Research Note

Measuring inequalities in access to health care. A review of the indices
by Sara Allin, Cristina Masseria, Corinna Sorenson, Irene Papanicolas and Elias Mossialos

Abstract:
Equity in health care is a goal embraced by most industrialized countries. Although universal coverage of health care services does not eliminate inequalities, it represents the first step towards a more equitable health care system.

This paper explores the main methodological issues involved in defining and measuring equity in access to health care. Access, equity and need are complicated concepts which are difficult to define and to measure. The definition of equity most appropriate for policy makers is that of equal access for equal need. There is no consensus about the definition of need, although most commonly ill-health is used to indicate need for health care, because of relative ease of measurement. Access is a multi-dimensional concept influenced by both supply and demand factors; however it is commonly approximated by utilization which is easily observed. Methodological issues arise in the simplification of these complex terms; for instance, the measurement of utilization alone to define access leaves out other important factors such as quality of care, and cultural and financial barriers, which are necessary in understanding inequalities.

Most countries use surveys and/or administrative sources to measure access and need. However, each of these methods faces inherent limitations. Surveys collecting data on utilization or self-assessed health are subject to bias based on questionnaire design, question wording and psychosocial and cultural factors. Administrative sources on the other hand are less able to collect information on health status, and might be limited in their coverage of other important indicators. Generally, there are three main approaches to calculating equity in access to health care, these are: 1) odds ratios, 2) rates of access and use-needs ratios, and 3) horizontal inequity index.

Although increasingly surveys are available at EU-level, more work is needed to improve these surveys and collect more comprehensive and reliable information on both health and access to health care.

This Research Note has been produced for the European Commission Sara Allin, Cristina Masseria, Corinna Sorenson, Irene Papanicolas and Elias Mossialos from the Health and Living Conditions Network of the European Observatory on the Social Situation and Demography. The views expressed are those of the authors and do not necessarily represent those of the European Commission.
Measuring inequalities in access to health care. A review of the indices\textsuperscript{1,2}

I. Introduction

Universal coverage of the population for a fairly comprehensive package of medical services is a fundamental policy goal within the EU. Governments are not only committed to pursuing the efficient delivery of high quality medical care, but also to ensuring equitable access to these services. This goal can be achieved only if access depends on need and not ability to pay, as expressed in many European policy documents and in the recent joint declaration of Belgium, Germany, Portugal, Spain, Sweden, and the United Kingdom:

“The fundamental values of equity, universality and solidarity underpin health systems throughout Europe. All our systems, although they vary greatly in how they are organized, managed, and financed, seek to provide equity of access to high quality, efficient and financially sustainable health care services to the entire population, based on need rather than ability to pay. All systems are based on solidarity – between ill and health, between poor and rich, between young and old and between those who live in urban and rural areas.” (Judge, Platt et al. 2005)

The broad aim of achieving equitable access to health care across social groups is to reduce, or at least not to exacerbate, existing health inequalities. There is evidence that although people in more vulnerable population groups have more need for health care, e.g. higher rates of disease and ill-health, they do not always receive the care they need. Inequity is present almost everywhere and can be explained by a range of geographical, financial, and socio-cultural barriers. The burden of payment for health care is a growing concern for socially and economically vulnerable people; and there is evidence that “the availability of good medical care tends to vary inversely with the need for it in the population served”, termed the “inverse care law” (Hart 1971). Offering universal access to health care services does not eliminate inequalities, as shown in most industrialized countries that have largely removed financial barriers to access. Different population groups such as poor people, older people, legal and illegal immigrants, people with disabilities, and ethnic minorities may have different health care needs and expectations (Healy and McKee 2004). A health system should be designed to address the diverse needs of the population in an equitable, efficient and responsive way.

However there is no commonly-accepted definition of ‘equitable access’; this is problematic because governments are left without a reference point with which to monitor the consistency of their health care policies (Oliver and Mossialos 2004). For instance, efforts to improve access to care by introducing waiting time guarantees or expanding statutory health care coverage may be undermined by introducing or increasing user charges for ambulatory and inpatient services (Mossialos and Thomson 2003). Moreover, to understand the concept of equity in access to health care it is necessary to introduce the concept of need for health care services. If people in different socioeconomic groups report the same use of health care, this does not signify that access is equitable. On the contrary, this situation may be inequitable since poor people have often greater health care need. The goal of equity in access to health care can therefore be achieved only if there is equal access for equal need (Wagstaft, van Doorslaer et al. 1991; Gulliford, Figueroa-Munoz et al. 2002; Braveman and Gruskin 2003). Yet, difficulties arise in defining both access and need.

In the first part of this paper the methodological issues related to the definition of equity, access and need are presented. In the second part, the focus will be on measurement issues, and finally the paper will report which data countries collect and use to analyze inequality in access to health care.

II. Defining equity

Before analysing the normative concept of equity it is important to differentiate equity or social justice from altruism or caring. Since caring and altruism are matters of preference, the amount of resources and the level of provision of health care should depend only on how much individuals care and on the cost of providing health care. According to this argument, costs and benefits should be balanced at the margin (Culyer, van Doorslaer et al. 1992), and the main objective of a health care system should be efficiency and a Pareto optimal allocation of resources. On the contrary, according to equity theories, the distribution of health care should be driven by principles of individual rights. Rawls posits that

\textsuperscript{1} The views expressed are those of the authors and do not necessarily represent those of the European Commission.

\textsuperscript{2} A number of experts have contributed to this research note by providing country reports, for which the authors are grateful. Their names and affiliations are listed in Appendix 3.
decisions concerning the allocation of resources and access to health care should be made under a “veil of ignorance” (Rawls 1971). Individuals should make decisions independently from their social position, by imagining what they would have judged as the best distribution of health care if they were ignorant about their actual socio-economic conditions.

A conflict between efficiency and equity criteria is therefore plausible. An efficient distribution may not be equitable and vice versa. Differences between libertarian and egalitarian viewpoints on equity are direct consequences of the equity-efficiency trade-off. The libertarian viewpoint is oriented to a “private” system, and the level of access depends on one’s willingness and ability to pay. On the contrary, according to the egalitarian view a publicly financed system should offer equal opportunity of access for those in equal need, independent of ability to pay (Williams 1993).

Three principles of equity are commonly discussed in relation to health care: (1) Equal access to health care for those in equal need of health care; (2) Equal utilization of health care for those in equal need of health care; (3) Equal (or, rather, equitable) health outcomes (Oliver and Mossialos 2004). The first principle - equal access for equal need - requires equal opportunities to access health for those in equal need of care. Equal opportunities require services are available when needed, are acceptable, and individuals do not face barriers (e.g., financial or otherwise) in accessing them. The second principle- equal utilization for equal need- requires conditions whereby those who have an equal need for health care make equal use of health care. Compared to equal access for equal need, this equity principle therefore requires more proactive (and possibly very costly) efforts by policy makers, and would require that potentially acceptable reasons for unequal use of health care services (by those in equal need) be overridden, such as differences in lifestyle preferences and/or levels of risk aversion. The principle of achieving equal health outcomes is potentially highly undesirable because it would require many restrictions on the ways in which people may choose to live their lives (Oliver, Healey et al. 2002). While achieving less unequal health outcomes (or more equitable health outcomes) may be a desirable policy objective, the multiple determinants of health that fall outside of the health system, and likely have a stronger impact on health, place this goal beyond the remit of health policy.

