

ORIGINAL ARTICLE

Oral health care and dental treatment needs in the Barents region

Eeva Widström^{1,2}, Natalia Kopusova¹, Ragnhild Nordengen³, Maud Bergdahl^{1,3}, Harald Eriksen¹, Ekaterina Fabrikant⁴

¹Institute of Clinical Dentistry, Faculty of Health Sciences, University of Tromsø, Norway

²The National Institute for Health and Welfare (THL), Helsinki, Finland

³Public Dental Service Competence Centre of Northern Norway (TkNN), Tromsø, Norway

⁴Moscow State University of Medicine and Dentistry, Moscow, Russia

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ABSTRACT

Objectives. The first aim was to study how oral health care delivery was organized in member countries and to determine whether there were differences across the Barents region. The second aim was to assess the performance of the care provision systems. The Barents region is one of the largest hinterlands in northern Europe.

Study design. Descriptions of the oral health care provision systems in Norway, Sweden, Finland and Russia were written. Performance of the care provision systems was assessed by evaluating access to and use of services in relation to oral health.

Methods. National statistics, governmental reports and scientific publications were used as data sources. Data were supplemented by sending questioning to national and local managers and experts. Inter- and intra-country comparisons included dental health status, service availability and restrictions, financial support for oral health care, availability of dental personnel and use of services.

Results. In the Barents region, oral health care provision systems, mainly operating via the public sector, were in place in all countries. However, in most countries, oral health was poorer, access to care more difficult and use of services lower, mainly because of a lack of dental personnel and economic constraints. Overall, there was a huge difference in the inhabitants to dentist ratios between the Nordic countries and Russia.

Conclusions. Professional co-operation within dentistry should be integral to the Barents region in order to expand the number of dental personnel, improve oral health and increase access to dental care.

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Key words: delivery of oral health care, access to dental care, dental workforce, oral health, service utilization, Barents region

INTRODUCTION

In a geographical context, the northernmost areas of Norway, Sweden, Finland and Russia (the Barents Euro-Arctic Region, BEAR) make up Europe's largest region for inter-regional co-operation. The region is characterized by harsh climatic conditions, a vulnerable environment and long distances, which challenge people, businesses and authorities. This vast region has a total area of 1.75 million km², a population of 5.5 million and 13 provinces or territories. In Norway, these are Nordland, Troms and Finnmark counties with a total population of 460,000; in Sweden, Västerbotten and Norrbotten counties with 509,000 inhabitants; and in Finland, Lapland and Oulu provinces with 650,000 inhabitants. The Russian BEAR area consists of Arkhangelsk and Murmansk Counties, the Republics of Karelia and Komi, and the Nenets Autonomous Area, with a total population of about 3,900,000 (Fig. 1). The population density in the whole area is

on average 3.5 inhabitants / km², varying from 0.3 in Nenets to 8 in Oulu. The largest city in the Barents region is Arkhangelsk (Russia) with 350,000 inhabitants (1).

Historically, and in spite of enormous natural resources, the Barents region has been less economically and educationally developed and has had higher unemployment than the southern or central parts of the host countries (2). The main economic activities in the Barents region are industries related to oil and natural gas, forestry and wood processing, pulp and paper production, shipbuilding and maintenance, coal mining, metallurgy, electricity generation and fishing (3). Despite the enormous natural resources in the north-western part of Russia, the persisting health problems related to bad health habits (e.g., high alcohol consumption) and very high mortality rates (4,5) have not led to an improvement in the living standards in the same way as in the more central areas of Russia (4,5). Moreover, huge intra-regional and inter-sectoral differ-



Figure 1. A map showing the countries, counties and territories belonging to the Barents region. The biggest cities and cities with dental schools (Tromsø, Umeå, Oulu and Arkhangelsk) are marked on the map.

ences in wages persist, limiting growth in personal incomes (3,6). To develop the region economically and socially, intergovernmental co-operation in the region was established and the Barents Euro-Arctic Council was formalized in the early 1990s. The region is also included in the Northern Dimension EU collaboration, which aims to strengthen co-operation among the EU member states, the Nordic countries (Norway and Iceland) associated with the EU under the European Economic Area and Russia. In this collaboration, health has been mentioned as one of the areas to be developed.

