INEQUALITIES IN ACCESS TO HEALTHCARE SERVICES BEFORE, DURING AND AFTER THE GEEK SOVEREIGN DEBT CRISIS.

INTRODUCTION

Inequalities in access to healthcare services constitute one of the three main aspects of health inequalities examined in the health economics literature alongside inequalities in health outcomes and inequalities in healthcare payments. Even though the conceptual literature has mainly focused on inequalities in health outcomes, inequalities in access to healthcare services have for long received the major share of attention in terms of empirical applications and publications (Macinko & Starfienld, 2002).

According to the World Health Organization (WHO) the presence of inequalities in access to healthcare means that access is not distributed across the population according to medical need but according to socioeconomic characteristics that should otherwise be unrelated to access and, eventually, treatment. This approach stems from the broader perspective of looking at health as a "special good", in other words a good that acts as a prerequisite for the individual's capability to function adequately in the social context (Anand et al, 2004; Fleurbaey & Shokkaert, 2009; Sen, 1999).

Organizational arrangements play a crucial role in the manifestation and the intensity of inequalities in access to healthcare. Access barriers are more frequent in healthcare systems relying heavily on market mechanisms due to the various failures of the private health insurance market. Healthcare systems providing universal coverage are considered more effective in limiting access barriers compared to systems relying on social insurance as the latter may not be as adequate in protecting the population in case of unemployment shocks. However, problems usually persist even in countries where universal coverage is formally in place, for a variety of reasons. These range from cultural or geographic barriers, to long waiting times, high user fees or even race, gender and age factors (Baeten et al, 2018).

Both principles of universal coverage and unhindered access to healthcare are of paramount importance for health systems across Europe. For these reasons, these principles appear in a

number of national constitutions as well as in official documents and reports of European and international institutions and organizations on a standard basis[1].

Barriers in access to healthcare services may increase considerably during economic crises. On one hand, crisis periods are associated with increases in demand for public healthcare services due to household income reductions (rendering private healthcare services unaffordable) as well as with possible adverse effects on health status itself. On the other hand, state financing of healthcare services may come under strain due to government spending cuts. Underfunding may lead to substantial shortages in healthcare service provision and large shares of the cost for healthcare to be paid by the patient, resulting in a bad performance in terms of access to healthcare (Baeten et al, 2018).

Greece experienced a similar situation during its sovereign debt crisis. The fiscal adjustment programs that the country pursued during the period 2010-2018, affected the living standards of Greek households through various channels. These included reductions in private and public-sector wages and pension benefits, soaring unemployment rates, as well as across-the-board direct and indirect tax hikes. Public healthcare provision was also significantly affected through health spending cuts, reductions in benefit eligibility, increases in user charges and broader institutional reforms with implications that are only now beginning to be properly assessed. The overall impression has been that access to healthcare was greatly compromised. Considering that tackling inequalities in access to healthcare remains at the top of the European policy agenda, looking at potential crisis-related effects during this period can, inter alia, reveal incompatibilities between goals and policies at both the European and the national level.

Studies about crisis effects on inequalities in access to healthcare services have been limited in Greece. Kyriopoulos et al (2014) found that in 2013 a total of 25% of chronic patients in Greece faced geographical barriers while 63.5% and 58.5% faced financial and waiting list barriers,

1 For EU institutions access to high-quality services is seen as a "crucial element of social investment and contributes to maintaining a productive workforce and to reducing the costs of care in the longer run" (e.g. European Commission, 2013; European Parliament, 2013), "is essential for good quality of life and inclusive growth" falling thus into the scope of the Europe 2020 strategy (European Commission, 2010), "can contribute to addressing social exclusion and poverty" (European Commission, 2010) and "is an important factor in addressing health inequalities" (Council of the European Union, 2010; 2011). The WHO as well as the OECD on various occasions also often note that unhindered access to healthcare services is a priority area and a fundamental policy objective in for the European region (see OECD Health at a glance reports or WHO "Health 2010" policy framework, 2012).

respectively. Unemployed, low-income and low-educated groups were more likely to face economic barriers while women, low-income patients, and patients with lower health status were more likely to face geographical barriers. They also find that the probability of waiting lists occurrence is greater amongst the unemployed, employees and low-income groups. However, this study does not shed light on the evolution of inequalities in access to healthcare as a result of the 2010-2018 crisis. Zavras et al (2016) use time-series analysis to show that socioeconomic status was a determinant of widening inequalities in unmet need for healthcare between 2006 and 2011. Karanikolos and Kentikelenis (2016) present rising unmet need statistics from Eurostat to argue that the relative gap in access to care between the richest and poorest population groups increased considerably (almost tenfold) between 2008 and 2013, but without proceeding to any further econometric analysis.

In this paper we analyze inequalities in access to healthcare services using data from the National Health Surveys carried out by EL.STAT in 2009, 2014 and 2019. The objective is to assess whether an increase in inequality is observed during this 10-year period. The first survey year represents the period prior to the sovereign debt crisis, the second the situation around the peak of the Greek recession while the third survey year the period right after Greece exited the its third economic adjustment program.

I. DATA

The analysis that follows uses cross-sectional data from the Greek National Health Survey which was carried out by the Hellenic Statistical Authority (EL.STAT) in 2009, 2014 and 2019. The Greek National Health Survey is part of a wider European statistical program, namely the European Health Interview Survey (EHIS) with data collection initially scheduled to take place every five years starting in 2009. EL.STAT released the 2009 data in July 2011, the 2014 data in June 2016 and the 2019 data in December 2020. A fourth wave is being planned for 2025.

The National Health Survey collects individual and household-level data from a fully representative sample across Greece. Its main aim is to collect information on a wide range of health-related variables including on physical and mental health status, use of healthcare services and behavioral factors that influence health. It also collects information on demographic and socioeconomic characteristics of the individuals and households interviewed. In terms of design, the questionnaire is first prepared according to Eurostat guidelines to

produce comparable data among Member States but is then adjusted to the cultural and institutional parameters of the national healthcare system in each participating country.

EHIS provides a unique opportunity for researchers to regularly monitor health inequalities in participating countries. The unavailability of periodically collected microdata combining socioeconomic characteristics with health-related variables had been a major drawback in advancing with this kind of research in Greece. The years for which data are already available, are particularly useful, allowing for the examination of the magnitude of inequalities in access to healthcare services in Greece before, during and after the crisis. In 2009, Greece had not entered its first financial assistance program, whereas by 2014 a wide range of developments at the social, fiscal and structural level had affected Greek households as well as the institutional framework related to the provision of healthcare services in Greece. In addition, the analysis of the 2019 survey provides a first assessment of the situation in the aftermath of the crisis.

The survey focuses on households and individuals aged 15 years and over residing in private households across the whole Greek territory and irrespective of their size or other socio-economic characteristics[2]. The surveys were conducted during the last quarters of each year and the reference periods range from 1 day to 12 months prior to the survey, depending on the variable. According to EL.STAT, the sample was fully representative of the reference population and its size ensured the high accuracy of the data collected. Quality and quantity checks were made in the database to correct recording, processing or any other errors in close cooperation with Eurostat (EL.STAT). The total response rate after the application of methods to reduce unit non-response was 95.5 percent in 2009, 82.9 percent in 2014 and 93.1 percent in 2019. For the purposes of our analysis, we focused on individuals aged 18 and over. This reduced our sample to 6,077 (from 6,172) observations in 2009, to 8,105 (from 8,225) observations in 2014 and 7,969 (from 8,125) observations in 2019.

II. VARIABLES

Access to healthcare services

[2] Individuals permanently residing in collective residences such as hospitals, hotels and asylums as well as households having as members foreign citizens serving as diplomatic staff are excluded from the sample.

Self-reported unmet need for healthcare is a frequently used outcome indicator in the literature examining inequalities in access to healthcare. Unmet need for medical and dental care are also the main healthcare access indicators reported by Eurostat (originating from the European Survey on Income and Living Conditions -known as EU-SILC[3]). EHIS includes binary variables for self-reported unmet need for medical (including GP, specialist and hospital visits) and dental care in the 12 months prior to the survey. We have merged the three binary variables for unmet medical need into a single binary variable (GP, specialist or hospital visits) while we examine unmet dental need separately.

In addition to self-reported unmet medical and dental need, EHIS includes a series of other variables indicating whether and when the respondent has accessed some very basic preventive services and diagnostics. We exploit this information by employing 3 additional indicators for access to doctors (GPs, doctors of other specialties and dentists) and 5 additional indicators for basic preventive tests (blood pressure measurement, cholesterol measurement, blood sugar measurement, mammogram and pap-smear) in the 12 months prior to the survey.

Table 1. EHIS access variables used in the analysis.

Healthcare variable	Indicator (yes/no)
Unmet need for healthcare	Self-reported unmet need for medical care in last 12 months. Self-reported unmet need for dental care in last 12 months.
Doctor visits	Respondent has visited a GP in last 12 months. Respondent has visited other specialists in last 12 months. Respondent has visited a dentist in last 12 months.
Basic diagnostic tests	Respondent has had his blood pressure measured in last 12 months. Respondent has had his cholesterol levels measured in last 12 months. Respondent has had his blood sugar measured in last 12 months. Respondent has had a mammogram in last 12 months. Respondent has had a pap-smear in last 12 months.

Notes: Unmet medical needs due to financial reasons, waiting list or distance; For the mammogram indicator, only women aged 40+ were considered ; For the pap-smear indicator, only women aged 18+ were considered.

[3] EU-SILC variables on unmet needs for healthcare also target two broad types of services: medical care (but in a single variable-question) and dental care. The survey records unmet need by reasons including (i) financial constraints ("too expensive"), (ii) distance, (iii) waiting list, and, (iv) lack of time, fear and other reasons. Eurostat considers that "barriers of access" exist if lack of access is the result of any the first three reasons, i.e., financial constraints, distance and waiting time. These "barriers of access" are identical to the reasons for unmet need we selected from the EHIS survey.

EHIS contains some additional variables capturing the intensity of use (e.g. count variables indicating the number of doctor visits). Given that we focus on unmet needs and access to basic services and tests (typically undertaken once per year), an analysis on the intensity of use is meaningless in the context of this study. Furthermore, focusing only on binary use indicators allows to use the same methods and tools as for the comprehensive variable capturing unmet need for healthcare and allows for the comparability of the results produced.

All EHIS health variables (including those on access to healthcare) are "subjective" or "self-reported" i.e., they are based on the responses of participants interviewed and not on external medical assessment or patient records. They may therefore suffer from potential mis-reporting bias (some respondents may be either under-reporting or over-reporting access due to poor memory or behavioral factors). This limitation is a common feature of health-related variables that are usually included in such household surveys. The alternative would be to use administrative data on access, such as hospital admission or patient records. However, such data are not systematically collected in Greece. In case they were available, they would suffer from even more serious flaws including non-representative samples, risk of improper statistical recording, confidentiality issues or lack of accompanying socioeconomic background information required in the context of an inequality analysis.

