



MASTEROPPGAVE

Dental education at the

University of Tromsø

Will the intentions be fulfilled?

Lene Arntzen, Kristine Heide

Veileder: Eriksen, H. M.



UNIVERSITETET I TROMSØ
Det helsevitenskapelige fakultet
Institutt for Klinisk Odontologi

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1. Introduction

Due to a general shortage of dentists in Norway, particularly in the North of Norway, the Norwegian government asked the University of Tromsø to investigate the need for recruitment of dentists and the possibilities for a dental school in Tromsø (1). A committee was established with representatives from UiT, the Public Dental Health Service and the private dental service. The committee concluded that there would be a reduction of dental man labour years of 26 % in 2030 compared to 2000 if the national educating capacity did not increase. The basis for this conclusion was that for the coming years there would be a higher rate of termination/ retirement than recruitment of dentists. Another reason was that there would be a higher number of women working as dentists, leading to a lower man labour year pr person (1 p., 3).

As a consequence of the committee's recommendations, the Norwegian Parliament decided in November 2002 to establish dental education at the University of Tromsø emphasizing the following main premises:

- The education in Tromsø shall contribute to increase the total number of dentists in Norway
- The program shall specifically meet the needs for dentists and dental specialists in Northern Norway
- The program shall comply with a decentralized educational model
- The program shall visualize the tasks and responsibilities in the public dental health service

The first class of 13 students started in Tromsø in the autumn 2004 and graduated in 2009. During the same year, the Norwegian Department of Health and Social Affairs presented a parliamentary document (Stortingsmelding 35) with the following recommendations with relevance for dental manpower output (2).

- There is an unequal distribution of oral health care personnel among different regions in Norway. In some regions there is a substantial shortage of dentists.
- There is a social oral health gradient. Parts of the population have extensive treatment needs that are not satisfactorily covered.
- The dental health care system needs a more efficient way of achieving results
- The collaboration between the private and public dental health care systems needs to be improved.

- The oral health promoting and disease preventing activities need to be areas of priority.

The aim of the present Master thesis is to evaluate today's manpower situation in the oral health care system with a main focus on the situation in Northern Norway. Will this situation be affected by the establishment of the dental educational program at UiT? In order to describe today's situation we want to discuss the following main topics:

2. How is the recruitment of dentists in Norway compared to the termination/retirement rate?

1. Today's Norwegian dental work force
2. Dentist/population ratio
3. Vacant public positions
4. Number of dentists educated in Norway
5. Norwegian dentists educated abroad
6. Foreign dentists working in Norway
7. The licensing program in Bergen
8. Expected termination/retirement rate for dentists in Northern Norway

3. What affects the need for dentists?

1. Demographic changes
2. Expected development of oral diseases
3. Changes in dental treatment needs, demands and expectations

4. Recruitment strategies in Northern Norway

5. Possible consequences – discussion and conclusions

2. Recruitment of dentists in Norway compared to the termination/retirement rate

The educational capacity both in dentistry and medicine was reduced in Norway in 1982 due to an estimated surplus of the work forces. This reduction had great implications for the output of dentists, mainly because a substantial amount of dental students terminated their studies. In the period of 1986-1995 the dropout-rate was recorded as high as 30-35 % for dental students in Oslo and Bergen (2, p. 42).

As a consequence, particularly the more remote regions in Norway experienced difficulties in recruiting dentists. In addition there has been a high dental manpower turnover, particularly in Northern Norway. This situation resulted in a strategy where the Norwegian

government started to recruit dentists from abroad. In 1999 the Norwegian government initiated collaboration with labour authorities in foreign countries, mainly Germany (2, p. 42).

There has also been an imbalance between the public and private dental health care system. One of the counties that have experienced problems regarding stability in the dental public dental health system is Nordland. In 2005 there were 25% vacant dental positions. In addition there was a high turnover rate, in the period of 1991-1997, $\frac{1}{4}$ of the positions were replaced every year (2, p. 45).

2.1 Today's dental work force.

In the whole of Norway, 968 man labour years were carried out in the public dental health service by 1122 dentists in 2009. Additional 2939 dentists were employed within the private dental health service and approximately 90 dentists were employed within municipal and governmental activities (3). This adds up to a total of 4151 working dentists in Norway (2009).

The current dental work force situation in Northern Norway is presented in Table 1. In addition there are 17 dentists employed at The University of Tromsø, IKO, approximately 10 working as tutors at the University clinic and around 20 dental specialists, mostly part time employed, at TkNN

Table 1. Dental work force in Northern Norway 2009 (3, 4, 5, 6).

County	Public positions available*	Vacant public positions*	Vacant public positions %	Man labor years, private (ssb)	Total dental work force in Northern Norway
Nordland	96	14	15	108	190
Troms	68	16	24	62	114
Finnmark	44	10	5	12	46
Total	208	40		182	350

*4, 5, 6.

2.2. Dentist/population ratio

Geographic availability and equal access to health care resources is one of the top priorities of the Norwegian government (2). One of the recommendations from the Norwegian

Department of Health and Social Affairs is that the unequal distribution of dental health care resources in Norway needs to be changed.

Private practitioners in Northern Norway

Finnmark has the lowest prevalence of private practitioners in Norway (2167 inhabitants pr private dentist) while Nordland had the third lowest coverage with 1622 inhabitants pr private dentist. Troms on the other hand is in the other part of the scale with only 1360 inhabitants' pr private dentist (7)

Public Dental Health Service employed in Northern Norway

The dentist/population ratio for the three counties in Northern Norway is presented in Table 2. Nordland, Troms and Finnmark have one of the highest degrees of coverage in Norway (7). But the statistics does not account for vacancies, and therefore the assessment of the actual coverage of dentists is not exact.

