corresponding work on these variations would be put at risk. The Child Healthcare Atlas was initiated by the expert community itself, based on a wish to improve internal prioritisation and quality. There is reason to believe that the resources that are currently allocated to the treatment of children can be prioritised better within the child population once the usage pattern has been described. If the consequence were to be that resources disappear to other disciplines where the scope of variation has not been mapped and described, that would quickly put a stop to similar projects and cooperation with other expert communities. The unique thing about the Child Healthcare Atlas is that we have mapped the variation in health service use in one fifth of the population of Norway. There is no reason to believe that we would not find corresponding or even greater variation among the remaining four fifths that have not been mapped throughout the range of disciplines that make up the specialist health service. In Norway, corresponding variation has so far only been described for day surgery, but data from national atlas projects worldwide shows that significant geographical variation in all disciplines is the rule, and not the exception. Until otherwise proven, we should assume that this is also the case for as yet unmapped areas of the specialist health service.

7.9 Conclusion

The motivation for mapping variation and use of health services should be to prioritise the right patients and reduce the risk of unnecessary harm and complications, not to make financial savings. Systematic and well-considered adjustments towards a medically correct and safe capacity level will also entail a possibility to create greater freedom of action in the allocation of resources. Internal discussion in the specialist communities about what is the correct and necessary level of resource use and what treatment does not contribute to improve health should also be encouraged. Many tests and examinations are carried out to guard against criticism, including criticism from colleagues. It is not always those who do most who do best, but those who do less are more at risk of attracting criticism.

References

Balteskard, L., T. Deraas, O. H. Førde, T. Magnus, F. Olsen, and B. Uleberg (2015). *Day surgery in Norway 2011–2013, a selection of procedures*. English version June 2017, ISBN: 978-82-93141-26-6.

Bernal-Delgado, E., T. Christiansen, K. Bloor, C. Mateus, A. Yazbeck, J. Munck, and J. Bremner (2015). "ECHO: health care performance assessment in several European health systems". *Eur. J. Public Health* 25.suppl 1, pp. 3–7.

Carlsen, K. C. L., G. Håland, C. S. Devulapalli, M. Munthe-Kaas, M. Pettersen, B. Granum, M. Løvik, and K.-H. Carlsen (2006). "Asthma in every fifth child in Oslo, Norway: a 10-year follow up of a birth cohort study". *Allergy* 61.4, pp. 454–460.

Coon, E. R., R. A. Quinonez, V. A. Moyer, and A. R. Schroeder (2014). "Overdiagnosis: How Our Compulsion for Diagnosis May Be Harming Children". *Pediatrics* 134.5, pp. 1013–1023.

Fisher, E. S., D. E. Wennberg, T. A. Stukel, D. J. Gottlieb, F. Lucas, and É. L. Pinder (2003a). "The Implications of Regional Variations in Medicare Spending. Part 1: The Content, Quality, and Accessibility of Care". *Ann. Intern. Med.* 138.4, pp. 273–287.

Fisher, E. S., D. E. Wennberg, T. A. Stukel, D. J. Gottlieb, F. Lucas, and É. L. Pinder (2003b). "The Implications of Regional Variations in Medicare Spending. Part 2: Health Outcomes and Satisfaction with Care". *Ann. Intern. Med.* 138.4, pp. 288–298.

Glover, J. A. (1938). "The Incidence of Tonsillectomy in School children". *Proc. R. Soc. Med.* 31.10, pp. 1219–1236.

Ibáñez, B., J. Librero, E. Bernal-Delgado, S. Peiró, B. López-Valcarcel, N. Martínez, and F. Aizpuru (2009). "Is there much variation in variation? Revisiting statistics of small area variation in health services research". *BMC Health Serv. Res.* 9.1, 60.

MacFaul, R. (2004). "Trends in asthma hospitalisation: is this related to prevention inhaler usage?" *Arch. Dis. Child.* 89.12, pp. 1158–1160.

NOU (2014:12). *Åpent og rettferdig – prioriteringer i helsetjenesten*. ISBN 978-82-583-1213-7.