In most EU member states, oral health care is distinct from general health care and is mostly run by the private sector (7). In all the Nordic countries and Russia, dental care is provided by both the public and private sectors. The public sector is run by local governments (municipalities, provinces and regional) and uses salaried personnel. The general goals of the oral health care provision systems are similar in all countries and emphasize equal access to all areas of primary health care, including providing both basic and specialized dental care at affordable prices. The national or the local governments have a central role in the goal setting, guidance, supervision and financing of dental services. Good dental health and an aesthetic dentition are considered very important, and the consumption of dental services is higher in wealthy societies (8). Thus, our hypothesis was that inhabitants in the Barents region would not be able to obtain and make use of dental services to the same extent as their compatriots outside the region.

Aim

Our study had two aims. The first was to study how oral health care delivery was organized in Norway, Sweden, Finland and Russia and to determine whether the care provision systems differed in the Barents region. The second aim was to assess performance of the care provision systems. In particular, we were interested in access to and use of dental services in relation to dental treatment needs and the roles played by the public and private sectors.

MATERIAL AND METHODS

Descriptions of the systems for the provision of oral health care in Norway, Sweden, Finland and Russia were written by authors coming from each country, based on their knowledge, national reports and, when needed, information provided by national and local managers and experts. An earlier written report (4) was used as the model. Performance of the care provision systems was evaluated using a comparative case study method and cross-case analyses to identify generalizable features in accessibility and use of dental services and treatment needs between countries and inside countries, contrasting the Barents region with the rest of the country. Access was used as a broad concept and measured as service availability, numbers of dental personnel, placement of dental schools, financing of the services and reimbursement of patient costs. Data on oral health were used to indicate treatment needs rather than outcome of care. Information

Table I. Populations, numbers of dentists or stomatologists and dental doctors by treatment sector, numbers of dental hygienists, dental technicians and ratios of inhabitants per dentist or per dental technician by county/territory and host country in the Barents region.

Country	Region or province	Inhabitants	Registered, working-aged dentists or stomatologists and dental doctors n	Year	Working in public dental service n	Working in private dental service %	Registered dental hygienists n	Registered dental technicians n	Inhabitants per dentist	Inhabitants per technician
Norway	Nordland county	235,380	182	2008	65	36	53	24	1,293	9,808
	Troms county	155,553	125	2008	57	46	61	13	1,244	11,966
	Finmark county	72,492	50	2008	33	66	29	2	1,449	36,246
	Total	463,425	357	2008	155	43	143	39	1,298	11,882
Sweden	All Norway	4,800,000	3,804	2008	987	26	755	577	1,262	8,318
	Västerbotten county	257,582	173	2009	93	54	49	90	1,489	2,862
	Norrbottnen county	249,677	162	2009	128	79	88	42	1,541	5,945
	Total	507,259	335	2009	221	133	137	132	1,514	3,842
Finland	All Sweden	9,256,347	8,409	2007	4,300	57	4	900	1,101	10,284
	Lapland	183,963	122	2008	82	67	48	18	1,508	10,220
	Oulu	469,104	327	2008	206	63	237	64	1,435	7,330
	Total	653,067	449	2008	288	64	285	82	1,454	7,964
Russia	all Finland	5,326,314	4,140	2008	2,060	50	2,006	841	1,287	6,333
	Murmansk oblast	892,534	No data				No data	No data		
	Republic of Karelia	716,281	384	2009	264	69	4	47	1,865	15,240
	Arkhangelsk oblast	1,336,539	583	2008	583	100	0	140	2,292	9,547
Nenets autonomous area (Murmansk)	Republic of Komi	1,018,674	372	2009	372	100	4	119	2,738	8,560
	Total (without Murmansk)	4,006,051	1,357	2008	18	100	0	3	2,335	14,008
	All Russia	142,000,000	81,400	2004	67,200	83	200	19	2,536	7,358

on various aspects of access to and use of dental services (e.g., having visited a dentist, stomatologists, dental doctor or dental hygienist during a year) and on oral health (mean DMFT values and proportions of caries-free 12-year-olds and edentulous adults) was collected predominantly from national statistics, government reports and national publications. This was supplemented by requests sent to local chief dental managers in the Barents provinces or territories by e-mail, regular mail or telephone. Questions e-mailed or mailed to the local managers during autumn 2009 and spring 2010 followed the outline in Tables I and II. National data were validated by the papers written by authors of the relevant country by cross-checking their data with older data or other available national reports and also by contacting authorities, university teachers and professional organizations by phone calls and e-mails to resolve ambiguous information.

