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Inequity in Healthcare Access in post-soviet Tajikistan

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Abstract

After the collapse of USSR, Tajikistan overcame a devastating civil war (1992- 1997). Already under-financed at the end of the Soviet Union, the healthcare system has been severely damaged. Tajikistan has an officially universal and free access to healthcare, inherited from socialism. But after the collapse, the universality was no longer sustainable. The State allowed some facilities to charge fees according to a price list (like laboratory tests), and the habit of "thanking" the doctor has been generalized, due to the low wage of medical staff. Therefore, the debate in post-soviet studies is acute in Tajikistan. Does the out-of-pocket expenditure increase inequality, or is there an informal redistributive system due to the price-differentiation conducted by benevolent doctors? By means of innovative tools (Kakwani Progressivity Index, decomposition of concentration index), this paper measures the vertical equity in financing and the horizontal equity in access, to test the "Robin Hood" hypothesis, based on the nationally representative Tajik Living Standards Survey (2007). The main result is that the "progressivity" in financing is illusory and reflects rather the horizontal inequity in access to care, than the benevolence of doctors.

Key words: out-of-pocket expenditure, health inequity measure, bootstrap inference method, post-soviet economy, informal economy.

JEL classification: I14 ; I15 ; I18

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1. Introduction

1.1. National background: the Tajik healthcare system inherited from Soviet Union

Tajikistan is a small, landlocked and mountainous post-soviet country in Central Asia, sharing borders with Afghanistan, Uzbekistan, Kirghizstan and China. It was already the poorest country of USSR, economically specialized in aluminum industry and cotton culture. Its current GDP (PPP) per capita is around 2,3K$ (2013), which ranks Tajikistan 182nd, after Cameroon and just before Tanzania in terms of purchasing power.

After the collapse of the USSR, Tajikistan was the only post-soviet country that had to overcome a devastating civil war for more than five years (1992-1997). Due to the state disruption, daily corruption developed in many spheres including in the health system. Already under-financed at the end of the Soviet Union, the healthcare system has been severely damaged by conflicts which deteriorated the infrastructures, by cuts in expenses and the resulting lacks in materials, by the departure of numerous doctors to Russia, and alike. Following the war, the state, supported by international donors, has launched healthcare reforms, despite a very strong budgetary constraint.

Tajikistan has an officially universal and free access to healthcare system, which it inherited from Soviet Union. There are no social contribution and no insurance scheme; this is a budgetary-based financing. The state and local authorities finance the facilities with the state and local budgets, relying on public resources (companies) and taxes. The system is almost entirely public, except few branches like pharmacy and dentistry. Doctors are almost all civil servants. The private facilities like diagnostic centers are now developing slowly in the capital Dushanbe, but it remains marginal at the national scale, peculiarly in 2007, when the Tajik Living Standards Survey was collected.

1.2. Why Tajikistan ? The singularity of the situation and the more general interest of studying it.

The collapse of the socialist state and the withdrawal of welfare provision endangered universal free access to healthcare. This is true for all the former soviet republics. But Tajik health reforms have been more difficult and longer to implement, because of the weakness of the state, leading to an extreme case study. On the one hand since 2005 the state allowed by decree some facilities to charge some services according to a price list (like laboratory tests), even if the universality is still officially written in the constitution. Since 2008, the Government also allowed some facilities, mostly in Dushanbe, to be partly “self-financed”, without the corollary reimbursement system[1]. On the other hand, the habits of “thanking”

1 Although those establishments still belong to public sector, they can officially ask for fees according to a price list precising which types of act the patients are charged for and at what price. This is a step further towards privatization of health financing compared to 2005, because it is an extended list of care (including all

the doctor by giving a "gift" (under-the-table payments) have been generalized almost everywhere, and (developed) become more or less an obligation, since doctors had to deal with the deprivation of their wages (Falkingham, 2004). The average wage is about 100$ in 2015. However it was much lower in 2007 when our data was collected (US$17), showing the deprivation of the health sector compared to other sectors of the economy[2] (workforce average of US$ 53). Therefore, a kind of informal private financing system emerged without any insurance scheme. But depending on their background patients do not behave the same, they don't take the same decision in terms of seeking for help, they do not call these out-of-pocket payments by the same name, and they might not pay the same amount. High-educated and rich people from the cities have started to call them "fee-for-service", while others will refer to them as "corruption" or "grateful gift". The subjective interpretation of those payments is more deeply analyzed in another paper[3]. Among doctors, the behavior and the designation term are not homogenous neither, and often depend on the background of the patient as well. Furthermore, the lack of public expenditure in health sector made the hospital unable to provide the medicines and other things needed during hospitalization (bed sheet, tubes, food…). In most of the cases, the relatives of the patients are meant to buy the list of medicines prescribed in a pharmacy. They will bring it afterwards to the hospital where the patient is hospitalized.

All those factors, new price setting exceptions, informal payments and compulsory medicine expenditure, in the absence of insurance scheme, are generating tremendous out-of-pocket payments: household expenditure covers more than 70% of the total health expenditure (Khodjamurodov and Rechel, 2010). This is a case of extreme out-of-pocket, however studying its consequences give us some information for other countries with high out-of-pocket, including some segments of healthcare system in European countries, such as "secteur 2" in France.

Hereafter we consider the total household health expenditure and its objective effect in terms of income distribution. Indeed, the consequences of the emergence of this partly informal, private financing system in terms of equity in access to care and financing of healthcare need to be explored. More precisely, we measure the effect of the out-of-pocket payments on the vertical equity in financing and on the horizontal equity in access.

Vertical equity in financing reflects whether people with different level of income, contribute differently to the financing system. In Tajikistan, this definition is less accurate than in Europe for example since there is no defined "system" of financing thought to have

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consultations of specialists and not only few specific care (tests and surgery). But our data have been collected before the decree.

2 Although the President decreed a doubling in 2005, and another increase to US$ 38 in early 2009, the health workers average salary remain lower than the workforce average (US$65) (Khodjamurodov and Rechel, 2010).

3 "Informal Payments to Doctors in post-soviet Tajikistan: from soviet *blat* to international *out-of-pocket* designation", S. Pellet, chapter of Dissertation (PHD).

redistributive effect among sick and not sick, or rich and poor, but only budgetary system (indirect tax and flat income tax) and out-of-pocket. Here vertical equity is then seen as the equity in distribution of "effort" of payments of people from different socioeconomic background. Then, if the richest contribute more relatively to their income than the poorest, the "system" is defined as progressive, otherwise it is considered as regressive. Progressivity is simply linked to vertical equity effect and not to redistributive effect (which implies a mechanism of redistribution set in the system of insurance or reimbursement). Vertical equity in Tajikistan implicitly raises the question of the existence of an informal redistributive system due to benevolent doctors, able to differentiate the prices according to the socioeconomic status of the patient.

Horizontal equity in access has also to be checked since progressivity in payments could simply reflect inequity in access. This horizontal equity measures whether people with the same health status have the same access to care, providing the vertical equity hypothesis in access is satisfied (the differential utilization of healthcare resources across individuals with different need is appropriate, meaning that people would seek help according to their need, once controlling for socioeconomic characteristics).

1.3. Contribution to the existing Literature (topic and methodology)

Tajikistan has not been very investigated by the economists so far, except through the perspective of conflict studies (Cassar *et al.*, 2011) and agricultural studies. The social and healthcare system is even less known by the social scientists community and most of the existing literature is peculiarly "grey" literature - reports written by NGO and International Agencies -, plus some descriptive studies, administrative surveys and qualitative works in social sciences (Hohmann, 2010). They produce interesting hypothesis to test, but no rigorous evaluation have been done as much as we know.

While the literature about the "Robin Hood" principle applied by the doctors in postsoviet area and Eastern Europe has started to converge towards the evidence of a negative impact of the out-of-pocket, concerning Tajikistan, many authors found a progressive effect. For instance, Falkingham suggested that the absolute smaller burden supported by the poorest quintile could be explained by the fact that doctors apply a kind of price differentiation: "there is evidence of informal targeting of unofficial charges with doctors charging according to some subjective assessment of patients' ability-to-pay" (Falkingham, 2004). Her very interesting work is mostly based on qualitative approach and descriptive statistics. She does not assess the significance nor compare to other possible causes, like a lower access to facilities. This paper also aims to test her hypothesis.

Concerning the measure of health financing inequality in Tajikistan, Habibov uses the nationally representative survey TLSS 2003 (N. N. Habibov, 2011) and measures the out-of-pocket inequality by means of concentration curves methodology, he concludes about

the progressivity of the system but only by comparing the concentration curve to the 45° line. However, this paper intends to add some conceptual distinction between "inequality" and "inequity" and also run statistical inference tests. The absence of inference test in Habibov (2011) will make difficult to compare the situation in 2003 and the one we analyze in 2007, though. Finally, Schwartz et al. study the evolution of households' health expenditure (Schwarz *et al.*, 2013) and note the importance of medicine expenditure burden, peculiarly paid by rich, without making any link to a possible illusionary progressivity effect.

Also, this paper analyses the differences in equity effect in more details, looking at the effect of each component of ambulatory and hospital expenditure. In this literature, the households expenditure are usually called "out-of-pocket expenditure" or "informal payments", and no one tried to differentiate the effect of informal and formal payments, precisely because the line is vague and the distinction is subtle in the law, since the system is still officially free. In another paper, we try to define a typology of the different kinds of expenditure, petty corruption, informal payments and gifts; in this one we will measure their own effect on equity.

In other geographical areas, some authors investigated very deeply both the question of horizontal and vertical equity (of financing and consumption) and the technical question of the statistical inference of the indexes (Wagstaff and van Doorslaer, 1997), few of them applied it to the situation of developing countries (Abu-Zaineh *et al.*, 2009) (Cissé *et al.*, 2007) and even less often to transition countries. We are peculiarly influenced by their empirical methods and are trying to use them in the singular context of Tajikistan, a developing (according to the International Statistical Institute) and post-socialist country.

We would like to contribute incidentally to the discussion about the measure of wealth in this context: is income a good index in an economy which main sectors are public and informal? Is consumption a sufficient index, or should we absolutely add all other equivalent expenditure (equivalent rent for example)? In the literature about Tajikistan, only the consumption index has been used so far. For both of them, should we divide it "per capita" or "per consumption unit" like INSEE does? Finally, in a country where money is so volatile and social status constantly fluctuating according to the remittances sent by the sons, uncles or fathers couldn't be more relevant a wealth index based on durable goods?

1.4. Results:

This paper shows that the system does not have the same effect in terms of equity of financing and equity of access depending on the type of services (ambulatory, hospitalization). In terms of vertical equity, the financing of ambulatory healthcare is neither significantly regressive nor progressive, and the financing of hospital seems extremely progressive, the majority funds coming from the 20% richest. But this

progressivity is the reflection of an inequity in access to hospital. Indeed, in terms of horizontal equity of access to the services, the Tajik system is slightly socially unfair concerning the ambulatory services, and more inequitable in its hospital services. Also, according to the rate of healthcare renunciation, it is obvious that the high level of progressivity is only illusory and results from the inadequate utilization of the services by the poorest, and even by a majority of the population. We, then, decompose the concentration indexes and show that the major factor of inequality in access is the consumption aggregate (wealth index). The unequal distribution of utilization of care is also mainly explained by income level at 30% (and secondly by the health status at 5%). In a nutshell, using more innovative tools and more precise measure of wealth, this paper shows completely different results about equity. The ”progressivity” in expenditure does not come from ”benevolent” doctors (”Robin Hood hypothesis”). Progressivity is illusory and reveals inequity in access.

2. Methodology and data: new tools applied to an original dataset

2.1. Data: a nationally representative multi-dimensional survey

The data used in the analysis is the Tajikistan Living Standards Measurement Survey (2007), a nationally representative survey with a complex design, more precisely a two-stage stratified sampling. The stratification is based on five regions (three oblasts, Dushanbe, RSD) and the two types of area (urban, rural), which means there are nine strata, since the capital Dushanbe is only urban. At the first stage, a random selection of 270 primary sampling units was run at the community level, constituting the clusters. In each cluster 18 households have been selected randomly. The large sample of 4800 households (or 29 798 individuals) allows also a regional analysis, provided that we take into account the weight variable, because one of the regions was oversampled in order to lead a policy evaluation. This survey, led by the Government Statistics Department, supervised by the World Bank, is compromising the feasibility of a survey in remote areas, characteristic of mountainous Tajikistan, and the national representation of regions we need. Indeed, since the system of payments is largely informal, regional characteristics emerge (ability to pay, informal “price” of the consultation, accessibility of the infrastructure, gender bias...).

The data consist of 15 thematic modules, including demographic and socio-economic individual and household characteristics (education, Labor Market participation, migration, etc.) and health questions (health status, access to ambulatory and hospital care, individual health expenditure, HIV awareness). A partial second round was organized, two months later. The aim was interviewing the migrants back from Russia in the meantime. We use this second round for the health variables because two questions about medicine expenditure were included making the computation of total households health expenditure

more relevant. We argue that the main socioeconomic characteristics have not changed in the interim.

2.2. An empirical approach influenced by the literature on tax progressivity

This paper aims at measuring vertical equity of the financing system (progressivity), which cannot be well assessed without assessing the horizontal equity in access.

To measure horizontal inequity, inequality in utilization of health care must be standardized for differences in need. After standardization, residual inequality in utilization by income is interpreted as horizontal inequity, which could be pro-rich or pro-poor. To demonstrate whether it is pro-poor or pro-rich, we use the methodology of concentration curve and the computation of the concentration index (O'Donnell *et al.*, 2008).

In order to measure vertical equity effect of the out-of-pocket payment for healthcare, the methodology in this paper refers to the taxation studies, with the computation of the Kakwani Progressivity Index (KPI), adapted to health expenditure analysis (Abu-Zaineh *et al.*, 2008; Cissé *et al.*, 2007). The KPI is defined as twice the area between healthcare payment concentration curve and the Lorenz curve of income index, and is calculated as the difference between the concentration index for health payments and the Gini coefficient. A positive value of the KPI indicates progressivity, and a negative one regressivity of the system of financing. In Tajikistan, we can consider all health payments as out-of-pocket payments since there is no insurance scheme. Then a positive KPI (vertical equity) would indicate either existing informal system of redistribution or a renunciation to care by the poorest. That is the reason why we need to measure in the same time horizontal equity of access.

