# Travel time and distances to Norwegian out-of-hours casualty clinics

**BACKGROUND** Geographical factors have an impact on the utilisation of out-of-hours services. In this study we have investigated the travel distance to out-of-hours casualty clinics in Norwegian municipalities in 2011 and the number of municipalities covered by the proposed recommendations for secondary on-call arrangements due to long distances.

**MATERIAL AND METHOD** We estimated the average maximum travel times and distances in Norwegian municipalities using a postcode-based method. Separate analyses were performed for municipalities with a single, permanently located casualty clinic. Altogether 417 out of 430 municipalities were included. We present the median value of the maximum travel times and distances for the included municipalities.

**RESULTS** The median maximum average travel distance for the municipalities was 19 km. The median maximum average travel time was 22 minutes. In 40 of the municipalities (10 %) the median maximum average travel time exceeded 60 minutes, and in 97 municipalities (23 %) the median maximum average travel time exceeded 40 minutes. The population of these groups comprised 2 % and 5 % of the country's total population respectively. In municipalities that had a permanently located casualty clinic (n = 316), the median average travel time was 16 minutes and the median average travel distance was 13 kilometres.

**INTERPRETATION** In many municipalities, the inhabitants have a long average journey to out-of-hours emergency health services, but seen as a whole, the inhabitants of these municipalities account for a very small proportion of the Norwegian population. The results indicate that the proposed recommendations for secondary on-call duty based on long distances apply to only a small number of inhabitants. The recommendations should therefore be adjusted and reformulated to become more relevant.

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*e-tabs 7 and 8 are found in the electronic issue of the Journal of the Norwegian Medical Association.*

**MAIN MESSAGE**

**Many municipalities with few inhabitants have long travel distances to out-of-hours casualty clinics.**

**The median value of the maximum average travel times for the municipalities was 22 minutes.**

Out-of-hours (OOH) emergency health services in Norway are changing. A growing number of municipalities find it difficult to maintain local out-of-hours services and therefore seek to establish inter-municipal collaboration. The on-call burden on GPs will be lessened, which may render positions in general practice more attractive. Many also claim that the services provided will be of a higher professional quality, medically as well as administratively, if municipalities choose to collaborate.

Larger OOH districts inevitably leads to longer travel distances to casualty clinics for many inhabitants. This often contributes to local opposition to a centralisation of such services. We have previously found that increasing distances are strongly associated with a reduced use of OOH services. The frequency of the most acute cases also declines with increasing distances.

In a study of the activity at the inter-municipal casualty clinic in Arendal, the consultation frequency declined by 1.6 % on average for each kilometre of added travel distance. There was also a significant drop in the number of home visits and ambulance call-outs per inhabitant as distances increased (1). These findings were confirmed by another study that examined six other OOH services (2). This emphasises the need for secondary on-call and other compensatory measures to provide the entire population with necessary access to emergency medical assistance, and a doctor around the clock in the OOH districts where the travel distances are longest. In this context, «secondary on-call» refers to doctors who are on standby on the *periphery* of the OOH district because of the long distances involved.

This article presents an analysis of maximum average travel times by car and travel distances to the OOH services for the population of Norwegian municipalities, as well as an overview of travel distances in those municipalities that have a single permanent casualty clinic. In addition, we have identified the proportion of municipalities and their inhabitants whose travel distances are so long that in light of previous findings we may assume a lower than expected use of OOH services. We have also estimated the number of municipalities and inhabitants that, according to the proposed recommendations, may be in need of secondary on-call arrangements because of long distances.

