



No unmet needs without needs! Assessing the role of social capital using data from European Social Survey 2014

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### Highlights

- Participation in informal networks decreases probability of unmet healthcare needs in Europe
- Trust in health services is relevant and there is margin to improvements
- Individuals involved in civic activities are more likely to report unmet needs
- Persistent needs for health care end up increasing probability of unmet needs
- Error correlation suggests sample selection models are appropriate to analyse unmet needs

Abstract

This paper examines the determinants of unmet healthcare needs in Europe. Special emphasis is put on the impact of social capital.

Data come from the European Social Survey, 2014. Our study includes 32,868 respondents in 20 countries. Because unmet needs are observed only in those individuals who are exposed to, and recognise, the need of medical care, sample selection can be an issue. To address it, we analyse the data using the bivariate sample selection model. When there is no need, there is no assessment of access to healthcare. Accordingly, in this situation, our model assumes that unmet need is unobserved.

The magnitude and statistical significance of the error correlation support our modelling strategy. A high proportion (18.4%) of individuals in need in Europe reported unmet needs. Informal connections seem to mitigate barriers to access as well as trust in other people and institutions, particularly in health services. Financial strain still is a strong predictor of unmet needs. Other vulnerable groups include informal carers, minorities and individuals feeling discriminated. Unmet needs might also arise due to persistent needs of healthcare as it seems to be the case of individuals with lower health status and chronic conditions. A result that merits further research concerns the positive impact of civic engagement on unmet needs.

Keywords: Unmet healthcare needs; Social capital; European Social Survey; Sample selection model

## 1. Introduction

Concerns over the extent and the consequences of health inequalities remain a major preoccupation in Europe. Life expectancy and health have improved in Europe in recent decades but at the same time large and increasing inequalities persist [1-3]. In this context, it is pertinent to analyse unmet healthcare needs and their main determinants, as they might result in poorer health status for the population affected and, if disproportionately concentrated among vulnerable groups, might widen health inequalities [4]. Unmet needs have been defined as the differences between those services judged necessary to deal appropriately with defined health problems and those services actually being received by individuals with such health problems [5].

While recognising that multiple factors contribute to health inequalities [6], access to healthcare is key in determining inequality [2, 7-8]. In recent years, unmet healthcare needs have been the motivation for much research. Our work contributes to this literature in two ways. Firstly, it explores the association between social capital and unmet needs at the European level. As far as we are aware, previous empirical investigation on unmet healthcare needs covering various European countries has not specifically addressed the role of social capital, exception made to a recent working paper that explores a similar line of research, using however a different

data set and a different methodological approach [9]. Social capital is a multidimensional concept, related with participation in social networks and trust in people or institutions, which has been increasingly used in economic analyses [10-12]. A strong association between social capital and health has already been established [13]. In the current paper we aim to explore the link between social capital and (foregone) healthcare.

Secondly, and differently from previous studies (some references below), we analyse unmet needs conditional on the existence of need for healthcare. While the healthcare need status is observed for all individuals in the sample, the unmet need status is observed only within the subgroup of individuals reporting needs. Therefore, the outcome variable (unmet need) is observed in a selected sample that may not be representative of the population. Other studies on the subject have not adopted this approach, implicitly assuming that there is no unmet need when there is no need.

However, because in this case individuals do not even need to seek care, it is not possible to know what would happen if they did; thus, it is not accurate to assume that individuals with no need also have unmet need. In our model, in this situation, the unmet need status is unobserved.

We think this is a relevant issue from the health policy perspective and it relates to what is expected from healthcare services. The approach of unmet needs is grounded on the assumption that utilisation of healthcare may be a proxy for how well needs are met [14]. From this perspective, the

starting point is the existence of needs. We acknowledge that the absence of needs might be affected, among other reasons, by previous utilisation of healthcare (thus, considering individuals with no need is also important for policy purposes). However, while the emergence of healthcare needs depends on numerous factors, well beyond healthcare [15], once they arise, it is up to healthcare services to meet them. Thus, at any given stage, what matters from the standpoint of access is to ensure that individuals who are in need get the healthcare they need and so this should be the focus of the assessment of unmet healthcare needs.

Additionally, we should note that the accessibility of health services depends not only on causes that relate to the health system (supply) but also on the patients themselves (demand) [7]. A gap between needed healthcare and healthcare received might emerge because there is a shortage of healthcare services, or because, despite the availability/affordability of services, individuals either do not realise that they have poor health or do not recognise that their poor health is amenable to healthcare interventions or are reluctant to seek advice or treatment [14].

Finally, in interpreting the results, one should be aware that absolute numbers regarding both needs and unmet needs might vary across settings.

Tackling unmet needs requires removing barriers to access that can be found at the level of individuals, health service providers and the health system. Access is also affected by public policy beyond the health system –

especially fiscal policy, but also social protection, education, transport and regional development policy [16, p.12]. The question is that unmet needs are a problem because there are needs in the first place and tackling needs is not only a matter of access to healthcare; it implies the coordination of the various policies impacting on social determinants of health. Thus, equally performing countries in terms of unmet needs (given need) might be confronted with different challenges regarding their populations' health. But then this deviates from the assessment of access to healthcare. Various empirical papers have focused on unmet healthcare needs, however, to our knowledge, few studies performed analyses at the European level. These studies were based on data from the European Statistics on Income and Living Conditions (EU-SILC) [17-20] and on data from the Survey of Health, Ageing and Retirement in Europe (SHARE), though in this latter case only five European countries were included in the analysis [21]. Our study takes advantage of the data collected within the rotating module on 'Social Inequalities in Health' of the European Social Survey – round 7 (ESS7), exploring its richness regarding information associated with social capital, for a large set of European countries. ESS7 further allows the exploration of a fresh view over unmet needs by providing information on whether or not individuals felt need for healthcare. More recently, researchers involved in the development of ESS7 published a paper about unmet needs using data from this survey

[22]. However, neither they analyse the effect of social capital nor do they use the methodology proposed in this paper.