Concerning the statistical inference of the indexes, we implement two methods. A first one is suggested by O'Donnell et al. (2008) and the other one by Abu-Zaineh (2008). The former is well adapted to our complex survey design. It consists in using the "convenient regression" of a transformed form of health payment on the weighted rank to obtain the indexes (β* estimate), then the standard errors of the estimate, robust to cluster effect and heteroskedasticity are an approximation of the standard errors of the concentration index. In the latter method (Abu-Zaineh *et al.*, 2008) the confidence interval of the indexes (both concentration index and KPI) are computed by bootstrapping the indexes on numerous subsamples. This method is supposed to be a better inference method and we are trying to adapt this inference method to a context of complex survey design (see below for more details).

2.2.1. Measure of vertical inequality and horizontal inequity: concentration index and statistical inference

The first existing method used here is the method of the "convenient regression", chosen for the facility of its implementation and the precision of the results in literature. The concentration index is proportional to the covariance between the health variable outcome considered and the rank in the income distribution, according to the following formula (Cf Jenkins 1988; Kakwani 1980):

$$C = (2/\mu)\ \mathrm{c\ o\ v}\ (h, r)$$

Therefore, we can deduce the following relationship, called the "convenient regression". Once one has computed the transformed variables of health, he can run the regression and the estimator related to the independent variable (the rank in income distribution) is a proxy of the concentration index (C= β*) (Kakwani *et al.*, 1997):

$$2\sigma_{r}^{2}\,(h_i/\mu) = \alpha + \beta r_i + \varepsilon_i$$

The standard error of β* is an approximation of the one of the concentration index. We mixed this method with the bootstrap inference method in order to compute this standard error and the confidence interval: we run p replications on subsamples of n observations in order to obtain a certain number of β_i* and deduce a non parametric distribution of the estimator and its confidence interval. Here are used clustering robust standard error and strata option to take into account the complex survey design.

One can also compute the concentration indexes by means of the second method (see below), and find similar results; the statistical inference method differs though.

2.2.2. Measure of inequity: Kakwani Progressivity Index

Here the second method of computation of the concentration index is used: the geometrical approximation of the index as a sum of rectangle areas.

$$C = 1 - 2(\Sigma V_{cum}\ .\ 1/\mathrm{N}),$$

First the households have to be ranked on the basis of their consumption aggregate . In this purpose we computed a cumulated sum of the total consumption aggregate and of the health variables, taking into account the weight variable. Then we compute the concentration index of each variable of interest – ambulatory expenditure, hospital expenditure, etc. - according to the formula of its geometrical approximation, the area between the Lorenz curve and the concentration curve, usually computed by means of Integral, is approximated by a sum of rectangle areas.
One can then write a program computing the difference between the concentration index of

each relevant health variable and then compute this difference for each subsample. One can run the program on p subsamples of n observations and deduce a distribution of bootstrapped KPI of each health variable and confidence interval. This ensures a good quality of inference of the estimation obtained for each progressivity index.

One can notice that it can be risky using a bootstrap when the sample has a "heavy tailed income distribution"(Abu-Zaineh *et al.*, 2008). In our sample the distribution of total consumption aggregate is rather "long tailed" (very concentrated around the mean, very few rich) so the bootstrap method seems to be relevant.

2.2.3. Decomposition of the concentration index

The concentration index can be decomposed as a weighted sum of the partial concentration indexes of each explanatory variable. Indeed,

$$C = \frac{2}{\mu}\, cov(y, r) \quad \text{with}$$

$$\mu = \alpha + \sum_k \beta_k\, \overline{x_k}$$

$$C = \frac{2}{\mu}\, cov\,(\alpha + \sum_k \beta_k\, x_k + \varepsilon, r\,)$$

$$C = \frac{2}{\mu}\left[\sum_k \beta_k\, cov\,(x_k, r) + cov\,(\varepsilon, r)\right]$$

$$C = \sum_k \beta_k\, \frac{2}{\mu} cov\,(x_k, r) + \frac{2}{\mu}\, cov\,(\varepsilon, r)$$

$$\text{or : } \overline{x_k}\; C_k = 2\, cov\,(x_k, r)$$

$$C = \sum_k \beta_k\, \frac{\overline{x_k}}{\mu}\, C_k + GC_\varepsilon/\mu$$

The weight represents a kind of elasticity of y to each explanatory variable (or a mean effect of the regressors).

2.3. Variable specification

2.3.1 Total consumption aggregate versus current consumption index (imputation method)

In this paper, the consumption aggregate per capita is defined as the total consumption aggregate per capita, the sum of the current consumption expenditure (including autoconsumption) and the equivalent rent, imputed after estimation. It is the "actual" expenditure for durable and non-durable goods. Habibov chose to use the current

consumption index (sum of current consumption expenditure for non durable goods) as an indicator of the ability-to-pay (ATP) and to rank the households, because this is known to be more reliable data than income data in developing countries. Tajikistan belongs to that category of countries where the household sources of income are diverse and mainly informal. The informal sector is estimated to cover more than 42%[4] of the workers; the declaration of income is not a common practice. In this context, the questions on their last expenditure for consumption are more indicative than asking them how much is their income.

However, current consumption index underestimates the discrepancy of ability-to-pay for healthcare between rural and urban areas[5], and it gives a greater place to the health expenditure included into the consumption index, which can bias the consumption aggregate distribution. As we don't have the data for all the households, we proceed to an imputation, based on the regression of the "potential rent" they could charge if they rented their home, on the characteristics of the households and the accommodation. Based on this regression, we predict the equivalent-rent on a subsample of accurate self-assessment and impute the prediction to those who does not have an accurate self-assessment or no self-assessment at all, according to the deterministic method of imputation (for more details on the construction of the consumption aggregate, see below appendix 1).

2.3.2 Aggregation of the components of health expenditure, note about the hospital expenditure variable

We define the monthly hospital expenditure as the sum of all components of the hospital expenditure declared for the last stay in hospital (copayment[6] – where it exists, food, bed sheet, physician gratification, other staff gratification, medicine/treatment, laboratory tests[7]) multiplied by the number of hospitalization in the year, divided by 12. This measure of hospital expenditure increases sharply the gap between the 10th decile and the others, compared to the simple aggregation of each component of the last stay, which is probably[8] the measure used by Habibov (N. N. Habibov, 2010) (N. N. Habibov, 2011). Indeed, the highest decile goes more often and benefit from more hospitalizations a year.

Table 1: hospital expenditure per quintile

4 According to the estimations of the author on the sample of workers declaring a job and income in 2007 TLSS, measured by means of the strictest definition of informal work, intersection of the 3 criteria given by ILO (no official employment contract, micro-enterprise and no social security affiliation).

5 If we include autoconsumption equivalent expenditure, the risk is to overestimate the average income in rural areas. So we decided to take into account only the actual expenditure.

6 Copayments exist in 8 districts (*rayons*) in 2007; this is a pilot-reform lead by the government in partnership with the World Bank. This is not a system of sharing fees or reimbursement but only a formal cost imposed to the patients.

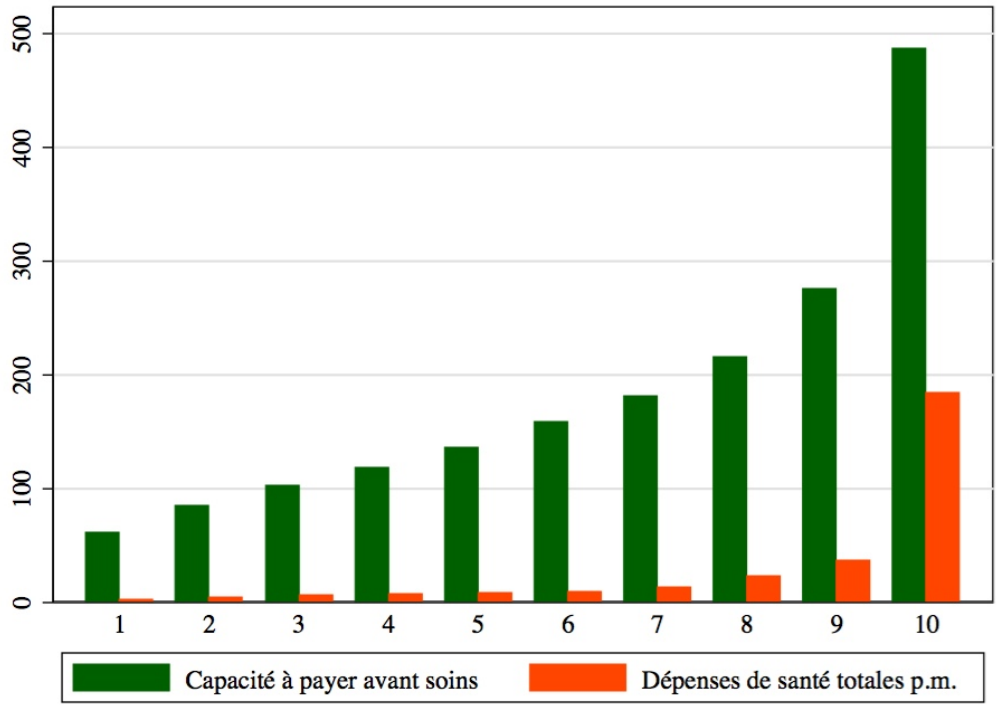
7 As we can see, transportation costs are not included into the hospital healthcare expenditure because there is no question about it in the survey. Therefore the hospital expenditure may be under-estimated.

8 According to our replications of the paper of 2011, at least.

Quintile	Hospital exp. (last stay)	Hospital exp. (month average)
1	8,38	1,13
2	10,99	1,94
3	16,60	3,63
4	23,73	9,00
5	62,45	81,38

There is a double risk with our variable "monthly hospital expenditure": to increase artificially the inequality between the 10% richest and the others, and also, to consider the big consumers of health as "very rich" (the richest) because their declared spending for healthcare added to the total equivalent consumption aggregate bring them to the top 10 of the distribution. In the same time we can consider that health is a luxury good in Tajikistan and if they can afford that expensive healthcare, they are rich (see appendix 2). We opted for the measure taking into account the number of visits (see in appendix 3 for an alternative variable). As a matter of fact, the distribution of pre-care ability-to-pay - the consumption aggregate including equivalent-rent and excluding health expenditure - plotted on the deciles of total consumption aggregate per capita is reassuring: the 10^{th} decile of consumption aggregate (including health) has also the greatest ability-to-pay excluding healthcare payments (graph 1). This measure of wealth (consumption aggregate including health) gives coherent distribution of ability-to-pay (consumption aggregate excluding health expenditure).

Graph 1: Distribution of health expenditure and pre-care ATP per decile of consumption aggregate per capita (somoni)



Source: Tajikistan Living Standards Survey (TLSS) 2007
Population: Households

The other health expenditure variable is the ambulatory expenditure (out-patient consultations, pharmacy, medicines prescribed or not, laboratory test, cost of transportation to the ambulatory facilities...) per month. It is the sum of those transformed transportation cost, untransformed fee-for-service and untransformed medication costs (see appendix 2 for more details).

2.3.3. Need-standardized utilization of care (indirect standardization with non linear model)

As the hypothesis of vertical equity in need is approximately satisfied (for more details see below part 4) then the measurement of horizontal inequity in healthcare use is similar to a standardization method. The idea is to see whether there is or not a difference in utilization of healthcare between the income quantiles, after standardizing for differences in factors of needs.

We use the "indirect" method and standardize for the following sociodemographic characteristics: age, sex, chronic disease, non-chronic disease, and self-assessed health status. The indirect standardization method aims at answering the question "what would be the utilization rate of each quintile if they all have a similar average effect of the demographic variables?" By definition the indirect standardization corrects the actual level of care consumption by comparing it to what would be the distribution of care consumption if all the individuals of each quintile keep their own demographic characteristics (age, sex,

chronic disease...) but have the same average effect of those characteristics on the utilization of care as the entire population. Unlike the direct standardization, it allows a different demographic structure but implies a same average effect.

This indirect standardization on the binary variable of utilization ("has needed to go to … care") is estimated by meanings of a probit model. According to O'Donnell *et al.* (O'Donnell *et al.*, 2008) it is needed to add the mean of the predicted value instead of the actual value to obtain the need-standardized variable "to ensure that the mean of standardized utilization equals that of actual utilization".

As there is no significant insurance scheme in Tajikistan, advantaging disabled or patients suffering from a chronic disease, the simple standardization method without control variables is relevant. Those controls are used by O'Donnell as a means not to overestimate artificially the extra-expenditure capability of the disabled entailed by a more generous insurance scheme covering them.

The computation of the standardized variable is:

$$y^*_{is} = y - y_x + \mu_x,$$

where y is the actual utilization of care, and μ_x the mean of y_x . First, we predict y_x (the need-predicted utilization) using a probit model:

$$y_x = 1 \text{ if } y^*_x > 0 \text{ and } y_x = 0 \text{ otherwise,}$$

with the latent variable $y^*_x = X'\beta + \varepsilon$ and X the vector of standardization variables. Then we compute its mean and deduce y^*_{is} (the need-standardized utilization) from the formula herebefore. This is how the standardized variables have been computed in the fourth part.