## Material and method

*Sample and variables*

The organisation of OOH services varies significantly from one municipality to the next (3). Most municipalities maintain

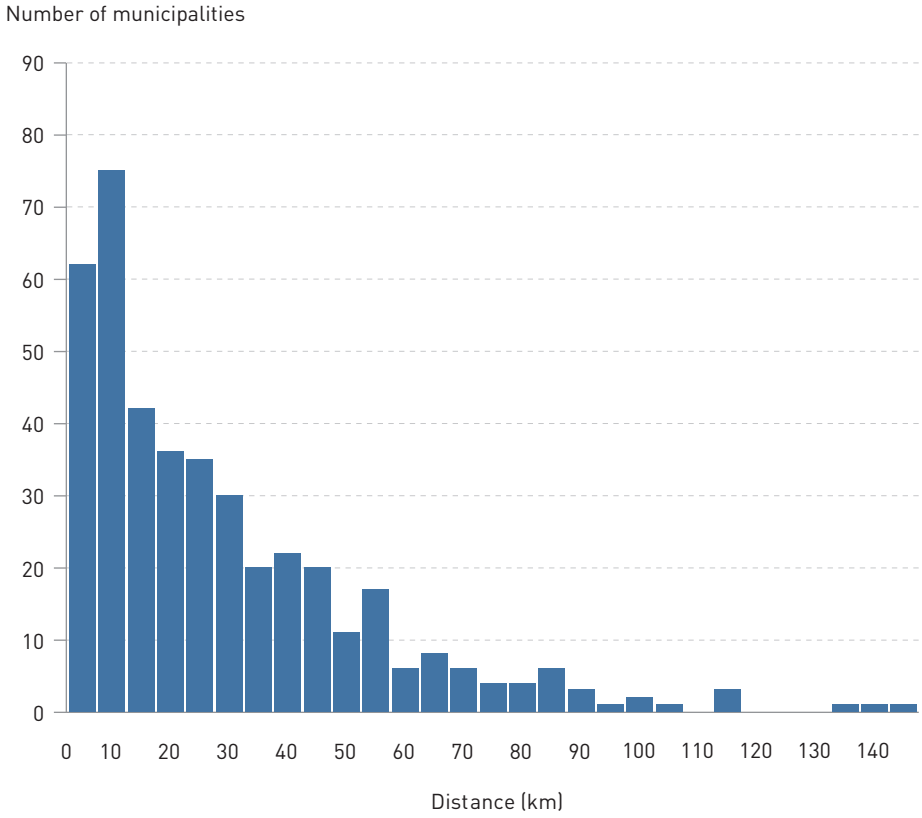


**Figure 1** *Histogram showing the distribution of maximum average travel distances for the municipalities included. Intervals of 5 km (N = 417)*

