## Out-of-Pocket Expenditures on Health: A Global Stocktake

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#### Abstract

We provide an overview of research on out-of-pocket health expenditures, reviewing the various summary measures and the results of multi-country studies using these measures. We present estimates for 146 countries from all World Bank income groups for all summary measures, along with correlations between the summary measures and macroeconomic and health system indicators. Large differences emerge across countries in per capita out-of-pocket expenditures in 2011 international dollars, driven in large part by differences in per capita income and the share of GDP spent on health. We find the two measures of dispersion or risk – the coefficient of variation and Q90/Q50 – are only weakly correlated across countries and not explained by our macroeconomic and health system indicators. Considerable variation emerges in the out-of-pocket health expenditure budget share which is highly correlated with the incidence of 'catastrophic' expenditures. Out-of-pocket expenditures tend to be regressive and catastrophic expenditures tend to be concentrated among the poor when expenditures are assessed relative to income, while expenditures tend to be progressive and catastrophic expenditures tend to be progressive and catastrophic expenditures tend to be specific expenditures are assessed relative to income, while expenditures tend to be progressive and catastrophic expenditures occurs among the rich when expenditures are assessed relative to consumption. At the extreme poverty line of \$1.90-a-day, most impoverishment due to out-of-pocket expenditures occurs among low-income countries.

**Keywords:** Out-of-pocket health expenditures; financial protection; health and poverty; sustainable development goals

**JEL codes:** I1, I3, J13

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## Introduction

Health care is different from other budget items in several key ways (cf. Arrow 1963). Its consumption is irregular and unpredictable. This reflects the fact that curative health care is valuable only in the event of illness, the timing and nature of which is substantially beyond the control of the individual, and the onset of which can carry an appreciable risk of physical impairment if not death. The consumption of health care can involve pain and discomfort; moreover, <u>at best</u> it allows the individual to restore her utility to its level prior to the illness. The consequent reduction in expenditure on other budget items – whether in the current period or in other periods – is therefore associated with a <u>reduction</u> in welfare rather than an increase, as is the case with other goods and services.

This is not to say that out-of-pocket expenditures are a fixture. People with the same health condition may end up spending different amounts for a variety of reasons: their insurance coverage may differ; some may also have other health conditions that may affect the treatment they need; people will vary in what they can afford to pay out-of-pocket so some may not get all the health care they need; and some may receive (and pay for) unnecessary care, unaware that it is medically unnecessary. This means that the amount someone pays out-of-pocket for health care is a poor proxy for the health improvement associated with it. But it does not negate the fact that the health event triggering the treatment was beyond the individual's control and at best the treatment returns the individual to their previous health and utility, rather than raising it above its initial levels.

There are two implications of these special characteristics of out-of-pocket health expenditures. First, in studies of inequality and poverty, out-of-pocket health expenditures by households should not be viewed as counting towards welfare. As Deaton and Zaidi (2002) put it, "By including health expenditures for someone who has fallen sick, we register an increase in welfare when, in fact, the opposite has occurred." (p32).<sup>1,2</sup> Second, since the amount people pay out-of-pocket for health care is not a fixture but can be influenced by public policy (e.g. through health insurance and provider-payment arrangements)<sup>3</sup>, policymakers are naturally interested in how much households spend out-of-pocket for health care – both in absolute terms and in relation to a household's overall budget. This interest is reflected in the fact that the sustainable development goals (SDGs) now include an indicator capturing out-of-pocket health expenditures relative to a family's means (indicator 3.8.2).

In this paper, we do four things. First, we summarize the measures used in previous studies of out-of-pocket health expenditures. These include expenditure in absolute (international dollar) terms, measures of dispersion (or risk), the out-of-pocket budget share, progressivity, the incidence of 'catastrophic' expenditures, inequality in the incidence of catastrophic expenditures, the incidence of 'impoverishing' out-of-pocket expenditures, and the addition to the poverty gap due to out-of-pocket expenditures. We highlight how and why some of these measures are sensitive to

the choice of consumption rather than income as the measure of a family's means. Second, we review the findings of multi-country and global studies of out-of-pocket health expenditures. These studies are relatively few and have typically used just one or two of the abovementioned measures. Third, in part to help guide future research but also to set the stage for our new empirical results presented below, we highlight the challenges faced by researchers in this area. These include identifying and accessing relevant household surveys, choosing between different adaptations of these surveys, computing out-of-pocket expenditures, and computing consumption and income. Finally, we present new estimates of out-of-pocket health expenditures for 146 countries. Our estimates cover more countries than previous global studies (133 countries), and in contrast to previous multi-country and global studies, where typically just one or two measures are used, we report estimates for all measures used in previous studies. We also explore the implications for 48 countries of choosing consumption rather than income as the measure of a family's means, and present multiple regression results showing the macroeconomic and health system (partial) correlates of the various measures.

## Previous studies of out-of-pocket health expenditures

A large literature exists on out-of-pocket health expenditures. This section summarizes this literature, beginning with an overview of the indicators used, and then moving on to the results of the literature to date, focusing on multi-country and global studies.<sup>4</sup>

#### Indicators and caveats

Table 1 lists the different indicators used in the studies to date. The first simply asks how much households spend per capita (in international dollars) on out-ofpocket health expenses. This number is sometimes reported in single-country studies (see e.g. Banthin et al. 2008), usually based on data from international databases like the OECD's Systems of Health Accounts (SHA) and the World Health Organization's (WHO) Global Health Expenditure Database (GHED). The second and third indicators are measures of dispersion. Gruber and Levy (2009), who first used them to analyze out-of-pocket health expenditures, interpret both as proxies for health care expenditure risk, but acknowledge they are only proxies and do not properly capture ex ante risk. None of the above-mentioned indicators relate out-of-pocket expenditures to a household's consumption or income. The fourth indicator – the out-of-pocket health expenditure budget share – does this. This does not tell us, however, whether the budget share varies with a household's income or consumption. The fifth measure – progressivity – gets at this by telling us whether the budget share is larger for poorer households (out-of-pocket expenditures are regressive) or smaller (out-of-pocket expenditures are progressive). Nor does the budget share measure tell us whether some households spend a particularly large fraction of their income or consumption on out-of-pocket health expenses. The sixth measure - the catastrophic expenditure indicator - does this. The seventh measure - the concentration index for catastrophic expenditures – gets at this issue of whether the likelihood of incurring catastrophic health expenditures differs between poorer and richer households. None of the abovementioned measures tell us whether households experienced <u>absolute</u> financial hardship as a result of incurring out-of-pocket health expenditures. The seventh and final measure – the impoverishment indicator – gets at this by telling us whether the out-of-pocket expenditure makes the difference between a household being above the poverty line and below it. There are two impoverishment indicators: the impoverishment headcount (the addition to the poverty headcount due to out-of-pocket expenditures pushing households below the poverty line) and the addition to the per capita poverty gap due to out-of-pocket health expenditures.

The above measures make sense if the household has a fixed income in each period and cannot borrow or save. In this case, the household relies on its current-period income to finance its out-of-pocket expenditures, and its nonmedical consumption falls by the full amount of the out-of-pocket expenditures. But if the household <u>does</u> have savings to draw on, or it can borrow, its consumption will fall by less than the amount of the out-of-pocket expenditures, and its gross consumption (the sum of its medical and nonmedical expenditures) will overstate what its consumption would have been in the absence of the health event (its 'counterfactual' or 'normal' consumption) (Wagstaff 2019). If we fail to take this into account, we will overestimate the incidence of catastrophic and impoverishing expenditures (Flores et al. 2008). We will also overestimate progressivity and the extent to which catastrophic expenditures are higher among the better off, because households experiencing a health event are further up the 'gross' consumption distribution than they are up the 'normal' consumption distribution.

Income may also be affected by a health event, so its reported income may be different from its counterfactual or normal value. The income of the person experiencing the health event may fall, as may the income of other household members, e.g. a caregiver. Such households will appear further down the 'reported' income distribution than the 'counterfactual' or 'normal' income distribution. So, if we rank households by reported income rather than by normal income, we will find out-of-pocket expenditures less concentrated among the better off, and therefore less progressive (and possibly even regressive). We will also find catastrophic expenditures less concentrated among the 'better off'; indeed, quite possibly, we will find them higher among the 'poor'.