### *Social Capital and Healthcare*

In broad terms, social capital can be regarded as factors that, through membership in social networks as well as features of social organisation, such as trust and norms, affect individuals' ability to cope and access resources and information [23-26]. Social capital has been linked with expectations, attitudes and beliefs (what people "feel"), but also with externally observable aspects of social organisation such as density of social networks, or patterns of civic engagement (what people "do"). In the former case, the focus is on trust (in people or in institutions and their representatives) while in the latter what is at stake is participation. The type of social connections of each person gives rise to another distinction: horizontal social capital versus vertical/linking social capital. Horizontal social capital includes both trusting and co-operative relations between members of a network who see themselves as being similar (bonding social capital) and the connections between individuals who are dissimilar with respect to socioeconomic and other characteristics (bridging social capital) [27-29]. In linking social capital the interactions occur across explicit,



formal or institutionalized power or authority gradients in society, connecting people across explicit ‘vertical’ power differentials [30].

Social capital has increasingly been recognized as a relevant concept that influences individuals’ behaviour in a wide range of decisions, impacting on important economic outcomes, including health [27, 31-33]. According to [13], four mechanisms may explain the positive effect of social capital on individuals’ health: through increased access to health relevant information; via the provision of informal healthcare and/or psychological support; through lobbying efforts and coordination to obtain health-enhancing goods and services; and, by reducing risky behaviours. Although most discussions tended to explore the relationship between social capital and health, the mechanisms presented above embody some potential effects of social capital on the use of healthcare, that is, informal channels of informational exchange might increase the ability of individuals to identify existing healthcare services and to recognise how they can help them; coordinated efforts might increase access to services. Further, the influence of networks might be relevant to reduce reluctance in seeking healthcare. Previous studies suggest that most patients who have a trusting relationship with their physicians are less likely to report having unmet healthcare needs than those with less trust [34]. Existing evidence also shows that trust in others and trust in the health system are: i) significantly associated with access to a regular physician [35] and, ii) significantly and negatively

associated with unmet needs [36]. It has been claimed that trust is important for patients' willingness to seek healthcare and it also encourages use of services, submission to treatment and patient compliance [37]. From the above, we expect to find a negative relationship between social capital and unmet needs.

## **2. Materials and Methods**

### *Data and Variables*

Data come from ESS, which has been administered in over 30 countries to date (this study includes data from 20 countries – full list is presented at the end of Table 1). Currently, there are eight rounds of data (from 2002 to 2016). This paper uses data from round 7 (ESS7), 2014. The data collected are representative of all individuals aged 15 and over, living within private households in each country [38]. Weights provided in the dataset are used. The ESS7 questions are grouped into two main sections: a core section that collects information on a range of subjects, from individuals' characteristics to sociodemographic, economic information, subjective well-being and social exclusion; and rotating modules. ESS7 contains the rotating section on 'Social Inequalities in Health', conceived to measure social determinants of health and health inequalities [39], collecting information about health status (physical and mental), healthcare utilisation and access indicators as well as on several health related lifestyles. A

complete description of the Survey can be found in the dedicated website (<http://www.europeansocialsurvey.org/>) and on [40, 41].

The ESS7 dataset contains 40,185 cases, with a participation rate ranging from 31.4% in Germany to 74.4% in Israel. However, we conducted the multivariate analysis using case wise deletion of missing data, hence, our estimates are based on 32,868 cases.

Similarly to previous studies [5, 17-22], to measure unmet needs, we resort on 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?”*. Those who answer ‘Yes’ are immediately classified as the ones with unmet healthcare needs. When the answer is ‘No’ or ‘Don’t know’ then there is a follow-up question: *“Was that because...?”*, to which the respondent had the following choices: a) ‘Were able to get medical consultation or treatment needed’; b) ‘Did not need medical consultation or treatment’ and c) ‘Don’t know’. The structure of the ESS7 questions and answers enable us to distinguish the individuals who had healthcare needs from those who did not have healthcare needs at all, and then, amongst the former group, those who reported unmet need and those who did not (Figure 1 illustrates how the data collected within ESS7 fit in our empirical model).

The data on unmet needs should be thought as if they were generated from two sequential and interrelated questions, the first questioning about

healthcare needs and, to those who needed medical care, a further question inquiring about unmet healthcare needs. We consider that this approach to interpretation of the data generation process approximates more accurately the actual individual behaviour and benefits the model specification.

Concerning social capital, ESS7 provides straightforward indicators for trust in institutions and in people. We also consider what individuals think overall about the state of health services in their countries (ranging from extremely bad (0) to extremely good (10)). To capture the extent to which individuals have developed close informal networks, we consider the question “*How often do you meet socially with friends, relatives or work colleagues?*”. We also consider whether individuals were engaged in social activities (civic engagement) that broaden their contacts with others beyond their closer circle. In the opposite direction, we include a variable measuring self-perceived discrimination. The proxies for social capital used are in line with other studies based on ESS data [12, 42-44]. We further consider interaction variables between the covariates male and informal network/civic engagement. Other control variables used can be found in Table 1, where the definitions of variables and some descriptive statistics are presented.

### *Empirical model*

As previously argued, individuals who did not need medical care in the period were not exposed to seeking medical care, being therefore impossible for them to assess whether they had unmet needs or not, implying that their unmet need status is unobserved. Therefore, unmet needs are observed in a selected sample that may not be representative of the population - there may exist unobserved factors that make individuals more likely to report both healthcare needs and unmet healthcare needs than would be predicted by the observed regressors. Data generation processes with sample selection features, such as this, should be analysed through modelling alternatives capable of accommodating sample selection; standard regression techniques would lead to inconsistent parameter estimates [45].

