

# Use of health services following self-harm in urban versus suburban and rural areas: a national cross-sectional study

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## ABSTRACT

**Objectives:** This study examines whether there is a difference between urban versus suburban and rural adolescents in their use of health services following two types of self-harm distinguished as self-harm with or without suicide intent.

**Setting:** A nationwide cross-sectional school survey of 11 406 Norwegian adolescents aged 13–19 years in 73 Norwegian junior and senior high schools.

**Participants:** Adolescents who reported self-harm and provided valid responses to a follow-up question about having received subsequent help or treatment (n=959) were included in the study. Adolescents were divided into urban versus suburban and rural depending on: (1) the location of municipalities where they attended school and (2) the place of residence. Associations between urban versus suburban and rural areas and the use of health services following self-harm were assessed in those who self-harmed with and without suicide intent.

**Primary outcome measure:** Use of health services following self-harm.

**Results:** 1 in 4 adolescents reported using health services following self-harm. Adolescents reporting self-harm with suicide intent were more likely to use health services than those who self-harmed without suicide intent. Following self-harm without suicide intent, adolescents in urban areas were four times more likely to use health services than adolescents in suburban and rural areas. There was no statistically significant area difference in the use of health services following self-harm with suicide intent.

**Conclusions:** This study found a geographical variation in the use of health services following self-harm without suicide intent, but not following self-harm with suicide intent. Differences in perception of self-harm and help-seeking behaviour between areas and different accessibility to services are suggested as possible explanations. There is a need to better understand how the interplay between individual characteristics and accessibility to services influences adolescents' use of health services following self-harm. We suggest that multilevel models are a valuable approach to achieve this goal.

## ARTICLE SUMMARY

### Article focus

- To examine the association between area and use of health services following self-harm (SH) with or without suicide intent.
- We hypothesised that (1) adolescents in urban areas would report the use of health services following SH more frequently and (2) an interaction between area and suicide intent would be present.

### Key messages

- To a lesser extent, adolescents in suburban and rural areas used health services following SH without suicide intent. This association was independent of sociodemographic characteristics and was not present among adolescents who reported SH with suicide intent.

### Strengths and limitations of this study

- Strong external validation of findings based on population data in a nationwide representative sample of adolescents from various geographical areas.
- Internal validity was strengthened by similar findings from two measurements of urban versus suburban and rural areas.
- Inclusion of individual data enabled us to adjust for individual characteristics that are known to be associated with the area and use of health services following SH.
- The cross-sectional design inhibits inference of causality. The observed association between area and use of health services following SH without suicide intent can only be inferred.
- Information from self-reports may be subject to inaccuracy and misclassification of SH with or without suicide intent.
- Possible residual confounding from unmeasured characteristics about the adolescents might impact to varying degrees the use of health services in urban versus suburban and rural settings.

## INTRODUCTION

Self-harm (SH) in adolescents is a major public health problem in many countries and regions of the world. Prevalence estimates from Europe and the USA indicate that, on average, 10% of adolescents report lifetime suicide attempts<sup>1 2</sup> and 13% report non-suicidal SH.<sup>3</sup> Although SH with and without suicide intent seems to represent distinct behavioural phenomena, there is also a significant overlap as up to 70% of those who have self-harmed without suicide intent also have attempted suicide.<sup>4</sup> However, only about 20% of all adolescents who self-harm have subsequently been in contact with health services.<sup>5</sup> It is still unclear why so few self-harming adolescents receive healthcare. Health-related help-seeking can be described as a process comprising four stages: the personal perception of the problem, the motivation or readiness to act, the perception that something can be done about the problem, and finally, the decision to act.<sup>6 7</sup> Maladaptive help-seeking attitudes and negative expectations of therapy in self-harming and suicidal adolescents<sup>6 8</sup> and their parents<sup>9</sup> have been found to be associated with reduced use of health services. However, important practical issues that may be crucial in help-seeking decisions such as accessibility to health services<sup>10-12</sup> are less studied among adolescents who self-harm. In general, utilisation of specialised health services by children and adolescents appears to decrease as distance and travel time to services increases.<sup>13 14</sup> Lack of local specialised health services and the need to travel distances to gain access to appropriate treatment may be significant obstacles to receiving healthcare among self-harming adolescents.<sup>15</sup>