Nystad, W., P. Magnus, O. Roksund, B. Svidal, and Ø. Hetlevik (1997). "The prevalence of respiratory symptoms and asthma among school children in three different areas of Norway". *Pediatr. Allergy Immunol.* 8.1, pp. 35–40.

Olsen, J. A. (1993). "But health can still be a necessity…". *J. Health Econ.* 12.2, pp. 187–191.

Parelius, I. and I. Aag (2008). "Medfødte misdannelser hos barn behandlet ved barneavdelingen UNN - et 5 års materiale". MA thesis. Universitetet i Tromsø.

Peiró, S. and A. Maynard (2015). "Variations in health care delivery within the European Union". *Eur. J. Public Health* 25.suppl 1, pp. 1–2.

Perrin, J. M., C. J. Homer, D. M. Berwick, A. D. Woolf, J. L. Freeman, and J. E. Wennberg (1989). "Variations in Rates of Hospitalization of Children in Three Urban Communities". *N. Eng. J. Med.* 320.18, pp. 1183–1187.

Porter, M. E., J. F. Baron, and M. Rejler (2010). "Highland District County Hospital: Gastroenterology care in Sweden". *Harvard Business School*.

Rejler, M. (2012). “Quality improvement in the care of patients with inflammatory bowel disease”. PhD thesis. Linköpings universitet.

Rejler, M., A. Spångéus, J. Tholstrup, and B. Andersson-Gäre (2007). “Improved Population-based Care: Implementing Patient- and Demand-directed Care for Inflammatory Bowel Disease and Evaluating the Redesign With a Population-based Registry”. *Qual. Manag. Health Care* 16.1, pp. 38–50.

Rejler, M., J. Tholstrup, B. Andersson-Gäre, and A. Spångéus (2012a). “Low prevalence of anemia in inflammatory bowel disease: a population-based study in Sweden”. *Scand. J. Gastroenterol.* 47.8-9, pp. 937–942.

Rejler, M., J. Tholstrup, M. Elg, A. Spångéus, and B. A. Gäre (2012b). “Framework for assessing quality of care for inflammatory bowel disease in Sweden”. *World J. Gastroenterol.* 18.10, pp. 1085–1092.

Statistics Norway (SSB) (1997). *Standardiserte rater - en metodebeskrivelse med eksempler fra dødsårsaksstatistikken*. Notater 97/22.

Thygesen, L. C., C. Baixauli-Pérez, J. Librero-López, N. Martínez-Lizaga, M. Ridao-López, and E. Bernal-Delgado (2015). “Comparing variation across European countries: building geographical areas to provide sounder estimates”. *Eur. J. Public Health* 25.suppl 1, pp. 8–14.

Wennberg, J. E. (2010). *Tracking Medicine: A Researcher’s Quest to Understand Health Care*. Oxford University Press.

Wennberg, J. and A. Gittelsohn (1973). “Small Area Variations in Health Care Delivery: A population-based health information system can guide planning and regulatory decision-making”. *Science* 182.4117, pp. 1102–1108.

Yasaitis, L., E. S. Fisher, T. A. Mackenzie, and J. Wasson (2009a). “Healthcare intensity is associated with lower ratings of healthcare quality by younger adults”. *J. Ambul. Care Manage.* 32.3, pp. 226–231.

Further Reading

Adler, J., K. C. Sandberg, B. H. Shpeen, S. J. Eder, M. Dhanani, S. J. Clark, and G. L. Freed (2013). "Variation in Infliximab Administration Practices in the Treatment of Pediatric Inflammatory Bowel Disease". *J Pediatr. Gastroenterol. Nutr.* 57.1, pp. 35–38.

Aronson, P. L., C. Thurm, E. R. Alpern, E. A. Alessandrini, D. J. Williams, S. S. Shah, L. E. Nigrovic, R. J. McCulloh, A. Schondelmeyer, J. S. Tieder, and M. I. Neuman (2014). "Variation in Care of the Febrile Young Infant $<$ 90 Days in US Pediatric Emergency Departments". *Pediatrics* 134.4, pp. 667–677.

Bourgeois, F. T., M. C. Monuteaux, A. M. Stack, and M. I. Neuman (2014). "Variation in Emergency Department Admission Rates in US Children's Hospitals". *Pediatrics* 134.3, pp. 539–545.