Socioeconomic status

In the analysis that follows we used total equivalized household income as the main measure of socioeconomic status- broadly known in the health inequalities literature as 'SES'. The latter can be described as a measure of an individual's economic or social position relative to others and has been consistently shown to be a strong predictor of a wide range of health-related outcomes (such as physical or mental health status or access to healthcare). SES is usually measured by income, education or occupation (but other variables have also been used either on their own or in a combined manner). Income is the most frequently used measure of SES in the health economics/inequalities literature. For analyzing access inequalities, alternative indicators could be the level of educational attainment, occupation, residential area (for the assessment of geographical disparities), ethnicity as well as healthcare insurance coverage. As far as the purposes of this study are concerned, household income is superior to most of these alternatives for both technical and conceptual reasons.

Starting from technical reasons, income variables present statistical properties that are desirable in terms of allowing the use of the most popular inequality measures. For example, income is usually measured as a continuous or ordinal variable that allows for the use of more advanced indices such as the concentration index (or other rank-dependent indices). Nominal variables such as employment status have some ordinal characteristics but cannot be ranked in a strict hierarchical sense. One could also opt for binary indicators such as "employed" versus "unemployed" and use them for the calculation of simpler indices, but this would entail a significant loss of information as other employment categories (such as housewives or students) would be excluded from the analysis or treated improperly.

From a conceptual perspective, educational attainment or occupation may conceal true SES at the household level as characteristics of other household members may have a neutralizing effect over a potential individual disadvantage. In the Greek context, using the "employed" versus "unemployed" distinction may confound the true situation with respect to access as the Greek insurance-based healthcare system typically provides for the full-range coverage of dependent family members (including spouses and students below 26 years of age) as well as its continuation for 12 months after the concerned person became unemployed. Therefore, a most useful variable in the Greek context would be one recording the respondents' health insurance status. However, relevant information is not available for 2009 and incompletely recorded in the 2014 and 2019 samples. This is a significant drawback of the Greek EHIS survey given the considerable public attention that had been given to the -reportedly- increasing share of the population without any health insurance coverage during the recession. Ethnicity and residential area also merit special consideration when the objective is to assess or quantify geographic disparities and access barriers for specific ethnic groups or minorities.

Examining effects on access in relation to household income is a lot more relevant given Greece's characteristics. On one hand, household income drastically decreased during the crisis. On the other hand, the country's population has been for years relying disproportionately on private healthcare provision compared to citizens in other advanced economies, therefore private resources have played a crucial role in accessing health services in Greece. Even though our focus is on income-related inequalities, we also examine associations between unmet need and access/use variables and additional household- and individual-level characteristics in the context of multivariate regression analyses.

The 2009 dataset includes information on household income as a continuous variable, whereas the 2014 and 2019 datasets include information on household income by categories. For both

years, we opted for the ordered, categorical version of the household income variable (i.e. quintiles) for comparability reasons and because this also facilitates the use of certain inequality measures such as frequency ratios. Note that in each year, the reference year for the income variable is the year preceding the survey.

III. METHODOLOGY

Inequality tools for health-related outcomes

Measures that have been proposed in the literature of health-related inequalities may be assessed and compared on various dimensions (Machenbach & Kunst, 1997; Regidor 2004).

The first dimension concerns whether they measure absolute or relative inequality. This distinction assumes two different meanings in the literature. According to the first, absolute indices of inequality measure univariate inequality whereas relative indices of inequality measure bivariate inequalities. This distinction is also known as a distinction between health inequalities and inequities, even though authors rarely use this distinction in practice nowadays[4]. Since the objective of this paper is to measure the social gradient in access to healthcare, we only focus on relative inequality that aims at quantifying the relation between socioeconomic status and access or service use. According to the second, more technical meaning of the distinction, absolute inequality indices are invariant to additions of equal magnitude to the variable of interest but may be influenced by multiplications by a constant. By contrast, relative indices of inequality are invariant to multiplications by a constant (Regidor, 2004).

The second dimension by which inequality measures are usually compared concerns whether they can capture the experiences of the total population or whether they focus on the experiences of the two extremes of the socioeconomic distribution. In the latter case, in-between categories are excluded from the analysis leading to information loss and possible

[4] Even though this difference is very important in the conceptual literature, in econometric applications authors very often use the simplified term health inequalities when they in fact refer to bivariate socioeconomic inequalities (inequities) in health and healthcare. In the last two decades, empirical studies mainly focus on socioeconomic inequalities in health and healthcare and, therefore, the use of relative inequality measures is the norm. For an overview of the older discussion between proponents of absolute versus relative inequality measures, see Regidor (2004).

errors in assessing the true magnitude of inequality when data at either end of the socioeconomic distribution are skewed.

The third dimension on which measures of inequality are compared is whether they represent a measure of "effect" or a measure of "total impact". In the first case the measure is insensitive to the distribution of the socioeconomic variable chosen, whereas in the second case the magnitude of the inequality will also depend upon the distribution of the socioeconomic variable itself.

In practice, choosing the appropriate inequality measure is rarely a matter of personal preference as the statistical properties of both the socioeconomic and the health variables available in surveys guide analysts to the most suitable index or measure depending on the question at hand. We also choose measures that are appropriate for the variables that will be used in our analysis i.e. binary access variables associated with an ordered income variable.

We begin by employing frequency ratios which are a very simple but also a very popular measure in the literature. Frequency ratios measure differences in healthcare use between the two extreme categories of the socioeconomic distribution (here between the fifth and the first household income quintile), therefore they do not capture the experiences of the total population. This measure is insensitive to changes in the average level of the health variable as well as to the distribution of the socioeconomic variable itself, therefore they represent a relative measure of inequality as well as a measure of effect. Frequency ratios have been used extensively in empirical studies on health inequalities despite their limitations (sensitivity to possible data skewness and not accounting for the experiences of socioeconomic categories in-between the extremes) because they easily illustrate disparities between the top and the bottom of the socioeconomic distribution.

An equally popular measure is to describe the association between socioeconomic status and the health variable by calculating regression coefficients, while at the same time including other relevant control variables in the regression. In the case of a binary outcome variable, it is standard practice to employ logit or probit multivariate regression analysis. We also use a series of probit regressions to examine associations between our binary indicators of unmet needs and access to healthcare and a series of frequently used demographic and socioeconomic characteristics. These include age, gender, household income, highest level of educational attainment, unemployment (as a proxy for insurance status), degree of urbanization and citizenship. This method does not produce a single inequality measure when the socioeconomic

variable is categorical or ordinal. This can be instead achieved by means of a rank correlation coefficient like Kendall's tau-b[5] that measures the similarity of the orderings between categorical variables (values close to 1 indicate strong similarity; values close to -1 indicate strong dissimilarity while 0 indicates independence between the two variables). Even though these measures are referenced in the literature overviewing health inequality measures and indices, they are not particularly popular and very seldom appear in empirical applications like the one we present here. We nevertheless present results from two rank correlation coefficients (Kendall tau-b and Spearman's rho) in the Appendix.

By contrast, the empirical literature mostly focuses on single inequality measures such as the Concentration Index (CI) which is derived from the Concentration Curve and remains the most popular health inequalities measure for more than two decades. Another similar measure is the Relative Index of Inequality (RII) which is derived from the Slope Index of Inequality and which is nevertheless much less popular compared to the CI. It is also worth noting that the Gini coefficient, which has been mainly used for the analysis of univariate inequality, can also be used to assess bivariate inequities through a standardization and decomposition approach (for more details see Asada et al, 2014). However, employing the Gini coefficient requires that the health variable is measured on a ratio scale or that it is at least ordinal. In the latter case, a transformation would be required to account for the fact that categories may not be equidistant, as for example in the case of self-assessed health variables (O' Donnell et al, 2008). As for the Relative Index of Inequality, its use would require the transformation of categorical socioeconomic variables by assigning "ridit" scores (which are closely related to cumulative frequency[6]) which could be problematic in the case of adjacent categories or may complicate the interpretation of the results (Manor et al, 1997; Regidor, 2004). For the reasons laid out above, we opt for the Concentration Index as the main inequality measure for the analysis that follows.

[5] For an overview of rank correlation measures including Kendall's tau-b, Spearman's rho, Kruskal Gamma and others, see Manor et al (1997).

[6] Each socioeconomic category is given a score called "ridit" score, which reflects the average cumulative frequency of the group or the midpoint of the range of each group in the cumulative distribution.

The Concentration Index

The concentration index (first proposed for the measurement of health inequalities by Wagstaff in 1991) is derived from the concentration curve in a similar way the Gini index is derived from the Lorenz curve. In fact, the concentration index may be seen as the bivariate analogue of the Gini index (O' Donnell et al, 2016).

Using the concentration index requires a continuous or at least ordinal socioeconomic background variable which can be used to rank individuals or groups from the least to the most advantaged. It then plots cumulative proportions of the health-related (outcome) variable against cumulative proportions of the ranked population.

A negative value of the concentration index indicates that the concentration curve lies above the diagonal and that the health variable is disproportionately concentrated amongst the more disadvantaged socioeconomic individuals or groups. A positive value of the index means that the concentration curve lies below the diagonal and that the health variable is disproportionately concentrated amongst the higher socioeconomic status individuals or groups. For this reason, interpretations regarding whether the sign of the concentration index denotes "pro-poor" or "pro-rich" inequality depend on the nature of the health variable that is each time being used; for variables that have a negative effect on well-being, such as poor health or unmet need for healthcare, a positive value of the index means that there is "pro-poor" inequality, whereas for variables influencing well-being in a positive manner, such as use of healthcare or a health utility index (increasing as health status improves), a positive value of the concentration index indicates that there is "pro-rich" inequality.

The concentration index assumes values between -1 and 1, with a zero value meaning that the concentration curve coincides with the diagonal (or "line of equality") and that there is no inequality to report[7]. The further away the curve lies from the diagonal, the larger the value of the index which is defined as twice the area between the concentration curve and the diagonal.

There are many ways to compute the concentration index, but the most well-known is the method widely known as the "convenient regression" which computes the index in terms of

[7] However, a zero value of the concentration index may also mean that the concentration curve crosses the line of equality and pro-poor inequality in one part of the distribution is offset by pro-rich inequality in another part of the distribution (O' Donnell et al, 2016).

covariance between the health variable and the fractional rank in the socioeconomic distribution. Using the convenient regression method, the concentration index is easily calculated as follows:

$$CI = \frac{2cov(y_i, R_i)}{\mu}$$

where y_i is the individual i 's health-related status, μ its mean and R_i is the individual's fractional rank in the socioeconomic distribution.

According to the distinctions between inequality measures given previously, the concentration index accounts for the experiences of individuals or groups across the socioeconomic spectrum, is a relative measure of inequality (it is invariant to equiproportionate changes in the health variable) as well as a measure of "total impact" (it also depends on the distribution of the socioeconomic variable itself)[8]. An absolute invariance version of the measure is the generalized concentration index which is obtained through multiplication of the standard index by the mean of the health variable (Wagstaff et al, 1991).