Norwegian adolescents from large cities used health services more frequently following SH than adolescents from smaller towns or rural areas did.<sup>16</sup> In contrast, a US National Community Survey found no urban-rural differences in the use of mental health services among adolescent suicide attempters.<sup>17</sup> The apparently contrasting results might be explained by the fact that the Norwegian study did not divide the adolescents into subgroups of SH with and without suicide intent and the latter study did not include adolescents who self-harmed without suicide intent. It is reasonable to expect differences in the use of health services between adolescents who self-harm with and without suicide intent. Suicide attempts in adolescents are associated with more depressive symptoms and more externalising problems compared with SH without suicide intent,<sup>18</sup> and thus adolescents who attempt suicide might more readily gain the attention of friends and parents. Research has shown that those adolescents who come in contact with health services following SH report more often a wish to die and have used more lethal methods of SH,<sup>5 19</sup> and they are often accompanied by their immediate family.<sup>20</sup> Additional variables, such as age, family socio-economic status and behavioural problems, also need to be taken into consideration.<sup>5 16 17 21</sup>

Limited research has addressed urban-rural differences in hospital admissions for SH.<sup>22 23</sup> The current

study expands on such prior investigations by examining the use of several types of health services in a nationwide representative sample of adolescents and by distinguishing between SH with and without suicide intent. Better knowledge of the use of health services following SH in adolescents in urban versus suburban and rural areas can contribute to further development of appropriate health services for different geographical areas and may also inform interpretation of clinical study results. In this study, we hypothesised that (1) adolescents in urban areas would report the use of health services after SH more frequently and (2) an interaction between area and suicide intent would be present.

## METHODS

### Sample

Data from a 2002 nationwide cross-sectional survey in 73 Norwegian junior and senior high schools were used in the current study. The response rate was 92.3%. The sample was stratified according to geographical region and school size, which in Norway is closely related to the degree of urbanity. The distribution of urban versus suburban and rural adolescents in the sample corresponded to the distribution in the general population.<sup>22</sup> The survey was anonymous, and hence a license from the Data Inspectorate to process personal sensitive data was not necessary to require. Consent from the Ministry of Research and Education, the local school authorities and the school boards was obtained. Written consent was obtained from every adolescent and parental consent was required. A detailed description of the design, sample and procedures is published elsewhere.<sup>24 25</sup>

The surveyed sample was 11 406 adolescents aged 13-19 years. The mean age for both genders was 15.7 years (SD=1.8). Girls were 51.2% of the sample. Of the 980 (8.7%) respondents who reported SH, 959 provided valid responses to a follow-up question about whether or not they received subsequent help or treatment from informal or formal help sources and were included in the analyses in the current study.

### Measures

The outcome variable was the use of health services following SH. Respondents who confirmed having received any help or treatment from a hospital/GP/psychologist/psychiatrist following SH were categorised as having used health services following SH.

SH is defined as: "An act of intentional self-poisoning or injury irrespective of the apparent purpose of the act."<sup>26</sup> The SH survey question: "Have you ever deliberately taken an overdose of pills or otherwise tried to harm yourself?" offered the following answer alternatives: yes, less than a year ago/yes, more than a year ago/no, never. Suicide intent was assessed by a question on the history of suicide attempt: "Have you ever tried to take your own life?" (yes/no). Those who responded with 'yes' to the questions on SH as well as on suicide

attempt were considered as cases of SH with suicide intent. Those who responded with 'yes' to the question of SH and 'no' to the question of suicide attempt were considered as cases of SH without suicide intent. Figure 1 is a flow chart of the selection and categorisation of the analysed sample in this survey.

No available general definition can accurately distinguish between urban, suburban and rural areas. In the current study, two measures of urban versus suburban and rural areas were used: (1) the municipalities in which the adolescents attended school and (2) residential area. The municipalities were defined as urban versus suburban and rural according to their function in previously defined residential and labour market regions.<sup>27</sup> People in a region go to the urban municipalities on a regular basis for work, school, leisure and cultural experiences. The urban municipalities thus serve as main regional centres for labour and services surrounded by suburban and rural commuting municipalities. Adolescents often travel some distance to their school, usually from remote parts of the municipality and sometimes across municipality borders. Thus, adolescents who live in suburban and rural areas may on a daily basis travel to urban places. Few adolescents attended school in rural municipalities, and therefore suburban and rural school municipalities were combined. This dichotomisation of municipalities matches the location of specialised health services, as a local general hospital was located in 23 of the 26 urban municipalities in the sample (89%) versus in only 2 of the 29 (7%) of the suburban and rural municipalities. The second measure of an urban area versus a suburban and rural area was developed from the adolescents' self-reports of where they lived. Of the 272 adolescents who reported living in a suburban or rural area, 44% attended school in an urban municipality. Of those who lived in an urban area, only a small percentage (13%) attended school in a municipality classified as suburban or rural.