Brogan, T. V., M. Hall, D. J. Williams, M. I. Neuman, C. G. Grijalva, R. W. Farris, and S. S. Shah (2012). "Variability in Processes of Care and Outcomes among Children Hospitalized with Community-Acquired Pneumonia". *Pediatr. Infect. Dis. J.* 31.10, pp. 1036–1041.

Caudri, D., A. H. Wijga, H. A. Smit, G. H. Koppelman, M. Kerkhof, M. O. Hoekstra, B. Brunekreef, and J. C. de Jongste (2011). "Asthma symptoms and medication in the PIAMA birth cohort: Evidence for under and overtreatment". *Pediatr. Allergy Immunol.* 22.7, pp. 652–659.

Close, G. R., R. L. Rushworth, M. I. Rob, and G. L. Rubin (1993). "Variation in selected childhood surgical procedures: the case of tonsillectomy and management of middle ear disease". *J. Paediatr. Child Health* 29.6, pp. 429–433.

Connell, F. A., R. W. Day, and J. P. LoGerfo (1981). "Hospitalization of medicaid children: analysis of small area variations in admission rates." *Am. J. Public Health* 71.6, pp. 606–613.

Coon, J. T., A. Martin, A.-K. Abdul-Rahman, K. Boddy, R. Whear, A. Collinson, K. Stein, and S. Logan (2012). "Interventions to reduce acute paediatric hospital admissions: a systematic review". *Arch. Dis. Child.* 97.4, pp. 304–311.

Dodd, K. L., S. Rhead, and K. Towey (1994). "Paediatric medical outpatients: are all those reviews necessary?" *Arch. Dis. Child.* 70.6, pp. 493–496.

Fisher, E. S., J. E. Wennberg, T. A. Stukel, J. S. Skinner, S. M. Sharp, J. L. Freeman, and A. M. Gittelsohn (2000). "Associations among hospital capacity, utilization, and mortality of US Medicare beneficiaries, controlling for sociodemographic factors". *Health Serv. Res.* 34.6, pp. 1351–1362.

Florin, T. A., B. French, J. J. Zorc, E. R. Alpern, and S. S. Shah (2013). "Variation in Emergency Department Diagnostic Testing and Disposition Outcomes in Pneumonia". *Pediatrics* 132.2, pp. 237–244.

Goodman, D. C., E. S. Fisher, G. A. Little, T. A. Stukel, and C.-H. Chang (2001a). "The Uneven Landscape of Newborn Intensive Care Services: Variation in the Neonatology Workforce". *Eff. Clin. Pract.* 4.4, pp. 143–149.

Goodman, D. C., E. S. Fisher, G. A. Little, T. A. Stukel, and C.-h. Chang (2001b). "Are Neonatal Intensive Care Resources Located According to Need? Regional Variation in Neonatologists, Beds, and Low Birth Weight Newborns". *Pediatrics* 108.2, pp. 426–431.

Goodman, D. C., E. S. Fisher, G. A. Little, T. A. Stukel, C.-h. Chang, and K. S. Schoendorf (2002). "The Relation between the Availability of Neonatal Intensive Care and Neonatal Mortality". *N. Eng. J. Med.* 346.20, pp. 1538–1544.

Hansen, T. E., B. Evjenth, and J. Holt (2013). "Increasing prevalence of asthma, allergic rhinoconjunctivitis and eczema among schoolchildren: three surveys during the period 1985–2008". *Acta Paediatrica* 102.1, pp. 47–52.

Holmes, G. L. (2002). "Overtreatment in children with epilepsy". *Epilepsy Res.* 52.1, pp. 35–42.

Jain, S., L. K. Elon, B. A. Johnson, G. Frank, and M. Deguzman (2010). "Physician practice variation in the pediatric emergency department and its impact on resource use and quality of care". *Pediatr. Emerg. Care.* 26.12, pp. 902–908.

Johnson, E. R., S. P. Etheridge, L. L. Minich, T. Bardsley, M. Heywood, and S. C. Menon (2014). "Practice Variation and Resource Use in the Evaluation of Pediatric Vasovagal Syncope: Are Pediatric Cardiologists Over-Testing?" *Pediatr. Cardiology* 35.5, pp. 753–758.

