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Prevalence and Generosity of Health Insurance Coverage:

A Comparison of EU Member States

Federico Toth

Abstract
The concept of health insurance coverage can be resolved into two different components: "prevalence" (who is insured), and "generosity" (what is guaranteed) of the insurance.
In this article, we first provide data on the prevalence of health insurance, whether public or private, in the EU member countries. Residents in EU countries without primary health insurance currently amount to 7.7 million (corresponding to 1.5% of the population).
To appraise the "generosity" of insurance coverage, we use two indicators: out-of-pocket expenditure and self-reported "unmet medical needs".
What emerges is a positive, albeit moderately intense, relationship between prevalence and generosity of health insurance coverage.

Keywords: universal health care; health coverage; European Union; comparative health policy; unmet medical needs; Great Recession; comparative analysis.

Introduction

The issue of people with no healthcare insurance is usually associated with the United States, overlooking the fact that part of the population of many European Union countries has no health insurance coverage. The European public debate widely disregards this aspect.

Lack of formal insurance is not a stand-alone problem: indeed, health coverage for many citizens holding a formal insurance policy is far from *generous*. It may in fact happen that citizens are formally insured against health risks, but then have to pay out of their own pockets to receive a particular treatment. This may stem from the fact that the insurance scheme does not cover certain medical procedures, or it can depend on the long waiting times required to obtain a given service. Also, some form of co-payment on the part of the patient

may be involved. All of the foregoing may limit access to healthcare, particularly to individuals with a lower income.

The purpose of this article is to investigate the dimensions of healthcare insurance coverage *prevalence* and *generosity*, and to discuss the relationship between these two dimensions. The scope of the survey includes the 28 countries currently belonging to the European Union (awaiting formal Brexit, the United Kingdom is included).

In the following sections we will address, in particular, the following questions:

1) Which European countries guarantee health insurance coverage to the entire population and which, conversely, leave part of the resident population without coverage?
2) In which countries is health insurance coverage considered more generous?
3) What is the relationship between prevalence and generosity of insurance coverage? Are they two independent dimensions? Are they two properties that mutually reinforce one another? Or is there some form of trade-off between the two dimensions?

Conceptual background

In the existing literature, expressions such as "universal health coverage", "universal health care", "healthcare coverage", "health insurance coverage", "health service coverage" are used in a confused and ambiguous way: at times they are treated as synonyms, while others they are given different meanings (Stuckler et al. 2010; O'Connell et al. 2014; Abiiro and De Allegri 2015).

Despite the terminological uncertainty, there is however a broadly shared opinion that the concept of health coverage should be studied on the basis of three distinct dimensions (WHO 2008; WHO 2010; WHO 2013; Lagomarsino et al. 2012; Kutzin 2013; Boerma et al. 2014; Cotlear at al. 2015; OECD 2018a): the breadth (who is covered), depth (what services are covered), and height (what proportion of cost is covered) of insurance coverage. These three

dimensions constitute what has come to be known as the "coverage cube" (Kutzin 2013; Boerma et al. 2014; Cotlear et al. 2015; Dmytraczenko and Almeida 2015; WHO 2015).

The first and third dimensions of the coverage cube lend themselves to operational definitions that are widely accepted and utilised in the literature: breadth can be expressed as the number of people enrolled in some type of insurance scheme, whereas height can be assessed by quantifying the amount of out-of-pocket healthcare expenditure (Lagomarsino et al. 2012; WHO 2013; Abiiro and De Allegri 2015; Burke et al. 2015; Dmytraczenko and Almeida 2015; OECD 2018a).

Assessing the second dimension, that is, the service package actually offered, proves to be more complicated. Many authors have concluded that the depth of healthcare coverage is difficult to quantify, and that associating reliable indicators to it poses some hurdles (Kutzin 2013; Burke et al. 2015; Cotlear et al. 2015; Dmytraczenko and Almeida 2015).

To overcome this problem, we hereby suggest merging depth and height into a single dimension, calling it the "generosity" of coverage. As will be explained in the following section, the generosity of coverage will be assessable through two, largely complementary indicators: unmet medical needs and out-of-pocket healthcare expenditure.

In this work, the concept of healthcare insurance coverage is therefore understood as being two-dimensional. The first dimension refers to the *prevalence* of health insurance, namely how many people enjoy some form of insurance coverage against health risks. The second dimension considers the level of protection granted by the insurance coverage. Hence, the first dimension essentially refers to *who* is covered, while the second dimension refers to *what* is guaranteed by the insurance coverage.

Distinguishing between the prevalence and generosity of healthcare coverage also means – at least in part – marking the difference between what citizens are granted on paper and what

they are guaranteed in practice (Stuckler et al. 2010; Savedoff et al. 2012; Abiiro and De Allegri 2015; Cylus and Papanicolas 2015; Cotlear et al. 2015).