Table II. Information on dental health in the Barents region.

Country	County or territory	12-year-old DMFT Mean	12-year-olds Caries-free %	Year %	Edentulous adults	Year
Norway	Nordland county	1.5	45	2008	No data	
	Troms county	1.7	42	2008	No data	
	Finmark county	2.1	34	2008	No data	
	All Norway	1.4	48	2008	2	2009
Sweden	Västerbotten county	0.8	62	2008	11	2002
	Norrbotten county	0.9	61	2009	No data	
	All Sweden	0.9	61	2008	3	2005
Finland	Lapland	0.7-2.6*	45	2006	22	2000
	Oulu	0.8-2.1*	38	2006	22	2000
	All Finland	1.2	43	2003	15	2000
Russia	Murmansk oblast	3.0	26	2007	No data	
	Republic of Karelia	2.6	25	2007	12	2007
	Arkhangelsk oblast	3.0	16	2007	31	2007
	Republic of Komi	4.0	11	2007	15	2007
	Nenets autonomic area	3.2	24	2007	50	2007
	All Russia	2.5	27	2007	15	2007

* In Finland there were no provincial DMFT mean values available, thus the range of municipal mean values is presented.

RESULTS

Oral health care provision systems

Norway

Most dentists in Norway work in the private sector (Table I). Nineteen county councils are responsible for planning and organizing public dental services. The Public Dental Service (PDS) was first established in the north of Norway in 1947 because of a shortage of dentists. For a period of time the PDS was responsible for the whole population in that area. Today, dental care provided by the PDS is restricted to children and special needs groups and most adults are expected to use and pay for private services. The PDS offers free treatment for children up to 19 years of age but parents have to contribute to the cost of orthodontic care. Young people aged between 19 and 20 years also have access to the PDS but pay a low fee. Mentally disabled adults, elderly residents in nursing homes, persons receiving

systematic nursing services at home and some other special needs groups, such as recipients of social welfare assistance, unemployed people and refugees (based on local decisions), also have free PDS care. In addition, a small number of other adults, mostly in rural areas, are offered care and pay a fee set by the county government.

In the two northernmost counties of Nordland and Finnmark, there were fewer dentists than the Norwegian average but in Troms there were more (9). Half of the dentists there worked in the PDS and half in private practice, which means that there were proportionately fewer private dentists (Table I). There were also fewer dental specialists than in the southern parts of the country. The number of vacant positions for public dentists in north Norway was higher (20%) than in central (11%) or southern Norway (5%) (10). Turnover of public dentists has been great because many recent graduates have chosen to work in the north for a while

before moving to other parts of the country (11). The number of dental hygienists was higher in the north (0.3 per 1,000 inhabitants) than the national average (0.16:1,000). Organizing emergency services and oral medical treatments at hospitals has also been a problem (12).

Sweden

Slightly more than half of Swedish dentists (4,300) work in the public sector and slightly fewer than half (3,300) work in the private sector. Some 2,500 dental hygienists support their work (Table I). Most dentists work in the bigger cities and in the central and southern parts of the country, and there is a lack of dentists in the north (13). Since 1938, local county councils have been responsible for organizing the public services and, since 1974, a national dental insurance program has covered all inhabitants from the age of 20 years and over, with the aim of making dental care financially accessible to all citizens. At present, the PDS offers systematic, free dental care to all children up to the age of 20 years and dental care for adults is provided if it is considered "appropriate and necessary" (14). The PDS is responsible for specialist dental treatments for the whole population. For certain special needs groups, there are special arrangements made by the PDS. Persons with severe illnesses are offered dental treatment as part of their medical treatments. In all of Sweden in 2008, 33,500 persons were treated under this scheme. Furthermore, 165,000 persons living in institutions or having medical treatments at home were offered free, outreach dental examinations. Of these, about 65% received "necessary dental treatment" that was invoiced as general health care (14).