Kharbanda, A. B., M. Hall, S. S. Shah, S. B. Freedman, R. D. Mistry, C. G. Macias, B. Bonsu, P. S. Dayan, E. A. Alessandrini, and M. I. Neuman (2013). "Variation in resource utilization across a national sample of pediatric emergency departments". *J. Paediatr.* 163.1, pp. 230–236.

Knapp, J. F., S. D. Simon, and V. Sharma (2013). "Variation and Trends in ED Use of Radiographs for Asthma, Bronchiolitis, and Croup in Children". *Pediatrics* 132.2, pp. 245–252.

Macias, C. G., J. M. Mansbach, E. S. Fisher, M. Riederer, P. A. Piedra, A. F. Sullivan, J. A. Espinola, and C. A. J. Camargo (2015). "Variability in inpatient management of children hospitalized with bronchiolitis". *Acad Pediatr.* 15.1, pp. 69–76.

Neuman, M. I., M. Hall, A. L. Hersh, T. V. Brogan, K. Parikh, J. G. Newland, A. J. Blaschke, D. J. Williams, C. G. Grijalva, A. Tyler, and S. S. Shah (2012). "Influence of Hospital Guidelines on Management of Children Hospitalized With Pneumonia". *Pediatrics* 130.5, e823–e830.

Norheim, O. F. et al. (2014). *Åpent og rettferdig – prioriteringer i helsetjenesten*. NOU 2014:12.

Quitadamo, P. et al. (2014). "European pediatricians' approach to children with GER symptoms: survey of the implementation of 2009 NASPGHAN-ESPGHAN guidelines." *J Pediatr. Gastroenterol. Nutr.* 58.4, pp. 505–509.

Scherer, L. D., B. J. Zikmund-Fisher, A. Fagerlin, and B. A. Tarini (2013). "Influence of "GERD" Label on Parents' Decision to Medicate Infants". *Pediatrics* 131.5, pp. 839–845.

Schnadower, D., N. Kuppermann, C. G. Macias, S. B. Freedman, D. Agrawal, J. Mao, and P. S. Dayan (2014). "Outpatient management of young febrile infants with urinary tract infections". *Pediatr. Emerg. Care.* 30.9, pp. 591–597.

Teno, J. M., V. Mor, N. Ward, J. Roy, B. Clarridge, J. E. Wennberg, and E. S. Fisher (2005). "Bereaved family member perceptions of quality of end-of-life care in U.S. regions with high and low usage of intensive care unit care". *J. Am. Geriatr. Soc.* 53.11, pp. 1905–1911.

Walnum, A. (2013). *Forskjeller i helsetjenesten. Hva kan vi lære av variasjon i medisinske kvalitetsregistre?* ISBN: 978-82-93141-12-9.

Willson, D. F., J.-H. Jiao, J. O. Hendley, and L. Donowitz (1996). "Invasive monitoring in infants with respiratory syncytial virus infection". *J. Paediatr.* 128.3, pp. 357–362.

Yasaitis, L., E. S. Fisher, J. S. Skinner, and A. Chandra (2009b). "Hospital Quality And Intensity Of Spending: Is There An Association?" *Health Aff (Millwood)* 28.4, w566–w572.

Appendices

Appendix A

Reference group

Ingebjørg Fagerli, head of section, paediatric department, Nordlandssykehuset hospital, Bodø, head of the Norwegian Society of Pediatricians

Jan-Petter Odden, head of the Children and Youth Clinic, Akershus University Hospital Hospital

Erik Borge Skei, chief senior consultant, Children and Youth Clinic, Akershus University Hospital

Pål Christensen, chief senior consultant, paediatric department, Innlandet Hospital, Lillehammer

Kåre Danielsen, head of the paediatric department, Sørlandet hospital

Hans Petter Fundingsrud, senior consultant, paediatric department, University Hospital of North Norway (UNN), Tromsø

Appendix B

Some things you should know about communicating statistics using maps

A map is a powerful communication tool that provides an intuitive and simplified picture of a set of figures. However, maps can also be seductive and highly misleading, and it is important for readers to be aware of some fundamental aspects. When choosing a cartographic form of expression, there are several choices to make that entail advantages as well as disadvantages. The most commonly used cartographic presentation is known as the choropleth map. In such maps, each area (the interactive atlas uses health trust areas) are assigned a shade of colour depending on which class the data value falls within. The advantage of this is that it is easy to identify the areas described, while the disadvantage is that large health trust areas will be visually dominant, while smaller areas get far less attention.

