

Supply of doctors to a rural region

## **Supply of doctors to a rural region:**

### **Occupations of Tromsø medical graduates 1979 – 2012**

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## **Abstract**

**Background:** When established in 1973, the aim of the medical school in Tromsø was to improve access to doctors and bring health care up to equitable national standards for the previously underprivileged rural population of Northern Norway. In this study we examine how the aim of supplying doctors to the north has been achieved.

**Material and method:** Utilising a cross-sectional design we have analysed 34 classes of Tromsø medical graduates (1979 – 2012) with regard to occupations in 2013 by year of graduation and by successive pools of cohorts.

**Results:** In 2013 altogether 822 of 1611 doctors (51 %) were working in Northern Norway. The proportions working in the north for old, intermediate and young cohorts were 37 %, 48 % and 60 % respectively.

**Conclusion:** Doctors graduated during recent years tend to start their working careers in the north to a higher degree than doctors graduated in previous periods. Among doctors from the older classes a relatively large minority have their end-careers in Northern Norway, with a noticeable inclination for long term work in primary care. Our results support that the first rural oriented medical education model of Europe established in Tromsø 40 years ago is sustainable, achieving its aims.

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### **Introduction**

In 1968, when the Norwegian Parliament decided to establish a new university in Tromsø, an overarching goal was to raise access to academic education for young people in Northern Norway to an equitable national level. Northern Norway, located around and mainly north of the Arctic Circle, includes about 1/3 of the area and 1/11 of the population of Norway, (474 563 inhabitants in 2013). The population is widely scattered, many living in remote communities.

(Figure 1)

The plan for a new northern medical school, in the 1960ties heavily resisted by the Norwegian medical establishment, turned out to be a decisive political argument in favour of a university in Tromsø. The political aim, embedded in the medical curriculum by the visionary leadership of the founding dean Peter F. Hjort, was to improve access to doctors and bring health care up to equitable national standards for the previously underprivileged rural population of Northern Norway (Medical curriculum - Tromsø 1971; Nordøy 1985). The Tromsø programme was inspired by concurrent international evidence. Particularly influential was the Northwestern Ontario Medical Programme of McMaster University, oriented towards the needs of rural and remote regions in the province of Ontario (Mulloy 2009). In accordance with this programme prioritised admission was given to a share of students from the north. An innovative pedagogical step was introduction of a tutorial year away from campus, involving training in local hospitals and rural general practices all over Northern Norway. These principles constituted Tromsø as the first rural oriented medical education model in Europe more than 40 years ago (Gamnes & Rasmussen 2013; Aaraas & Halvorsen 2014). The first class of medical students enrolled in 1973 was graduated in 1979.

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Three studies, covering succeeding cohorts of Tromsø graduates up to 2001, have shown that from 49 to 56 % of the doctors start their working careers in Northern Norway, and they reside in the north up to ten years after graduation (Forsdahl et al. 1988; Tollan & Magnus 1993; Alexandersen et al. 2004). Among doctors with a northern background the proportions were significantly higher, from 73 to 83 %. This confirmed the so called “salmon effect”: Doctors (like salmons) tend to return to the geographical area (river) where they grew up. This hypothesis, originally suggested by Torstein Bertelsen (Bertelsen 1963), was influential in the struggle for a university and a medical school in Northern Norway in the 1960ties. Since that time, inspired by Tromsø and other pioneer medical schools, evidence about the usefulness of establishing medical education in rural areas has emerged from all over the world (Rabinowitz et al. 2005; Norris et al. 2006; Worley et al. 2008; WONCA Rural Medical Education Guidebook 2014). Programs including pre-graduate and early post-graduate training in rural practices are shown to increase supply of general practitioners to rural and underserved areas (Dunabin et al. 2006; Straume et al. 2010; WHO Global policy recommendations 2010). This paper follows up on the three previous studies tracking early careers of Tromsø graduated doctors up to 2001. Based on a historical material including 34 classes of Tromsø medical graduates from 1979 through 2012, we address the following questions: 1) Do more recently graduated doctors tend to start their working careers in Northern Norway, as previously shown for their colleagues graduated up to 2001? 2) To what degree are doctors from the older classes, graduated from 1979 through 2001, still working in Northern Norway in 2013?