Unfortunately, only a very few surveys include the necessary information on saving and borrowing for health purposes that allow one to make adjustments for financing out-of-pocket expenditures through dissaving and borrowing. Rarely do surveys ask respondents in a household that has experienced or is experiencing sickness how their current income compares to their prior or normal income. So, the observations above really serve to remind us that our estimates likely deviate from those we would obtain if we had the necessary data to relate out-of-pocket expenditures to 'normal' consumption and 'normal' income.

#### Previous studies

Table 2 reports results of previous multi-country and global studies. There have been no regional or global studies to date on the dispersion of out-of-pocket expenditures or on the out-of-pocket budget share, and there have been no global studies to date on per capita expenditures in dollar terms, progressivity or inequality in catastrophic expenditures. Moreover, the scope of the regional studies on per capita expenditures, progressivity and inequality in catastrophic expenditures has been limited to the OECD countries in the case of the first two measures and Asia in the case of the third. There <u>have</u> been global studies on catastrophic and impoverishing out-of-pocket expenditures, including two recent large-scale studies. The work reported in this paper on these measures extends these previous studies in a number of ways (for example, we include more recent datapoints, we use the new updated international poverty lines, and we compare results using income and consumption) but we limit our analysis to the most recent datapoint for each country and unlike the two recent studies do not report trends.

# Challenges in studies of out-of-pocket health expenditures

Researchers analyzing out-of-pocket health expenditures face several challenges. In this section we review the key ones, in part to help guide future research but also to set the stage for the empirical results presented below.

#### **Surveys**

Computing the measures in Table 1 requires microdata from nationallyrepresentative household surveys that contain data on out-of-pocket health expenditures as well as total household consumption or income. An invaluable resource for identifying and exploring access to potentially suitable surveys is a microdata catalog, such as those maintained by the International Household Survey Network and the World Bank.

These catalogs include 'standalone' surveys as well as survey 'collections' – see Figure 1. The former include country-specific household surveys such as a Household Budget Survey (HBS) or an Household Income and Expenditure Survey (HIES) (their scope is typically rather similar). Some countries also have a dedicated survey capturing health expenditures and other health-related concerns: the US, for example, has a Medical Expenditure Panel Survey. Access to the microdata from these standalone surveys tends to vary. Some countries provide authorized users with access to the microdata, though in many cases the publicrelease microdata are modified to ensure respondent anonymity. Countries also vary in their policies on who may access the microdata and how: OECD countries like Ireland, the UK and the US have very liberal policies, as do several middleincome countries, like Peru and South Africa, allowing any bon-fide researcher to download the public-release microdata. By contrast, many OECD countries have much tighter access policies, authorizing only nationals of the country access to the data, and even then sometimes requiring the user access the data on-site.

The other surveys in Figure 1 belong to multi-country survey collections. These are of two types. The first are genuine multi-country surveys – surveys where there is a fairly standardized questionnaire used in several countries. The World Bank's Living Standards Measurement Study (LSMS) is an example. The WHO's World Health Survey (WHS) is another. The former is a multipurpose survey with rich information on household consumption and expenditure across a range of areas, including health, while the latter is a health survey with extensive information on out-of-pocket health expenditures but only very limited information on other expenditures. Access rules to these multi-country datasets vary, sometimes (e.g. the LSMS) varying even across surveys within a collection depending on permissions granted by the relevant government.

The second type of multi-country survey collection consists of country-specific surveys where the questionnaires differ across countries but the data have been harmonized ex post. Eurostat, for example, every five years takes the raw data from the HBS surveys of the EU member states and produces a harmonized dataset for each country with the same constructed harmonized expenditure variables, including out-of-pocket health expenditures. The Luxembourg Income Study (LIS) also produces harmonized datasets based on HBS and HIES surveys for a wide range of countries; some of these have harmonized data on out-of-pocket health expenditures. In both cases, authorized users are able to access only the dataset comprising the harmonized variables, not the original data. The LIS has a more liberal access policy than Eurostat, but access involves submitting code to LIS by email and then having the results emailed back, while Eurostat provides an encrypted CD containing the harmonized microdata to approved users.

Several groups within the World Bank also construct harmonized datasets. In the regional World Bank units, the focus is on overall household consumption, the aim being to assist the Bank's poverty-monitoring work; in this work, the methods used to construct consumption aggregates in the LSMS (Deaton and Zaidi 2002) typically guide the process. Other groups in the World Bank have goals other than facilitating poverty-monitoring. One harmonization exercise (the Standardized Household Expenditure Survey (SHES) is directed at assisting the process of constructing purchasing power parities (PPPs), and the process of constructing expenditure totals and subtotals is guided by the UN's Classification of Individual Consumption According to Purpose (COICOP) classification system. In both exercises, the various components of consumption – including out-of-pocket health expenditures – are also distributed along with the consumption aggregate. Often,

the original microdata (or parts of the microdata) are also made available to authorized users (typically World Bank staff), which allows for validation, where possible, of different methods to estimate out-of-pocket health expenditures, which can then be related to a standardized consumption aggregate.

Some country-specific surveys can appear in multiple (harmonized) multi-country collections. France's HBS, for example, has been harmonized by both Eurostat and the LIS. Peru's ENAHO survey has been harmonized by both the LIS and the World Bank's SHES exercise. Romania's HBS has been harmonized by Eurostat and the World Bank's Europe and Central Asia harmonized collection (ECAPOV). These multiple adaptations provide additional opportunities for data-validation but also highlight the potential for obtaining different results depending on which adapation one uses.

The studies to date summarized in Table 2 have mostly used standalone surveys. The exceptions are the studies by Wagstaff et al. (2018b; 2018c) – they use standalone surveys <u>and</u> surveys from several collections. Often, the authors sifted through alternative estimates (e.g. of catastrophic expenditures) for a particular country and year, using external checks to choose between them.

#### Measuring out-of-pocket spending

Household surveys vary in how (and indeed whether) they inquire about out-ofpocket health expenditures. This poses challenges for comparisons across countries, and indeed over time within the same country.

First, not all surveys are clear whether the spending reported is gross or net of any reimbursement by a health insurer, and even when it is clear, the amount reimbursed may not be known at the time of the survey, making it impossible to correct for overreporting. Second, surveys likely vary in their comprehensiveness. This is likely linked to the fact that surveys vary in the number of items they inquire about. Exploiting the fact that the WHS asked about out-of-pocket expenditure in two ways, Lu et al. (2009) find that use of the single-item question leads to a smaller estimate of out-of-pocket expenditure than the survey's multiitem question. Third, surveys vary in their recall periods, sometimes using recall periods for infrequent items -e.g. inpatient care - that are likely to be inappropriately short (e.g. 3 months) and recall periods for frequent items -e.g.medicines – that are likely to be inappropriately long (e.g. 12 months). Exploiting the two recall periods for inpatient care in the WHS, Lu et al. (2009) find that the 4week recall period leads to a larger (annualized) estimate of out-of-pocket spending than the 12-month recall period. Fourth, surveys vary in how in the survey they collect the out-of-pocket expenditure data. Sometimes, the data are collected in the expenditure section, and the respondent is asked to provide information on the household's total out-of-pocket expenditures for a specific item, e.g. inpatient care. In other cases, the data are collected in the health section, and the respondent is

asked to go through <u>each household member in turn</u> and report the household member's expenditures for the specific item. In some surveys, out-of-pocket expenditures are collected in both sections. The choice of which approach to use may well affect the reliability of results.<sup>5</sup> Fifth, different adaptations of a survey may have different values of the out-of-pocket expenditure variable or variables. For example, the out-of-pocket health expenditure variables in the US public-release Consumer Expenditure Survey data are top-coded.

### Measuring consumption and income

A consumption aggregate should capture consumption across a broad range of categories and should also capture the use value of durables (Deaton and Zaidi 2002). Housing should also be included, measured by the value of the flow of services that the household receives from occupying its dwelling (Balcazar et al. 2014). An income aggregate should capture both wage and nonwage income, wage income including earnings from dependent activities, and nonwage income capturing all other income including household crop and livestock production, self-employment earnings and transfer income (Carletto et al. 2007). While in the past, it was unusual to find income aggregates for developing-country household surveys, this is changing (Davis et al. 2017). It remains the case, however, that consumption provides a broader measure of a household's living standards than income. Constructing consumption and income aggregates is a lengthy process especially if they are to be constructed in a way that is similar across datasets. Using preconstructed aggregates is therefore very attractive, whether via ex post harmonized surveys or via other surveys where aggregates have been constructed.