In addition to analysing the two dimensions separately, this work aims at investigating the relationship existing between prevalence and generosity of health coverage.

In this respect, we can formulate three possible hypotheses.

1) We could hypothesise a positive relationship between these two dimensions: we should then expect countries with widespread insurance coverage to also register a high degree of generosity of the coverage. In other countries, maybe those with lower healthcare expenditure, the exact opposite should occur: a low prevalence would be associated with low generosity of coverage.

2) Conversely, we could argue that – being the economic resources allotted to healthcare inevitably limited – there is an actual trade-off between generosity and prevalence (WHO 2010; Lagomarsino et al. 2012; Boerma et al. 2014): either coverage includes the entire population, but with a less generosity, or it is granted only to part of the population, but with greater generosity.

3) As a third hypothesis, we could even claim that the two dimensions are independent from one another. Hence, in different countries there may be a greater or lesser prevalence of insurance coverage, regardless of the generosity of the guaranteed coverage.

Definitions, Data Sources and Methods

This work focuses on the concept of health insurance coverage (or simply, health coverage). By this expression, we mean any type of insurance coverage, both public and private, that pays for essential medical care. Holders of health insurance are covered against the risk of illness, and do not pay for the healthcare services they make use of; at the very most, they may incur in some type of cost sharing.

In the following sections, we will make a distinction between "universal" and "non-universal" countries. Countries where all residents are formally holders of health insurance covering essential healthcare will be labelled as "universal". For the purposes of this work, it is of no import whether such insurance coverage is public or private, or ensured by a mandatory or voluntary scheme; what counts is that all residents are covered for health risks, and that such coverage relates to medical care deemed essential (Boerma et al. 2014; Cotlear et al. 2015).

The *uninsured* instead refer to those who do not have no health coverage, neither public nor private, and therefore have to pay for healthcare services out of their own pockets.

The indicators used. As already mentioned, in this work the concept of health insurance coverage is resolved into two dimensions: prevalence and generosity.

The *prevalence* of health insurance coverage is defined as the share of the population covered for a defined set of health care services under public programmes and through private health insurance (OECD 2018a). With regard to this indicator, the main data source used in this article is the *OECD Health Statistics 2018* online database (OECD 2018b). This database was supplemented by the *Health at a Glance* reports (various years), also published by the OECD, and the *Health Statistics* dataset provided by Eurostat (2018). An invaluable source of information, especially to trace the historical development of each national system, was the *HiT-Health Systems in Transition* report series, edited by the European Observatory on Health Systems and Policies.

To assess the *generosity* of insurance coverage, the two indicators used in the following sections include: 1) out-of-pocket health expenditure; 2) the so-called *unmet medical needs*.

As is known, out-of-pocket expenditure refers to medical costs borne directly by single individuals and not reimbursed by any insurance scheme. Data on *out-of-pocket* spending (calculated as a percentage of the total healthcare expenditure) are drawn from the *Health*

Statistics dataset provided by Eurostat (2018). For missing data, our source is the *Global Health Expenditure Database* held by the World Health Organisation (WHO 2018).

The so-called *unmet medical needs* are the second indicator used to appraise the generosity of insurance schemes. Citizens' viewpoints on "unmet" medical needs (and therefore on the barriers that actually limit access to health services) are collected annually by Eurostat, through the EU-SILC (*Statistics on Income and Living Conditions*) survey. Respondents are asked whether in the last 12 months they had to forgo a medical procedure or service considered "truly necessary" due to one of the following reasons: excessive cost charged to the patient; long waiting times required to obtain a service; excessive distance from the place of residence.

We ought to briefly explain why we have selected these two indicators to assess the generosity of coverage. Firstly, the data pertaining to such indicators can be obtained from the same source, that is from Eurostat. Hence, they are comparable, up-to-date and available for all EU countries from 2005 onwards.

On a conceptual level, the two indicators selected are largely complementary, because they cover two different consequences resulting from a scarcely generous (if not altogether missing) insurance coverage. If the healthcare insurance available does not cover given services, or offers only partial coverage, the insured have two options: they either 1) do without such services (the *unmet medical needs* therefore increase substantially), or 2) pay for the services directly (thus increasing out-of-pocket expenditure). If we somewhat simplify the issue, we can generally affirm that, if an insurance coverage is all-encompassing, the insured will have no need to pay out of his own pocket: out-of-pocket expenditure will therefore be minimal. If, on the contrary, the insurance coverage is not generous, a substantial part of the expenditure will eventually be charged to the insured (Lagomarsino et al. 2012; WHO 2013; OECD 2018a).