The participation rates in Västerbotten and Norrbotten in the latter scheme were slightly higher than in the country on average (15).

Finland

Half of the active dentists in Finland are employed by the PDS, which started as a school dental care program in 1956 and, since 1972, has offered services for younger adults. Slightly fewer than half (43%) the dentists are in private practice, and the remainder work in universities, hospitals, the armed forces, and so on. There are about 1,760 dental hygienists, of whom 60% are estimated to work in the public sector, and 840 dental technicians, almost all of whom work in the private sector. Of these, about a third are clinical dental technicians (denturists) providing prosthetic treatment to edentulous patients (16). Public dental services are available all over the country in health centres run by municipalities alone or in collaboration with neighbouring municipalities. Children and adolescents under 18 years of age are offered regular dental examinations, preventive and necessary restorative and orthodontic treatment free of charge. Adults pay fixed fees set by the central government. Before 2002, dental care in the PDS was restricted to younger adults, special needs groups and some elderly, such as veterans of the Second World War. In 2001–2002, the dental care provision system was reformed and the age limits restricting adults using the PDS were abolished. Reimbursement of private dental care (excluding prosthetic treatment) from the National Health Insurance system was also extended to cover all adult age groups. About 60% of the private practitioners in Finland work in the 10 biggest cities. Only 1 of these, Oulu, is situated in the

Barents region. In the Finnish Barents region, the ratio of inhabitants to a dentist is higher and the PDS plays a greater role than in the other parts of the country (17).

Russia

Traditionally, dental professionals in the Russian Federation consisted of “stomatologists,” “dental doctors” and nurses. Stomatologists are required to study for 5 years before becoming a “medical doctor of stomatology.” “Dental doctors” have a shorter period of study (2 years and 10 months) and are allowed to provide basic dental care. Even though most schools no longer educate dental doctors, almost 30% of dental professionals still have this diploma. Nurses are educated as general nurses or have undergone on-the-job training. In 2004, the total number of active stomatologists and dental doctors was about 81,400. Of these, 67,200 (46,877 stomatologists and 20,304 dental doctors; 82.5%) were employed by the public sector and worked for local, regional or federal authorities, and 14,200 (17.5%) worked in the private sector (18). In addition, a number of salaried dentists worked in hospitals, the armed forces, mental institutions and prisons. A great majority of the stomatologists employed by the state had received special training. In 2008, 4,267 stomatologists were specialists in paediatric dentistry (9%); 18,684 in restorative dentistry (40%); 4,757 in oral surgery (10%); 8,053 in prosthetics (17%); and 1,858 in orthodontics (4%); while 9,258 (20%) had no specialization (19). The number of dental technicians working for the state was 19,308 in 2004 (18). There is no information on dental technicians working privately.

Up until 1991, during the Soviet era and

in the early years of the Russian Federation, the health care system was highly centralized, hierarchical and provided by high numbers of specialist doctors. The system was under-financed. Oral health care was in a similar situation. Due to a lack of dental personnel, materials and equipment, dental services were offered mostly for patients with acute needs (toothache or decay) (23). Today, dental care is free for children up to the age of 16 years and for the elderly living either in nursing homes or in their own homes with social support. By law, all other adults have the right to some care in the public dental service. Treatment offered varies from region to region but usually includes oral surgery, restorative and some prosthetic treatment. In practice, many adults have to seek dental care from the private sector. Costs of private dental care are not refundable but can be tax deductible.

Most oral health care is provided in polyclinics or departments of general medical clinics staffed by salaried public stomatologists and located close to the patients residences, schools or workplaces. There are 5,484 small (1-2 stomatologists) and 833 large state-owned public dental clinics. Of these, 545 are associated with universities and academies, 4,476 are close to schools and 246 at state factories. Until the 1990s, school-based dental units played an important role in the prevention and treatment of dental diseases among children. During the transition period, reduced financial state support resulted in the closure of approximately 40% of the school clinics, which limited the continuity of preventive programs (18).

Private dentistry is expanding in Russia. In cities with more than 500,000 inhabitants there are more than 100 private dental clinics.

In Moscow and St. Petersburg more than 800 private dental clinics exist. In these cities, almost 50% of dental care for adults is provided privately (18). There were some private dental services in all areas of the Barents region mostly because a number of the public stomatologists also worked privately (Table I). In Arkhangelsk, the number of private clinics was high because of proximity to Arkhangelsk Medical University (18).