The popularity of the concentration index mainly stems from its axiomatic properties and its easy interpretation (Erreygers, 2009). However, the index needs to be corrected when responses to the health-related variable are binary. In the next section, we present a brief overview of the relevantly recent discussion on using the concentration index with binary outcome variables.

The Concentration Index for binary variables

A number of variants of the concentration index have been proposed when the variables of interest possess different statistical properties. Not accounting for these properties may affect

[8] Also, according to the distinction used by Regidor (2004), the concentration index is not a measure of inequality but a measure of inequity i.e., the concentration index is a bivariate measure associating socioeconomic status with health-related factors. A more advanced interpretation of the distinction between inequality and inequity calls for the employment of a standardization method that isolates and removes the effect of "legitimate" factors before applying any measurement method. This would then lead to reporting inequities instead of inequalities in health i.e., differences that are due to "illegitimate" factors or differences that are ethically unacceptable.

the value of the index as well as inequality orderings (O' Donnell et al, 2016; Erreygers and van Ourti, 2011). Furthermore, when the health variable of interest is bounded (e.g. a binary variable) the "mirror property" of the concentration index is violated (Erreygers, 2009). This means that values of the concentration index may differ depending on whether it is computed over attainments or shortfalls from the upper limit of the health variable. The standard version of the concentration index does not meet this condition. Moreover, Wagstaff (2005) has shown that, for dichotomous variables, the bounds of the index are not -1 and 1 but may depend on the mean value of the variable in question. For large samples, the lower bound becomes $\mu - 1$ and the upper bound becomes $1 - \mu$. This mainly creates problems in terms of cross-country comparisons, especially when the mean level of health varies between countries (the range of the index shrinks when the mean is high and increases when the mean is low). Given that many empirical applications in health equity analysis very frequently involve the use of bounded or binary indicators, both Wagstaff (2005) and Erreygers (2009) proposed variants of the concentration index that they consider more appropriate for such cases.

For dichotomous variables Wagstaff (2005) has suggested dividing the concentration index by 1 minus the mean, in other words dividing it by its feasible minimum or maximum. Erreygers (Erreygers 2009; Erreygers and Van Ourti, 2011) has on the other hand criticized the normalization proposed by Wagstaff on the grounds that it produces an inequality measure that only partially satisfies the mirror condition. Erreygers has instead proposed a correction that satisfies the latter but is sensitive to equiproportionate changes in the health variable. His variant assigns a larger value to the index when positive changes (i.e. improved health or access) take place at the upper 50% of the income distribution. So, if we move from a hypothetical state that only the 10 richest persons enjoy good health to a distribution that the second 10 richest persons also enjoy good health, then employing the Erreygers correction would assign a higher value to the concentration index (i.e. it would imply an increase in the degree of inequality). This approach has been criticized by Wagstaff (2011) on the grounds that it takes the focus away from relative to absolute inequality and that it contravenes the initial properties and advantages of the concentration index.

The merits and shortcomings of both corrections have been intensely debated. Kjelsson and Gerdtham (2013) argue that, even though Erreygers' criticism of Wagstaff's normalization is technical, the difference between the two proposed indices is in fact normative. They also argue that Wagstaff's index is a reasonable alternative to an absolute index for dichotomous variables and that it represents a compromise between relative inequality in health and relative inequality

in ill-health (for more, see Kjelsson and Gerdtham, 2013). In any case, the choice of either normalization method would depend on the desired value judgments underlying the index. O' Donnell et al (2016) note that if one is not convinced that one variant of the concentration index is normatively superior to its alternatives, then one should check whether inequality results are consistent between the two variants. We do not have any particular preference regarding the normative values underlying the two normalizations. For this reason, we employ the indices proposed by both Wagstaff and Erreygers and report corresponding results. It is worth mentioning that we do not observe significant differences with respect to our findings depending on the normalization method pursued.

Finally, there is a need to address conceptual matters related to the distinction between inequality and inequity. For this reason, we employ an indirect regression-based standardization method removing the effect of acceptable or "legitimate" sources of inequality (Fleurbaey and Shokaert, 2009), before applying our inequality measures. Fairness-standardization is similar to age-standardization in epidemiological studies, which removes the influence of age when estimating mortality rates, but in this context, standardization may remove the influence of additional sources of inequality that one may choose to consider as acceptable (Asada et al, 2015). The standardization procedure thus produces the unfair distribution of the health variable in question and the subsequent application of an inequality index would measure inequities instead of inequalities. In this case we only control for demographic characteristics (gender and age) with the exception of visits to specialists where we also control for need (using the presence of a chronic condition as a proxy). The indirect standardization procedure involves the estimation of a regression model where the dependent variable is the health variable of interest and the regressors are the confounding variables for which we want to standardize or control (O' Donnell et al, 2008). Estimates of the indirectly standardized health variable (in this instance, of the variables for unmet need) are given by the difference between the actual health variable and the x-expected health, plus the sample mean (ibid). By contrast, the direct standardization method predicts unfair health directly by allowing the illegitimate variables alone to influence the predictions. These different calculation procedures imply that unfair health estimated by the direct standardization does not include the unexplained component of the health distribution while the unfair health estimated by the indirect standardization does (Asada et al, 2015). Some recent studies suggest that unexplained inequality is often large and not evenly distributed across socioeconomic groups, in other words

it is an ethically unacceptable source of inequality. The indirect standardization method is therefore considered superior in that respect (Asada et al, 2015; Garcia-Gomez et al, 2012).

It should be noted that the discussion over "legitimate" and "illegitimate" sources of inequalities in health is a source of intense disagreement amongst authors because it entails ethical judgments that may vary to a significant extent. This debate, however, mostly concerns inequalities in health outcomes and the role of behavioral factors leading to these inequalities[9] (such as smoking or alcohol consumption). More specifically, some authors are proponents of the view that some health outcomes are simply a matter of individual preferences. Therefore, there is no need to be concerned with any inequality arising from individual choices made rationally and, nowadays, in full awareness of any consequences they may have (this notion is closely linked to the "rational addiction theory" developed by Becker and Murphy in 1988). Proponents of this view consider that individual behavioral factors leading to adverse health outcomes are acceptable sources of inequality and should be treated as such. Most health economists however disagree with this approach, as unhealthy habits such as smoking are not evenly distributed across the population but have been consistently found to be more prevalent amongst lower socioeconomic groups. Such concerns are less relevant in the context of inequalities in access to healthcare examined in this study.

IV. RESULTS

Sample statistics

We start by simple sample frequencies for the unmet need and health service utilization variables in 2009, 2014 and 2019 (Table 2). The first observation is the sharp increase in self-reported unmet need for healthcare during the crisis. Self-reported unmet need for healthcare almost tripled between 2009 and 2014. In the 2019 sample it appears to have decreased significantly but it still remains in higher levels compared to 2009. The increase in self-reported unmet need for dental care was even larger during the entire period examined. Visits to GPs in the 12 months prior to the survey on average declined in 2014 and 2019 compared to 2009. Visits to other specialties remained broadly at the same levels. Visits to dentists remained stable

[9] Evidence suggests that proponents of the "policy amenability" definition of health inequalities (suggesting that all factors amenable to policy interventions, including individual behaviors, are unfair) are in a better position to defend their arguments. For an overview of the relevant discussion see Anand et al (2004).

during the crisis and slightly increased in 2019. Regarding preventive tests, we observe a significant drop in the mean occurrence of blood pressure, cholesterol and blood sugar measurement during the crisis (by over 20 percentage points). Their occurrence only marginally increased in the 2019 sample; it remained at considerably lower levels in 2019 compared to 2009. On the contrary, there was a noticeable increase in the aggregate use of women's tests such as mammograms and pap-smears.

Table 2. Sample statistics: access to healthcare.

	2009		2014		2019	
	N	%	N	%	N	%
Sample size	6,077	100	8,105	100	7,969	100
Access and use of healthcare services						
Unmet needs in last 12 months						
Self-reported unmet need for medical care	484	8.0	1,778	22.8	869	10.9
Self-reported unmet need for dental care	275	4.5	1,230	15.7	741	9.3
Doctor visits in last 12 months						
GP	3,935	65.0	4,707	58.3	4,676	58.9
Other specialties	2,913	48.4	3,774	47.2	3,759	47.4
Dentist	2,729	45.6	3,741	46.6	3,951	49.8
Basic preventive tests in last 12 months						
Blood pressure measurement	4,133	79.3	4,357	55.9	4,746	59.7
Cholesterol measurement	4,121	78.3	4,436	56.8	5,014	63.0
Blood sugar measurement	4,092	78.2	4,404	56.4	4,966	62.4
Mammogram	595	21.4	1,194	34.1	1,231	36.4
Pap-smear	997	26.8	1,860	40.7	1,718	41.1

Source: ELSTAT (EHIS), own calculations.

Notes: Analysis is weighted using EHIS survey sample weights, unstandardized health distributions; Unmet medical needs due to financial reasons, waiting list or distance; For the mammogram indicator, only women aged 40+ were considered; For the pap-smear indicator, only women aged 18+ were considered.

Tables 3 provides the breakdown of unmet need and access to healthcare services by income quintile. Even though the increase in unmet needs during the crisis was more pronounced for the lower income quintiles, the deterioration was evident across the household income spectrum. After the crisis, unmet needs decreased for all income categories, but the decrease was sharper at the upper end of the income distribution. Access to doctors and basic preventive tests also declined across the income distribution during the crisis, however differences were more pronounced at its lower end. The use of some services (such as women's preventive tests and visits to GPs) improved at the upper end of the distribution but worsened at its lower end. Improvements in the preventive tests variables in 2019 appear to mostly favor higher income groups. The general takeaway is that a deterioration is observed across the income spectrum in

Table 3. Access to healthcare by income quintile.