3. Results in terms of vertical equity in financing: is the system really progressive?

3.1. The vertical equity in total health expenditure at the household level

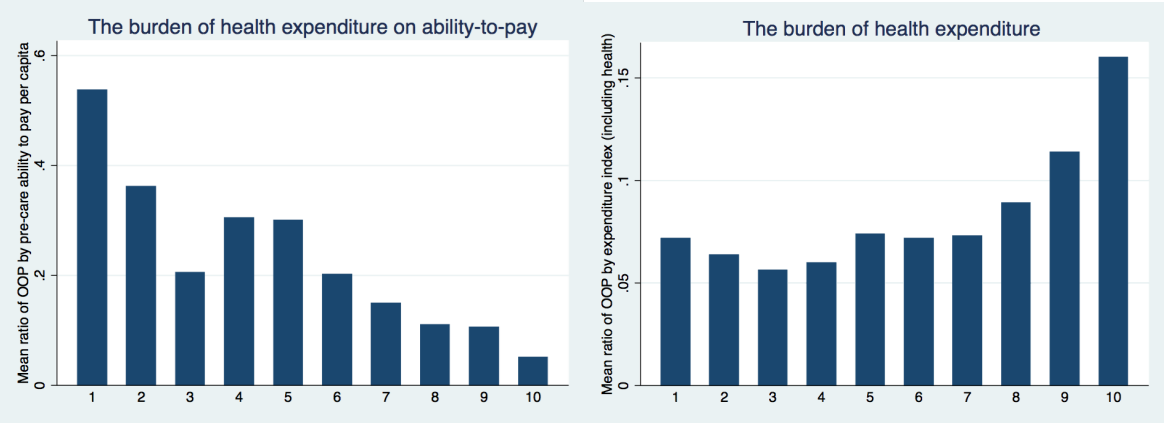
The financial "effort" made by one member of the household, relative to his own income, does not make sense because most of the members do not earn money themselves, and because we use the household consumption aggregate per capita as an equivalent of the household income. Then we temporarily come back to a household level analysis. The share of total expenditure going to healthcare payments (the burden) is decreasing from 27% supported by the poorest 20% to 4% supported by the richest 20%, indicating the total financing system does not seem to be progressive (strongly regressive?). Here we simply look at the proportionality between health payments and some measure of living standards (ability-to-pay). Thus, we compare health payments to ATP before any health payment, as

advised in O'Donnell *et al.* (2008).

If we look at the burden as a ratio between the health expenditure and the total consumption aggregate (including health expenditure) the graph does not look the same. Indeed, adding health expenditure to ability-to-pay increases the income indicator strongly and may gather all the big payers in the highest decile. Next, in order to look now at the distributional impact of health finance, we reintroduce all healthcare payments into the measure of ability-to-pay, including OOP (O'Donnell *et al.*, 2008, p. 188) to measure the progressivity.

Graph 2a: The difference in health burden along the ability-to-pay distribution

Graph 2b: The difference in health burden along the consumption aggregate distribution



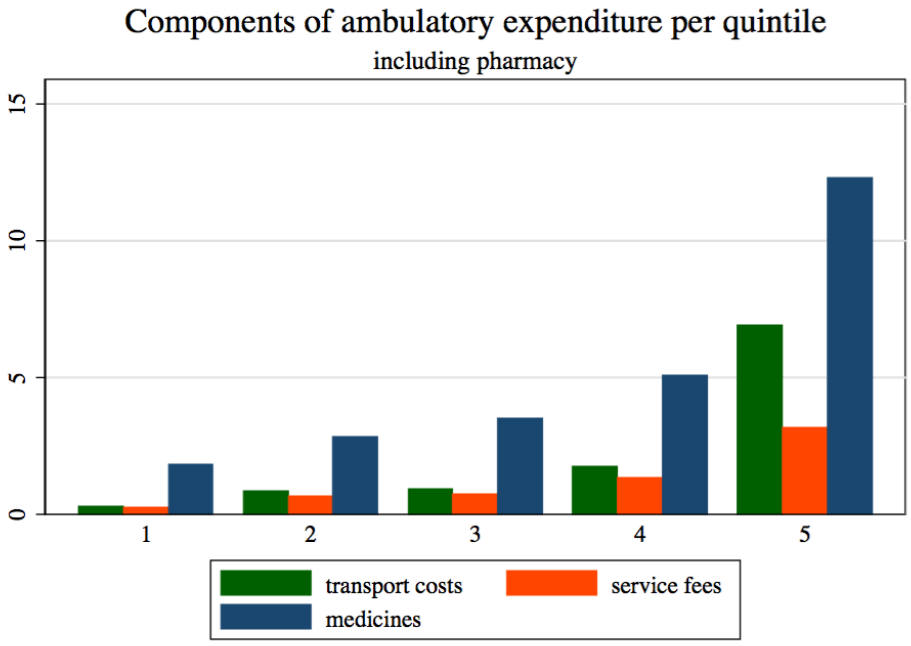
Source: TLSS 2007
Population: all households

3.2. Who pays? Computation of the Progressivity Index

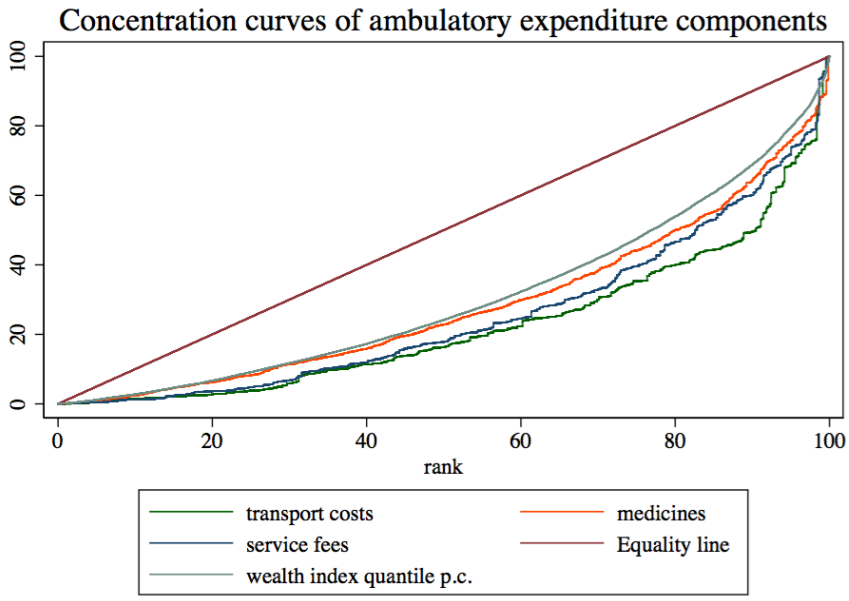
3.2.1 Is ambulatory financing progressive?

Hereafter (on the left) is decomposed the ambulatory expenditure: in outpatient the highest burden in each quintile is the medicine component, which includes prescribed and non-prescribed medication. We see also that the richest quintile has average expenditure much higher than all others, and the difference between the highest quintiles is bigger than among the lowest quintiles.

Graph 3a: Ambulatory expenditure per quintile (somoni)



Graph 3b: Cumulated share of each component per percentile



Sources: TLSS (2007)
Population: all individuals
Note: The 40% poorest cumulate less than 20% of total income and less than 15% of the ambulatory expenditure.

In terms of cumulative share (on the right), the overall ambulatory expenditure significantly differs from the proportionality line, indicating an unequal distribution. In order to interpret it in terms of equity, one needs to compare the lines with the Lorenz curve of consumption aggregate (wealth index). The ambulatory financing seems to be approximately

proportionate to the consumption aggregate of each quantile, with some differences between the components. The most progressive seem to be the transportation costs[9] and the fee-for-service to doctors (mostly informal payments). This may be coherent with the hypothesis of Falkingham (informal price differentiation) but could also be the consequence of the lowest utilization of healthcare by the poorest as we can see on the graph of ambulatory utilization (horizontal inequity, significantly positive concentration index).

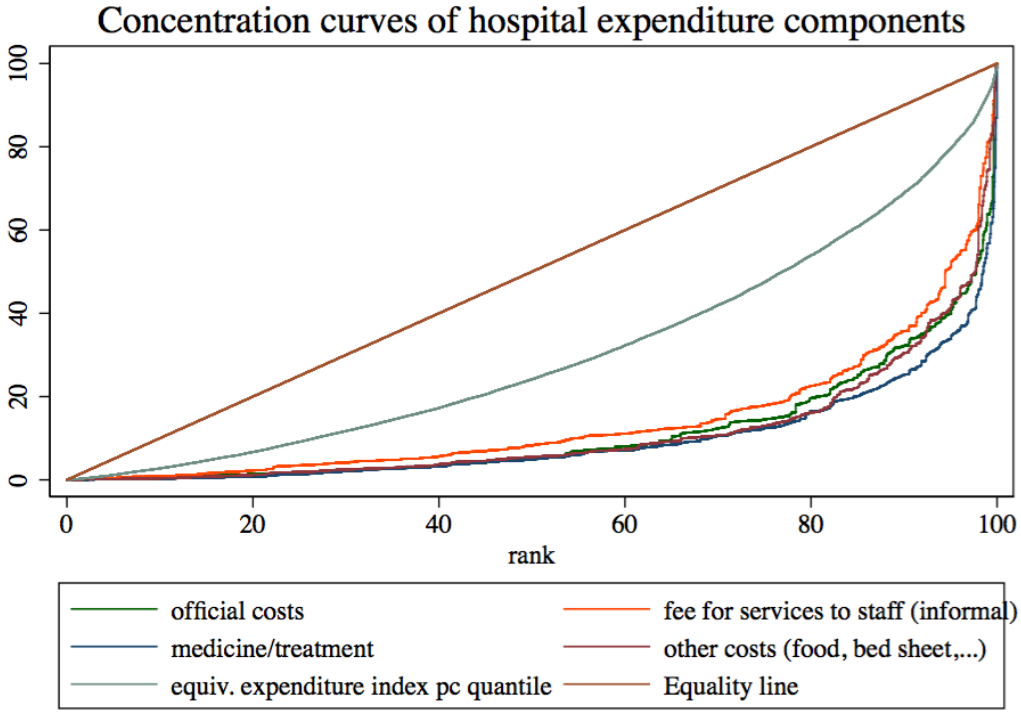
3.2.2. Vertical financing equity or horizontal consumption inequity in hospital expenditure?

The in-patient sector financing seems to reflect a remarkable progressivity, whatever the type of components (official, informal, food...). The main part of financing relies on the richest: the cumulative share of payments of the poorest 80% represents less than 40% of the payments.

In detail, the payments to specialist (mostly informal) seem to be the least progressive, but still progressive. We can suppose that the poorest going to hospital are at least paying those fee-for-service (contrarily to the hypothesis of Falkingham) like the minimal payments, whereas the other costs are more often demanded to the richest (adjustment variable?). For more details see below the table synthetizing the KPI and their significance.

Graph 4: Progressivity in hospital financing?

9 It has to be noticed that when we use as an indicator of transportation cost the price of the last way to ambulatory facility without taking into account the number of visits, transportation cost appeared to be regressive, because the poorest live in remote areas and have to pay more for their longest journey to the facilities. But while taking into account the number of visits, just like for hospital expenditure (see hereafter) it becomes progressive and increase the difference between the richest and the poorest. Here is an interpretation: the poorest go to seek help but less often than the richest (and probably less often that needed) and at the very last, when they can no longer avoid it, according to the popular habit “let's wait and see if it goes by itself”...



Source: TLSS 2007
Population: all individuals
Note: The 40% poorest cumulate less than 20% of total income and less than 6% of the hospital expenditure.

Hereafter the cumulative shares at the decile level that one can read on the concentration curve are recapitulated. As we can see on the graph and on the table the expenditure are very concentrated among the richest, the 90% poorest only concentrate about 40% of the hospital expenditure and the 50% poorest only concentrate 5-8% of the hospital expenditure. The ambulatory services are more equally distributed but still apparently progressive since the poorest deciles pay less for the healthcare system than their cumulated share of income would allow. The fifth decile cumulates about 19-27% of ambulatory financing. One can notice the exception of the medicine expenditure in ambulatory (including not prescribed medicines), which fits almost perfectly to the cumulative share of income.

Table 2: Decile share of expenditure per component

	Decile share in ambulatory				Decile share in hospital			
Decile sup. bound	consumption aggregate	transportation cost	Fee-for-service	ambulatory medicine	official fees	informal fees	other costs	hospital medicine
10%	2.5	1.6	1.3	3.1	0.6	0.9	0.5	0.5
20%	7.1	4.7	5.4	7.9	1.6	2.3	1.5	1.2

30%	12.9	7.8	9.5	13.1	2.7	4.4	2.6	2.3
40%	19.6	11.2	14.1	20.2	4.0	6.7	4.7	3.8
50%	27.0	18.9	21.6	27.1	5.7	8.7	6.7	5.8
60%	36.4	28.2	29.3	35.9	9.4	12.7	8.6	8.9
70%	46.9	37.2	39.8	45.5	14.4	17.2	12.6	12.3
80%	59.9	45.8	52.8	56.8	24.1	26.5	22.5	20.2
90%	75.2	63.9	68.5	73.4	37.2	43.4	37.7	31.3
100%	100	100	100	100	100	100	100	100

3.3. Healthcare renunciation exists among poor population

In order to investigate further whether the progressivity found in hospital sector is a real progressivity allowed by informal price differentiation or the result of care renunciation, descriptive statistics have to be run. The data include some variables linked to healthcare renunciation: the difficulty to find money for healthcare, renouncing seeking help, the reason for delaying seeking help, renouncing going to hospital after reference, the reason for this. The data also include an interesting variable: the involuntary renunciation in the case of being refused healthcare.

If the difference among the four first quintiles is not always important, the inequality between the first and the fifth quintile for all variables is very clear. Among the households who find impossible to gather the money needed for healthcare, there are twice more people from the 20% poorest than 20% richest. Among people who have been refused healthcare from the medical staff there are 30% of 20% poorest against 12% of 20% richest. Economic reasons for not seeking help are much less mentioned by the highest quintile than by the lowest.

Finally, an interesting result correlated to what we observe on the field, according to qualitative data, is that the “distrust” towards medical staff is peculiarly present among the 20% richest, and inexistent among the poorest. Either because the highly educated people realized that the system is weak and corrupted more than the others, or because they are more often facing extortion problems. The question unfortunately does not precise if distrust concerns the quality of service (and the skills of the staff) or the honesty of the staff.

These results advocate the hypothesis of “illusory” progressivity of healthcare financing explained by the care renunciation of many poor households. The small difference among the 80% poorest and the important difference between the 20% richest and all the others tend to show that health is a luxury good in Tajikistan. Not only the poorest are excluded

from the system, but only the richest really enjoy the services "normally", when they need. Even people who are rich enough, or middle class, face some problem to access healthcare and then consume less than the top 20% rich.