Thus, the equity principle most appropriate for policy makers to pursue is equal access to health care for those in equal need (horizontal equity), because it is specific to health care, and it respects acceptable reasons for differentials in health care utilisation by those in equal need (Oliver and Mossialos 2004). Moreover, consistent with many governments’ aims to provide services on the basis of need and not ability to pay, unequal access across groups defined by income or socio-economic status is the most appropriate starting point in directing policy.

III. Defining and measuring need

The definition of need for health care is highly ambiguous. Four definitions have been proposed: 1) an individual’s level of ill-health, 2) an individual’s capacity to benefit from health care, 3) the expenditure a person ought to have, and 4) the minimum amount of resources required to exhaust an individual’s capacity to benefit (Culyer and Wagstaff 1993). The first definition is often considered to be too narrow since it considers only an individual's current health status and it may miss the value of preventive care. The second does not take into account the amount of resources spent, leaving unanswered the question of how much health care a person needs. On the contrary, the third concept takes into consideration this issue since need is defined as the amount of health care required to attain equality of health. The fourth definition implies that when capacity to benefit is, at the margin, zero, need is zero; but when capacity to benefit is positive, need is assessed considering the amount of expenditure required to reduce capacity to benefit to zero.

Measuring need by level of ill-health is favoured because of data availability and relative ease of measurement; while measures of health status are well developed and easily accessible, measuring capacity to benefit is highly complex. However, the level of ill-health may not necessarily be consistent with capacity to benefit. Some debilitating diseases have no effective treatments or cures; and, as mentioned previously, this approach may not be appropriate for the evaluation of preventive treatments.

Ill-health is most commonly measured at the individual level through self reported health measures. Typically health surveys include questions concerning self-assessed health. A variety of self-assessed

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3 These three definitions of equity are consistent with the concept of horizontal equity – which states that equals should be treated equally, but not vertical equity (unequals should be treated unequally). The latter concept is more common in the literature of financing health care (i.e. individuals on different income should contribute different amounts to the financing of the system) but not in terms of access to care.
health questions exist, with some measures taking a broad perspective - reporting a general health ranking- and some a narrower approach - assessing a wider range of concerns, such as physical and emotional well-being. Self-assessed measures can also be generic - measuring general subjective health, or disease-specific - measuring the subjective health of patients with particular conditions (Masseria, Allin et al. 2007).

While evidence supports self-assessed health measures to be predictive of mortality, interdisciplinary research has found differences between self-ratings and medically-obtained health status information (Idler and Benyamini 1997). The extent of the discrepancies between subjective health measures and clinical information are not consistent across individuals of different gender, age, ethnicity and socio-economic status. Moreover, various independent studies have confirmed that gender, age group and ethnicity influence individuals’ responses to self-assessed health status questions (Groot 2000; Benyamini, Blumstein et al. 2003; Lindeboom and van Doorslaer 2004). A main methodological challenge in the use of self-assessed health is that a respondent’s answer may also incorporate his/her perception of health status in relation to his/her particular social position and reference group (Idler and Benyamini 1997; Jürges 2007). Stress and negative attitudes also play a role in influencing perceived health status. For example, self-assessed health has been found to be affected by negative attitudes, which do not have long-term implications on health (Watson and Pennebaker 1989). Also, personality traits such as neuroticism and perceived lack of control have also been found to influence mortality as well as self-assessed health (Singh-Manoux, Martikainen et al. 2006).

Potential bias in self-assessed health measures, whether by socio-economic group, age, or other factor could be limited through the use of vignettes (Masseria, Allin et al. 2007) or through the computation of a more comparable health indicator on the basis of several self-reported health measures (see for example (Jürges 2007)4). This latter approach requires an array of health indicators to be included in a survey.

IV. Defining and measuring access

Access to health care is a complicated concept. Many researchers use the term “access” as synonymous with “utilization”, implying that an individual’s use of health services is proof that he/she can access these services. However, as noted above, access refers to opportunities, whereas utilisation is the manifestation of these opportunities; differences in utilisation could be either for acceptable reasons (e.g. personal preferences) or unacceptable reasons, e.g. information about service availability, direct costs (e.g. user charges) or indirect costs (e.g. transport, lost wages).

A comprehensive definition was articulated by Whitehead and colleagues: access refers to the ability to secure a specified range of services, at a specified level of quality, subject to a specified maximum level of personal inconvenience and cost, whilst in possession of a specified level of information (Whitehead, Evandrou et al. 1997). Therefore, a distinction must be made between ‘having access’ – the possibility of using a service if required-, and ‘gaining access’ -actually using a service. A precondition for access is an adequate supply of services, so that individuals have the potential to use a health service (Gulliford, Figueroa-Munoz et al. 2002). When accessing care, an individual may face financial, organizational, social or cultural barriers that limit his/her possibility to use health services. Moreover, access is also affected by timing and outcomes, and the receipt of good quality service when an individual needs it. Finally, equity in access needs to be considered for all groups in society who may differ in terms of need, socio-economic status, culture, language, and religion.

Thus, it is clear that both supply and demand-side factors influence equal access for equal need. On the supply side, health care resources must be distributed to regions according to population size, health care needs and (if income affects access) the income mix within each regional population, rather than any historical pattern of distribution towards relatively wealthy regions (Oliver and Mossialos 2004). Moreover, incentives/directives are needed for sufficient facilities and staff to locate and remain in underserved areas.

On the demand side, most importantly one must consider an individual’s ability to pay. User charges are increasingly being used in many countries as a method by which to attempt to quell the demand for health care, but there is some evidence that charges have a higher impact on the demand for

4 Although self-reported health status is considered a good predictor of mortality, there are large variations in reporting across countries in Europe. Usually Scandinavian countries tend to report better health status than Southern European countries. Using the Survey of Health, Ageing and Retirement in Europe, the author analyses whether these differences are due to objective or quasi objective differences in health status or to differences in reporting bias. Ordered probit and generalised ordered probit models for self-assessed health are run to generate overall and country specific threshold values. Moreover, health status is further decomposed into prevalence effect, the severity effect, and residual effect.
health care in lower income groups than in higher income groups (Mossialos and Thomson 2003). Thus provisions must be made for user charges to be means-tested over the range of specified health services in a manner that is consistent with the accepted principle of equity. Similarly, waiting lists for the range of specified services should not significantly differ by income group. Demand is also influenced by factors such as knowledge, information, cultural beliefs, indirect financial costs (e.g. travel costs), the opportunity cost of patients’ time (e.g. foregone wages), and their preferences. Some of the above could be addressed by providing, for example, targeted health care information and health promotion messages.

Indicators of access to health care

Even if different indicators of access can be measured such as waiting time, availability of resources and user charges, access can rarely be observed directly. Rather utilization is observed. Therefore, while the principle of equity most appropriate for policy is equal access for equal need, what is commonly measured and analyzed is equal utilization for equal need.

Utilization can either be measured through micro-level surveys which ask if individuals have used inpatient, outpatient or day services in the past six months or year (and often also the number of visits), or through accounting data of expenditure or claims data. Both sources may include data on organizational and financial barriers to utilization such as waiting times, or out-of-pocket payments. Also direct costs to health care such as prescription charges are usually available. However surveys have the advantage of collecting individual-level data on socio-economic situation (e.g. employment status, level of income and wealth) and personal factors such as expectations and self-assessed health, while analyses using administrative data rely on ecological sources of income in the form of geographical indicators of deprivation or income which are less accurate. Data on personal barriers such as reasons for deciding not to seek care, experiences of the services received, and also the perceptions of the benefits are more difficult to obtain, although to some extent these are included in existing surveys (see Section VI).