	2009						2014						2019					
Access to and use of healthcare services	**q1**	**q2**	**q3**	**q4**	**q5**	**total**	**q1**	**q2**	**q3**	**q4**	**q5**	**total**	**q1**	**q2**	**q3**	**q4**	**q5**	**total**
Unmet needs in last 12 months																		
Self-reported unmet need for medical care	10.8%	8.6%	7.1%	6.9%	6.2%	8.2%	35.6%	28.0%	23.2%	20.6%	16.2%	24.4%	18.8%	14.3%	12.2%	8.7%	5.3%	11.9%
Self-reported unmet need for dental care	5.8%	5.4%	4.7%	3.6%	2.3%	4.7%	25.6%	20.7%	16.0%	11.7%	5.9%	16.1%	22.2%	14.5%	7.9%	3.4%	1.0%	9.4%
Doctor visits in last 12 months																		
GP	65.5%	59.6%	65.4%	63.9%	60.2%	63.1%	59.7%	60.0%	60.6%	62.1%	67.6%	61.4%	54.8%	60.6%	64.6%	66.4%	70.7%	63.5%
Other specialties	42.9%	44.5%	46.6%	51.1%	59.0%	47.2%	41.2%	48.9%	47.6%	51.0%	56.2%	49.0%	44.1%	45.6%	50.8%	52.9%	59.5%	50.0%
Dentist	39.9%	41.5%	47.7%	51.0%	63.2%	46.3%	32.7%	38.4%	44.8%	49.9%	57.1%	44.5%	31.7%	38.3%	44.7%	54.8%	66.6%	46.2%
Basic preventive tests in last 12 months																		
Blood pressure measurement	78.7%	76.8%	77.0%	80.2%	77.4%	77.9%	56.1%	59.1%	59.3%	62.7%	67.1%	60.6%	56.2%	62.4%	64.0%	67.6%	69.7%	64.2%
Cholesterol measurement	74.8%	76.4%	77.0%	78.7%	82.0%	77.1%	55.5%	60.2%	59.4%	63.7%	67.7%	61.1%	57.0%	63.8%	66.7%	71.7%	73.4%	66.8%
Blood sugar measurement	74.0%	76.6%	77.1%	78.5%	82.0%	77.0%	54.7%	59.5%	59.7%	63.0%	67.1%	60.7%	57.3%	63.3%	65.9%	70.6%	73.3%	66.2%
Mammogram	8.9%	8.4%	10.9%	15.4%	26.4%	11.6%	7.5%	14.3%	13.8%	23.1%	29.2%	17.2%	3.6%	8.3%	14.8%	22.3%	39.0%	15.7%
Pap-smear	15.2%	12.2%	19.1%	22.1%	33.9%	17.8%	6.1%	16.2%	21.4%	30.0%	34.1%	21.6%	6.2%	12.6%	20.3%	25.6%	37.4%	19.1%

Source: ELSTAT (EHIS), own calculations.

Notes: Analysis is weighted using EHIS survey sample weights; Distributions have been indirectly standardized for gender/age (all indicators) and need (specialist visits); Small differences with Table 2 (totals in last columns of each year) are due to the reporting of unstandardized results in Table 2; For the mammogram indicator, only women aged 40+ were considered; For the pap-smear indicator, only women aged 18+ were considered.

Table 4. Access to healthcare by age group.

	2009						2014						2019					
	18-30	**30-50**	**50-65**	**65-75**	**75 or above**	**total**	**18-30**	**30-50**	**50-65**	**65-75**	**75 or above**	**total**	**18-30**	**30-50**	**50-65**	**65-75**	**75 or above**	**total**
Access to and use of healthcare services																		
Unmet medical needs in last 12 months																		
Self-reported unmet need for medical care	10.3%	9.8%	6.3%	5.9%	7.9%	8.0%	17.9%	19.5%	25.3%	31.6%	29.5%	23.3%	6.9%	8.4%	11.4%	17.0%	14.7%	11.0%
Self-reported unmet need for dental care	5.0%	3.8%	3.0%	4.2%	7.7%	4.6%	15.7%	15.3%	18.8%	16.1%	13.5%	16.0%	7.7%	8.7%	11.0%	11.7%	7.1%	9.3%
Doctor visits in last 12 months																		
GP	47.2%	48.7%	65.6%	78.6%	81.0%	64.4%	46.7%	49.1%	61.4%	75.7%	78.4%	58.7%	34.6%	47.8%	64.9%	77.6%	82.0%	59.0%
Other specialties	48.9%	47.6%	45.5%	46.4%	46.7%	46.9%	42.0%	49.8%	54.9%	50.1%	44.6%	49.2%	43.0%	50.2%	51.9%	51.2%	49.7%	49.7%
Dentist	60.5%	57.4%	50.5%	36.4%	21.3%	45.3%	55.7%	53.1%	49.9%	37.1%	22.3%	46.9%	59.4%	57.2%	54.6%	39.9%	22.2%	49.8%
Basic preventive tests in last 12 months																		
Blood pressure measurement	60.5%	64.2%	83.6%	88.0%	88.6%	79.0%	31.1%	43.9%	64.4%	80.4%	84.5%	56.4%	33.5%	49.3%	68.6%	79.8%	76.0%	59.8%
Cholesterol measurement	66.5%	67.0%	80.3%	86.0%	84.2%	77.8%	35.5%	45.7%	67.6%	78.8%	79.0%	57.5%	38.5%	54.9%	71.2%	81.7%	74.8%	63.1%
Blood sugar measurement	67.2%	65.8%	80.5%	85.8%	84.8%	77.7%	35.1%	45.4%	66.9%	78.3%	78.5%	57.1%	38.6%	53.8%	70.6%	81.2%	74.7%	62.5%
Mammogram	-	43.0%	31.7%	14.2%	2.3%	21.4%	-	46.1%	44.1%	25.2%	8.2%	34.1%	-	50.9%	48.4%	26.9%	7.2%	36.4%
Pap-smear	36.9%	53.0%	34.5%	10.3%	1.5%	26.8%	47.6%	55.4%	44.5%	21.0%	5.1%	40.7%	39.6%	61.0%	48.7%	21.3%	3.7%	41.1%

Source: ELSTAT (EHIS), own calculations.

Notes: Analysis is weighted using EHIS survey sample weights; Distributions have been indirectly standardized for gender (all indicators) and need (specialist visits); Small differences with Tables 2 & 3 (totals in last columns of each year) are due to differences in the demographic standardization definitions; For the mammogram indicator, only women aged 40+ were considered; For the pap-smear indicator, only women aged 18+ were considered.

2014 compared to 2009, but this deterioration appears to disproportionately affect lower income groups. The overall situation appears improved in 2019 compared to 2014 but still worse compared to the pre-crisis period. Improvements in 2019 are more pronounced at the higher end of the income distribution for the majority of variables examined.

Table 4 provides the breakdown of unmet need and access to healthcare services by age group. In 2009, younger respondents reported higher unmet medical needs compared to more senior respondents. The inverse is observed with respect to unmet dental needs with senior citizens reporting higher unmet dental needs compared to younger groups. As expected, for all other access indicators employed in our analysis i.e. doctor visits and diagnostic tests, use increases with age as a result of increased needs for healthcare that accompany older age. A reversed trend is observed with respect to dental services and women's diagnostic tests (mammograms and pap-smears) with the frequency decreasing as age increases. The most probable explanation for this is that psychological or cultural barriers (such as lack of information/health education, fear, or shame for these examinations) are typically more common amongst older respondents. Moving to 2014 and 2019, we observe that unmet medical need increased across the age distribution, but older Greeks now report increased unmet needs compared to both 2009 and younger respondents. Unmet dental needs also increased across the age distribution during the crisis.

Doctor visits and the use of frequently-used diagnostic tests continue to be more prevalent amongst older individuals in 2014 and 2019 reflecting increased medical needs except for visits to dentists and women's tests.

Frequency ratios

We continue by measuring inequality in terms of frequency ratios (Table 5). For variables associated with a positive characteristic, such as access to healthcare services, the ratio corresponds to the share of the individuals belonging to the highest income quintile divided by the share of the individuals belonging in the lower income quintile. This is known as the Q5/Q1 approach. The inverse (Q1/Q5) is being followed for the unmet need variable as higher proportions of the characteristic indicate a worse performance (Börsch-Supan et al, 2015). Therefore, for all variables included in Table 3, ratios above 1 indicate the presence of pro-rich inequalities and ratios below 1 indicate pro-poor inequalities. Before acquiring quintile means,

the distributions were indirectly standardized for demographic factors (age and gender), whereas for specialist visits variable, the distribution was also standardized for need (by accounting for the presence of a chronic disease).

Frequency ratios indicate that inequalities in unmet need for healthcare as well as in the use of basic preventive services and tests have increased after 2009. In the pre-crisis situation, inequalities are observed for most indicators examined (self-reported unmet need for healthcare, dentist and specialist visits, cholesterol tests, blood sugar tests, mammograms pap-smears) whereas marginal pro-poor inequality was observed with respect to GP visits and blood pressure measurement. In 2014 and 2019 however, pro-rich inequality is observed for all access indicators employed in the analysis and has furthermore increased in magnitude. In 2014, respondents belonging to the lowest income quintile were twice as likely to report unmet need for healthcare. More importantly, the gap in unmet medical needs between the lowermost and the uppermost income categories increased further between 2014 and 2019. The results are also striking regarding unmet need for dental care, women's exams (mammograms and pap-smears) and visits to dentists. It appears that inequality increased sharply during the crisis and continued to increase in its aftermath.

Table 5. Frequency ratios between uppermost and lowermost income categories.

Access to and use of healthcare services	**2009**	**2014**	**2019**
Unmet medical needs in last 12 months			
Self-reported unmet need for medical care	1.75	2.20	3.55
Self-reported unmet need for dental care	2.49	4.34	22.20
Doctor visits in last 12 months			
GP	0.92	1.13	1.29
Other specialties	1.37	1.36	1.35
Dentist	1.58	1.75	2.10
Basic preventive tests in last 12 months			
Blood pressure measurement	0.98	1.20	1.24
Cholesterol measurement	1.10	1.22	1.29
Blood sugar measurement	1.11	1.23	1.28
Mammogram	2.95	3.89	10.83
Pap-smear	2.24	5.59	6.03

Source: ELSTAT (EHIS), own calculations.

Notes: Ratios above 1 indicate pro-rich inequalities, ratios below 1 indicate pro-poor inequalities; Distributions indirectly standardized for demographic status (all indicators) and need (specialist visits); For the mammogram indicator, only women aged 40+ were considered; For the pap-smear indicator, only women aged 18+ were considered; analysis is weighted using EHIS survey sample weights.

An initial assessment based on these figures would be that the resilience or improvement observed with respect to access to specific services during the crisis (shown in Table 2) was unevenly distributed across the socioeconomic spectrum. As already discussed, frequency ratios capture relative inequality but are generally considered a crude measure as they only reflect the experiences of the two extremes of the socioeconomic distribution. In the next section, we present results in terms of concentration indices, an indicator that captures the experience of the entire income spectrum.

Concentration Indices

Concentration indices for all outcome indicators are presented in Table 6. As discussed previously, we report results from both the Wagstaff and Erreygers normalizations, as we have no preference for the value judgments underlying the two variants of the Index. In terms of results, we observe some small differences with respect to the magnitude of the indices depending on the normalization employed but no differences with respect to the direction of inequality (as captured by the signs of the indices) or its statistical significance. This indicates that there is no discrepancy in terms of the key takeaways of our analysis depending on the normalization method. Before computing the indices, the healthcare distributions were indirectly standardized for age and gender, as well as need (using specialist visits as an indicator). Positive values of the index indicate disproportionate concentration of the healthcare variable amongst the higher household income groups, whereas negative values of the index indicate disproportionate concentration of the healthcare variable amongst the lower household income groups.

