Geographical patterns of unmet health care needs in Italy

Cavalieri, Marina
Department of Economics and Quantitative Methods,
University of Catania

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GEOGRAPHICAL PATTERNS OF UNMET HEALTH CARE NEEDS IN ITALY

Marina Cavalieri*

Abstract. In recent years, health care reforms and restrained budgets have risen concerns about accessibility to health services, even in countries with universal coverage health systems. Previous studies have explored the issue by using objective event-oriented measures such as those related to utilization of health care. Analyzing access through subjective process-oriented indicators allows to better disentangle the process of seeking care, to investigate self-perceived barriers to health services and to account for differences in individual health care preferences. In this paper, data from the 2006 Italian component of the European Survey on Income and Living Conditions (EU-SILC) are used to explore reasons and predictors of self-reported unmet needs for specialist and/or dental care among adult Italians aged 18 and over. Results reveal different patterns across socio-economic groups and geographical macro-areas. Evidence of income-related inequalities and violations of the horizontal equity principle are also found both at a national and regional level. Policies to address unmet health care needs should adopt a multidimensional approach and be tailored so as to consider such heterogeneities.

Keywords: unmet health care needs, access to health care, inequality, inequity, Italy

JEL classification: I11, I18, C31

1. Introduction

Since its founding in 1978, the Italian National Health Service (*Servizio Sanitario Nazionale*, SSN) has had a statutory obligation to provide equal access according to needs to all citizens and legal residents, regardless of factors such as income, gender, ethnicity, education, religion and geographical location. The SSN draws on the principles of universalism and comprehensiveness established in the Italian Constitution which defines health as "a fundamental right of the individual and as a collective interest, and guarantees free medical care to the indigent" (Art. 32). The health decentralization process undergone since the 1990s and the 2001 amendment to the Title V, part two, of the Constitution have further shared responsibilities for health care provision between central government and the regions, by establishing the exclusive competency of the former to set the "essential levels of care" (Livelli essenziali di assistenza, LEA) to be provided uniformly across the country and by making the latter fully responsible for their provision and the organisation of health care in their own territories (Art. 117).

*Department of Economics and Quantitative Methods, University of Catania, Corso Italia, 55 - 95121 Catania, Italy. E-mail: mcavali@unict.it.

Despite the SSN egalitarian mandate, there is evidence that inequity in the access to health care services, in terms of both quantity and quality of care received by individuals in equal need, still exists. In particular, Italy exhibits marked income-related and regional variations in the use of health care services, with a clear-cut north-south divide (Masseria, 2003; Giannoni and Masseria, 2005; Giannoni *et al.*, 2007; Giannoni, 2008). Common to this literature is the reliance on actual utilization (measured by indicators such as physician visits and hospitalization rates) as a proxy for access. However, by relying on this approach, those perceived medical needs that do not turn into demand and, therefore, remain unmet are neglected. Moreover, measuring access to health care services through objective rather than subjective indicators does not allow to control for differences in individual preferences that could account for differences in utilization patterns, without necessarily implying an inequitable treatment (Koolman, 2007). Lastly, these studies do not fully investigate the process of seeking medical care and the subjective barriers individuals with health needs encounter in accessing it.

Unmet need for health care is a quite elusive concept. Carr and Wolf (1976) define unmet needs as the differences, if any, between services judged necessary to deal appropriately with health problems and services actually received. In their words: "an unmet need is the absence of any, or of sufficient, or of appropriate care and services". According to this definition, a health care need remains unmet if services are unavailable not only in the right quantity and/or quality, but also whenever and/or wherever they are required. Hence, either features of the health care system (i.e. lack of supply, waiting times, etc.) or personal characteristics of individuals seeking care (i.e. income, time or family constraints, etc.) can give rise to unmet needs.

Researches on unmet health care needs have taken place mainly in the US and Canada and have found prevalences in the population ranging from 5 to 20 percent in the former and from 4 to 12 percent in the latter[1]. A general trend towards a rise in the phenomenon over recent years has also been observed. Although one should be aware about making comparisons between these studies because of the variability in the methods and designs used, prevalences in the US are generally found to be higher than in Canada, showing that unmet needs are related to health coverage, a factor that in theory should not be an issue in countries with a universally accessible publicly funded healthcare system. However, this is not always the case. For a country with a NHS, meeting the needs of all individuals who seek health care is not just a matter of equity but also of efficiency, provided that a timely health care response may often prevent the onset of more serious illness, complications and thus the provision of more costly treatments. Therefore, the prevalence of unmet health needs can also be understood as an indicator of health system performance.

To inform policy makers about the capacity of a given health care system to appropriately respond to the citizens' needs, it is important to investigate reasons why some individuals do not receive the required care and to identify factors that put help-seekers at higher risk of making such experience. Indeed, the already cited literature has found that the unmet need risk for health care is greatest among specific vulnerable sub-populations (e.g. women, less healthier and low-income individuals, immigrants, etc.)[2]. To the best of our knowledge no previous studies have explored this issue for Italy. The present paper intends to fill in the

[1] See, for Canada, Chen and Hou (2002), Sanmartin *et al*. (2002), Wilson and Rosenberg (2004), Wu *et al*. (2005), Bryant *et al*. (2008), Levesque *et al*. (2008); for the US, Diamant *et al*. (2004), Mollborn *et al*. (2005), Shi and Stevens (2005), Pagan and Pauly (2006); for Sweden, Westin *et al*. (2004).
[2] Shi and Stevens, 2005.

existing gap by focusing on that portion of the population with perceived health problems that, however, does not receive specialist and/or dental care and by analyzing reasons, predictors and geographical disparities of these unmet health needs. Finally, income-related inequality in unmet health needs by a decomposition approach is explored and the existence of horizontal inequity is tested for different geographical areas.

The paper proceeds as follows. In section 2, a short outline of specialist and dental care facilities provided by the Italian health care system is presented. Section 3 describes data source, variables, estimation approach and inequality and inequity measurement methodologies. Results are shown and discussed in section 4. The last section concludes.

2. Specialist and dental care in Italy

Within the Italian SSN, specialized outpatient care, including visits, diagnostic and curative activities, is provided either by public or by accredited private facilities with which the Local Health Authorities (LHAs) have made agreements and signed contracts. Access to these services is regulated through referral from general practitioners (GPs), who act as gatekeepers. Once authorized by their GP, patients are free to choose any accredited provider and place of treatment. A national list, drawn up in 1996, defines all the specialist services included in the national benefit package. Regions are, however, free to deliver additional services for which they are financially responsible. Depending on the region of residence, the payment of a ticket is sometimes required as an additional source of financing and in an attempt to discourage an inappropriate use. Nonetheless, ticket exemption is allowed for patients with low income and chronic pathologies. Without being authorized by a GP, direct access to public specialist care must be financed out-of-pocket or through a privately purchased health insurance. Because of long waiting lists and the often unsatisfactory quality of public services, many patients seek care outside the SSN, resorting to private providers[3]. Since these are not regulated by the public system, their fees are market-based and, therefore, much higher than those of public specialists. Although the utilization of private specialist services differs greatly by region, in 2005 an average of about 48% of specialist visits and 21% of diagnostic services were entirely paid out of pocket (ISTAT, Multiscopo Survey).

Despite the influence of oral diseases on individual's well-being and quality of life, dental care has received little attention by the SSN. Almost all types of dental services are excluded from the nationally provided package of essential levels of care (Decree "DPCM 29/11/2001"). The only exception is represented by a limited set of services available for "vulnerable" groups of individuals defined according to age (i.e. children aged 0-14), income and specific chronic conditions (e.g., metabolic diseases, immunodeficiency, etc.). To receive this care, all patients (except for exempted categories) have to pay a ticket. The extremely limited public coverage has been historically justified on the ground that much of the demand for dental treatments results from pure esthetical considerations and, therefore, may not be considered strictly necessary. However, numerous regions have decided to guarantee some additional dental care services to their residents on the basis of regulated fees. This notwithstanding, the extremely low number of public dentists and the long waiting times continue to induce the overwhelming majority of the Italian population in need of dental care to visit private dentists (92% in 2005 according to ISTAT, Multiscopo Survey).

[3] Although a 1999 reform introduced constraints on the dual practice regime, SSN specialists continue *de facto* to practice privately.

3. Material and methods

3.1. Data source

The data are taken from the 2006 Italian component of the European Union Survey on Income and Living Conditions (EU-SILC). The EU-SILC is based on a standardized questionnaire for all EU countries, aiming at providing timely and comparable cross-sectional and longitudinal multidimensional micro data on income, poverty, social exclusion and living conditions. Although the survey is mainly oriented to the analysis of poverty and deprivation, it provides the opportunity to explore issues related to health accessibility since a set of items are specifically designed to measure self-assessed health status and barriers encountered by household members aged 16 and over in trying to access to medical services. The 2006 module for Italy, conducted by the National Institute of Statistics (ISTAT), comprises 21,499 households (54,512 individuals) who were selected from across Italy, using a two-stage sampling procedure according to which municipalities are first divided into strata (by administrative region and number of residents) and then, for each strata, a sample of municipalities is chosen (first stage) and households are selected randomly within each municipality from the register office records (second stage). Further details on the EU-SILC design, sample selection strategy and interview procedures are available elsewhere (ISTAT, 2008).

For the specific purpose of this work, attention is restricted to adults aged 18 and older (45,358 eligible observations). Respondents with less than 18 years old are removed from the study sample since their access to health care services is generally tied to the decisions of their parents or legal guardians.