#### Additional data needs

Additional data elements include the thresholds – the catastrophic expenditure threshold, and the poverty line. Typical thresholds for consumption and income are 5%, 10%, 15%, 20% and 25%; the SDG (3.8.2) is 10%. Sometimes out-of-pocket expenditure is related to consumption net of a deduction for food costs, but this practice is ill-advised, as it makes it hard to interpret the resultant incidence rates (Wagstaff 2019). Obvious poverty lines in multi-country studies are the family of international poverty lines (Jolliffe and Prydz 2016; Ferreira and Sanchez 2017). These require consumption or income be converted to 2011 prices using the country's consumer price index (CPI) and then to 2011 international (PPP) dollars using the 2011 PPPs from the International Comparison Program. Data on both are available from the World Bank and IMF databases.

#### Computation

The computation of the first two measures – expenditure in absolute terms and dispersion – is straightforward, the only complication being that Q90/Q50 is undefined if median out-of-pocket expenditures is zero, which is quite possible. The

computation of the budget share is also straightforward, the only complication being what to do if the denominator is negative, which is possible if it is household income. Progressivity is easily computed as the difference between the Gini coefficient (for income or consumption) and the concentration index for out-of-pocket expenditures, both of which can be computed straightforwardly in Stata using any user-developed section that computes inequality measures such as CONINDEX (O'Donnell et al. 2015). The incidence of and inequality in catastrophic expenditures can both be computed using the Stata section FPRO (Eozenou and Wagstaff 2018), as can the headcount- and poverty gap-based measures of impoverishment. Further guidance on the computation issues is provided in O'Donnell et al. (2008).

# New global estimates of out-of-pocket health expenditures – data

In the rest of the paper we present new global estimates of out-of-pocket health expenditures for each of the measures listed in Table 1. We present in this section details of the data we use.

Our data are drawn from the soon-to-be-released 2019 version the World Bank's Health Equity and Financial Protection Indicators (HEFPI) database (Wagstaff et al. 2018a; Wagstaff et al. 2019). In generating the database, we identified potentially suitable surveys by searching the above-mentioned microdata catalogs and multi-country survey collections. In some cases, the surveys were not accessible to us. In others, the data were accessible but the survey turned out to lack key information. Sometimes the surveys we analyzed were different adaptations of the same survey – for example, as mentioned above, Romania's HBS has been harmonized by Eurostat and the World Bank's ECAPOV exercise. We identified 1,948 potentially suitable surveys or adaptations thereof from 182 countries. We analyzed and obtained out-of-pocket expenditure estimates for 1,000 of these surveys, covering 154 countries.

Our out-of-pocket expenditure estimates vary in how they are computed. In some cases, the survey asks only in the consumption or expenditure section about out-of-pocket spending. In other cases, the expenditure questions are in the health section. In some cases, some items are asked about in one section, e.g. the expenditure section, and other items are asked about in the other, e.g. the health section. We have used as much information as possible, and where the recall period is less than 12 months, we have annualized by multiplying the amount recorded by 12 in the case of a one-month recall, by two in the case of a six-month recall, and so on. Some surveys asked about all items of health expenditures in both the expenditure and health section. In these cases, we used whichever section had the longer recall period – usually the expenditure section.

We mostly relate out-of-pocket health expenditures either to total household consumption (in low- and middle-income countries) or to income (in high-income

countries). Increasingly, surveys try to collect data on both, but it is still the case that income is typically not available for low- and middle-income countries. Where we can, we show how the results change as we move from consumption to income.

In the catastrophic expenditure analysis, we use thresholds of 10% and 25%. In the impoverishment analysis, we use the \$1.90-a-day, \$3.20-a-day and \$5.50-a-day international poverty lines (IPLs) (Jolliffe and Prydz 2016; Ferreira and Sanchez 2017), as well as a \$10.00-a-day line which may be better thought of as a global low-income line rather than a poverty line per se (Kochhar 2015). In converting our health expenditure data to international dollars, and in deriving the IPLs, we convert values in different years to 2011 values using local CPIs and LCUs to international dollars using 2011 PPPs.

We checked the numbers underlying our estimates against published numbers. We checked our estimated consumption-per-capita estimates against the numbers in the World Bank's PovcalNet when available and those in the World Development Indicators (WDI) when not; large discrepancies were flagged.<sup>6</sup> We checked our household health budget share against numbers from the WDI which are based on data from the WHO GHED; again, large discrepancies were flagged.<sup>7</sup> Last, we checked our \$1.90-a-day poverty headcount estimates against the numbers in PovcalNet, flagging large discrepancies.<sup>8</sup> Estimates of catastrophic and impoverishing expenditure incidence were not automatically rejected when flags were raised, but our tendency was to prefer estimates where flags were not raised, and we typically only retained datapoints where the flag was only just up. This quality control process led to many datapoints being dropped, and some entire survey families.<sup>9</sup>

In our database, many countries have series from multiple surveys or at least multiple adaptions of a survey. For any given year for any given country, we retained at most only one estimate of each measure, using the same survey for each measure. We preferred consistent data series, preferring the same survey and the same adaptation of it. In some cases, we had no choice but to switch survey, e.g. because a survey was discontinued or because we had limited access to the surveys. After excluding datapoints on quality grounds, and after selecting among the remaining datapoints, we retained 612 of the 1,000 surveys, covering 146 of the 154 countries. The estimates presented below are for the latest year for which we have data; country-level trends will be analyzed in a future paper.

# New global estimates of out-of-pocket health expenditures – results

In this section we present our new global estimates of out-of-pocket health spending using the measures in Table 1. We use maps to show the international variation in our measures and, for selected measures, tables showing the means by region and World Bank income group. In addition, to shed light on the sources of international variation in our measures, we present the results of multiple regressions that show the correlations between each of our measures and selected macroeconomic and health system variables.<sup>10</sup> We discuss the charts and regressions results below, going through the measures in Table 1 in turn.

#### Expenditure in absolute terms

The top left map in Figure 2 shows per capita out-of-pocket health expenditures in 2011 international dollars for the latest year for which we have survey data. These numbers, it should be reiterated, are based entirely on our estimates from household surveys. They contrast with estimates presented in international health accounts databases, which are sometimes interpolations between datapoints, and sometimes estimated from non-survey sources such as user fees revenues reported by providers; the latter are not always reliable with providers often reporting less than households say in surveys they spent (see e.g. Lieberman and Wagstaff 2009).

The map reveals large differences across countries. Tables 3 and 4 suggest the differences are driven in large part by international differences in per capita income. High-income countries tend to spend more out-of-pocket than poorer ones. Table 3 also reveals differences across regions even within income groups. Among the high-income countries, per capita out-of-pocket expenditures range from Sweden's \$32 to Switzerland's \$1200. Among the low-income countries, expenditures range from Madagascar's \$6 to over \$100 in Cambodia, Haiti and Nepal. The regression results in Table 4 suggest larger per capita out-of-pocket expenditures are also positively correlated with the share of GDP spent on health, and negatively correlated with the share of THE channeled through government financing 'schemes' (like the UK's National Health Service) and nonprofit schemes.

#### Dispersion (risk)

Figure 2 also shows the two measures of dispersion. In countries where median per capita out-of-pocket expenditures is zero (e.g. Botswana), Q90/Q50 is undefined, so the set of countries differ across the two maps. The patterns of shading also differ, reflecting the low (albeit significant) correlation between the two dispersion measures (r=0.154, p=0.09). Interestingly, dispersion in out-of-pocket expenditures is sometimes high in some countries where the amount in dollar terms is low, such as Sri Lanka and the UK. The regressions in the case of these two indicators shed very little light on the sources of cross-country differences – the R<sup>2</sup>s for the regressions are just 0.008 and 0.087 respectively. The only significant correlate is the Gini index of income inequality which is positively correlated with the Q90/Q50 ratio. Table 5 confirms the lack of any clear pattern by income group, and while there is a hint that countries in Latin America and the Caribbean have higher risk of out-of-pocket expenditures, this region's rank varies across income groups.