Table 2. Dentist/population ratio for Northern Norway (2009) (3).

Counties	Dentist/population ratio
Nordland	1158
Troms	1089
Finnmark	1344

2.3. Vacant public positions in Northern Norway (2009) (see also Table 1).

In Nordland county 14 of 96 public positions were vacant. In Troms and Finnmark counties the figures are 16 of 68 and 10 of 44 respectively (Annual county reports). This gives a percentage of unemployed public dental positions of 15% in Nordland, 24% in Troms and 5% in Finnmark.

2.4 Number of dentists educated in Norway

The output of new dentists graduating in Norway is presented in Table 3. For the years of 2006-2010 there was on average educated 105 dentists. At the universities of Bergen and Oslo the average drop out rate has been 20-25 per cent in the period from 1996 to 2002 (3).

Table 3. Recruitment of educated Norwegian dentists from the Universities of Bergen, Oslo and Tromsø 2006-2010 (8).

Universities	2006	2007	2008	2009	2010	Average	Total
UiB	45	41	48	53	38	45	225
UiO	61	66	51	64	58	60	300
UiT	-	-	-	11	18	15*	29

*Average in Tromsø only calculated for 2009 and 2010.

2.5 Norwegian dentists educated in foreign countries

In 2010 there were 40 Norwegian dentists educated at foreign universities who got license to practice in Norway. On average there has from the last five years been awarded 16 dental licenses annually to Norwegians educated in foreign countries (9). Table 4 gives an overview of Norwegian dentists educated abroad during the period 2006 – 2010 (9).

Table 4. Norwegian dentists graduating from foreign universities during the period 2006 – 2010 (9).

	2006	2007	2008	2009	2010	Total
Nordic countries	4	0	6	2	7	19
Other countries	6	10	5	9	33	63

Figures from “Statens lånekasse for utdanning” shows that there were a total of 193 dental students in foreign countries in the study year of 2009/2010. From the study year of 2005/2006 until today there has been a gradual increase of dental students abroad, from 90 in 2005/2006 to 193 in 2009/2010 (10). The number of dental students abroad is high compared to number of dental licenses awarded annually. This may be due to the students’ progression, where students may need to use longer time to finish their studies. High dropout rate among dental students in foreign countries may be another explanation. Some students apply to Norwegian universities after completing parts of the educational program abroad, completing their education in Norway. Another possibility is that dentists do not return to Norway after graduation. As pointed out, the number of dental students abroad has increased during the last five years, which may result in a higher number of licenses handed out in the years to come.

2.6. Foreign dentists working in Norway

Table 5. Figures of licenses awarded to foreign dentists with non-Norwegian background, educated in Nordic and other foreign countries 2006 – 2010 (9).

	2006	2007	2008	2009	2010	Aver.	Total
Nordic countries	21	22	37	56	35	34	171
Other foreign countries	66	53	80	79	69	69	347

Table 5 shows that during the last five years, a total of 518 foreign dentists have entered the Norwegian dental work force. A total of 453 dentists of foreign origin were working in the public dental health service in Norway. In Northern Norway there were 97 (3), which constitute 48 % of the total public workforce (97/ 200). This number does not differentiate between general practitioners and specialists. There is no clear information regarding if the recruited foreign dentists from the last five years are in public or private positions. However, using the numbers from “Statens autorisasjonskontor” it can be accounted for an annual access of foreign dentists of 103 during the last five years.

2.7. The Norwegian licensing program

For dentists educated at foreign universities, it is set as a requirement that the practical and theoretical aspect of the dental program they have attended is comparable to the Norwegian programs (11). A candidate with a degree from an EØS country is automatically qualified. The qualifying program at UiB was established in 1999 for dentists outside the EØS region and financed by The Norwegian Department of Health. The aim of the program secures the professional qualifications of the foreign dentists and gives them a basic knowledge of the Norwegian health care system. Dentists from Australia, Canada, New Zealand, Switzerland and USA, who are applying for a Norwegian license, will under normal circumstances not be asked to attend the program. After the candidates have completed the course and passed the exam, they receive a license to practice in Norway.

In the last five years, the average educational capacity of Norwegian universities has been 120 dentists a year. Norwegians educated at foreign universities constitutes an average

of 16 dentists a year. Another 103 foreign dentists can on average be accounted for from the last five years. Adding up these numbers gives a total of 239 dentists a year.

2.8. Expected termination/ retirement rate for dentists in Northern Norway

Table 6. Public and private positions in 2008 occupied by dentists over 60 years of age in Northern Norway (3). The figures do not differentiate between general practitioners and specialists.

County	Public dentists>60 yrs	Private employees >60 yrs
Nordland	21 (27% of the work force)	30 (26% of the work force)
Troms	14 (21% of the work force)	16 (23% of the work force)
Finnmark	5 (13% of the work force)	2 (13% of the work force)

Table 7. Age distribution among working dentists in Northern Norway, both public and private, 2008 figures (3) The figures do not differentiate between general practitioners and specialists.

Age of dentists (and dentist specialists)	Public	Private	Total
<30	32	9	41
30-39	54	51	105
40-49	27	42	69
50-59	32	51	83
>60	40	48	88
Total	185	201	386*

As presented in Table 1, today's total workforce of dentists in northern Norway is 382. 200 of these dentists are in public positions and 182 in private positions. When illustrating today's retirement rate and age distribution we have used 2008 figures; there were 192 public and 208 private working dentists in northern Norway, whereas seven out of each group was of unknown age and has not been accounted for in these calculations.

Dentists at the age of 60 or above in public positions of northern Norway constitute 22 % of the positions. Dentists of the same age group in the private dental health care make up 24 % of the positions.