3.2. Variable definitions

The Italian version of the EU-SILC collects information on individuals' unmet needs for two types of health care, namely specialist treatments (with the exception of dental ones) and dental services[4]. Self-reported unmet needs for consulting a medical specialist are defined on the basis of the following question: "During the past 12 months, was there ever a time when you needed a visit by a specialist or a medical treatment but you did not receive it?". A similarly worded question is addressed to identify self-perceived unmet needs for dental care. Respondents who reply affirmatively (i.e. yes, there was at least one occasion when the person really needed examination or treatment but did not) are coded as having an unmet need and are then asked the main reason for not getting specialist/dental care. Possible answers are: 1) could not afford to (too expensive); 2) too long waiting lists; 3) could not take time because of work, care for children or for others 4) too far to travel/no means of transportation; 5) fear of the specialist/dentist; 6) wanted to wait and see if the problem got better on its own; 7) did not know any good specialist/dentist; 8) other reasons. Multiple responses are not allowed.

Following the previous literature on access barriers to health care services, answers are classified into four different categories according to the nature of the stated reason: availability, accessibility, acceptability and other (Chen and Hou, 2002). The first group

[4] Indeed, the technical guidance provided by the EUROSTAT to each member state, asserts that in principle, there is no reason for excluding from the survey questions on unmet needs for general practitioners (GPs). However, since in most EU countries access to GPs is generally open, it is mainly at the stage of access to specialist examinations and treatments that restrictions show up.

includes only the "waiting list" response, as an indicator of unavailability of the service at time required. The accessibility category relates to barriers, such as financial and transportation problems, that are not voluntary chosen by the individual and can be hardly overcome in the short run. With the exception of the "other" response which is separately tabulated, all the remaining reasons, partly due to a personal choice and mainly concerning attitudes, personal beliefs and competing responsibilities, are grouped into the acceptability category.

The well-establish Andersen Behavioural Model provides the conceptual framework for the analysis (Andersen, 1968). Although this model, refined and extended several times by Andersen himself and by his colleagues Newman and Aday (see, among others, Andersen and Newman, 1973; Aday and Andersen, 1974; Andersen, 1995), was originally developed to examine medical care service utilisation, it has also been successfully used to predict unmet needs for health services (Shi and Stevens, 2005; Mollborn *et al*., 2005; Wu *et al.*, 2005). According to the behavioural approach, individual predictors of health care service use are classified into three categories: *predisposing factors*, such as socio-demographic characteristics (e.g., age, sex, education, marital and occupational status, race, religion) and health beliefs that shape the propensity of individuals to use services; *enabling factors*, which refer to community (e.g., rural-urban character, supply features) and personal or family (e.g., income, insurance coverage) resources that promote or inhibit use; and *need factors*, which encompass the individual's illness or impairment that necessitate use.

Building upon this approach, the selected predictors are typical of those found in previous studies on medical care use and non-use. Respondents are classified into age groups, namely 18-44, 45-64 and more than 64 years old. Interactions between age and gender are considered and male individuals 18-44 years old represent the reference category. Education and marital status are included as predictors since they are assumed to affect the propensity to seek care. Education refers to the highest degree attained based on the International Standard Classification of Education (ISCED). Three categories are included in the analysis: less than second stage of secondary education (ISCED-97: codes 0-2), second stage of secondary level of education (ISCED-97: codes 3-4), tertiary education (ISCED-97: codes 5-6). Marital status distinguishes between married, unmarried (including co-habiting) and separated/divorced/widowed. Employment status, which is likely to affect the time price of health care use, is presented as a dichotomous variable to reflect whether the individual is currently working (full-time, part-time or self-employed) or other (unemployed, retired, student, doing housework and other economically inactive). Respondents' actual citizenship status is coded by the EU-SILC as Italian, any EU-25 country except Italy and any other country. The income variable is the logarithm of annual disposable (i.e. after-tax) household income per equivalent adult, using the modified OECD equivalence scale to account for household size and composition[5]. The impact of supply-side factors is explored at regional level by augmenting the dataset with external information on the number of both public and accredited private ambulatory and laboratory facilities and the number of dentists per 100,000 inhabitants. Data on these two variables refer to the year 2006 and are respectively from the ISTAT indicators on regional health systems and the National Federation of Surgeons' and Dentists' Associations (*Federazione Nazionale degli Ordini dei Medici Chirurghi e degli Odontoiatri*, FNOMCEO). Geographical effects, other than those determined by differences

[5] The modified OECD equivalence scale gives a weight of 1.0 to the first adult, 0.5 to the second and each subsequent person aged 14 and over, and 0.3 to each child aged under 14 in the household, being calculated as:
equivalent income = [(income)/(1+0.5*(number of adults – 1) + 0.3*children)].

in the observed supply factors, are captured by grouping the 19 Italian regions and the 2 autonomous provinces into five macro-areas: North-West, North-East, Centre, South and Islands.

The choice of health measures was limited to some degree by what was available across the dataset employed in the analysis. As proxies of specialist care need, three types of questions are considered. First, respondents' rating of their general health status in accordance with a standard five-point scale (very good, good, fair, bad, very bad)[6]. Second, responses to "Do you suffer from any chronic illness or condition? (yes/no)". Third, data indicating whether or not a respondent has being hampered in daily activities because of health problems for at least the last 6 months. To predict dental care needs, the above-mentioned health status variables do not seem to be particularly appropriate[7]. Indeed, Allin, Masseria and Mossialos (2006) report that a preliminary analysis of their data on health care use showed that healthy individuals were more likely to access dental care than those who had more self-reported general health problems. This finding seems consistent with the idea that, in the case of dental care, self-rated general health status acts rather as a predisposing factor than a need indicator (Gilbert, Duncan and Vogel, 1998). Therefore, in absence of information on individuals' dental and oral health status (i.e. number of teeth, dentures, tooth decays, filled teeth, bleeding gums, etc.) as well as lifestyle habits like smoking and drinking, only age and sex are considered as proxies of dental needs.

3.3. Analysis

All analyses were performed using Stata version 9.1. Data were weighted at individual level (cross-sectional weights provided by the EU-SILC) to make the results representative for the Italian general population. Robust estimators of variance that account for the effects of weighting were used (Huber 1967; White 1980, 1982). Cases missing information on any of the selected variables accounted for less than 0.5% of the total and were therefore excluded from the final sample (45,175 respondents representing the population of about 48.8 million). An overview of all explanatory variables used in this study with their sample-weighted means and standard deviations is provided in Table 1.

Firstly, the prevalence for different types of unmet health needs (specialist care only, dental care only and both specialist and dental care) was estimated among adult Italians. The percentage contribution of each related reason was also computed. Analogous analyses were then performed at a sub-national level, by grouping Italian regions into five macro-areas. Chi-square tests were used to identify statistically significant differences between groups and geographical areas. Finally, a series of multivariate regression analyses were conducted to examine the simultaneous influence of the selected predisposing, enabling and need factors on whether individuals had experienced unmet needs for specialist and/or dental care.

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[6] Self-assessed health (SAH) has been extensively used in previous researches on the relationship between health and use of medical care (Grootendorst, 1995; Van Doorslaer *et al*., 2004; Morris *et al*., 2005). This variable has also been shown to be a powerful predictor of mortality (Idler and Kasl, 1995; Idler and Benyamini, 1997).

[7] Studies on the demand for dental care have sometimes considered the self-reported general health status as an indicator of dental care need (see, among others, Manning and Phelps, 1979 and Sintonen and Linnosmaa, 2000).

Table 1
Variable definitions and summary statistics (N=45,175)

Variable name	Variable definition	Mean	St. Dev.
Predisposing factors			
Age/Sex			
Age1844M	Men with age between 18 and 44 years old (*ref. category*)	0.227	0.419
Age4564M	Men with age between 45 and 64 years old	0.151	0.358
Age65M	Men with 65 years old or more	0.103	0.304
Age1844F	Women with age between 18 and 44 years old	0.222	0.416
Age4564F	Women with age between 45 and 64 years old	0.156	0.363
Age65F	Women with 65 years old or more	0.140	0.347
Education			
Primary	1 if less than second stage of secondary level, 0 otherwise (*ref. category*)	0.560	0.496
Secondary	1 if second stage of secondary level education, 0 otherwise	0.335	0.472
Tertiary	1 if tertiary education, 0 otherwise	0.105	0.307
Marital status			
Married	1 if married, 0 otherwise (*ref. category*)	0.586	0.493
Unmarried	1 if never married, 0 otherwise	0.280	0.449
S/D/W	1 if separated/divorced/widowed, 0 otherwise	0.135	0.341
Employment status			
Working	1 if currently working, 0 otherwise	0.456	0.498
Citizienship			
Italian	1 if Italian, 0 otherwise (*ref. category*)	0.957	0.202
EU25	1 if any EU25 country except Italy, 0 otherwise	0.003	0.059
Other	1 if any country except EU25, 0 otherwise	0.039	0.194
Enabling factors			
Income			
LnInc	Log of equivalised disposable household income	9.503	1.000
Supply-side factors			
Amb	N. of public and accredited private ambulatories and laboratories per 100,000	17.960	8.552
Dent	inhabitants	88.349	12.877
Geographical areas	N. of dentists per 100,000 inhabitants		
North-West		0.269	0.444
North-East	1 if North-West region, 0 otherwise (*ref. category*)	0.191	0.393
Centre	1 if North-East region, 0 otherwise	0.195	0.396
South	1 if Centre region, 0 otherwise	0.233	0.422
Islands	1 if South region, 0 otherwise	0.112	0.315
	1 if Island region, 0 otherwise		
Need factors			
Health status			
SAH1		0.131	0.337
SAH2	1 if self-assessed health status is very good, 0 otherwise (*ref. category*)	0.436	0.496
SAH3	1 if self-assessed health status is good, 0 otherwise	0.328	0.470
SAH4	1 if self-assessed health status is fair, 0 otherwise	0.087	0.281
SAH5	1 if self-assessed health status is bad, 0 otherwise	0.019	0.135
Chronic conditions	1 if self-assessed health status is very bad, 0 otherwise		
Chronic		0.215	0.411
Health limitations	1 if having any chronic condition, 0 otherwise		
Hampered		0.231	0.421
	1 if hampered by health problems, 0 otherwise		

Note: Weighted means. Because of rounding, detail may not add to totals.

