Benefit Incidence Analysis of Health Spending in Cameroon

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Abstract
Equity in access and use of healthcare is an important objective for any health system and an essential prerequisite for achieving Universal Health Coverage for any country. This research examines to what extent health benefits are distributed throughout socio-economic groups and how the different types of providers contribute to inequity in health benefits in Cameroon. On the benefits of health across socio-economic groups is estimated by using the indices of concentration, the Kakwani indices and the curves of concentration. The benefits coming from three formal types of providers of health (public, private and ONG) are analyzed. The decomposition of the indices of concentration in types of providers helps to quantify the relative contribution of suppliers to the global distribution of benefits across the socio-economic groups. We use in this study, both the data of the last Cameroonian survey of households (ECAM4) and those of public expenditures on health of the Ministry of Health (NHA). The results show a global pro-poor distribution of health care benefits (CI= -0.201). The public providers appeared to be the most pro-poor with a concentration index of −0.224. NGO providers also favored the poorest people as shown in the concentration index of -0.170. Private providers is less pro-poor with a concentration index of − 0.151. The overall benefits of public health spending on health care providers are pro-poor in Cameroon, demonstrating that the authorities have a policy that targets the poorest segments of society. As it has been found that most people in the poorest segments of society have access to health services in public, private and NGOs health facilities, it is logical that the distribution of public spending on health care benefits the poor.

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The pro-poor distribution of probability in general healthcare utilization was attributable to the needs and non-needs factors (except hypertension and the 30-59 age group). Despite the provision of free services by public healthcare providers, our analysis found that the utilization rate of public healthcare provider services remains low compared to that of private provider.

Consequently, considering that less persons belonging to disadvantaged economic groups have access to health care in public health provider facilities, compared to healthcare of private provider service, it is essential that the funding and implementation authorities invest more in public health facilities, so that to benefit the smallest economically lower number of society. Moreover, measures should be initiated to improve the quality of service delivery, with a view to improving the rate of utilization of government services amongst the poorest. On the other hand, interventions should be made to reduce the household economic burden of major illnesses.

Key Words: Benefit Incidence Analysis, Concentration Curve, equity in health benefits, Cameroon
1. Introduction

Equity in the access and the use of health care is an important objective for any health system and an essential prerequisite for the realization of the cover of universal health (CUH) for any country. However, in several low income countries, and with average income, socio-economically disadvantaged persons; generally despite their highest needs in health care, use in a lesser measure the medical services than the individuals with higher income; which thus ends with inequality in the health care (Akazili et al. 2012; Mtei et al. 2012).

The supply and demand of a health system may contribute to the iniquity in the distribution of health benefits. The health care in the low income countries and in average incomes countries are generally furnished conjointly by a melange of health providers. In Cameroon, the services of health are formally made of a mixture of public, private, and ONG ((Minister of health, 2012). Concerning the fourniture of health care by the public installations, the users of cares often pay for a low amount of user money. The demanders of cares to private suppliers are required to pay for relatively high amount of money coming from their pockets, and as such, these fournishers are not accessible to several persons with a low income. This mixer of different fournishers creates a certain number of factors on the side of supply which could create conditions which increase iniquity.

From the demand side, the behavior of the demander of health care varies often through socio-economic groups. This is often linked with a variation in the degree of conscience for health, the physical health installations, and the economic privation, etc. (Gwatkin et al. 2005; Amin et al. 2010; Muriithi 2013).

Cameroon is a country with a large economic disparity, where 37.5% of the 20 millions citizens leave below the poverty threshold (INS, 2014). Moreover, 82.48% of persons depend on the informal sector of the economy with only unstable incomes while only 17.52% of the total population is connected to the formal sector of the economy (INS, 2014). Given the conditions of the supply and the demand of the health system in Cameroon, there is a strong reason to believe that iniquity in the benefits of health care could be considerable.

To realize the universal cover of health (CUS), all the persons should have an equitable access to health care considering the need without financial privation. A dimension of progress towards the realization of the CUS is the degree of iniquity in the health benefits across socio-economic groups. Given that the poorest segments of society are generally more in the need of medical cares, the distribution of real benefits should probably favor this population group. Thus, the degree of the progress of the CUS is reflected not only in the relative distribution of the benefits accumulated relative to the absolute need for the health care in all the socio-economic segments. As a consequence, the need for this study is to examine the relative difference in the health benefit across the socio-economic groups with the aim to identify the weaknesses concerning equity in the health system, which would thus permit to inform the policies and programs which would aim to realize the cover of universal health.
Research questions

To which extent the benefits coming from health services, are distributed throughout socioeconomic groups in Cameroon?
How the benefits coming from different types of providers contribute to the equity of the health system in Cameroon?