Figures from SSB show the age distribution of working dentists, both private and public in northern Norway. When considering the age distribution of dentists, it can be noted that the largest group within public dentists are the ones aged 30-39 years. 54 out of 185 of the public dentists are within this age group. This makes up a total of 29 %. Among private working dentists the age group 30-39 years and 50-59 years are of equal size; 51 out of 201 dentists are within this age. These two groups each makes up 25 % of the total private dental workforce.

Furthermore, among public dentists the age group from 50-59 year olds constitutes 32 dentists, which give a percentage of 17. If considering the age distribution of the workforce as a whole, 22 % are aged 50-59, and 23 % are aged 60 or more.

The age distribution among dentists is important when calculating coming retirement rates. It can be assumed that within the coming ten years, dentists who were 60 years or older in 2008, will be eliminated from the work force. Dentists within the age of 50-59 years will be the next to retire, and within a period of 15 years they can be expected retired. This means that approximately 45 % of today's workforce will be eliminated in about 15 years.

With the conditions set for calculations in "Rapport: Arbeidsmarkedet for helse- og sosialpersonell fram mot år 2030", there will be an increase from 2008 of dentist man labour year up to 19%. With the same conditions, an increase in demand of 37% for dental health care personnel at the year of 2030 is expected. This means there will be a shortage of dentists compared to the expected need (12, p. 59).

3. What affects the need for dentists?

3.1 Demographic changes

Demographics are the description of characteristics of a population, including gender, race, age, income, disabilities etc. (13). In the present context we wish to focus on the demographic trends in immigration and age distribution.

Immigrant population

The share of immigrants in Norway has and will increase in the years to come. In addition the part of the population with immigrant background will increase. It is estimated that by the year of 2060 these two groups will be between 1,3 to 2,3 million (a vague number, because the development of work situation and the immigrational politics makes these estimations complicated).

As differences in oral health between ethnic Norwegians and immigrant children have been observed (14), an altered demographic constitution with more immigrants can increase the need for dental health services.

In 2010 there were 459 000 immigrants in Norway. In addition there were 93 000 inhabitants born in Norway, but with parents of immigrant background. All together this group constitute 11, 4 % of the population. Information from The National Bureau of Statistics indicates that there will be approximately 1, 1 million immigrants in Norway in 2030 (both immigrants and people born in Norway, but with immigrant parents). The total number of inhabitants in 2030 is estimated 5, 8 millions. The group of immigrants will then constitute approximately 19 % of the Norwegian population (3).

Samlet antall innvandrere og personer født i Norge med utenlandsfødte foreldre

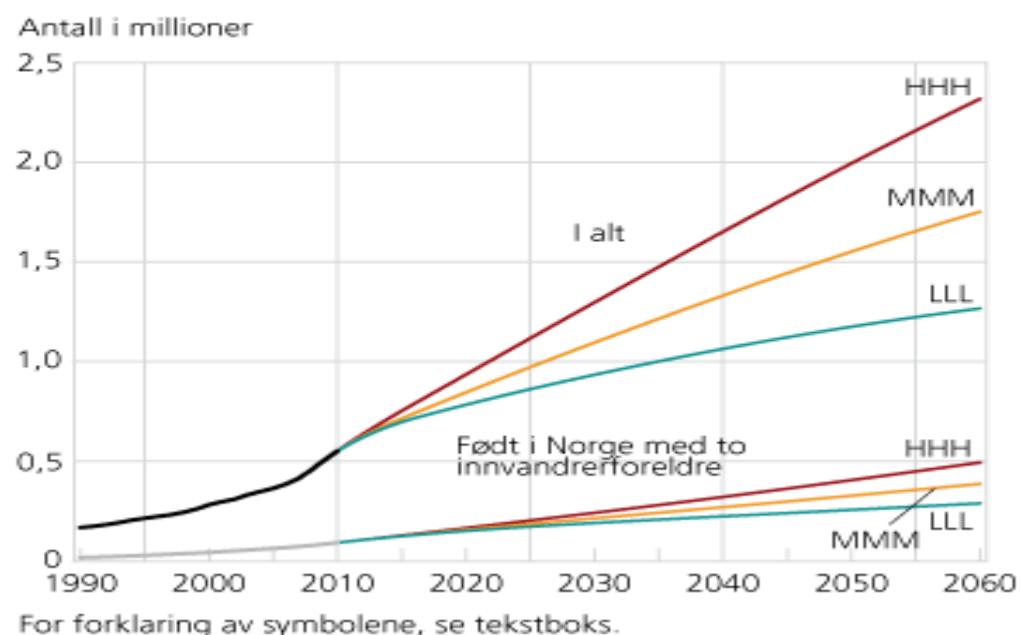


Fig.1 Survey of inhabitants in Norway with immigrant background, net. immigration (3)

HHH: High level fertility, high level age and high level immigration

MMM: Mid level for fertility, mid level age and mid level immigration

LLL: Low level fertility, low level age and low level immigration

Average age

Since the 1950 the proportion of older persons (person over 60 years) have been rising steadily in Norway, from 8% in 1950 to 11% in 2009, and is expected to reach 22% in 2050. As long as old-age mortality continues to decline and fertility remains low, the proportion of older persons will continue to increase (15).

3.2. Expected development of oral diseases

During the last 35-40 years there has been a significant improvement in the oral health status of the population. The overall oral health in Norway is relatively good and the share of the population who visit a dentist/dental hygienist every year is high compared internationally (2). Many children and adolescents have no carious lesions and compared to earlier generations fewer elderly patients have dentures (16). In 2004 60-70 % of the adult population reported their oral health as good, while only 5-13% reported it as bad (16).