Given the dichotomous nature of the dependent variables, binary response models were indicated. The link test (Tukey, 1949; Pregibon, 1980) was used to choose between the linear probability model (LPM), and the non-linear logit and probit specifications. According to this test, the model of interest was estimated, and the linear prediction and its square were computed. The dependent variable was then regressed using the same specification (LPM, logit, probit) in a separate model against the linear prediction, the linear prediction squared and a constant term. Independently of the type of care not received, the squared linear prediction term was insignificant only for the logit model, thus denoting a correct specification (results are available on request). For each binary measure of unmet needs, a latent variable specification of the estimated logit model was used which can be written as:

$$y_i^* = x_i^{'}\beta + \varepsilon_i \qquad i = 1, \dots, N \qquad (1)$$

where, $x_i^{'}$ is the vector of the selected variables (predisposing, enabling and need factors) which are associated with unmet needs and ε_i is assumed to follow a standard logistic distribution. In the dataset, y_i^* are not observed but have a dichotomous observed realization on the dependent variable (y_i) so that,

$$y_i = 1, \text{if } y_i^* > 0$$
$$y_i = 0, \text{ otherwise}$$

The above model was firstly run using the overall national study sample. With the same set of independent variables, separate models were then estimated at a macro-area level. To assess the magnitude of the associations and to allow direct comparisons across macro-areas, average partial effects (APEs) are computed (Wooldridge, 2002). By measuring results in terms of units of probability, partial effects (PEs) allow to overcome the arbitrariness necessarily existing in the scaling of logit coefficients. For continuous regressors, such as income, PEs are computed by taking the derivative of the logit probabilities with respect to that variable. For discrete regressors, PEs are obtained by taking differences of probabilities at different settings of the variable in question (e.g. zero and one when the variable is binary), holding other variables fixed. In both cases, PEs are observations specific (O'Donnell *et al.*, 2007). To solve this problem, PEs are generally computed at mean or median values of all regressors, or, alternatively, the PE for each observation is estimated and then the average of these is taken. In this paper, the latter approach has been preferred.

3.4. Measuring inequality and inequity in unmet health needs

Following the standard literature on inequalities in health and health care utilization, a concentration index (CI) was used to measure relative income-related inequality in actual unmet health needs (Wagstaff *et al.*, 1991; Kakwani *et al.*, 1997). For weighted data, CI can be conveniently computed as (Van Doorslaer and Jones, 2003):

$$CI = \frac{2}{\mu}\sum_{i=1}^{N} w_i(y_i - \mu)\left(R_i - \frac{1}{2}\right) = \frac{2}{\mu} cov_w(y_i, R_i) \qquad (2)$$

where N is the sample size, y is the unmet health needs variable, μ is its weighted mean, w_i indicates the sampling weight of individual i (with the sum of w_i equal to N), R_i is the weighted relative fractional rank of the *i*th individual in the income distribution (Lerman and Yitzhaki, 1989) and cov_w denotes the weighted covariance.

As noted by Wagstaff (2005), when applied to binary variables, the bounds of (2) are not -1 and +1 but depend upon the mean of the indicator. This would, in theory, impede geographical comparison due to substantial differences in means across macro-areas. One way of avoiding the problem is to normalize CI by dividing through by 1 minus the mean. Therefore, a zero value for CI means that there is no inequality. Whenever unmet health needs are concentrated among the worse-off (better-off), CI will assume negative (positive) values.

The decomposition approach applied in this paper to disentangle the partial contribution of different determinants to the total unmet health needs inequality is based on the work of Wagstaff *et al.* (2003). However, the main drawback of their methodology is the requirement

of a linear, additively separable model. For non-linear models, Van Doorslaer, Koolman and Jones (2004) propose a useful approximation based on the partial effects representation, which has the advantage of being a linear additive model and the disadvantage that the decomposition is not unique but depends on the values at which partial effects are calculated. Therefore, given the logit model for unmet health needs defined in equation (1), CI can be decomposed as:

$$CI = \sum_k (\beta_k^m \bar{x}_k / \mu) CI_k + GCI_\varepsilon / \mu \quad (3)$$

where x_k indicates the selected explanatory variables, $\bar{x}_k$ is the mean of x_k, β_k^m is the (average) partial effect of x_k, CI_k is the concentration index for x_k (defined analogously to CI) and GCI_ε is the generalized concentration index for the disturbance term. Equation (3) shows that CI can be thought as being made up of two components: the first is the deterministic, or "explained", component which is equal to a weighted sum of the concentration indices of the regressors (CI_k), where the weights are simply the elasticities of unmet health needs with respect to each determinant ($\beta_k^m \bar{x}_k / \mu$); the second component (GCI_ε / μ) is a residual, or "unexplained", component which reflects the inequality in health that cannot be explained by systematic variation in the determinants across socioeconomic groups but includes also an approximation error in moving from the nonlinear model to a linear approximation.

While CI provides a measure of income-related inequality in actual unmet health needs, it does not tell anything about the degree of inequity. Indeed, according to the horizontal equity principle, an unmet health need must be considered inequitable if access to health care is not equal for equal need. Therefore, to measure inequity, inequality in unmet health needs must be standardized for differences in need. Using the indirect standardization approach proposed by Wagstaff and Van Doorslaer (2000) to remove the effects of standardizing variables, need-predicted unmet health needs are given by:

$$\hat{y}_i = G(\sum_n \hat{\beta}_n x_i^n + \sum_z \hat{\beta}_z \bar{x}_i^z) \quad (4)$$

where G takes the logistic functional form, x^n indicates a vector of need standardizing variables, $\bar{x}_i^z$ is the mean of x^z which is a vector of non-need variables, $\hat{\beta}_n$ and $\hat{\beta}_z$ represent the corresponding coefficients from model (1). Estimates of indirectly standardized unmet health needs, $\hat{y}_i^{IS}$ are then given by the difference between actual and need-predicted unmet health needs, plus the mean of need-predicted unmet health needs, that is:

$$\hat{y}_i^{IS} = y_i - G\left(\sum_n \hat{\beta}_n x_i^n + \sum_z \hat{\beta}_z \bar{x}_i^z\right) + \frac{1}{N}\sum_{i=1}^N G\left(\sum_n \hat{\beta}_n x_i^n + \sum_z \hat{\beta}_z \bar{x}_i^z\right) \quad (5)$$

The distribution of $\hat{y}_i^{IS}$ (e.g., across income) can be interpreted as the distribution of unmet health needs that would be expected to be observed, irrespective of differences in the distribution of the need standardizing variables across income. The horizontal inequity (HI) index could then be computed by estimating the CI (defined analogously to (2)) for $\hat{y}_i^{IS}$. Alternatively, HI index is obtained by subtracting the CI of $\hat{y}_i$ from the CI of y_i[8].

[8] These two approaches for estimating the HI index are perfectly equivalent in terms of final result. However, the resulting estimate will in general differ from the HI estimate obtained through the decomposition, because of the linear approximation error (Van Doorslaer *et al*., 2000).

To test for geographical differences, Huber-White robust standard errors for concentration and HI indices were computed by running a weighted least squares regression of a transformation of the variable on relative rank in the income distribution (Kakwani *et al*., 1997).

4. Results

In 2006, approximately 6.9% of the Italian population aged 18 and older experienced at least one unmet need for specialist care over the past 12 months while the prevalence of unmet needs for dental care in the same age group accounted for 10.4% (Table 2). Furthermore, 3.5% of the overall adult population reported both types of care not received. Although at this stage of the analysis it was not controlled yet for the effects of other potential confounding factors, gender seems to be significantly associated with not obtaining needed health care. Women indicate an overall higher percentage of any type of perceived unmet need than men do. This difference is the result of the complicated and well documented[9] association between gender, income and health; compared to men, women are generally less integrated into the labour market, have often precarious employment, gain lower income and retain primary responsibility as family caregivers[10]. Through the direct and indirect effects on the health status, all these factors expose women to a higher risk of seeing their needs for medical care unmet.

Table 2
Percentage of population with unmet health needs by type of care not received and sex (95% CI)

Unmet needs	Total	Men	Women	P-value*
Specialist care	6.9	5.9	7.7	<0.01
	(6.6-7.2)	(5.5-6.4)	(7.3-8.2)	
Dental care	10.4	9.9	10.8	<0.05
	(10.0-10.8)	(9.4-10.5)	(10.3-11.3)	
Specialist and dental care	3.5	3.0	4.1	<0.01
	(3.3-3.8)	(2.7-3.3)	(3.7-4.4)	

Note: Weighted sample used.
* Computed from a Chi square test of independence with 1 df.

Table 3 presents the percent distribution of reasons behind these unmet health needs. Accessibility issues, above all the economic one, were the most frequently reported reasons. Given the insufficient coverage provided by the SSN and the resulting need to turn to the private market, the percentage of cost-related unmet needs was much higher for dental than for specialist care (58.8% *vs.* 44.4%, respectively). Transportation difficulties were a minor barrier, identified by only 1.2% of individuals with unmet specialist needs and fewer than 1% of those with unmet dental needs. Around two in ten individuals (21.4%) attributed their unmet needs for specialist care to the unavailability of services when required. On the contrary, the presence of long waiting lists was a less important problem in the case of dental

[9] For a review of the relevant literature, see Janzen and Muhajarine, 2003.
[10] According to our dataset, 34.4% of women versus 57.6% of men (unadjusted OR=0.39, *p*-value<0.01) were working at the time the interview was carried out. The mean equivalised disposable income was equal to €17,571 for men (95% CI 17,364-17,779) and €16,437 for women (95% CI 16,251-16,624). The distribution by income quintiles was less favourable to women too (*p*-value<0.01).

care (6.2%). Working and family responsibilities contribute to an underutilization of medical services too. About 11% of those who refrained from seeking a specialist despite a perceived need and 10% of those gone without needed dental care reported lack of time. Altogether, other acceptability problems such as fearing doctors, deciding not to bother or not knowing where to go accounted for approximately 15% of unmet needs, independently of the type of care sought.

