**Subjective perceptions of unmet need for health care in Europe among social groups**

## Findings from the European social survey (2014) special module on the social determinants of health

Erlend L. Fjær1 (Corresponding Author: erlend.fjar@ntnu.no)

Per Stornes1

Liubov V. Borisova2

Courtney McNamara1

Terje A. Eikemo1

1 Department of Sociology and Political Science, Norwegian University of Science and Technology Trondheim, Norway

2 Department of Sociology, Uppsala University, Uppsala, Sweden

**Abstract**

*Background*: Unmet need can be defined as the individually perceived subjective differences between services judged necessary to deal with health problems and the services actually received. This study examines what factors are associated with unmet need, as well as how reasons for unmet need are distributed across socioeconomic and demographic groups in Europe.

*Methods*: Multilevel logistic regression models were employed using data from the 7th round of the European Social Survey, on people aged 25 to 75. Self-reported unmet need measured whether respondents had been unable to get medical consultation or treatment in the last 12 months. Reasons for unmet need were grouped into three categories: availability, accessibility and acceptability. Health status was measured by self-reported health, non-communicable diseases, and depressive symptoms.

*Results*: Two thirds of all unmet need was due waiting lists and appointment availability. Females and young age groups reported more unmet need. We found no educational inequalities, while financial strain was found to be an important factor for all types of unmet need for health care in Europe. All types of health care use and poor health were associated with unmet need. Low physician density and high out-of-pocket payments were found to be associated with unmet need due to availability.

*Conclusion:* Even though health care coverage is universal in many European welfare states, financial strain appeared as a major determinant for European citizens’ access to health care. This may suggest that higher income groups are able to bypass waiting lists. European welfare states should therefore intensify their efforts in reducing barriers for receiving care.

**Key words**: unmet need; health care services; socioeconomic position; inequality.

# Introduction

Access to health care is a fundamental determinant of health 1. Because of this, a key guiding principle in European welfare states is that access to health care, understood in the context of whether people *in need* of medical care receive it or not 2, should be the same for all people regardless of their social position in society 3 4.

The concept of *unmet need* is a subjective measure of access to health care. Carr and Wolfe 5 define it as “*the differences between services judged necessary to deal appropriately with health problems and services actually received*”. When health care systems measure equality of access in terms of whether the appropriate medical treatment has been given for the condition in question, this disregards the subjective component of care in terms of patient perceptions. We conceive of *overall unmet need* as the subjective perception of not receiving appropriate medical help.

Research on unmet need has mainly been carried out in the US 6-9 and Canada e.g. 10 11. Research from Europe is largely unavailable, which could be reflected by the fact that health care coverage is universal in many European countries 1, and the barriers for receiving care, such as cost, are lower in Europe compared to the US 12.

Previous research has produced somewhat mixed and inconclusive results. Different studies have reported different population groups reporting higher unmet need, such as women, people with poor health status, younger people, higher educated, lower income groups, unemployed, non-immigrants, urban residents and individuals without insurance coverage 10 11 13-16.

It is still unclear to what extent citizens of European countries in (subjective) need of medical care are not getting their warranted treatment across social groups. This article aims to shed further light on this under-researched concept in a European context. We do this by classifying unmet need into three subcategories, based on the typology by Chen & Hou 10 and Sibley & Glazier 11. *Availability* includes unmet need related to waiting lists, services not being available when required, and services not being available in an area. *Accessibility* refers to unmet need related to cost. *Acceptability* refers to not being able to take time off work or having other commitments.

Using the most recent European data available, this study examines what factors are associated with unmet need, as well as how reasons for unmet need are distributed across socioeconomic and demographic groups in Europe. In order to contextualize our results, we also control for country specific features of health systems which may be meaningful for unmet need, such as physician density and out-of-pocket (OOP) payments. As the focus is on types of unmet need across social groups, we do not delve on cross country inequalities.

# Data and methods

This study was based on data from the 7th round of the European Social Survey (ESS), fielded in 2014/2015 17. ESS is a bi-annual academically driven cross-national survey. For the first time, the survey contained a special rotating module on social determinants of health, in addition to the core questionnaire 18. Our study included 27,879 respondents in 20 countries: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Hungary, Ireland, Israel, Lithuania, Netherlands, Norway, Poland, Portugal, Slovenia, Spain, Sweden, Switzerland and United Kingdom. Estonia was excluded due to missing data on non-communicable diseases. Data collection was based on face-to-face interviews with individuals aged 15 and above living in private households. In this study, we included respondents aged 25 to 75. Response rates ranged from 31 per cent in Germany to 68 per cent in the Czech Republic, and were overall similar to previous rounds of the ESS 18. Individuals with missing data on study variables were excluded.