It has to be noticed that geographical reasons are mentioned almost only by the 20% poorest, which means that poverty and lack of access to care in Tajikistan is peculiarly linked to the remoteness of some areas and that social inequality are cumulated with spatial disparity. This issue of geographical inequality needs to be further investigated and will be the topic of another article. Indeed, the supply factor (or the lack of supply in poor remote area more precisely) rather than the cost itself could explain a part of the illusory progressivity in the lowest quintile.

For robustness check, the same statistics have been run with another variable of wealth, the ability-to-pay not taken into account the health expenditure. The obtained distribution of quintile for each variable is approximately the same, the differences between the proportion of quintile represented are sometimes even clearer.

Table 3: Healthcare renunciation indicators per quintile

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	Total
During the last 12 months, finding money to pay for health care for the members was...						
Impossible	**27.18**	19.10	14.70	26.20	12.83	100
Difficult	19.75	21.32	20.94	19.24	18.75	100
Not difficult	14.17	16.26	19.45	21.52	**28.60**	100
No one has needed health care	20.38	20.68	20.39	20.55	18.00	100
Total	19.18	20.04	20.27	20.42	20.09	100
Headcount						4436
In the past 12 months, how many times has someone in your household been ill but did not seek for help						
Once	**25.50**	20.36	21.03	16.25	16.86	100
Twice	**21.32**	**23.80**	18.91	21.96	14.01	100
Three	**24.15**	17.86	**26.48**	16.78	14.73	100
Four +	15.75	21.87	16.08	**24.82**	21.48	100
None	15.16	18.48	19.94	21.21	**25.20**	100
Total	18.20	19.52	20.16	20.31	21.80	100
Headcount						2506
What was the reason for delaying or not seeking help?						
Thought they would get	22.74	24.90	25.21	14.13	13.03	100

better without doing anything						
Thought they would get better using traditional herbs	23.16	15.23	19.23	19.56	22.81	100
Thought they would get better using pharmaceuticals they already had	17.14	19.42	21.01	23.23	19.20	100
Could not afford to pay	**25.43**	**23.02**	18.97	18.17	14.41	100
It was too far away	**35.33**	15.50	16.55	23.01	9.62	100
Other	28.32	17.61	8.54	16.56	28.97	100
Total	23.08	21.20	20.52	18.86	16.34	100
Headcount						917
In the past 12 months, how many times has someone in your household been referred to the hospital but not gone?						
Once	**24.68**	**22.35**	21.88	18.15	12.95	100
Twice	**23.87**	**26.25**	17.18	16.84	15.86	100
Three	22.01	16.69	18.81	31.03	11.46	100
Four +	**27.74**	16.99	17.48	**29.34**	8.45	100
None	21.63	19.56	21.31	17.90	**19.61**	100
Total	23.08	21.20	20.52	18.86	16.34	100
Headcount						917
What was the main reason for not going to the hospital?						
Poor conditions in the hospital	21.99	47.74	15.67	2.42	12.18	100
Thought that things would get better	24.12	19.84	20.13	14.22	21.70	100
Unable to afford treatment	**25.05**	22.43	17.69	23.86	10.96	100
Unable to get to where services were available	12.12	23.64	15.93	41.30	7.01	100
Referred to another hospital	46.43	18.46	30.03	5.08	0.00	100
Distrust of health personnel	0.00	27.86	25.95	17.80	**28.39**	100
It was too far	**44.99**	16.62	22.69	13.12	2.58	100
Other	6.94	14.89	40.70	27.00	10.48	100
Total	24.38	22.66	19.82	19.73	13.40	100
Headcount						471
Has anyone in your household ever been refused health care ?						
Yes	**30.40**	15.71	19.57	22.17	**12.15**	100
No	19.08	20.08	20.27	20.40	20.16	100

Total	19.18	20.04	20.27	20.42	20.09	100
Headcount						4436

According to this table, and due to the fact there are no reimbursement system, we first can conclude that the system is far from being free, as supposed to be, and secondly, that expenditure are actually rather an indicator of access. The one who pays is the one who goes. Let's see in more details how deep is the gap in financing between the poorest and the richest.

3.4. Aggregated indices for each type of expenditure

All the concentration indexes are significantly positive, indicating strong inequality in the financing system. Concerning the equity issue, ambulatory, unlike the hypothesis on informal progressivity, is mostly equitable, but without redistributive aspect. Poorest quintile doesn't cumulate more payments than their cumulate income share, and richest no less. In detail, the KPI of fee-for-service (including laboratory test) is not significantly different from zero, indicating that the expenditure share is equal to the income share of each quintile, either because they adapt their consumption or because the informal part of the service fees is adapted exactly to the ability-to-pay. The KPI of transportation costs confirmed the apparent progressivity read on the concentration curve (the concentration curve lies outside of the Lorenz curve): the richest pay more for transportation because they go more often. There is no significant regressivity: the medicine seems to be slightly more financed by the poorest in proportion of their ability-to-pay since the KPI is negative, but after statistical inference by bootstrapping method, it appears not to be significant. The poorest do not purchase relatively less medicine although there is no reimbursement system.

On the contrary, hospital, which we expected to be very regressive[10], seems to be very progressive. All the components seem progressive: they all have very significantly high positive KPI with the highest KPI obtained for medicines. That means two possible things: the specialists ask only the richest for the "informal payments" and the official fees don't apply to the poorest for any reason or the poorest just renounce to go to hospital (transport cost, treatment cost...). However, if we use the other hospital expenditure variable (expenditure during the last stay) the concentration curves of hospital expenditure such as staff payments lie inside the Lorenz curve indicating a regressivity of those components (see appendix 6). That means that in cross-section, if one compares the expenditure of all patients in a hospital at one point, the richest pay much less than the poorest to the doctors in proportion of their ability-to-pay (in relative value), whereas when one takes into account the fact that they benefit from more hospitalizations, it becomes "progressive" (in

10 This is even more probable nowadays in the capital Dushanbe where most of the public facilities have the right to charge official fees since 2008 decree. This decree allows them to be partially self-financed.

relative value), which contradicts the hypothesis of an informally redistributive mechanism due to benevolent doctors, made by many researchers (Falkingham, Habibov, Schwartz…). But in both cases, in absolute value the informal financing system is pro-poor: the curves are always under the 45° equality line meaning that the poorest never pay more than the richest.

In more details, the most progressive component is the medicine one. Hospitals are facing a shortage of medicines, but in the same time they are supposed to provide them according to the law. This may be an adjustment variable: the hospitals provide sometimes the medication when the patient is very poor[11]. The least progressive one is the staff payments (fee for service, mostly informal, even in the officially not free institutions, you are not supposed to pay directly to the doctor, unless this is the most common practice). This result also diminishes the credibility of the hypothesis of price discrimination. This is very interesting to notice that the most informal part of expenditure that we expected to be the most flexible and indexed to ability-to-pay is actually the least flexible. The habit of "thanking" the doctor is a social norm that imposes more rigid fees than the more formal expenditure...

The other method of concentration index computation results in very similar coefficient estimations, and confidence intervals are approximately similar as well, which indicates a good robustness of our estimations and of the significance[12].

Table 4: Synthesis of concentration indexes and KPI obtained by bootstrap

Variables	component	Concentration index (BTS s.e.)	confidence interval	KPI (BTS s.e.)	confidence interval
Consumption aggregate		**0.3977**	.3727969 .4226485	-	-
		0.0127			
Total ambulatory month expenditure		**0.4319**	.3685829 .4951319	0.0341	-.032426 .1006953
		0.0323		0.0340	
	transport costs	**0.5634**	.4547889 .6719376	**0.1656**	.0508735 .2804075
		0.0554		0.0586	
	service	**0.4720**	.349655	0.0743	-.0577566

11 This is indeed what the author has observed at least in Badakhshan region and in Dushanbe. In some cases, when a patient comes with a certificate issued by the head of community (*djamoat*) saying he is poor, then the hospital takes in charge a part of treatment costs. But what about corruption to obtain those certificate?

12 According to the covariance method, we obtain the same statistical significance of all indexes and very similar estimations : 0.398 ; 0.432 ; 0.797 and 0.675 (total health expenditure). With the convenient regression we find slightly different estimations : 0.376 ; 0.444 ; 0.756 and 0.658

	fees		.5943476		.2063138
		0.0624		0.0674	
	medicines	**0.3711**	.3062642 .4358606	-0.0267	-.0981487 .0448281
		0.0331		0.0365	
Total hospital month expenditure		**0.7968**	.7459631 .8476885	**0.3991**	.3541729 .4440333
		0.0260		0.0229	
	official fees	**0.7747**	.7083801 .8409598	**0.3769**	.3147702 .4391243
		0.0338		0.0317	
	staff payments	**0.7256**	.6644003 .7868137	**0.3279**	.2719843 .3837843
		0.0312		0.0285	
	other costs	**0.7894**	.7157902 .8630746	**0.3917**	.311191 .4722284
		0.0376		0.0411	
	medicines	**0.8194**	.74597 .8927684	**0.4216**	.3563137 .4869792
		0.0374		0.0333	
Total health expenditure (monthly)		**0.6753**	.6172157 .7334118	**0.2776**	.2245972 .3306357
		0.0296		0.0271	

To conclude this part, we can say that the apparent strong progressivity of hospital expenditure is probably the reflection of different utilization of care. To assess whether this different access to care is inequitable taking into account the need for care, we now turn to a measure of horizontal equity in access.

4. **Horizontal inequity in consumption of healthcare**

4.1. The concentration of need-standardized healthcare utilization

According to the table below and the comparison between non-standardized and standardized concentration curves (appendix), the standardization reduces slightly the difference across quintile, meaning that the poorest use less than needed. The comparison between the use of ambulatory services and its standardized utilization shows a very small difference in terms of concentration, like the table (2.2) shows it, the indirect standardization for demographic variables does not change so much the percentage of utilization in each quintile, maybe because the variables are very little correlated to the

income. It has to be noticed that the utilization of ambulatory services takes into account the pharmacy and not only outpatient consultation. It explains that the utilization of ambulatory facilities is not so unequal; most of people seek for help but don't use the same quality of care depending on their income. As a whole 4 percentage points difference after standardization does not seem to reveal so much horizontal inequality in terms of utilization.

Table 5a: The distribution of standardized use of ambulatory services

Quintile	Actual utilization of ambulatory care	Need-predicted utilization of ambulatory care	Need-standardized utilization of ambulatory care
1	0.0426089	0.0563342	0.0435771
2	0.0520162	0.0553362	0.0538943
3	0.0564686	0.0573207	0.0561242
4	0.062382	0.0568173	0.0624076
5	0.0787347	0.0603786	0.0753982

Table 5b: The distribution of standardized use of hospital services

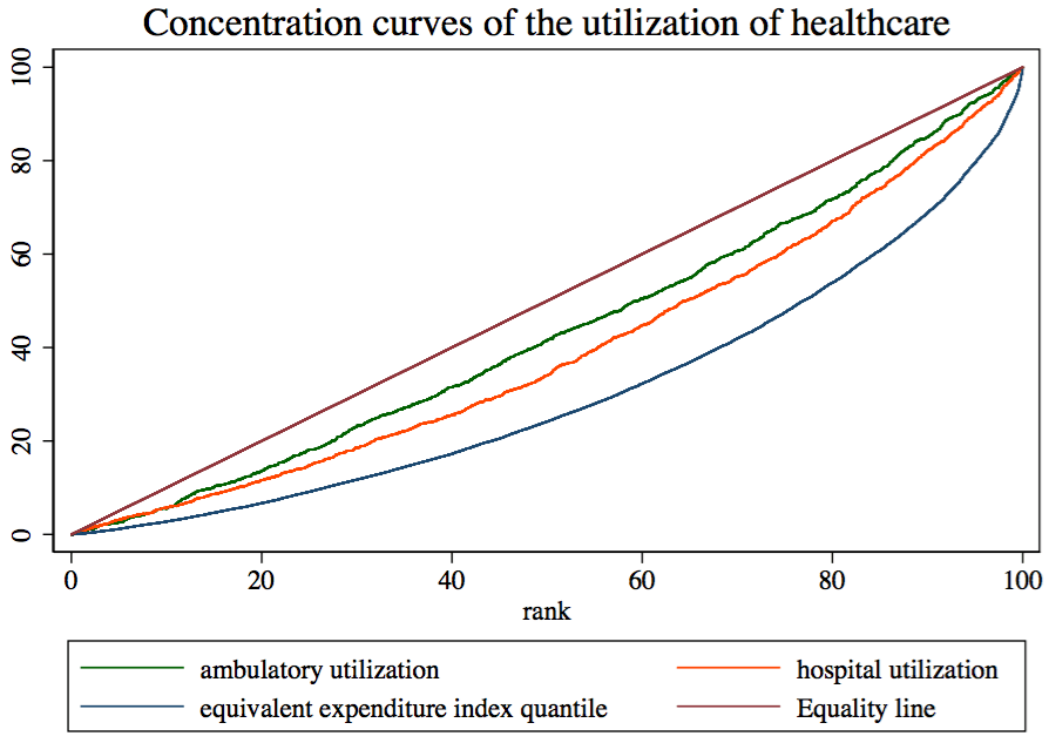
Quintile	Actual utilization of hospital care	Need-predicted utilization of hospital care	Need-standardized utilization of hospital care
1	0.03	0.05	0.04
2	0.04	0.05	0.04
3	0.05	0.05	0.05
4	0.05	0.05	0.05
5	0.09	0.06	0.08

Source: TLSS 2007
Population: all individuals ranked by household income

The comparison between standardized utilization of ambulatory services and standardized utilization of hospital services shows that the hospital care is even less used by the poorest than ambulatory, which is coherent with the result about chronic disease concentration. If the poorest are less often sick, they logically use less hospital care. But it could also explain the surprising result of a better health among the poorest: in most of the cases the poorest (especially in remote area) don't go to the hospital and are not aware about their disease

(explaining the lack of diagnosis and declaration then) except in the extreme cases, when too obvious symptoms appear.