We ought to warn the reader about the two generosity indicators we have selected. Although widely used in the literature (WHO 2013; Thomson *et al*. 2014; Abiiro and De Allegri 2015; Cylus and Papanicolas 2015; Reeves et al. 2015; OECD 2018a), the two indicators present limitations that should not be neglected. Both should indeed be freed from a subjective and cultural component that may vary – even significantly – depending on the country (OECD 2018a). For example, it is possible that the greater or lesser propensity to pay for healthcare services directly is influenced by cultural and socio-economic factors: in some countries, it is considered normal to resort to out-of-pocket spending, and those with a higher income will be more able to afford the expenditure. Even the perception of *unmet medical needs* inevitably has a strong subjective component (Allin et al. 2010), and the same health problem may be perceived differently depending on the social context.

The generosity index. The indicators for out-of-pocket healthcare expenditure and unmet medical needs will first be presented separately, and then they will be merged into a single generosity index. This index is constructed as follows: for each country, the standardised value of out-of-pocket expenditure is added to the standardised value of unmet medical needs. The sum is then multiplied by -1, as both out-of-pocket spending and unmet needs are indicators of a lack of generosity.

The relationship between prevalence and generosity. Once we have calculated the generosity index, it will be possible for us to investigate the relationship between prevalence and generosity of health coverage. For this purpose, we will use a scatterplot and the relative regression line between the two variables.

Each EU country will be placed on the scatterplot, based on its prevalence and generosity values. Hence, it will be possible to identify, and visualize, how distant the national systems analysed in this work are from one another. The scatter plot will provide some valuable clues, revealing some groups of countries having similar characteristics.

Cluster analysis. To gather the 28 countries into groups that are as homogeneous as possible, we will perform a cluster analysis. We will apply the non-hierarchical clustering method. The four variables taken into consideration are all cardinal quantitative data: prevalence, out-of-pocket expenditure, unmet medical needs, and health expenditure per capita (calculated in $, purchasing power parity). There will be three resulting clusters.

Results

Prevalence of health insurance coverage: a comparative view

The first variable analysed refers to the prevalence of insurance coverage against health risks. For each country, we report the percentage of population with primary health insurance, whether public or private. Let us start from analysing the situation relative to 2016, or the last year available (**Table 1**, last column).

Out of the 28 European countries examined in this work, 14 ensure universal coverage, 4 have what we can call "quasi-universal" coverage, and 10 countries do not have universal coverage. The 14 countries with universal coverage (where 100% of the population is therefore covered) include: Croatia, Czech Republic, Denmark, Finland, Germany, Greece, Ireland, Italy, Latvia, Malta, Portugal, Slovenia, Sweden, and United Kingdom.

According to the OECD data, four countries have coverage that can be considered "quasi-universal." In this work, we consider quasi-universal those countries where the percentage of the uninsured is minimal, not exceeding 0.2% of the population. The four quasi-universal countries are Austria, France, the Netherlands and Spain.

In the remaining 10 countries, universal coverage is not achieved. In these states, the uninsured account for at least 1% of the resident population. The countries without universal healthcare coverage are: Belgium, Bulgaria, Cyprus, Estonia, Hungary, Lithuania, Luxembourg, Poland, Romania and Slovakia.

In 2016, the uninsured in European Union countries total 7.7 million, corresponding to 1.5% of the population. In absolute terms, the countries with the highest number of uninsured people are Poland (3.2 million), Romania (2.2 million) and Bulgaria (0.8 million).

[**Table 1 here**]

Intertemporal comparison

To better understand how health coverage has evolved over time, it would be helpful to review the historical series: what was the situation like 10, 20, 30 and 40 years before? Let us look at the data, making it clear that 1) when referring to the insured and uninsured population in EU member countries over the past decades, the calculation includes all the countries presently belonging to the European Union (even those which were not yet members at the time); 2) in our intertemporal comparison, for the sake of simplicity, we have treated the quasi-universal countries as if they were universal countries.

In the mid-Seventies, 17 European states had universal or quasi-universal coverage. Ten years later, in 1986, the countries ensuring universal coverage had increased, reaching 20. After 1986, however, the number of universal European countries dropped, first to 18 (in 1996), then to 16 (in 2006). In 2016, it increased again to 18. This means that within the current EU, the maximum number of universal countries was reached in the mid-Eighties, and has since dropped.

This fluctuating trend is also reflected by the percentage of the uninsured. In 1976, the uninsured in Europe were 6.2% of the population. In 1986, they had dropped to 2.7%, and reached as low as 0.3% in 1996 (the most extensive coverage). After 1996, the uninsured in Europe started increasing again: in 2006, they were 0.7% of the population, and at present total 1,5%. In absolute terms, the figure is perhaps even more striking. In 1996, in the 28

countries currently belonging to the European Union, one and a half million people were uninsured. In 2006, the uninsured totalled 3.6 million. In 2016, there are more than 7.7 million.