Oral health among children

Available information indicates that oral health has improved among children and adolescents from 1985-2010 (17, p. 18). In 2007 the share of patients in the age group 3-5 years that had no carious lesions was the highest recorded, 85-90% for 3 year olds and 75% for the 5 year olds (17, p 6). This indicates that more and more children have none or only a few carious lesions. Since 1995, 12 year olds has had in average 2 teeth with carious lesions compared to 1985 where the number was 3,5 (16, p 2). The same development can be seen in all of the young age groups that have been examined (16) (fig.2).

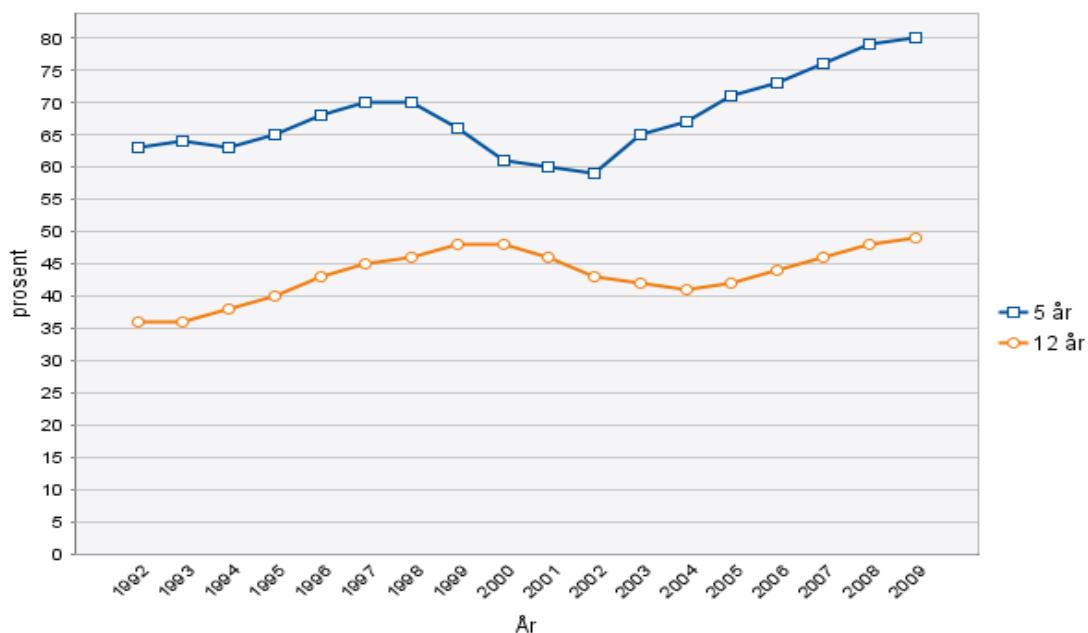


Fig. 2. Part of 5 and 12 year old children with no carious experience (16, artikkel Tannhelse, via SSB)

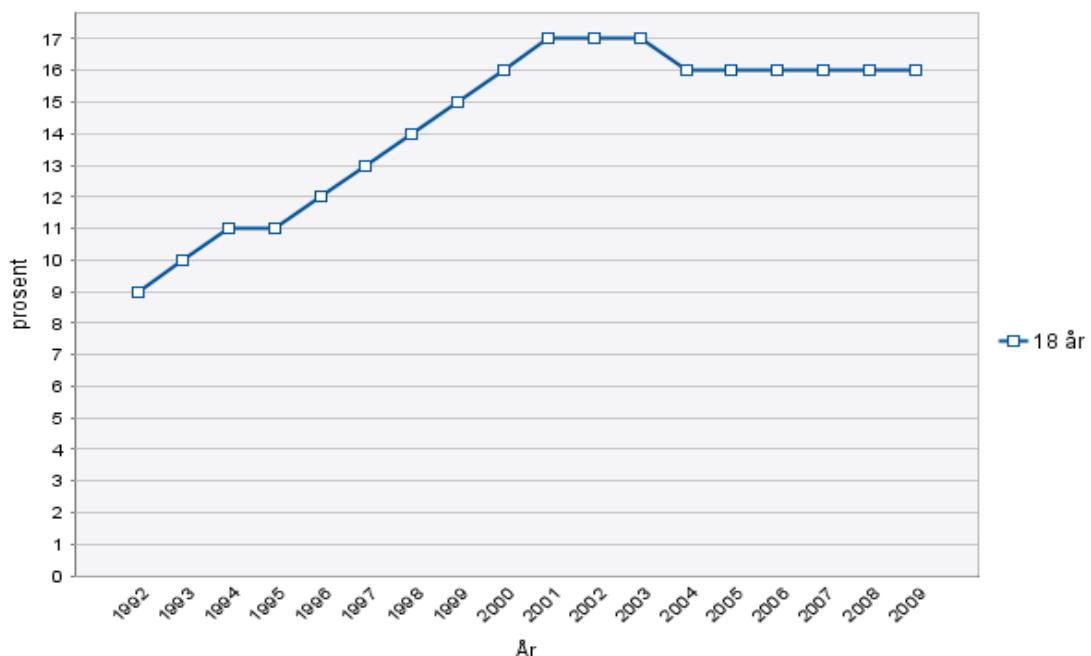


Fig. 3. Part of 18 year olds with no carious lesions. (16, artikkelen Tannhelse, via SSB).

In 1999 and 2003 two studies were performed on children with different ethnicities in Oslo. In total 711(1999) and 218 (2003) children were examined. In comparison with Norwegian 3 year olds the children with an immigrant background had a percentage of 60% (1999) and 58% (2003) with no carious experience, while Norwegian 3 year olds had a percentage of 84% (both years). Corresponding differences was found in the older age groups, 12 and 18 year olds, measured as teeth with carious lesions (17, p. 18). As these children will have more restorations, this might lead to more resources needed in regards to treating immigrants in the future. (But more research is needed on a national scale to be able to generalize these findings).