Data collected through surveys and interviews may be subject to survey bias if response rates are not sufficiently high, and if a disproportionate amount of respondents are from disadvantaged groups (Morgan et al. 2003). In the US, telephone surveys have become increasingly popular, yet low response rates are an even larger problem in these instances (Berk and Schur 1998). Moreover, surveys that are very long and ask for detailed data about health care use and access to health care are subject to conditioning effects. As these questions are likely to have follow-up questions when affirmative answers are given, respondents learn along the way that they can answer fewer questions by responding negatively. Studies have shown that longer surveys tend to report smaller amounts of unmet need than shorter surveys (Berk and Schur 1998). Other methodological issues concerning surveys are their comparability. Although similar surveys ask similar conceptual questions on health care use and access with similar wording, research has shown that differences in semantics can affect survey responses (Berk and Schur 1998). Moreover, question wording can often have inherent cultural or ethnic biases due to different social norms (Warnecke, Johnson et al. 1997). Longitudinal surveys although very useful for analyzing the long-term relationship between socioeconomic status and access to health care are subject to further bias if the individuals who drop out are the most vulnerable and unhealthy (Jones, Koolman et al. 2005). Nationally collected indicators are also likely to be influenced by the political and policy priorities of a country; in terms of what indicators are collected and made available, as well as which policies are prioritized (Nolte, Wait et al. 2006)

While specific indicators exist to measure the different dimensions of access individually, there is no all-encompassing indicator. Service availability traditionally uses indicators on the per capita availability of medical staff and resources such as hospital beds and medical technology units. While these indicators give some indication of quantity of resources available they say nothing about the quality of these resources or if individuals are making use of them.

Newer indicators of service availability such as distance, travel time, travel cost or available public transport to nearest medical resources face additional methodological issues. Data using geographic information systems to estimate distance or travel time to the nearest medical resources tend to underestimate journeys patients actually made. This is because the nearest service is not always the one preferred by all individuals (Phillips, Kinman et al. 2000; Haynes 2003).

5 For example, for respondents who said that they had no unmet need, a follow-up probe was asked that increased the number of respondents answering yes: “Even if you got the care eventually, I am interested in any time in the past year that you didn’t get medical care you thought you needed when you needed it. This would include preventive care or checkups, any medical tests or treatments, including physician or hospital visits, surgery, or medications. Was there any time like this during the past year?”
More specific problems however concern ambiguity in some of the indicators. For example measuring use of primary care by the number of GP visits provides no information on the quality of care or the length of consultation. Similarly, unless surveys ask for utilization of inpatient and outpatient visits in both the public and private sectors, and the numbers of each, they will measure incomplete pictures of total use (Goddard and Smith 2001). Moreover, system characteristics may vary widely across countries such as the number and role of GPs and specialists, whether there is gatekeeping (i.e. patients need referrals from their GP to access specialist care), whether alternatives to hospital care exist (e.g. outpatient clinics or home care), the extent to which individuals engage in self-care and self-medication, and whether specialists are available outside hospital. Moreover with the development of disease management programmes in many countries, it will become increasingly difficult to measure access as different care pathways are introduced.

Measuring financial and organizational barriers to access present additional methodological issues, since, where barriers have been completely successful, individuals will not report data on costs or waiting times having not received the service. Thus, these indices may under report barriers to access where they exist (Whitehead and Dahlgren 2006). Recently an indicator measuring unmet need has been incorporated in some surveys (e.g. the EU-SILC survey – see Section VI) to overcome this problem for financial barriers. This indicator asks if an individual’s medical need was not met due to financial (or other) reasons.

Quality of services is usually measured through some form of patient survey, meant to assess their views and experiences. In most countries there is not one comprehensive survey but various different surveys issued by different service providers. The main methodological problem with quality measurement is that the different surveys tend to phrase their questions differently making the data very difficult to compare (Morgan, Gulliford et al. 2003). Moreover, research has shown that patient’s satisfaction tends to be highly correlated with prior expectations, which may not accurate represent their experiences (Fitzpatrick and Hopkins 1983). Differences in ratings have also been found to exist between men and women, and people belonging to different age, socio-economic and cultural groups (McKinley, Stevenson et al. 2002). Although more expensive and time consuming, a patient-base experiences questionnaire can overcome these issues. For example, the Picker/Commonwealth Program for Patient Centered Care asked patients more factual questions about their visit to health care providers rather then subjective questions (Box 1), reaching high degrees of face validity, construct validity and internal reliability\(^6\) (Jenkinson, Coulter et al. 2002).

**Box 1: Examples of Questions in a Picker In-Patient Survey**

1. When you had important questions to ask a doctor, did you get answers you could understand?
(Yes, always / Yes, sometimes / No / I had no need to ask )

2. Sometimes in hospital one doctor or nurse will say one thing and another will say something quite different. Did this happen to you?
(Yes, often/ Yes, sometimes / No)

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\(^6\) An indicator is said to have face validity when it measures something which can be measured. An indicator has construct validity when it measures what it claims to measure. An indicator with internal reliability is one that is consistent across observations.
V. Methods of measuring inequity in access to health care

There is a longstanding debate on the most appropriate method of measuring inequalities in access (most often approximated by utilization) to health services. Two main streams dominate this debate: there are those who measure inequalities in the distribution of health care use, and those that measure the difference in health care use among different values of another variable, namely socioeconomic, i.e. income or social class (Murray, Gakidou et al. 1999). Wagstaff and colleagues argue that the level of inequalities found depends on the chosen approach (Wagstaff, van Doorslaer et al. 1991), and after reviewing numerous measures of inequalities, others endorse that the choice of the indicator should depend on the nature of the data (Mackenbach and Kunst 1997). Three approaches are described below, along with suggestions about the circumstances in which they should be used.

Three of the most common approaches to measuring inequalities include:
- Odds ratios
- Rates of access & use-needs ratios
- Horizontal inequity index

The first is a measure of association (Regidor 2004) that compares the probability of health care use across different categories of a chosen socioeconomic variable. Odds ratios are calculated using a logistic regression of health care use (as a binary variable) on the chosen socioeconomic variable allowing also for need standardization (often just age and gender). This addresses questions such as – are higher income groups more likely to access health services than lower income groups, holding needs and demographics constant? It is appropriate when data on access are binary – i.e. with 'yes' or 'no' responses, and when data on socio-economic characteristics are categorical, e.g. educational attainment. The main shortcoming with this approach is that it does not consider the distribution of people across the various categories.

A useful summary measure of access between population groups is a rate of access indicator. Different population groups can be defined according to the variable of interest: such as socio-economic status, income or ethnicity. Rates of access can be both an absolute measure – the difference in rates between a selected population and a reference population - or a relative measure – the ratio of rates between a selected population and a reference population (Mackenbach and Kunst 1997). When using rates of access it is important to take into account the relative size of the different population groups being used to avoid bias (Gulliford, Figueroa-Munoz et al. 2002). This approach is useful when an absolute measure of utilisation is needed for a specific population group.