Consequently, we analyse unmet needs resorting on the bivariate sample selection model, using Cameron and Trivedi's [45] terminology, or the Tobit Type 2 Model in Amemiya's [46] terminology. The model is composed by two equations, an outcome equation that models the outcome of interest (unmet needs) and a selection equation that governs whether the individual needs medical care over the observation period. The model can be presented as follows:

$$(1) \quad need\_hc_i^* = w_i' \delta + \varepsilon_{1i}$$

$$(2) \quad unmet_i^* = x_i' \beta + \varepsilon_{2i}$$

This model specifies that the unmet status is observed when  $need_{hc_i^*} > 0$ , whereas unmet is unobserved otherwise. Equations 1 and 2 are, respectively, the selection and the outcome equation.  $w_i'$  and  $x_i'$  are vectors of covariates,  $\delta$  and  $\beta$  are vectors of parameters to estimate and  $\varepsilon_{1i}$  and  $\varepsilon_{2i}$  are the error terms. It is assumed that the error terms follow a bivariate normal distribution, with mean zero, variance one and correlation  $\rho$ . Our main interest is in estimating  $\beta$ , which will be inconsistent when obtained using standard regression techniques and the error terms of both equations are correlated. The bivariate sample selection model assumes that there is nonzero correlation between the error terms  $\varepsilon_{1i}$  and  $\varepsilon_{2i}$ :  $\rho \neq 0$ . To avoid identification by functional form specification, the selection equation should have at least one variable that is not in the outcome equation [45]; we include a set of individual health status variables that influence the selection equation but not the outcome. Table 1 (previous section) identifies those that are included only in the selection equation. These are health-related variables which should influence healthcare needs but not unmet needs. Individuals suffering from chronic conditions, for instance, require a continuous monitoring; while being vulnerable to healthcare needs, should present no augmented exposition to unmet needs due to regular and planned visits to the doctor and even greater confidence in terms of self-management of their illnesses.

Regarding the interpretation of results, we are interested in analysing the effects of covariates on the outcome. Once all coefficient estimates are obtained, one can consider estimating marginal effects of the covariates on several conditional probabilities of interest. Due to the non-linearity of the model specified, probabilities and marginal effects are functions of the covariates and model coefficients [47]. Here, and in line with Cameron and Trivedi [45], we compute the Average Marginal Effects (AMEs). These can be interpreted as the change on the interest probability when regressors suffer a small change [45]. In the case of dummy regressors, it is the discrete difference of the probabilities computed with these variables set to the values 1 and 0, which represents an absolute effect measure. The standard method of reporting AMEs is in the [0-1] probabilities metric, which may be considered rather unintuitive. Hence, we also present the results using the metric Number Needed to Treat (NNT). This is an absolute effect measure, used to assess beneficial and harmful effects of medical interventions [48]. NNT can be adapted to our setting and, despite the many contingencies in computing NNT associated with medical interventions, we will estimate it as follows:  $NNT = 1/(\text{Risk Difference})$ , where in our model the risk difference is the AME. The NNT metric signals how many people would have to experience an intervention in order to reduce the number of individuals with unmet needs by one.

We estimate the model through maximum likelihood (ML) in Stata 13.1 using the *heckprobit* command.

### 3. Results

As shown in Table 1, about 40% of individuals reported participating in informal networks; half were engaged in at least one civic activity. The average level of trust was slightly below the mid-point in the case of institutions and slightly above the mid-point in the case of trust in people. Opinions about health services were on average positive though not very high.

Taking into account only the individuals in need (78.3% of total sample; SE=0.003), the prevalence of unmet needs in Europe was 18.4% (SE=0.004).

Although our main interest lies on the determinants of unmet healthcare needs at the European level, there are variations across countries. Hence, Table 2 provides an overview of differences for some variables. Unmet needs given need vary from 5.7% in Netherlands to 30.5% in Poland. The level of need also varies greatly from 54.4% in Hungary to 90.7% in Portugal. Unmet needs in total population have a minimum of 4% in Netherlands and a maximum of 22.2% in Poland.



In terms of financial strain, while in Hungary only 7.2% of the population say they live comfortably with current income, in Denmark, this figure reaches 68.8%.

Concerning social capital, Table 2 also shows variations. Hungary has the lowest average values for informal networks and civic engagement.

Portugal has the highest average value for informal networks but trust is higher in Norway, Belgium and Denmark. Poland, Hungary and Slovenia, on the contrary, have the lowest figures for trust variables.

Regarding the regression analysis, the Wald test for independent equations shows that the null hypothesis that they are independent is rejected ( $\chi_1^2 = 185.74$ ;  $p < 0.001$ ), meaning that the disturbances in the two equations are correlated ( $\rho = -0.773$ ,  $p < 0.001$ ). This result evidences the presence of sample selection in our data.

Concerning the impact of explanatory variables on the probability of unmet needs, conditional on existing need (Table 3 -  $P(\text{sun}=1|\text{need\_hc}=1, X)$ ), those associated with social capital are statistically significant and in general the effects are as expected, that is, higher levels of social capital decrease the probability of unmet needs. However, civic engagement not only presents the largest magnitude but also has a positive coefficient.

Regarding the opinion about the state of health services, for each additional point, the probability of unmet needs decreases by about 0.015. Feeling discriminated or belonging to a minority ethnic group shows a relevant

effect. But, undoubtedly, one of the most important effects stems from income: living comfortably with current income decreases the probability of unmet needs by 0.08, compared to those who find it difficult to live with their current income. Coping with current income also has a relevant, though less pronounced, effect. Not being engaged in informal care has a negative and statistically significant effect.

Males have lower probability of unmet needs; age has a negative impact but of a smaller amount. Other statistically significant effects which increase the probability of unmet needs are living in urban areas and education (the coefficient is small but if we consider 10 additional years of full-time education the probability goes up by 0.03). Regarding health status variables, which influence unmet needs indirectly through needs, the number of chronic conditions and having diabetes have a positive impact. All categories of self-assessed health, compared to bad or very bad health, are statistically significant and decrease probability of unmet needs.

Regarding the interaction terms, we obtained no statistically significant outcomes (results available upon request).