## Study variables

Unmet need was operationalized through four binary variables, which were subjected to separate analyses. *Overall unmet need* was assessed by the question: “In the last 12 months, were you ever unable to get a medical consultation or the treatment you needed for any of the reasons listed on this card?” Respondents answering yes were characterized as having overall unmet need. Respondents were coded as having unmet need due to *availability* if they indicated any of the following reasons for unmet need: waiting list too long, no appointments available, or the treatment needed was not available nearby. Respondents were coded as having unmet need due to *accessibility* if they indicated they could not pay for services. Respondents were coded as having unmet need due to *acceptability* if they indicated that they were unable to get a medical consultation because they could not take time off work, or had other commitments 10 11. The operationalization differs somewhat between previous studies, as we did not have specific data on transportation (accessibility), and health knowledge and attitudes (acceptability).

*Gender* was dummy coded, with females assigned the value one. *Age* was measured in ten-year age dummy groups, with 25-34 as the reference. *Education* was measured as the highest level of completed education, according to the International Standard Classification of Education (ISCED). The low educational group included respondents with lower secondary or less education, the medium group upper secondary or advanced vocational education, and the high group tertiary education (reference). Low income groups were identified by the concept of *financial strain,* measured by those finding it difficult or very difficult managing on present income, with those coping or living comfortably as the reference. *Rurality* was measured by those reporting to be living in a country village or in the countryside, with those living in big cities, suburbs, town and small cities as reference. Those reporting not being born in their country of residence were characterized as *immigrants*, with the reference category being anyone born in their country of residence. *Occupational status* was measured by main activity last 7 days. The categories used were paid work (reference), unemployed, permanently sick or disabled, retired, and finally those primarily doing housework or looking after children. Students and those in military service were excluded.

**Health care use** was measured by three binary variables, based on whether respondents indicated seeing (1) a *general practitioner* (GP), (2) *medical specialist*, or (3) *using alternative health care* in the past 12 months*.*The reference categories were no use in all cases.

In terms of **health status**, *self-reported health* was dichotomized, based on the question: “How good is your health in general?” The responses ‘very good’, ‘good’ and ‘fair’ were coded as good health and used as reference, while ‘poor’ or ‘very poor’ health were coded as poor health.

*Depressive symptoms* were measured with the CES-D 8 depression scale 19. This is a summated rating scale of eight items on how often over the past week respondents experienced symptoms associated with depression see 20, and has been validated as a screening tool. Values ranged from none or almost none of the time (0) to all or almost all of the time (3). Anyone scoring over 10 on the 24-point scale were coded as having depressive symptoms.

The presence of *non-communicable diseases (NCDs)* see 20 was operationalized as a summary measure, indicating whether respondents had none (reference), one, or two or more NCDs.

At the **macro level**, we controlled for two indicators. Physician density per 1000 of the population for the most recent year 21 was included as a measure of the overall availability of the health care system. Accessibility of the health care system was measured by the out-of-pocket payments as a percentage of total health expenditures for the most recent year 22.

## Statistical analysis

Logistic multilevel analyses with maximum likelihood estimation were performed in Stata 14. Two levels were used: individuals (N=27,879) and countries (N=20). Analysis was first carried out on the overall unmet need variable and then on the specific reasons for unmet need (i.e. availability, accessibility, and acceptability). A step-by-step approach was utilized whereby first, the null model was estimated. The explanatory indicators at the individual level were then added in the following sequence: demographics, economic, health care use and health status indicators. Finally, the second level indicators were included in the analysis. For the three subtypes of unmet need, only the final models are shown.

# Results

## Descriptive results

Table 1a shows descriptive statistics for unmet need. The first column provides the distribution of the groups in the sample. The majority was in paid work, but almost a quarter were retired. The second column shows the prevalence of overall unmet need within the sample groups. Unmet need overall was at 12% and was relatively evenly distributed among age, gender and education. Unmet need was much higher in the financial strain group (18.2%), among the permanently sick and disabled (22.3%), and among users of health services (13%-16%). Unmet need was also much more common among respondents with poor health (24.0%), depressive symptoms (22.7%) and those with more than one chronic condition (17.3%).

This pattern was very much the same for the subtypes of unmet need, shown in columns 3-5. Availability accounted for most of overall unmet need (8%). For accessibility (1.6% of total), financial strain (5%) and poor self-reported health (6.2%) and depressive symptoms (5.5%) had a strong association. There was also a notable reverse educational gradient where higher educated had less than half (0.9%) the unmet need than the lower (2.2%). For acceptability (2.8% total), it was notable that this was most common among those in paid work (3.7%). Note that as the subcategories were not mutually exclusive, they added up to 12.4%.

Table 1b summarizes the macro variables. Out-of-pocket payments ranged from 5% to 31% of total health expenditure (mean 17.6%), and physician density ranged from 2.2 to 5 per 1000 (mean 3.5).