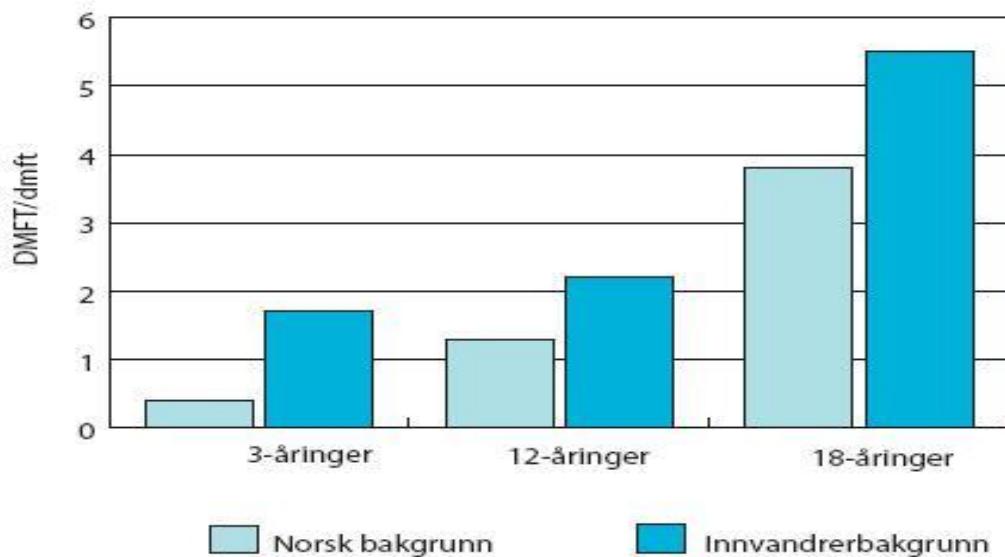


Fig. 4. Average DMFT/dmft- scores among 3-, 12- and 18 year olds with Norwegian and immigrant backgrounds (14)

Oral health among adults

There has been no regular registration on oral health and oral disease conditions among adults in whole Norway. Because of this, the information about adult oral health is limited. Two regional surveys have, however, been carried out; the Oslo- and the Trøndelag investigations. Both surveys started in 1973 and have been repeated with an interval of 10 years. The main features of the surveys can be used as an indicator of the development of oral health conditions among adult Norwegians (17, p. 23).

Both the Oslo- and the Trøndelag studies were repetitive cross-sectional in design. The Oslo studies show that in the period from 1973-2003 the average DMFS-values decreased with 65 %. Participants who had no untreated carious lesions (DS) increased from 5 % in 1973 to 54 % in 2003 (17, p. 26).

Oral hygiene and periodontal disease were also recorded in the Oslo-survey, and showed a significant improvement in the period from 1973 to 1993. During the last decade this has been a stable situation (17, p. 26). Patients with severe periodontal disease (one or more periodontal pockets of 6 mm or more) have decreased from 21, 8 % in 1984 to 8, 1 % in 2003. People with a non-western background had more periodontal disease than people with Norwegian or other western background (17, p. 28).

The Trøndelag survey has followed two birth cohorts, persons born 1929-1938 and 1959-1960. The survey has been carried out with a ten year interval. In addition to the birth

cohorts, a selection of persons aged 35-44 were investigated every time the survey was carried out. Along the survey new age groups has been added to be able to follow younger birth cohorts. In 1983 and 1993, 23-24 year olds were investigated.

The results of the survey show that for the birth cohort 1959-1960 the average number of filled teeth increased from 11,1 in 1973 to 14,7 in 2006. From 1983 to 2006 the average DMF-index and present teeth remained unchanged (17, p. 24).

The birth cohort 1929-1938 showed that from 1973 to 1994 the median DMFT and DMFS was unchanged, but from 1994 to 2006 there was a decrease in DMFS. As the M and F component are not reversible and number of carious surfaces was low, this is assumed caused by e.g. demographic composition (17, p. 25).

Looking at differences over time within the same age group showed that young adults (23-24 year olds), from 1983 to 1994 had a decrease in median values of DMFS; 60 % reduction in urban areas and 53 % in rural areas. A significant reduction in DMFT was observed, from 17 in 1983 to 9 in 1994. The reduction seen was mainly due to less filled teeth.

When comparing the age group of 35-44 year olds from the year of 1973 to 2006 there was a great change in DMF-index. Average missing teeth (MT) were reduced from 8,7 to 1,2. Average filled teeth and average untreated carious teeth were reduced over the period. Present teeth increased from 19,8 teeth in 1973 to 26,8 in 2006.

The age group of 45-54 year olds was investigated in 1983 and 1994. The proportion with teeth in both jaws increased from 71% to 92 %, and the proportion of people who had teeth in only one jaw decreased from 15 % to 5 %. Within the same period the proportion of toothless decreased from 14 % to 3% (17, p. 25, 26). The results from these studies show improving oral health among adults.

Improved oral health in society results in a lower demand for dental health services. Both adults up to the age of 40 and 20 year olds have an improved oral health compared to the same age groups 20-30 years ago (17). As a consequence, less restorative work and periodontal treatments have to be performed in these cohorts. Dental health controls within these groups will be more controls of the “healthy mouth” and less controlling a “diseased mouth”. “Healthy mouth” controls can to a great extent be performed by dental hygienists.

Oral health among the elderly

Many of the patients in the older age groups had a limited access to oral health services in their childhood and adolescence, which has implications for their oral health today

(16, p. 5). The incidence of tooth loss in the elderly Norwegian population is decreasing. Norwegian surveys carried out from the 1980-1993 indicate a decrease in edentulousness from 80 % to 54% during this period (18, p. 404). When a dentate elderly person gets an illness, loss of function or needs medication, the oral health will often suffer. This situation will lead to a demand for more resources for elderly oral healthcare.