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### **Material and method**

Close to all doctors in Norway (96 %) are members of the Norwegian Medical Association (NMA). The Institute for Studies of the Medical Profession organised under NMA has free access to its membership register when used for descriptive and quality improvement purposes. For this study, an anonymous file of all the 1611 still active doctors who graduated in Tromsø between 1979 and 2012 was compiled with the following variables: gender, year of graduation, geographical working region (Northern Norway or not) and present type of occupation (primary health care, university hospital, other hospital, other type of work). Through a cross-sectional design we have analysed outcomes with regard to occupation in 2013 by utilising different pools of cohorts. Firstly, we compare proportions of doctors working in and outside Northern Norway according to graduation year. Secondly, we have compared occupations for doctors graduated from 1979 through 2001 with those graduated more recently. Thirdly, we present occupation characteristics for three cohorts (old, intermediate and young cohorts) according to rising admission quotas for students from Northern Norway. The admission quotas have been increased over the years from 25 % (1973 - 1978) to 50 % (1979 - 1998) and 60 % (1999 - 2012). The following results are generated through IBM SPSS Statistics 21.

### **Results**

Among the 1611 doctors 822 (51 %) were working in Northern Norway. Figure 1 displays the numbers of doctors at work in 2013 in and outside Northern Norway for each graduation year since 1979. Overall, the curves demonstrate a historical trend of an increasing proportion of doctors retained in Northern Norway from 1979 through 2012. However,

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temporary declines are observed during the years 2000 – 2002 and in 2011.

(Figure 2)

The analysis comparing proportions of doctors in two cohorts, one old for doctors graduated up until 2001 (n=841) and another recent cohort for graduates after 2001 (n=770), showed that respectively 46,0 and 56.5 % were working in Northern Norway .

Table 1 gives an overview of the material characterized by proportions of workforce in Northern Norway, females, and of types of medical work according to cohorts with different admission quotas for medical students from Northern Norway.

(Table 1)

Among northern working doctors graduated in the old classes a particularly high proportion was still engaged in primary health care in 2013 (52.1 %), almost ten per cent above the overall proportion shown in table 1 (42.5 %). Also, for classes belonging to the young cohorts the proportion in primary health care was higher among doctors working in Northern Norway (36.4 %) than for all doctors (33.5 %). For doctors working in Northern Norway belonging to the intermediate cohorts a notable finding was a high proportion employed at the university hospital, clearly above the overall proportion (52.4 % vs. 42.4 %).

Table 1 also indicates that the overall proportions of female doctors and proportions of doctors working in the north have increased at a fairly similar rate over the years. Calculated for the young cohorts with the highest share of female doctors, the proportions working in the north were close to equal for the two sexes, 59.3 and 60.2 % for female vs. male doctors respectively.

## Discussion

A main finding of this study is that 51 % of doctors graduated in Tromsø from 1979 through 2012 were still working in Northern Norway in 2013. Taking all graduates into account, independently of geographical region of origin, this proportion corresponds well with results from previous studies covering up to ten years after graduation (Forsdahl et al. 1988; Tollan & Magnus 1993; Alexandersen et al. 2004). For young cohorts, including students admitted to the school after 1998 (graduated after 2004), the proportion of doctors at work in the north was 59.7 % (Table 1). This was 10 % above results for the first five classes graduated from 1979 through 1984, when they were tracked five years after graduation (Forsdahl et al. 1988).

### *Study limitations and salmon effect*

The cross-sectional design of the study with principally unequal outcomes in different cohorts (early, intermediate and late careers) does not allow for causal inferences or interpretations based on statistical comparisons between the groups. Factors not studied, which most likely have contributed to decisions about settling and careers, are social and professional influences within and across classes, official regulations and changes in the labour market. For example the temporary reduction in proportion of northern workforce among doctors graduated from 2000 through 2002 (Fig. 1) might reflect a strategic movement out of Northern Norway due to insecurity during the introduction period of the new patient list system. In the following years, when the positive aspects of the system became clear, the trend again changed in favour of careers in Northern Norway. Similarly, the drop among 2011-graduates might be associated with strategic concerns, now related to

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revision of the national employment system for young doctors in internship. Regrettably, historical data about individual doctors' geographical origin were not preserved in the university archives in 2013. Due to this we were unable to analyse the salmon effect directly as done in the three previous studies. However, our group based analytical approach indirectly supports a sustaining effect, since raised admission quotas for students with a northern background are associated with increased proportions of doctors working in Northern Norway (Table 1).