---- Table 1a here ----

---- Table 1b here ----

## Results from the regression analysis

We report odds ratios with one decimal (two for macro variables), with 95% confidence intervals in [brackets]. Three-decimal figures are available in the tables. We report 0.05 significance for individual level variables, and 0.1 for macro variables.

### Overall unmet need

---- Table 2 here ----

Table 2 shows the results from the stepwise analysis of overall unmet need. Overall unmet need must be read as a weighted average where availability accounted for around 67%, accessibility 13%, and acceptability 23%, with a 3% overlap between subtypes.

The coefficients for females remained positive and significant throughout the models. However, the odds ratios were reduced from around 1.4 [1.3-1.5] to 1.1 [1.0-1.2] in models 1 to 4. After controlling for all variables, females remained slightly more likely to report unmet need overall.

There was a persistent pattern whereby odds ratios for unmet need were reduced with age throughout all models. The effects attenuated somewhat when controlling for other factors, but the youngest age group remained at the highest risk of unmet need. In model 4, the oldest group had half the odds of unmet need compared to the reference group (0.5 [0.4-0.6]).

Education was not found to be associated with unmet need. There were slight educational differences in model 1, but these became insignificant and close to zero when controlling for other demographic and health factors.

Financial strain emerged as a strong predictor of unmet need. The odds ratios were reduced slightly from 1.9 [1.8-2.1] to 1.6 [1.5-1.8] when controlling for health.

The unemployed, retired and houseworkers deviated very little from respondents in paid work in all models. The group of permanently sick and disabled was found to have higher odds of unmet need in models 1 and 2. This association disappeared completely when controlling for health care use and health status in models 3 and 4.

In model 4, the rural group had slightly lower odds (0.9 [0.8-1.0]) of unmet need, while immigrants had slightly higher (1.2 [1.0-1.3]). The association was persistent in all models.

In terms of health care use, both GP use (1.6 [1.4-1.8]) and specialist use (1.6 [1.4-1.7]) appeared as strong predictors of unmet need in model 4. It should be taken into account that GP use was very prevalent at around 75%, which means that the reference group of no GP use was very unlikely to have any unmet need. Specialist use was less prevalent at around 40%, which infers that most specialist use occurred in combination with GP use.

All of the health status variables stood out as strong predictors of unmet need: Poor self-reported health (1.3 [1.1-1.5]), depressive symptoms (1.7 [1.5-1.9]), one NCD (2.1 [1.8-2.4]), and two or more NCDs (3.1 [2.7-3.6]). Note somewhat inflated confidence intervals for these measures. Also note that around half the sample had one chronic condition, and around one fifth had two or more. People who reported good health were thus more unlikely to report unmet need.

### Full models with macro variables: overall, availability, accessibility and acceptability.

---- Table 3 here ----

Table 3 shows the full models for overall unmet need and the three subcategories, with macro variables added. Here, we will report on the noteworthy differences between the subcategories in terms of the most influential variables.

Financial strain was found to be associated with all types of unmet need. The strongest association was related to accessibility (4.8 [3.8-6.0]), followed by acceptability (1.7 [1.4-2.0]) and availability (1.3 [1.2-1.5]). Respondents with financial strain were therefore more likely to report unmet need due to waiting lists, because no appointments were available, or if they were unable to get time off work or had other commitments. Note somewhat inflated confidence intervals for the strongest coefficients.

Occupational status was found to be associated with the three subtypes of unmet need to varying degrees. The unemployed had higher odds of problems with accessibility (1.6 [1.2-2.2]), and lower odds of acceptability (0.4 [0.3-0.7]). Although the sick/disabled suffered little unmet need overall, they were still at higher risk of problems with accessibility (1.6 [1.1-2.3]), much like the unemployed. These associations remained even after controlling for financial strain. Acceptability mainly represented a problem for those in paid work.

In terms of health care use, there was little variation between the types of unmet need. The exception was for accessibility, where there was no significant difference between GP users and non-users. Use of alternative treatments was mainly an issue in relation to availability (1.5 [1.3-1.6]).

In terms of health status, all measures of poor health were strongly associated with almost all types of unmet need. Noteworthy was that poor self-reported health had the strongest association with accessibility (1.7 [1.3-2.2]), which means that people with poor self-reported health were more likely to have problems with paying for health care. The same was found to be true of respondents with depressive symptoms (2.3 [1.8-2.9]). Even stronger associations were found among respondents with NCDs. Here, we can note that people with multiple NCDs had the highest coefficient for acceptability (3.6 [2.8-4.7]).

The results for physician density (0.8 [05-1.1]) and OOP payments (1.04 [0.99-1.08]) were significant at the 0.1 level for availability only. Marginal probabilities were calculated in Stata, showing that increasing physician density from 2.2 to 5 reduced the likelihood of availability-related unmet need by 5.8%. Increasing OOP payments from 5.2% to 31.3% resulted in a higher likelihood of unmet need by 6.3%.