The horizontal inequity index derives from the Gini index as proposed by Wagstaff and Van Doorslaer (Wagstaff and van Doorslaer 2000). It is based on the concentration curve for medical care (LM) and for need (LN), ranking individuals by an socioeconomic variable, e.g. income (from the worst-off to the most well-off) as shown in Figure 1. If both utilization and need are equally distributed across the chosen socioeconomic indicator, the two curves coincide with the diagonal (Figure 1). If, on the contrary, they lie above (below) the diagonal, the delivery of medical care and the need distribution advantage the worse-off (better-off). Whenever the curve for need is located above both the diagonal and the curve for medical care, the pro-poor availability of medical care is not enough to cover the need of the most disadvantaged individuals. Therefore, the horizontal inequity index compares the level of need with the amount of medical care received by ranking each individual by income level. When there is horizontal equity, medical care and needs are proportionally distributed across income groups and, therefore, HI equals zero. On the contrary, there is horizontal inequity favouring the better off (worse-off) if the need concentration curve lies above (below) the medical care concentration curve. Kakwani and colleagues have shown that it is possible to compute the above index using a "convenient" regression (Kakwani, Wagstaff et al. 1997).

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7 The x axis represents individuals ranked by income, and on the vertical axis there is the cumulative proportion of health care use.
The horizontal inequity index allows to rank countries by level of inequality and to use all available information when variables are continuous, e.g. income. Moreover, this approach enables the decomposition of the contribution of need (i.e. ill-health) and non-need (i.e. socio-economic) variables to overall inequality in health care (Wagstaff, van Doorslaer et al. 2003). The contribution of each determinant to total inequality in health care demand can be decomposed into: 1) its impact on demand, as measured by the demand health elasticity; and 2) its degree of unequal distribution across socio-economic status (e.g. income), as measured by the (income) concentration index. However, the main limitations of the horizontal inequity index methodology are that countries with different gradients in health care use may yield the same inequality index and that a value of zero for the horizontal inequity index can be obtained also if the two curves (medical care and need) cross the diagonal (e.g. inequality favouring middle income and no clear gradient). Furthermore, policy makers often find difficult the interpretation of the index and the meaning of the cross-country comparison.

VI. Current measures of access and need

In order to gather information to measure the extent to which equal access for equal need is achieved, many countries conduct national surveys of health and experiences with health care. The indicators collected include health status, non-medical determinants of health, socio-demographic characteristics, use of health care, and sometimes other factors related to access such as unmet need, waiting times, insurance status, charges, and perceived quality. Moreover, in those countries with explicit policies addressing inequalities in access to health care, the measurement of indicators allows them to monitor their progress on these objectives, and to ascertain what improvements can be made in policy implementation (Morgan, Gulliford et al. 2003).

In the past several years the EU has made considerable efforts to collect standardized health and health care information across Member States. One of the main EU initiatives has been the collection of comprehensive information on the national health interview survey (HIS) and health examination survey (HES) instruments that have been developed, used and evaluated throughout the Member States. Currently the ‘HIS/HES database’ Internet site is available to provide information on Member State surveys, with information on questions, methodologies, and recommendations.

Currently there are number EU-level surveys that collect useful information on health, socio-economic variables, and health care use (see Table 1). Eurostat has constructed multi-national surveys to measure a wide range of information on social and health issues in Member States. Until

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8 This methodology provides a single, relative measure of income-related inequity in access to health care. However, cross-country differences in the distribution by income of both medical use and need are plausible. An equivalent index across countries may mask different distributions. Moreover, whenever the medical care (or need) concentration curve crosses the diagonal the index may approximate zero, since a pro-poor in part of the distribution may compensate a pro-rich in another (or vice versa).

9 Health interview surveys (HIS) deliver information through interview and questionnaires.

10 Health examination surveys (HES) deliver information through clinical measurement, interviews and questionnaires.
recently the interview survey tools available were predominantly socio-economic questionnaires which included small health modules such as the European Community Household Panel (ECHP) survey with its replacement the EU Statistics on Income and Living Conditions (EU-SILC) survey covering even more limited health information. More recently the Directorate General of Health and Consumer Protection has initiated a European Core Health Interview Survey (ECHIS) which is to be introduced in 2007 and will collect more comprehensive health status and health utilization data. The EU also funds the Survey of Health, Ageing and Retirement in Europe (SHARE) to collect health and socioeconomic variables for the population of age 50 and over. Table 1 presents the main characteristics of these surveys, highlighting the main indicators they collect along with their advantages and disadvantages.

Table 1: Key EU surveys and relative strengths and weaknesses

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<th>Survey</th>
<th>Survey Profile</th>
<th>Key Strengths and Weaknesses</th>
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| **European Community Household Panel Survey (ECHP)** | "An annual panel survey based on a representative panel of households and individuals in each country [in the EU15], covering a wide range of topics: income, health, education, housing, demographics and employment characteristics." | **Pros:**  
- Cross-sectional and longitudinal data came from the same survey and were processed at the same time.  
- Centralized questionnaires modified by each country to suit local conditions.  
- Multidimensional coverage of a range of topics (e.g., health, employment, income).  
- Standardized methodology and procedure (sampling, questionnaire design), yielding comparable information across countries.  
- Panel design (allows dynamic effects of cross-national policies to be explored in more depth, especially in countries which did not previously implement their own longitudinal surveys.)  
- Detailed data available on non-medical factors influencing health and barriers to access such as income and education.  
**Cons:**  
- Health status and health utilization questions tend to be very general and limited in scope.  
- No questions on consumption of private medical care or out-of-pocket costs for care.  
- Behavioral aspects, such as smoking and BMI, were not added until 1998.  
- No questions on wealth  
- Primarily, subjective health questions, which are sensitive to cultural and psychosocial factors.  
- Low initial response rates and panel attrition (also variable across countries, which limit the validity and comparability of data) (Response rate averaged 70% in wave 1, ranging from 50% in Germany and Luxembourg to 90% in Italy and Portugal). Attrition rate was also found to be correlated with health status.  
- Non-participation of Sweden and 12 accession counties.  
- Lack of integration in some National Statistical Systems.  
- From the third wave, data for Germany, Luxemburg, and the UK have been replaced with national surveys, respectively the SSGP, PSELL and the BHPS  
For France, no information on access is available. |
### European Union Statistics on Income and Living Conditions (EU-SILC)

"Aims at collecting timely and comparable cross-sectional and longitudinal multidimensional microdata on income, poverty, social exclusion and living conditions."

- Progressively replaced the ECHP, particularly following the Lisbon and Nice European summits.
- Rotational panel survey: a sample of people are selected and followed up for a minimum of 4 years (started in 2004), allowing new sub-groups of the population to be added each year.
- Coverage will include all 27 member states as well as Turkey, Iceland and Switzerland by December 2006.
- Key indicators of need (self-reported health status):
  - Self perceived health
  - Having a chronic illness or health problem
  - Limited activity due to health problem in the past 6 months
  - Self-reported height and weight (to derive body mass index)
- Key indicators of access:
  - Unmet medical or dental care in past 12 months
  - Unmet need on one or multiple occasions
  - Main reason for unmet medical/dental need (financial, waiting list, no time due to work/care responsibilities, fear or doctors/ hospitals/ treatment, wanted to wait and see if problem improved on its own, did not know of a good doctor/ specialist, other reason)
- Other important indicators:
  - Smoking
  - Information on gross income, including the self-employed
  - Information on assets and wealth and property income
  - Information on benefits received
  - Demographic information
  - Housing information including interest on mortgage loans
  - Education information

### Survey of Health, Ageing and Retirement in Europe (SHARE)

"Multidisciplinary and cross-national survey on health, socio-economic status and social and family networks of individuals aged 50 or over."