There are some statistically significant differences by gender in the stated reasons. In particular, the already mentioned gender disparities in labour market participation rates and earnings may explain why, for both types of care remained unmet, men reported higher occurrences because of no time and lower occurrences because of cost barriers. Given the highest opportunity cost of their time, men are also more likely than women to attribute their unmet needs to the presence of long waiting lists.

Table 3
Percent distribution of reasons for unmet health needs by type of care not received and sex

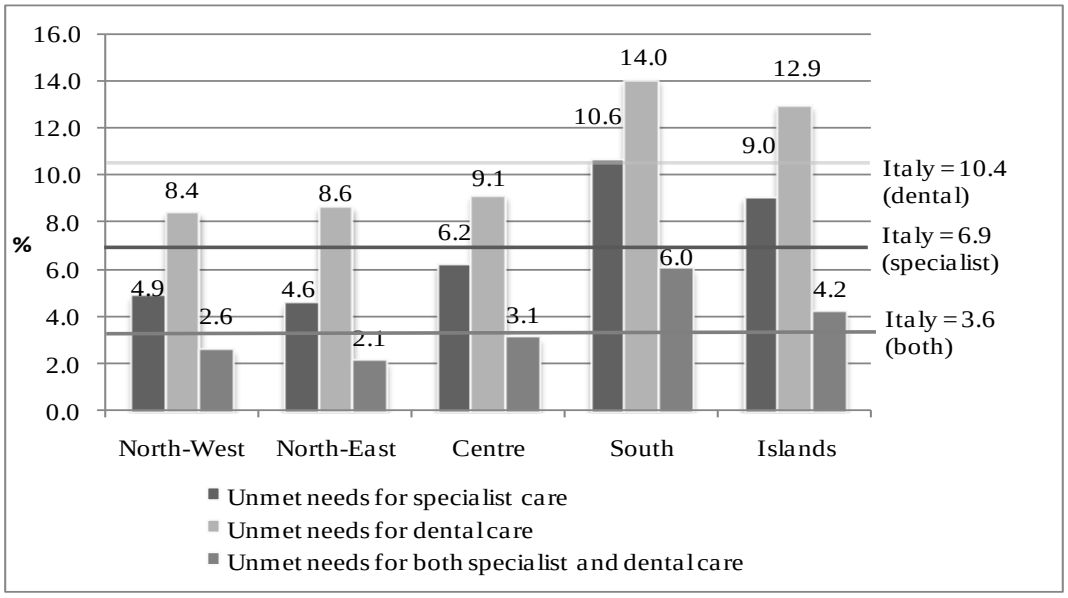
Reason	Unmet needs for specialist care (95% CI)				Unmet needs for dental care (95% CI)			
	TOTAL	*Men*	*Women*	*P-value*[*]	*TOTAL*	*Men*	*Women*	*P-value*[*]
Availability	*21.4 (19.6-23.2)*	*22.9 (20.2-25.9)*	*20.3 (18.1-22.6)*	*<0.01*	*6.2 (5.3-7.1)*	*6.3 (5.1-7.8)*	*6.1 (5.0-7.3)*	*<0.01*
Waiting list	21.4 (18.1-22.6)	22.9 (20.2-25.9)	20.3 (18.1-22.6)	<0.01	6.2 (5.3-7.1)	6.3 (5.1-7.8)	6.1 (5.0-7.3)	<0.01
Accessibility	*45.5 (43.2-47.8)*	*42.7 (39.1-46.3)*	*47.5 (44.6-50.5)*	*<0.01*	*59.6 (57.7-61.4)*	*57.4 (54.6-60.1)*	*61.4 (59.0-63.8)*	*<0.01*
Too expensive	44.4 (42.1-46.7)	41.7 (38.2-45.4)	46.2 (43.3-49.2)	<0.01	58.8 (57.0-60.6)	56.6 (53.8-59.3)	60.7 (58.3-63.1)	<0.01
Too far	1.2 (0.7-1.8)	0.9 (0.4-2.0)	1.3 (0.8-2.2)	<0.01	0.7 (0.5-1.2)	0.8 (0.4-1.7)	0.7 (0.4-1.2)	*n.s.*
Acceptability	*26.4 (24.4-28.5)*	*27.9 (24.8-31.2)*	*25.4 (22.8-28.0)*	*<0.01*	*25.5 (23.9-27.1)*	*27.4 (25-29.9)*	*23.9 (21.8-26.0)*	*<0.01*
No time	11.2 (9.8-12.7)	12.6 (10.3-15.4)	10.1 (8.5-12.1)	<0.01	9.6 (8.5-10.7)	11.2 (9.6-13.1)	8.2 (6.9-9.6)	<0.01
Fear	3.6 (2.9-4.6)	3.3 (2.3-4.6)	3.9 (2.8-5.3)	<0.01	7.2 (6.3-8.2)	6.4 (5.2-7.8)	7.9 (6.7-9.3)	<0.01
Watchful waiting	10.6 (9.3-12.1)	11.2 (9.2-13.5)	10.2 (8.5-12.2)	<0.01	7.9 (6.9-8.9)	8.6 (7.1-10.2)	7.3 (6.1-8.6)	<0.01
No good doctor	0.9 (0.6-1.4)	0.8 (0.4-1.5)	1.1 (0.6-1.7)	<0.05	0.8 (0.5-1.2)	1.2 (0.7-2.1)	0.5 (0.3-0.8)	<0.01
Other reasons	*6.7 (5.7-7.8)*	*6.5 (5.1-8.3)*	*6.9 (5.6-8.3)*	*<0.01*	*8.8 (7.9-9.8)*	*8.9 (7.5-10.5)*	*8.7 (7.5-10.0)*	*<0.05*

Note: Weighted sample used. Multiple responses were not allowed. Because of rounding, detail may not add to total.
Unmet needs for specialist care: Chi-square test with 7 df = 12.51; p>0.05.
Unmet needs for dental care: Chi-square test with 7 df = 28.60; p< 0.05.
[*]Computed from a Chi square test of independence with 1 df.
n.s.: not significant.

The analysis of within-country data provides some insights into the existence of geographical inequalities in unmet health needs. Figure 1 shows the percentages of the Italian population with unmet needs for specialist and/or dental care across five geographical macro-areas. In each macro-area, the prevalence of unmet needs for dental care is higher than that for specialist care. Regardless of the type of care not received, in the northern and central parts of Italy the percentages of people with unmet needs are significantly lower than the corresponding national averages. The lowest rates are reported respectively in the North-East (4.6%, 95% CI 4.1-5.1) for unmet specialist needs and in the North-West (8.4%, 95% CI 7.7-9.1) for unmet dental needs. On the contrary, these percentages reach their maximum in the

southern part of the country where values of respectively 10.6% (95% CI 9.9-11.4) for unmet specialist needs and 14.0% (95% CI 13.1-14.9) for unmet dental needs are found. In the two main islands (i.e. Sardinia and Sicily), the prevalence of unmet needs was 9% (95% CI 8.0-10.2) for specialist care and nearly 13% (95% CI 11.6-14.3) for dental care. Similar geographical patterns were also shown by the percentage of the individuals reporting either type of unmet health needs.

Figure 1
Percentage of population with unmet health needs by type of care not received and macro-area



Note: Weighted sample used.
Unmet needs for specialist care: Chi-square test with 4 df = 423.98; p<0.01.
Unmet needs for dental care: Chi-square test with 4 df = 278.37; p<0.01.
Unmet needs for both specialist and dental care: Chi-square test with 4 df = 282.87; p<0.01.
Percentages were all statistically significant at a 1% level when compared to the corresponding national average values.

Table 4
Intra-area coefficients of variation for the prevalence of unmet health needs by type of care not received

Macro-area	***Regions***	***Unmet needs***		
		Specialist care	***Dental care***	***Specialist and dental care***
North-West	Piedmont, Valle d'Aosta, Lombardy and Liguria;	0.18	0.20	0.40
North-East	Autonomous Provinces of Bolzano and Trento, Veneto, Friuli Venezia Giulia and Emilia Romagna	0.28	0.22	0.45
Centre	Tuscany, Umbria, Marche and Lazio	0.25	0.17	0.40
South	Abruzzi, Molise, Campania, Apulia, Basilicata and Calabria	0.16	0.12	0.12
Islands	Sicily and Sardinia	0.11	0.16	0.31

Note: Weighted sample used.
The coefficient of variation (CV) was computed as the ratio of the standard deviation of the regional prevalences to the mean prevalence in the macro-area.

As a measure of the intra-area variability of the regional percentages of people with unmet health needs, coefficients of variation (CV) were computed (Table 4). Results show a North-South divide with greater CV values in the former and lower ones in the latter.

Tables 5 and 6 analyze the percentage contribution of each self-reported reason for both types of unmet health needs at a macro-area level. With regard to unmet specialist needs, affordability appears to be a serious problem especially in the poorer South where more than one out of two respondents refrains from seeing a physician due to economic reasons (6.1 percentage points more than the national average). As for availability-related unmet specialist needs, the prevalence was lowest in the North-East and highest in the Islands, particularly in Sicily (26.3%, 95% CI 17.2-38.0; result not presented). Conversely, in the South and the Islands it appears to be less difficult to reconcile specialist visits with work and family commitments. This is mainly the result of a lower employment rate which makes easier for individuals of both sexes to take time off for seeking health care. Moreover, in these geographical areas a more extensive concept of family network exists which helps women in their caregiving responsibilities, even in presence of worse quality public assistance services.