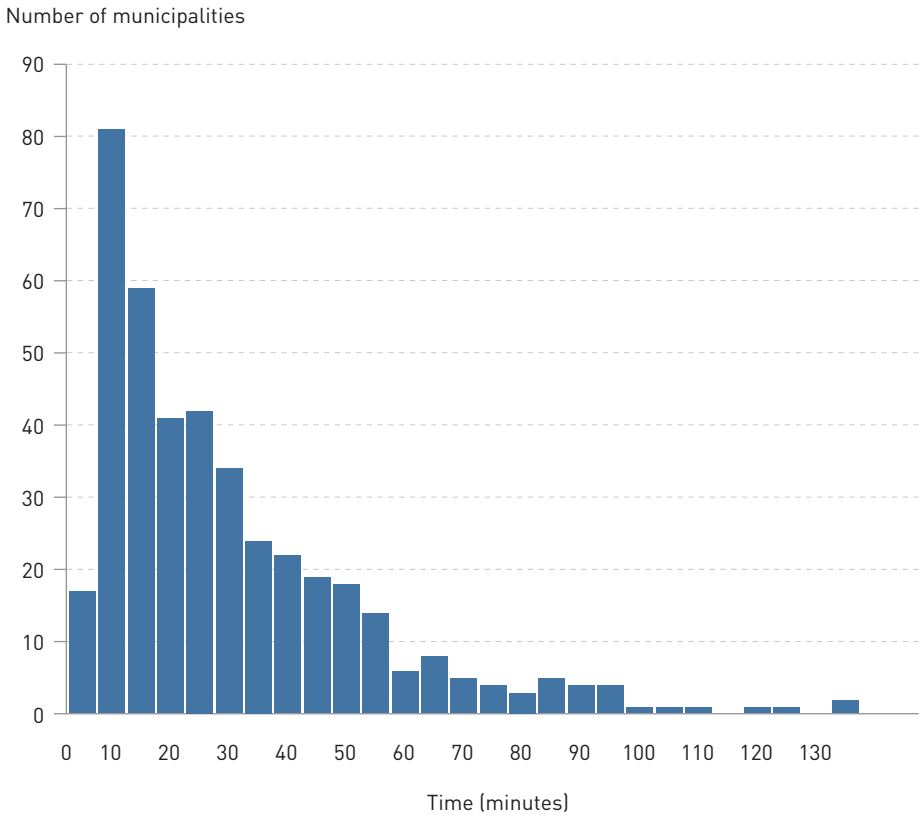


**Figure 2** *Histogram showing the distribution of maximum average travel times for the municipalities included. Intervals of 5 minutes (N = 417)*

emergency medical arrangements in the form of a single permanent casualty clinic, located in their own or another municipality and open in the afternoon and evening, at night or weekends. Inhabitants in these municipalities will have the same distance to the casualty clinic at all times, and it is possible as well as relevant to calculate average travel times and distances.

In the remaining municipalities the location of the OOH casualty clinic will vary. For some inter-municipal on-call arrangements the location will vary according to the municipality that provides the doctor (mutual inter-municipal OOH services). In many other cases, most of the OOH activity is handled locally in the afternoons and evenings and in the daytime during weekends, while at night it will often be centralised to a larger casualty clinic in another municipality which stays open throughout the night.

A number of additional variants do not involve a permanently located casualty clinic. A few municipalities have more than one casualty clinic at several locations for different parts of the day. In municipalities where the location of the emergency medical services is not fixed, it is impossible to estimate average travel times and distances for the inhabitants as a whole, but the average travel time and distance to the OOH casualty clinic that is located furthest away can be estimated.

As we see it, the maximum average travel time and distance to the OOH casualty clinic in a given municipality will be especially relevant for assessments of preparedness, and is a main outcome measure in this study. Average travel time for the municipalities with a single permanent casualty clinic is another main outcome. For municipalities, maximum average travel time is identical to the average travel time.

The secondary outcome measures include municipalities with more than 15 kilometres, 40 minutes and 60 minutes median maximum average journey. In addition, we analysed the population size of these municipalities. We defined distances of more than 15 km as being associated with a sufficient reduction in the use of OOH services that it could have practical implications. At a distance of 15 km the estimated rate of contact is 12.6 % less and the consultation rate is 21.3 % less than the highest theoretical rates (at 0 km) (1).

In a proposal for a national action plan for OOH services in 2009 (4), the National Centre for Emergency Primary Health Care recommended that wherever 8 000–10 000 inhabitants live in a geographically concentrated area and have a travel distance exceeding 40 minutes of driving time, there should always be a secondary on-call scheme in place. For 4 000–5 000 inhabi-

tants, the limit should be 60 minutes. We wanted to investigate how large a proportion of the population would fall within these limits. For practical reasons we regarded each municipality as a single unit, although there are some examples of contiguous population clusters that do not correspond to municipal boundaries.

All municipalities were included in one or more of the analyses, with the exception of municipalities where the primary OOH facility is on board a boat. An overview of the municipalities included in the various analyses is provided in Table 1.

*Method*

Information on the organisation of OOH services and the location of their casualty clinics was retrieved from the National Emergency Primary Health Care Registry (3). This registry is based on information collected in in 2011 with the aid of a web-based questionnaire completed by the heads of the local OOH healthcare services. A subsequent examination revealed a number of inaccuracies in the registry. We therefore double-checked the information through Internet searches and telephone inquiries to the municipal administration in those cases where the calculation of travel distances gave rise to uncertainty as to how the OOH services were organised in 2011. The number of discrepancies from the registry was not recorded.