Easily, one may think that the drop in health insurance prevalence is essentially attributable to the economic crisis, which has hit Europe since 2008 (Karanikolos et al. 2013; Thomson et al. 2014; Kentikelenis 2015; Reeves et al. 2015). This is only true in part: the number of the uninsured had already started increasing over the previous decade and in particular during the 1996-1998 two-year period (rising from 1.6 million in 1996 to over 4.3 million in 1998).

The effects of the great financial crisis have contributed to exacerbate the situation. The percentage of the uninsured remained roughly stable for over a decade, from 2000 until 2011. In 2012 there was a surge, especially in Greece and Poland. This acceleration actually doubled the number of uninsured individuals, which rose from 0.9% to 1.8% of the EU population in a single year. In the years to follow, the total number of uninsured has grown further, reaching 2% in 2015. Owing to the reform recently implemented in Greece, which has reinstated universal coverage (OECD 2018), in 2016 the total number of uninsured in the European Union has dropped to 1.5% of the population.

Generosity of coverage: out-of-pocket spending and unmet medical needs

We therefore noted that universal health coverage is guaranteed in 14 countries belonging to the European Union (on a total of 28), while in 4 there is a "quasi-universal" coverage. These data refer to the *prevalence* of coverage (how many people have primary health insurance), but not to its *generosity*. To appraise the extent to which citizens of different countries are actually protected against health risks, we use two indicators, the first being out-of-pocket health expenditure, whilst the second consists of the so-called *unmet medical needs*.

Out-of-pocket spending

We will start by considering the incidence of out-of-pocket spending (calculated as a percentage of the total healthcare expenditure) in the 28 EU countries (**Table 2**). We would expect countries with universal coverage to have out-of-pocket expenditure values that tend to be lower than in countries where part of the population has no health insurance coverage. Quite simply, the argument is the following: those who do not have insurance (whether mandatory or voluntary) must pay all medical expenses out of their own pockets, thus increasing the overall out-of-pocket expenditure. Conversely, if all residents in a country have health insurance coverage, there should be fewer reasons for out-of-pocket spending.

[**Table 2 here**]

This expectation is generally confirmed by the data: in countries without universal coverage, the out-of-pocket expenditure averages 21.2%, whereas in countries with universal or quasi-universal coverage, the out-of-pocket spending averages 15.3%.

There are, however, some countries where the level of out-of-pocket expenditure is very high notwithstanding the guarantee of universal coverage. This is especially the case in Latvia, Malta, Greece and Portugal. In these four countries, – all with universal coverage – out-of-pocket spending exceeds, at times substantially, 25% of the total healthcare expenditure. In Spain and Italy, out-of-pocket spending exceeds 20%.

Given the above, it is reasonable to ask whether the great financial crisis has had a significant effect on out-of-pocket expenditure in EU countries (Palladino et al. 2016).

During the four years immediately preceding the outbreak of the crisis, out-of-pocket expenditure in the 28 EU countries averaged 14.5% of the overall healthcare spending. In the four years following the outbreak (between 2009 and 2012), out-of-pocket expenditure

averaged 14.0% (WHO 2018): it therefore dropped, albeit slightly. From 2013 onwards, out-of-pocket spending started rising again, exceeding the percentages reached in the years immediately preceding the crisis.

Unmet medical needs

The second indicator used to assess the generosity of health insurance coverage consists of the *unmet medical needs*. As already mentioned, this indicator attempts to determine the extent to which citizens forgo medical treatment they would actually require for economic reasons or organisational limitations of the healthcare system (Cylus and Papanicolas 2015).

Table 2 shows, for each European country, the percentage of respondents who claim to have forgone, in the last year, at least one necessary medical examination due to its cost, the long waiting lists, or the excessive distance from to their place of residence.

Similarly to the arguments referred to out-of-pocket spending, we would expect, also on this front, a lower level of self-reported unmet medical needs in universal countries, and a higher level of unmet needs in countries without universal coverage. And this is actually the case. In countries with universal or quasi-universal coverage, citizens who claim unmet medical needs are, on average, 1.9% of the population, compared with an average of 5.0% in non-universal countries. It is, however, also true that the second and third highest value of unmet medical needs are registered in countries (Greece and Latvia) with universal coverage. Even Italy, Finland and Ireland, despite having universal coverage, have values of unmet medical needs that exceed the European average.

Also in the case of unmet medical needs, it is useful to compare the years immediately preceding and following the outbreak of the great financial crisis.