A study performed in 2003 aimed to estimate the prevalence of teeth and dentures in individuals aged 67 and above. They identified 3 regions with marked differences in oral health conditions (Region A: South-East Norway including Oslo. Region B: West and Central Norway including Bergen and Trondheim and Region C: Northern Norway). In total, they found that 40% had their own teeth only, 28% had a combination of partial dentures and own teeth and 40% had dentures only (Fig.6). However, while looking at the regional distribution, they found that there were large geographical disparities with respect to dental/denture status in Norway were the South-East region was the best and Northern Norway the least favourable (18, p 403) (Fig.6).

Distribution of teeth and dentures according to regions

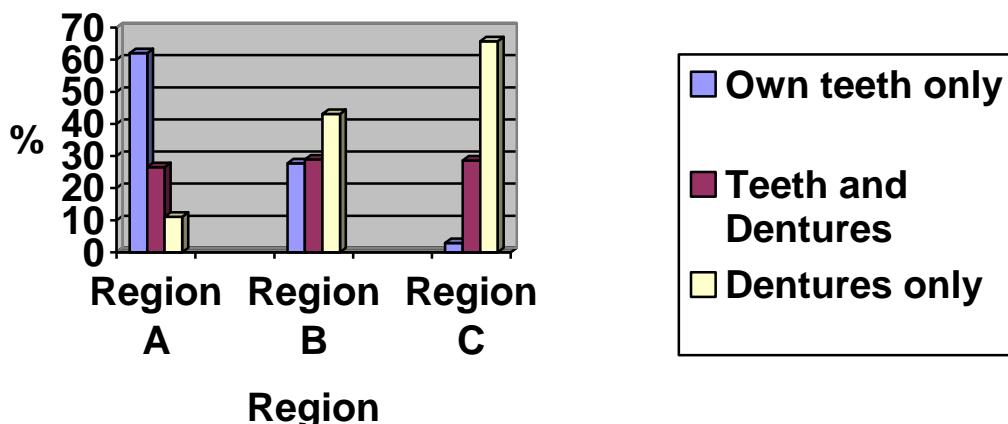


Fig. 5. Dental conditions of individuals >67 years in different Norwegian regions (16)

Edentulousness

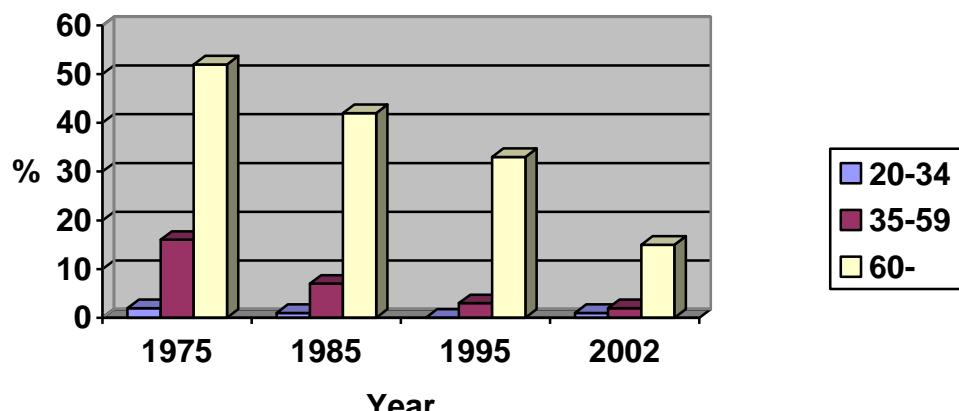


Fig. 6. Edentulousness in different Norwegian age groups 1975 – 2002 (16).

3.3. Changes in dental treatment needs, demands and expectations

Children and adolescents:

As described earlier in this thesis the oral health among children has improved during the last 25 years. This development may lead to a lower treatment demand, with a focus on prophylaxis and a greater portion av treatment that can be preformed by a dental hygienist, where the focus is palced on control of the healthy oral cavity rather than a control for pathology.

Adults

A consequence of the improved oral heath status in children and adolecents is that there will be a an increase in older patients with theire own teeth, in addition the almount of teeth with cariouslesions (DMFT) will decrease for patients reaching the age of 70 in 2055 (19).

Many of the older age groups visit the dentist often and on a regular basis, compared to the younger adults. A financially strong generation of older dentate patients might increase the demand for dental treatment. As a result of the older population being dentate, maintenance of earlier placed restorations and replacing missed teeth with bridges or implants, this will lead to a higher demand for dental treatment. Even with the consequences of this development, it will balance with the decreasing need for dental treatment in the younger population at least until 2025 (2, p 109).

Surveys made from 1985 to 2006 show no increase in the population's expenses on dental health services during the last 20 years, compared to the increased cost of these services. This means that the increase in demand/consumption has mainly followed the demographic development.

Altered public refund systems for certain groups of society being in greater need of dental treatment may cause an increased demand, whereas parts of the population may have refrained from dental treatment due to economic conditions (2, p. 109).

Economic growth leads to growth in the populations purchase power and increased gross domestic product will in general increase the demand of goods and services. An increased demand for dental treatment may be expected as well.

The elderly

As more and more of the elderly population are dentate (as mentioned earlier), there will be a higher treatment demand in conservative treatment and prosthetics among the elderly patients. The combination of an increasing number of elderly reaching the age of 85 and a decrease in endentulousness might lead to increased treatment need (17).

Periodontal disease, oral pain and problems with mastication are prevalent among the elderly, in addition it will be a challenge to maintain advanced prosthetics, especially for patients living in an institution. There will probably be an increase in treatment demand to maintain and hopefully improve the oral health among the elderly.