The average travel times and distances were estimated using a postcode-based method developed by the National Centre for Emergency Primary Health Care (2). An open access database containing coordinates and population figures for all Norwegian postcodes as of 1 January 2011 was used (5). The travel times and distances from each postcode coordinate to the casualty clinic, which were estimated with the aid of Google Maps, were multiplied by the population figure for each postcode. The sums of «population minutes» and «population kilometres» were then divided by the total population figure for each municipality. This yields an average travel time and distance for the local inhabitants in municipalities that have a permanent casualty clinic. For municipalities that provide OOH services in alternating locations we calculated the distance to the casualty clinic located furthest away.

We have previously compared this procedure to several other methods for calculation of distance when the exact address is unknown. The gold standard for the comparison is the average based on the distance from each single address point. The postcode-based method provides more valid estimates of the average travel times and distances than methods based on the population centroid of a given municipality (2).

**Table 1** Included and excluded municipalities by different types of OOH facilities, 2011

| | Number of municipalities | Total population | Median population | Included in analyses of maximum average travel time | Included in analyses of average travel time |
|---|---|---|---|---|---|
| Single permanent location | 316 | 3 455 591 | 5 120 | Yes | Yes |
| Alternating location[1] | 101 | 1 410 261 | 3 008 | Yes | No |
| OOH services by boat | 13 | 36 743 | 2 143 | No | No |
| All | 430 | 4 902 595 | 4 540 | | |

[1] Also including Oslo and Bergen

**Table 2** Maximum average travel times and distances to the casualty clinic for all included municipalities (N = 417) in 2011. Median, 10th and 90th percentiles. For those municipalities that provide OOH services in alternating locations, figures refer to the clinic located furthest away.

| | | Travel time (minutes) | | | Travel distance (km) | | |
|---|---|---|---|---|---|---|---|
| | Number | Median | 10th percentile | 90th percentile | Median | 10th percentile | 90th percentile |
| Northern Norway Regional Health Authority | 86 | 19 | 5 | 63 | 17 | 2 | 60 |
| Central Norway Regional Health Authority | 78 | 25 | 7 | 57 | 22 | 4 | 63 |
| Western Norway Regional Health Authority | 76 | 18 | 7 | 63 | 15 | 5 | 55 |
| South-Eastern Norway Regional Health Authority | 170 | 21 | 11 | 52 | 19 | 5 | 57 |
| **Norway** | **417** | **22** | **7** | **59** | **19** | **4** | **59** |

**Table 3** Average travel times and distances to the casualty clinic for municipalities that have a single permanent OOH casualty clinic (n = 316), 2011. Median, 10th and 90th percentiles

| | | Travel time (minutes) | | | Travel distance (km) | | |
|---|---|---|---|---|---|---|---|
| | Number | Median | 10th percentile | 90th percentile | Median | 10th percentile | 90th percentile |
| Northern Norway Regional Health Authority | 64 | 12 | 4 | 42 | 9 | 2 | 42 |
| Central Norway Regional Health Authority | 56 | 19 | 6 | 50 | 18 | 4 | 53 |
| Western Norway Regional Health Authority | 62 | 16 | 7 | 53 | 13 | 5 | 53 |
| South-Eastern Norway Regional Health Authority | 134 | 18 | 7 | 49 | 15 | 4 | 53 |
| **Norway** | **316** | **16** | **6** | **49** | **13** | **4** | **53** |

**Table 4** Number of municipalities and population in municipalities with a maximum average travel time of more than 40 minutes, 60 minutes and a travel distance of more than 15 km in 2011. For those municipalities that provide OOH services in alternating locations, travel times and distances refer to the casualty clinic located furthest away.

