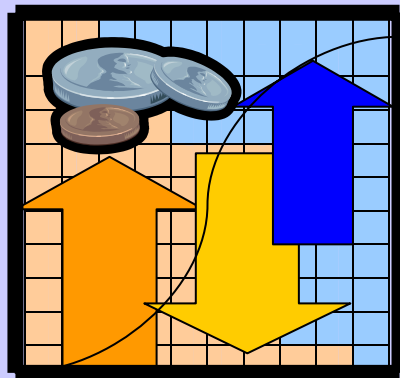




**World Health Organization**  
*Geneva*

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**Distribution of health payments  
and  
catastrophic expenditures**

**Methodology**

***DISCUSSION PAPER***

***NUMBER 2 - 2005***

*Department "Health System Financing" (HSF)  
Cluster "Evidence and Information for Policy" (EIP)*

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*by*

***Ke Xu***



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## **Introduction**

Health systems deliver health services, preventive and curative, that can make a substantial difference to peoples' health. However, accessing these services can lead to individuals having to expend catastrophic proportions of their available income, and some households are pushed into poverty as a result. Furthermore, because of these negative impacts some households forgo health services and suffer ill health.

The fairness of health financing is a subset of the three main goals of health systems; good health, responsiveness, and fairness of financial contribution. Fairness in financial contribution and protection against financial risk is based on the notion that every household should pay a fair share. What constitutes a fair share depends on people's normative expectations as to how health systems are financed. Nevertheless, in all countries, fairness in financial contribution embraces two critical aspects; that of risk pooling between the healthy and the sick and risk sharing across wealth and income levels. Risk pooling denotes the premise that the contributions for those that are healthy pay for the care of those that are sick, so that individuals who become sick are not struck by a double burden of sickness and financial costs of health care. Over the life span, each individual is likely to benefit from the financial security of risk pooling when she or he becomes sick. Risk sharing, while similar, refers to the premise that fairness does not mean equal contributions from all, regardless of income or wealth, but that contributions are greater from those who have more financial resources. In practical terms, embedding these notions of fairness in financing is a step towards preventing the catastrophic expenditure of households when one of the members becomes ill.

Health policy makers have long been concerned with protecting people from the possibility that ill health will lead to catastrophic financial payments and subsequent impoverishment.

This report will address the following questions: (1) Who uses what type of health services? (2) Who pays how much and for what kinds of health services? (3) How do these payments impact on a household's financial situation? (4) What kinds of households are more likely to face catastrophic expenditure?

## **Data requirements**

National representative household surveys that include:

- Individual level:
  - socio-economic information (such as, age, sex, education, urban/rural location and so on)
  - health service utilization
- household level:
  - total household consumption expenditure
  - food expenditure (not include tobacco and alcohol)
  - out-of-pocket health expenditure and private health insurance premium

## Definitions and constructions of variables

All the variables related to expenditure are converted to a monthly figure. Where survey data is provided in other units (i.e. when the recall period is 7 days, 2 weeks, 3 months, 6 months, or one year) the data should be adjusted to monthly figures. If the survey was conducted over more than one month and the inflation rate is high over these months, all of the expenditures should be deflated to a common month according to the Consumer Price Index (CPI).

### II.1. (1) Out-of-pocket health expenditure (oop)

Out-of-pocket health payments refer to the payments made by households at the point they receive health services. Typically these include doctor's consultation fees, purchases of medication and hospital bills. Although spending on alternative and/or traditional medicine is included in out of pocket payments, expenditure on health-related transportation and special nutrition are excluded. It is also important to note that out-of-pocket payments are net of any insurance reimbursement.

### III.1. (2) Household consumption expenditure (exp)

Household consumption expenditure comprises both monetary and in-kind payment on all goods and services, and the money value of the consumption of home-made products.

### IV.1. (3) Food expenditure (food)

Household food expenditure is the amount spent on all foodstuffs by the household plus the value of family's own food production consumed within the household. However, it excludes expenditure on alcoholic beverages, tobacco, and food consumption outside the home (e.g. hotel and restaurants).

### V.1. (4) Poverty line (pl) and household subsistence spending (se)

The household subsistence spending is the minimum requirement to maintain basic life in a society. A poverty line is used in the analysis as subsistence spending.