#### The out-of-pocket expenditure budget share

The first map in Figure 3 shows the considerable international variation in the outof-pocket health expenditure budget share. Table 6 shows the means by region and income group. The budget share measure has the advantage over the abovementioned measures of relating a household's out-of-pocket expenditure to its overall consumption or income. The high-income countries – including the US – tend to have lower out-of-pocket budget shares, though there are exceptions, including Chile, Greece, Korea and Portugal. There are countries in all the remaining groups with shares more than 7%, notably Brazil, Egypt, Nepal and Nicaragua. The regressions suggest the out-of-pocket budget share is higher in countries that spend a large share of their GDP on health, and lower in countries that channel more of their total health spending through social health insurance schemes, government 'schemes', and nonprofit schemes; the relationship is stronger (p<0.05) for government schemes than social health insurance schemes. By contrast, channeling health expenditures through private insurance (whether a compulsory or a voluntary scheme) does <u>not</u> reduce the out-of-pocket budget share.

#### Progressivity

The second map in Figure 4 shows the progressivity of out-of-pocket health expenditures with respect to consumption in the case of the low- and middle-income countries and income in the case of the high-income countries. The two bottom maps show progressivity for both consumption and income where we can compute both. As anticipated above, out-of-pocket expenditures are less progressive when assessed relative to income rather than consumption: the median values of the Kakwani progressivity index among the 48 countries where we can compute it using both income and consumption are -0.11 (regressive) and 0.06 (progressive) for income and consumption respectively. This difference is statistically significant (p=0.00). We see out-of-pocket expenditures mostly emerging as regressive when assessed relative to income – especially so in Bangladesh, Bolivia, Haiti and India in the lowand middle-income countries, and in Australia, France and Korea in the highincome countries. The regressions in Table 4 suggest that progressivity of out-ofpocket expenditures is lower in richer countries and countries spending a large share of their GDP on health, and in countries channeling higher shares of their total health expenditures through social health insurance schemes, government 'schemes' or compulsory health insurance schemes, but this is potentially misleading because in some countries progressivity is assessed relative to income while in others it is assessed relative to consumption.

#### Catastrophic expenditures

The top left map in Figure 4 shows the incidence of catastrophic expenditures at the 10% level – relative to consumption in the low- and middle-income countries, and income in the high-income countries. The shading of the budget share and

catastrophic expenditure maps are quite similar and would have been even more so if the cutoffs had been set to divide countries into five equal-size groups. This reflects the high correlations between the budget share and the catastrophic expenditure measures: the correlation between the budget share and the 10% catastrophic expenditure measure is 0.97 (p=0.00), while the correlation between the budget share and the 25% catastrophic expenditure measure is 0.81 (p=0.00). Thus, countries with high budget shares tend to have a high incidence of catastrophic out-of-pocket health expenditures. There are 26 countries where catastrophic expenditures exceed 15%, including five low-income countries (Afghanistan, Cambodia, Nepal, Tajikistan and Uganda) and five high-income countries (Barbados, Chile, Greece, Malta and Portugal). The regression results, like the maps, are similar to those for the budget share. Thus, as with the budget share, catastrophic expenditures are lower in countries that channel more of their total health spending through social health insurance schemes, government 'schemes' and nonprofit schemes. Table 7 points to some regional variation, with higher catastrophic expenditure incidence in South Asia, especially in India and Nepal. Finally, for 48 countries, we can compute catastrophic expenditure incidence using either consumption or income in the denominator. At the 10% threshold, the median consumption-based rate is 10.62 while the median income-based rate 10.65; the difference is not statistically significant (p=0.97). As far as the catastrophic expenditure incidence rate is concerned, then, the choice of consumption vs. income in the denominator seems to make little difference.

#### Inequality in incidence of catastrophic expenditures

The top right map in Figure 4 shows the inequality of catastrophic expenditures across the consumption distribution in the case of low and middle-income countries and across the income distribution in the case of high-income countries. As with progressivity, the bottom two maps show the effect of switching between consumption and income in countries where we can compute the concentration index both ways. Unsurprisingly, given the comments above, we find the incidence of catastrophic expenditures tends to be higher among the poor when the poor are defined in terms of income, and <u>lower</u> among the poor when the poor are defined in terms of consumption: the median values of the concentration index among the 48 countries where we can compute it using both income and consumption are -0.12and 0.10 for income and consumption respectively. This difference is statistically significant (p=0.00). Thus, while the choice between income and consumption seems to matters very little as far as the incidence of catastrophic expenditures is concerned, it seems to matter a great deal as far as inequality in catastrophic expenditures is concerned. When assessed relative to income, catastrophic expenditures emerge as highly concentrated among the poor in Bangladesh, Bolivia, Guatemala, India and the Seychelles; in all five countries, except the Seychelles, catastrophic expenditures emerge as concentrated among the better off when assessed relative to consumption. The regressions in Table 4 are relatively uninformative, suggesting that inequality in the incidence of catastrophic

expenditures is lower in countries channeling higher shares of their total health expenditures through a social health insurance scheme. Again, these results are somewhat misleading given we have used consumption in some countries and income in others.

#### Impoverishment

The maps in Figure 5 show the percentage of the population impoverished by out-ofpocket expenses for the three international poverty lines and the \$10.00-a-day lowincome line. Table 8 shows the means by income group and region for the \$1.90-aday line. Unsurprisingly, given the higher fraction of households living in the vicinity of the extreme poverty line in low-income countries, it is in this group of countries that we see the highest rate of impoverishment due to out-of-pocket expenditures. The rate of impoverishment at the extreme poverty line is especially high in South Asia, with Afghanistan and India having the highest rates (4.5 and 4.2 percentage points respectively). At the \$3.20-a-day line, low-income countries still have the highest rate of impoverishment, with South Asia again having the highest rate. As we move up to the \$5.50-a-day poverty line, it is the lower middleincome countries that have the highest impoverishment rate, and at the \$10.00-aday line, it is the upper middle-income countries that have the highest rate. The regression results in Table 4 suggest that impoverishment (at the extreme poverty line) is lower in richer countries and countries spending larger shares of their GDP on health, and in countries channeling larger shares of their total health spending through social health insurance schemes, government schemes or nonprofit schemes.

The maps in Figure 6 show the addition to the per capita poverty gap from out-ofpocket health expenses, again for the same four poverty lines. As the poverty line is raised, the addition to the poverty gap inevitably increases; the cutoffs are therefore held constant across the four maps and are chosen to divide countries at the \$10.00a-day poverty line into five equal-sized groups. At \$10.00-a-day line, the countries with the largest additions to the poverty gap are Cambodia, Egypt, Moldova, Nepal and Nicaragua. The countries with the smallest additions are the Czech Republic, Germany, Luxembourg, Timor-Leste and the United Kingdom. Other low-income countries in the bottom fifth – apart from Timor-Leste – include Lesotho, Madagascar, Mozambique, Rwanda and Zimbabwe. Chile is the high-income country with the highest addition to the poverty gap at the \$10.00-a-day poverty line. Other OECD countries with relatively high additions to the poverty gap include Israel, Korea, Poland, Switzerland and the United States. Table 9 shows the medians by income group and region for the \$1.90-a-day line: only in the low-income group do we see any appreciable contribution to the poverty gap. The regression results in Table 4 suggest that the addition to the poverty gap due to out-of-pocket expenditures (at the extreme poverty line) is lower in richer countries and in countries channeling larger shares of their total health spending through nonprofit schemes.

## Conclusions

We have tried to give a sense of the state of research on out-of-pocket health expenditures prior to the present paper, assembling and explaining the various summary measures used in national and international studies, and reviewing the results of multi-country and global studies that have used these measures. These studies have almost all used just one or two measures, and some measures have not been used at all in any multi-country study prior to the present paper. In our empirical analysis, we presented results for 146 countries from all World Bank income groups for all summary measures. We also presented correlations between the summary measures and macroeconomic and health system indicators.