| | | | > 40 minutes | | | | > 60 minutes | | | | > 15 km | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Municipalities | Included population | Municipalities | | Population | | Municipalities | | Population | | Municipalities | | Population | |
| | Number | Number | Number | (%) | Number | (%) | Number | (%) | Number | (%) | Number | (%) | Number | (%) |
| Northern Norway Regional Health Authority | 86 | 464 061 | 24 | (28) | 47 430 | (10) | 10 | (12) | 21 881 | (5) | 45 | (52) | 107 860 | (13) |
| Central Norway Regional Health Authority | 78 | 650 850 | 23 | (30) | 52 354 | (8) | 8 | (10) | 10 053 | (2) | 52 | (67) | 216 980 | (33) |
| Western Norway Regional Health Authority | 76 | 1 010 541 | 18 | (22) | 49 358 | (5) | 9 | (11) | 21 869 | (2) | 41 | (51) | 145 803 | (14) |
| South-Eastern Norway Regional Health Authority | 172 | 2 740 400 | 32 | (19) | 112 305 | (4) | 13 | (8) | 30 688 | (1) | 100 | (58) | 536 575 | (20) |
| **Norway** | **417** | **4 865 852** | **97** | **(23)** | **261 447** | **(5)** | **40** | **(10)** | **84 491** | **(2)** | **238** | **(57)** | **1 007 218** | **(21)** |

**Table 5** Number of municipalities and population in municipalities with a median average travel time of more than 40 minutes, 60 minutes and a travel distance of more than 15 km in 2011. The table includes only municipalities that have a single permanent casualty clinic within the OOH district.

| | | | > 40 minutes | | | | > 60 minutes | | | | > 15 km | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Municipalities | Included population | Municipalities | | Population | | Municipalities | | Population | | Municipalities | | Population | |
| | Number | Number | Number | (%) | Number | (%) | Number | (%) | Number | (%) | Number | (%) | Number | (%) |
| Northern Norway Regional Health Authority | 64 | 407 780 | 9 | (14) | 12 864 | (3) | 3 | (5) | 2 294 | (1) | 23 | (36) | 51 579 | (13) |
| Central Norway Regional Health Authority | 56 | 554 665 | 13 | (23) | 23 763 | (4) | 3 | (5) | 3 001 | (1) | 30 | (54) | 120 795 | (21) |
| Western Norway Regional Health Authority | 62 | 630 727 | 8 | (13) | 21 495 | (3) | 6 | (10) | 11 957 | (2) | 27 | (44) | 92 041 | (15) |
| South-Eastern Norway Regional Health Authority | 134 | 1 862 419 | 19 | (14) | 48 167 | (3) | 9 | (7) | 15 833 | (1) | 67 | (50) | 337 583 | (18) |
| **Norway** | **316** | **3 455 591** | **51** | **(16)** | **106 289** | **(3)** | **21** | **(7)** | **33 085** | **(1)** | **147** | **(47)** | **597 298** | **(17)** |

The calculations were initially made by manually entering the coordinates of each postcode and casualty clinic in Google Maps' website (6) and then processed further. The entries in Google Maps could be made automatically once we had developed a spreadsheet that could retrieve travel distances with the aid of an import XML function (7).

*Statistical methods*

We estimated the median, the 10th and the 90th percentiles for the maximum average and the average travel times and distances for the municipalities included. We also constructed histograms that show the distribution of maximum average travel times and distances for those municipalities. The proportion (%) of municipalities that had more than 15 kilometres maximum average travel distance and 40 and 60 minutes of travel time respectively was estimated. In addition, we estimated the proportion that the inhabitants in these municipalities accounted for of the total number in the municipalities included.

The data are partly presented for Norway as a whole, partly at the level of health regions or according to the type of OOH services provided. Separate, equivalent analyses were undertaken on municipalities that had a single permanent casualty clinic. The data were entered and processed in Microsoft Excel 2010.