In all years examined, the negative sign of the concentration indices and their statistical significance indicate that unmet needs for both medical and dental care were disproportionately concentrated amongst lower income quintiles. The magnitude of the concentration indices was however larger in 2014 compared to 2009 with the differences being statistically significant. This suggests that pro-rich inequality in both unmet needs for medical and dental care increased considerably during the crisis. While inequality in unmet medical need partially recovered in 2019 it still remained at a higher level compared to the pre-crisis period. Inequality in unmet dental needs continued its upward trajectory even after the crisis.

Table 6. Concentration Indices

	2009		2014		2019		2014 vs 2009		2019 vs 2009	
	Wagstaff CI	**Erreygers CI**	**Wagstaff CI**	**Erreygers CI**	**Wagstaff CI**	**Erreygers CI**	**Wagstaff CIs**	**Erreygers CIs**	**Wagstaff CIs**	**Erreygers CIs**
Access to healthcare services										
Unmet medical needs in last 12 months										
Self-reported unmet need for medical care	-0.077***	-0.031***	-0.112***	-0.092***	-0.109***	-0.066***	**	***	**	***
Self-reported unmet need for dental care	-0.076***	-0.022***	-0.177***	-0.109***	-0.284***	-0.128***	***	***	***	***
Doctor visits in last 12 months										
GP	-0.004	-0.004	0.029**	0.028**	0.051***	0.051***	*	*	***	***
Other specialties	0.067***	0.067***	0.045***	0.045***	0.065***	0.065***				
Dentist	0.097***	0.095***	0.111***	0.111***	0.150***	0.147***			*	*
Basic preventive tests in last 12 months										
Blood pressure measurement	0.005	0.004	0.037***	0.037***	0.050***	0.050***	**	**	**	**
Cholesterol measurement	0.038**	0.032**	0.041***	0.041***	0.070***	0.068***				
Blood sugar measurement	0.041***	0.035***	0.041***	0.041***	0.066***	0.064***				
Mammogram	-0.009	-0.006	0.079***	0.042***	0.128***	0.116***	***	***	***	***
Pap-smear	-0.001	-0.001	0.063***	0.045***	0.113***	0.107***	***	***	***	***

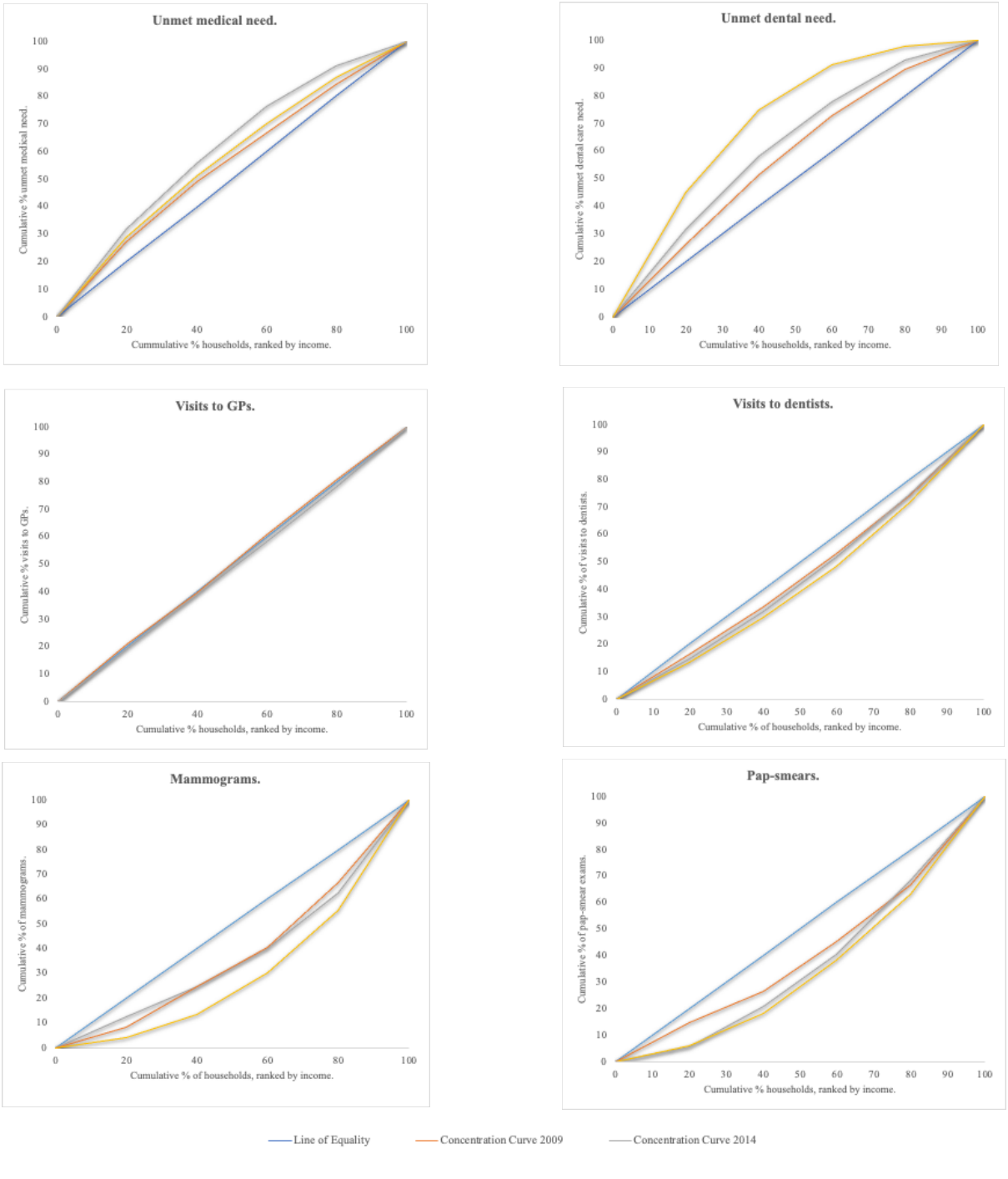
Source: ELSTAT (EHIS), own calculations.

*Notes: Negative sign of the CI indicates disproportionate concentration of the health-related variable amongst lower income categories, positive sign of the CI indicates disproportionate concentration amongst higher income categories; Distributions indirectly standardized for demographic status (all indicators) and need (specialist visits); For the mammogram indicator, only women aged 40+ were considered; For the pap-smear indicator, only women 18+ were considered; * for p < .05, ** for p < .01, and *** for p < .001.*

As per the remaining binary indicators, a differentiation in the direction of inequality is observed in 2009 regarding some of the access variables used. In particular, the CIs of variables such as GP visits, mammograms and pap-smears assumed negative signs in 2009, but the indices were not statistically significant, therefore there is no pro-poor income-related inequality to report in these instances. For all the remaining indicators, the indices assumed positive signs and were statistically significant revealing the presence of pro-rich inequalities in the use of essential health services and tests. In 2014 and 2019, we observe statistically significant concentration indices for all binary indicators for unmet needs and service use employed in the analysis. The direction of inequality is overall as expected, with unmet need being concentrated amongst lower income groups and the remaining access variables being concentrated amongst higher income groups. The size of the indices is larger in 2014 with the exception of visits to other specialties (however, the difference between the two years regarding the specific indicator is not statistically significant, so there is no reduction in inequality to report). The sharpest increases are observed with respect to visits to GPs, blood pressure measurement and women's screening tests. For these indicators, the increase in the degree of inequality during this period is statistically significant. Furthermore, inequality continued to increase across all indicators in 2019. Results broadly suggest that socioeconomic inequalities in access to healthcare are observed in all three survey years analyzed. However, most of the access distributions had become considerably more unequal in 2014 and 2019 compared to 2009 with the negative change impacting the groups belonging to the lower end of the Greek household income distribution.

Panel Figure 1 provides a selected visual representation of inequalities in line with the CI results presented in Table 6. Concentration curves for unmet needs lie above the diagonal (negative CIs) while curves for healthcare use lie below the diagonal (positive CIs), suggesting pro-rich inequality in the distribution of the variables in question. Concentration curves in 2014 and 2019 have moved further away from the diagonal (line of the quality) compared to 2009. Table 6 results indicate that this effect is statistically significant regarding unmet need for medical care, unmet need for dental care, GP visits, blood pressure measurement and women's exams (mammograms and pap-smears), as well as for visits to dentists in 2019 compared to 2009. For the remaining variables, no statistically significant increase in pro-rich inequality is observed, even if the latter was both present and statistically significant in 2014 and 2019 for all ten variables examined.

Figure 1. Concentration Curves for unmet need and healthcare use variables.



Source: ELSTAT (EHIS), own calculations.

Probit models

Tables 7-9 present results from probit regressions used to examine associations between the ten access/use healthcare indicators and a series of individual and household characteristics. The explanatory variables selected are some of the most commonly used in the empirical literature on socioeconomic determinants of access to healthcare and include household income, level of education, unemployment and citizenship status as well as degree of urbanization of the primary residence area. Age and gender were also included to isolate their effect. Table 7 compares probit regression results for unmet medical and dental needs between the three survey years, while corresponding results for doctor visits and diagnostic tests are presented in Tables 8 and 9 respectively.

We start from the results of the probit regressions for unmet medical need and demographic variables. Women are more likely to report unmet need for medical care in Greece with this effect becoming statistically significant after 2014. Older Greeks were less likely to report unmet medical needs in 2009 but the opposite trend is observed in 2014 and 2019.

As expected, unmet medical needs are negatively associated with income, decreasing as household income increases, with effects becoming statistically significant after 2014. These marginal effects are larger in 2014 and 2019 compared to 2009. A negative association is also observed with respect to the education variable; this effect is only statistically significant in 2014. Interestingly, we find no association between unemployment and unmet needs in 2009 but a statistically significant effect in 2014, possibly reflecting the sharp increase of the unemployment rate and the adverse effects of long-term unemployment amidst the crisis.

In 2009, we observe statistically significant effects of the citizenship status and degree of urbanization variables on unmet medical need. Non-Greek (and especially, non-EU) respondents had a higher probability to report unmet medical needs in 2009 and the effect was statistically significant. In 2014 and 2019 however, these effects disappear. The most possible explanation is the levelling down of access for the entire population irrespective of citizenship status (see also Appendix, Table A2). Similarly, the variable on degree of urbanization of the primary residence area reveals that individuals in semi-urban or rural areas were more likely to have unmet medical needs before the crisis with the effect disappearing during the crisis. However, they were less likely to report unmet needs compared to individuals residing in urban areas in 2019.

Table 7. Probit models for unmet medical and dental need.