The European average of people who complain unmet medical needs has greatly diminished in the 2005-2008 four-year period, dropping from 5% to 3.1% of the population. Starting

from 2009, however, the trend reversed, and the percentage of Europeans claiming unmet medical needs began to grow again up to 3.6%, as recorded in 2013 (Eurostat 2018). The crisis seems therefore to have stopped a positive trend (toward an increasingly greater satisfaction of healthcare needs), triggering a slow deterioration of the situation.

The generosity index

As anticipated in the previous methodological section, the indicators for out-of-pocket expenditure and unmet medical needs can be merged into a single generosity index. The latter is calculated by adding (and then multiplying by -1) the standardised values of the two indicators analysed beforehand. The results are illustrated in **Table 3**, with Luxembourg, the Netherlands and Germany ranking in the first three positions. The healthcare systems of these three countries should therefore be considered as the most generous. The countries ranked in the last positions are Greece, Latvia and Estonia (corresponding to the least generous systems).

[**Table 3 here**]

The most generous healthcare systems are generally found in countries where universal or quasi-universal coverage is implemented. Conversely, non-universal countries rank low in our ratings (and therefore have less generous systems).

The relationship between prevalence and generosity

The calculation of a synthetic generosity index allows placing on a scatterplot the two health coverage variables (prevalence and generosity) analysed in this work (**Figure 1**).

[**Figure 1 here**]

What type of relationship exists between these two variables? To answer this question, we have calculated the regression line. The beta coefficient equal to +0.1405 indicates a slight positive relationship: a 1% increase in health coverage prevalence corresponds to an increase of barely more than 0.1% in the generosity index. The linear correlation coefficient (r= .40) suggests a moderate strength relationship.

The scatterplot presented in **Figure 1** should be examined "by quadrant". The upper-right quadrant contains the most generous universal (or quasi-universal) countries. On the opposite side, in the lower-left quadrant, we find the countries that are not only non-universal, but also less generous. The counties within the upper-left quadrant (Luxembourg and Slovakia) can be considered "generous but non-universal", whereas those in the lower-right quadrant are "universal but scarcely generous".

Looking at the countries within each quadrant leads us to speculate that the countries where universal coverage combines with high levels of generosity may be the economically richer ones. Likewise, we can assume that the poorer countries (or those which spend less on healthcare) have less generous health systems.

The cluster analysis

The placement of the countries on the scatterplot provides some interesting indications. However, if the objective is to group the healthcare systems of the 28 EU countries as homogeneously as possible, it is preferable to adopt a non-hierarchical clustering method. To this end we consider four variables: the three indicators that have been extensively analysed in the foregoing sections are complemented by health expenditure per capita (calculated in $,

purchasing power parity). Data refer to 2016. The three clusters that emerge from this procedure are presented in **Table 4**.

[**Table 4 here**]

[**Table 5 here**]

Cluster 1 includes 9 countries, and has final cluster centres (Ref. **Table 5**) that indicate high health coverage (99.4%), high generosity (13.5% out-of-pocket expenditure and 1.1% unmet medical needs) and high health expenditure per capita ($5,290).

The seven countries within *cluster 2* have universal coverage (100%), intermediate levels of generosity (22.8% out-of-pocket expenditure and 2.1% unmet medical needs) and intermediate levels of healthcare spending ($3,434 per capita).

The *third cluster* includes the remaining 12 countries. Its cluster centre features low health coverage (94%), low generosity (29% out-of-pocket spending, 5.2% unmet medical needs) and low health expenditure per capita (only $1,910).

If we examine the distances between cluster centroids (reported in **Table 4**) we obtain significant additional information. Within each cluster, some countries are closer to the cluster centre, while others are more "peripheral".

In the first cluster, Luxembourg is the most peripheral case. Indeed, it differs from the other countries of the first cluster for its low prevalence and the higher health expenditure per capita (by far the highest among all EU countries).

In the second cluster, the United Kingdom is the most distant from cluster centres. Apart from health spending per capita, the prevalence and generosity values of the UK are similar to those of cluster 1.

Romania and the Czech Republic are the two anomalous cases present in the third cluster. Romania has the lowest health spending per capita of all EU countries. The Czech Republic is instead a virtuous case: it achieves prevalence and generosity levels similar to the countries included in cluster 1, but with a substantially lower expenditure.

Discussion

The data presented in the previous section deserve a brief discussion, also considering the research questions asked in the Introduction.

Let us start from the prevalence of health coverage. The data show that only half (14 out of 28) of the European countries guarantee universal health insurance coverage. Four countries provide coverage that can be defined quasi-universal, while in the remaining 10 countries, the percentage of uninsured ranges between 1% and 17% of the population. Currently, the uninsured in European Union countries total 7.7 million, corresponding to 1.5% of the population.

The uninsured in Europe are mostly concentrated in the Eastern countries: Poland, Romania, Bulgaria, Hungary, Slovakia, Lithuania and Estonia.