- Multi year panel survey: a probability sample in each participating country is selected (beginning in 2004, second wave completed by 2007).
- Coverage included 11 countries in the first instance (Austria, Belgium, Denmark, France, Germany, Greece, Italy, Sweden, Switzerland, Spain, the Netherlands), and subsequently Israel. The second wave will also include data from the Czech Republic and Poland.
- Key indicators of need (health status):
  - Self perceived health
  - Prevalence of chronic conditions (e.g., hypertension, diabetes, arthritis)
  - Prevalence of cancer
  - Experience of certain symptomology in past 6 months (e.g., back or joint pain, cough,

### Pros:

- Centralized questionnaires modified by each country to suit local conditions.
- Addressed many of the limitations present in the ECHP, notably the problem of attrition.
- Very detailed information on income and wealth.
- Includes data on a larger sample of countries that the ECHP.
- Links to data from national registries where available.

### Cons:

- Health questions are very general and limited in scope; more limited than ECHP
- No questions on utilization of care, making questions on unmet need less useful/valid.
- No questions on consumption of private medical care or out-of-pocket costs for care.
- Initial response rate low in some countries.
- Cross sectional and longitudinal data may differ due to the rotational sample.
- Due to rotational sample, few people will be followed for over 4 years, which may be a limitation when studying health changes over time.
- By removing many of the variables included in ECHP instead of adding new ones the continuity of data collection was disrupted thus making analyses of time trends extremely difficult.
### European Core Health Interview Survey (ECHIS)

The goals of European Health Survey System can be summarized as follows:
- Identification of health problems; description of the health status and health needs of the population; estimation of the prevalence and distribution of health indicators; analysis of social (in)equality in health and access to health services; study healthcare consumption and

<table>
<thead>
<tr>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Centralized questionnaire component, sections modified by each country to suit local conditions.</td>
<td>- Not yet in use.</td>
</tr>
<tr>
<td>- Contains more expansive section on health than any of the previous surveys.</td>
<td>- Contains a number of subjective health questions, which are sensitive to cultural and psychosocial factors.</td>
</tr>
<tr>
<td>- Contains more detailed information on utilization.</td>
<td>- May be very lengthy, which could subject it to bias.</td>
</tr>
<tr>
<td>- Will include sections on special health issues, providing more in depth multinational data.</td>
<td>- Data on individuals’ expectations about their health are included</td>
</tr>
<tr>
<td>- Contains questions on utilization and unmet need together.</td>
<td>- Focuses specifically on persons aged 50 and older and, therefore, does not provide information for younger age groups.</td>
</tr>
<tr>
<td>- Relatively lower response rate, compared to the ECHP and its US counterpart, the Health and Retirement Survey (in particular there is high item-non response for the objective health measures).</td>
<td>- Data on individuals’ expectations about their health are included</td>
</tr>
</tbody>
</table>

#### Key indicators of utilization:
- How many visits to a medical doctor in the past year (GP & Specialist)
- Inpatient and outpatient visits
- Hospitalization (and type) in past year
- Receipt of private and home care

#### Key indicators of access:
- Waiting times
- Visits regarding mental health
- Insurance coverage (public and private)
- Foregone care (and reason)
- User charges paid for services accessed

#### Other important indicators:
- Socioeconomic status: income, current work activity, opportunities to work after retirement, assets, wealth and consumption
- Social and Family networks (assistance within families, transfers of income and assets, volunteer activities)
- Housing
- Education

#### Objective measures of health:
- Walking speed
- Grip strength

#### Pros:
- Frequency of medication intake
- Self-reported height and weight (to derive body mass index)
- Smoking
- Difficulty performing daily activities (ADL) and instrumental ADL
- Temporary reduction (last two weeks) of activity because of health problems
- Amount of physical activities performed per week

#### Cons:
- Swollen legs, sleeping problems

<table>
<thead>
<tr>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Centralized questionnaire component, sections modified by each country to suit local conditions.</td>
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<td>&quot;The goals of European Health Survey System can be summarized as follows: identification of health problems; description of the health status and health needs of the population; estimation of the prevalence and distribution of health indicators; analysis of social (in)equality in health and access to health services; study healthcare consumption and</td>
</tr>
<tr>
<td>- Self perceived health</td>
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<tr>
<td>- Being hampered by daily activities</td>
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</tbody>
</table>
its determinants, and preventive care; and study possible trends in health status, lifestyle and healthcare services consumption among the population.

- Temporary reduction (last six months) of activity because of health problems
- Prevalence of chronic conditions (e.g., hypertension, diabetes, arthritis)
- Health affecting work attendance
- Height and weight (to derive body mass index)
- Smoking
- Difficulty performing daily activities
- Amount of physical activities performed per week
- Experiencing pain, discomfort, depression/anxiety over the past 4 weeks.

### Key indicators of utilization
- How many visits to a medical doctor in the past year (GP & Specialist)
- How many visits to an alternative medical practitioner (e.g., acupuncturist, homeopath)
- Hospitalization (and type) in past year
- Receipt of private and home care
- Inpatient and outpatient visits
- Taken prescribed/un-prescribed medication in past 2 weeks
- Vaccinations received and date received
- Last time blood pressure, blood sugar measured
- Last time received a mammography/cervical smear test/fecal occult blood test

### Key indicators of access
- Waiting times
- Unmet medical/dental need
- Reason for unmet medical/dental need

Sources: (European Commission 2002; European Commission 2004; Borsch-Supan and Jurges 2005; Eurostat 2005; Eurostat 2006)

In addition, the EU Member States collect data at national level that are useful for within-country analyses. Appendix 1 includes a table showing the indicators of health and access to health care that are collected in a selection of European countries. A wealth of macro-level indicators related to access and utilization are also collected at the international level - OECD, Eurostat and WHO (see Appendix 2).

Countries outside of the EU, such as Canada and the United States, collect a comprehensive set of indicators that are used to inform policy. For example, in the United States, the Agency for Healthcare Research and Quality (AHRQ) collects information on indicators related to preventable hospitalizations, hospital quality, and patient safety. In Canada, the Canadian Institute for Health Information has directed the development and reporting of indicators on several specific programme and service areas impacting health, including primary health care, home care, continuing care, mental health and addiction treatment, and rehabilitation services. For example, with regards to primary health care, the following indicators are being used (not exclusive): (1) Difficulty obtaining routine or on-going health services, (2) Patient satisfaction with overall health care services, and (3) Hospitalization rate for ambulatory care sensitive conditions.
VII. Conclusions and recommendations

Equal access to health care is a widely accepted goal of most European and other industrialized countries' governments. Underlying this broad equity goal is the aspiration to reduce persistent health inequalities across social groups within countries. Translating this policy goal to a measurable objective is not straightforward. Moreover, there is considerable debate surrounding the definition of key concepts such as equity, health care need, and access and also about the most appropriate or accurate way to measure equity in health care.

Most commonly equity is defined in terms of equals treated equally (horizontal equity) with health care need measured by levels of ill-health, and access approximated by utilization. Thus, one can identify inequity where patterns of utilization differ across individuals with the same health care need (i.e. health status), whether across income, social, or other socio-economic groups. Information on socio-economic status, health status and utilization patterns are needed in order to conduct these analyses. While survey data provide information on all these levels, administrative data may provide more accurate information on utilization. However, administrative data provide a less comprehensive source of socio-economic information (which would be collected through geographical measures of income or deprivation) and health status (which in the best circumstances offers physician diagnosis). Using utilization to approximate access does not account for acceptable variations in health care use, thus consensus is required in defining the reasons for these acceptable variations. The many unacceptable reasons for variations in the use of health care use will also have to be addressed at the level of both the supply side and the demand side (as discussed above).