Classification is another factor that one should be aware of when interpreting maps. All the variables presented are in principle continuous variables (rates are at interval/ratio level). In order to present this in a meaningful form on a map, this information must be simplified - we need to classify (group) the information. It is an unfortunate effect of such generalisation that it may hide big differences between data values in the data set and/or emphasise minor differences between variable values on the map. In order to counteract this, the method known as Jenks natural breaks has been chosen for the interactive atlas, and four classes are used. This classification method uses an algorithm to maximise homogeneity within each class as well as heterogeneity between classes. It is recommended that maps produced using this method be supplemented by a frequency histogram where users can find the 'thresholds' in the distribution of data observations. The interactive atlas includes such a frequency histogram (bar chart) that is intended to be used alongside the map to interpret the variations observed.

Maps are intended to provide a simplified picture of reality, but maps are also produced on the basis of a number of subjective choices. These choices have a bearing on other people's perception of reality. Just as with figures and statistics, one should take a critical approach when interpreting maps. Therefore, be aware of the rhetorical possibilities of the map.

Appendix C

Definition of the Hospital referral areas

Hospital referral areas	Short name	Municipalities
Helse Finnmark health trust	Finnmark	2002 Vardø 2003 Vadsø 2004 Hammerfest 2011 Kautokeino 2012 Alta 2014 Loppa 2015 Hasvik 2017 Kvalsund 2018 Måsøy 2019 Nordkapp 2020 Porsanger 2021 Karasjok 2022 Lebesby 2023 Gamvik 2024 Berlevåg 2025 Tana 2027 Nesseby 2028 Båtsfjord 2030 Sør-Varanger
UNN health trust	UNN	1805 Narvik 1851 Lødingen 1852 Tjeldsund 1853 Evenes 1854 Ballangen 1902 Tromsø 1903 Harstad 1911 Kvæfjord 1913 Skånland 1917 Ibestad 1919 Gratangen

		1920 Lavangen
		1922 Bardu
		1923 Salangen
		1924 Målselv
		1925 Sørreisa
		1926 Dyrøy
		1927 Tranøy
		1928 Torsken
		1929 Berg
		1931 Lenvik
		1933 Balsfjord
		1936 Karlsøy
		1938 Lyngen
		1939 Storfjord
		1940 Kåfjord
		1941 Skjervøy
		1942 Nordreisa
		1943 Kvænangen
Nordlandsykehuset health trust	Nordland	1804 Bodø
		1837 Meløy
		1838 Gildeskål
		1839 Beiarn
		1840 Saltdal
		1841 Fauske
		1845 Sørfold
		1848 Steigen
		1849 Hamarøy
		1850 Tysfjord
		1856 Røst
		1857 Værøy
		1859 Flakstad
		1860 Vestvågøy
		1865 Vågan
		1866 Hadsel
		1867 Bø
		1868 Øksnes
		1870 Sortland
		1871 Andøy
		1874 Moskenes
Helgeland health trust		1811 Bindal
		1812 Sømna
		1813 Brønnøy
		1815 Vega
		1816 Vevelstad
		1818 Herøy
		1820 Alstahaug
		1822 Leirfjord
		1824 Vefsn
		1825 Grane