In Sweden and Russia, dental specialist services were provided mainly by the PDS, in Norway mainly by the private sector and, in Finland, specialist care was provided both publicly and privately. In all countries, the most advanced specialist care in oral medicine was provided at hospitals.

Education of dentists

There are 3 universities educating dentists in Norway, 4 in Sweden, and 3 in Finland; there are 47 in Russia (18) that have faculties and departments to educate stomatologists. A fourth university in Finland reopened its dental education program in the autumn of 2010. Four universities with dental schools are situated in the Barents region. The Institute of Clinical Dentistry in Tromsø in Norway opened in 2004, the Department of Odontology at the University of Umeå in Sweden has existed since 1956, the University of Oulu in Finland since 1973 and the Dental Faculty at the Northern State Medical University (Arkhangelsk) opened in 1958. In addition, there are schools for dental hygienists in Tromsø, Umeå and Oulu. In some regions of the Russian Federation, a small number of dental hygienists has been trained since 2001, but their overall contribution to dental care has so far been negligible.

Use of services

In Norway, children's up-take of services was about 70% in 2008, and about 97% of those between 1 and 19 years had been seen (covered) during a 2-year period (6). Use of dental services among the special needs groups was 73% in northern Norway and 66% in Norway on average, and 90% were on recall lists (9). In northern Norway, about 9% of the "normal" adult population received dental care in the PDS in 2008 and, in southern Norway, 6% received care (9). A questionnaire survey in 2004 (20) revealed that 78% of the adults had visited a dentist during the previous year and 87% during the previous 2 years.

In Sweden 50% of the population was treated by private dentists and 42% by the PDS. In 2003, 85% of those aged 20 to 85 years had visited a dentist or a dental hygienist at least every second year (21). There were no regional differences overall in adult use of dental services, but in the 2 northernmost counties almost twice as many individuals obtained dental care through the PDS than through private practices (14).

In Finland, participation in public dental services is high among schoolchildren, with only 1% using private services. Due to individualized recall intervals, 75% of those younger than 18 years visited a dentist or a dental hygienist in 2008. There were no regional variations in this proportion. That same year, the PDS treated 21% and private dentists 20% of the adults. The elderly used dental services less often than younger adults. In the Finnish Barents region, 22% of the adult population had used the PDS and 17% had used private services (17).

In Russia, it is estimated that practically all children and adolescents used public dental

services in 2007 (22). Only 15% of the children received dental care at school-based clinics (22) and most preventive programs were run by companies selling toothpaste and dental products – though in collaboration with dental professionals. Such programs covered slightly fewer than half (44%) of the children and adolescents (18). A study from Pitkäranta district in Karelia in the mid-1990s reported that 53% of the 15-year-olds had visited a stomatologist or a dental doctor during the previous 12 months, 43% during the last 2 to 3 years and the rest more seldom, indicating problems in accessing dental care (23). It is estimated that 80% of the adult population obtained dental care through the PDS (18).

Treatment needs

National mean values of caries-free 12-year-olds and mean DMFT-indexes (9,24,25) showed considerably better oral health in the Nordic countries than in Russia (26) (Table II). Children in the north of Norway had more caries experience than the children in other parts of the country. This was also true of Finland, where only municipal information could be found in the north, but the difference was smaller. In Sweden, no regional differences were found. In Russia, children had clearly more caries in the Barents region than in the Federation on average (Table II).

Local and national studies from the Nordic countries indicated great improvements in the dental health of working aged adults during the past 20–30 years; adults retained more teeth, had fewer carious teeth and more fillings than before (27,28). Edentulousness in adults was more common in Finland than in Norway and Sweden (Table II). According

to a clinical study in Norway, edentulousness among the elderly (persons 67 years and older) was considerably more common in northern Norway (67%) than in central Norway (39%) or in southern Norway (11%) (29). The situation was similar in northern Sweden where 11% of the elderly (65 years and older) had lost all their teeth compared with 3% on average in Sweden (15,21). In Finland, a national clinical study showed that edentulousness was more common in northern (22%) than in southern Finland (10%). In the age group 65+ years, 44% were edentulous, in northern Finland 64% and in southern Finland 37% (28). Results from a recent national study in Russia (26) showed that the average edentulousness was on the same level as in Finland and that edentulousness was more common in the Barents region (Table II).