Who are the uninsured? Depending on the system adopted and the legislation in force in each country, some specific categories of residents are more likely than others to be left without health insurance. In a number of countries there is no insurance coverage for some freelancers, atypical workers and part-time workers. This happens, for example, in Bulgaria and Poland. In other systems (including Bulgaria, Estonia, Luxembourg and Romania) the unemployed may not have adequate health insurance coverage, especially the long-term unemployed or those who are not recipients of public subsidies. In several Eastern European countries (including Bulgaria, Hungary, Poland and Romania), a considerable segment of the uninsured is of Roma ethnicity: those among them who do not have any identification

documents or a fixed domicile are usually excluded from the coverage offered by the mandatory scheme.

One might expect that European countries have evolved, over the decades, towards an increasing prevalence of healthcare coverage. However, this is not the case: compared with twenty or so years ago, the number of the uninsured in Europe has increased significantly. In 1996, the uninsured were only 0.3% of the population, while in 2016 they reached 1.5% (a five-fold increase).

We will now comment on the indicators used to assess the generosity of coverage.

Out-of-pocket spending differs substantially from one EU member country to another. In France, for example, the out-of-pocket expenditure is less than 10% of the overall spending, whereas in Bulgaria the value is almost five-fold higher (48%). According to the World Health Organization, high out-of-pocket spending in the financing of a healthcare system is iniquitous (WHO 2000). Many European countries face this issue, as in almost half of them (13 out of 28) the out-of-pocket expenditure is higher than 20% of the overall health spending, and in six it exceeds 30%.

If we examine the trend over the past few years, we conclude that out-of-pocket spending has not increased due to the economic crisis - on the contrary it has dropped, albeit slightly, in the years immediately following 2008. The lower than normal out-of-pocket spending in times of economic crisis can be easily explained by the fact that families are (or fear of finding themselves) in financial straits and therefore save on private health spending.

We also find important differences between one country and the other with respect to unmet medical needs. In many countries, the percentage of residents who report unmet medical needs is under 1%. In other countries, values rise remarkably: 15% of Estonian and 13% of Greek interviewees report unmet medical needs.

For several years, the great financial crisis caused a slight increase in unmet medical needs. The European average rose from 3.1% in 2008 to 3.6% in 2013. This is linked to the fact that some European governments cut public health spending upon the onset of the crisis (Karanikolos et al. 2013; Thomson et al. 2014; Morgan and Astolfi 2015; Reeves et al. 2015). In response to the crisis, many EU countries increased the user charges imposed on patients (Kentikelenis 2015; Lehto et al. 2015; Morgan and Astolfi 2015; Palladino et al. 2016). This has mostly damaged low-income individuals (Thomson et al. 2014), who have had to forgo some healthcare services.

At the beginning of this article, we asked ourselves what type of relationship exists between prevalence and generosity of health coverage. In the previous section (Ref. **Figure 1**), we have seen how a positive, weakly intense relationship emerges between these two variables. In other words, this means that higher levels of prevalence are generally associated with higher levels of generosity, and vice versa. However, there are many exceptions to this rule: there are "universal but scarcely generous" countries (like Greece and Latvia), and "generous but non-universal" countries (like Luxembourg).

The cluster analysis performed subsequently seems to confirm the existence of a positive relationship between prevalence and generosity, but adds a further element: as a general trend, the countries that manage to combine universal coverage and generosity are those that invest more resources in healthcare. The level of healthcare spending per capita can therefore be considered a first – albeit partial – explanation of the reasons why some health systems, taken as a whole, are more generous than others. The conclusion may not be original, but money matters also when it comes to health coverage.

The cluster analysis has also allowed us to subdivide the 28 EU countries into three different clusters.

The first cluster comprises Austria, Belgium, Denmark, France, Germany, Ireland, Luxembourg, Netherlands and Sweden. These countries are mostly characterised by high levels of generosity resulting from high amounts of healthcare spending. If we exclude the variable of healthcare spending, even in the UK, the Czech Republic and Slovenia, the levels of generosity and prevalence are similar to the countries of this first cluster.

The second cluster includes Finland, Italy, Malta, Portugal, Slovenia, Spain and the UK. These 7 countries are all universal, but compared with the countries of the first cluster they have lower levels of generosity. In all the countries belonging to this cluster, healthcare spending is lower (at times even much lower) than the spending of the countries of cluster 1. If healthcare expenditure was not considered, even Croatia could be included in this second cluster.

The third cluster comprises the 12 remaining countries: Bulgaria, Croatia, Cyprus, the Czech Republic, Estonia, Greece, Hungary, Latvia, Lithuania, Poland, Romania and Slovakia. Most of these countries are not universal and have low levels of generosity. This can be attributed, at least in part, to the low levels of healthcare spending per capita, which are much lower than both cluster 1 and cluster 2.