A wide variety of indicators on access to health care are collected by governments in order to monitor their health system's goals. However, there exist some methodological limitations with the different types of methods used to collect this information. For instance, most individual-level data is based on surveys, measuring self-reported utilization, and in fewer instances, patient perceived quality. Yet when asked over a time-frame of a year, these questions require respondents to remember all contacts with the health system. Evidence shows that when comparing self-reported utilization data to medical records, there is consistent underreporting of utilization (Palin and Zumbo 2003). National indicators generally focus on utilization rates, treatment processes and outcomes. Yet, these routinely collected indicators are often crude measures of access, which should be used and interpreted with care. Thus such indicators should be complemented with other indicators such as ability to pay, geographical location, patient satisfaction and quality of care.

When measuring access to health care, and inequalities therein, the following recommendations should be taken into account:

- Population health surveys would be most useful for the purpose of analyzing equity in health care if they included comprehensive measures of:
  1) health status, through general and specific questions;
  2) socio-economic status, capturing all income sources, wealth and education; (in particular among the older, non-economically active population, it is vital to measure the total value of income and assets in order to capture accumulated wealth)
  3) health care use, e.g. number of physician visits and number of hospital admissions,
  4) factors impacting accessibility of health services, such as waiting times, distance to facilities, perceived quality of care, patient satisfaction, public versus private sector use, user charges imposed or other costs,
  5) non-use of health care (i.e. unmet need), along with explanations.

- Information on hospital utilization should be disaggregated in order to better understand the differences between elective versus emergency care, and inpatient versus day care, in light of evidence that lower socio-economic groups are making more use of emergency care than they may need, but less use of some types of surgery.

- Information on user charges and costs of accessing care should include both official and unofficial (informal) payments. Also, costs of transportation, and other indirect costs, should be measured.
• Information on insurance status should be collected, along with the benefits individuals are entitled to (e.g. direct access to specialists, choice of provider, shorter waits, package of care and which services are excluded).

• Surveys should be regularly updated to monitor changes over time. Longitudinal surveys are especially useful in order to identify the causal pathways between health and health care use and also between socio-economic factors and health.

• Measures of self-assessed health could be complemented with ‘vignettes’ in order to minimize bias in reporting across population groups (e.g. socio-economic, cultural, and age groups).

• At present, EU-level surveys exist which facilitate cross-country comparisons; however, these should be expanded to include further indicators of access, such as those currently collected in individual countries, e.g. quality of care, costs (and benefits) of voluntary insurance (See Appendix 1).

• When making cross-country comparisons, care needs to be taken when translating terms into different languages, and interpreting results of surveys. For example, the self-assessed health category “excellent” is a common term in English, but in German, “ausgezeichnet” is a more ironic exaggeration in particular in relation to health (Jürges 2007). See also (Masseria, Allin et al 2007) for more information on the challenges with comparing self-assessed health outcomes across countries.

• For country-level analyses, data linkages should be facilitated, e.g. between surveys and administrative data measuring actual health care use and costs to improve the accuracy of health care utilization information and to validate self-reported information.

• Attempts ought to be made to widen the focus of equity to consider not just groups defined by income, but also, where appropriate, groups defined by (for example) geographical residence, education, race/ethnicity, gender and lifestyle.

• Survey design should maximize generalizability to the entire population, therefore capturing the health care needs of vulnerable, potentially under-represented groups such as immigrants, homeless people, and older people living in institutions.
References


### Appendix 1. Indicators of access collected by selected EU countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Indicators of access to health care (data source)</th>
</tr>
</thead>
</table>
| Belgium         | Contacts with GPs, specialists, primary health care, dentists, other health services  
Hospital admissions  
Waiting lists  
Vaccinations  
Breast and Cervical cancer screening  
Use of medications  
Prevention  
Amount spent on health care/medicines/medical appliances in the past month  
Difficulty in financing out of pocket payments  
Unmet medical/dental/eye care in past year due to financial difficulty  
Need to postpone an operation or dental care in the past year  
Patient Satisfaction  
(National Health Survey)                                                                                                                                                                    |
| Czech Republic  | Use of health services in the past 12 months  
Use of medications  
Use of social support services  
(Health Interview Survey Czech Republic; HISCR)                                                                                                                                              |
| Denmark         | Utilization of health services, alternative treatments  
Reactions to symptoms  
Prevalence of HIV-testing  
Prevalence of supplementary health insurance  
Citizen’s involvement  
Dental care coverage  
(Health and Morbidity Survey)                                                                                                                                                                   |
| Estonia         | Utilization of different health services  
(Estonian Health Survey, Health Behaviour Survey)  
Ability to access primary, secondary or dental services, and description of barriers  
Quality of services  
Patient satisfaction  
Access to health care services  
(Patient and Insured Persons Satisfaction Survey)                                                                                                                                               |
| Finland         | Health Behaviour and Health among the Finish Adult Population: annual survey organized by the National Public Health Institute                                                                                                                                                        |
| France          | Utilization of GP services, dental services, outpatient care  
Over 24 hour hospitalization rates  
Consumption of pharmaceuticals  
Consumption of selected medical screening procedures - including cervical and breast cancer screening  
(French National Health Survey)  
Use of complementary health insurance coverage  
Means of access to complementary health insurance coverage  
Cost of complementary health insurance coverage  
Last visit to GP, specialist  
Evaluation of socio-economic barriers in access to care  
(Survey on Health and Social Protection)                                                                                                                                                     |
| Germany         | Utilization of health services including GPs and specialists  
Consumption of pharmaceuticals  
Health check-ups and preventative measures  
Health insurance  
Use of early diagnosis/opportunistic screening  
(Federal Health Monitoring system)                                                                                                                                                               |
| Hungary         | Frequency of consulting specialists  
Frequency of attending a dentist  
Use of screening services  
(National Health Interview Survey)                                                                                                                                                               |
| Italy           | Utilization of health care services  
- inpatient care  
- specialist care  
- GP care  
- emergency care  
- preventative care  
Waiting Times  
(National Survey of Health and Health Services)                                                                                                                                                 |
<table>
<thead>
<tr>
<th>Country</th>
<th>Details</th>
</tr>
</thead>
</table>
| Lithuania | Utilization of health care services (Health Interview Survey of the Lithuanian Population, Health Behaviour Monitoring Project)  
- inpatient care  
- specialist care  
- GP care  
- emergency care  
- preventative care  
Prevention measures (Health Interview Survey of the Lithuanian Population):  
- vaccinations,  
- measuring arterial blood pressure  
- glucose concentration indices  
- cholesterol  
- breast and cervical cancer screening  
Use of medications (Health Interview Survey of the Lithuanian Population)  
Activities of health personnel  
Role of family members and other persons in changing health behaviour  
Reasons for not being able to access medical or dental care (Health Interview Survey of the Lithuanian Population)  
Reasons for accessing medical care (Health Behaviour Monitoring Project)  
Satisfaction with medical care  
Information and attention provided by medical personnel in past year |
| Poland | Utilization of health care services (National Health Survey)  
Prevention measures (National Health Survey):  
- vaccinations  
- blood pressure  
- birth control  
- cholesterol  
- breast and cervical cancer screening  
Use of medications (National Health Survey)  
Barriers to access to health (Health Care in Households Survey) |
| Slovenia | Utilization of health care services in the past 12 months  
- GPs  
- dentists  
- gynaecology (if applicable)  
Use of medications and compliance with treatment plans  
Waiting times and waiting lists  
Referrals  
Use of private health services  
Use of contraceptives  
Health insurance and health policy  
- assessment  
- bureaucracy  
Satisfaction and Self-Perceived Quality (The Slovenian Public Opinion Survey; The Health Monitor Questionnaire; The World Health Survey) |
| Spain | Doctor visit in the past 2 weeks, or last visit  
Type of visit  
- diagnosis  
- check up  
- prescription  
- sick leave certificate  
Type of doctor visited  
- GP  
- specialist (list of possible specialists provided)  
- private doctor  
- NHS doctor  
Travel time to doctor  
Waiting time to see doctor  
Use of dental service in last 3 months; type of service received; frequency of visits  
Type of dentist: private/NHS  
Hospital use in the last 12 months; days in hospital; type of intervention; waiting list; how hospitalization was financed  
Emergency services utilization over the last 12 months; type and frequency of emergency service utilization  
Prescription and non-prescription medication use over the past two weeks  
Unmet need and reason for unmet need (National Health Survey) |
<table>
<thead>
<tr>
<th>Country</th>
<th>Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sweden</strong></td>
<td>Contact with health service providers (National Survey on Public Health)</td>
</tr>
<tr>
<td></td>
<td>Access to health care (National Survey on Public Health)</td>
</tr>
<tr>
<td></td>
<td>Informal care work (National Survey on Public Health)</td>
</tr>
<tr>
<td></td>
<td>Use of social welfare services (Survey on Living Conditions)</td>
</tr>
<tr>
<td></td>
<td>Use of medications (Survey on Living Conditions)</td>
</tr>
<tr>
<td></td>
<td>Unmet medical and dental need, reasons why (Survey on Living Conditions, National Survey on Public Health)</td>
</tr>
<tr>
<td></td>
<td>Reasons for not buying prescribed medications (National Survey on Public Health)</td>
</tr>
<tr>
<td><strong>Turkey</strong></td>
<td>Vaccinations</td>
</tr>
<tr>
<td></td>
<td>Family Planning</td>
</tr>
<tr>
<td></td>
<td>Antenatal care and delivery assistance</td>
</tr>
<tr>
<td></td>
<td>Abortions</td>
</tr>
<tr>
<td></td>
<td>Fertility Preferences</td>
</tr>
<tr>
<td><strong>United Kingdom</strong></td>
<td>Number of visits to GP, family doctor about individual health in the past year (private/public)</td>
</tr>
<tr>
<td></td>
<td>Use of hospital consultant/outpatient services in the past year (private/public)</td>
</tr>
<tr>
<td></td>
<td>Been in hospital as an in-patient overnight or longer in the past year (private/public)</td>
</tr>
<tr>
<td></td>
<td>Had a dental check-up in the past year (private/public)</td>
</tr>
<tr>
<td></td>
<td>Use of social care services (e.g. home care) in the past year</td>
</tr>
<tr>
<td></td>
<td>Private insurance status</td>
</tr>
<tr>
<td></td>
<td>(British Household Panel Survey)</td>
</tr>
<tr>
<td></td>
<td>Objective health measures (English Longitudinal Survey of Ageing)</td>
</tr>
</tbody>
</table>