Our results reveal large differences across countries in per capita out-of-pocket health expenditures in 2011 international dollars. These are driven in large part by differences in per capita income, with high-income countries tending to spend more out-of-pocket than poorer ones. But we find out-of-pocket expenditures varying sharply within income groups, ranging from \$32 in Sweden to \$1200 in Switzerland in the high-income group, and from \$6 in Madagascar to over \$100 in Cambodia, Haiti and Nepal in the low-income group. Out-of-pocket expenditures are also positively correlated with the share of GDP spent on health.

We find the two measures of dispersion or risk – the coefficient of variation and Q90/Q50 – are only weakly correlated across countries. Dispersion in out-of-pocket expenditures is sometimes high in countries where the amount in dollar terms is low, such as Sri Lanka and the UK, and we find only one macroeconomic and health system variable correlated with the dispersion measures (the Gini index of income inequality, which is positively correlated with the Q90/Q50 ratio). Nor do we find any clear pattern by income group.

We find considerable international variation in the out-of-pocket health expenditure budget share, with clearer correlations with macroeconomic and health system variables. The high-income countries tend to have lower out-of-pocket budget shares, though there are exceptions. In the low- and middle-income groups, we find countries with budget shares more than 7%, including Brazil and Egypt. The out-ofpocket budget share is higher in countries that spend a large share of their GDP on health, and lower in countries that channel more of their total health spending through social health insurance schemes, government 'schemes' like the NHS, and nonprofit schemes.

As anticipated, we find out-of-pocket expenditures are less progressive when assessed relative to income rather than consumption: in fact, we find out-of-pocket expenditures are regressive when assessed relative to income and progressive when assessed relative to consumption. In the low- and middle-income countries, we find out-of-pocket expenditures to be especially regressive (when assessed relative to income) in Bangladesh, Haiti and India. The incidence of catastrophic expenditures (at the 10% level) is highly correlated with the out-of-pocket budget share (r=0.94, p=0.00), and the correlations with the macroeconomic and health system variables are, unsurprisingly, also similar across the two out-of-pocket expenditure measures. We find 26 countries where catastrophic expenditures exceed 15%, including five low-income countries (Afghanistan, Cambodia, Nepal, Tajikistan and Uganda) and five high-income countries (Barbados, Chile, Greece, Malta and Portugal). We find some regional variation, with a higher catastrophic expenditure incidence in South Asia, especially in India and Nepal. We find little difference between the consumptionand income-based estimates of catastrophic expenditure incidence.

By contrast, we do find that the degree of inequality in catastrophic expenditures depends on whether expenditures are related to consumption or income: the incidence of catastrophic expenditures tends to be higher among the poor when the poor are defined in terms of income, and <u>lower</u> among the poor when the poor are defined in terms of consumption. When assessed relative to income, catastrophic expenditures emerge as highly concentrated among the poor in Bangladesh, Bolivia, Guatemala, India and the Seychelles; in all five countries, except the Seychelles, catastrophic expenditures emerge as concentrated among the better off when assessed relative to consumption.

Unsurprisingly, given the higher fraction of households living in the vicinity of the extreme poverty line (\$1.90-a-day) in low-income countries, it is in this group of countries that we see the highest rate of impoverishment due to out-of-pocket expenditures. The rate of impoverishment at the extreme poverty line is especially high in South Asia, with Afghanistan and India having the highest rates. At the \$3.20-a-day line, low-income countries still have the highest rate of impoverishment, with South Asia again having the highest rate. As we move up to the \$5.50-a-day poverty line, it is the lower middle-income countries that have the highest impoverishment rate, and at the \$10.00-a-day line, it is the upper middle-income countries that have the highest rate.

Inevitably, we find that as the poverty line is raised, the addition to the poverty gap due to out-of-pocket expenditures inevitably increases. At \$10.00-a-day line, the countries with the largest additions to the poverty gap include Cambodia and Egypt, while the countries with the smallest additions include Germany, Timor-Leste and the UK. Chile is the high-income country with the highest addition to the poverty gap at the \$10.00-a-day poverty line. Only in the low-income group do we see any appreciable contribution to the poverty gap at the \$1.90-a-day poverty line.

Table 1.	Concepts and	indicators i	used in st	udies of	out-of-	pocket h	nealth exp	penditures
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Concept	Indicator	Interpretation	Study introducing the indicator	Comments
Expenditure in absolute terms	Per capita annual out-of-pocket expenditures in monetary terms	Absolute amount of expenditure per capita, adjusted for inflation and in international studies converted to a common currency	Multiple studies in the United States report trends in per capita out-of-pocket expenditures in dollar terms (see e.g. Banthin et al. 2008).	
Dispersion (risk)	Coefficient of variation (CV)		Gruber and Levy (2009)	Gruber and Levy actually use the variance, but this is not invariant with respect to the mean, quadrupling when everyone's out- of-pocket expenditures double (cf. e.g. Cowell 2011)
	Q90/Q50	Ratio of the expenditures incurred by households at the 90 <sup>th</sup> and 50 <sup>th</sup> percentiles of the out-of-pocket expenditure distribution	Gruber and Levy (2009)	Q90/Q50 is undefined if Q50=0
Budget share	Budget share	Share of income or consumption spent on out-of-pocket health expenses		
Progressivity	Kakwani's (1977) index of progressivity equal to the concentration index for out-of- pocket expenditures minus the Gini coefficient for income or consumption. <sup>11</sup>	A negative value of Kakwani's index indicates out-of-pocket expenditures are regressive, or equivalently that the budget share declines with income or consumption	Wagstaff et al. (1992)	Wagstaff et al. also compute progressivity indices for other financing sources, e.g. taxes, social health insurance contributions, etc. They also use Suits' (1977) progressivity index.
Catastrophic expenditures	CATA	Fraction of households whose out- of-pocket health expenditures exceed some prespecified threshold (e.g. 10% or 25%) of their total income of consumption	Berki (1986) and Wyszewianski (1986)	CATA (10%) is SDG indicator 3.8.2. Wagstaff and van Doorslaer (2003) add a variation that captures the 'overshoot' of expenditures above the threshold, not just whether the threshold is exceeded
Inequality in incidence of catastrophic expenditures	Concentration index (CI) of catastrophic expenditures – CI(CATA)	A negative value indicates catastrophic expenditures are more common among those at the bottom of the income or consumption distribution	Wagstaff and van Doorslaer (2003)	
Impoverishment	The increase in the poverty headcount and mean poverty gap when out-of-pocket expenditures are subtracted from income or consumption – IMPOV	Out-of-pocket expenditures are said to be 'impoverishing' if they are sufficiently large to leave a household below the poverty line based on consumption or income <u>net</u> of out-of-pocket expenditures but above the poverty based on consumption or income <u>gross</u> of out-of-pocket expenditures	Wagstaff and van Doorslaer (2003)	