Graph 5: Comparison of the use of the two types of facilities



Source: TLSS 2007
Population: all individuals

Once healthcare utilization has been standardized for need, one can measure inequity by the concentration index. The concentration index of the self-assessed variable is not significant, suggesting an equal distribution of "good or bad" subjective health among the population. All other concentration indexes are significantly positive, revealing an unequal distribution of declared chronic disease, and unequal distribution of consumption. This inequality is pro-rich, the poorest access less to the healthcare system whatever the type of facilities (out-patient or in-patient), the in-patient healthcare being more inequitable, though. But the poorest seem to need less, since they have on average less often a chronic disease than the richest. This can probably be explained by a least number of diagnoses among the poorest than among the richest, since they are less often going to a specialist. Concerning the concentration of utilization of hospital services, once standardized, the utilization of care by poor is significantly lower than the utilization by the richest. Also a difference appears

between ambulatory and hospital in terms if horizontal inequity of access: the concentration index of hospital utilization is significantly higher than the concentration index of ambulatory and the one of needs. Hospital has a more unequal access than ambulatory: some people from lower quantiles are likely to go less to hospital than richer people with the same needs, whereas the difference in ambulatory is lower. Horizontal inequity is stronger in terms of access to hospital than access to ambulatory, which might correspond to a least flexible price fixing by the specialists than by the primary care doctors, but which might also correspond to geographical inaccessibility of the hospital in a country like Tajikistan, where roads and infrastructure are poorly developed.

Also, one can notice that the two concentration curves of having a chronic disease and seek help in ambulatory the last 4 weeks are almost confounded: quintile share of chronic disease patients is equivalent to quintile share of utilization of ambulatory (but not to share of hospital utilization). This is either due to the diagnosis effect, mentioned herebefore or because most of the people knowing they have a chronic disease are observing the prescription and going to ambulatory consultation on a regular basis. This also shows that the ambulatory facilities are more accessible to the majority of people. Indeed in remote area, the first hospital is very often far away, several hours of cars on unsafe roads, then the rural health center or the policlinic are the most accessible.

Table 6: Horizontal Equity measure, concentration indexes

	CI (covariance method)	Concentration index (BTS convenient reg)	BTS s.e.	Confidence interval
Chronic disease	**10.6**	**7.85**	1.32	[5.26 ; 10.44]
Utilization of ambulatory care	**12.1**	**9.28**	1.91	[5.54 ; 13.02]
Utilization of hospital care	**20.6**	**17.66**	1.56	[14.61 ; 20.71]

4.2. Decomposition of the horizontal equity index (concentration index of healthcare access)

The decomposition consists in computing the elasticity of health variable to each factor of inequality to the health variables and the partial concentration index linked to it. The contribution of each explanatory variable to total inequality is the product of elasticity and partial index.

First, we need to run a regression to estimate the β_k . Our model is not very fitting and does not explain a big part of the variation of health expenditure. Probably due to the fact there

are so many "non users" (expenditure = 0). Thus, the decomposition of the concentration index of health expenditure is not very accurate; the error term is higher than the total contribution of the regressors. (The results for the decomposition of the health expenditure variable are not reported here, because of the weakness of the explanatory power of the model).

Table 7: Regression of health variables on the main explanatory variables

	(1) Utilization of ambulatory care	(2) Utilization of hospital care
Consumption aggregate p.c.	0.000 (3.71)***	0.000 (4.71)***
classeage==1	-0.179 (2.08)**	0.003 (0.42)
classeage==2	0.049 (0.65)	0.034 (3.98)***
classeage==3	-0.023 (0.29)	0.033 (3.67)***
classeage==4	0.144 (1.97)**	0.027 (3.38)***
classeage==5	0.263 (3.88)***	0.032 (3.82)***
sex	0.224 (6.86)***	0.021 (6.95)***
educ==1	0.034 (0.62)	0.018 (2.77)***
educ==2	0.029 (0.47)	0.014 (2.11)**
educ==3	-0.004 (0.05)	0.011 (1.12)
having a member abroad currently	0.021 (0.33)	0.005 (0.92)
having no migrant in the last 3 years	0.001 (0.01)	0.003 (0.98)
educ_m==1	-0.012 (0.29)	-0.001 (0.15)
educ_m==2	0.024 (0.44)	0.006 (1.24)
educ_m==3	0.089 (0.55)	0.048 (1.50)
Sogd	0.105 (1.03)	0.034 (4.13)***
Khatlon	0.026 (0.26)	0.015 (1.97)**
Gbao	-0.173 (1.55)	0.060 (4.02)***
RRP	-0.089 (0.83)	0.023 (2.74)***
urban	0.035	0.001

	(0.40)	(0.25)
chronic disease	0.381	0.117
	(6.90)***	(10.75)***
self assessed health status 1 - very good	-0.639	-0.031
	(2.05)**	(2.43)**
sah2	-0.680	-0.067
	(2.22)**	(1.23)
sah3	-0.358	-0.021
	(1.15)	(1.13)
sah4	-0.085	0.004
	(0.26)	(0.12)
presence of hospital	-0.026	0.002
	(0.35)	(0.53)
presence of polyclinic	0.061	0.009
	(1.26)	(2.37)**
presence of feldsher	0.080	0.005
	(1.39)	(1.32)
Presence of ambulance	0.038	0.001
	(0.54)	(0.19)
Presence of women's consultation	0.067	-0.012
	(1.25)	(3.05)***
drugstore	0.036	0.004
	(0.65)	(1.04)
dentist	-0.062	-0.001
	(0.80)	(0.16)
Child doctor	-0.057	-0.007
	(1.19)	(1.96)**
Constant	-1.410	
	(4.25)***	
R^2	0. 36	0.37
N	23,456	23,456

The regressions (1) and (2) of table 5 are the first step of the following decomposition. In regression (1), one can notice the strong significance of consumption aggregate, sex, old age, and health status on access to ambulatory care estimator (and often a high elasticity). However, in table 8, one can see that the main contributor to inequality is actually consumption aggregate (wealth), due to the fact that sex and ages are quite equally distributed. Surprisingly, concerning the inequality in access to hospital, the consumption aggregate plays a lower role. Even if socioeconomic status is a strong explanation to the utilization of hospital care, it is a lower contributor to inequality, because there are a greater number of significant factors (especially health status and geographical variables). This may be explained by the fact that people, as we see and hear in Tajikistan, are waiting the moment when their health status is that bad that they need to go to hospital instead of going straight to outpatient care. Probably for two reasons: because they need to pay anyway the

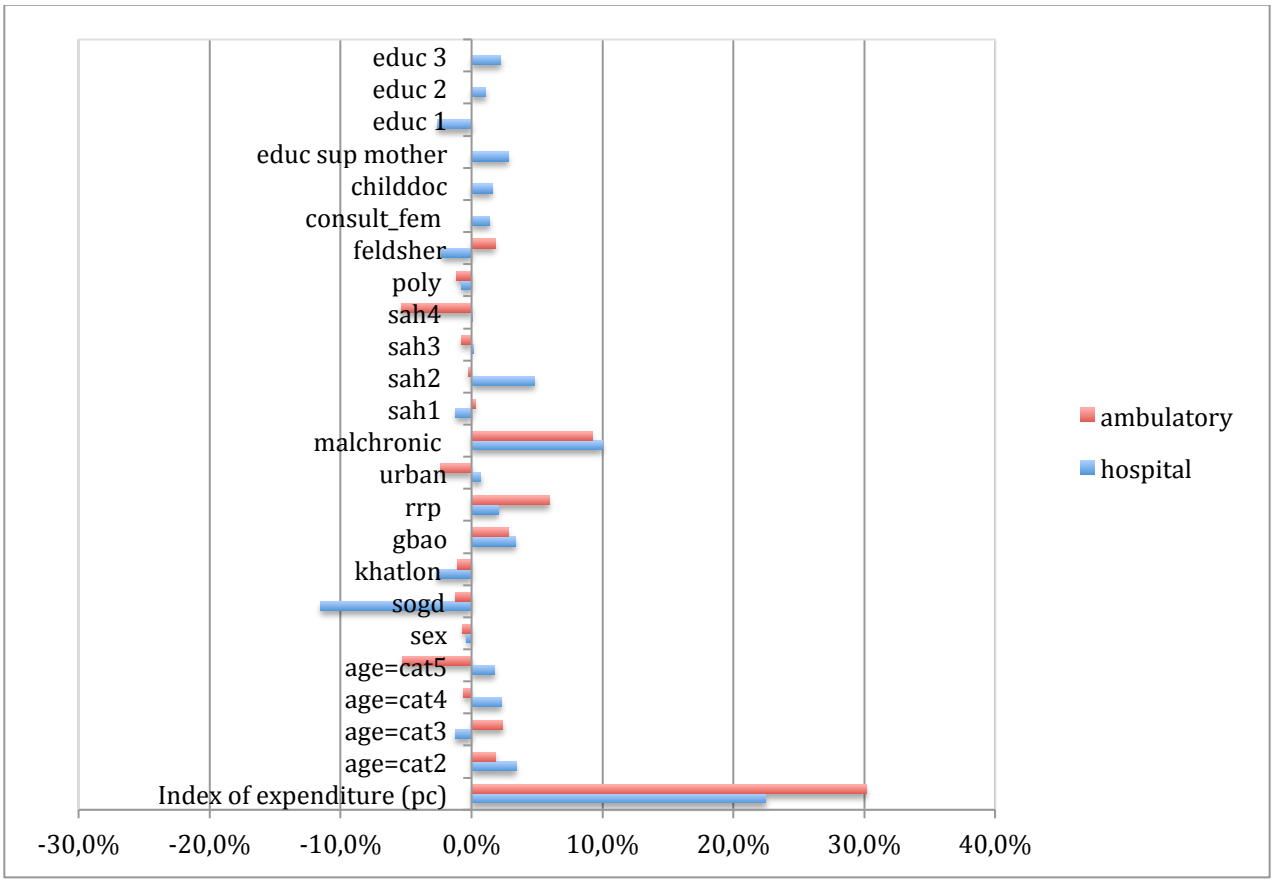
doctor they prefer to wait to see if it is worsening and secondly, because they are still influenced by the soviet mentalities, according to which secondary care and specialists were much better and often priority. Then at this stage of the illness, cares are more intense, more expensive (as the concentration curve of expenditure shows) and less efficient.

The result of this decomposition is much more interesting than the decomposition of concentration index of health expenditure, first because our sum of contributions explains a bigger part of the total inequality and secondly, because the variable is less endogenous (cf appendix 7).

Table 8: The decomposition of concentration index of utilization of care

	Utilization of ambulatory facilities			Utilization of hospital		
variable	elasticity	CI	pct contribution	elasticity	CI	pct contribution
Index of expenditure (pc)	0,09	0,40	30,2%	0,12	0,40	22,4%
age=cat2				0,11	0,07	3,4%
age=cat3				0,09	-0,03	-1,3%
age=cat4	0,04	0,06	1,9%	0,08	0,06	2,3%
age=cat5	0,07	0,04	2,4%	0,08	0,04	1,7%
sex	0,20	0,00	-0,6%	0,22	0,00	-0,4%
sogd	0,05	-0,12	-5,3%	0,20	-0,12	-11,5%
khatlon	0,02	-0,05	-0,7%	0,11	-0,05	-2,6%
gbao	-0,01	0,19	-1,2%	0,04	0,19	3,4%
rrp	-0,03	0,04	-1,1%	0,11	0,04	2,0%
urban	0,02	0,22	2,8%	0,01	0,22	0,7%
malchronic	0,07	0,11	5,9%	0,19	0,11	10,0%
sah1	-0,07	0,04	-2,3%	-0,06	0,04	-1,2%
sah2	-1,17	-0,01	9,2%	-1,03	-0,01	4,8%
sah3	-0,06	-0,01	0,3%	-0,05	-0,01	0,1%
sah4	0,00	0,14	-0,2%	0,00	0,14	0,1%
poly	0,04	-0,02	-0,8%	0,06	-0,02	-0,8%
feldsher	0,07	-0,09	-5,4%	0,05	-0,09	-2,3%
consult_fem	0,04	-0,04	-1,1%	-0,08	-0,04	1,4%
childdoc	-0,04	-0,05	1,8%	-0,07	-0,05	1,6%
educ sup mother				0,01	0,43	2,8%
educ 1				0,12	-0,04	-2,6%
2				0,12	0,02	1,1%
3				0,01	0,33	2,2%
Total explained			35,8%			37,4 %
CI			12 ,1%			20,5%

Graph 6 : Contribution of each explanatory variable to inequality of access (ambulatory and hospital)



6. **Discussion and conclusion**

Imputation

The imputation seems to work correctly, despite the small sample on which we estimate the equivalent-rent. The representativeness is satisfying except between urban and rural, it is slightly unbalanced towards urban compared to the population sample, since they have probably a clearer figure of the real rent in the neighborhood. The risk is to overestimate slightly the income of the rural households to which we impute the equivalent-rent (those who did not estimated their probable rent), and then overestimate slightly their income. It

might imply an underestimation of the inequality linked to income. Indeed if those rural households are actually poorer than the imputation of slightly higher estimated rent, they will be ranked higher in the distribution than they should be.

Hospital expenditure variable and consumption aggregate

The main limit of the results above could be the construction of the hospital expenditure per month and its role in the total equivalent consumption aggregate that we use as ability-to-pay variable to rank the households, aiming at approximating the income distribution. Indeed if the hospital expenditure are overestimated then by adding all expenditure as an index of wealth, it concentrates all the big users of healthcare among the richest and could artificially increases the progressivity pattern[13]. For example the graph 1 reveals a big discrepancy between the 9th and 10th decile, due to the fact that we take into account health expenditure in the estimation of wealth, all big payers in health are also concentrated in the 10th decile. But the table of renunciation to healthcare showing that the 80% poorest face a lot of problems to access the system and then consume less than needed support the idea that our variable is relevant. Especially since the change to "pre-care ability-to-pay" variable gives the same result in terms of renunciation[14].

The adequacy of our variable depends on whether the information about the number of hospitalization, by which we multiply the cost of the last stay, is reliable or not. Among the 1455 individuals declaring at least one hospitalization a year, there are 63 individuals declaring between 30 and 90 times of hospitalization. One can worry about the fact that they declared the number of nights passed in hospital instead of number of stays. If the Russian questionnaire is similar to the English one and without ambiguity ("how many times X was hospitalized overnight in the 12 past months"), the Tajik questionnaire is more ambiguous: "how many times X has been put in a hospital bed in the past 12 months" literally, even if this is an idiom, it might be ambiguous for some weak Tajik speakers[15]. Moreover, there is a small peak at 30 times (35 persons on 63), which might correspond to one month of hospitalization if they misunderstood. One can notice that it concerns only 0.5% of the sample, since 95% have not been hospitalized at all. For instance if someone with high expenditure claimed he has been hospitalized 90 times, because he understood 90 days, it increases consequently his health expenditure and wealth index in the same time. This may bias the data because he probably did not pay every day the declared sum of the last stay.