### Appendix 2. Macro-level indicators of access collected by international organizations

<table>
<thead>
<tr>
<th>Type of indicator</th>
<th>Indicators of access (and source)</th>
</tr>
</thead>
</table>
| **Health financing**       | • Total expenditure on health (total, public, private) (OECD)  
• Current expenditure on health (total, public, private) (OECD)  
• Investment on medical facilities (total, public, private) (OECD)  
• Expenditure on personal health care (total, public, private) (OECD)  
• Expenditure on medical services (total, public and private) (OECD) for:  
  - all medical services  
  - curative and rehabilitative care  
  - long-term nursing care  
  - ancillary services  
  - services not allocated by function  
• Total expenditure on health, pharmaceuticals and other medical non-durables (OECD)  
• Total health expenditure as % of gross domestic product (GDP), (WHO)  
• Total health expenditure, PPP$ per capita (WHO)  
• Public sector health expenditure as % of total health expenditure (WHO)  
• Total inpatient expenditure as % of total health expenditure (WHO)  
• Expenditure on inpatient care, PPP$ per capita (WHO)  
• Public inpatient expenditure as % of total inpatient expenditure (WHO)  
• Total pharmaceutical expenditure as % of total health expenditure (WHO)  
• Salaries as % of total public health expenditure (WHO)  
• Public sector expenditure on health as % of total government expenditure, (WHO)  
• Private households’ out-of-pocket payment on health as % of total health expenditure (WHO)  
• Out-of-pocket payments (households) (OECD)  
• Private insurance (OECD)  
• Share of population eligible for health care coverage (total and separately for in-patient and acute care, out-patient medical care, and pharmaceutical goods) (OECD)  
• Pharmaceutical expenditure, PPP$ per capita (WHO)  
• Public pharmaceutical expenditure as % of total pharmaceutical expenditure (WHO)  
• Total capital investment expenditures on medical facilities as % of total health expenditure (WHO)  
• Pharmaceutical production (OECD)  
• Pharmaceutical value added (OECD)  
• Pharmaceutical consumption (total, and by type) (OECD)  
• Pharmaceutical sales (total, and by type) (OECD) |
| **Service Availability**   | **Medical Professionals**  
• Total health, hospital employment (full-time equivalent (FTE), head count including self-employment) (EU Manpower project, OECD)  
• Total employment (per 1,000 by gender) in offices of: physicians, dentists, paramedical practitioners, out-patient care centres, medical/diagnostic laboratories, home health care, other ambulatory care (EU Manpower project)  
• Total employment (persons, FTE per 1,000, gender) in dispensing chemists, retail sale and other suppliers of optical glasses, hearing aids, other medical appliances, other sale of pharmaceutical and medical goods. (EU Manpower project)  
• Total employment (persons, FTE per 1,000, gender) in general hospitals, mental health and substance abuse hospitals, other specialty hospitals (EU Manpower project)  
• Total employment (persons, FTE per 1,000 by gender) in facilities for nursing care, residential mental retardation, mental health & substance abuse, elderly community care, other residential care (EU Manpower project)  
• Number of professionally staffed hours for emergency services in a year per 100,000 population, also per km2 (Emergency Services Project)  
• Physicians per 100,000 (total, physicians, medical group of specialties (PP), general practitioners, dentists, pharmacists, nurses, midwives) (WHO)  
• Percent of physicians, and % of nurses working in hospitals (WHO)  
• Physicians, nurses, midwives, pharmacists and dentists graduated per 100,000 (WHO)  
• Employment (FTE per 1,000 by gender) in provision and administration of public health programmes (EU Manpower project)  
• Practicing physicians, specialists, dentists, pharmacists, nurses (FTE equivalent, head count including self-employment) (OECD)  
• General practitioners (FTE equivalent, head count including self-employment) (OECD)  
• Number of physiotherapists per 100,000 by region (Eurostat)  
• Practising pharmacists per 100,000 (Eurostat)  
• Number of physicians per 100,000 by 23 specialties (Eurostat)  
• Midwives employed per 100,000 (Eurostat) |
<table>
<thead>
<tr>
<th>Service Availability (Medical Resources)</th>
<th>Disease prevention (EU EHRM project)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qualified nurses per 100,000 (Eurostat)</td>
<td>- prevalence of antihypertensive drug treatment among actual and potential hypertensives in the population by gender, ages 25-74, SES</td>
</tr>
<tr>
<td>Clinical psychologists per 100,000 population (EU Mental Health project)</td>
<td>- % population with blood pressure measurement in the past 5 years</td>
</tr>
<tr>
<td>Practicing and licensed dentists per 100,000 (Eurostat)</td>
<td>- % of women aged 20-69 receiving cervical and breast cancer screening</td>
</tr>
<tr>
<td>Hospital staff ratio to acute care (EU Manpower project, OECD)</td>
<td>- % of population with cholesterol measurement in past 5 years by gender, ages 25-74, SES</td>
</tr>
<tr>
<td>Number of pneumonia and allergy units per 100,000 population (Eurostat)</td>
<td>- Colorectal cancer screening coverage</td>
</tr>
<tr>
<td>Number of primary health care centres, percent of these with facilities for asthmatic children, spirometry, COPD education (EU IMCA project)</td>
<td>- Dental health screening per 1000 aged 3-16 for non-symptomatic oral disease</td>
</tr>
<tr>
<td>Number of stroke centres (EU Eurociss project)</td>
<td>- % of pregnant women attending antenatal care who accept HIV screening</td>
</tr>
<tr>
<td>Number of stroke centres (EU Eurociss project)</td>
<td>- % women using peri- and postmenopausal hormone medication by 5 year age groups</td>
</tr>
<tr>
<td>Number of stroke centres (EU Eurociss project)</td>
<td>- Prevalence of lipid lowering drug treatment in the population by gender, ages 25-74, SES</td>
</tr>
<tr>
<td>Number of stroke centres (EU Eurociss project)</td>
<td></td>
</tr>
</tbody>
</table>
session during the past year (IMCA project)