Table 5
Percent distribution of reasons for unmet specialist needs by macro-area (95% CI)

Reason	North-West	North-East	Centre	South	Islands	ITALY
Too expensive	43.8	35.9	38.5	50.5	44.3[ns]	44.4
	(38.3-49.5)	(30.9-41.3)	(33.5-43.8)	(46.6-54.3)	(38.0-50.7)	(42.1-46.7)
Waiting list	20.6	16.7	25.1	19.9	25.8	21.4
	(16.6-25.2)	(13.2-20.9)	(21.3-29.3)	(17.1-23.0)	(20.8-31.5)	(19.6-23.2)
No time	12.3	14.6	13.6	9.0	9.0	11.2
	(9.0-16.6)	(11.4-18.5)	(10.1-18.2)	(7.0-11.6)	(6.0-13.2)	(9.8-12.7)
Too far	1.3	0.5	1.1[ns]	1.7	0.3	1.2
	(0.4-3.5)	(0.2-1.4)	(0.4-3.2)	(0.9-3.1)	(0.0-1.5)	(0.7-1.8)
Fear	2.8	3.8	4.3	3.5	4.1	3.6
	(1.6-5.1)	(2.4-6.0)	(2.8-6.7)	(2.2-5.6)	(2.3-7.2)	(2.9-4.6)
Watchful waiting	10.4	14.3	7.1	10.2	12.9	10.6
	(7.4-14.5)	(10.9-18.5)	(5.1-9.8)	(8.2-12.7)	(9.0-18.2)	(9.3-12.1)
No good doctor	0.1	1.6	0.8	1.3	0.7	0.9
	(0.0-.8)	(0.7-3.4)	(0.3-2.1)	(0.8-2.2)	(0.1-2.9)	(0.6-1.4)
Other reasons	8.6	12.6	9.5	3.8	2.9	6.7
	(6.3-11.6)	(9.5-16.5)	(7.1-12.6)	(2.6-5.6)	(1.6-5.2)	(5.7-7.8)

Note: Weighted sample used. Multiple responses were not allowed. Because of rounding, detail may not add to total.
Chi-square test with 28 df = 127.75; $p<0.01$.
[ns] Indicates not significant at a 5% level when compared to the corresponding national average value.

Table 6 confirms that costs are the main barrier in accessing dental care, particularly for those residing in the two main islands. Compared to data on unmet specialist needs, smaller proportions of individuals gave waiting list as a reason for not having accessed the service. However, individuals who cited long waits mainly belong to low income groups, which cannot afford to go to a private dentist and have thus to rely exclusively on the inadequate public service. This is particularly true in the South of Italy, where more than 42% (95% CI 34.6-54.8) of respondents reporting that the service had not been available when it was required belonged to the first quintile of income (27.7% the corresponding national value, 95% CI 23.7-32.0) (result not presented).

Table 6
Percent distribution of reasons for unmet dental needs by macro-area (95% CI)

Reason	North-West	North-East	Centre	South	Islands	ITALY
Too expensive	59.0	58.1	52.7	59.8	64.8	58.8
	(54.8-63.0)	(54.3-61.9)	(48.4-56.9)	(56.4-63.0)	(59.3-69.9)	(57.0-60.6)
Waiting list	6.2	3.3	6.8	8.1	4.3	6.2
	(4.4-8.7)	(2.3-4.8)	(4.7-9.7)	(6.5-10.0)	(2.7-6.9)	(5.3-7.1)
No time	8.9	10.4	13.3	7.4	10.1	9.6
	(6.9-11.3)	(8.4-12.9)	(10.6-16.7)	(5.8-9.4)	(7.1-14.1)	(8.5-10.7)
Too far	0.7	0.7[ns]	0.8	0.9	0.4	0.7
	(0.3-1.5)	(0.3-1.8)	(0.3-2.0)	(0.3-2.3)	(0.1-2.0)	(0.4-1.2)
Fear	6.4	6.0	7.5	7.6	8.5	7.2
	(4.7-8.7)	(4.4-8.1)	(5.7-9.8)	(6.1-9.5)	(5.9-12.0)	(6.3-8.2)
Watchful waiting	7.9[ns]	7.6	5.4	9.9	6.6	7.9
	(6.0-10.4)	(5.9-9.7)	(3.9-7.3)	(8.1-12.0)	(4.1-10.6)	(6.9-8.9)
No good doctor	0.8	0.4	2.3	0.5	0.4	0.8
	(0.3-1.9)	(0.1-1.0)	(1.1-4.4)	(0.2-.9)	(0.1-2.9)	(0.5-1.2)
Other reasons	10.1	13.4	11.2	5.9	4.9	8.8
	(8.1-12.6)	(11.0-16.2)	(9.0-13.9)	(4.5-7.7)	(3.2-7.4)	(7.9-9.8)

Note: Weighted sample used. Multiple responses were not allowed. Because of rounding, detail may not add to total.
Chi-square test with 28 df = 145.66; p<0.01.
[ns] Indicates not significant at a 5% level when compared to the corresponding national average value.

Table 7
Percentage of population with unmet health needs by income quintiles and measures of income-related inequality

Macro-area	Income quintiles					1st to 5th quintile ratio	Concentration Index[1]	t-value[2]
	1	2	3	4	5			
				Unmet needs for specialist care				
North-West	7.15	4.39	4.67	3.63	4.40	1.62	-0.120	-3.09
North-East	6.15	5.00	3.77	3.74	4.03	1.53	-0.118	-3.50
Centre	9.35	5.80	5.10	5.90	4.61	2.03	-0.141	-4.06
South	16.45	11.96	9.69	8.79	5.40	3.05	-0.229	-9.86
Islands	12.58	9.23	9.06	7.74	6.41	1.96	-0.145	-3.74
ITALY	*11.35*	*7.18*	*5.78*	*4.85*	*4.54*	*2.5*	*-0.224*	*-15.26*
				Unmet needs for dental care				
North-West	11.98	8.56	8.80	6.64	5.84	2.05	-0.157	-5.62
North-East	12.0	8.54	8.79	8.33	5.30	2.26	-0.148	-6.26
Centre	13.22	8.88	8.34	7.76	7.29	1.81	-0.134	-4.72
South	20.45	16.23	13.17	11.27	7.91	2.58	-0.214	-10.11
Islands	16.41	13.29	13.3	12.43	9.0	1.82	-0.106	-2.99
ITALY	*15.63*	*11.09*	*9.87*	*7.95*	*6.7*	*2.33*	*-0.199*	*-16.64*
				Unmet needs for specialist and dental care				
North-West	4.22	2.13	2.81	1.94	1.73	2.44	-0.179	-3,17
North-East	3.37	2.39	1.68	2.03	0.91	3.70	-0.223	-4.74
Centre	5.61	2.63	2.22	2.37	2.40	2.34	-0.192	-3.34
South	9.76	7.79	5.38	3.78	2.68	3.64	-0.268	-9.81
Islands	6.50	3.66	4.48	3.81	2.38	2.73	-0.166	-2.86
ITALY	*6.71*	*3.59*	*2.85*	*2.22*	*1.99*	*3.37*	*-0.279*	*-13.48*

Note: Weighted sample used.
[1]Concentration indices were normalized to avoid dependence on the mean due to the binary nature of the unmet needs variables (Wagstaff, 2005).
[2] t-values based on robust standard errors.

Table 7 illustrates the percentage of population who reported either one or both types of unmet health needs across income quintiles. As measures of relative income-related inequality, a simple ratio of the prevalence of unmet needs in the first and fifth quintiles of the income distribution and the concentration index (unstandardized) are computed[11]. Results show clear evidence of gradients by both income and macro-area. The percentages range from 4% of respondents who reported unmet specialist needs in the top income quintile in the North-East of Italy (5.3% for unmet dental needs and 0.9% for both type of unmet needs) to 16.4% in the bottom income quintile in the South (20.4% for unmet dental needs and 9.8% for both types of unmet needs). Independently of the type of claimed unmet need, the South has the highest levels of inequality for both indices, while the North-East has the lowest inequality for unmet specialist needs and the two main islands present the lowest concentration indices for the other types of unmet needs. Such inequalities by income group, however, cannot be interpreted as inequity since they may merely reflect differences in the need for health care.

The weighted national sample was used to estimate the association of potential risk factors with the three types of unmet health needs. Table 8 displays the results of the logit regressions. In addition to the estimated coefficients and the associated standard errors, average partial effects (APEs) on the probability of an individual reporting an unmet need are provided.

After adjustment for socio-economic, health and other characteristics, interaction terms between age and gender show the existence of two gradients. Holding gender constant, the probability of experiencing any type of unmet need tends to decrease with age. Similarly, holding age constant, estimates of unmet needs for women are in general higher than those for men, though not all effects are significant and some of the differences are negligible. These findings have been widely documented in the literature[12] and suggest that life events affect some demographic groups differently than others. Nonetheless, the relationship between age, sex and unmet needs has to be interpreted with caution, given the great variety of factors that may have an influence on it. For example, it has already been emphasized as the work burden borne by women usually includes responsibilities for homemaking and caregiving in addition to eventually paid employment. These multiple roles generate more competing priorities and leave women with less time to seek care for themselves. However, the opposite has also been proved to be true: women have generally more contacts with the healthcare system than do men[13] and are more likely than men to be the primary care seekers for dependent children and elderly family members. For all these reasons, they have more opportunities to experience difficulties in accessing care and a higher probability to complain for unmet needs.