The outputs in the second and third columns of Table 3 (concerning the probability of unmet needs conditional on needing healthcare and the probability of unmet needs, respectively) are similar in terms of signals and statistical significance.

For a more intuitive interpretation of results, Figure 2 shows the relative impact of several explanatory variables on the occurrence of unmet needs; in this case, the shorter the bars the greater the effect of the respective covariates. It can also be regarded as the policy effort (NNT) necessary to eliminate unmet needs. Now, the longer the bars the greater the effort. For instance, moving 12 individuals from the category ‘living with difficulty on present income’ to ‘living comfortably on present income’ would reduce the number of individuals with unmet needs by one. The same result would be obtained by moving 21 individuals from the category ‘living with difficulty on present income’ to ‘coping on present income’. Trust in health services also has great impact: moving 12 individuals with the worst opinion to an average value would reduce the number of individuals with unmet needs by one. On the positive segment of the x-axis in Figure 2, leading 27 individuals to stop feeling discriminated would reduce the number of individuals with unmet needs by one.

#### **4. Discussion**

The prevalence of unmet needs estimated in this study is high, meaning that authorities still face important challenges regarding inequalities in healthcare in Europe.

However, the combinations of needs, on the one hand, and unmet needs, given need, on the other, vary across countries meaning that problems and

priorities in terms of policy measures are likely to differ in the European panorama. Moreover, it matters whether one looks at unmet needs in the whole population or at unmet needs in the population with need. In Table 2, for instance, Finland has lower prevalence of unmet needs in the whole population than Portugal (17.9% versus 20.6%). However, once we consider only the population in need, both countries have similar figures (22.4% in Finland and 22.8% in Portugal). This happens because Portugal has more people in need than Finland (90.7% versus 79.8%). It might also imply that the need to pursue coordinated policies targeting population's health is more pertinent in Portugal.

In terms of the determinants of unmet needs, the central focus of this paper is on social capital. Globally, social capital dimensions seem to be relevant. Most studies have hitherto analysed and confirmed a positive relation between social capital and health; our results suggest that this relation also exists in the case of (access to) healthcare. Informal networks should be encouraged (in this regard, our results are in line with [9]) and interventions to help individuals to build trust, in general and in particular in health services, should be considered. The mean value of opinions about health services is 5.73 (in a scale from 0 to 10), thus, there seems to exist margin for improvement. There are countries (Hungary, Ireland and Poland) with mean values below 4, as shown in Table 2. Others, like Portugal and Slovenia, also have values below 5. In fact, the analysis of NNT shows that

changing expectations about health services has an impact similar to changing financial strain. Thus, these countries could gain a lot in terms of improved access by building trust in their health services.

Feelings of perceived discrimination also seem to be deterring individuals from seeking healthcare and strategies to tackle the problem should be implemented. The Expert Panel on Effective Ways of Investing in Health, created by the European Commission [49], has proposed a series of policy interventions to mitigate unmet needs in Europe. In the case of minorities and people feeling discriminated, the Panel draws particular attention on Roma, undocumented migrants and people with mental ill health. Proposed interventions range from establishing outreach services with trained peer health workers to help bridge the gap between the specific needs of excluded groups and mainstream health service provision as well as enhancing knowledge about health services and improving health literacy for underserved groups, to guaranteeing entitlement to health services, among others [16,50]. The magnitude of this sort of problems is also likely to vary across countries, being more pertinent in countries whose populations are composed of numerous ethnicities. In Table 2, for example, we can see that, apart from Israel (which has its own specificities), Great Britain and France have the highest percentages of people belonging to a minority or feeling discriminated (18.6 and 16.4 per cent, respectively).

The most unexpected result associated with social capital concerns the impact of civic engagement; being involved in this sort of activities (see Table 1 for the list included in the survey) increases the probability of unmet needs. In a previous study [9], volunteering and participation in a formal group also increased probability of unmet needs. We conjecture that this variable is influenced by reporting behaviour; that is, individuals involved in civic activities are probably more aware of their rights and have broader interpretations of these rights; otherwise, we would expect that more active individuals were able to better identify and navigate existing health services. We also performed the analysis replacing the binary variable ‘Civic\_engage’ by the number of civic activities in which individuals were engaged – no relevant changes were observed in the estimation results.

The same arguments might apply to education which has a positive impact on the probability of unmet needs as well. Previous findings are mixed in this regard. In [20], higher education decreased probability of unmet needs, while in [18], a negative relationship between tertiary education and probability of unmet needs for dental care was found and a positive relationship in the case of medical care. The authors suggest that more educated individuals have, on average, greater time constraints which may lead them to postpone medical visits or treatments.

These opposite effects stem from the complexity of access and the interaction between system and individual characteristics. On the one hand, promoting health literacy and empowerment of service users [50] is expected to decrease unmet needs (and needs themselves) by improving people's knowledge, motivation and competence to access, understand, appraise and apply health information in order to make judgments and take decisions about healthcare [16]. On the other, increased recognition of needs and services which can alleviate these needs might lead to more people reporting unmet needs. A study for Canada [5], for example, found that higher than expected use of health services was associated with reported unmet needs. Thus, unmet needs may also in part represent dissatisfaction with the health system which is in accordance with the above results concerning the impact of civic engagement and education. Living in urban areas increases the probability of unmet needs, which is a bit counter-intuitive as services are commonly concentrated in urban areas. However, it might be the case that regions with higher population density face disproportionately higher demand for healthcare. Around large cities, there are hospitals occupying the same land as they did for a long time, even though the distribution and composition of the population around the hospital may have changed beyond recognition [16]. It might also be the case that time constraints are higher in urban settings compared to rural.