## Results

Table 1 provides an overview of the municipalities that were included and excluded. Of

**Table 6** OOH services with alternating location, by type. Population figures and maximum average travel time to OOH casualty clinics. Municipalities that provide OOH services in several alternating locations include the cities of Oslo and Bergen.

| | Number of municipalities | Total population | Median population | Median maximum average travel distance (km) | Median maximum average travel time (minutes) |
|---|---|---|---|---|---|
| Mutual inter-municipal OOH services | 23 | 64 340 | 2 224 | 34 | 33 |
| Centralised night-time OOH services | 43 | 218 527 | 3 171 | 41 | 44 |
| Multiple alternating locations within the municipality | 7 | 943 791 | 32 524 | 11 | 14 |
| Other arrangements | 28 | 182 603 | 2 920 | 38 | 41 |

the 101 municipalities associated with OOH services in alternating locations, 23 had a mutual inter-municipal collaboration, 43 provided centralised night-time OOH services and 28 had other arrangements. Seven municipalities had multiple internal locations, including Oslo and Bergen with their city-district casualty clinics. The population in the excluded municipalities (OOH services by boat) accounted for 0.7 % of the total population in Norway as of 1 January 2011. Altogether 73 % of the municipalities, with 70 % of the total population, had permanent casualty clinics.

The distribution of the maximum average travel distances is shown in Figure 1. A maximum travel distance of 5–10 kilometres was the most usual (75 municipalities). The shortest estimated travel distance was 0.4 kilometres, while the longest amounted to 141 kilometres. The distribution of maximum average travel times is shown in Figure 2. The most frequent average travel time was 5–10 minutes (81 municipalities). The shortest travel time was one minute, the longest 131 minutes.

Table 2 shows the median maximum travel times and distances with the 10th and 90th percentiles for all municipalities included. The municipalities belonging to Western Norway Regional Health Authority had the shortest maximum travel times and distances, while those in Central Norway Regional Health Authority had the longest travel times and distances to the OOH casualty clinic. The 10th percentile was lowest in municipalities under Northern Norway Regional Health Authority, for maximum time as well as distance, while the travel time for the 90th percentile was highest in those under the Northern and Western Regional Health Authorities.

Table 3 shows the median average distances and travel times to OOH services for municipalities that have a single permanent casualty clinic. The median average travel times and distances for municipalities with a permanent casualty clinic were shortest in the areas encompassed by Northern Norway and Central Norway Regional Health Authorities. In municipalities with a permanent casualty clinic (n = 316) the median average travel times and distances were lower than the maximum average travel times and distances in all municipalities seen as a whole (N = 417).

Table 4 shows that 238 (57 %) municipalities had more than 15 kilometres maximum average travel distance. These municipalities accounted for 21 % of Norway's total population. Ninety-seven municipalities had more than 40 minutes of maximum travel time, and 40 municipalities had more than 60 minutes of maximum travel time. These municipalities accounted for 5 % and 2 % of the national population respectively. The largest proportion of the population that had more than one hour of maximum travel time to a OOH casualty clinic was found in areas under Northern Norway Regional Health Authority, whereas South-Eastern Norway Regional Health Authority had the lowest proportion. Table 5 shows that 33 085 inhabitants, equivalent to less than 1 % of the inhabitants in municipalities with a single permanent casualty clinic, had more than one hour of travel time to the nearest casualty clinic.

Table 6 shows travel times and distances in municipalities with varying types of alternating locations for their OOH services. The median maximum average travel times and distances were highest in municipalities providing centralised OOH services in the night-time and lowest in municipalities that have multiple, alternating locations for their OOH services internally.

Eight municipalities had population figures and travel times indicating that secondary on-call arrangements ought to be considered, according to the action plan (e-tab 7, e-tab 8). Two of these fulfilled both criteria for secondary on-call arrangements. One of these eight municipalities had a single permanent casualty clinic. Five municipalities had more than 40 minutes of travel time and more than 8 000 inhabitants, and five had more than 60 minutes of travel time and more than 4 000 inhabitants.

The population of the municipalities that were covered by the proposed recommendations for secondary on-call arrangements amounted to 70 422 persons, equivalent to 1.4 % of the national population. Eighty-nine municipalities with a total of 191 025 inhabitants had a maximum travel time of more than 40 minutes, but too few inhabitants to be affected by the action plan's recommendations for secondary on-call arrangements. Of these, 50 municipalities with a total of 102 009 inhabitants (2.1 % of the national population) had a single permanent casualty clinic.