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13 For instance, if we take the variable as a simple aggregation of the costs of the last stay, we get a complete different pattern, revealing no progressivity in financing the hospital healthcare (payments seem proportional to income) and even very slightly regressive (at the bottom and top of distribution). See appendix 6 for the concentration curves.

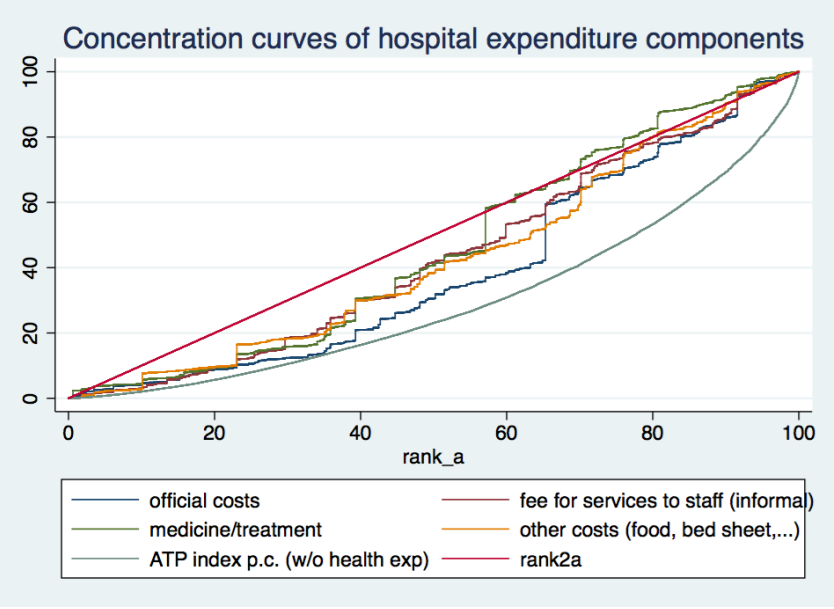
14 We also tried to create a variable by modelisation, which smooth a bit the extreme expenditure and then decrease their weight in the equivalent-income distribution we build. See in appendix 3 for more details.

15 In Tajikistan there are many different dialects and languages

To check to robustness of the results above, we made again the concentration curves without the extreme values of number of visits to hospital. The individuals with more than 30 visits have been dropped. It does not change the trend and the shape of the concentration curves of expenditure.

Including all health expenditure in the consumption aggregate or not?

Due to the same concern, someone can argue we should remove the health expenditure from the consumption aggregate, because of the correlation between the wealth ranking variable (based on consumption aggregate) and the health expenditure. We argue that someone who can pay for his health might be considered as richer in this constrained context. First, the health expenditure represents only 7% of total expenditure. Secondly not taking into account the health expenditure in the consumption aggregate has a quite important effect on distribution (see appendix 6: concentration curves based on another variable "pre-care ability to pay"). Indeed, the rank of the big consumers of healthcare changes, we consider them as poorer. However, among consumers, health is a big budget item, so some of them probably renounce to other budget item and restrain themselves to consume. Therefore, if we do not take health expenditure into account we under-estimate widely their standard of living. This is also an argument in favor of building an consumption aggregate instead of a consumption index as it has been done in the literature. Indeed, it allows us to minimize the importance of health expenditure and consumption in the wealth index by adding some estimation of the expenditure for durable goods.



Concentration of needs

Concerning the concentration of needs, we choose the variable "chronic disease", probably a bit more objective than the SAH. The concentration curve is under the Lorenz and the concentration index significantly different from zero, revealing a slightly unequal distribution of chronic disease, pro-poor: the poorest are slightly less often suffering from chronic disease than the richest. This might be due to two reasons. Either the poorest underdeclare a chronic disease, because they simply had not been diagnosed since, they go less often to healthcare services, or the construction of our equivalent expenditure variable concentrated the biggest healthcare users in the highest decile.

Bootstrapping

Here the bootstrap is replicated 200 times, usually recommended to provide a good inference. As Deaton[16] wrote (1987) using bootstrap in complex design implies to run a number of replications lower than the number of clusters per strata. In TLSS data the number of clusters varies a lot across strata. So, as a test, the bootstrap methodology has also been implemented by using the smallest number of clusters you can find in the strata. The results are coherent with the table 4. The same concentration indexes and progressivity indexes are significant; the confidence intervals are only slightly different. Most of the time, they are bigger when they are not significant and tighter when they are significant. The estimated values of the concentration indexes are also very similar to those computed thanks to the "convenient regression". The estimation of the concentration indexes and KPI and their statistical inference estimation seem to be robust. However there is a remaining question about the relevance of the bootstrap method in complex design.

Conclusion

Concerning households' out-of-pocket, the progressivity index indicates a strong progressivity in hospital financing (almost only the richest pay) and neither progressivity, nor regressivity in ambulatory expenditure. Concerning fee-for-service expenditure in ambulatory, there is no evidence of a positive price discrimination coming from the doctors, and in hospital those under-the-table payments are among the least progressive. They are even regressive, when we take the expenditure of last stay in hospital.

Concerning the utilization of ambulatory services (including pharmacy, rural health center, home consultation, polyclinic...), after standardizing for demographic characteristics, such as age, sex, chronic disease and functional limitations, by means of an indirect standardization method, we observe a significant horizontal inequity. The poorest 20% concentrate less than 20% of utilization of care for (at least) a same level of needs.

16 Indeed, a complex design implies that one bootstraps stratum by stratum and resamples not the households but the clusters in each stratum.

Concerning the concentration of utilization of hospital services, once standardized, the utilization of care by poor is significantly lower than the utilization by the richest. Horizontal inequity peculiarly occurs in terms of access to hospital, which might correspond to a least flexible price fixing by the specialists than by the primary care doctors, but which might also correspond to geographical inaccessibility of the hospital in a country like Tajikistan, where roads and infrastructure are poorly developed. If one looks at the incremental difference (number of visit once started to use the facilities) then one can notice that the gap is deeper. The descriptive statistics about healthcare renunciation advocate the existence of horizontal inequality as well.

To summarize, the "illusory" progressivity in hospital financing is actually explained by the inequality of access (either geographical or socio-economic) and the healthcare renunciation by some vulnerable population. Indeed, we observe a horizontal inequity especially in terms of access to hospital, explained by the huge burden that hospital represents for the poorest, according to the measure of hospital expenditure as a share of income. We cannot exclude the supply factor (or geographical inequality), which will be further explored in another paper. However, to determine more specifically the role of each factor we considered a decomposition of the concentration index, and income is clearly the biggest contributor, even if there are differences in intensity of the contribution between ambulatory and hospital expenditure.

To explore further the different contribution of each factor to the "illusory" progressivity, we also consider to run a regression controlling for the type of services, the number of visits and other characteristics and quality factors of services, conditionally to the fact of using facilities (two-parts model). If the consumption aggregate was significant, that would mean that the richest pay more for a same service. Then that would be possible to further explore the role of doctors in differentiating the prices, and to distinguish between the qualitative aspect of access and the quantitative aspect of access.

In a nutshell, this paper showed that there is no free access mainly due to small daily corruption. This is the strong inequity in access mainly explained by wealth index, which explains the "illusory progressivity" of the system. This result contradicts the famous hypothesis of "benevolent doctors" organizing an informal system of redistribution (in 2007). If the variables tell different stories depending on how they are built, what is sure is the inequity of the system.

Appendices

Appendix 1: The construction of the consumption aggregate (wealth indicator)

Habibov (2008, 2011) chose to use the current consumption index (sum of current consumption expenditure for non durable goods) as an indicator of the ability-to-pay (ATP) and to rank the households, because this is known to be more reliable data than income data in developing countries. Tajikistan belongs to that category of countries where the household sources of income are diverse and mainly informal. For instance the level of remittances from migrants is estimated to reach 49.6%[17] of GDP in 2013. Many households rely on one son's wage in Russia, completed by small informal jobs (selling products, spare taxi courses) and by autoconsumption mostly in rural areas thanks to vegetable patch. The informal sector is estimated to cover more than 42%[18] of the workers; the declaration of income is not a common practice. In this context, the questions on their last expenditure for consumption are more indicative than asking them how much is their income.

However, current consumption index underestimates the discrepancy of ability-to-pay for healthcare between rural and urban areas[19], and it gives a greater place to the health expenditure included into the consumption index, which can bias the consumption aggregate distribution. Indeed durable goods are varying a lot across the regions, for instance the type of accommodation, which has to be taken into account. The consumption expenditure linked to the accommodation is not relevant: in cross section some of them have just bought a house, other have it from inheritance or are building it. So, this paper tries to improve the capture of the ability-to-pay by including a rent-equivalent expenditure in the computation of the ability-to-pay. As we don't have the data for all the households, we proceed to an imputation, based on the regression of the "potential rent" they could charge if they rented their home, on the characteristics of the households and the accommodation. We focus on the group of households for which the interviewer said "the equivalent rent seems accurate", which reduces sharply the subsample (20% of the population) but provides an estimation of better quality (R^2 higher than 30%). The subsample is quite representative of the entire population, except in terms of area: there are a little bit more urban than rural, which can slightly bias the estimation. In urban areas, people have a more precise idea of the real rent. The risk is to overestimate a little the equivalent-rent of the rural areas out of the "accurate" subsample. We estimate the equivalent rent with the following linear model:

$$R_i = \alpha + \beta X_i + \varepsilon_i,$$

where R is the equivalent rent, X a vector of accommodation characteristics such as dummies of type of accommodation (urban, flat, roof and floor materials...), dummies of

17 World Bank estimations, http://data.worldbank.org/indicator/BX.TRF.PWKR.DT.GD.ZS (consulted July 31st 2015).

18 According to the estimations of the author on the sample of workers declaring a job and income in 2007 TLSS, measured by means of the strictest definition of informal work, intersection of the 3 criteria given by ILO (no official employment contract, micro-enterprise and no social security affiliation).

19 If we include autoconsumption equivalent expenditure, the risk is to overestimate the average income in rural areas. So we decided to take into account only the actual expenditure.

regions, the presence of heating system, bath, terrace, elevator, garage, dummy of the proximity of school, categorical variable of density of population and education of the head of household.

Based on this regression, we predict the equivalent-rent on a subsample of accurate self-assessment and impute the prediction to those who does not have an accurate self-assessment or no self-assessment at all, according to the deterministic method of imputation.

We opted for the deterministic imputation method instead of random imputation method. Indeed the random simulation generates important error terms based on the normal distribution characterized by the mean and variance obtained by regression. Because the sample is small and the values quite spread, the generated error terms are very spread and often highly negative which implies too many negative equivalent-rent while added to the βX_i predicted by the regression model. It pulls down the equivalent rent and the estimation of ATP in the end. The descriptive statistics obtained with this method are not coherent at all with the national statistics.

The representativeness of the subsample of "accurate estimation of rent" (according to the interviewer) has been checked.

Besides the equivalent-rent, concerning the other current consumption expenditure, we eventually decided to exclude the energy bill because it seems to overestimate the ability-to-pay of GBAO (because of the bad estimation of the quantity used and the price, in this region where the winter is very cold, they have huge expenditure in energy. However this is mostly autoconsumption (collected wood) and households are asked to give the equivalent in Somoni. The mean is 6 times higher than in Dushanbe. Then adding this energy expenditure would underestimate the living standards in the capital Dushanbe where the access to health is the easiest and overestimate the ability to pay in the remote rural areas of GBAO.

Finally, we chose to use a measure of the total equivalent expenditure per capita instead of dividing by unities of consumption not only because this is what has been done in the existing literature (N. Habibov, 2009) (Deaton, 1997) but also because in order to build the consumption aggregate, we started from the individual level, and sum the individuals' expenditure in each households to get the total expenditure per households (*collapse* command). Indeed, dividing by unity of consumption (u.c.) might create a bias by giving more weight to adults than to children. However the priority may be given to different members depending on the social background of the households. For instance, if the priority to care is given to children and pregnant women in poor households, they will have less weight because of the u.c. computation and their expenditure would weight less, and they will be considered as poorer (positive bias). If we divide by the number of people, maybe we don't take into account the economy of scale in the very big family but at least

we do not introduce a bias correlated to the socio-economic characteristics such as quintile, for example. Another bias would be to overestimate the expenditure and income of the households where several members are sick and big consumers of care, since we would sum the individual expenditure but would divide by less than the number of members. Also we do not have the complete information to compute the value of the weight for each member and we cannot use those computed in other countries because of the singularity of the Tajik context.

Appendix 2 : Hospital expenditure and ambulatory expenditure variables

The estimation of hospital expenditure based on the information we have is a bit problematic. None of the estimations are perfectly satisfying, neither taking the last bill and dividing it by 12 (strongly underestimating), nor multiplying it by the number of times the patient has been to hospital and dividing by 12. For instance in the case of a chronic disease, there might be sometimes some arrangement made, especially in a country where so much social and economic mechanism and transaction are informal. Some patients may not pay the same amount each time when their health status requires many hospitalizations in absence of insurance. They may not necessarily pay the same amount for medicines, if they still have some pills left. Nevertheless, concerning the "fee for service" to the doctor, qualitative data tend to prove that you pay every time a similar small amount for the service.