Differential attitudes towards doctors and self-care as well as different expectations about how, when and where health services ought to be provided may also play a somewhat role in explaining gender and age difficulties in obtaining the needed care (Chen and Hou, 2002; Mollborn *et al.*, 2005; Sanmartin and Ross, 2006). Prior studies suggest that expectations about the health care system may not be the same at different times in life. In particular, younger patients tend to have higher expectations than elderly ones and thereby are more often dissatisfied with the care received (Sitzia and Wood, 1997; Peck *et al.*, 2004; Moret *et al.*, 2007).

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[11] Compared to the first to fifth quintile ratio, the concentration index (CI) has the advantage of reflecting the full distribution of values.

[12] See Diamant *et al*. (2004), Mollborn *et al*. (2005), Bryant *et al*. (2008), Levesque *et al*. (2008).

[13] See Fabbri and Monfardini (2003), Atella *et al*. (2004), Giannoni (2008).

Table 8
Logit models for unmet health needs by type of care not received

Variable	**UNMET NEEDS**								
	SPECIALIST CARE			***DENTAL CARE***			***SPECIALIST AND DENTAL CARE***		
	Coefficient	*SE*	*APE*	*Coefficient*	*SE*	*APE*	*Coefficient*	*SE*	*APE*
Predisposing factors									
Age4564M	-0.094	(0.097)	-0.005	0.172**	(0.074)	0.016	-0.154	(0.137)	-0.005
Age65M	-0.452***	(0.119)	-0.024	-0.260***	(0.097)	-0.022	-1.031***	(0.176)	-0.025
Age1844F	0.347***	(0.086)	0.023	0.104	(0.066)	0.010	0.304**	(0.125)	0.011
Age4564F	0.096	(0.099)	0.006	0.167**	(0.076)	0.016	-0.061	(0.139)	-0.002
Age65F	-0.534***	(0.116)	-0.028	-0.266***	(0.094)	-0.023	-0.964***	(0.163)	-0.025
Secondary	-0.039	(0.060)	-0.002	-0.211***	(0.048)	-0.019	0.013	(0.084)	0.000
Tertiary	-0.199*	(0.106)	-0.011	-0.337***	(0.083)	-0.028	-0.220	(0.161)	-0.007
Unmarried	-0.130*	(0.071)	-0.008	-0.211***	(0.058)	-0.019	-0.252**	(0.102)	-0.008
S/D/W	0.374***	(0.073)	0.025	0.315***	(0.063)	0.031	0.448***	(0.100)	0.017
Working	0.295***	(0.063)	0.018	0.023	(0.050)	0.002	0.174**	(0.086)	0.006
EU25	0.965*	(0.410)	0.084	0.217	(0.442)	0.021	1.216**	(0.572)	0.066
Other	0.572***	(0.160)	0.042	0.679***	(0.120)	0.078	1.130***	(0.185)	0.058
Enabling factors									
LnInc	-0.151***	(0.020)	-0.009	-0.108***	(0.016)	-0.010	-0.127***	(0.024)	-0.004
Amb	-0.002	(0.004)	-0.000				-0.014**	(0.006)	-0.000
Dent				-0.001***	(0.002)	-0.000	0.000	(0.003)	-0.000
North-East	-0.102	(0.081)	-0.006	0.032	(0.062)	0.003	-0.256**	(0.117)	-0.008
Centre	0.244***	(0.086)	0.016	0.107*	(0.064)	0.010	0.279**	(0.128)	0.010
South	0.830***	(0.076)	0.059	0.556***	(0.063)	0.057	1.003***	(0.111)	0.040
Islands	0.651***	(0.123)	0.048	0455***	(0.085)	0.048	0.766***	(0.193)	0.033
Need factors									
SAH2	0.401***	(0.111)	0.026				0.381**	(0.166)	0.013
SAH3	1.111***	(0.119)	0.078				1.298***	(0.175)	0.052
SAH4	1.080***	(0.142)	0.091				1.333***	(0.204)	0.069
SAH5	1.524***	(0.174)	0.158				1.809***	(0.240)	0.123
Chronic	0.220***	(0.066)	0.014				0.226**	(0.091)	0.008
Hampered	0.802***	(0.077)	0.055				0.896***	(0.006)	0.033
Constant	-2.713***	(0.230)		-1.252***	(0.232)		-3.476***	(0.389)	
N (unweighted)	45175			45175			45175		
(Pseudo-)R^2	0.0873			0.0228			0.1069		
Log PseudoLikelihood	-10309.368			-14720.663			-6191.9215		
Link test	z = 1.11, p = 0.267			z = -1.85, p = 0.064			z = -1.20, p = 0.230		

Note: All results are weighted. SE = robust standard errors. The average partial effects (APEs) were calculated by computing the partial effects for each observation and then taking the average across the sample. The link test is based on the reported significance of the prediction squared term.
***, ** and * indicate significance at 1%, 5% and 10%, respectively.

Among the other predisposing factors, level of education seems to be related to difficulties in receiving care when required. As shown in Table 8, the estimated effects of educational achievement are negative for either definition of unmet needs. After all other variables are controlled for, those with a secondary level of education (the variable is, however, significant only for dental care) or a tertiary degree are less likely to experience any of the two types of unmet needs if compared with the reference group of those with primary education. Furthermore, the magnitude of these effects, though not very strong, increases over the levels of educational attainment. One rationale for this gradient is that higher educational individuals may encounter less difficulties in meeting their health needs as long as they are generally

better able to navigate the health care system and to use their "voice" to obtain necessary services (Hirschman,1970). In addition, more educated people usually experience stronger social networks which act as useful supply information device when accessing care (Devillanova, 2008). However, the same findings may as well provide evidence that health providers treat social groups differently.

Marital status is statistically relevant in specifying the probability of claiming an unmet need. Compared to the baseline of being married, singles are less likely to report unmet needs for any kind of care required. On the opposite, the impact of being either separated or divorced or widowed is always positive and ranges between 1.7 and 3.1 percent, depending on the type of care not received.

Not surprisingly, activity status is found to influence the probability of remaining without care, especially because of not being able to take time off. Being economically active is a significant and positive factor to have a higher likelihood of reporting unmet needs for specialist care alone and for both types of care at the same time, but the corresponding APEs are small in magnitude.

There are clear and quite strong effects of not having an Italian citizenship. Compared to the baseline of being Italian, coming from other EU25 countries increases the probability of claiming an unmet need for specialist care by about 8% (the coefficient is not significant for dental care) while the positive effect of being a non-EU citizen is stronger for unmet dental care needs than for specialist ones (APE=0.078 *vs.* APE=0.042, respectively). These findings are not unexpected in light of the fact that immigrants often experience specific access barriers to health care because of language and cultural problems, poor knowledge of the health care system and of their rights, different health care preferences, different perceptions of health and illness and visible minority status (Wu *et al.*, 2005).

With regard to the enabling factors, the estimated coefficients for the income variable are all negative and statistically significant at a 1% level. Other things being equal, increasing income results in a lower probability of reporting any type of unmet need, though these effects are quite small. Therefore, there is evidence of 'pro-poor' inequity in unmet needs, which is consistent with the fact that in Italy, as many other developed countries, GPs are more intensely visited by the lower income groups, while specialists' services, including dental ones, are disproportionally used by higher income individuals who may afford to pay out of pocket for them (Bago d'Uva *et al.*, 2009).

Turning to the variables which proxy the availability of health services, the coefficient of AMB is insignificant for unmet specialist care needs. For all the other types of unmet needs, supply-side variables are statistically significant, have the expected negative signs but their effects are trivial in magnitude. These findings are coherent with those of previous studies using a double hardle model to disentangle the demand for health care. Thus, Pohlmeier and Ulrich (1995) and Fabbri and Monfardini (2003) have concluded that supply side variables do not affect the contact choice while show a positive impact on the frequency decision.

As already found in previous bivariate analyses, there is evidence of some relevant sized regional-specific effects. In general, compared to individuals who live in the North-West of Italy, only those who reside in the North-East are less likely to see their health care needs unmet, but not all the effects are significant. On the contrary, living in the southern part of the country increases the likelihood of reporting an unmet need by about 0.06 for either type of care not received and by 0.04 for both specialist and dental care.

Unsurprisingly, all factors included in the model to account for the individual need for specialist care have positive and highly statistically significant coefficients. In particular, a clear and positive gradient is observed in the magnitude of the estimated effects of the SAH

variable as it moves from “good” to “very bad” (“very good” is the category omitted). For individuals with a ‘‘very bad’’ SAH the probability of claiming an unmet need for specialist care is 0.158 greater than for those defining their health status as ‘‘very good’’. Having any chronic condition also induces a higher probability of experiencing an unmet specialist need, but the effect is modest. Finally, the average response to being hampered in daily activities because of health problems is 0.055 for unmet specialist needs alone and 0.033 for both types of unmet needs.

Separate models were estimated for each macro-area and for different types of unmet needs using logit specifications (Table 9). Results, which are only presented as average partial effects (APEs), mirror qualitatively those obtained for the full sample, though many effects are not statistically significant. Among those variables that show statistical significance, income and health measures seem particularly important for determining the probability of experiencing an unmet specialist need. However, the magnitude of these effects is quite different across macro-areas. As for ln(income), the largest negative estimates are observed for the Islands (-0.016) and the South (-0.014) of Italy while the smallest estimate is for the North-East (-0.003, but the variable is only significant at a 10% level). The gradient from “very good” to “very bad” SAH is the strongest in the Islands, followed by the North-West. On the contrary, the North-East presents the smallest APE of a “very bad” SAH (0.055). The effect of suffering from a chronic condition is statistically significant in the North-East and the South of the country (APEs equal to 0.020 and 0.030, respectively). Finally, being hampered in daily activity due to illness increases the probability of reporting an unmet need for specialist care of about 0.1 in the South. In all other areas, effects of this variable are much smaller. Concerning unmet dental needs, ln(income) is the only variable to be significant for all macro-areas. Although its effects is not very strong (about 1% on average), it tends to increase moving from the North to the South and the Islands.