# Discussion

The aim of this study was to examine what factors are associated with unmet need, as well as how reasons for unmet need are distributed across socioeconomic and demographic groups in Europe. Like previous work in this area, we found overall unmet need to be greater among females 23, older populations 24, those living in rural areas 25, those with greater use of health care services 23 and those with poor health status 11. Overall unmet need was also associated with financial strain. This finding aligns with work demonstrating greater unmet need among those in lower income groups 26.

In contrast to a study from Canada 15, we found that immigrants had slightly higher odds of reporting unmet need. We did not control for length of stay, however. The results could be due to different regulatory frameworks and demographic composition of migrants in Canada versus Europe. The results suggest that overall, immigrants to European countries experience higher subjective barriers in access to health care. Some barriers specific to migrants have been documented, such as legal, language and information barriers, as well as cultural differences 27. There could be variation in unmet need within this group, due to effects of country of origin and destination.

We found no significant association between education and overall unmet need. This is in line with work by Chen and Hou 10. However, other work on this relationship is somewhat mixed: Allin and Masseria 23 found that lower education was slightly associated with unmet need in Europe while Sibley and Glazier11 found that higher education was associated with unmet need in Canada. Even in our descriptive results, there were very small bivariate differences in unmet need among educational groups. Our interpretation is that inequality in unmet need does not manifest itself along educational lines at the pooled European level. There is of course the possibility that this is not the case for all the individual countries included in the analysis.

Differences in findings may relate to studies’ use of different measures of unmet need. For example, we found that occupational status had a rather slight association with overall unmet need. However, the results from the sub-category analyses reveal that this is in some cases due to contradictory effects of the different types of unmet need. The unemployed for instance, were found to have higher odds of reporting problems with accessibility, and lower odds reporting problems with acceptability. The same was found for the permanently sick and disabled, who were more likely to experience problems of accessibility, but less of acceptability. The employed measure of unmet need can thus substantially impact findings.

In terms of the sub-category analyses, availability was found to be the most common reason for unmet need in our study, despite the fact that European countries mainly have universal health care systems. In Canadian studies by Sibley and Glazier 11 and Chen and Hou 10, availability was ranked as the most common reason and the second most common reason for unmet need respectively. In a European study by Allin and Masseria 23, accessibility (i.e. cost) was the most common reason for unmet need. Health status, in the forms of poor self-reported health, depressive symptoms, and NCDs, was often found to be the strongest predictor of all types of unmet need. These results suggest that people with a higher degree of general need, measured by self-reported health, are more likely to experience a subjective feeling of not having their needs met, for a variety of different reasons.

In reference to the socioeconomic and demographic variables, financial strain was the only item to persistently and substantially influence unmet need across all subtypes, besides the older age groups. Few studies have investigated the relation between income and different types of unmet need at the European level. Allin and Masseria 23 found that people with lower income had high odds of reporting problems with accessibility. Hernández-Quevedo and colleagues 28 also found a relationship between income and unmet need due to availability. However, no associations between income and availability were found in Canada 10 11, where health care is also universal.

These findings suggest that financial strain may be related to unmet need in Europe beyond not being able to pay for care directly. It could be that people with fewer financial resources are less able to bypass waiting lists compared to higher income groups. It could also be that those experiencing financial strain are less able to take time off work. Low income groups have been shown to more affected by a fear of loss of income, and a higher degree of job insecurity 29, which could affect their health care seeking behaviour.

We only found a significant association between OOP payments and physician density for availability. US studies have found that higher OOP payments are associated with higher unmet need 30 31. Their findings may not be comparable to a European context because of fundamental differences in the organization of health care systems 32. However, our results, held together with the findings on financial strain and availability, suggest that low income groups could be at higher risk of delayed or unavailable care due to higher OOP payments.

Research on physician density and unmet need is lacking, but the results suggest that high physician density may moderate the influence of OOP payments, and that this association should be studied further.

## Limitations

This study should be interpreted in the light of some limitations. The data obtained in this article is only based on self-reported unmet need and does not include additional clinical assessments whether a patient has received appropriate treatment. As previous studies have shown that individuals are better able to estimate their health status compared to others 33, they could also be in a position to identify shortcomings in their experience with health care 12. However, the question on unmet need is open to several interpretations, and is likely to be affected by cultural context and the respective health care systems of the respondents. Moreover, the question on unmet need has a time window of 12 months. This could affect the validity, as the possibility of unreliable recall is present. Ideally, it would also have been desirable to have a more objective measure of income, as financial strain only captures a limited aspect of financial situation. Finally, there are limitations related to small sample sizes, which makes it difficult to study cross-national variation for different reasons of unmet need between countries.

## Conclusion

Even though health care coverage is universal in many European welfare states, financial strain appeared as a major determinant for European citizens’ access to health care. This may suggest that higher income groups are able to bypass waiting lists. European welfare states should therefore intensify their efforts in reducing barriers for receiving care.