4. Recruitment strategies in Northern Norway

One of the main challenges in the public dental health care is to make dental services available to the population in all parts of the country. This is of great importance to equalize social differences (2, p. 15). The high turn-over rate in public dentist positions in the Northern Norwegian counties has been a problem during the last three decades (2, p. 45). To make equal public access to dental health care services across the nation, the government points it will use political means to make the counties better suited to keep and/ or recruit dentists in areas which has shown a low coverage (2, p. 16). To get a more even distribution of dentists it has been suggested a governmental control system on establishing dental practices in areas with a high degree of dentist coverage. The main aim of this proposition is to prevent too many establishments of dental practices in central areas and thereby make dentists work in the district. This is meant to secure a more even geographical distribution of dentists and thereby equal access to dental health services in all parts of the country (2, p. 114). The proposed

national maximum price rate is another mean to equalize the distribution of dentists throughout the country. To have a dental practice in central areas will probably become less attractive if national price rates are introduced.

To reorganize the dental studies of UiO and UiB, as in expanding the student's external dental practices from 5 to 10-12 weeks, is another suggested strategy to assure geographical distribution of dentists.

The main argument for introducing vocational training for dentists is to increase the competence before working as independent dentists, but it is also assumed to equal geographical distribution of dentists (2, p. 119).

4.1. Finnmark

Recruiting dentists to Finnmark fylkeskommune has been a problem for many years. Tendencies show that a local university increases the possibility for the students to stay in the northern part of the country. The establishment of a dental school in Tromsø will most likely lead to an improved coverage of dentist positions in the county. Twenty-eight of a total of 29 dental students graduating from The University of Tromsø until now have got positions in Northern Norway. Recruiting local youths is a main aim for the county government (fylkeskommune), as these are more likely to stay in the district and provide a more stable personnel situation. On a yearly basis, representatives of the county administration visit dental students at the UiT to promote Finnmark.

Offering local youth work at clinics during summer is another mean to recruit dentists who originates from the district.

To increase the number of student clinics was thought to ease the future recruitment of dentists. Through collaboration with UiT, there were established university clinics in Alta (2007) and Hammerfest (2008). It is also desirable to make the dental clinic in Kirkenes a university clinic. Larger dental health teams will provide a more challenging and inspiring praxis, which in turn is hoped to have a positive effect on future recruitment of dentists to the county.

Recruiting dentists from Russia, the county government of Finnmark wishes to have a candidate program for Russian dentists at UiT, equal to the licensing program in Bergen. The county government of Finnmark has several other actions to promote dentist positions, which are;

- Dentists, who work at a clinic with recruitment issues, are offered one year off to attend further studies, with the benefits of getting paid.
- Scholarships to local youths who attend dental studies and are willing to return to Finnmark when finished studying.
- Dentists and other dental health workers are offered visits at TkNN to improve competence within different fields of odontology (odontophobia, periodontitis, pedodontics...)
- One of the four specialist candidate positions in the orthodontics programme at UiT is reserved for Finnmark.
- Specialist candidate position within the field of clinical odontology is offered at UiT, and general practitioners in Finnmark are being informed about this option.
- ”Ambuleringstillegg” increases to 1200 kroner/ day (5, p 20-22).

4.2. Nordland

In order to recruit future dental workforce, the county government of Nordland performed in 2009 some means aimed towards youths in the district;

- Attended work stands aimed towards high school (vgs) students to inform about dental school programs.
- Distributed brochures on dental school programmes to upper secondary schools counselors.
- Dental students who originate in Nordland were offered summer jobs in the county.

The county government offers other benefits to recruit and stabilise the dentist workforce, which are as follows;

- Financial support to attend courses
- Postgraduate education financial support for 25 public dentists
- Adjusted working hours, either reduced or expanded
- Opportunity to hire the clinic for private practising
- After one year, another 50 hours extra vacation time
- Financial support for moving costs

These are all aims to improve the dentist situation in the region (4, p 9). (nfk.no)

4.3. Troms

There was established a committee to consider the recruitment situation of Troms County. Recruitment strategies of Troms County was; to specify in the dentist position advertise, if an experienced or freshly educated dentist was needed; Specific means to keep elder dentists for as long as possible; Moving dentist positions temporarily to other clinics (6).

- The county government of Troms can offer a salary of 492 000 kroner/ year.
- Dentists who has worked within the county government for two years are guaranteed a pay raise of 40 000 kroner and another 30 000 kr after 4 years.
- After working two another week of vacation is offered.
- Financial support of 9000 kroner is given for attending courses.
- Establishing scholarship of 30 000 kroner is given as a one time payment when dentists starts working in a public position within the county government og Troms. This scholarship is now being reevaluated and it has not been decided yet if it is to be prolonged or discontinued.

In addition, the county government policy is to make the transition of moving to a new place and starting a new job as smooth as possible, and is therefore being helpful in finding a place to stay and giving social follow up to assure each employee's general happiness.

To develop further competence within different fields of odontology, apprenticeship and specialist education is an option. A scientific career is also being facilitated.

In the northern part of Troms there is some general benefits when living and working in the area (20). These are the same as for Finnmark.

5. Possible consequences – discussion and conclusions

When comparing the dentist/population ratio to other regions of Norway there is no major unequal distribution. Troms County has quite a low ratio of 1089 inhabitants pr. dentist. This was the lowest ratio of all Norwegian counties in 2009. The highest ratio was in Nord-Trøndelag with 1500 inhabitants pr dentist. Finnmark was the county in addition to Nord-Trøndelag with most inhabitants pr dentist (3). Nordland represents an average ratio. This indicates that there is no major discrepancy on dentist/ population ratio in northern Norway compared to other parts of the country. As reported earlier there has been a great turnover rate in some of the counties in Northern Norway, where $\frac{1}{4}$ of the positions where replaced every year (2, p. 45). This may lead to a lack of continuity.