There is a double risk with our variable "monthly hospital expenditure": to increase artificially the inequality between the 10% richest and the others if there are arrangement, and also, to consider the big consumers of health as "very rich" (the richest) because their declared spending for healthcare added to the total equivalent consumption aggregate bring them to the top 10 of the distribution. Some of them are from poor rural regions; they are not especially from capital elite. In the same time we can consider that health is a luxury good in Tajikistan and if they can afford that expensive healthcare, they are rich. Anyway, this is partly a "parti-pris" (meaning we take the responsibility for our own choice). In the context of restricted information we have about it, we opted for the measure taking into account the number of visits (see in appendix 3 for an alternative variable). As a matter of fact, the distribution of pre-care ability-to-pay - the consumption aggregate including equivalent-rent and excluding health expenditure - plotted on the deciles of total consumption aggregate per capita is reassuring: the 10^{th} decile of consumption aggregate (including health) has also the greatest ability-to-pay excluding healthcare payments (graph 1). This measure of wealth (consumption aggregate including health) gives coherent distribution of ability-to-pay (consumption aggregate excluding health expenditure). On the graph below, we plot also the Total consumption index, which includes autoconsumption

and excludes equivalent-rent, to compare the distribution of consumption and consumption aggregate.

The other health expenditure variable is the ambulatory expenditure (out-patient consultations, pharmacy, medicines prescribed or not, laboratory test, cost of transportation to the ambulatory facilities...) per month. Hereafter are the components. The transport cost component is based on the question "How much did ... spend on travel to the consultation the last time it was needed during the last 4 weeks? - Cost one way". We compute the total transportation cost as follow: twice the number of visits times the last one-way transportation cost ($y\_tr = 2*(nb\_visits)*x\_tr$). The service "fees" component is based on the question "How much did ... pay for these services, including payments for laboratory tests and all consultations in the 4 weeks?" , so we add it without transformation. The component "medication prescribed and not prescribed" is based on two questions: "during the 4 last weeks, has … been prescribed any medication by a doctor? - How much did ... pay for this medication?" Then we simply add it. The ambulatory expenditure variable is the sum of those transformed transportation cost, untransformed fee-for-service and untransformed medication costs.

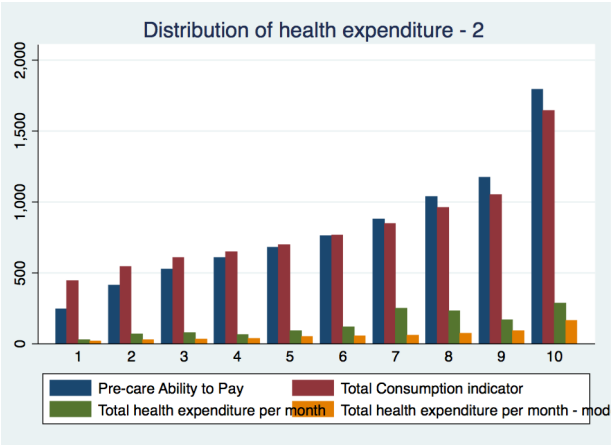
Appendix 3: Modelised health expenditure variable and its distribution

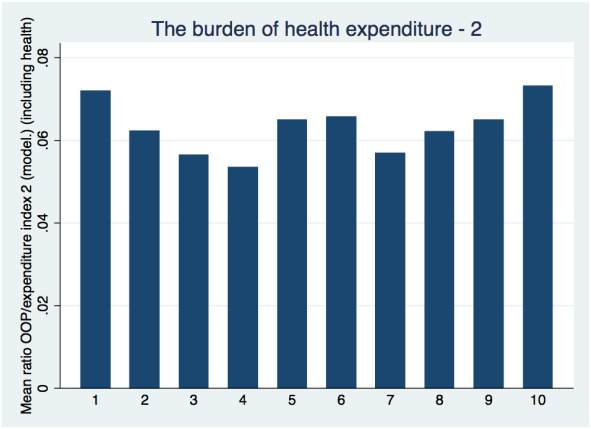
We also tried to create a variable by modelisation (in orange on the graph), which smooth a bit the extreme expenditure and then decrease their weight in the equivalent-income distribution we build:

$$y^* = 1/12 \, . \, [X_i + (n-1). \sqrt{(X_i)}]$$

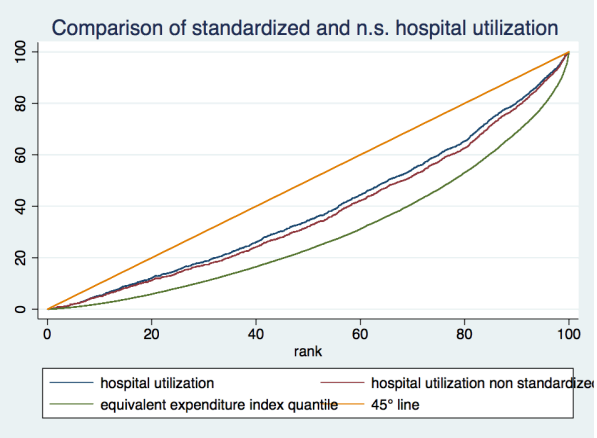
The idea is to give less importance to the number of visits in the computation of hospital expenditure and reduce the risk of overestimating the wealth of someone going very often to the hospital or who misunderstood the question. The limit and the risk of this modelised variable are this time underestimating some extreme cases of catastrophic spending: 5 hospitalizations for example in private hospital or with a very famous doctor very demanding or an operation very technical, implying the use of technology... However those extreme cases are located in Khatlon surprisingly where there is no hi-tech hospital (none of those case in Dushanbe...). So it might be either some misreporting by one of the interviewer or a huge case of corruption. Somehow, there is no reason neither to arbitrary drop the observation of "catastrophic" use of hospital, that is why we preferred to use the normal

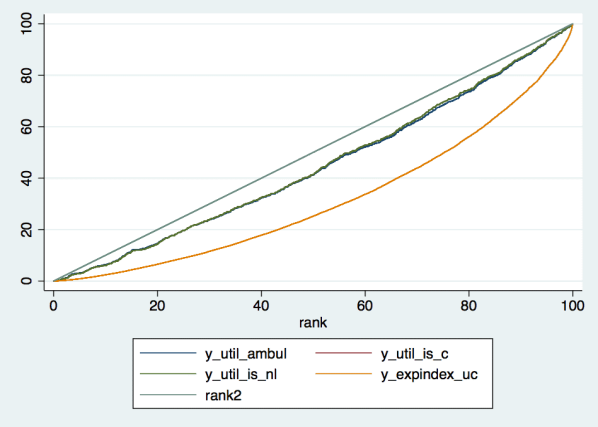
On the graph hereafter, we use the modelized estimation of total hospital expenditure in the variable consumption aggregate (decile): the discrepancy between deciles is smoothed and the importance of the health expenditure in total expenditure is reduced. The distribution of health burden gets a smoothed U shape, indicating an almost equal burden across decile.





Appendix 4: Standardized versus non standardized utilization of care





Appendix 5: Healthcare renunciation

Here is the table of column percent, to compare with the row percent table, without the structure effect in the questions with filter. Indeed the fifth quintile is less represented among people who did not seek for help or go to hospital, then they are structurally less represented in the questions induced by the previous one.

During the last 12 months, finding money to pay for health care for the members was...

Impossible	3.41	2.29	1.74	3.09	1.54	2.41
Difficult	35.11	36.28	35.24	32.13	31.83	34.10
Not difficult	13.64	14.98	17.72	19.46	26.29	18.46
No one has needed health care	47.83	46.46	45.30	45.32	40.34	45.03
Total	100	100	100	100	100	100

In the past 12 months, how many times has someone in your household been ill but did not seek for help

Once	26.48	19.72	19.72	15.13	14.62	18.91
Twice	12.47	12.98	9.99	11.51	6.84	10.65
Three	5.96	4.11	5.90	3.71	3.03	4.49
Four +	3.75	4.86	3.46	5.30	4.28	4.34
None	51.33	58.33	60.94	64.35	71.23	61.62
Total	100	100	100	100	100	100

What was the reason for delaying or not seeking help ?

Thought they would get better without doing anything	21.30	25.39	26.55	16.19	17.24	21.62
Thought they would get better using traditional herbs	11.85	8.48	11.06	12.24	16.47	11.80
Thought they would get better using pharmaceuticals they already had	17.92	22.11	24.70	29.72	28.35	24.13
Could not afford to pay	39.66	39.08	33.26	34.67	31.74	35.99
It was too far away	6.79	3.25	3.58	5.41	2.61	4.44
Other	2.48	1.68	0.84	1.77	3.58	2.02
Total	100	100	100	100	100	100

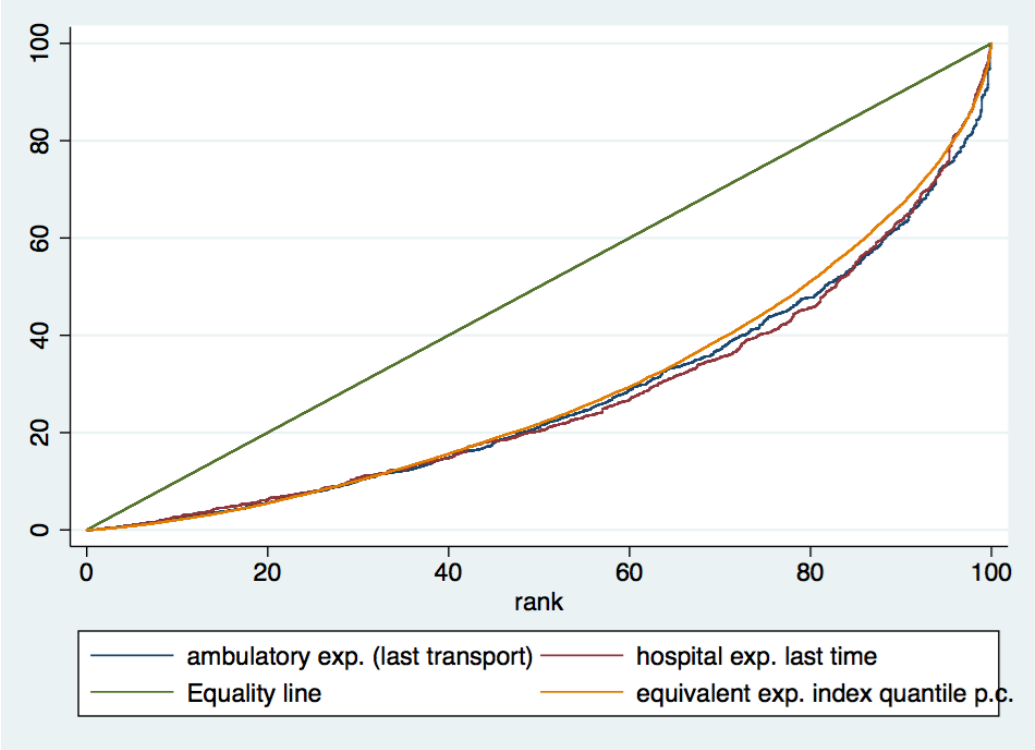
In the past 12 months, how many times has someone in your household been referred to the hospital but not gone?

Once	29.51	29.10	29.42	26.55	21.87	27.60
Twice	17.00	20.36	13.76	14.67	15.95	16.44
Three	4.76	3.93	4.58	8.21	3.50	4.99
Four +	4.37	2.91	3.09	5.65	1.88	3.63
None	44.36	43.70	49.15	44.92	56.80	47.34
Total	100	100	100	100	100	100

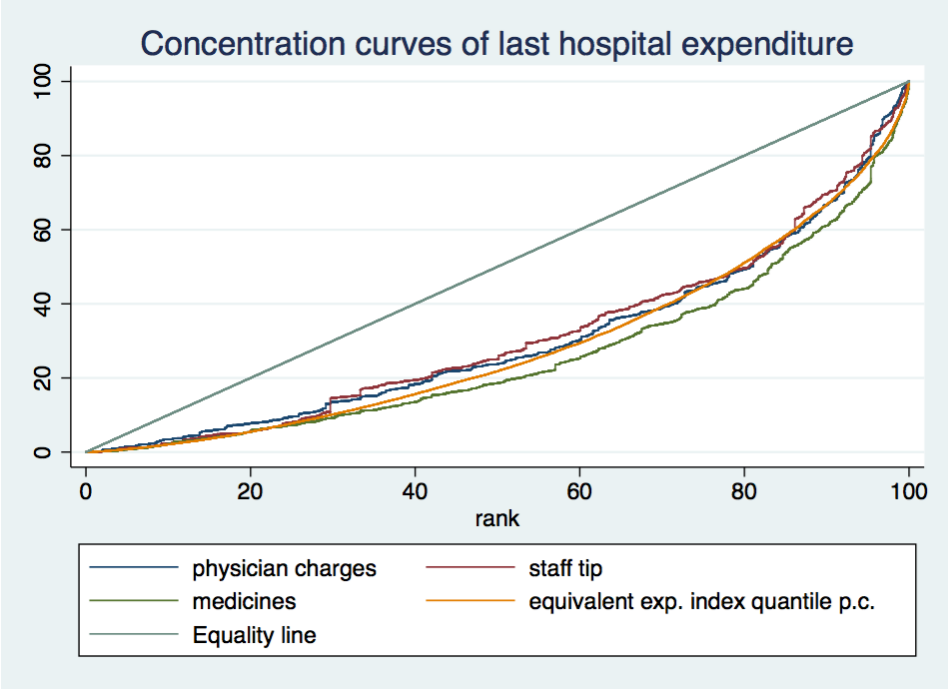
What was the main reason for not going to the hospital ?