Costs and financing of dental care

In Norway, dental care cost €1,161 million in 2008 (30). The major part of dental care costs (78%) is paid directly by the patients (31). The PDS is financed by patient fees, general and local taxation and, to a small extent, by national health insurance reimbursements for some specialist treatments. In Sweden, the total cost for dental care was €1,944 million in 2008 (Socialstyrelsen, Stockholm. Personal communication). Children's dental care is financed solely by local taxation. The dental insurance is financed by general and local taxation and patient fees. The total cost of dental care for the special needs groups was €78 million in 2008 (32). Adults are requested to pay their dental care costs up to €308. When the costs exceed this self-risk-payment, the national dental insurance reimburses 50% of the costs. When the costs are higher than

€1,540 the reimbursement is 85%. In Finland, €974.9 million was used on dental care in 2008 (33). In the PDS, patient fees for adults are fixed and heavily subsidised and, in the private sector, pricing is unregulated. To reimburse basic treatments in the private sector, the National Insurance Institute (NHI) uses a fee schedule which is lower than the fees actually charged (16). The PDS is financed by a combination of national and local tax revenues and patient fees. NHI is financed by contributions from employers, employees and central funds (general taxation). In the PDS, patients pay on average 23% of the costs and in private care 68% plus all costs of prosthetic treatments (16).

In Russia, no information could be found out about the costs of dental care because it is included in the total costs of health care. Dental care is financed through obligatory medical insurance and national, regional and municipal budgets (tax revenues) according to an annually updated program. Specialized dental care is provided through dental hospitals and departments in general medical hospitals and is funded directly by the state.

The GNP used on health care in Norway was 8.9%; in Sweden, 9.2%; in Finland, 8.2%; and in Russia, 3.7%. The GNP used on dental care in Norway was 0.5%; in Finland, 0.4%; and in Sweden, 0.7%; in Russia, this proportion must be much smaller. Of the total costs of dental care, the greatest part was spent in the private sector (Norway, 77%; Finland, 60%; and Sweden, 63%), but in Russia this was estimated to be just 30% (34).

DISCUSSION

Our study shows that, although it was relatively easy to provide a general description of the oral health care provision systems in Norway, Sweden, Finland and Russia, it was much more difficult to find out how the systems worked in real life. Also, finding information about the access to and utilization of dental care was arduous. This was especially true in some of the Russian territories. We also had difficulties interpreting and validating some of the data we found. For example, counting the numbers of stomatologists in Russia was difficult because there may be some double registration of those working both in the public and private sectors. It is also possible that not all dental doctors were included. Equal access to health care is a politically important concept in all the countries studied, but there were no good systems in place in any of the countries for monitoring the performance of the oral health care provision system, nor could we determine if oral health care was accessed according to need (equity). So far, there are aren't any good systems in place for gathering standardized data for oral health care provision in Europe, which is a result of cultural differences and different traditions. Thus, we had to use rather crude indicators such as workforce numbers, decentralization of dental schools (educating dentists outside capital cities), information on use of services and financing. We also found that there was little information on the dental health of the adult populations. This ignorance indicates that oral health care is not a high priority in health politics, although it concerns all citizens and is costly. For this report, we endeavoured to find the best available data and we

believe that collectively the data we present are sufficiently robust to identify the main features in the care provision systems and to allow crude comparisons.

Our study showed that, in all countries studied, the PDS provided oral health care for children and adolescents free of charge. Adults belonging to special needs groups were offered various benefits in all countries. Except in Norway, all adults had access to care through the PDS, which was subsidized in Sweden and Finland and free of charge in Russia, except for prosthetic materials. Although dental care in Russia was meant to be part of the general health care, the low workforce numbers and regional restrictions in the supply of dental services meant that access to such care was probably not always satisfactory. In northern Norway, because of a long-standing shortage of dentists in the PDS and few private practitioners, access to care was also poor.