Age decreases probability of unmet needs which might happen because older people are more aware of their health condition and consequently more inclined to visit the doctor or get treatment. A worrying finding is the impact of chronic conditions, in particular diabetes. Those who have persistent needs for healthcare, seem to end up, by this reason, more vulnerable to unmet needs. The organisation of health services must move from the traditional model based on hospitals and operating theatres and adapt to the growth of multi-morbidity and chronic diseases. Coordination and integration of services are necessary to facilitate the movement of patients between different services as the emergence of barriers along the path can lead to unmet needs [16]. Clinical guidelines and referral systems can also be used to help in this process of dealing with the needs of people with chronic diseases and multiple morbidities [50].

Finally, financial strain has great impact. Income thus seems to persist as a relevant barrier to access in Europe. Fjær et al. [22], using data from ESS7, also found that financial strain is a strong predictor of unmet need, being associated with all types of reasons (costs, waiting lists, other commitments). Possible measures to address this problem include the revision of user charges but this is not sufficient as people have to bear other costs (transport, for example) to receive healthcare. Identifying (and filling) gaps in publicly financed coverage of cost-effective services is of utmost relevance to reduce the need for using private services and hence



out-of-pocket payments. Medicines should be given careful attention in this regard as out-of-pocket payments for outpatient medicines are the single most important driver of healthcare related financial hardship among poor households [16]. Measures to increase access to medicines include the development of joint procurement agreements for medicines and instruments and incentives to ensure rational prescribing, among others. Last but not least, fiscal and social protection policies (affecting e.g. pensions and unemployment benefits) are critical to address poverty and income inequality [16, 50].

Evaluating access to healthcare through the analysis of self-reported unmet needs has some limitations, related with reporting behaviour, preferences, and it also leaves out individuals who do not report unmet needs but who spend a large share of their budgets on healthcare, even to such an extent that it must consume less of other necessary commodities [51]. It is also possible that some of the perceived needs are indeed needs for social rather than healthcare [14, 52].

Nonetheless, it has been the most adopted approach to assess forgone healthcare and should continue to be so [50]. In this paper we used data and methods that distinguish between individuals without unmet needs because they had their needs fulfilled and individuals without unmet needs because they did not have needs. The results in terms of error correlations support our modelling strategy. In fact, as we developed the current paper, the

questionnaire of EU-SILC changed with the inclusion of a question on whether individuals really needed medical examination or treatment [53].

This is a confirmation that this issue is not trivial and in the future more data will be available to further explore it. Moreover, in the future, with the collection of several rounds of data, temporal relationships between the dependent and independent variables, used in this study, might be modelled, which is not possible at the present with the (cross-sectional) ESS7 data.

Another feature which deserves attention in future works concerns the use of multilevel analysis to investigate how environmental variables and contextual factors (e.g. characteristics of the health system, the mix of health financing sources and other relevant variables measured at the country level) affect healthcare needs. Previous studies, using EU-SILC data [18-20], have considered some of these country level variables but results have been mixed. Hence, this research avenue should be further pursued, now testing with the indicator of unmet needs, given needs.

## **5. Conclusions**

Considering individuals who reported healthcare needs, a quite high proportion of them reported unmet needs. This result is worrying in a context of ongoing inequalities in health. Informal connections can play a relevant role in mitigating barriers to access as well as reinforcing trust,

particularly in healthcare services. These results are pertinent namely in contexts of economic crises and tight financial constraints, as those experienced by some European countries in recent years. In these situations it is even more important to identify non-financial mechanisms of improving access to healthcare. Closer attention should be given to informal carers and those feeling discriminated. This is a particularly sensitive matter as there are systematically underserved population groups in Europe such as Roma, undocumented migrants and people with mental ill health. Individuals with persistent needs, despite being, in principle, more frequent users of services, seem to end up more vulnerable to unmet needs. Thus, healthcare services must reinforce communication channels with these patients and might eventually adopt a casuistic approach whenever they use healthcare. Delivery models must evolve from the traditional focus on hospitals; the coordination and integration of services should be promoted and developed in order to facilitate the movement of patients between different settings. Residents in urban areas are more likely to report unmet needs; it should be investigated whether this result stems from preferences or from health service congestion. Financial strain stands out as one of the strongest predictors of unmet needs. Despite the attention given to financial protection of individuals and households for a long time [54], cost barriers remain a great obstacle to healthcare utilisation.

Interventions to tackle this problem include an array of policy measures

within and outside the health system. Reducing out-of-pocket payments for outpatient medicines is key to lower the risk of financial hardship among poor households but other measures within the areas of fiscal and social policies are also critical to address poverty and income inequality. A puzzling result that remains to future research concerns the positive impact of civic engagement on unmet needs.

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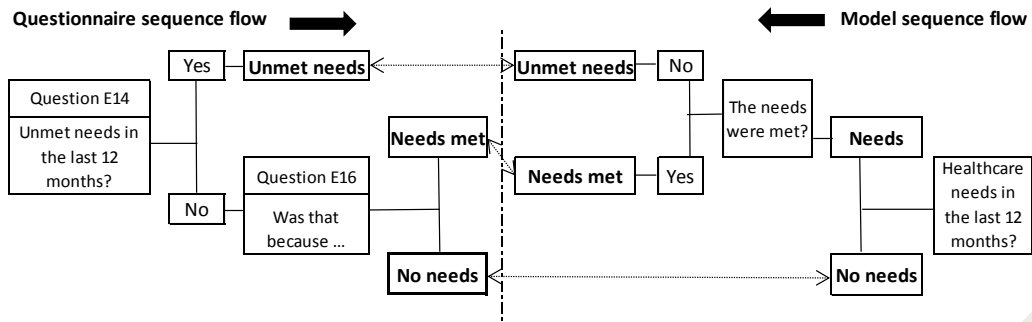
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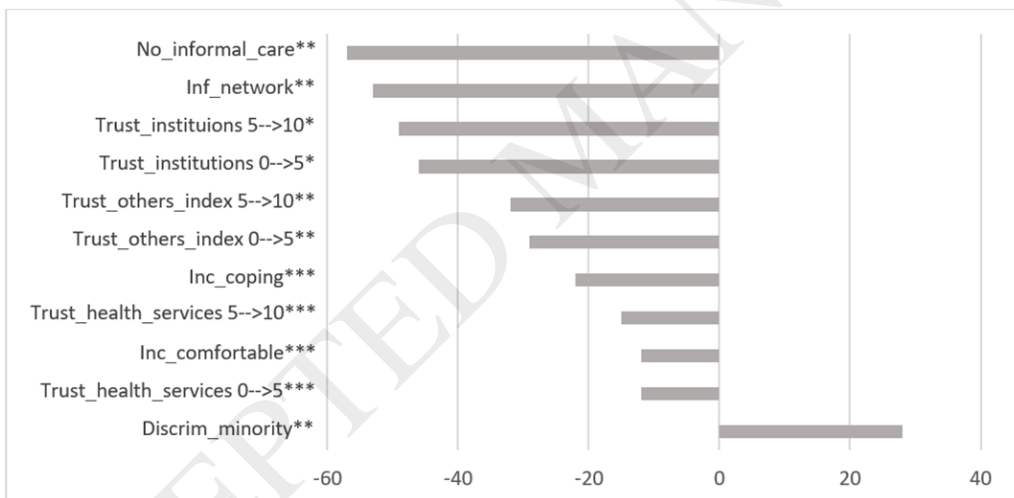
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**Figure 1. Unmet needs - from ESS7 questionnaire flow to model sequence flow**