Appendix 6: Concentration curves of health expenditure with the expenditure of the last stay in hospital

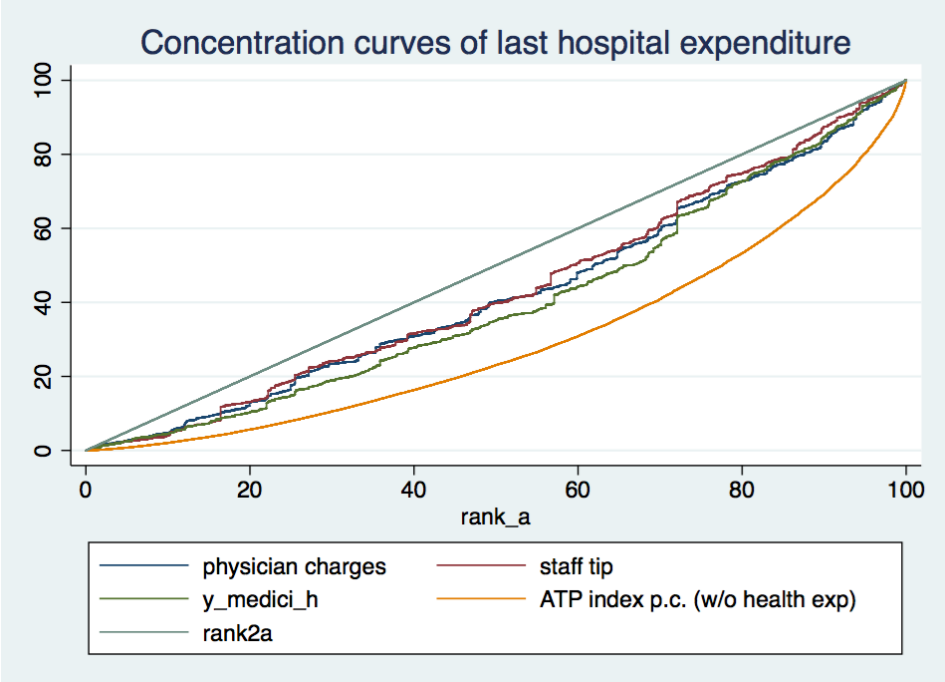
Here is the concentration curve obtained if one takes into account the simple aggregation of costs during the last stay in hospital, and ambulatory computed for the last stay. One can observe no progressivity pattern, but a distribution very close to the income distribution.



In more details, here are the concentration curves for each component of hospital expenditure. One can notice the regressivity of informal payments to staff.



Finally, if we look at the same hospital expenditure concentration curves but based on the "pre-care ability to pay" (consumption aggregate, without the health expenditure), it changes completely the results, showing a regressive pattern of the system. However, as we discuss it in paragraph 6, this is less likely to be robust.



Appendix 7: Concentration indexes decomposition

Total health expenditure CI decomposition	Ambulatory access CI decomposition	Hospital access CI decomposition
expindex_pc elasticity: 4.1740244	expindex_pc elasticity: .09134515	expindex_pc elasticity: .11605876
expindex_pc concentration index: .39777677	expindex_pc concentration index: .39777677	expindex_pc concentration index: .39777677
expindex_pc percentage contribution: 2.4583705	expindex_pc percentage contribution: .30152077	expindex_pc percentage contribution: .22445039
_Iclasseage_1 elasticity: -.02451047	_Iclasseage_1 elasticity: -.02832885	_Iclasseage_1 elasticity: .0053825
_Iclasseage_1 concentration index: .02818314	_Iclasseage_1 concentration index: .02818314	_Iclasseage_1 concentration index: .02818314
_Iclasseage_1 percentage contribution: -.00102281	_Iclasseage_1 percentage contribution: -.00662538	_Iclasseage_1 percentage contribution: .00073752
_Iclasseage_2 elasticity: -.0037373	_Iclasseage_2 elasticity: .01285133	_Iclasseage_2 elasticity: .10518048
_Iclasseage_2 concentration index: .06644916	_Iclasseage_2 concentration index: .06644916	_Iclasseage_2 concentration index: .06644916
_Iclasseage_2 percentage contribution: -.00036771	_Iclasseage_2 percentage contribution: .00708647	_Iclasseage_2 percentage contribution: .03398033
_Iclasseage_3 elasticity: .1093664	_Iclasseage_3 elasticity: -.00511791	_Iclasseage_3 elasticity: .09169791
_Iclasseage_3 concentration index: -.02808767	_Iclasseage_3 concentration index: -.02808767	_Iclasseage_3 concentration index: -.02808767
_Iclasseage_3 percentage contribution: -.00454834	_Iclasseage_3 percentage contribution: .00119289	_Iclasseage_3 percentage contribution: -.01252213
_Iclasseage_4 elasticity: .11982911	_Iclasseage_4 elasticity: .0401943	_Iclasseage_4 elasticity: .08389539
_Iclasseage_4 concentration index: .05590272	_Iclasseage_4 concentration index: .05590272	_Iclasseage_4 concentration index: .05590272
_Iclasseage_4 percentage contribution: .00991855	_Iclasseage_4 percentage contribution: .01864618	_Iclasseage_4 percentage contribution: .02280206
_Iclasseage_5 elasticity: .11131463	_Iclasseage_5 elasticity: .06637079	_Iclasseage_5 elasticity: .08249075
_Iclasseage_5 concentration index: .04356624	_Iclasseage_5 concentration index: .04356624	_Iclasseage_5 concentration index: .04356624
_Iclasseage_5 percentage contribution: .00718051	_Iclasseage_5 percentage contribution: .02399492	_Iclasseage_5 percentage contribution: .01747263
sex elasticity: .00035725	sex elasticity: .19517523	sex elasticity: .21562159
sex concentration index: -.00362982	sex concentration index: -.00362982	sex concentration index: -.00362982
sex percentage contribution: -1.920e-06	sex percentage contribution: -.00587899	sex percentage contribution: -.00380523
_Ieduc_1 elasticity: -.202789	_Ieduc_1 elasticity: .01989791	_Ieduc_1 elasticity: .12482665
_Ieduc_1 concentration index: -.04296603	_Ieduc_1 concentration index: -.04296603	_Ieduc_1 concentration index: -.04296603
_Ieduc_1 percentage contribution: .01290098	_Ieduc_1 percentage contribution: -.00709455	_Ieduc_1 percentage contribution: -.02607567
_Ieduc_2 elasticity: -.38939362	_Ieduc_2 elasticity: .02154372	_Ieduc_2 elasticity: .12247558
_Ieduc_2 concentration index: .01822061	_Ieduc_2 concentration index: .01822061	_Ieduc_2 concentration index: .01822061
_Ieduc_2 percentage	_Ieduc_2 percentage	_Ieduc_2 percentage

contribution: -.01050521

_Ieduc_3 elasticity: -.1239157
_Ieduc_3 concentration index: .32720525
_Ieduc_3 percentage contribution: -.06003431

I_fammig_2 elasticity: .0182776
I_fammig_2 concentration index: -.0082234
I_fammig_2 percentage contribution: -.00022255

I_fammig_0 elasticity: .0457573
I_fammig_0 concentration index: .0057413
I_fammig_0 percentage contribution: .00038898
_Ieduc_m_1 elasticity: -.06258805
_Ieduc_m_1 concentration index: .08189424
_Ieduc_m_1 percentage contribution: -.00758923
_Ieduc_m_2 elasticity: -.10815795
_Ieduc_m_2 concentration index: .10896611
_Ieduc_m_2 percentage contribution: -.0174503
_Ieduc_m_3 elasticity: -.02362046
_Ieduc_m_3 concentration index: .43112884
_Ieduc_m_3 percentage contribution: -.01507816

sgd elasticity: .25280571
sgd concentration index: -.11680208
sgd percentage contribution: -.04372103

khat elasticity: .63247978
khat concentration index: -.04808847
khat percentage contribution: -.045034

gbao elasticity: .01353159
gbao concentration index: .19097952
gbao percentage contribution: .00382638

rrp elasticity: .25327636
rrp concentration index: .03967868
rrp percentage contribution: .01488007

contribution: .00325744

_Ieduc_3 elasticity: -.00042918
_Ieduc_3 concentration index: .32720525
_Ieduc_3 percentage contribution: -.00116533

I_fammig_2 elasticity: .00497723
I_fammig_2 concentration index: -.0082234
I_fammig_2 percentage contribution: -.00033965

I_fammig_0 elasticity: .00059958
I_fammig_0 concentration index: .0057413
I_fammig_0 percentage contribution: .00002857
_Ieduc_m_1 elasticity: -.00376278
_Ieduc_m_1 concentration index: .08189424
_Ieduc_m_1 percentage contribution: -.00255714

_Ieduc_m_2 elasticity: .00479796
_Ieduc_m_2 concentration index: .10896611
_Ieduc_m_2 percentage contribution: .00433851

_Ieduc_m_3 elasticity: .00222
_Ieduc_m_3 concentration index: .43112884
_Ieduc_m_3 percentage contribution: .0079424

sgd elasticity: .05450666
sgd concentration index: -.11680208
sgd percentage contribution: -.05283144

khat elasticity: .0165045
khat concentration index: -.04808847
khat percentage contribution: -.00658621

gbao elasticity: -.00758784
gbao concentration index: .19097952
gbao percentage contribution: -.01202533

rrp elasticity: -.03264281
rrp concentration index: .03967868
rrp percentage contribution: -.01074823

contribution: .01084964

_Ieduc_3 elasticity: .01384088
_Ieduc_3 concentration index: .32720525
_Ieduc_3 percentage contribution: .02201846

I_fammig_2 elasticity: .01454783
I_fammig_2 concentration index: -.0082234
I_fammig_2 percentage contribution: -.00058164

I_fammig_0 elasticity: .04487278
I_fammig_0 concentration index: .0057413
I_fammig_0 percentage contribution: .00125255
_Ieduc_m_1 elasticity: -.00207093
_Ieduc_m_1 concentration index: .08189424
_Ieduc_m_1 percentage contribution: -.00082456

_Ieduc_m_2 elasticity: .0142359
_Ieduc_m_2 concentration index: .10896611
_Ieduc_m_2 percentage contribution: .00754187

_Ieduc_m_3 elasticity: .01343404
_Ieduc_m_3 concentration index: .43112884
_Ieduc_m_3 percentage contribution: .02815897

sgd elasticity: .20313514
sgd concentration index: -.11680208
sgd percentage contribution: -.11535559

khat elasticity: .11323176
khat concentration index: -.04808847
khat percentage contribution: -.02647355

gbao elasticity: .03626771
gbao concentration index: .19097952
gbao percentage contribution: .03367518

rrp elasticity: .10506785
rrp concentration index: .03967868
rrp percentage contribution: .0202689

urb elasticity: -.34269004
urb concentration index: .22118035
urb percentage contribution: -.11222793

malchro elasticity: .21265663
malchro concentration index: .10601167
malchro percentage contribution: .03337994

sah1 elasticity: -.12138643
sah1 concentration index: .03886822
sah1 percentage contribution: -.00698583

sah2 elasticity: -1.0194208
sah2 concentration index: -.00950521
sah2 percentage contribution: .01434724

sah3 elasticity: -.04976316
sah3 concentration index: -.00552486
sah3 percentage contribution: .00040708

sah4 elasticity: .0863535
sah4 concentration index: .13882062
sah4 percentage contribution: .01774953

hosp elasticity: .04369175
hosp concentration index: -.01169963
hosp percentage contribution: -.00075688

poly elasticity: -.07571978
poly concentration index: -.02433971
poly percentage contribution: .00272884

feldsher elasticity: .28848709
feldsher concentration index: -.08687991
feldsher percentage contribution: -.03711066

ambulance elasticity: .11265458
ambulance concentration index: -.07743194
ambulance percentage contribution: -.01291582

consult_fem elasticity: .0703979
consult_fem concentration index: -.03846295

urban elasticity: .01534382
urban concentration index: .22118035
urban percentage contribution: .02816258

malchronic elasticity: .06742164
malchronic concentration index: .10601167
malchronic percentage contribution: .05931238

sah1 elasticity: -.07267686
sah1 concentration index: .03886822
sah1 percentage contribution: -.02344138

sah2 elasticity: -1.1664916
sah2 concentration index: -.00950521
sah2 percentage contribution: .09201019

sah3 elasticity: -.05800617
sah3 concentration index: -.00552486
sah3 percentage contribution: .00265942

sah4 elasticity: -.00199636
sah4 concentration index: .13882062
sah4 percentage contribution: -.00229978

hosp elasticity: -.01540161
hosp concentration index: -.01169963
hosp percentage contribution: .00149531

poly elasticity: .03732738
poly concentration index: -.02433971
poly percentage contribution: -.00753937

feldsher elasticity: .07461498
feldsher concentration index: -.08687991
feldsher percentage contribution: -.05379448

ambulance elasticity: .0117759
ambulance concentration index: -.07743194
ambulance percentage contribution: -.0075667

consult_fem elasticity: .03519331
consult_fem concentration index: -.03846295

urban elasticity: .00658639
urban concentration index: .22118035
urban percentage contribution: .00708267

malchronic elasticity: .19380398
malchronic concentration index: .10601167
malchronic percentage contribution: .09988939

sah1 elasticity: -.06401011
sah1 concentration index: .03886822
sah1 percentage contribution: -.01209612

sah2 elasticity: -1.0343375
sah2 concentration index: -.00950521
sah2 percentage contribution: .04779992

sah3 elasticity: -.05208682
sah3 concentration index: -.00552486
sah3 percentage contribution: .00139911

sah4 elasticity: .00116913
sah4 concentration index: .13882062
sah4 percentage contribution: .00078908

hosp elasticity: .01610259
hosp concentration index: -.01169963
hosp percentage contribution: -.00091595

poly elasticity: .06456325
poly concentration index: -.02433971
poly percentage contribution: -.00764018

feldsher elasticity: .05362857
feldsher concentration index: -.08687991
feldsher percentage contribution: -.02265263

ambulance elasticity: .00422678
ambulance concentration index: -.07743194
ambulance percentage contribution: -.00159123

consult_fem elasticity: -.07521719
consult_fem concentration index: -.03846295

consult_fem percentage contribution: -.00400918	consult_fem percentage contribution: -.01123298	consult_fem percentage contribution: .01406574
drugstore elasticity: -.00921343 drugstore concentration index: .01489602 drugstore percentage contribution: -.00020321	drugstore elasticity: .03003868 drugstore concentration index: .01489602 drugstore percentage contribution: .00371316	drugstore elasticity: .03757214 drugstore concentration index: .01489602 drugstore percentage contribution: .00272107
dentist elasticity: -.1607545 dentist concentration index: -.02595144 dentist percentage contribution: .006177	dentist elasticity: -.03240194 dentist concentration index: -.02595144 dentist percentage contribution: .0069779	dentist elasticity: -.00465187 dentist concentration index: -.02595144 dentist percentage contribution: .00058694
childdoc elasticity: .04700704 childdoc concentration index: -.04922416 childdoc percentage contribution: -.00342605	childdoc elasticity: -.04411354 childdoc concentration index: -.04922416 childdoc percentage contribution: .01801949	childdoc elasticity: -.06533373 childdoc concentration index: -.04922416 childdoc percentage contribution: .01563575

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