Conclusion. Policy implications and future research perspectives

This article has wanted to shed light on an issue that is widely neglected in the public European debate, that is the issue of citizens who are uninsured or underinsured against health risks.

The issue of the uninsured population is usually associated with the United States, or other countries outside Europe. However, the data analysed in the foregoing show that more than a third of EU member countries (but they are even one half if we also include the "quasi-universal" countries) do not provide health care coverage to the entire population. At present, there are 7.7 million uninsured in the EU.

EU member countries adopt healthcare organisation and financing methods that differ from one another. Protection against health risks, method of payment for healthcare services, patient rights and the package of essential medical care differ depending on the country of residence. For those who consider it appropriate for the EU to have a single, and therefore uniform social protection system in all member countries, this is definitely a matter to ponder upon.

The issue of uninsured European citizens is, perhaps, deliberately neglected: the public opinion does not seem to be aware of, or in any event preoccupied with the problem (Eurobarometer 2018), and policy makers have focussed their attention on other issues and objectives. For example, Directive 2011/24/EU was implemented with the intent to favour cross-border circulation of patients (hence the free choice of the healthcare provider). We, however, believe that before extending the freedom of choice, it would be more important and urgent to guarantee that all residents are covered insofar as essential medical care is concerned. The European Commission and Parliament should prioritise the issue of the uninsured on their political agenda, and work so that soon all member countries will guarantee health coverage to the entire population in practice and not only on paper.

In this article, prevalence (and therefore "formal" coverage) has been analysed together with generosity (that is, the protection actually granted by the coverage). This lends added value to this paper because, to date, very few scientific works have addressed health insurance coverage analysing and linking its different dimensions.

We have proposed a two-dimensional perspective on the concept of health coverage, as an alternative to the three-dimensional model widely used to date in the literature. It is our opinion that the conceptualisation used in this work allows to overcome some limits of the "coverage cube", especially with reference to the operative definition of the depth dimension.

In the previous sections, two indicators were used to investigate the generosity of the coverage. As previously pointed out, these indicators appear to be solid but perhaps a little rudimentary. In view of future research on this topic, we could think of increasing the number of indicators and identifying more sophisticated ones. Cluster analysis can also be improved, taking into consideration additional variables. Another aspect would deserve to be further developed. To assess overall health coverage, we have added, for each country, all types of insurance coverage, may they be public universal schemes, mandatory social health insurance schemes, mandatory and voluntary private insurance, and targeted programs designed for specific population subgroups (Toth 2016). In the future, it would be interesting to address and analyse each type of insurance coverage individually, to understand which ones are more or less generous towards their subscribers. This is another topic that would greatly benefit from further research.

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Table 1 – Percentage of population with healthcare insurance (1976-2016)

	1976	1986	1996	2006	2016
Austria	96.0	99.0	99.0	98.5	99.9
Belgium	99.0	98.0	99.0	99.0	99.0
Bulgaria	100	100	100	81.8	88.2
Croatia	100	100	100	100	100
Cyprus	NA	NA	NA	83.0	83.0
Czech Rep	100	100	100	100	100
Denmark	100	100	100	100	100
Estonia	100	100	95.8	95.2	94.0
Finland	100	100	100	100	100
France	97.3	99.2	99.4	99.9	99.9
Germany	92.1	91.2	99.9	99.8	100
Greece	75.0	100	100	100	100
Hungary	100	100	100	100	95.0
Ireland	85.0	100	100	100	100
Italy	95.0	100	100	100	100
Latvia	100	100	100	100	100
Lithuania	100	100	100	90.9	92.5
Luxembourg	99.8	99.7	98.6	98.7	95.9
Malta	100	100	100	100	100
Netherlands	69.5	66.3	98.6	99.5	99.9
Poland	100	100	100	99.3	91.5
Portugal	60.0	100	100	100	100
Romania	100	100	100	100	89.0
Slovakia	100	100	99.3	96.3	94.5
Slovenia	100	100	99.0	99.0	100
Spain	81.0	97.1	98.6	98.3	99.9
Sweden	100	100	100	100	100
UK	100	100	100	100	100
EU-28 Average	*93.8*	*97.3*	*99.7*	*99.3*	*98.5*

Source OECD (2018a); OECD (2018b); Eurostat (2018); European Observatory on Health Systems and Policies (various years).
Notes NA: not available.