It was obvious from our study that the PDS was the main dental care provider in the Barents region. The apparent freedom of choice between public and private dental services was fairly irrelevant since there were few private practitioners. Overall, there was a huge difference in the inhabitant-to-dentist ratios between the Nordic countries and Russia. In the Nordic countries, numbers of dentists have long been high in comparison with other EU member states (7). Economic differences between Russia and the Nordic countries and the generally bad health situation in Russia were certainly the most important explanations for this (3,6,35). Furthermore, it was obvious there were fewer dentists and poorer access to care especially for adults in the Barents region than on average in each

of the studied countries, which is in agreement with our hypothesis. The trend seems to be that dentists educated in southern Norway, even those originally from the north, tend to stay in the south after graduation (11). To counteract this trend, dental education has been recently started in Tromsø, Norway. Almost all graduates from the new dental school in Tromsø have remained in the north of Norway. According to the local chief dental managers in the Barents region with whom we have been in contact, the universities of Umeå, Oulu and Arkhangelsk are an important source of dentists for their regions. Dental training in St. Petersburg serves Karelia, but Nenets and Komi are less well served in this respect. In these regions, financial contracts between the local PDS and students encourage return of local graduates.

In the Nordic countries, there have been goal-directed attempts to increase team work in dentistry, and high numbers of dental hygienists have been trained in order to make oral health care more efficient and cost-efficient. The number of hygienists in these countries is among the highest in Europe (36). Surprisingly, when many wealthy countries in Europe are discussing team work and cost-efficiency and starting to educate dental therapists (hygienists who do fillings), Russia, with major economic problems and major general health problems, has ceased training "dental doctors" whose education is of similar duration to that of dental therapists. The explanation may well be that pay differentials between people with high and low levels of education are still small in Russia, removing the incentive to encourage the training of dental doctors. In addition, the numbers of dental technicians were lower in the Barents

region than in the host countries and generally lower than in the EU (7).

In Russia, the health care system was undergoing a major reform and there were plans to guarantee a national minimum level of oral health care for the population throughout the Federation. It is planned that the minimum level of care will include regular examinations, preventive and restorative care and some orthodontic treatment for children. For adults, emergency care, basic restorative treatment and specialized oral medical care at hospitals will be included. Furthermore, the plans include a 3-level hierarchical organization of services. Monitoring the oral health of the population and the organization of continuing education for dental personnel will be included in the plans. In remote and sparsely populated regions, mobile dental clinics have been suggested (37).

In the Nordic countries, there has been a continuing decrease in caries prevalence in children during the past 20–30 years, with a levelling out trend at the turn of this century. The WHO's goal of mean DMFT for 12-year-olds of 1.5 or below before the year 2020 has already been met in the Nordic countries, except in northern Norway. In Russia, children still had more caries and the disease levels were similar to those in the Eastern European countries, which joined the EU in 2004 (7,34). In the Russian Barents regions, the dental treatment needs for children were even higher. The collapse of the school dental care and preventive programs in the 1990s lowered the level of public awareness of self-care in Russia and has resulted in the deterioration of the quality of dental care and dental health among children (18). A study from rural Karelia showed that awareness

of oral health risks and self-care was inadequate even among relatively highly educated people (23). It is also well-known that tooth brushing frequencies among children are lower in Eastern than in Western Europe (38). The higher rate of edentulousness in adults throughout the Barents region reflects history, poor access to care and economic constraints as well as popular attitudes that do not consider teeth and dental appearance to be important. Overall, we formed the impression that the need for dental care was generally higher throughout the Barents region except for northern Sweden. This was especially apparent in the Russian Barents region.

In the Nordic countries, the proportion of GNP used on health care was twice that in Russia. Although costs of dental care not could be separated from health care costs in Russia, it is clear that much less funding was available for dental care there than in the Nordic countries.

Conclusions

Our study indicates that despite the existence of oral health care provision systems in the Barents region, inhabitants in this region had greater difficulty accessing dental services than their compatriots outside the region; the principal causes were lack of dental personnel and economic constraints. Professional cooperation within dentistry should be integral to the Barents region in order to expand the number of dental personnel, improve oral health and increase access to dental care.

Competing interests

The authors declare that they have no competing interests.

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Professor Eeva Widström
 National Institute of Health and Welfare (THL)
 P.O. Box 30
 00271 Helsinki
 FINLAND
 Email: eeva.widstrom@thl.fi