## Discussion

This study shows that the median maximum travel time to OOH services in Norwegian municipalities in 2011 was 22 minutes, and the median maximum travel distance was 19 kilometres. Twenty-three per cent of the municipalities, with five per cent of the national population, had more than 40 minutes of median maximum average travel time, and 10 % of the municipalities, with 2 % of the national population, had more than 60 minutes of median maximum average travel time. Among the municipalities that participate in OOH arrangements with a single permanent casualty clinic, the median average travel time was 16 minutes and the median average travel distance was 13 kilometres. Altogether 47 % of these municipalities, with 17 % of the inhabitants, had travel distances exceeding 15 kilometres, i.e. travel distances that according to previous studies (1, 2) are associated with a reduced use of OOH services.

Among the municipalities that have a permanent casualty clinic it is interesting to note that the median travel times and distances are considerably lower in Northern Norway than in other parts of the country. Most likely, this reflects the fact that the population in the North is more typically concentrated around the centre of the municipalities, where the casualty clinic also tends to be located.

One strength of this study is that is has been possible to estimate maximum average travel times and distances for as many as 417

out of 430 municipalities. These figures are especially interesting in terms of preparedness and illuminate the need for extra measures in addition to standard OOH services, even though for some municipalities this will be relevant only during parts of the day. For municipalities in which the provision of OOH services is spread over several municipalities, the longest travel distances will most often be relevant only during those times of the day when the activity is at its lowest, since local emergency services are provided within short travel distances at times when demand is at its highest.

Inhabitants in municipalities with a single casualty clinic face the same travel distances at all times and will hence be able to serve as a better basis for prognoses of the rate of use of OOH services in the population seen in relation to distance. In municipalities that provide OOH services in alternating locations across several municipalities, the inhabitants will in most cases need to travel only a short distance to reach these services, even though the maximum distance (for example during the night) may be long. The consultation rate may therefore be far higher than the maximum average travel time would indicate. Figures from municipalities with a single permanent casualty clinic are somewhat less representative, since they comprise only 73 % of the municipalities with 70 % of the total national population.

A weakness of the study is that the National Emergency Primary Health Care Registry has proven to contain a number of incorrect data, despite the fact that the information has been provided by the local emergency services themselves. Although the information has been checked in cases of doubt, we cannot exclude the possibility that incorrect information on the organisation of OOH services may have been included for some municipalities.

The method that was used to estimate distances has proven robust (2), but since the distances apply to the municipal level, it is possible that analyses using postcodes as units could have yielded a more representative description of actual average travel times. We chose not to undertake analyses at the postcode level, however, since no statistics on the use of OOH services are available for each postcode. It is also possible to investigate distances to OOH services from each individual address point, but we did not have the resources to retrieve the necessary information from Statistics Norway.

The larger the units into which we divide the material, the more dominant the central areas will be. Some municipalities have only a single postcode from which to estimate distances. This may cause the travel distance to be underestimated, since the post office and the casualty clinic are often located near each other.

The distribution of travel times corresponds to travel distances, with some right-side displacement of the curve. This is partly because some municipalities rely on ferries, meaning that the journey takes longer than the travel distance in kilometres would indicate, and the fact that average driving speeds are lower over short distances. We consider the chosen limit of 15 kilometres to be relevant, but it is essentially arbitrary. A limit of 12.5 kilometres would most likely have been more correct, since this is the shortest distance at which we observed a statistically significant reduction of the contact rate when looking at the confidence intervals of the regression analysis, as described in a previous article (1).

No equivalent investigations of the distance to OOH services have been undertaken in Norway. Internationally there are few examples of OOH arrangements that correspond to the Norwegian one, and we are not aware of any comparable studies from other countries. The South Denmark Regional Authority has defined a service goal saying that the distance to the nearest place for a consultation should be less than 30 kilometres, although a little longer in certain areas and during the night (8). In Norway, 137 municipalities with a total of 400 000 inhabitants would fail to satisfy a requirement for a maximum average travel distance of 30 kilometres.