## *Academy and global trend*

Since around 1990, the global trend towards specialisation and urbanisation has had major a counterproductive effect on settling and living in rural areas worldwide. Northern Norway is one example. Since 1990 the population of Norway has increased with 818 000 while the population of Northern Norway has increased with scarcely 14 300. This indicates a great movement of people out of rural areas, some towards northern cities like Tromsø, more towards southern parts of Norway. In this situation the 822 Tromsø doctors working in the north in 2013, on average one doctor per 577 inhabitants, make a significant contribution to medical development and health care for the population of Northern Norway. Obviously, a sustaining impact of rural medical schools on health care for people in their regions is dependent on maintenance of the medical school itself. Attracting academics for research and teaching purposes is crucial. The high proportion of doctors employed at the university hospital of Northern Norway shows that this has been accomplished to a large extent. In addition the rural oriented curriculum with ample clinical training away from campus implies that many of the northern doctors working in local hospitals and in primary care outside Tromsø are affiliated with the university as part time academics. Together with student



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selection strategies, distributed non- metropolitan medical education may be a powerful strategy for recruitment and retention in rural areas (Sen Gupta et al. 2014). A particular success for the medical school in Tromsø has been the recurring population health studies, launched in 1974 and still proceeding (Jacobsen et al. 2012). This has stimulated to continuous fruitful research activity attracting doctors and scientists nationally and internationally to the north, countering the global centralization trend. Moreover the studies have engaged people and health workers in local communities and probably contributed to public health promotion. Official data has shown gradually improving health indicators for the population of Northern Norway during the last 40 years (Statistics Norway 2009), as also recently documented in an international publication (Aaraas & Halvorsen 2014).

## *Faculty development*

Faculty development, sustainability and health care improvements as described above are supported by further initiatives related to education and research. Over the years the original faculty of medicine has widened its scope and merged into “The Faculty of Health Science”. Today, the faculty incorporates a series of health education programmes, among them psychology, physiotherapy, occupational therapy, nursing, bioengineering, radiography, and odontology. Several programmes have decentralised modules and are particularly designed to attract students from northern counties. It is evident that this has contributed to recruitment and retention of a manifold of health professions to Northern Norway (Jensen 2008).

## *Decrease in northern employment with time*

Compared to previous findings of high northern employments of doctors in the early stages

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of careers, our material suggests a gradual move out of Northern Norway with time. This is apparent for the oldest classes with the lowest share of doctors with a northern background (Table 1). Compared to the evaluation after five years (Forsdahl et al. 1988), the percentage working in the north up to 34 years after graduation has decreased from 49,1 to 36.8 %. A flux out of the region for end-careers in this oldest group of doctors is not surprising, as most of them have their background from the southern part of the country. Still the proportion working in the north is well above the 25 % northern admission quotas for the actual classes. This may indicate a long term retaining effect of a medical education model fostering early co-operation and familiarity with local health care systems. In support of this is also the persistent, relatively high proportion working in the north among intermediate and later graduated classes in comparison to previous studies (Tollan & Magnus 1993; Alexandersen et al. 2004).

### *Work in primary care*

A noteworthy finding among doctors in the first graduated classes is the high proportion of long term retention in primary health care in the north (52.1 %). This finding, along with reduction in primary care work in the intermediate cohorts, and then again a rising tendency in recent years, may partially be due to professional and political trends combined with organising reforms of the different periods. A green wave with positive attitudes towards primary care work in the early 1980ties was gradually replaced by a more specialist oriented era. In recent years this has been partially outweighed by adjustment to a new patient list system with improved conditions for work in primary care and general practice. The proportion choosing careers in primary health care has traditionally been high among Tromsø graduated doctors. Still in 2013, the proportions of Tromsø graduates working in primary practice in the country as a whole, respectively 42.5 %, 27.5 % and 33.5 % for three

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cohorts analysed in this study (Table 1), are all substantially above the national average of 23 % (Norwegian Medical Association 2013).