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# Descriptive statistics for unmet need

Table 1a: Bivariate distribution of sample, and prevalence of unmet need within groups

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | **Proportion of sample** | **Prevalence of unmet need within group** |
|  |  |  | Overall | Availability | Accessibility | Acceptability |
| *Total (N=27.879)* | *100,0* | *12,0* | *8,0* | *1,6* | *2,8* |
| *Gender* |
|  | Male | 47,3 | 10,1 | 6,5 | 1,1 | 2,6 |
|  | Female | 52,7 | 13,6 | 9,3 | 2,0 | 2,9 |
| *Age* |  |  |  |  |  |  |
|  | 25-34 | 16,4 | 14,3 | 8,8 | 1,7 | 4,7 |
|  | 35-44 | 20,3 | 13,2 | 8,3 | 1,8 | 3,8 |
|  | 45-54 | 21,7 | 12,0 | 7,7 | 1,7 | 2,8 |
|  | 55-64 | 21,7 | 11,3 | 8,2 | 1,3 | 2,1 |
|  | 65-75 | 20,0 | 9,3 | 7,1 | 1,2 | 0,9 |
| *Education* |
|  | Low | 22,4 | 12,0 | 8,0 | 2,2 | 2,1 |
|  | Medium | 51,6 | 12,0 | 7,9 | 1,6 | 2,9 |
|  | High | 26,0 | 11,8 | 8,3 | 0,9 | 3,1 |
| *Financial strain* |
|  | No strain | 79,2 | 10,3 | 7,1 | 0,6 | 2,4 |
|  | Strain | 20,8 | 18,2 | 11,2 | 5,0 | 4,0 |
| *Urbanity* |
|  | Urban | 63,9 | 12,8 | 8,5 | 1,7 | 3,0 |
|  | Rural | 36,1 | 10,5 | 7,1 | 1,3 | 2,4 |
| *Immigrant status*  |
|  | Non-immigrant | 88,9 | 11,7 | 7,9 | 1,5 | 2,6 |
|  | Immigrant | 11,1 | 14,0 | 9,1 | 2,2 | 4,3 |
| *Occupational status*  |
|  | Paid work | 60,8 | 11,7 | 7,4 | 1,1 | 3,7 |
|  | Unemployed | 5,8 | 14,9 | 8,6 | 4,1 | 2,4 |
|  | Permanently sick or disabled | 3,2 | 22,3 | 15,5 | 7,2 | 1,7 |
|  | Retired | 22,3 | 9,6 | 7,5 | 1,2 | 0,8 |
|  | Housework | 8,0 | 14,0 | 10,3 | 2,2 | 1,9 |
| **Health care use**  |
| *GP utilization* |
|  | No | 25,2 | 6,9 | 4,1 | 0,9 | 1,4 |
|  | Yes | 74,8 | 13,7 | 9,3 | 1,8 | 3,2 |
| *Specialist utilization* |
|  | No | 57,7 | 8,4 | 5,1 | 1,0 | 2,1 |
|  | Yes | 42,4 | 16,8 | 11,9 | 2,3 | 3,4 |
| *Alternative treatment* |
|  | None | 63,2 | 9,5 | 6,1 | 1,3 | 2,3 |
|  | One or more | 36,8 | 16,1 | 11,2 | 2,0 | 3,4 |
| **Health status** |
| *Self-reported health* |
|  | Good health | 93,1 | 11,1 | 7,4 | 1,1 | 2,8 |
|  | Poor health | 6,9 | 24,0 | 16,6 | 6,2 | 2,9 |
| *Depressive symptoms* |
|  | No | 87,2 | 10,3 | 7,1 | 1,0 | 2,5 |
|  | Yes | 12,7 | 22,7 | 14,5 | 5,5 | 4,4 |
| *Non-communicable diseases* |
|  | None | 27,0 | 4,8 | 3,3 | 0,6 | 1,1 |
|  | One | 26,1 | 9,7 | 6,4 | 0,9 | 2,5 |
|  | Two or more | 46,9 | 17,3 | 11,5 | 2,5 | 3,8 |

Table 1b: Summary of macro variables

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | N | Mean | SD | Min | Max |
| Out-of pocket payments | 27 879 | 17.61 | 7.26 | 5.22 | 31.27 |
| Physician density | 27 879 | 3.54 | 0.71 | 2.22 | 4.95 |