Violations of the horizontal equity principle for the probabilities of reporting different types of unmet health needs were tested. Strictly speaking, this principle requires that need-standardized unmet health necessities ought not to be systematically related to income. In the indirect standardisation procedure, need was proxied by five age-sex dummies, four SAH dummy variables, one dummy for the presence of chronic conditions and another one for whether the individual is hampered in his or her usual activities. The only exception is unmet dental needs, for which just age-sex interaction variables were used. Figure 2 presents the horizontal inequity (HI) indices along with their 95% confidence intervals. In all macro-areas and for any type of care not received, the distribution of unmet needs probability is noticeably pro-poor as HI indices are all negative and statistically significant. In other words, lower-income individuals are more likely to experience unmet health needs than higher-income ones, given the same need. However, there are important differences among types of unmet health needs and macro-areas in the degree to which this inequity occurs. Thus, everywhere (with the only exception of the Islands), given need, the probability of reporting unmet specialist needs is relatively more equitably distributed by income than the probability of reporting unmet dental needs. In terms of geographical patterns, the need-standardized distributions of unmet specialist needs confirm the picture already shown by the concentration indices for the actual distributions. Regarding unmet specialist needs, HI values are much less negative than the corresponding CI values presented in Table 7, suggesting that even if specialist care needs are more concentrated among the poorer segments (i.e. the CI for need-predicted unmet specialist needs are all negative), the distributions of unmet specialist needs probabilities are still skewed to the lower end of the income distributions. The opposite is true in the case of unmet dental needs, given that in all geographical areas the need distribution is

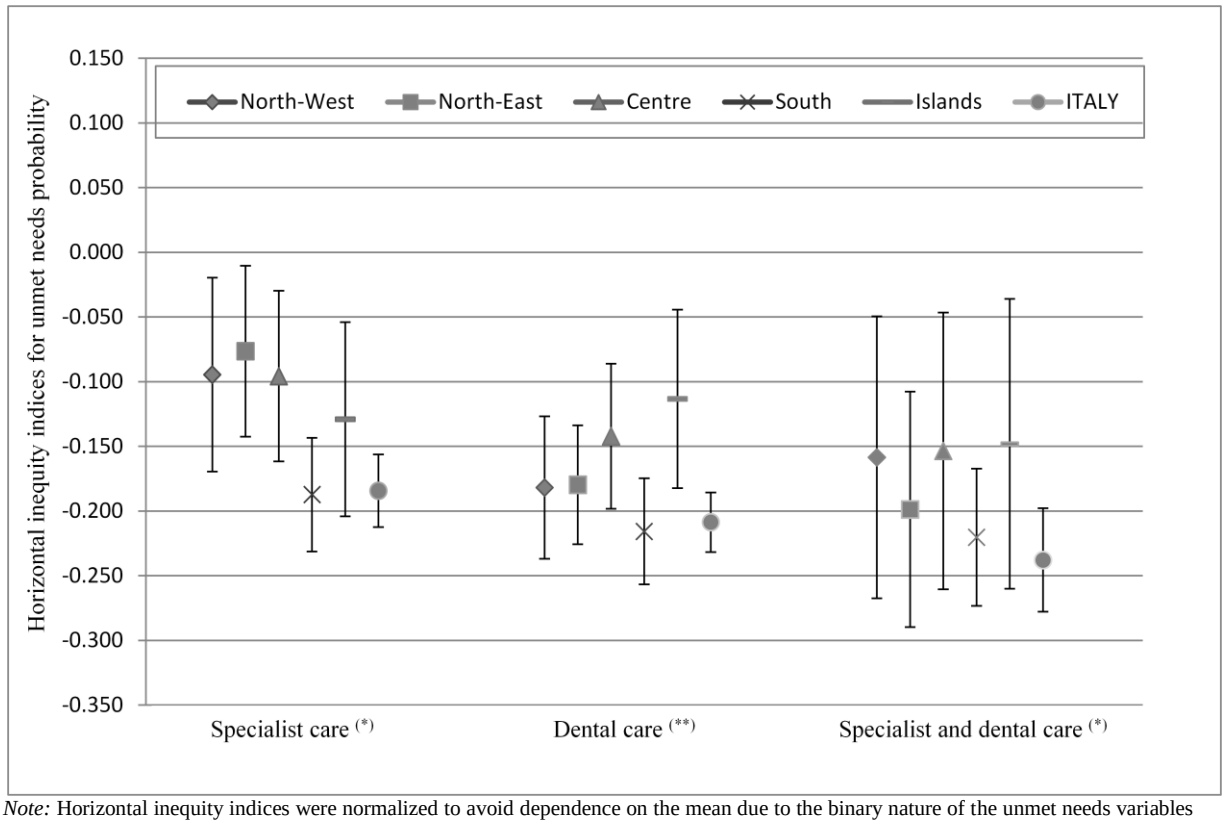
Table 9
Average partial effects on the probability of reporting unmet health needs by type of care not received and macro-area

Variable	***Logit: Average Partial Effects (APEs)***				
	North-West	*North-East*	*Centre*	*South*	*Islands*
Unmet needs for specialist care					
Age4564M	-0.002	0.008	-0.027**	0.007	-0.020
Age65M	-0.018*	-0.007	-0.028**	-0.039**	-0.018
Age1844F	0.035***	0.018**	0.005	0.028**	0.021
Age4564F	0.019*	0.010	-0.014	0.005	0.014
Age65F	-0.031***	-0.012	-0.027**	-0.040***	-0.008
Secondary	0.002	0.011*	-0.004	-0.006	-0.019
Tertiary	-0.011	0.003	0.016	-0.053***	-0.011
Unmarried	0.007	-0.005	-0.002	-0.024**	-0.016
S/D/W	0.044***	0.019***	0.019**	0.020*	0.006
Working	0.009	0.017**	0.019**	0.023**	0.020
EU25	0.032	([a])	-0.009	0.414***	0.411
Other	0.064***	0.052***	0.020	-0.069*	-0.071**
Amb	-0.000	-0.001**	-0.000	0.001	-0.001
LnInc	-0.006***	-0.003*	-0.007***	-0.014***	-0.016***
SAH2	0.037**	0.004	0.029**	0.002	0.119***
SAH3	0.087***	0.028**	0.077***	0.077***	0.193***
SAH4	0.123***	0.043**	0.078***	0.063***	0.256***
SAH5	0.271***	0.055**	0.132***	0.135***	0.366***
Chronic	0.004	0.020***	0.005	0.030***	0.013
Hampered	0.035***	0.031***	0.057***	0.094***	0.043**
Unmet needs for dental care					
Age4564M	0.009	-0.003	-0.021	0.053***	0.056**
Age65M	-0.028**	-0.046***	-0.035**	-0.022	0.056
Age1844F	0.010	0.010	-0.000	0.015	0.008
Age4564F	0.009	-0.008	0.007	0.027	0.066**
Age65F	-0.037***	-0.047***	-0.025	-0.017	0.060
Secondary	-0.004	-0.011	-0.011	-0.042***	-0.030*
Tertiary	-0.021*	-0.020*	-0.013	-0.054***	-0.029
Single	-0.001	-0.002	-0.016	-0.047***	-0.027
S/D/W	0.037***	0.041***	0.034***	0.035**	-0.013
Working	-0.009	-0.005	0.007	-0.004	0.015
EU25	0.082	-0.022	-0.051	0.020	0.307
Other	0.079***	0.113***	0.008	0.063	-0.113**
Dent	-0.000**	0.000	0.000	-0.000	0.002**
LnInc	-0.008***	-0.007***	-0.010***	-0.013***	-0.015***
Unmet needs for specialist and dental care	-0.006	0.002	-0.022***	0.001	0.013
Age4564M	-0.019***	-0.016***	-0.025***	-0.046***	0.001
Age65M	0.016**	0.001	0.000	0.009	0.040**
Age1844F	0.002	0.001	-0.008	-0.011	0.026
Age4564F	-0.029***	-0.018***	-0.025***	-0.037***	0.007
Age65F	0.006	0.006	-0.000	-0.008	-0.006
Secondary	-0.011	0.004	0.017	-0.035***	-0.010
Tertiary	-0.001	-0.004	-0.007	-0.016	-0.007
Unmarried	0.029***	0.008	0.010	0.023**	-0.004
S/D/W	0.003	0.003	0.004	0.005	0.017
Working	0.053	([a])	0.003	0.106	0.517***
EU25	0.062***	0.067***	0.022	-0.036	-0.021
Other	0.000	-0.001**	-0.000	-0.000	-0.001**
Amb	-0.000	-0.000	0.000	-0.000	-0.000
Dent	-0.002	-0.002**	-0.005***	-0.005**	-0.009***
LnInc	0.005	-0.004	0.033**	0.006	0.117***
SAH2	0.041***	0.016**	0.062***	0.069***	0.152***
SAH3	0.068***	0.042***	0.058**	0.073***	0.212***
SAH4	0.163***	0.068***	0.108***	0.130***	0.315***
SAH5	0.002	0.009**	0.003	0.015*	0.010
Chronic	0.022***	0.012**	0.042***	0.049***	0.040***
Hampered					

Note: All results are weighted. The average partial effects were calculated by computing the partial effects for each observation and then taking the average across these. Levels of statistical significance are reported at the 1% significance level (***), 5% significance level (**) and 10% significance level (*) for the coefficients on the specific variables of interest.
([a]) The EU25 variable was dropped because of collinearity with income.

clearly to the advantage of the better-off. The South of the country presents the most marked pro-poor biases for the probability of experiencing any type of care not received. With regard to unmet specialist needs, the HI index for the South is about two times and half lower than that for the North-East (the less negative value). As for unmet dental needs, the range between the highest and the lowest negative HI values (South and the Islands, respectively) is almost identical to that of unmet specialist needs and equal to -0.10.