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Concept	Multi-country studies	Global studies
Expenditure in absolute	Squires (2011) compares 12 OECD countries in terms of inter alia per	None
terms	capita out-of-pocket expenditure in \$US, using data from the OECD's	
	Health Data database. He finds that Switzerland and the US have	
	the largest per capita out-of-pocket expenditures on health, and	
$\mathbf{D}^{\prime}$ $(\cdot, \mathbf{l})$	France and the UK the smallest.	N
Dispersion (risk)	None	None
Budget share	None We act off at al. (1008: 1000) account the ana manificity of and of a solution	None
Progressivity	wagstaff et al. (1992; 1999) report the progressivity of out-of-pocket	None
	expenditures (and other financing sources) in 10 and 12 OECD	
	expenditures emerge as regressive for all countries and years excent	
	in Spain in 1980, and the trend is towards greater regressiveness	
Catastrophic	Van Doorslaer et al. (2007) look at catastrophic spending in 10 Asian	Xu et al. (2003: 2007) analyze catastrophic expenditures in 89
expenditures	territories. They find relatively low rates in Malaysia. Sri Lanka and	countries defining catastrophic as out-of-nocket expenditures
expenditures	Thailand, and relatively high rates in China, Vietnam and	exceeding 40% of consumption less a deduction for food costs. They
	Bangladesh.	reported mean and median rates of catastrophic spending so defined
		of 2.3% and 1.5% respectively.
		Wagstaff et al. (2018b) report results for 133 countries across the
		world, many for multiple years. They estimate the mean and median
		catastrophic out-of-pocket payment rates at the 10% threshold to be
		9.2% and 7.1%. They report a positive population-weighted median
		annual rate of change of catastrophic payment incidence whatever
		catastrophic payment incidence measure is used.
Inequality in incidence of	Van Doorslaer et al. (2007) look at the distribution by gross	None
catastrophic expenditures	consumption of those experiencing catastrophic payments in 10 Asian	
	territories. For the most part, they find that catastrophic spending is	
	anonding is concentrated among the peer whatever the threshold	
Importanishmont	Van Deereleer et al. (2006) use dete from 11 Asian segonomies to	Yu at al. (2007) analyze imperentiating out of neaket expenditures in
Impoverisiment	'gross' and 'net' poverty beadcounts and poverty gaps using the World	89 countries defining a household as noor if its consumption fell short
	Bank's dollar-a-day noverty line (as well as its \$2-a-day noverty line)	of an allowance for food costs $1^2$ They estimated that globally 1.7% of
	They find that the dollar-a-day poverty headcount is on average	the population fell into poverty so defined because of out-of-pocket
	almost three percentage points higher after deducting out-of-pocket	health spending, with 90% of those people living in low-income
	spending from household consumption. In Bangladesh and India, the	countries.
	difference is almost four percentage points. In Malaysia and Sri	
	Lanka, by contrast, the difference is just 0.1 and 0.3 percentage	Wagstaff et al. (2018c) report rates of impoverishment in 122
	points respectively.	countries (many for several years) using the \$1.90-a-day and \$3.10-a-
		day poverty lines as well as a relative poverty line equal to 50% of
	Alam et al. (2005) compare 'gross' and 'net' poverty headcounts in 10	median consumption. They find population-weighted median rates of
	countries in Eastern Europe and the Former Soviet Union using a	impover ishment of 1.86% at the \$1.90-a-day line, 2.44% at the \$3.10- $$
	\$2.15-a day poverty line at 2000 prices and purchasing power	a day line, and 1.83% at the relative poverty line. Across countries,
	parities. On average, out-of-pocket payments raise the poverty	the population-weighted median annual rate of change of
		impoverishment is negative at the \$1.90-a-day line but positive at the

## Table 2. Previous studies of out-of-pocket health expenditures

headcount by two percentage points, with Armenia (3.4), Georgia (3.6)	\$3.10-a-day and relative poverty lines. They estimate the population-
and Tajikistan (3.3) recording the highest percentage point increases.	weighted median of the poverty gap increase attributable to out-of-
	pocket health expenditures to be US¢1.22 per capita at the \$1.90-a-
	day line and US¢3.74 per capita at the \$3.10-a-day line.

	Low- income	Lower middle- income	Upper middle- income	High income	Total
	02		104	502	100
East Asia & Pacific	92	55	124	592	102
Europe & Central Asia	55	174	211	341	228
Latin America & Caribbean	84	46	225	384	167
Middle East & North Africa		130	236	605	135
North America				539	539
South Asia	93	76			76
Sub-Saharan Africa	26	49	70		39
Total	32	68	171	435	122

<u>Table 3: Median per capita out-of-pocket expenditures on health, 2011 international</u> <u>dollars, latest year</u>

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	OOP per cap PPP \$	CV	Q90/Q50	Budget Share	CATA10	Kakwani	CI CATA10	IMPOV190	IMPOV PG 190
Per capita GDP 2011 int. \$	11.042***	-111.962	0.162	0.016	0.052	-0.003*	-0.003	-0.060***	-0.001***
	(0.000)	(0.327)	(0.536)	(0.388)	(0.445)	(0.081)	(0.161)	(0.000)	(0.000)
Gini index of income inequality	0.022	2.043	$0.530^{*}$	0.010	0.074	-0.001	-0.000	0.004	-0.000
	(0.967)	(0.844)	(0.075)	(0.382)	(0.108)	(0.554)	(0.996)	(0.496)	(0.874)
Total Health Exp. (THE) as % GDP	9.061**	91.114	-0.217	$0.146^{**}$	$0.562^{**}$	-0.009**	-0.009	-0.109**	-0.000
	(0.002)	(0.444)	(0.750)	(0.012)	(0.005)	(0.040)	(0.124)	(0.002)	(0.243)
SHI schemes as % THE	-0.497	28.365	0.095	-0.019**	-0.053*	-0.001*	-0.001*	-0.012**	-0.000
	(0.236)	(0.333)	(0.509)	(0.017)	(0.052)	(0.093)	(0.056)	(0.005)	(0.190)
Govt. Financing Arrang. as % THE	-1.611***	2.726	-0.012	-0.034***	-0.104***	-0.001**	-0.001	$-0.008^{*}$	0.000
	(0.000)	(0.540)	(0.926)	(0.000)	(0.000)	(0.025)	(0.111)	(0.095)	(0.613)
Comp. PI as % THE	-3.590	-1.758	-0.505	-0.042	-0.156	-0.007**	-0.003	-0.039	-0.000
	(0.258)	(0.950)	(0.404)	(0.313)	(0.282)	(0.035)	(0.673)	(0.151)	(0.530)
Nonprofit schemes as % THE	-3.568**	21.545	1.005	-0.074***	-0.190**	-0.001	0.001	-0.030**	$-0.000^{*}$
	(0.026)	(0.230)	(0.124)	(0.000)	(0.002)	(0.458)	(0.835)	(0.002)	(0.051)
Vol. Schemes as % THE	-0.426	34.959	-0.140	-0.008	-0.032	0.000	0.002	-0.006	-0.000
	(0.683)	(0.353)	(0.597)	(0.719)	(0.701)	(0.817)	(0.281)	(0.613)	(0.232)
No. observations	422	422	361	422	422	422	421	422	422
R-squared	0.750	0.008	0.087	0.248	0.244	0.227	0.254	0.445	0.278
p: Soc. Sec.=Other Govt.	0.001	0.345	0.276	0.019	0.032	0.597	0.988	0.213	0.028

Table 4: Multiple regressions explaining international differences in out-of-pocket expenditure measures

Note: Numbers in parentheses are p-values. \* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.001

	Low- income	Lower middle- income	Upper middle- income	High income	Total
East Asia & Pacific	34	9	10	4	9
Europe & Central Asia		6	7	5	5
Latin America & Caribbean	45	10	13	13	13
Middle East & North Africa		7	7	7	7
North America				6	6
South Asia	5	7			6
Sub-Saharan Africa	9	8	12		10
Total	9	9	11	5	9

<u>Table 5: Median values of the Q90/Q50 dispersion measure of risk of out-of-pocket</u> <u>expenditures on health, latest year</u>

### Table 6: Median budget share for out-of-pocket expenditures on health, latest year

	Low- income	Lower middle- income	Upper middle- income	High income	Total
East Asia & Pacific	4.0	1.7	3.7	3.1	2.6
Europe & Central Asia	3.7	3.6	3.8	2.6	3.2
Latin America & Caribbean	3.0	4.1	3.6	3.5	3.9
Middle East & North Africa		3.5	3.7	4.7	3.5
North America				2.6	2.6
South Asia	6.4	3.6			4.7
Sub-Saharan Africa	2.7	2.7	2.0		2.6
Total	2.8	3.1	3.4	2.7	2.9

	Low- income	Lower middle- income	Upper middle- income	High income	Total
East Asia & Pacific	0.10	0.17	0.07	-0.18	0.08
Europe & Central Asia	0.17	0.10	0.07	-0.06	-0.01
Latin America & Caribbean	0.11	0.02	0.07	0.12	0.08
Middle East & North Africa		0.08	0.08	-0.12	0.04
North America				-0.24	-0.24
South Asia	0.05	0.09			0.07
Sub-Saharan Africa	0.04	0.04	0.02		0.04
Total	0.05	0.07	0.07	-0.08	0.04

<u>Table 6: Median progressivity index values for out-of-pocket expenditures on health,</u> <u>latest year</u>

#### <u>Table 7: Median incidence of catastrophic out-of-pocket health expenditures at the</u> <u>10% threshold, latest year</u>