*Note:* The data on unmet needs should be thought as if they were generated from two sequential and interrelated questions, the first questioning about healthcare needs and, to those who needed medical care, a further question inquiring about unmet healthcare needs. However, in ESS7 individuals are first inquired about unmet needs and then individuals without unmet needs are inquired about their need status. Here, it is illustrated how the data collected within ESS7 fit in our empirical model.



**Figure 2. Number needed to treat (NNT) for selected explanatory variables**

*Notes:* NNT corresponds to the number of people who would have to experience an intervention in order to reduce the number of individuals with unmet needs by one. For negative values (e.g. Trust\_health\_services 0-->5), because these are variables that decrease probability of unmet needs, then, to reduce unmet needs, interventions should consist in moving individuals to the indicated condition. In the case of positive values (e.g. Discrim\_minority), we have variables that increase the probability of unmet needs, thus, to reduce unmet needs, interventions should consist in withdrawing individuals from the condition in question.

\*\*\* $p < 0.01$ ; \*\* $p < 0.05$ ; \* $p < 0.1$

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**Table 1. Definition of explanatory variables and descriptive statistics**

<b>Explanatory variables</b>	<b>Description</b>	<b>Mean</b>	<b>S.D.</b>
<i>Sociodemographic</i> Age	age of the individual, in years (15-100)	49.08	18.45
Male	= 1 if the gender is male; 0 otherwise	0.476	0.499
Education	years of full-time education completed (0-42)	13.02	3.915
Alone	=1 if only one person lives regularly as a member of household; 0 otherwise	0.205	0.404
Children	=1 if there are children living at household; 0 otherwise	0.357	0.479
Married	=1 if the individual is married or lives with a partner; 0 otherwise	0.510	0.499
Divorced	=1 if the individual is divorced or legally separated; 0 otherwise	0.106	0.308
Widow	=1 if the individual is a widow; 0 otherwise	0.080	0.271
Single	=1 if the individual is single; 0 otherwise ( <i>omitted category</i> )	0.295	0.455
Citizen	=1 if the individual is a citizen of the country ; 0 otherwise	0.958	0.199
<i>Occupation</i> Paid_work	=1 if the individual's main activity in the 7 days prior to the survey was paid work; 0 otherwise	0.509	0.499
Unemployed	=1 if the individual's was unemployed in the 7 days prior to the survey (either looking for a job or not); 0 otherwise	0.054	0.227
Retired	=1 if the individual's was retired in the 7 days prior to the survey; 0 otherwise	0.247	0.431
Student	=1 if the individual's main activity in the 7 days prior to the survey was education; 0 otherwise	0.083	0.276

Others	=1 if the individual's main activity in the 7 days prior to the household was housework, community or military service or other; permanently sick or disabled; 0 otherwise ( <i>omitted category</i> )	0.105	0.306
<i>Financial strain</i> Inc_comfortable	=1 if the individual is living comfortably on present income; 0 otherwise	0.342	0.474
Inc_coping	=1 if the individual is coping on present income; 0 otherwise	0.456	0.498
Inc_difficulty	=1 if the individual lives with difficulty on present income; 0 otherwise ( <i>omitted category</i> )	0.202	0.401
<i>Place of residence</i> Urban	=1 if the individual lives in a big city or in the suburbs or outskirts of a big city; 0 otherwise	0.323	0.467
Mixed area	=1 if the individual lives in a town or small city; 0 otherwise	0.317	0.465
Rural	=1 if the individual lives in a country village or in the countryside; 0 otherwise ( <i>omitted category</i> )	0.358	0.479
No_informal_care	=1 if the individual does not spend any time looking after or helping family members, friends, neighbours or others; 0 otherwise	0.675	0.468
<i>Health information</i> Nodiscussion	=1 if the individual did not discuss health with medical specialist or general practitioner, in the 12 months preceding the survey; 0 otherwise	0.044	0.206
<i>Social capital - bonding</i> Inf_network	=1 if the individual socially meets with friends, relatives or colleagues intensively (several	0.414	0.492



	times a week or everyday); 0 otherwise		
<i>Social capital - bridging</i> Civic_engage	= 1 if the individual was engaged in any of the following activities, in the 12 months preceding the survey (0 otherwise): - contacted politician or government official - worked in political party or action group - worked in another organisation or association - worn or displayed campaign badge or sticker - signed petition - taken part in lawful public demonstration - boycotted certain products	0.501	0.500
<i>Social capital - cognitive</i> Trust_others_index	average of the answers to the questions about: (i) opinion about people, if they are helpful or not (from 0-selfish to 10 – mostly helpful); (ii) opinion about people, if they try to take advantage or try to be fair (from 0 – try to take advantage to 10 – try to be fair); (iii) opinion about people, if can be trusted (from 1 – you can't be too careful- to 10 – most people can be trusted)	5.419	1.834
Trust_institutions_index	average of the answers to the questions about if the individual trusted each of the following institutions: national parliament; the legal system; the police; politicians; and political parties (from 0 – no trust at all – to 10 – complete trust)	4.693	2.078