Swedish authorities have investigated distances to the healthcare centres («vårdcentraler»), which to a certain extent are comparable to the Norwegian daytime casualty clinics. The study showed that 6 739 persons, equivalent to 0.073 % of the population, had more than 40 minutes of travel time to the nearest centre in 2012. The proportion was largest in Norrbotten county, where this applied to 0.9 %. Eighty-one per cent of the population had less than five minutes of extra driving time to the second closest healthcare centre (9).

Fortunately, few people need to travel a very long distance (> 60 minutes of travel time) to an OOH casualty clinic in Norway, but this nevertheless applies to more people than is indicated by the tables in this study. At the periphery of municipalities that cover a large geographical area there are numerous inhabitants who need to travel for more than 40 or 60 minutes to reach emergency medical services, even though the estimated average for the municipality in question is far lower.

In future reforms of the municipal structure and the organisation of emergency medical services – with increasingly large units – there is an increasing risk of overlooking the inhabitants at the periphery, since they will contribute less to the estimated average, even though the absolute number of inhabitants remains unchanged. Care should therefore be taken in making decisions that apply to the inhabitants on the periphery based on aggregated data for the entire municipality or OOH district.

These findings show that if the population criteria for secondary on-call arrangements described in the proposal from the National Centre for Emergency Primary Health Care for an action plan at the municipal level (4) are applied, very few inhabitants will be included. When applied at the municipal level, the recommendations appear not very suitable or appropriate.

Nearly 200 000 persons live in municipalities in which the maximum travel times are so long that they would be covered by the distance criteria in the proposed recommendations for secondary on-call arrangements, but where the population is too small to be affected by the population criteria. Since we also know that many inhabitants have long travel distances, even though the average travel distance in the municipality as a whole is shorter than the stipulated limits, we must assume that several hundred thousands of inhabitants face travel times of more than 40 minutes. These will risk being left without acceptable primary emergency services should the municipalities choose to adhere strictly to the proposed recommendations for secondary on-call arrangements in the action plan.

One weakness of this study is that we have assessed how large a proportion of the population is covered by the recommendations on the basis of the municipal structure in 2011, and not on the basis of real population concentrations independently of the municipal boundaries, as suggested by the recommendations in the proposed action plan (4). For example, two or more neighbouring municipalities that are located far away from the casualty clinic may have a total population that exceeds the limits in the recommendations, and it is conceivable that population concentrations within a single municipality could be affected by the recommendations without these being applicable to the municipality as a whole.

We nevertheless claim that the results presented here may indicate that the proposed recommendations apply to an insufficient proportion of the population, and that it could be appropriate to remove or adjust the limits in the population criteria. The National Centre for Emergency Primary Health Care has submitted a proposal to the governmental committee for emergency medicine for a service requirement saying that at least 90 % of the inhabitants in an OOH district

should have less than 40 minutes of travel time to the nearest casualty clinic (10).

A new municipal structure consisting of fewer but much larger municipalities will present further challenges if municipalities are used as the unit of analysis, and even more so if a number of such enlarged municipalities cooperate in forming inter-municipal OOH districts. A sustainable plan for what an acceptable travel time should be and the recommended threshold for when secondary on-call arrangements should be organised should also in the future be based on actual population concentrations and distances to the permanent casualty clinic, independently of present and future municipal boundaries. For example, secondary on-call arrangements could be organised through contracts with GPs' offices in the peripheral areas of OOH districts.

## Conclusion

In more than half of all municipalities, the inhabitants face travel distances that are so long that the activity of the OOH services might be lower than expected. Moreover, many municipalities have travel distances that are so long that secondary on-call arrangements should be considered, even where the population is small. The proposed recommendations for on-call arrangements should be adjusted to ensure provision of adequate primary medical services to as many people as possible.

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