Figure 2
Horizontal inequity (HI) indices for the probability of experiencing unmet health needs (with 95% confidence intervals)



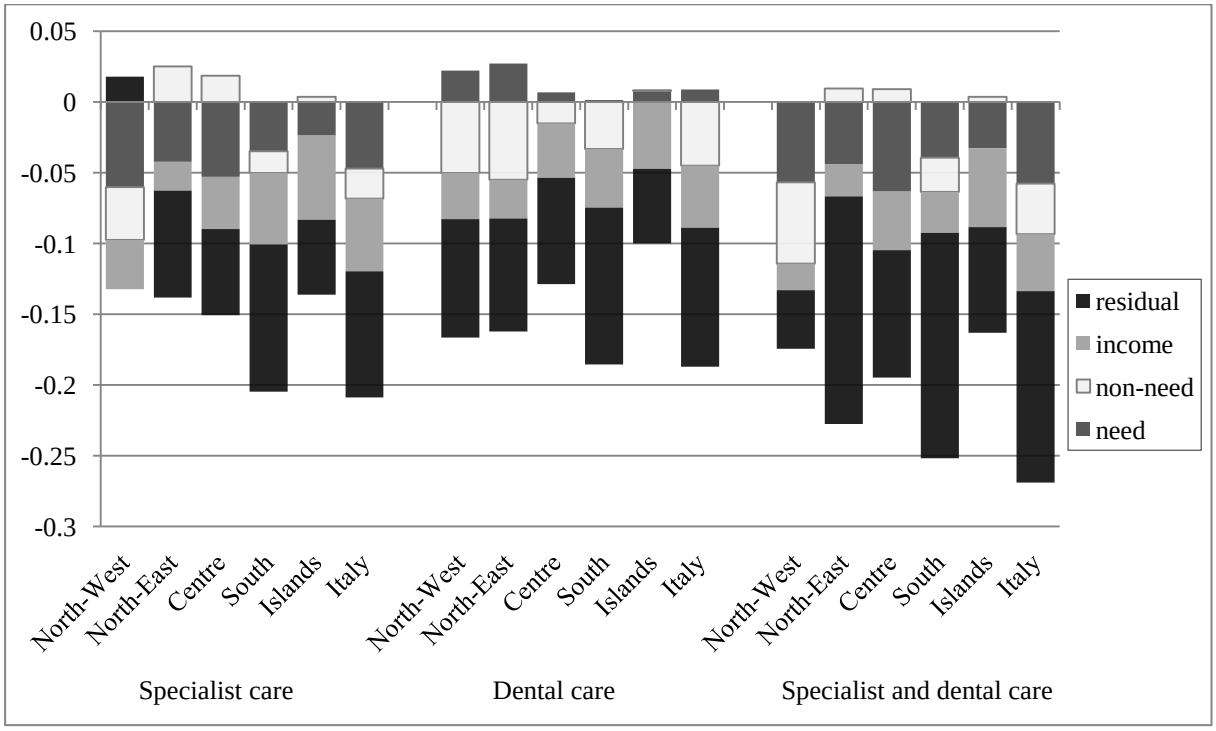
Note: Horizontal inequity indices were normalized to avoid dependence on the mean due to the binary nature of the unmet needs variables (Wagstaff, 2005).
(*) Indirectly standardised for 11 need dummies [age-sex, SAH, chronic condition and health limitations].
(**) Indirectly standardised for 5 age-sex dummies.

Finally, the decomposition approach was used to break down total inequality into the partial contributions of all the explanatory variables employed in previous logit regressions. Figure 3 summarizes graphically the results for four aggregated categories of determinants: need variables (age-sex, SAH, chronic condition and health limitations, depending on the type of unmet needs), non-need factors (education, marital status, working conditions, citizenship, supply-side variables), (the log of) income and a residual term. One way of interpreting the figure is as follows. Wherever the probability of unmet health needs were equally distributed across income, the sum of the bars would be zero. Wherever a perfectly equitable distribution of unmet health needs across income exists, the sum of the bars would be equal to the need bar. In presence of discrepancies between the actual and the need-expected distribution, the other bars appear (Koolman and van Doorslaer, 2004). Negative contributions increase the size of the pro-poor inequality in the unmet health needs distribution while positive

contributions decrease such inequality (or, alternatively, increase inequality in favor of the better-off individuals)[14].

As seen from the figure below, the partial contribution of the residual term is generally negative and very big. One possible reason for the latter is that the "linear" residual includes not only the unexplained variation (a prediction error) but also the error generated by the linear approximation procedure (van Doorslaer *et al.*, 2004). There is great geographical heterogeneity in the decomposition results. Except for dental care, the need based variables exhibit a negative contribution to inequality in all macro-areas. However, this contribution tends to become more modest as long as one moves from the North to the South of Italy. On the contrary, the income variable starts progressively to increase its importance. Therefore, in the South and in the Islands, pro-poor inequity is mainly accounted by the partial contribution of income, in some cases even reinforced by the contribution of other non-need variables, especially education. The full decomposition results show that in the two northern areas where the contribution of non-need variables to the pro-poor distribution is larger, this is primarily due to marital status such as being separated, divorced or widowed, working condition and education (result available on request). Since some of these variables may indicate a higher need for care by the poor (the contributions are all negative), it may be that the need contribution in this geographical areas is indeed underestimated, thus resulting in an overestimation of the pro-poor inequity.

Figure 3
Decompositions of inequality in unmet health needs probability



Note: Decompositions based on linear approximations using marginal effects from logit regressions.

[14] Van Doorslaer *et al*. (2004) observe that, as a consequence of aggregating the partial contributions of several variables, a small aggregated contribution may hide the sum of large positive and negative single contributions.

5. Conclusion

Difficulties by individuals in accessing health services is a well known phenomenon. A growing number of studies has analyzed barriers to health care in countries with a national health system. However, the reliance on utilization as a proxy for access does not let to fully explore the dynamic process of seeking health care and the many self-perceived factors that can refrain individuals from obtaining the needed care. In this paper, we focus on subjective process-oriented measures which do not consider access to health care only in terms of final event (i.e. use) but also allow for the role of different individual preferences in explaining the interactions between demand and supply of health services. Therefore, patterns in self-reported unmet needs for specialist and dental care in Italy are examined using nation wide data from the European Union Survey on Income and Living Conditions (EU-SILC).

Descriptive analyses show that, in spite of the SSN constitutional obligation to provide universal health care, a large proportion of the Italian adult population claims unmet needs for specialist and/or dental care. Cost of care is the most important reason reported for unmet health needs, followed by waiting lists (especially for specialist care) and difficulties to reconcile the visits with work and family commitments. The extended analysis of differences in unmet health needs across geographical macro-areas reveals a more mixed picture. Moving from the north to the south of the country, prevalences increase and the stated reasons tend to change. In the north, consistently with social and economic specificities, competing priorities become a relatively more important motivation, albeit affordability continues to be the leading reason. On the contrary, in the south, lack of financial means represents the sole barrier to health need satisfaction.

In line with previous international studies, logistic regression results confirm that some population groups are more vulnerable to experiencing unmet health needs than others. These include women, low income and less educated individuals, immigrants and people with poor health status. Other individual characteristics which are positively associated with unmet needs are: being young and separated/divorced/widowed, having a job, residing in the south and the islands. Generally speaking, two main conclusions may be drawn from the econometric findings. Firstly, consistently with the existing literature[15], individual conditions play a major role than supply-side factors in explaining accessing behaviours. Secondly, the Andersen behavioural model, which has been used in this paper as conceptual framework, seems to fit only partly, given that most predictors, thought statistically significant, present rather small APEs.

Evidence of income-related inequalities in unmet health needs are also found. Independently of the type of care not received, southern regions show the highest inequalities which persist even when standardization for differences in health needs is made. The contribution of non-need factors to such inequalities differs across geographical areas too. In the northern regions, they are generally the main responsible for pro-poor inequities. In the south and the islands, non-need factors play a much minor role compared to income.

From a public policy perspective, these findings highlight the importance of using multidimensional and differentiated approaches for improving access to health care, accounting for the fact that barriers to health care are unlikely to be uniform across groups of people and geographical areas. In the specific case of Italy, attention should be primarily focused on demand-side interventions which require the involvement of welfare sectors other

[15] See, among others, Fabbri and Monfardini (2003).

than the health one. A combined public policy that addresses financial and nonfinancial barriers to care is especially needed. In particular, enhancing certain social support mechanisms and education could prove to be a key strategy for reducing acceptability barriers that women and young people face.

There are a number of limitations of this paper. First, as information on unmet health needs is self reported, some concern could stem from the possibility of unreliable recall. On the contrary, given the specific study purpose, recognition errors because of clinically not validated data are not a problem. Second, EU-SILC does not enable to distinguish between different experiences of self-perceived unmet health care needs. Specifically, it is not possible to discern situations in which people do not receive health care at all from situations in which they do not receive it in the way they want (e.g. in a timely manner). This fact limits the interpretation of the data, particularly in relation to specific policy options that might be considered to reduce the occurrence of unmet needs. Third, unperceived unmet needs are completely neglected by the survey. Fourth, the EU-SILC design is cross-sectional, and thus data on outcomes and determinants are collected simultaneously. Because of this, associations observed between variables cannot be inferred to be causal. Lastly, lack of data on individual actual use of health care services has not allowed to investigate the association between unmet needs and subsequent utilization behaviours.

Future studies should continue to monitor the unmet health care needs phenomenon and to provide further understanding of the nature of these barriers so as to better target resources to population needs and to ensure more effective health policies. In particular, more research is needed on how recent health reforms involving fiscal restraint and regionalization in Italy may have influenced reported unmet health care needs and their implications for the future.

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