Trust_health_services	opinion about country's health services (from 1-extremely bad to 10-extremely good)	5.732	2.456
Discrim_minority	=1 if the individual describes himself as being a member of a group discriminated against in the country or if belongs to minority ethnic group in the country; 0 otherwise	0.110	0.313
<i>Health variables</i> Num_chronic_cond <sup>a</sup>	number of the following health problems from which the individual suffers in the 12 months preceding the survey: heart or circulation problems; high blood pressure; breathing problems; allergies; back or neck pain; muscular or joint pain in hand or arm; muscular or joint pain in foot or leg; stomach or digestion related problems; skin condition problems; severe headaches or diabetes	1.765	1.688
High_blood_pressure <sup>a</sup>	=1 if the individual has had high blood pressure in the 12 months preceding the survey; 0 otherwise	0.186	0.389
Breathing_problems <sup>a</sup>	=1 if the individual has had breathing problems in the 12 months preceding the survey; 0 otherwise	0.086	0.280
Allergies <sup>a</sup>	=1 if the individual has had allergies in the 12 months preceding the survey; 0 otherwise	0.121	0.326
Back_neck_pain <sup>a</sup>	=1 if the individual has had back or neck pain in the 12 months preceding the survey; 0 otherwise	0.390	0.488
Severe_headaches <sup>a</sup>	=1 if the individual has had severe headaches in the 12	0.134	0.340

	months preceding the survey; 0 otherwise		
Diabetes <sup>a</sup>	=1 if the individual has had diabetes in the 12 months preceding the survey; 0 otherwise	0.056	0.231
SAH_very_good <sup>a</sup>	=1 if the individual's self-assessed health is very good; 0 otherwise	0.249	0.433
SAH_good <sup>a</sup>	=1 if the individual's self-assessed is good; 0 otherwise	0.436	0.496
SAH_fair <sup>a</sup>	=1 if the individual's self-assessed is fair; 0 otherwise	0.244	0.429
SAH_bad_very_bad <sup>a</sup>	=1 if the individual's self-assessed health is bad or very bad; 0 otherwise ( <i>omitted category</i> )	0.071	0.256
Never_smoke <sup>a</sup>	=1 if the individual has only smoked a few times or if he has never smoked; 0 otherwise	0.537	0.499
Drink_up_once_month <sup>a</sup>	=1 if the individual reports to drink alcohol up to once a month; 0 otherwise;	0.454	0.498

*Country dummies:* AT-Austria; BE-Belgium; CZ-Czech Republic; DK-Denmark; FI-Finland; FR-France; DE-Germany; HU-Hungary; IE-Ireland; IL-Israel; LT-Lithuania; NL-Netherlands; NO-Norway; PL-Poland; PT-Portugal; SI-Slovenia (*omitted category*); ES-Spain; SE-Sweden; CH-Switzerland; GB-United Kingdom

*Notes:* a- variables included only in the selection equation

**Table 2 – Descriptive statistics for selected variables in European countries**

Variables	Mean																			
	AT	BE	CH	CZ	DE	DK	ES	FI	FR	GB	HU	IE	IL	LT	NL	NO	PL	PT	SE	SI
Unmet need (in total population)	0.061	0.103	0.066	0.055	0.162	0.066	0.128	0.179	0.201	0.131	0.059	0.069	0.192	0.126	0.040	0.131	0.222	0.206	0.105	0.092
Need (in total population)	0.822	0.792	0.792	0.604	0.880	0.762	0.818	0.798	0.828	0.766	0.544	0.564	0.667	0.636	0.705	0.749	0.726	0.907	0.648	0.758
Unmet/Need (unmet need in population in need)	0.074	0.130	0.083	0.092	0.184	0.086	0.157	0.224	0.242	0.171	0.108	0.122	0.288	0.198	0.507	0.175	0.305	0.228	0.161	0.122
<i>Sociodemographic</i>																				
Age	49.52	46.98	47.82	47.04	50.13	48.03	47.29	50.99	49.72	52.12	50.00	50.30	48.72	49.39	51.01	46.57	46.13	53.06	49.40	49.30
Male	0.467	0.504	0.512	0.461	0.514	0.522	0.536	0.499	0.479	0.459	0.432	0.449	0.440	0.371	0.448	0.533	0.465	0.436	0.500	0.469
<i>Financial Strain</i>																				
Inc_comfortable	0.302	0.360	0.579	0.125	0.399	0.686	0.305	0.250	0.327	0.397	0.072	0.268	0.256	0.151	0.484	0.641	0.108	0.131	0.640	0.379
Inc_coping	0.565	0.414	0.320	0.505	0.499	0.253	0.454	0.617	0.470	0.433	0.516	0.473	0.422	0.536	0.381	0.288	0.668	0.498	0.287	0.455
<i>Social capital - bonding</i>																				