	Low- income	Lower middle- income	Upper middle- income	High income	Total
East Asia & Pacific	11	3	10	6	5
Europe & Central Asia	12	8	9	5	8
Latin America & Caribbean	7	10	10	10	10
Middle East & North Africa		8	8	13	9
North America				5	5
South Asia	21	8			12
Sub-Saharan Africa	6	7	3		5
Total	7	8	8	5	7

	Low- income	Lower middle- income	Upper middle- income	High income	Total
-				0.4.0	
East Asia & Pacific	1.70	0.25	0.78	0.18	0.25
Europe & Central Asia	1.98	0.00	0.00	0.04	0.03
Latin America & Caribbean	0.34	0.75	0.47	0.70	0.50
Middle East & North Africa		0.13	0.27	0.44	0.20
North America				0.18	0.18
South Asia	3.19	0.79			1.36
Sub-Saharan Africa	1.34	1.36	0.45		1.21
Total	1.38	0.48	0.10	0.06	0.30

Table 8: Median rates of impoverishment due to out-of-pocket health expenditures, <u>\$1.90-a-day poverty line, latest year</u>

<u>Table 9: Median contribution of out-of-pocket health expenditures to per capita</u> poverty gap in \$US, \$1.90-a-day poverty line, latest year

	Low- income	Lower middle- income	Upper middle- income	High income	Total
East Asia & Pacific	0.01	0.00	0.00	0.00	0.00
Europe & Central Asia	0.02	0.00	0.00	0.00	0.00
Latin America & Caribbean	0.00	0.01	0.00	0.01	0.00
Middle East & North Africa		0.00	0.00	0.01	0.00
North America				0.00	0.00
South Asia	0.02	0.00			0.01
Sub-Saharan Africa	0.02	0.01	0.00		0.01
Total	0.02	0.00	0.00	0.00	0.00

<u>Figure 1. Types of household survey datasets used in analysis of out-of-pocket</u> <u>health expenditures</u>





## Figure 2: Mean per capita out-of-pocket expenditure and dispersion

Dispersion in Health Expenditures (Q90/Q50)







Note: Surveys are the same in the left and right maps in each row, but not necessarily the same in the top and bottom maps in each column.



#### Figure 4: Catastrophic health expenditures and their distribution by consumption and income

Note: Surveys are the same in the left and right maps in each row, but not necessarily the same in the top and bottom maps in each column.

### Figure 5: Impoverishment due to out-of-pocket health expenditures



Percentage of Households Impoverished by Out-of-Pocket Health Expenditures, PL=\$5.50-a-day

Percentage of Households Impoverished by Out-of-Pocket Health Expenditures, PL=\$10.00-a-day





#### Figure 6: Contribution to the poverty gap of out-of-pocket expenditures

### References

- Alam, A., M. Murthi, R. Yemtsov, E. Murrugarra, N. Dudwick, E. Hamilton and E. Tiongson (2005). <u>Growth, poverty, and inequality : Eastern Europe and the former Soviet Union</u>. Washington, DC, World Bank.
- Arrow, K. J. (1963). "Uncertainty and the welfare economics of medical care." <u>The American</u> <u>economic review</u> **53**(5): 941-973.
- Balcazar, C. F., L. Ceriani, S. Olivieri and M. Ranzani (2014). Rent imputation for welfare measurement: a review of methodologies and empirical findings. The World Bank, Policy Research Working Paper Series, 7103.
- Banthin, J. S., P. Cunningham and D. M. Bernard (2008). "Financial burden of health care, 2001-2004." <u>Health Aff (Millwood)</u> **27**(1): 188-195.
- Berki, S. (1986). "A look at catastrophic medical expenses and the poor." <u>Health Affairs</u> **5**(4): 138-145.
- Blinder, A. S. (1985). Comment on "Measuring Income: What Kind Should Be In?" by David T. Ellwood and Lawrence H. Summers. <u>Conference on Measurement of Noncash Benefits:</u> <u>Proceedings Vol. 1</u>. Washington, DC, Bureau of the Census.
- Carletto, G., K. Covarrubias, B. Davis, M. Krausova and P. Winters (2007). <u>Rural Income Generating</u> <u>Activities Study: Methodological note on the construction of income aggregates</u>. Rome.
- Citro, C. F. and R. T. Michael, Eds. (1995). <u>Measuring poverty: A new approach</u>. Washington, D.C. , National Academies Press.
- Cowell, F. (2011). <u>Measuring Inequality</u>. Oxford, Oxford University Press.
- Davis, B., S. Di Giuseppe and A. Zezza (2017). "Are African households (not) leaving agriculture? Patterns of households' income sources in rural Sub-Saharan Africa." <u>Food Policy</u> **67**: 153-174.
- Deaton, A. and S. Zaidi (2002). <u>Guidelines for constructing consumption aggregates for welfare</u> <u>analysis</u>. Washington DC, World Bank.
- Eozenou, P. and A. Wagstaff (2018). FPRO: Stata module to compute Financial Protection Indicators for Health Expenditures, Boston College Department of Economics.
- Ferreira, F. H. G. and C. Sanchez (2017). "A richer array of international poverty lines" Blogpost. <u>Let's Talk Development http://blogs.worldbank.org/developmenttalk/richer-array-</u> <u>international-poverty-lines</u>.
- Flores, G., J. Krishnakumar, O. O'Donnell and E. van Doorslaer (2008). "Coping with Health-Care Costs: Implications for the Measurement of Catastrophic Expenditures and Poverty." <u>Health</u> <u>Economics</u> 17 12: 1393-1412.
- Gruber, J. and H. Levy (2009). "The Evolution of Medical Spending Risk." <u>Journal of Economic</u> <u>Perspectives</u> **23**(4): 25-48.
- Jolliffe, D. and E. B. Prydz (2016). "Estimating International Poverty Lines from Comparable National Thresholds." Journal of Economic Inequality **14 2**: 185-198.
- Kakwani, N. C. (1977). "Measurement of tax progressivity: An international comparison." <u>Economic</u> <u>Journal</u> **87**(345): 71-80.
- Kochhar, R. (2015). <u>A Global Middle Class Is More Promise than Reality: From 2001 to 2011, Nearly</u> <u>700 Million Step Out of Poverty, but Most Only Barely</u>. Washington, D.C.
- Lieberman, S. S. and A. Wagstaff (2009). <u>Health Financing and Delivery in Vietnam: Looking</u> <u>Forward</u>. Washington DC, World Bank.
- Lu, C., B. Chin, G. Li and C. J. Murray (2009). "Limitations of methods for measuring out-of-pocket and catastrophic private health expenditures." <u>Bulletin of the World Health Organization</u> **87**(3): 238-244, 244A-244D.

O'Donnell, O., E. van Doorslaer, A. Wagstaff and M. Lindelow (2008). <u>Analyzing Health Equity Using</u> <u>Household Survey Data: A Guide to Techniques and Their Implementation</u>. Washington DC, World Bank.