Table 2 – Out-of-pocket spending and "unmet" medical needs in Europe (2016)

	Out-of-pocket spending (% of total healthcare expenditure)	*Unmet medical needs (% of respondents)*
Countries with universal or quasi-universal coverage		
Austria	18.9	0.2
Croatia	15.4	1.7
Czech Rep	15.0	0.7
Denmark	13.7	1.3
Finland	19.9	4.1
France	9.8	1.3
Germany	12.4	0.3
Greece	34.3	13.1
Ireland	13.0	2.6
Italy	23.1	5.5
Latvia	44.6	8.2
Malta	37.1	1.0
Netherlands	12.3	0.2
Portugal	27.8	2.4
Slovenia	12.5	0.4
Spain	23.8	0.5
Sweden	15.2	1.6
UK	15.1	1.0
Countries without universal coverage		
Belgium	15.9	2.4
Bulgaria	48.0	2.8
Cyprus	43.9	0.6
Estonia	22.7	15.3
Hungary	29.7	1.3
Lithuania	32.3	3.1
Luxembourg	10.6	0.4
Poland	22.9	6.6
Romania	20.8	6.5
Slovakia	18.4	2.3
Average of universal or quasi-universal countries	*15.3*	*1.9*
Average of countries without universal coverage	*21.2*	*5.0*
EU-28 average	*15.7*	*2.5*

Source: Eurostat (2018); WHO (2018).

Table 3 – Generosity index (2016)

	Generosity index
Luxembourg	1,81
Netherlands	1,70
Germany	1,67
France	1,64
Slovenia	1,63
Czech Rep	1,32
Denmark	1,29
UK	1,24
Austria	1,10
Sweden	1,07
Croatia	1,02
Ireland	1,01
Belgium	0,79
Slovak Rep	0,59
Spain	0,57
Finland	-0,02
Hungary	-0,18
Portugal	-0,30
Italy	-0,69
Romania	-0,74
Malta	-0,78
Lithuania	-0,90
Poland	-0,96
Cyprus	-1,30
Bulgaria	-2,26
Estonia	-3,23
Latvia	-3,37
Greece	-3,72

Source Author's elaboration on data Eurostat (2018) and WHO (2018)

Table 4 – Countries belonging to each cluster and distance from the relative centroid

Country	*Cluster*	*Distance*
Austria	1	7.3
Belgium	1	622.5
Denmark	1	197.4
France	1	508.1
Germany	1	172.9
Ireland	1	9.4
Luxembourg	1	1083.8
Netherlands	1	39.2
Sweden	1	96.4
Finland	2	678.0
Italy	2	7.6
Malta	2	78.4
Portugal	2	655.7
Slovenia	2	662.0
Spain	2	174.3
UK	2	743.7
Bulgaria	3	333.3
Croatia	3	206.0
Cyprus	3	360.7
Czech Rep	3	574.2
Estonia	3	78.0
Greece	3	350.7
Hungary	3	52.7
Latvia	3	321.4
Lithuania	3	67.8
Poland	3	126.4
Romania	3	758.5
Slovak Rep	3	261.8

Source Author's elaboration on data OECD (2018b), Eurostat (2018) and WHO (2018)

Table 5 – Final cluster centre for each cluster

	Cluster		
	1	2	3
Health insurance coverage	99.4	100.0	94.0
Out-of-pocket spending	13.5	22.8	29.0
Unmet medical needs	1.1	2.1	5.2
Health expenditure per capita. PPP (USD)	5.290	3.434	1.911
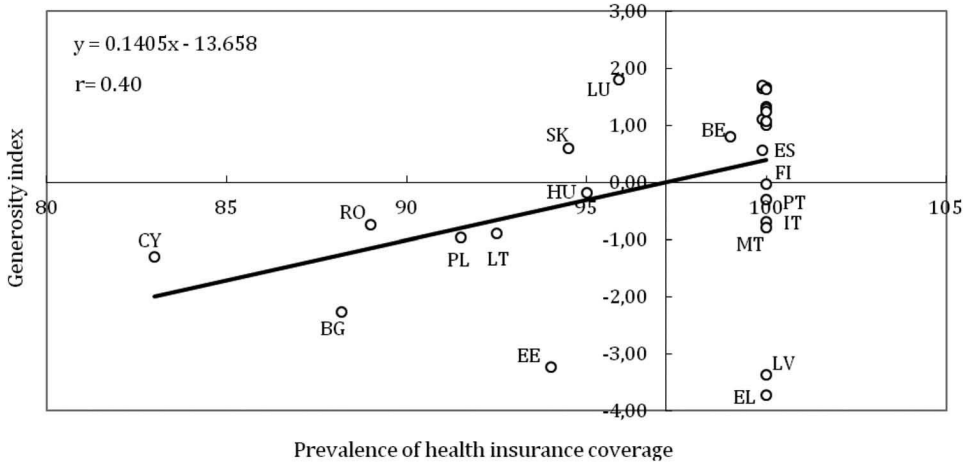
Figure 1 – Prevalence and generosity