	Probits for unmet medical need			Probits for unmet dental need		
	2009	**2014**	**2019**	**2009**	**2014**	**2019**
	dydx (s.e.)	dydx (s.e.)	dydx (s.e.)	dydx (s.e.)	dydx (s.e.)	dydx (s.e.)
Demographics						
Gender						
Male	-0.008	-0.083***	-0.027***	0.016*	-0.061***	-0.002
	(0.009)	(0.013)	(0.008)	(0.007)	(0.011)	(0.007)
Age *(base: 18-30)*						
30-50	-0.007	0.029	0.025*	-0.020	0.009	0.027*
	(0.017)	(0.020)	(0.012)	(0.013)	(0.019)	(0.011)
50-65	-0.041*	0.093***	0.054***	-0.035*	0.048*	0.051***
	(0.017)	(0.023)	(0.013)	(0.014)	(0.022)	(0.012)
65-75	-0.051**	0.159***	0.107***	-0.032*	0.018	0.066***
	(0.118)	(0.030)	(0.016)	(0.015)	(0.024)	(0.014)
75 or above	-0.038*	0.116***	0.080***	-0.003	-0.021	0.013
	(0.119)	(0.028)	(0.016)	(0.017)	(0.023)	(0.013)
[Overall effect of age]	*[**]*	*[***]*	*[***]*	*[**]*	*[**]*	*[***]*
Socioeconomic background						
Household income quintile *(base:q1)*						
q2	-0.020	-0.058*	-0.056**	-0.003	-0.024	-0.068***
	(0.014)	(0.027)	(0.020)	(0.009)	(0.023)	(0.020)
q3	-0.034*	-0.098***	-0.078***	-0.000	-0.060**	-0.130***
	(0.014)	(0.026)	(0.021)	(0.010)	(0.023)	(0.020)
q4	-0.033*	-0.116***	-0.111***	-0.000	-0.092***	-0.169***
	(0.015)	(0.028)	(0.021)	(0.011)	(0.023)	(0.020)
q5	-0.040*	-0.141***	-0.148***	-0.008	-0.139***	-0.194***
	(0.018)	(0.034)	(0.022)	(0.015)	(0.025)	(0.020)
[Overall effect of hh income]		*[***]*	*[**]*		*[***]*	*[***]*
Highest level of education attained *(base: no education)*						
Primary	-0.020	-0.039	0.027	-0.015	-0.008	0.049***
	(0.016)	(0.025)	(0.016)	(0.015)	(0.025)	(0.015)
Lower secondary	-0.019	-0.071*	-0.027	-0.024	-0.067*	-0.037*
	(0.020)	(0.031)	(0.020)	(0.018)	(0.028)	(0.018)
Upper secondary	-0.030	-0.066*	-0.010	-0.050**	-0.045	-0.009
	(0.018)	(0.029)	(0.017)	(0.016)	(0.028)	(0.015)
Post-secondary, non-tertiary	-0.016	-0.038	0.027	-0.056**	-0.28	0.044
	(0.028)	(0.043)	(0.025)	(0.019)	(0.040)	(0.024)
First stage of tertiary	-0.021	-0.088**	-0.020	-0.067***	-0.083**	-0.015
	(0.020)	(0.031)	(0.018)	(0.016)	(0.029)	(0.016)
Second stage of tertiary	-0.135	-0.146**	-0.025	0.000	-0.077	-0.020
	(0.089)	(0.045)	(0.026)	(.)	(0.040)	(0.025)
[Overall effect of education]		*[*]*		*[***]*	*[**]*	*[***]*
Unemployed	0.030	0.090***	-0.025	-0.006	0.085***	0.029*
	(0.024)	(0.023)	(0.014)	(0.013)	(0.021)	(0.013)
Citizenship *(base: Greek)*						
Other EU country	0.032	-0.018	0.075	0.059	-0.076	-0.056
	(0.043)	(0.065)	(0.060)	(0.042)	(0.053)	(0.052)
Other non-EU country	0.069*	-0.003	0.006	0.125***	-0.023	0.038
	(0.028)	(0.038)	(0.027)	(0.029)	(0.034)	(0.023)
[Overall effect of citizenship]	*[*]*			*[***]*		
Degree of urbanization *(base: urban)*						
Semi-urban	0.086	-0.021	-0.035**	0.037**	-0.001	-0.035***
	(-0.066)	(0.016)	(0.012)	(0.013)	(0.014)	(0.009)
Rural	0.038*	-0.026	-0.057***	0.020**	-0.003	-0.035***
	(0.016)	(0.016)	(0.008)	(0.007)	(0.014)	(0.008)
[Overall effect of urbanization]	*[*]*		*[***]*	*[**]*		*[***]*
N	5,548	7,798	7,954	5,548	7,822	7,958
[McFadden's Pseudo R-squared]	*[0.02]*	*[0.05]*	*[0.06]*	*[0.08]*	*[0.05]*	*[0.11]*

Source: ELSTAT (EHIS),, own calculations.

*Notes: Analysis is weighted using EHIS survey sample weights; robust standard errors in parentheses; * for p < .05, ** for p < .01, and *** for p < .001.*

The probits for unmet dental need point to an association of the dependent variable with both gender (males were more likely to report unmet need in 2009, while the opposite is observed in 2014) and age. Household income is not associated with unmet dental needs in 2009 but its effect becomes statistically significant in both 2014 and 2019, with unmet need for dental services decreasing as the income level increases. Marginal effects for the household income variable are larger in 2014 compared to 2009 and in 2019 compared to 2014. Similar associations are observed with respect to the education variable. As with unmet medical need, the statistically significant effects of citizenship status disappear in 2014 and 2019 pointing to levelling-down effects. Individuals in non-urban areas were more likely to report unmet dental needs in 2009 and less likely in 2019 compared to individuals in residing in urban areas.

Table 8 includes the results from the regressions for doctor visits (GPs, specialists and dentists). In all years, women were more likely to have visited a doctor in the 12 months preceding the survey with the effect being statistically significant across all three dependent variables. As expected, the same applies for older individuals with the exception of visits to dentists where the opposite is observed. Income is positively associated with visits to GPs in 2019, with visits to specialists in 2009 and 2014 and visits to dentists in all three years. Education is also strongly associated with visits to dentists in all survey years. The (negative) effect of the unemployment variable becomes statistically significant for all three types of visits in 2019. The association between citizenship status and three doctor visit variables is mixed; non-Greeks were less likely to have visited doctors in 2009 and 2019 with some opposite to neutral results during the crisis. The negative association between visits to specialists and living in semi-urban or rural areas is statistically significant in both 2009 and 2014 most probably indicating shortages for specialists in non-urban areas. Another possible explanation for this finding is that public primary care is better developed in non-urban areas in Greece rendering visits to (usually private-sector) specialists less frequent compared to urban areas. Visits to dentists were less likely for persons living in rural areas prior to the crisis and more likely in its aftermath.

Results from the probit analyses for diagnostic exams are presented in Table 9. As with the regression results for doctor visits, women are more likely to have accessed services across all indicators employed. These different results depending on gender (women are more likely to report both unmet needs and service utilization) may either indicate that women are more health

Table 8. Probit models for doctor visits.

	Probits for GP visits			Probits for specialist visits			Probits for dentist visits		
	2009	**2014**	**2019**	**2009**	**2014**	**2019**	**2009**	**2014**	**2019**
	dydx (s.e.)	dydx (s.e.)	dydx (s.e.)	dydx (s.e.)	dydx (s.e.)	dydx (s.e.)	dydx (s.e.)	dydx (s.e.)	dydx (s.e.)
Demographics									
Gender									
Male	-0.074***	-0.069***	-0.069***	-0.133***	-0.216***	-0.135***	-0.090***	-0.062***	-0.075***
	(0.015)	(0.014)	(0.012)	(0.016)	(0.013)	(0.013)	(0.016)	(0.014)	(0.012)
Age *(base: 18-30)*									
30-50	0.031	0.007	0.014***	0.021	0.093***	0.087***	-0.040	-0.032	-0.040
	(0.027)	(0.026)	(0.025)	(0.026)	(0.024)	(0.024)	(0.026)	(0.026)	(0.023)
50-65	-0.192***	0.125***	0.279***	0.079**	0.187***	0.183***	-0.049	-0.032	-0.036
	(0.029)	(0.029)	(0.025)	(0.029)	(0.027)	(0.025)	(0.029)	(0.028)	(0.024)
65-75	-0.306**	0.258***	0.390***	0.151***	0.178***	0.229***	-0.137***	-0.110***	-0.142***
	(0.031)	(0.032)	(0.026)	(0.032)	(0.031)	(0.027)	(0.032)	(0.032)	(0.026)
75 or above	0.330***	0.281***	0.427***	0.191***	0.157***	0.271***	-0.274***	-0.223***	-0.260***
	(0.030)	(0.032)	(0.028)	(0.032)	(0.032)	(0.028)	(0.031)	(0.031)	(0.028)
[Overall effect of age]	*[***]*	*[***]*	*[***]*	*[***]*	*[***]*	*[***]*	*[***]*	*[***]*	*[***]*
Socioeconomic background									
Household income quintile *(base: q1)*									
q2	-0.063**	-0.002	-0.041	0.006	0.058*	-0.009	0.017	0.032	0.025
	(0.022)	(0.031)	(0.024)	(0.023)	(0.029)	(0.026)	(0.023)	(0.028)	(0.024)
q3	-0.002	-0.001	0.069**	0.021	0.018	0.032	0.054*	0.069*	0.055*
	(0.023)	(0.030)	(0.025)	(0.025)	(0.028)	(0.026)	(0.024)	(0.027)	(0.025)
q4	-0.023	0.011	0.077**	0.053*	0.036	0.018	0.061*	0.088**	0.095**
	(0.024)	(0.031)	(0.027)	(0.027)	(0.029)	(0.028)	(0.026)	(0.028)	(0.026)
q5	-0.053	0.059	0.103**	0.124***	0.066	0.048	0.135***	0.099**	0.170***
	(0.032)	(0.037)	(0.033)	(0.033)	(0.036)	(0.036)	(0.034)	(0.035)	(0.033)
[Overall effect of hh income]			*[**]*	*[**]*	*[*]*		*[***]*	*[***]*	*[***]*
Highest level of education attained *(base: no education)*									
Primary	-0.032	-0.014	-0.053	0.033	0.023	0.040	0.058*	0.081**	0.056**
	(0.026)	(0.030)	(0.030)	(0.028)	(0.029)	(0.029)	(0.028)	(0.026)	(0.029)
Lower secondary	-0.090**	-0.029	-0.066	0.005	0.039	0.015	0.072*	0.139***	0.111***
	(0.033)	(0.035)	(0.036)	(0.034)	(0.035)	(0.036)	(0.034)	(0.032)	(0.036)
Upper secondary	-0.036	-0.052	-0.079*	0.015	0.041	0.022	0.179***	0.186***	0.111***
	(0.031)	(0.033)	(0.033)	(0.033)	(0.033)	(0.032)	(0.033)	(0.030)	(0.036)
Post-secondary, non-tertiary	-0.050	-0.027	-0.049	0.101*	0.090*	0.067	0.170***	0.266***	0.215***
	(0.041)	(0.045)	(0.042)	(0.046)	(0.045)	(0.042)	(0.047)	(0.043)	(0.032)
First stage of tertiary	-0.041	-0.028	0.067	0.047	0.082*	0.088*	0.244***	0.331***	0.280***
	(0.033)	(0.036)	(0.035)	(0.036)	(0.095)	(0.035)	(0.036)	(0.032)	(0.042)
Second stage of tertiary	-0.426*	-0.017	-0.006	-0.081	0.082	0.195***	0.239	0.372***	0.317***
	(0.166)	(0.052)	(0.043)	(0.088)	(0.050)	(0.044)	(0.223)	(0.050)	(0.034)
[Overall effect of education]	*[**]*					*[***]*	*[***]*	*[***]*	*[***]*
Unemployed	-0.017	-0.017	-0.074**	0.012	-0.035	-0.049*	-0.043	-0.030	-0.067**
	(0.034)	(0.023)	(0.023)	(0.038)	(0.023)	(0.023)	(0.034)	(0.023)	(0.022)
Citizenship *(base: Greek)*									
Other EU country	0.036	-0.153*	-0.164*	-0.145	0.048	0.072	-0.062	-0.023	-0.210**
	(0.060)	(0.072)	(0.080)	(0.074)	(0.075)	(0.106)	(0.066)	(0.076)	(0.070)
Other non-EU country	-0.145***	0.072	-0.096*	-0.108**	0.088*	-0.110**	-0.108**	0.026	-0.105**
	(0.040)	(0.044)	(0.041)	(0.041)	(0.040)	(0.039)	(0.035)	(0.043)	(0.040)
[Overall effect of citizenship]	*[***]*	*[*]*	*[**]*	*[**]*		*[*]*	*[**]*		*[***]*
Degree of urbanization *(base: urban)*									
Semi-urban	-0.054*	-0.042*	-0.009	-0.007	-0.035*	-0.006	0.034	0.002	- 0.046**
	(0.024)	(0.018)	(0.019)	(0.027)	(0.018)	(0.020)	(0.024)	(0.017)	(0.019)
Rural	-0.015	-0.050**	-0.029	-0.103***	-0.098***	-0.074***	-0.044**	0.018	0.064***
	(0.016)	(0.019)	(0.016)	(0.017)	(0.018)	(0.016)	(0.017)	(0.018)	(0.016)
[Overall effect of urbanization]		*[*]*		*[***]*	*[***]*	*[***]*	*[**]*		*[***]*
N	5,525	8,079	7,938	5,511	7,996	7,924	5,478	8,025	7,941
[McFadden's Pseudo R-squared]	*[0.09]*	*[0.05]*	*[0.10]*	*[0.04]*	*[0.06]*	*[0.05]*	*[0.10]*	*[0.07]*	*[0.11]*