Inf_network	0.3 93	0.5 00	0.4 91	0.2 91	0.3 64	0.5 32	0.5 05	0.4 33	0.5 11	0.3 95	0.1 34	0.3 27	0.3 44	0.1 96	0.5 89	0.5 71	0.2 36	0.6 67	0.6 01	0.3 32
<i>Social capital - bridging</i>																				
Civic_engage	0.5 01	0.4 69	0.5 78	0.2 74	0.6 65	0.6 60	0.5 60	0.7 29	0.6 41	0.5 68	0.1 61	0.4 61	0.3 70	0.2 22	0.5 93	0.6 71	0.2 55	0.3 63	0.7 74	0.2 90
<i>Social capital - cognitive</i>																				
Trust_others_index	5.2 89	5.1 48	5.9 11	4.6 10	5.4 48	6.7 60	4.8 60	6.5 31	5.1 05	5.7 31	4.4 25	5.6 28	5.1 10	4.9 33	6.0 26	6.5 26	4.0 98	4.3 37	6.3 92	4.6 92
Trust_institutions_index	4.7 37	4.8 06	6.0 50	4.0 83	5.0 43	6.2 15	3.6 48	5.8 95	4.1 40	4.6 19	4.0 36	4.3 74	4.0 35	3.8 64	5.4 39	6.3 80	3.1 23	3.3 42	5.9 39	3.0 70
Trust_health_services	6.6 52	7.4 66	7.3 26	6.0 48	5.8 54	6.5 66	4.7 12	6.8 40	6.2 92	5.9 74	3.3 48	3.9 80	6.2 02	5.0 44	5.9 60	6.8 25	3.4 37	4.5 55	5.7 51	4.5 54
Discriminatory	0.0 70	0.0 93	0.1 04	0.0 74	0.0 76	0.0 70	0.0 81	0.0 94	0.1 64	0.1 86	0.0 77	0.0 74	0.3 07	0.1 39	0.1 18	0.0 94	0.0 52	0.5 02	0.1 13	0.0 53

Minimum (Maximum) value in light (dark) grey

**Table 3. Average marginal effects of explanatory variables on the probability of: subjective unmet needs conditional on existing need for healthcare [P(sun=1|need\_hc=1, X)]; subjective unmet needs [P(sun=1|X)]; need for healthcare [(P(need\_hc = 1 |X)]**

Explanatory variable	P(sun=1  need_hc=1, X)	P(sun=1 X)	P(need_hc = 1  X)
<i>Sociodemographic</i>			
Age	-0.0027 ***	-0.0029 ***	-0.0003
Male	-0.0235 ***	0,0009	-0.0578 ***
Education	0.0032 **	0.0028 *	0.0015
Alone	-0.0031	0.0099	-0.0287 **
Children	0.0143	0.0167	-0.0015
Married <sup>a</sup>	-0.0272 *	-0.0376 **	0.0156
Divorced <sup>a</sup>	0.0011	-0.0034	0.0099
Widow <sup>a</sup>	-0.0335 *	-0.042 *	0.0081
Citizen	-0.0327 *	-0.0466 *	0.0227
<i>Occupation</i>			
Paid_work <sup>b</sup>	0.0172	0.0394 **	-0.0435 ***
Unemployed <sup>b</sup>	0.0145	0.0437 *	-0.0583 **
Retired <sup>b</sup>	-0.0156	-0.0282	0.0233
Student <sup>b</sup>	-0.0311 *	-0.0275	-0.0177
<i>Financial Strain</i>			
Inc_comfortable <sup>c</sup>	-0.0826 ***	-0.1036 ***	0.0204 *
Inc_coping <sup>c</sup>	-0.0468 ***	-0.0525 ***	0.0009
<i>Place of residence</i>			
Urban <sup>d</sup>	0.0247 **	0.0194 *	0.0168 *
Mixed area <sup>d</sup>	0.0142	0.0091	0.0142 *
No_informal_care	-0.0201 **	-0.0216 *	-0.0015
<i>Health information</i>			
Nodiscussion	-0.0168	-0.0054	-0.0297
<i>Social capital - bonding</i>			
Inf_network	-0.018 *	-0.0208 *	0.0008
<i>Social capital - bridging</i>			
Civic_engage	0.0438 ***	0.0402 ***	0.0187 **
<i>Social capital - cognitive</i>			
Trust_others_index	-0.0069 **	-0.0074 **	-0.0004
Trust_institutions_index	-0.0043 *	-0.0076 **	0.006 **

Trust_health_services	-0.0149 ***	-0.0175 ***	0.002
Discrim_minority	0.0364 **	0.039 **	0.0018
<i>Health variables</i>			
Num_chronic_cond	0.0217 ***	-	0.052 ***
High_blood_pressure	0.0045	-	0.0108
Breathing_problems	-0.0083	-	-0.0201
Allergies	-0.0052	-	-0.0125
Back_neck_pain	-0.0079 *	-	-0.0191 *
Severe_headaches	-0.0023	-	-0.0056
Diabetes	0.0234 ***	-	0.0539 ***
SAH_very_good <sup>e</sup>	-0.0893 ***	-	-0.2352 ***
SAH_good <sup>e</sup>	-0.0618 ***	-	-0.1521 ***
SAH_fair <sup>e</sup>	-0.0328 ***	-	-0.0833 ***
Never_smoke	-0.0016	-	-0.0038
Drink_up_once_month	-0.0019	-	-0.0045
<i>Country dummies<sup>f</sup></i>			
AT	-0.0337*	-0.0764***	0.0848***
BE	0.0362*	0.0247	0.0308*
CH	0.0091	-0.0125	0.0481***
CZ	-0.0139	0.0153	-0.04671***
DE	0.066***	0.0301	0.0865***
DK	-0.0072	-0.0051	-0.0633
ES	0.0056	-0.0259	0.0688***
FI	0.1408***	0.1452***	-0.001
FR	0.1117***	0.0911***	0.056***
GB	0.0604**	0.0611**	0.0092
HU	-0.0352*	0.0313	-0.1574***
IE	-0.0038	0.0387	-0.0919***
IL	0.1948***	0.2126***	-0.0349*
LT	0.0719**	0.1146***	-0.0777***
NL	-0.0729***	-0.0633***	-0.0564***
NO	0.1165***	0.1226***	-0.0031
PL	0.134***	0.1421***	-0.0032
PT	0.0727**	0.0317	0.0921***
SE	0.0677**	0.1244***	-0.1063***

Notes: \*\*\*p<0.01; \*\*p<0.05; \*p<0.1.

Reference categories: a- Single; b - Others; c - Inc\_difficulty; d – Rural area; e -SAH\_bad\_very\_bad; f - SI