The comparison between attending school in an urban versus a suburban and rural municipality and living in a place classified as suburban and rural is shown in table 1.

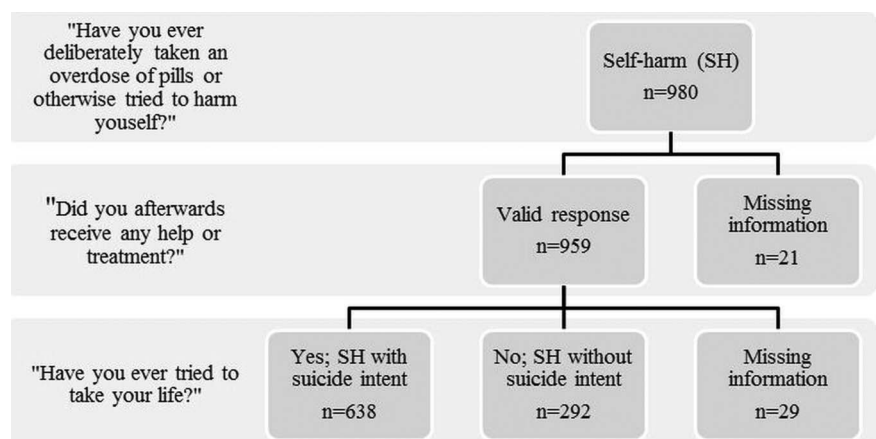
In order to get the most valid and objective measure of whether the adolescents were in an urban area versus a suburban and rural setting, we report on both measures of area.

Variables that have been shown previously to be associated with the use of health services among self-harming adolescents were included in the analyses. They included help from parents or friends, age, living in a single-parent household and parental education. Parents were dichotomised into those with a university degree and those without. Previous literature found that self-harming adolescents with highly educated parents have a higher tendency to use health services following SH.<sup>21</sup> A problem behaviour sum score was constructed from self-reported frequency measures on problem behaviours such as school truancy, theft, violence, conflicts with teachers and use of illicit drugs in the past year. The distribution of the problem behaviour scores was positively skewed. For the purpose of this study, the sum score was therefore dichotomised into those with extensive problem behaviour (above the 75th centile) and those with less or no problem behaviour (below the 75th centile) in order to control for those adolescents who were more likely to come into contact with health services because of a heavy burden of problem behaviour.

### Statistical analyses

Statistical analyses were performed using SPSS V.17 (SPSS Inc, Chicago, Illinois, USA). We assessed bivariate associations between urban versus suburban and rural areas and the use of health services following SH and potential covariates. Two types of analyses were used for assessing bivariate associations: cross tabulations using Pearson's  $\chi^2$  test and bivariate logistic regression analyses with unadjusted ORs and Wald tests. The adjusted association was estimated in a multivariate logistic regression model, applying a stepwise procedure based on model fit criteria (log-likelihood ratio). The covariates considered for inclusion in the multivariate model demonstrated significant bivariate association ( $p < 0.05$ ) with the outcome variable (use of health services following SH) and one of the

**Figure 1** Flow chart of the selection of the analysed sample (n=959).



**Table 1** The adolescents' place of residence and school municipality (n=959), n (%)

	Place of residence	
	Urban (n=687)	Suburban and rural (n=272)
School municipality		
Urban (n=719)	598 (83.2)	121 (16.8)
Suburban and rural (n=240)	89 (37.1)	151 (62.9)

two explanatory variables (school municipality or place of residence). A multiplicative interaction term 'area' × 'suicide intent' entered in the second step of the multivariate analysis was statistically significant ( $p < 0.001$ ) when the school municipality and residential areas were used. Therefore, the bivariate and multivariate logistic regression analyses were conducted separately for those who reported SH with and without suicide intent.

## RESULTS

Only one in four (24.5%) adolescents in our survey who self-harmed reported using health services after their SH. In bivariate analyses on place of residence, adolescents living in urban areas were more likely to report use of health services following SH (26.6%) compared with adolescents who lived in suburban and rural locations (19.1%,  $\chi^2$  (1, n=959)=5.96;  $p=0.02$ ). Among adolescents who attended school in urban areas, 25.6% used health services following SH compared with 21.3% of adolescents in suburban and rural schools. The difference was not statistically significant ( $\chi^2$  (1, n=959)=1.61,  $p=0.21$ ).