# Multilevel logistic regression: Overall unmet need (OR)

Table 2: Overall unmet need, multilevel logistic regression

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Overall unmet need** | **Null model** | **Model1** | **Model2** | **Model3** | **Model4** |
| Femalea) |  | 1.422\*\*\* | 1.379\*\*\* | 1.186\*\*\* | 1.135\*\* |
|  |  | [1.32,1.53] | [1.28,1.49] | [1.10,1.28] | [1.05,1.23] |
| Age 35-44 b) |  | 0.919 | 0.916 | 0.899 | 0.877\* |
|  |  | [0.82,1.03] | [0.82,1.03] | [0.80,1.01] | [0.78,0.99] |
| Age 45-54 b) |  | 0.818\*\*\* | 0.804\*\*\* | 0.739\*\*\* | 0.665\*\*\* |
|  |  | [0.73,0.92] | [0.71,0.90] | [0.66,0.83] | [0.59,0.75] |
| Age 55-64 b) |  | 0.744\*\*\* | 0.738\*\*\* | 0.646\*\*\* | 0.562\*\*\* |
|  |  | [0.66,0.84] | [0.65,0.84] | [0.57,0.73] | [0.49,0.64] |
| Age 65-75 b) |  | 0.595\*\*\* | 0.630\*\*\* | 0.539\*\*\* | 0.464\*\*\* |
|  |  | [0.52,0.68] | [0.53,0.75] | [0.45,0.65] | [0.39,0.56] |
| Low education c) |  | 1.129\* | 0.896 | 1.051 | 0.965 |
|  |  | [1.01,1.27] | [0.79,1.01] | [0.93,1.19] | [0.85,1.09] |
| Medium education c) |  | 1.154\*\* | 1.054 | 1.115\* | 1.080 |
|  |  | [1.05,1.26] | [0.96,1.16] | [1.01,1.23] | [0.98,1.19] |
| Financial strain d) |  |  | 1.923\*\*\* | 1.926\*\*\* | 1.614\*\*\* |
|  |  |  | [1.76,2.10] | [1.76,2.11] | [1.47,1.78] |
| Rural domicile e) |  |  | 0.865\*\*\* | 0.900\* | 0.900\* |
|  |  |  | [0.80,0.94] | [0.83,0.98] | [0.83,0.98] |
| Immigrantf) |  |  | 1.129\* | 1.148\* | 1.153\* |
|  |  |  | [1.01,1.27] | [1.02,1.29] | [1.02,1.30] |
| Unemployed g) |  |  | 1.006 | 1.041 | 0.994 |
|  |  |  | [0.86,1.17] | [0.89,1.22] | [0.85,1.17] |
| Permanently sick or disabled g) |  |  | 2.087\*\*\* | 1.495\*\*\* | 1.006 |
|  |  |  | [1.74,2.50] | [1.24,1.79] | [0.83,1.22] |
| Retired g) |  |  | 0.995 | 0.904 | 0.825\* |
|  |  |  | [0.85,1.16] | [0.78,1.06] | [0.71,0.96] |
| Houseworker g) |  |  | 1.048 | 1.000 | 0.962 |
|  |  |  | [0.91,1.21] | [0.87,1.15] | [0.83,1.11] |
| GP visit h) |  |  |  | 1.877\*\*\* | 1.601\*\*\* |
|  |  |  |  | [1.69,2.09] | [1.44,1.78] |
| Specialist visit i) |  |  |  | 1.854\*\*\* | 1.554\*\*\* |
|  |  |  |  | [1.71,2.01] | [1.43,1.69] |
| Alternative treatment j) |  |  |  | 1.591\*\*\* | 1.345\*\*\* |
|  |  |  |  | [1.47,1.72] | [1.24,1.46] |
| Poor self-reported health k) |  |  |  |  | 1.328\*\*\* |
|  |  |  |  |  | [1.16,1.52] |
| Depressive symptoms l) |  |  |  |  | 1.700\*\*\* |
|  |  |  |  |  | [1.53,1.89] |
| One NCD m) |  |  |  |  | 2.061\*\*\* |
|  |  |  |  |  | [1.79,2.37] |
| Two or more NCDs m) |  |  |  |  | 3.120\*\*\* |
|  |  |  |  |  | [2.74,3.55] |
| Constant | 0.120\*\*\* | 0.110\*\*\* | 0.105\*\*\* | 0.0436\*\*\* | 0.0285\*\*\* |
|  | [0.095,0.150] | [0.085,0.140] | [0.081,0.140] | [0.033,0.058] | [0.022,0.038] |
| Variance  | 1.328\*\* | 1.338\*\* | 1.343\*\* | 1.326\*\* | 1.291\*\* |
|  | [1.11,1.59] | [1.11,1.61] | [1.11,1.62] | [1.11,1.59] | [1.09,1.52] |
| N | 27879 | 27879 | 27879 | 27879 | 27879 |
| Akaike information criterion | 19755.86 | 19600.44 | 19295.00 | 18649.75 | 18123.01 |

Reference categories: a) Male b) Age 25-35, c) High education, d) No financial strain, e) Urban domicile, f) Non-immigrant, g) Paid work, h) No GP visit, i) No specialist visit, j) No alternative treatment, k) Good health, l) No depressive symptoms, m) No NCDs.