- O'Donnell, O., S. O'Neill, T. Van Ourti and B. Walsh (2015). CONINDEX: Stata module to perform estimation of concentration indices, Boston College Department of Economics.
- Squires, D. A. (2011). "The U.S. health system in perspective: a comparison of twelve industrialized nations." <u>Issue Brief (Commonw Fund)</u> **16**: 1-14.
- Suits, D. (1977). "Measurement of tax progressivity." <u>American Economic Review</u> **67**: 747-752.
- van Doorslaer, E., O. O'Donnell, R. P. Rannan-Eliya, A. Somanathan, S. R. Adhikari, C. C. Garg, D. Harbianto, A. N. Herrin, M. N. Huq, S. Ibragimova, A. Karan, C. W. Ng, B. R. Pande, R. Racelis, S. Tao, K. Tin, K. Tisayaticom, L. Trisnantoro, C. Vasavid and Y. Zhao (2006). "Effect of payments for health care on poverty estimates in 11 countries in Asia: an analysis of household survey data." Lancet 368(9544): 1357-1364.
- van Doorslaer, E., O. O'Donnell, R. P. Rannan-Eliya, A. Somanathan, S. R. Adhikari, C. C. Garg, D. Harbianto, A. N. Herrin, M. N. Huq, S. Ibragimova, A. Karan, T. J. Lee, G. M. Leung, J. F. Lu, C. W. Ng, B. R. Pande, R. Racelis, S. Tao, K. Tin, K. Tisayaticom, L. Trisnantoro, C. Vasavid and Y. Zhao (2007). "Catastrophic payments for health care in Asia." <u>Health Econ</u> 16(11): 1159-1184.
- Wagstaff, A., E. van Doorslaer, S. Calonge, T. Christiansen, M. Gerfin, P. Gottschalk, R. Janssen, C. Lachaud, R. E. Leu, B. Nolan and et al. (1992). "Equity in the finance of health care: some international comparisons." Journal of Health Economics **11**(4): 361-387.
- Wagstaff, A., E. van Doorslaer, H. van der Burg, S. Calonge, T. Christiansen, G. Citoni, U. G. Gerdtham, M. Gerfin, L. Gross, U. Hakinnen, P. Johnson, J. John, J. Klavus, C. Lachaud, J. Lauritsen, R. Leu, B. Nolan, E. Peran, J. Pereira, C. Propper, F. Puffer, L. Rochaix, M. Rodriguez, M. Schellhorn, O. Winkelhake and et al. (1999). "Equity in the finance of health care: some further international comparisons." Journal of Health Economics 18(3): 263-290.
- Wagstaff, A. and E. van Doorslaer (2003). "Catastrophe and impoverishment in paying for health care: with applications to Vietnam 1993-1998." <u>Health Economics</u> **12**(11): 921-934.
- Wagstaff, A., P. Eozenou, S. Neelsen and M.-F. Smitz (2018a). <u>The 2018 Health Equity and Financial</u> <u>Protection Indicators Database: Overview and Insights. Policy Research Working Paper</u> <u>WPS8577</u>. Washington, DC.
- Wagstaff, A., G. Flores, J. Hsu, M. F. Smitz, K. Chepynoga, L. R. Buisman, K. van Wilgenburg and P. Eozenou (2018b). "Progress on catastrophic health spending in 133 countries: a retrospective observational study." <u>Lancet Glob Health</u> 6(2): e169-e179.
- Wagstaff, A., G. Flores, M. F. Smitz, J. Hsu, K. Chepynoga and P. Eozenou (2018c). "Progress on impoverishing health spending in 122 countries: a retrospective observational study." <u>Lancet Glob Health</u> 6(2): e180-e192.
- Wagstaff, A. (2019). "Measuring Catastrophic Medical Expenditures: Reflections on Three Issues." <u>Health Economics in press</u>.
- Wagstaff, A., P. Eozenou, S. Neelsen and M. F. Smitz (2019). "Introducing the World Bank's 2018 Health Equity and Financial Protection Indicators database." <u>Lancet Glob Health</u> **7**(1): e22e23.
- Wyszewianski, L. (1986). "Families with catastrophic health care expenditures." <u>Health Services</u> <u>Research</u> **21**(5): 617-634.
- Xu, K., D. B. Evans, K. Kawabata, R. Zeramdini, J. Klavus and C. J. Murray (2003). "Household catastrophic health expenditure: a multicountry analysis." <u>Lancet</u> **362**(9378): 111-117.
- Xu, K., D. B. Evans, G. Carrin, A. M. Aguilar-Rivera, P. Musgrove and T. Evans (2007). "Protecting households from catastrophic health spending." <u>Health Aff (Millwood)</u> **26**(4): 972-983.

## Notes

1 As Blinder (1985) put it: "...dollars [spent on medical care] do not buy happiness; they just maintain human capital". Or as the US National Academy of Science (NAS) Panel on Poverty and Family Assistance put it: "A sick person with high medical care expenditures is not made better off than a healthy person with no or relatively low expenditures; at best, the added expenditures serve only to restore the sick person to a healthy state" (Citro and Michael 1995, p236).

<sup>2</sup> In practice, and surprisingly given that Deaton and Zaidi (2002) was commissioned by the World Bank and published in its working paper series, most World Bank poverty assessments (72/76 or 95%) either do not take medical spending out of the picture or do not appear to do so.<sup>2</sup> An "advanced" search of the World Bank's documents and reports <u>website</u> allows the user to specify "Poverty Assessment" in the document type. Such a search in September 2017 produced 178 documents. Of these, 95 are not in English, or are a background paper or another document within the poverty assessment or are a duplicate. Of the remaining 83, 2 were not a typical poverty assessment and did not report a poverty analysis, 2 lacked the necessary data to undertake a traditional consumption- or income-based poverty analysis, and 3, dur to data limitations, reported a poverty analysis based solely on food expenditures. Among the 76 actual poverty assessments, 5 used income, 24 explicitly included spending on medical services in the consumption aggregate, and 43 did not explicitly exclude medical spending from the consumption aggregate. Among the remaining 4 studies, 3 explicitly excluded all medical spending from the consumption aggregate, and 1 included private insurance premiums but excluded other medical spending.

<sup>3</sup> Some form of health insurance or prepayment system – whether private insurance, an earnings-linked social health insurance scheme or a tax-financed public health system – is the obviously way to limit the size of outof-pocket health expenses and their welfare effects. The details of the scheme matter a lot. What services and interventions are covered and what are excluded? Are there copayments? If there are, are they means-tested and are there copayment ceilings? The way service provision is funded and organized also matters. In poor countries where services are very limited, the scope for large out-of-pocket expenses are also limited – a low incidence of 'large' out-of-pocket expenses may be a sign of a severely constrained health services. The way providers are paid may also matter. With copayments, patients may end up paying more out-of-pocket if providers are paid fee-for-service than if they are paid in another way, such as a salary.

<sup>4</sup> A large number of single-country studies have been undertaken but reviewing them is beyond the scope of this paper.

<sup>5</sup> In our work, we have examined multiple surveys that have collected data on out-of-pocket expenditures in both the consumption and health sections, and have found that recall periods tend to be longer in the consumption section than in the health section, and that annualized expenditures tend to be higher when estimated using data from the health section than when using data from the consumption section.

 $^6$  In the PovcalNet comparisons, numbers were flagged where ARD\_C >10%. When the comparison is made with the World Development Indicators, numbers were flagged when ARD\_C >15%.

<sup>7</sup> Numbers where AD\_HSH >5% were flagged.

<sup>8</sup> Numbers where AD\_P190 >10% were flagged.

<sup>9</sup> The WHS was excluded in its entirety, failing most of the three quality checks in most countries. The problem with the survey is not the health expenditure data which are very detailed and credible; rather, the problem lies with the total household consumption data.

<sup>10</sup> The tables show the marginal effects reported from multiple regressions that include: per capita GDP in 2011 international dollars; the Gini index of income inequality; total health expenditure (THE) as % GDP; the percentage of THE channeled through social health insurance schemes; the percentage of THE channeled through (other) government-financed programs such as NHS-type arrangements and public health programs; the percentage of THE channeled through compulsory private insurance; the percentage of THE channeled

through nonprofit schemes; and the percentage of THE channeled through voluntary health insurance schemes. The omitted category is payments made out-of-pocket through no scheme, so the coefficients are to be interpreted as effects relative to this omitted category. GDP per capita is also interacted with itself (i.e. GDP per capita squared) and with each of the other variables. The regressions are estimated on all available datapoints, not just the most recent year. The regressions are similarly specified to those in Wagstaff et al. (2018b; 2018c) except that the regressions here exploit the new WHO GHED which allow us to extract how much of THI is spent by different schemes and programs rather than how much revenue was raised by (or for) them.

<sup>11</sup> The concentration index is twice the area between the Lorenz curve for income and the concentration curve for taxes or payments, while the Gini coefficient is equal to twice the area between the Lorenz curve and the line of equality. The Lorenz curve is formed by ranking households by their income and plotting the cumulative percent of households so ranked on the x-axis against the cumulative percent of income on the y-axis. The concentration curve is formed by keeping households ranked by their income and plotting the cumulative percent of households so ranked on the x-axis against the cumulative percent of taxes or payments on the y-axis.

<sup>12</sup> The deduction was set equal to average food spending among households whose food spending share (as a percentage of total consumption) was in the 45th to 55th percentile range, the assumption being that, at least in low- and middle-income countries, the food intake of this group averages 2,000 kilocalories.