Table 2 shows several additional factors related to the use of health services following SH as well as school municipality and place of residence. They include age  $\geq 18$  years, living with only one parent, problem behaviours and having received help from parents/family members or friends following SH. The bivariate association between use of health services following SH and

urban place of residence was no longer statistically significant after adjustment for significant covariates. The interaction term between suicide intent and area was statistically significant ( $p < 0.001$ ).

One-third (29.2%) of the adolescents who reported SH with suicide intent used health services afterwards compared with 13.7% of those who reported SH without suicide intent ( $\chi^2$  (1, n=930)=26.01,  $p < 0.001$ ). Adolescents with suicide intent were also more likely to having received help from their parents or family members (22.9%) than those who reported SH without suicide intent (12%);  $\chi^2$  (1, n=930)=14.49,  $p < 0.001$ .

In the adolescents who reported SH without suicide intent, only 4.5% of those who attended school in suburban and rural areas reported use of health services following SH, compared with 16.4% of those who attended school in urban areas ( $\chi^2$  (1, n=292)=6.04,  $p=0.02$ ). After potential covariates had been taken into consideration, the likelihood of using health services following SH without suicide intent was four times higher among adolescents attending urban schools, compared with adolescents in suburban and rural schools (OR 4.11, 95% CI 1.22 to 13.80). The results were similar when we used place of residence as the independent variable: 4.8% of adolescents residing in suburban and rural locations reported using health services following SH without suicide intent versus 17.3% of the adolescents living in urban areas ( $\chi^2$  (1, n=292)=6.94,  $p=0.01$ ). None of the covariates under consideration had the strength to alter this association and the adjusted OR was the same as the crude OR 4.19 (95% CI 1.44 to 12.16).

In adolescents who reported SH with suicide intent, there was no statistically significant difference in use of health services between those attending schools in urban areas (29.6%) and those attending suburban and rural schools (27.8%), either in bivariate or multivariate analyses. Using place of residence as an independent variable, no statistical differences were observed in the use of health services following SH with suicide intent among those living in urban areas (30.6%) compared with those living in suburban and rural areas (25.4%,  $\chi^2$  (1, n=638)=1.47;  $p=0.23$ ).

**Table 2** Association between sociodemographic and psychosocial variables and use of health services after self-harm (SH), school municipality and place of residence (n=959), OR (95% CI)

	Use of health services after SH	Urban school municipality	Urban place of residence
Age $\geq 18$ (n=959)	1.520 (1.092 to 2.115)	8.159 (4.469 to 14.896)	1.213 (0.865 to 1.701)
Lives in single-parent household (n=954)	1.519 (1.128 to 2.045)	1.823 (1.346 to 2.470)	1.765 (1.321 to 2.359)
Parent(s) with a university degree (n=863)	1.522 (1.115 to 2.076)	1.356 (0.988 to 1.859)	1.451 (1.073 to 1.963)
Problem behaviour >75th centile (n=853)	1.593 (1.133 to 2.240)	0.732 (0.517 to 1.036)	1.109 (0.781 to 1.573)
Help from parents or family (n=183)	5.721 (4.051 to 8.079)	1.150 (0.786 to 1.682)	1.141 (0.793 to 1.643)
Help from friends (n=409)	1.682 (1.251 to 2.262)	1.426 (1.055 to 1.928)	1.159 (0.871 to 1.542)

## DISCUSSION

To our knowledge, this nationwide survey is the first to address use of health services following SH with or without suicide intent among adolescents in urban versus suburban and rural areas. In summary, few adolescents reported use of health services following SH and the proportion that did so was higher among those with suicide intent compared with those who reported SH without suicide intent. Adolescents in suburban and rural areas were less likely to use health services following SH without suicide intent than their urban counterparts. This association was independent of individual variables known from previous research on adolescents to be associated with the use of health services following SH.<sup>5 16 17 21</sup>

In a previous study of this sample of adolescents, use of health services was low (25%).<sup>28</sup> The current study examines whether geographical location contributes as one possible explanation to variation in service use among adolescents who self-harm with or without suicide intent. The few previous population-based studies that reported on area differences in health service utilisation following SH are limited because they did not divide the adolescents into subgroups of SH with and without suicide intent, which limits comparability,<sup>16</sup> and used population size to differentiate between areas.<sup>17</sup> The latter classification did not reflect geographical location or accessibility to health services.