\*p<0.05,\*\*p<0.01,\*\*\*p<0.001

# Multilevel logistic regression: Full models (OR)

Table 3: Overall unmet need, availability, accessibility and acceptability, full model multilevel logistic regressions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Unmet need:** | **Overall** | **Availability** | **Accessibility** | **Acceptability** |
| Female a) | 1.134\*\* | 1.157\*\* | 1.378\*\* | 1.026 |
|  | [1.05,1.23] | [1.05,1.27] | [1.11,1.71] | [0.88,1.20] |
| Age 35-44 b) | 0.877\* | 0.923 | 0.968 | 0.763\*\* |
|  | [0.78,0.99] | [0.80,1.07] | [0.71,1.32] | [0.63,0.93] |
| Age 45-54 b) | 0.665\*\*\* | 0.741\*\*\* | 0.672\* | 0.497\*\*\* |
|  | [0.59,0.75] | [0.64,0.86] | [0.49,0.92] | [0.40,0.61] |
| Age 55-64 b) | 0.561\*\*\* | 0.685\*\*\* | 0.484\*\*\* | 0.408\*\*\* |
|  | [0.49,0.64] | [0.59,0.80] | [0.34,0.69] | [0.32,0.52] |
| Age 65-75 b) | 0.464\*\*\* | 0.548\*\*\* | 0.482\*\* | 0.290\*\*\* |
|  | [0.39,0.56] | [0.44,0.68] | [0.30,0.77] | [0.19,0.45] |
| Low education c) | 0.965 | 0.906 | 1.093 | 0.989 |
|  | [0.85,1.09] | [0.78,1.05] | [0.77,1.54] | [0.77,1.27] |
| Medium education c) | 1.080 | 1.004 | 1.289 | 1.054 |
|  | [0.98,1.19] | [0.90,1.12] | [0.96,1.73] | [0.88,1.26] |
| Financial strain d) | 1.611\*\*\* | 1.310\*\*\* | 4.770\*\*\* | 1.681\*\*\* |
|  | [1.46,1.77] | [1.17,1.47] | [3.77,6.03] | [1.40,2.02] |
| Rural domicile e) | 0.900\* | 0.971 | 0.821 | 0.971 |
|  | [0.83,0.98] | [0.88,1.07] | [0.66,1.02] | [0.83,1.14] |
| Immigrant f) | 1.153\* | 1.125 | 1.087 | 1.478\*\*\* |
|  | [1.02,1.30] | [0.97,1.30] | [0.82,1.45] | [1.20,1.81] |
| Unemployed g) | 0.995 | 1.035 | 1.575\*\* | 0.438\*\*\* |
|  | [0.85,1.17] | [0.85,1.26] | [1.15,2.15] | [0.31,0.62] |
| Permanently sick or disabled g) | 1.006 | 1.185 | 1.625\*\* | 0.255\*\*\* |
|  | [0.83,1.22] | [0.95,1.48] | [1.13,2.34] | [0.15,0.44] |
| Retired g) | 0.824\* | 1.008 | 0.911 | 0.280\*\*\* |
|  | [0.71,0.96] | [0.85,1.20] | [0.60,1.39] | [0.18,0.42] |
| Houseworker g) | 0.962 | 1.138 | 1.110 | 0.384\*\*\* |
|  | [0.83,1.11] | [0.96,1.34] | [0.78,1.57] | [0.27,0.54] |
| GP visit h) | 1.601\*\*\* | 1.704\*\*\* | 1.197 | 1.921\*\*\* |
|  | [1.44,1.78] | [1.49,1.95] | [0.89,1.60] | [1.54,2.39] |
| Specialist visit i) | 1.554\*\*\* | 1.699\*\*\* | 1.527\*\*\* | 1.395\*\*\* |
|  | [1.43,1.69] | [1.54,1.88] | [1.22,1.91] | [1.19,1.64] |
| Alternative treatment j) | 1.346\*\*\* | 1.471\*\*\* | 1.152 | 1.091 |
|  | [1.24,1.46] | [1.33,1.62] | [0.93,1.42] | [0.93,1.28] |
| Poor self-reported health k) | 1.328\*\*\* | 1.286\*\* | 1.716\*\*\* | 0.969 |
|  | [1.16,1.52] | [1.10,1.50] | [1.30,2.26] | [0.71,1.33] |
| Depressive symptoms l) | 1.699\*\*\* | 1.474\*\*\* | 2.299\*\*\* | 1.589\*\*\* |
|  | [1.53,1.89] | [1.30,1.67] | [1.83,2.89] | [1.30,1.94] |
| One NCD m) | 2.065\*\*\* | 1.906\*\*\* | 1.750\*\* | 2.497\*\*\* |
|  | [1.80,2.37] | [1.62,2.25] | [1.17,2.62] | [1.91,3.27] |
| Two or more NCDs m) | 3.128\*\*\* | 2.730\*\*\* | 2.973\*\*\* | 3.649\*\*\* |
|  | [2.74,3.56] | [2.34,3.19] | [2.07,4.27] | [2.82,4.72] |
| Physician density | 0.820 | 0.726(\*) | 0.982 | 1.026 |
|  | [0.61,1.10] | [0.50,1.05] | [0.67,1.43] | [0.78,1.35] |
| Out of pocket-payments | 1.023 | 1.037(\*) | 1.013 | 1.017 |
|  | [0.99,1.05] | [1.00,1.08] | [0.98,1.05] | [0.99,1.04] |
| Constant | 0.0386\*\*\* | 0.0244\*\*\* | 0.00129\*\*\* | 0.00566\*\*\* |
|  | [0.013,0.120] | [0.006,0.096] | [0.000,0.005] | [0.002,0.016] |
| Variance | 1.244\*\* | 1.405\*\* | 1.315\* | 1.163\* |
|  | [1.08,1.43] | [1.12,1.76] | [1.06,1.63] | [1.04,1.31] |
| N | 27879 | 27879 | 27879 | 27879 |
| Akaike information criterion | 18123.01 | 13875.74 | 3666.04 | 6358.86 |