Reason and Objectives of the Study

These days in Cameroon, data is missing on socioeconomic relative to the inequalities and iniquities in the use and the provision of health care, and the benefits of public expenditures. In order to have efficient pro poor public expenditures, pro poor policies should be put in place. Moreover, those who decide should be better informed both on those who benefit from public expenditures and how policies may be developed to reduce inequalities in the health system.

This study aims to examine to which extent the benefits coming from health services in monetary terms, are distributed throughout socioeconomic groups and how the benefits coming from different types of providers finally contribute to the equity of the health system in Cameroon.

After the introduction in section 1, section 2 presents the Cameroon’s health system while section 3 provides a brief review of literature. The section 4 describes the methodology of the study. The data used in the study are presented in section 5. Section 6 provides the empirical results of the study and Section 7 draws conclusions and policy implications.

2. The Cameroonian health system

In the following paragraphs, we briefly present Cameroon's health system in order to provide contextual understanding of the distribution of health care benefits across socio-economic groups and its contribution to equity and hence movement towards universal health coverage.

Cameroon's health system comprises various public and private entities, institutions and organizations that provide health services to the population. The Ministry of Public Health is responsible for the maintenance of all public health services in Cameroon. The public health sector is the main provider of health care in Cameroon. The private sector (non-profit and for-profit), traditional medicine and traditional Chinese medicine are also available in the country. The main sources of funding for health care come from government, public enterprises, foreign aid donors, private enterprises, households, religious missions and non-governmental organizations (NGOs) (MoHC, 2012). Cameroon spends about 5.5% of its GDP on health care to improve infrastructure and obtain new medical equipment (MoHC, 2012).

The public health sector in Cameroon is in place to provide the general population with cheap healthcare services and medications. The Cameroonian health system is divided into three levels: Central (strategic), intermediate (technical) and peripheral (operational). Health services in Cameroon are provided by hospitals and clinics. The country has 178
health districts and 162 district hospitals, of which only 154 are operational. In addition, Cameroon has 2,043 public health care facilities, mostly concentrated in urban areas of the country (MoHC, 2012).

1) Public sector health care mainly includes curative, preventive, promotional and rehabilitative services, while the private sector provides mainly for-profit curative services. NGOs mainly provide preventive and basic care to underserved populations. The private sector, despite limited infrastructure, employs more health care providers than the public sector.

Private health care is also available in Cameroon. However, patients must pay for all medical services used in private medical facilities, and the cost of treatment can be much higher than with equivalent procedures obtained through the public sector. As a result, only those who can afford private health care are entitled to services in this sector.

Health care financing is strongly influenced by direct payments (households), which account for 70.42% of the country's total health expenditure (MoHC, 2012). Public facilities are accessible to all in principle. However, public and private providers and NGOs observe different socio-economic patterns in the use of health care, which may be related to the distribution of benefits of health services across different socio-economic groups.

3. Brief Review of the literature

As concerns Cameroon, the literature on the Benefit incidence analysis of public spending in health in Cameroon is very scarce. Under these conditions, we will only review below a few of those studies related to this theme and conducted in other countries.

The shocks of health could increase the vulnerability of households and perturb their bread winner. To make health services usable, many countries adopt a system of universal and subventioned health care, with the pre-hypothesis that the poor are those who benefit the most from the importance of an equitable distribution of the benefits of public health subventions, which come from the fact that without adequate access to health services, vulnerable households could go to the payments of their pockets, which would increase the risk of becoming poor if the payments are substantial and for prolonged periods (For a recent review of literature on the economic impacts of health shocks on households in low and middle income countries, see Alma and Mahal (2014)).

In a transversal study of 11 Asiatic countries, Van Doorslaer et al. (2006) have examined whether the country payments of health care reinforced poverty. They found that the estimates of poverty after having taken into account the pocket payments for health were much higher than the conventional estimates, which went from 1.2% more population in Vietnam to 3.8% in Bangladesh.

In a recent study, Rashad and Sharaf (2015) have found the empirical evidence according to which, the health expenditures coming from pockets have pushed 6% of the Egyptians households to know the financial catastrophe and 7.4% of the households have fallen below the poverty threshold after having controlled for health spending. They also found that rural
households are more susceptible to experience catastrophic health expenditures when they are compared with urban households.