When comparing vacant positions within the public dental health care it shows that the percentage in northern Norway is significantly higher compared with the rest of the country (4, 5, 6). Nordland and Troms has had a percentage of vacant positions of about 30% the last years (4, 6). In Troms the vacancies are now at a level of 24 % and Finnmark has improved from a stable level of 20 to about 15% during the last two years (3). The last years show a tendency of stabilizing the workforce in the northern counties, but still there is a high vacancy level. As the dentist/population ratio is quite even compared with the country as a whole, this may indicate that dentists in other parts of the country are distributed with a greater proportion working at private positions, than in northern Norway.

During the past five years an average of 111 dentists has graduated annually from Norwegian universities (8). When the educational capacity of UiT peaks from the year of 2012 this number will increase to 137 (if accounted for a completion degree of 80% at UiT, which gives 32 dentists a year).

The number of Norwegian dental students at foreign universities is increasing. Today there are a total of 193, distributed at different educational levels. Five years ago there was half as many (9). There is no available info on what stage of the education these students are at, but if distributed even into five years it will during the next years give an output of 39 dentists. In 2010 40 Norwegian dentists from foreign universities got their license to practice in Norway. The average from 2006 to 2010 was 16. An increase in dentists from this category can be expected in the years to come. Norwegian dentists educated abroad will probably represent a stable work force in Norway.

A total of 518 dentists with a non-Norwegian background have received a license to practise in Norway over the last five years. There is no available information on how long these dentists will stay in Norway. But it can be assumed that dentists with a foreign background sooner or later will leave the country. Foreign dentists constitute a large proportion of the total public dental workforce in northern Norway, almost 50 % (3). This is a contributing factor regarding the unstable workforce, where high rates of replacements are seen annually.

The fact that there, on average, annually has been handed out 103 licenses to foreign dentists over the last five years (9) , which is almost as many as educated dentists in Norway, indicates a great need of dentists. If this trend continues, the educational capacity for dentists in Norway may be questioned.

Dentists aged 60 or more occupy 22 % of the public dental positions and 24% of the private dentist positions in northern Norway (2008 figures). Further assessment of age distribution among working dentists shows that nearly 40 % of public and 50 % of private working dentists are aged over 50 years old (3). Todays retirement age for dentists is at 65 years. In 15 years all of the dentists aged 50 or more can be assumed to have retired, as they will all exceed the age of 65. As a consequence, approximately 45 % of the workforce in northern Norway will have to be replaced within the coming 15 years.

The annual output of graduating dentists will be about 170 Norwegian dentists per year (8, 9). In addition about 100 dentists of foreign background can be accounted for (9). This makes up an average total access of 273 dentists a year. Over some years this might exceed the replacement need with a stabilizing impact in northern Norway.

When trying to assess the present and future need for dentists, many factors might be considered. Within the present thesis we have chosen to discuss only the demographic changes and the development of oral disease. As indicated in our thesis, the oral health and the composition of the Norwegian population is changing. Studies like the Trøndelag and Oslo (17) investigations disclose improvement in the oral health status among the adult population. In addition statistics from SSB shows a great improvement in the oral health status for the younger population (age groups 6, 12, 18 year olds). These findings might indicate a reduction in the need for dentists, fewer diseased patients and less treatment need.

At the same time there is improvement in the oral health among the elderly population; studies have shown a reduction in the number of edentulousness during the last 30 years (18). In the situation with higher numbers of elderly being dentate, the need for treatment might increase. As more and more of the population have their own teeth, more recourses are needed to maintain the oral health of the elderly.

Another factor that needs to be discussed is the changes in the composition of the population, as previously mentioned the part of the population aged over 60 is increasing (according to UN) (15). Taking this into account, in addition to the fact that there is a great number of this age group being dentate, one might assume that this might lead to a great increase in treatment need.

Another demographic change in the Norwegian population is the increasing number of immigrants. As previously mentioned, the number of immigrants or parts of the population with an immigrant background might reach 19% of the population by the year of 2030 (3). Studies have shown some differences in the oral health status when comparing Norwegian

children and children with an immigrant background (14). As the number of immigrants is increasing and studies show a higher treatment need, this might lead to a higher demand for dentists.

It is important to take into account that the findings regarding immigrants cannot be generalized, as there are no studies performed on a national scale and only on children in the Oslo area. We have chosen to include these studies to be able to disclose trends as regards to the oral health within the immigrant population.

Recruitment strategies are strategies in the different counties in Norway to ensure an equal geographical distribution of dentists. What these strategies imply differ from county to county, but we wish to focus on Nordland, Troms and Finnmark. The start salary and benefits for the 3 counties are relatively similar, but Nord Troms and Finmark have some general benefits when working and living in the area, these benefits are not only for dentists but advantageous for the whole population. One thing the 3 counties have in common is that the salary and other benefits are the same regardless of where you live and work as a dentist. A dentist working in a small community in Nordland has the same benefits as a dentist working in one of the larger cities in the region. One might discuss that for instance a higher salary or other benefits for dentists working in the more rural places would perhaps lead to a lower turnover rate.

From this thesis we can conclude that there has been an improved workforce situation in the Northern counties, where the vacancies has dropped during the last two years. It can be assumed that the establishment of the dental educational program at UIT has been a contributing factor. Today, 28 out of 29 dentists graduating from UIT, are employed in Northern Norway. To make a certain conclusion on this, the situation has to be further evaluated in the years to come, but the tendency indicates a positive trend.

Evaluating the educational capacity at Norwegian Universities in addition to foreign manpower in respect of the retirement rate and demographic development, one can conclude that there will be an increased need for dentists in the years to come.

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