Reference categories: a) Male b) Age 25-35, c) High education, d) No financial strain, e) Urban domicile, f) Non-immigrant, g) Paid work, h) No GP visit, i) No specialist visit, j) No alternative treatment, k) Good health, l) No depressive symptoms, m) No NCDs.

(\*)p<0.1, \*p<0.05, \*\*p<0.01 ,\*\*\*p<0.001

# Appendix

Table A1: Unmet need by physician density

|  |  |  |
| --- | --- | --- |
| **Country** | **Physician Density\*** | **Unmet need** |
| Poland | 2,22 | 22,4 |
| Slovenia | 2,54 | 8,5 |
| Ireland | 2,67 | 7,0 |
| UK | 2,81 | 14,3 |
| Finland | 2,91 | 17,1 |
| Hungary | 3,10 | 6,1 |
| Netherlands | 3,15 | 4,3 |
| France | 3,19 | 19,2 |
| Israel | 3,34 | 18,0 |
| Denmark | 3,49 | 6,6 |
| Czech | 3,71 | 7,1 |
| Belgium | 3,78 | 10,0 |
| Germany | 3,89 | 16,1 |
| Sweden | 3,93 | 10,0 |
| Switzerland | 4,05 | 6,0 |
| Portugal | 4,10 | 18,4 |
| Lithuania | 4,12 | 12,4 |
| Norway | 4,28 | 12,6 |
| Austria | 4,83 | 5,5 |
| Spain | 4,95 | 13,5 |

\*Physician density by 1000 population

Table A2: Unmet need by out-of-pocket payments

|  |  |  |
| --- | --- | --- |
| **Country** | **OOP\*** | **Unmet need** |
| Netherlands | 5,22 | 4,3 |
| France | 6,34 | 19,2 |
| UK | 9,73 | 14,3 |
| Slovenia | 12,07 | 8,5 |
| Germany | 13,20 | 16,1 |
| Denmark | 13,36 | 6,6 |
| Norway | 13,61 | 12,6 |
| Sweden | 14,06 | 10,0 |
| Czech | 14,33 | 7,1 |
| Austria | 16,15 | 5,5 |
| Ireland | 17,66 | 7,0 |
| Belgium | 17,81 | 10,0 |
| Finland | 18,23 | 17,1 |
| Poland | 23,46 | 22,4 |
| Spain | 24,00 | 13,5 |
| Hungary | 26,59 | 6,1 |
| Switzerland | 26,80 | 6,0 |
| Portugal | 26,84 | 18,4 |
| Israel | 26,98 | 18,0 |
| Lithuania | 31,27 | 12,4 |

\*OOP: Out-of-pocket payments as percentage of total health expenditure.

# Appendix: Effect sizes of unmet need

To illustrate the effect sizes in more concrete terms, marginal probabilities were calculated in Stata for selected items, based on overall unmet need in table 3. The overall predicted unmet need is 11.5, not far from the sample mean of 12. If all other values are held at sample means, and we vary one parameter at a time, we get the following probabilities of unmet need:

|  |  |
| --- | --- |
| Male | 10.8 |
| Female | 12.0 |
| Old age group | 6.9 |
| Younger age groups | 13.1 |
| Financially strained | 15.1 |
| Not strained | 10.3 |
| No GP use | 8.3 |
| GP use | 12.3 |
| No specialist use | 9.5 |
| Specialist use | 13.6 |
| No alternative treatments | 10.1 |
| Alternative treatments | 13.1 |
| Good health | 11.2 |
| Poor health | 14.1 |
| No depressive symptoms | 10.6 |
| Depressive symptoms | 16.1 |
| One NCDs | 17.8 |
| Two NCDs | 17.4 |