## Conclusion

Tromsø-doctors graduated during recent years tend to start their working careers in the north to a higher degree than doctors graduated in previous periods. Among doctors from the older classes a relatively large minority have their end-careers in Northern Norway, with a noticeable inclination for long term work in primary care. Our results support that the first rural oriented medical education model of Europe established in Tromsø 40 years ago is sustainable, achieving its aims.

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### Practice points

- As a pioneer rural education model in Europe, the medical school of Tromsø has contributed substantially to bring health care up to equitable national standards for people in Northern Norway.
- Successful recruitment and retention of doctors and allied health personnel for work in rural areas is supported by education programs engaging communities and personnel in primary health care as trusted partners.
- Since 1974, continuing population health studies has attracted doctors and scientists nationally and internationally for living and long term work in Tromsø and the arctic area of Norway.

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### **Declaration of interest**

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the article.

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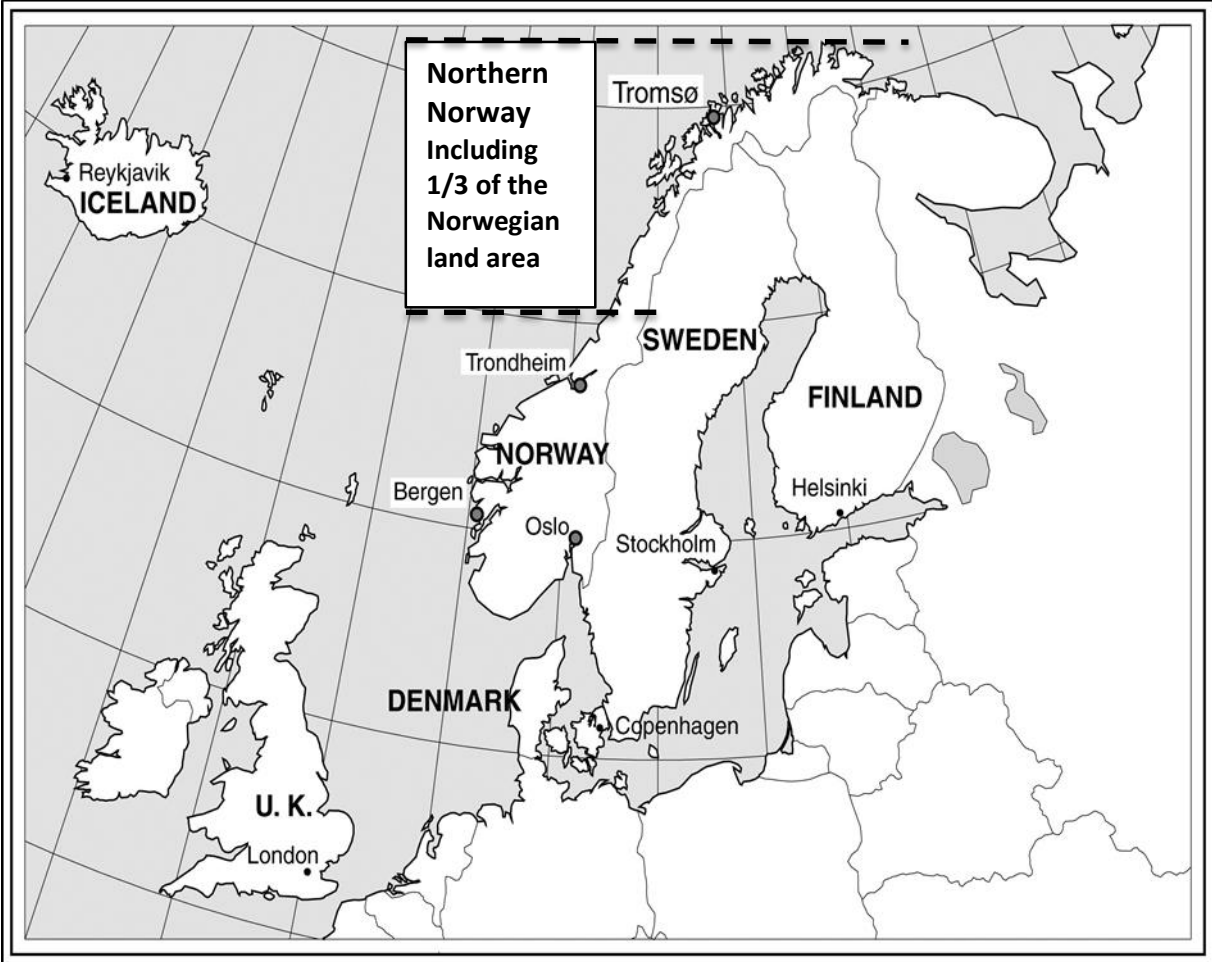
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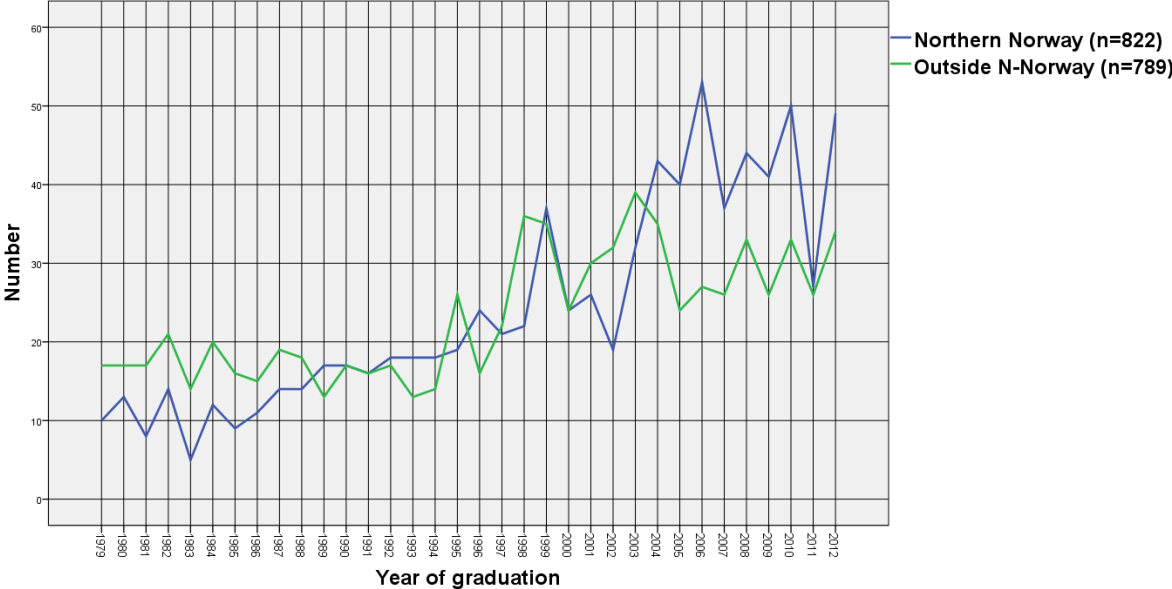


Figure 1 Map showing the location of Northern Norway in Northern Europe



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**Figure 2.** Number of doctors educated in Tromsø 1979-2012, working in and outside Northern Norway in 2013 by year of graduation



**Table 1.** Doctors graduated in Tromsø 1979 – 2012 in active work 2013. Proportions of workforce in Northern Norway, females and type of medical work according to cohorts with different admission quotas for northern student applicants

<b>Occupational characteristics</b>	<b>Old cohorts</b> Northern quota 25 %; admissions 1973-1978 <b>n = 193</b>	<b>Intermediate cohorts</b> Northern quota 50 %; admissions 1979-1998 <b>n = 847</b>	<b>Young cohorts</b> Northern quota 60 %; admissions after 1998 <b>n = 571</b>
Work in Northern Norway	36.8 %	48.4 %	59.7 %
Female	34.7 %	52.5 %	61.6 %
Type of medical work			
• Primary health care	42.5 %	27.5 %	33.5 %
• University hospital	24.9 %	42.4 %	34.2 %
• Other hospital	17.1 %	23.1 %	30.5 %
• Other type of work	15.5 %	7.0 %	1.9 %