		1826 Hattfjelldal 1827 Dønna 1828 Nesna 1832 Hemnes 1833 Rana 1834 Lurøy 1835 Træna 1836 Rødøy
Helse Nord-Trøndelag health trust	Nord-Trøndelag	1632 Roan 1633 Osen 1702 Steinkjer 1703 Namsos 1711 Meråker 1714 Stjørdal 1717 Frosta 1718 Leksvik 1719 Levanger 1721 Verdal 1724 Verran 1725 Namdalseid 1736 Snåsa 1738 Lierne 1739 Røyrvik 1740 Namsskogan 1742 Grong 1743 Høylandet 1744 Overhalla 1748 Fosnes 1749 Flatanger 1750 Vikna 1751 Nærøy 1755 Leka 1756 Inderøy
St. Olavs hospital health trust	St. Olavs	1567 Rindal 1601 Trondheim 1612 Hemne 1613 Snillfjord 1617 Hitra 1620 Frøya 1621 Ørland 1622 Agdenes 1624 Rissa 1627 Bjugn 1630 Åfjord 1634 Oppdal 1635 Rennebu 1636 Meldal 1638 Orkdal

		1640 Røros 1644 Holtålen 1648 Midtre Gauldal 1653 Melhus 1657 Skaun 1662 Klæbu 1663 Malvik 1664 Selbu 1665 Tydal
Helse Møre og Romsdal health trust	Møre og Romsdal	1502 Molde 1504 Ålesund 1505 Kristiansund 1511 Vanylven 1514 Sande 1515 Herøy 1516 Ulstein 1517 Hareid 1519 Volda 1520 Ørsta 1523 Ørskog 1524 Norddal 1525 Stranda 1526 Stordal 1528 Sykkylven 1529 Skodje 1531 Sula 1532 Giske 1534 Haram 1535 Vestnes 1539 Rauma 1543 Nesset 1545 Midsund 1546 Sandøy 1547 Aukra 1548 Fræna 1551 Eide 1554 Averøy 1557 Gjemnes 1560 Tingvoll 1563 Sunndal 1566 Surnadal 1571 Halsa 1573 Smøla 1576 Aure
Helse Førde health trust	Førde	1401 Flora 1411 Gulen 1412 Solund 1413 Hyllestad

		1416 Høyanger 1417 Vik 1418 Balestrand 1419 Leikanger 1420 Sogndal 1421 Aurland 1422 Lærdal 1424 Årdal 1426 Luster 1428 Askvoll 1429 Fjaler 1430 Gaular 1431 Jølster 1432 Førde 1433 Naustdal 1438 Bremanger 1439 Vågsøy 1441 Selje 1443 Eid 1444 Hornindal 1445 Gloppen 1449 Stryn
Helse Bergen health trust	Bergen	1201 Bergen 1233 Ulvik 1234 Granvin 1235 Voss 1238 Kvam 1241 Fusa 1242 Samnanger 1243 Os 1244 Austevoll 1245 Sund 1246 Fjell 1247 Askøy 1251 Vaksdal 1252 Modalen 1253 Osterøy 1256 Meland 1259 Øygarden 1260 Radøy 1263 Lindås 1264 Austrheim 1265 Fedje 1266 Masfjorden
Helse Fonna health trust	Fonna	1106 Haugesund 1134 Suldal 1135 Sauda 1145 Bokn

		1146 Tysvær 1149 Karmøy 1151 Utsira 1160 Vindafjord 1211 Etne 1216 Sveio 1219 Bømlo 1221 Stord 1222 Fitjar 1223 Tysnes 1224 Kvinnherad 1227 Jondal 1228 Odda 1231 Ullensvang 1232 Eidfjord
Helse Stavanger health trust	Stavanger	1101 Eigersund 1102 Sandnes 1103 Stavanger 1111 Sokndal 1112 Lund 1114 Bjerkreim 1119 Hå 1120 Klepp 1121 Time 1122 Gjesdal 1124 Sola 1127 Randaberg 1129 Forsand 1130 Strand 1133 Hjelmeland 1141 Finnøy 1142 Rennesøy 1144 Kvitsøy
Østfold health trust	Østfold	0101 Halden 0104 Moss 0105 Sarpsborg 0106 Fredrikstad 0111 Hvaler 0118 Aremark 0119 Marker 0122 Trøgstad 0123 Spydeberg 0124 Askim 0125 Eidsberg 0127 Skiptvet 0128 Rakkestad 0135 Råde 0136 Rygge