Source: ELSTAT EHIS,, own calculations.

*Notes: analysis is weighted using EHIS survey sample weights; robust standard errors in parentheses; * for p < .05, ** for p < .01, and *** for p < .001.*

Table 9. Probit models for diagnostic exams

	Probits for blood pressure measurement			Probits for cholesterol measurement			Probits for blood sugar measurement			Probits for mammogram			Probits for pap-smear		
	2009	**2014**	**2019**	**2009**	**2014**	**2019**	**2009**	**2014**	**2019**	**2009**	**2014**	**2019**	**2009**	**2014**	**2019**
	dydx	dydx	dydx	dydx	dydx	dydx	dydx	dydx	dydx	dydx	dydx	dydx	dydx	dydx	dydx
	(s.e.)	(s.e.)	(s.e.)	(s.e.)	(s.e.)	(s.e.)	(s.e.)	(s.e.)	(s.e.)	(s.e.)	(s.e.)	(s.e.)	(s.e.)	(s.e.)	(s.e.)
Demographics															
Gender															
Male	-0.055***	-0.066***	-0.030***	-0.065***	-0.084***	-0.048***	-0.059***	-0.089***	-0.049***						
	(0.013)	(0.014)	(0.013)	(0.014)	(0.015)	(0.012)	(0.014)	(0.015)	(0.013)						
Age															
(base: 18-30)															
30-50	0.010	-0.117***	-0.133***	-0.008***	0.094***	0.141***	-0.0033	0.097***	0.131***				0.095***	0.056**	0.107**
	(0.032)	(0.026)	(0.025)	(0.031)	(0.026)	(0.025)	(0.031)	(0.026)	(0.025)				(0.020)	(0.021)	(0.020)
50-65	0.194***	0.315***	0.326***	0.130***	0.311***	0.309***	0.112***	0.312***	0.303***	-0.008	-0.005	-0.006	0.069**	0.023	0.074
	(0.032)	(0.029)	(0.026)	(0.031)	(0.029)	(0.025)	(0.031)	(0.028)	(0.025)	(0.021)	(0.018)	(0.018)	(0.022)	(0.022)	(0.020)
65-75	0.233***	0.467***	0.430***	0.192***	0.421***	0.411***	0.168***	0.425***	0.409***	-0.104***	-0.086***	-0.092***	-0.077***	-0.078***	-0.052***
	(0.033)	(0.030)	(0.026)	(0.032)	(0.032)	(0.026)	(0.032)	(0.032)	(0.026)	(0.024)	(0.020)	(0.019)	(0.022)	(0.023)	(0.020)
75 or above	0.238***	0.511***	0.398***	0.184***	0.430***	0.361***	0.160***	0.432***	0.364***	-0.201***	-0.170***	-0.186***	-0.154***	-0.163***	-0.144***
	(0.033)	(0.030)	(0.029)	(0.033)	(0.032)	(0.029)	(0.032)	(0.032)	(0.029)	(0.019)	(0.018)	(0.017)	(0.018)	(0.023)	(0.018)
[overall effect of age]	*[***]*	*[***]*	*[***]*	*[***]*	*[***]*	*[***]*	*[***]*	*[***]*	*[***]*	*[***]*	*[***]*	*[***]*	*[***]*	*[***]*	*[***]*
Socioeconomic background															
Household income quintile *(base: q1)*															
q2	-0.016	0.015	0.057*	0.016	0.032	0.050*	0.030	0.034	0.041	0.008	0.024	-0.004	-0.016	0.030	0.023
	(0.020)	(0.028)	(0.025)	(0.021)	(0.030)	(0.025)	(0.022)	(0.030)	(0.025)	(0.020)	(0.0266)	(0.024)	(0.019)	(0.022)	(0.020)
q3	-0.007	0.010	0.066*	0.019	0.012	0.063*	0.033	0.024	0.052*	0.011	0.003	0.028	0.029	0.027	0.052*
	(0.021)	(0.027)	(0.026)	(0.023)	(0.029)	(0.026)	(0.023)	(0.029)	(0.026)	(0.020)	(0.025)	(0.024)	(0.019)	(0.022)	(0.021)
q4	0.025	0.038	0.085**	0.033	0.041	0.088**	0.046	0.043	0.074**	0.019	0.048	0.034	0.013	0.038	0.044
	(0.022)	(0.028)	(0.028)	(0.023)	(0.031)	(0.027)	(0.024)	(0.031)	(0.027)	(0.021)	(0.026)	(0.025)	(0.019)	(0.022)	(0.022)
q5	0.004	0.070*	0.084*	0.061*	0.059	0.081*	0.074**	0.061	0.078*	0.085**	0.037*	0.067*	0.063*	0.012	0.033
	(0.028)	(0.034)	(0.034)	(0.027)	(0.039)	(0.034)	(0.028)	(0.039)	(0.034)	(0.029)	(0.030)	(0.032)	(0.026)	(0.026)	(0.027)
[overall effect of hh income]			*[*]*							*[*]*	*[*]*	*[*]*	*[***]*		
Highest level of education attained															
(base: no education)															
Primary	-0.012	0.003	0.053	0.043	0.005	0.068*	0.014	-0.002	0.065*	-0.012	-0.003	0.023	0.038	0.029	0.069**
	(0.024)	(0.029)	(0.030)	(0.027)	(0.029)	(0.030)	(0.026)	(0.029)	(0.030)	(0.023)	(0.027)	(0.028)	(0.023)	(0.027)	(0.023)
Lower secondary	0.005	-0.013	0.016	0.022	-0.015	-0.055	-0.012	-0.017	0.062	0.001	-0.028	-0.052	0.056*	-0.004	0.0106***
	(0.029)	(0.035)	(0.036)	(0.033)	(0.036)	(0.036)	(0.032)	(0.035)	(0.037)	(0.027)	(0.030)	(0.033)	(0.027)	(0.028)	(0.027)
Upper secondary	-0.047	-0.020	0.019	0.062*	-0.006	-0.073*	0.015	-0.011	0.077*	0.068*	0.017	0.060	0.095**	0.054	0.111***
	(0.029)	(0.032)	(0.033)	(0.033)	(0.033)	(0.033)	(0.030)	(0.032)	(0.033)	(0.027)	(0.030)	(0.029)	(0.025)	(0.028)	(0.022)
Post-secondary, non-tertiary	-0.030	0.002	0.024	0.056	0.028	0.110**	-0.001	0.042	0.102*	0.030	0.130**	0.138**	0.103**	0.168***	0.178***
	(0.039)	(0.042)	(0.042)	(0.040)	(0.043)	(0.042)	(0.041)	(0.043)	(0.042)	(0.043)	(0.049)	(0.042)	(0.035)	(0.041)	(0.031)
First stage of tertiary	-0.010	0.002	0.079*	0.047	0.046	0.124***	0.009	0.039	0.135***	0.010	0.049	0.103**	0.123***	0.151***	0.197***
	(0.030)	(0.035)	(0.035)	(0.033)	(0.035)	(0.035)	(0.032)	(0.035)	(0.036)	(0.028)	(0.032)	(0.032)	(0.035)	(0.030)	(0.024)
Second stage of tertiary	0.1258	0.024	0.136**	-0.110	0.056	0.180***	-0.151	0.065	0.176***	0.051	0.026	0.035	0.111	0.128**	0.164**
	(0.050)	(0.049)	(0.043)	(0.236)	(0.049)	(0.043)	(0.237)	(0.049)	(0.043)	(0.136)	(0.041)	(0.038)	(0.137)	(0.045)	(0.033)
[overall effect of education]			*[***]*			*[***]*			*[***]*	*[**]*	*[***]*	*[***]*	*[***]*	*[***]*	*[***]*
Unemployed	-0.018	-0.054*	-0.046*	-0.042	0.042	-0.080***	-0.038	-0.033	-0.079***	0.008	0.003	-0.013	0.010	0.001	0.022
	(0.031)	(0.022)	(0.023)	(0.035)	(0.023)	(0.023)	(0.064)	(0.023)	(0.023)	(0.035)	(0.024)	(0.022)	(0.024)	(0.017)	(0.019)
Citizenship															
(base: Greek)															
Other EU country	0.044	-0.005	-0.085	-0.033	-0.014	-0.028	-0.038	-0.026	-0.024	0.020	0.028	0.081	-0.022	0.030	0.024
	(0.054)	(0.076)	(0.079)	(0.065)	(0.077)	(0.081)	(0.064)	(0.077)	(0.081)	(0.078)	(0.066)	(0.092)	(0.047)	(0.058)	(0.070)
Other non-EU country	-0.008	0.066	-0.068	-0.088*	0.101*	-0.075	-0.109**	0.104*	-0.070	-0.046	0.057	0.076*	-0.057*	0.036	0.046
	(0.037)	(0.044)	(0.044)	(0.045)	(0.043)	(0.043)	(0.045)	(0.043)	(0.043)	(0.034)	(0.035)	(0.036)	(0.022)	(0.029)	(0.031)
[Overall effect of citizenship]					*[*]*		*[*]*	*[**]*							
Degree of urbanization															
(base: urban)															
Semi-urban	-0.017	-0.039*	-0.042*	0.026	-0.015	-0.018	0.037	-0.023	-0.015	-0.008	0.016	0.040	-0.023	0.021	-0.001
	(0.023)	(0.018)	(0.019)	(0.022)	(0.018)	(0.019)	(0.021)	(0.018)	(0.019)	(0.021)	(0.016)	(0.017)	(0.018)	(0.014)	(0.017)
Rural	0.051***	-0.022	0.022	0.025	-0.027	-0.003	0.018	-0.037*	0.003	-0.033*	-0.028	-0.052***	-0.028*	-0.006	-0.040
	(0.014)	(0.018)	(0.016)	(0.015)	(0.018)	(0.016)	(0.015)	(0.018)	(0.016)	(0.014)	(0.014)	(0.014)	(0.12)	(0.015)	(0.014)
[Overall effect of urbanization]	*[***]*									*[*]*	*[*]*	*[***]*			
N	4,788	7,800	7,954	4,821	7,806	7,954	4,800	7,806	7,954	4,046	5,942	6,303	5,558	7,902	7,918
[McFadden's Pseudo R-squared]	*[0.09]*	*[0.12]*	*[0.08]*	*[0.05]*	*[0.10]*	*[0.08]*	*[0.05]*	*[0.10]*	*[0.08]*	*[0.13]*	*[0.06]*	*[0.08]*	*[0.14]*	*[0.08]*	*[0.09]*