There are many ways to define poverty. None of them are perfect considering the soundness in theory and feasibility in practice. Here we use a food share based poverty line for estimating household subsistence. This poverty line is defined as the food expenditure of the household whose food expenditure share of total household expenditure is at the 50<sup>th</sup> percentile in the country. In order to minimize measurement error, we use the average food expenditures of households whose food expenditure share of total household expenditure is within the 45th and 55th percentile of the total sample. Considering the economy scale of household consumption, the household equivalence scale is used rather than actual household size. The equivalence scale is:

$$eqsize_h = hsize_h^\beta$$

where  $hsize_h$  is the household size. The value of the parameter  $\beta$  has been estimated from previous studies based on 59 countries' household survey data, and it equals 0.56.

Subsistence spending can be calculated as follows:

1. Generate the food expenditure share ( $foodexp_h$ ) for each household by dividing the household's food expenditure by its total expenditure

$$foodexp_h = \frac{food_h}{exp_h}$$

2. Generate the equivalent household size for each household as

$$eqsize_h = hhsiz_e_h^{0.56}$$

3. Divide each household food expenditure by the equivalent household size to get equivalised food expenditures ( $eqfood_h$ )

$$eqfood_h = \frac{food_h}{eqsize_h}$$

4. Identify the food expenditure shares of total household expenditure that are at the 45<sup>th</sup> and 55<sup>th</sup> percentile across the whole sample, name these two variables as  $food45$  and  $food55$ . If the survey includes a household weighting variable, the percentile calculation should consider the weight.
5. Calculate the weighted average of food expenditure in the 45<sup>th</sup> to 55<sup>th</sup> percentile range. This gives the subsistence expenditure per (equivalent) capita, which is also the poverty line ( $pl$ )

$$pl = \frac{\sum w_h * eqfood_h}{\sum w_h} \text{ where } food45 < foodexp_h < food55$$

6. Lastly, calculate the subsistence expenditure for each household ( $se_h$ ) as

$$se_h = pl * eqsize_h$$

A household is regarded as poor ( $poor_h$ ) when its total household expenditure is smaller than its subsistence spending.

$$\begin{aligned} poor_h &= 1 & \text{if } exp_h < se_h \\ poor_h &= 0 & \text{if } exp_h \geq se_h \end{aligned}$$

#### VI.1. (5) The household's capacity to pay ( $ctp$ )

*Household capacity to pay.* The household capacity to pay is defined as a household non-subsistence spending.

The household's capacity to pay ( $ctp_h$ ) defined as the non-subsistence effective income of the household. However, some households may report food expenditure that is lower than

subsistence spending ( $se_h > food_h$ ). This indicates that the household's food expenditure is less than the estimated poverty standard for that country. Such a situation could also be due to the fact that the reported food expenditure in the survey does not consider food subsidies, coupons, self-production and other non-cash means of food consumption. In this particular case the non-food expenditure is used as non-subsistence spending.

$$ctp_h = exp_h - se_h \quad \text{if } se_h \leq food_h$$

$$ctp_h = exp_h - food_h \quad \text{if } se_h > food_h$$

#### **VII.1. (6) Out-of-pocket health payments share of household capacity to pay (oopctp)**

The burden of health payments is defined as the out-of-pocket payments as a percentage of a household's capacity to pay.

$$oopctp_h = \frac{oop_h}{ctp_h}$$

#### **VIII.1. (7) Catastrophic health expenditure (cata)**

Catastrophic health expenditure occurs when a household's total out-of-pocket health payments equal or exceed 40% of household's capacity to pay or non-subsistence spending. The threshold of 40% could be changed according to countries' specific situation.

The variable on catastrophic health expenditure is constructed as a dummy variable with value 1 indicating a household with catastrophic expenditure, and 0 without catastrophic expenditure.

$$cata_h = 1 \quad \text{if} \quad \frac{oop_h}{ctp_h} \geq 0.4$$

$$cata_h = 0 \quad \text{if} \quad \frac{oop_h}{ctp_h} < 0.4$$

#### **IX.1. (8). Fairness in Financial Contribution index (FFC)**

To allow for comparisons, the distribution of household financial contribution across households has been summarised using an index called Fairness of Financial Contribution (FFC). This index is designed to weight heavily those households that have spent a very large share of their beyond subsistence effective income on health. The index thus reflects overall inequality in household financial contribution into the health system, but particularly reflects those households facing catastrophic health expenditure.

The *FFC* is based on the mean of the cubed absolute difference between the *oopctp* a given household and the *oopctp* norm. The index is of the form:



$$FFC = 1 - \sqrt[3]{\frac{\sum_{h=1}^n w_h |oopctp_h - oopctp_o|^3}{\sum w_h}}$$

$$oopctp_o = \frac{\sum w_h oop_h}{\sum w_h ctp_h}$$

The FFC ranges between 0 and 1. The fairer the health financing system, the closer FFC will be to 1.