Our observation of geographical variations in the use of health services following SH without suicide intent could possibly be associated with area differences in how SH is understood, adolescents' help-seeking behaviour<sup>6 29 30</sup> and accessibility to health services. It might be that in a rural culture of 'self-reliance', people are expected to meet their own needs and help seeking is not 'permitted' except in a dire emergency.<sup>12</sup> Suicide attempt(s) constitutes the strongest known predictor for suicide<sup>31</sup> and represents those cases of SH with more intense thoughts about death and suicide ideation.<sup>3 18</sup> Further, suicide attempts are usually associated with a higher level of medical severity than non-suicidal SH.<sup>32</sup> It might be that fear of being stigmatised when seeking health services following SH<sup>33</sup> in a rural area<sup>12 34</sup> is less significant for SH which is medically serious and potentially lethal than for non-suicidal SH, which could be seen as an expression for minor depression and psychosocial dysfunction.

Another potential explanation is the lack of local specialised health services in rural areas and the consequent need to travel to gain access to appropriate treatment. This may function as significant obstacles to accessing healthcare in self-harming adolescents,<sup>12 15</sup> especially if the behaviour is viewed as less dangerous or alarming. Adolescents are usually dependent on parents' or other adults' help to seek out and gain access to specialised treatment.<sup>19 20</sup> Adolescents who self-harmed without suicide intent were in general less likely to receive help from their parents. We did not find any geographical

variation in adolescents' reports of help from parents/family members following SH. However, adolescents attending urban schools were more likely to receive help from their friends following SH than were their suburban and rural counterparts. It is possible that long and complicated travelling may constitute a major barrier to accessing services for those adolescents who self-harm without suicide intent, because they are less likely to seek help from parents or friends who can assist them.

We used population data to study area differences in the use of health services following SH among adolescents. The strengths of the study include a high response rate and strong external validation of findings based on a nationwide representative sample of adolescents from various geographical areas in Norway. Norway is a country well suited to this type of study because a significant proportion of the population live in urban, suburban and rural areas and the population is covered by a publicly funded universal healthcare system. Internal validity was strengthened by similar findings from two measurements of urban versus suburban and rural areas. The inclusion of individual data enabled us to adjust for individual characteristics that are known to be associated with the area and use of health services following SH. Hence, this study helps overcome some of the shortcomings of previous studies of health service utilisation following SH that have been based on hospital discharge data with limited patient characteristics.

The study has some limitations. Information from self-reports may be subject to inaccuracy and hence misclassification of SH with or without suicide intent. We do not know how the responding adolescents may have interpreted the question of whether they had received any help or treatment following SH, potentially inflating false negative and false positive responses. However, even though the respondents may have under-reported or over-reported the type of SH and their subsequent use of health services, there is no reason to assume that any such bias would differ systematically between adolescents in urban versus suburban and rural areas and thereby contribute to a biased association. The cross-sectional design inhibits inference of causality. In this study, it was possible to adjust for individual characteristics with the potential to act as confounders. However, we cannot rule out residual confounding from unmeasured characteristics of the adolescents, such as fear of stigma, which might impact to varying degrees on the use of health services in urban versus suburban and rural settings.<sup>34</sup> The data were collected in 2002, which might limit the representativeness of the youth of today. The observed association between area and use of health services following SH without suicide intent can only be inferred.

Our finding of less use of health services following SH without suicide intent compared to SH with suicide intent should help planners target resources on populations that are underusing health services. The results from this study have some implications for further research. Studies using more fine-graded scales of urban versus suburban and

rural areas and including factors like SH methods, travel distance or time to available inpatient and outpatient resources, availability of public transportation and reasons why health services were or were not used may contribute to additional insights into the association between area and/or accessibility to health services and service utilisation following SH. Research using multilevel modelling are highly valuable to better understand how the interplay between individual characteristics, the perception of SH and accessibility to services influences adolescent use of health services following SH.<sup>35</sup> The suggested future research may contribute to further development of local health services that are well adapted to the population in the geographical area they serve.

**Contributors** IR contributed to the data collection, research idea and provided input in the data analysis. EAF conducted data analysis. EAF, BS, IR, LM, EM and AJT participated in the interpretation of the results. EAF was involved in preparing the initial draft of the manuscript. BS revised the manuscript critically for important intellectual content; the manuscript was then circulated repeatedly among all authors for critical revision. All authors have read and approved the final version of the manuscript.

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