Source: ELSTAT EHIS,. own calculations.

*Notes: analysis is weighted using EHIS survey sample weights; robust standard errors in parentheses; * for p < .05, ** for p < .01, and *** for p < .001; For the mammogram probits, only women 40+ were considered; For the pap-smear probits, only women 18+ were considered.*

conscious compared to men or could be partially associated with the increased morbidity and physical discomfort rates which are typically found amongst women in health-related studies and surveys. Age-related associations resulting from the regressions are statistically significant in all survey years. For the blood pressure, cholesterol and blood sugar measurement indicators- naturally- a positive association with age is observed. The opposite applies to women-specific diagnostic exams (mammograms and pap-smear tests) with the occurrence of testing decreasing with age. As mentioned earlier, this negative relationship is most possibly explained by the lower awareness regarding women-specific exams or potential psychological or cultural barriers amongst older women in Greece. Furthermore, the association with income and education is statistically significant in the case of both women screening tests (their occurrence increases along with household income and education level) pointing to significant socioeconomic inequality effects. Results depending on citizenship status and residential area are not consistent across the various diagnostic indicators (with the exception of mammograms where living in non-urban areas appears to reduce the possibility to undertake this specific exam in all EHIS survey years).

DISCUSSION

The aim of this paper was to explore socioeconomic inequality in unmet needs and in the utilization of some very basic healthcare services in Greece just before, around the peak of, and after the 2009-2018 crisis. One of the main findings of the analysis was that Greeks reported significantly higher unmet healthcare needs compared to the period before the crisis with self-reported unmet need for medical care almost tripling between 2009 and 2014, and showing some significant but incomplete signs of recovery in 2019 compared to the period before the crisis. The corresponding increase was even larger for unmet dental care need during the last decade with deepening access problems instead of recovery observed even after the crisis.

Indices of income-related inequality for unmet need increased considerably during the crisis. Utilization decreased for some basic tests and services but remained at the same level or even increased for others. However, all these effects were unevenly distributed across the income distribution at the expense of individuals belonging to more financially disadvantaged households. As a result, income-related inequality for some of these healthcare utilization indicators increased

further and continues to increase even after the crisis. The analysis indicates that, apart from unmet medical need, income-related inequality was particularly large for unmet dental need, visits to dentists and women's screening tests in Greece. Regression analyses revealed statistically significant associations between these variables and socioeconomic status. These findings may have some useful policy implications in terms of reducing access barriers in public health service provision to the extent that equitable access to healthcare remains a policy priority in both Greece and Europe. Some important interventions in the Greek healthcare sector took place after the second EHIS survey year (i.e., 2014). Prominent examples include the further decrease of the public healthcare financing, further institutional changes in the primary care sector but, also, measures to provide basic health insurance coverage to the uninsured population. The analysis of the recent 2019 survey wave indicates that self-reported unmet medical needs decreased after the crisis and so did socioeconomic inequality for this particular indicator. However, the situation did not improve with respect to access to dental care, visits to doctors and basic diagnostic exams with negative aggregate and distributional effects observed during the Greek sovereign debt crisis persisting or even worsening in its aftermath.

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APPENDIX

Table A1. Rank correlation coefficients (healthcare variables and income).

	2009		2014		2019	
	Spearman's rho	**Kendall's tau-b**	**Spearman's rho**	**Kendall's tau-b**	**Spearman's rho**	**Kendall's tau-b**
Access to and use of healthcare services						
Unmet medical needs in last 12 months						
Self-reported unmet need for medical care	-0.054***	-0.049***	-0.110***	-0.099***	-0.084***	-0.063***
Self-reported unmet need for dental care	-0.077***	-0.069***	-0.136***	-0.123***	-0.179***	-0.138***
Doctor visits in last 12 months						
GP	-0.090***	-0.081***	0.033**	0.030**	0.071***	0.057***
Other specialties	0.043*	0.025*	0.062***	0.056***	0.076***	0.058***
Dentist	0.217***	0.195***	0.227***	0.197***	0.200***	0.154***
Basic preventive tests in last 12 months						
Blood pressure measurement	-0.072***	-0.065***	0.064***	0.058***	0.071***	0.056***
Cholesterol measurement	-0.025	-0.023	0.081***	0.074***	0.086***	0.068***
Blood sugar measurement	-0.028*	-0.026*	0.082***	0.075***	0.082***	0.064***
Mammogram	0.139***	0.125***	0.177***	0.170***	0.078***	0.063***
Pap-smear	0.083***	0.064***	0.051***	0.046***	0.040***	0.033***

Source: ELSTAT EHIS, own calculations

Notes: Rank correlation coefficients measure similarity between orderings of the variables (household income and access to/use of healthcare): in the presence of "pro-rich" inequality, negative coefficients are expected for unmet need and positive values for the remaining indicators; Unstandardized distributions; For the mammogram indicator, only women aged 40+ were considered; For the pap-smear indicator, only women aged 18+ were considered; Analysis is weighted using EHIS survey sample weights.

Table A2. Unmet needs by citizenship and residential area.

	For medical care			For dental care		
	2009	**2014**	**2019**	**2009**	**2014**	**2019**
Citizenship						
Greek	7.8	29.6	10.8	4.1	23.4	8.9
Other, EU citizen	10.4	23.1	18.7	6.0	10.5	18.6
Other, non-EU citizen	15.6	24.2	13.6	15.2	15.9	21.1
Degree of urbanization						
Densely populated area	6.7	24.7	11.7	2.9	15.3	9.5
Intermediate area	10.4	23.3	7.5	6.0	15.5	7.5
Thinly populated area	8.8	24.9	9.7	5.7	17.7	9.7

Source: ELSTAT EHIS, own calculations.

Notes: Analysis is weighted using EHIS survey weights; Unmet need distributions have been standardized for demographic factors (age and gender).

Table A3. EHIS survey sample description.

	2009		2014		2019	
	N	%	N	%	N	%
Total sample	6,077	100	8,105	100		
Demographic status						
Age						
18-30	747	12.3	813	10.0	1,152	14.5
30-50	1,561	25.7	2,598	32.1	2,595	32.6
50-65	1,467	24.1	1,993	24.6	2,061	25.9
65-75	1,077	17.7	1,264	15.6	1,074	13.5
75 or above	1,224	20.2	1,437	17.7	1,086	13.6
Sex						
Men	2,364	38.9	3,338	41.2	4,155	52.15
Women	3,713	61.1	4,767	58.8	3,813	47.9
Access to healthcare services						
Unmet medical needs in last 12 months						
Self-reported unmet need for medical care (GP, specialist or hospital visits)	484	8.0	1,778	22.8	869	10.9
Self-reported unmet need for dental care	275	4.5	1,230	15.7	741	9.3
Doctor visits in last 12 months						
GP	3,935	65.0	4,707	58.3	4,676	58.9
Other specialties	2,913	48.4	3,774	47.2	3,759	47.4
Dentist	2,729	45.6	3,741	46.6	3,951	49.8
Basic preventive tests in last 12 months						
Blood pressure measurement	4,133	79.3	4,357	55.9	4,746	59.7
Cholesterol measurement	4,121	78.3	4,436	56.8	5,014	63.0
Blood sugar measurement	4,092	78.2	4,404	56.4	4,966	62.4
Mammogram	674	15.3	1,050	17.7	1,231	36.4
Pap-smear	1,103	18.2	1,636	20.7	1,718	41.1
Background information						
Highest degree of education attained						
No education	761	12.5	619	7.6	354	4.4
Primary	1,851	30.5	1,624	20.1	1,437	18
Lower secondary	711	11.7	1,020	12.6	689	8.6
Upper secondary	1,481	24.4	2,438	30.1	2,794	35.1
Post-secondary, non-tertiary	246	4.1	449	5.5	459	5.6
First stage of tertiary	1,016	16.7	1,676	20.7	1,816	22.8
Second stage of tertiary	10	0.2	276	3.4	423	5.3
Citizenship						
Greek	5,776	95.1	7,753	95.7	7,659	96.1
Other, EU citizen	82	1.4	64	0.8	54	0.7
Other, non-EU citizen	219	3.6	287	3.5	256	3.2
Degree of urbanization						
Densely populated area	2,581	42.5	2,455	30.3	5,270	66.1
Intermediate area	648	10.7	2,328	28.7	1,000	12.5
Thinly populated area	2,848	46.9	3,319	41.0	1,700	21.3

Notes: Analysis is weighted using EHIS survey sample weights; For the mammogram indicator only women aged 40+ were considered; For the pap-smear indicator only women 18+ were considered.

Source: ELSTAT, EHIS.