### **X.1. (9) Impoverishment (impoor)**

A non-poor household is impoverished by health payments when it becomes poor after paying for health services.

The variable created to reflect poverty impact of health payments (*impoor<sub>h</sub>*) is defined as 1 when household expenditure is equal to or higher than subsistence spending but is lower than subsistence spending net of out-of-pocket health payments, and 0 when both are equal to or higher than subsistence spending.

$$impoor_h = 1 \quad \text{if } exp_h \geq se_h \text{ and } exp_h - oop_h < se_h$$

$$impoor_h = 0 \quad \text{if } exp_h \geq se_h \text{ and } exp_h - oop_h \geq se_h$$

### **XI.1. (10) Expenditure quintile (quintile)**

The expenditure quintile is ranked by equivalized per capita household expenditure (*eqexp<sub>h</sub>*).

$$eqexp_h = \frac{exp_h}{eqsize_h}$$

Note: household weight should be considered when grouping the population by quintile.

## **Result Generation**

### **XII.1. 1. Distribution of health service need and utilization by expenditure quintile**

This includes (1) the percentages of self-reported illness and utilization across whole population; (2) distribution across expenditure quintile on percentages of self-reported illness and utilization of health services; (3) where information on utilization of different kinds of facilities is available, the distribution of utilization on different kinds of services is also required.

### **XIII.1.2. Distribution of out-of-pocket health payments across quintiles**

This includes (1) the whole sample mean of out-of-pocket payments (*oop*) per household, out-of-pocket health payments as a share of total household consumption expenditure (*oopexp*), the out-of-pocket payments as a share of household capacity to pay (*oopctp*), the percentage of households impoverished (*impoor*); (2) the percentage of households at different levels of health payments burden (four groups according to *oopctp*) 0-10%, 10-20%, 20-40% and equal to or above 40%; (3) distribution of *oop*, *oopexp*, *oopctp* and *impoor* across expenditure quintile.

#### **XIV.1. 3. The structure of out-of-pocket health payments in each quintile**

This includes the share of each component (such as inpatient services, outpatient services, medicine, etc.) by quintile.

#### **XV.1. 4. Determinants on catastrophic health payments**

Characteristics of households related to catastrophic health expenditure should be explored. In order to do this Logistic regression is suggested. Logistic regression will be used to analyze the determinants of catastrophic expenditure. The basic function form is

$$y = \alpha + \sum \beta_i \chi_i + \varepsilon$$

$$y = \ln\left(\frac{p}{1-p}\right)$$

where  $y$  is the dependent variable, in this case,  $\alpha$  is the constant,  $X_i$  is one of the independent variables,  $\beta_i$  is the coefficient of independent variable  $X_i$ ,  $p$  is the probability of a household facing catastrophic expenditure.

The dependent variable is a dummy variable on catastrophic expenditure (1, with catastrophic expenditure and 0, without catastrophic expenditure). Independent variables are socio-economic indicators such as, urban/rural, poor/non-poor, household size, insurance coverage (where applicable), and with /without senior family members, and health service utilization.

#### **XVI.1. 5. Subnational**

If the sample is regional representative, the sub-national analysis on items 1, 2, 3, is required.

#### **XVII.1. 6. Time series**

When two or more than two years surveys are available, time series comparison on item 1, 2, 3, 4, are required.

### **Structure for the report**

The report will include two parts: main report and 5 appendices.

#### **XVIII.1. 1. Main report**

The primary reader of the main report would be a policy maker in the country so it is encouraged to use graphs rather than tables to present the results. The main report should be around 10-15 pages including graphs.

We suggest the main report include the following sections

## I. Introduction (brief)

### **XIX.1. II. Data sources and definitions (survey name, year, nationally representative or not)**

### **XX.1. III. Results**

In the result section, the following issues should be addressed

- Distribution of health service need and utilization by expenditure quintile
- Distribution of out-of-pocket health payments across quintile
- The structure of out-of-pocket health payments in each quintile
- Determinants on catastrophic health payments
- The result on sub-national analysis where it is possible
- Where time series data is available all the above issues should be addressed with comparison to all years.

### **IV. Summary**

Highlight the main results and policy recommendations.

### **XXI.1. 2. Appendices**

The following appendix should be provided together with the main report.

1. Brief description of the health system, particularly health financing system.
2. Data description including sample size, the months that the survey was conducted, the recall period of different expenditure items (food, non-durable goods, durable goods, out-of-pocket health payments), sampling, and quality evaluation if possible.
3. Specific methodology on each step of the variable construction, assumptions made and any issues needing clarification.
4. The software programs used for the calculation.
5. Result tables for all results presented in the main report