• Bed occupancy rate in percentage, acute care hospitals only (WHO)
• Acute care bed days (OECD)
• Acute care occupancy rate (Number of acute care beds effectively occupied (beddays) in in-patient institutions divided by the number of available acute care beds and multiplied by 100) (OECD)
• Acute care turnover rate (Number of acute admissions (or discharges) divided by the number of available acute care beds) (OECD)
• Total surgical procedures (in-patient and day cases) (OECD)
• Long stay (more than 300 days) psychiatric patients (EU Mental health project), more than a year (WHO)
• Discharge rate by diagnostic categories per 100,000 population(OECD)
• Average patient length of stay, limited diagnosis in days per diagnosis (Eurostat, OECD)
• Average length of stay by in-patient and acute care (number of days stayed in an in-patient institution divided by number of discharges (including deaths) during the year) (OECD, WHO)

Rates of the following surgeries performed:
  - Births by mode of delivery per 1,000 live births (EU Peristat project)
  - Percent of births without medical intervention (EU Peristat project)
  - Coronary Artery Bypass Grafting per 100,000 (EU Eurociss project)
  - Cancer palliative therapy (EU Eurochip project)
  - Cancer treatments including surgery, chemotherapy, radiotherapy, endocrine therapy, bone marrow transplants (EU Eurochip project)
  - Cardiovascular operation rate by event, by hospital discharge, acute vs elective including pacemakers, CT, MRI scans for stroke, valvular operations, aortic and other aneurysms (EU Eurociss project)
  - Deliveries after assisted reproductive technology (EU Reprostat project)
  - Percent vaginal births with episiotomy (EU Peristat project)
  - Percent pregnancies following fertility treatment (EU Peristat project)
  - Number of heart transplants per 100,000 (Eurociss project)
  - Percent of diabetes patients receiving laser treatment (EUDIP project)
  - Annual incidence and prevalence of dialysis and transplantation per million (EUDIP)
• Percentage of children who have received diphtheria, tetanus, pertussis, measles and influenza immunizations prior to their 1st birthday (OECD)
• Number of women aged 50-69 having received a bilateral mammography in the past year (OECD)
• Number of women aged 20-69 reporting cervical cancer screening in the past 3 years (OECD)
• Number of transplants (for bone marrow, heart, liver, lung, kidney) conducted according to national and local registries per 100,000 population (OECD)
• Autopsy rate in percentage, for all deaths, and for hospital deaths (WHO)
• Percent of population with access to dentist within convenient distance (WHO)
• Medicine use for selected items in DDD/1,000 population/day (Eurostat)
• Time between diagnosis of cancer and first treatment by site (EU Eurochip project)
• Rates per 100,000 of the following surgeries performed (OECD):
  - Cataract surgery
  - Tonsillectomy with or without adenoidectomy
  - Percutaneous coronary interventions (PTCA and stenting)
  - Coronary stenting
  - Coronary bypass
  - Cardiac catheterisation
  - Pacemakers
  - Ligation/stripping of varicose veins
  - Appendectomy
  - Cholecystectomy
  - Laparoscopic cholecystectomy
  - Inguinal and femoral hernia
  - Prostatectomy (transurethral)
  - Prostatectomy (excluding transurethral)
  - Hysterectomy (vaginal only)
  - Caesarean section
  - Hip replacement
  - Knee replacement
  - Breast conserving surgery
  - Mastectomy

Appendix 3. Country Experts

The following experts contributed to this research note by providing country reports:

Belgium – Dirk Corens and Maarten van Stiphout (Centre for Health Economics, Free University of Brussels); Bulgaria – Alexandrina Stoyanova (CRWE, University of Barcelona); Czech Republic – Martin Dlouhy (Czech Institute of Health Policy and Economics); Denmark – Karsten Vrangbaek (University of Copenhagen); Estonia – Triin Habicht (Health Economics Department, Estonian Health Insurance Fund) and Jarno Habicht (World Health Organization Country Office, Estonia); Finland – Jan Klavus (STAKES, Helsinki); France – Sandra Mounier-Jack (London School of Hygiene and Tropical Medicine); Germany – Stefanie Ettelt (London School of Hygiene and Tropical Medicine); Hungary – Roza Adany (School of Public Health, University of Debrecen); Ireland - Helen McAvoy (Institute of Public Health, Belfast); Italy - Margherita Giannoni-Mazzi (University of Perugia); Latvia - Daiga Behmane (University of Latvia); Lithuania - Skirmante Starkuviene (Dept of Social Medicine, Kaunas University of Medicine); Netherlands – Jeanine Suurmond (Dept. of Social Medicine, Academic Medical Centre, University of Amsterdam); Poland - Adam Kozierkiewicz (Health Information Systems Unit, Institute of Public Health of Jagiellonian University, Kraków); Romania - Victor Olsavszy (World Health Organization); Slovenia - Tit Albreht (Institute of Public Health of the Republic of Slovenia); Spain - Alexandrina Stoyanova (University of Barcelona); Sweden - Anna Melke (Göteborg University and the Vårdal Institute); Turkey - Omer Saka (Kings College London) and Nebibe Varol (London School of Economics and Political Science Health and Social Care); United Kingdom - Sara Allin, Cristina Masseria, Corinna Sorensen and Irene Papanicolas (London School of Economics and Political Science Health and Social Care).