		0137 Våler 0138 Hobøl
Akershus health trust	Akershus	0121 Rømskog 0221 Aurskog-Høland 0226 Sørum 0227 Fet 0228 Rælingen 0229 Enebakk 0230 Lørenskog 0231 Skedsmo 0233 Nittedal 0234 Gjerdrum 0235 Ullensaker 0237 Eidsvoll 0238 Nannestad 0239 Hurdal 0211 Vestby 0213 Ski 0214 Ås 0215 Frogn 0216 Nesodden 0217 Oppegård Inclusive districts Grorud Alna Stovner
Oslo University Hospital health trust	OUS	0301 Oslo Exclusive districts Grorud Alna Stovner
Innlandet health trust	Innlandet	0236 Nes 0402 Kongsvinger 0403 Hamar 0412 Ringsaker 0415 Løten 0417 Stange 0418 Nord-Odal 0419 Sør-Odal 0420 Eidskog 0423 Grue 0425 Åsnes 0426 Våler 0427 Elverum 0428 Trysil 0429 Åmot 0430 Stor-Elvdal 0432 Rendalen

		0434 Engerdal 0436 Tolga 0437 Tynset 0438 Alvdal 0439 Folldal 0441 Os 0501 Lillehammer 0502 Gjøvik 0511 Dovre 0512 Lesja 0513 Skjåk 0514 Lom 0515 Vågå 0516 Nord-Fron 0517 Sel 0519 Sør-Fron 0520 Ringebu 0521 Øyer 0522 Gausdal 0528 Østre Toten 0529 Vestre Toten 0533 Lunner 0534 Gran 0536 Søndre Land 0538 Nordre Land 0540 Sør-Aurdal 0541 Etnedal 0542 Nord-Aurdal 0543 Vestre Slidre 0544 Øystre Slidre 0545 Vang
Vestre Viken health trust	Vestre Viken	0219 Bærum 0220 Asker 0532 Jevnaker 0602 Drammen 0604 Kongsberg 0605 Ringerike 0612 Hole 0615 Flå 0616 Nes 0617 Gol 0618 Hemsedal 0619 Ål 0620 Hol 0621 Sigdal 0622 Krødsherad 0623 Modum 0624 Øvre Eiker 0625 Nedre Eiker

		0626 Lier 0627 Røyken 0628 Hurum 0631 Flesberg 0632 Rollag 0633 Nore og Uvdal 0711 Svelvik 0713 Sande
Vestfold health trust	Vestfold	0701 Horten 0702 Holmestrand 0704 Tønsberg 0706 Sandefjord 0709 Larvik 0714 Hof 0716 Re 0719 Andebu 0720 Stokke 0722 Nøtterøy 0723 Tjøme 0728 Lardal
Telemark health trust	Telemark	0805 Porsgrunn 0806 Skien 0807 Notodden 0811 Siljan 0814 Bamble 0815 Kragerø 0817 Drangedal 0819 Nome 0821 Bø 0822 Sauherad 0826 Tinn 0827 Hjartdal 0828 Seljord 0829 Kviteseid 0830 Nissedal 0831 Fyresdal 0833 Tokke 0834 Vinje
Sørlandet health trust	Sørlandet	0901 Risør 0904 Grimstad 0906 Arendal 0911 Gjerstad 0912 Vegårshei 0914 Tvedestrand 0919 Froland 0926 Lillesand 0928 Birkenes 0929 Åmli

	0935 Iveland
	0937 Evje og Hornnes
	0938 Bygland
	0940 Valle
	0941 Bykle
	1001 Kristiansand
	1002 Mandal
	1003 Farsund
	1004 Flekkefjord
	1014 Vennesla
	1017 Songdalen
	1018 Søgne
	1021 Marnardal
	1026 Åseral
	1027 Audnedal
	1029 Lindesnes
	1032 Lyngdal
	1034 Hægebostad
	1037 Kvinesdal
	1046 Sirdal

Helseatlas

Email: helseatlas@skde.no

www.helseatlas.no

Senter for klinisk dokumentasjon og evaluering

Email: post@skde.no
Phone: 77 75 58 00
www.skde.no

Postal address
SKDE
Postboks 6
9038 Tromsø

ISBN: 978-82-93141-27-3

Helseatlas | SKDE