Several studies have examined the distribution of the benefits coming from the subventions of public health in a vast number of countries with mixed results. For example, in a study of a transversal cut of countries, O’Donnell et al. (2007) have reported substantial variations in the incidence of the public subventions of health, across 11 Asiatic countries. The study revealed that the subvention of public health is strongly poor in Hong-Kong, slightly pro poor in Malaysia and in Thailand, equally distributed in Sri Lanka, whereas it is moderately pro rich in Vietnam. In the rest of countries with low incomes and the provinces examined, the rich receive more substantially the subvention than the poor.

In another transversal study of 59 countries, Wagstaff et al. (2014) have estimated the pro poor character of the government health expenditures at different levels of revenues. They found that on the average, government health expenditures are pro riches. At the level of the country, and in the majority of the countries, the government health expenditures is neither pro rich nor pro poor, whereas in a little minority it is pro riches and again in a small minority, it is pro poor. Moreover, the government health expenditures on the private installations contracted are pro rich for all the types of healthcare and in almost all the Asiatic countries; all the government expenditures on health are significantly pro rich. Moreover, they found that at the level of the country, the pro poor character of the government expenditures on health are positively correlated with the GDP per capita, with the government health expenditures per person and to the six measures of the quality of governance of a country, while it is negatively correlated to the share of revenues and to the share of the revenues of governmental installations coming from the redevances (of the costs of utilization) per user.

In addition to the studies in a transversal cut of the country, an increasing number of specific studies in the country have examined the distribution and the aspects of the equity of the public subventions of health in a large number of countries, during the different periods, and by using different evaluation techniques, and have led to the also mixtes conclusions like in the transversal studies above (e.g., Alam et Ajay (2014), Akazili et al. (2012), Burger et al. (2012), Limwattananon (2012), Chen et al. (2015)). For example, Akazili et al. (2012) have conducted an analysis of financial incidences and of the benefits of the health services in Ghana, and have found that the system of financing of medical cares is progressive whereas the distribution of the total benefits of health services both public and private, is pro riches. However, the treatment of hospitalized sick people at the level of the hospitals of the district, are pro poor and the benefits of medical services at the primary level are relatively equally distributed. The study also reported a certain number of constraints of access which contribute to the iniquities in the distribution of the benefits of health services in Ghana.

In another study, Limwattananon et al. (2014) found that the public subventions to medical cares, both outpatient (OP) and inpatient (IP) services to public hospitals and health facilities, in Thailand was pro-poor between 2003 and 2009, which preferentially benefited the poorer quintiles.
Burger et al. (2012) examined whether public health expenditures and access to health services in South Africa have become pro poor between 1993 and 2008, with an increase on the part of public clinics and the expenditures of hospitals going to the poor. Moreover, they noticed ameliorations in access both financial and physical services of public health which have significantly helped the poor households who are the most frequent users of public hospitals and clinics, than those who are richer.

Onwujekwe et al. (2012) have found the evidence that although the cover of the health services of priority public health was well under the cibles levels in Nigeria, the poorest quintiles and the rural residents who are in the greatest need have received more net benefits of the provision of these health’s services.

By using the analysis of the incidence of benefits (AIB), Anselmi et al. (2015) have evaluated horizontal and vertical equity in the geographic allocation of recurrent expenditures for outpatient healthcare across the districts of Mozambique between 2008 and 2011. They found a pro rich distribution of governmental expenditures brought by the use of pro rich services. Although amelioration towards horizontal and vertical equity in government expenditures and of donors, took place between 2008 and 2011, the iniquities in the distribution of expenditures across the beneficiaries have persisted and were conducted by the iniquities in the use of the service.

In a recent study, Chen et al. (2015) examined how the benefits of governmental subventions to health care in China are distributed. By using the analysis of the incidence of benefits (AIB), these authors found an inequitable distribution of the government subventions of health during the period 2002-2007, where individuals with high incomes generally win the greater benefits of the subventioned health. Although the greater subventions of health were concentrated among the rich and did not demonstrate the effects reducing inequality in the different regions during the years studied, some policy reforms along with the decrease in out-of pocket-payments and the rising allocation of government healthcare resources to healthcare facilities widened access and improved the opportunity to receive healthcare benefits all of which reduced inequity.

4. Methodology

The analysis of the incidence of benefits (AIB) with the index of concentration (IC), the curve of concentration and the index of Kakwani (IK) will be used to measure the size of equity in this study.

4.1 The Analysis of the Incidence of Benefits (AIB)

The analysis of the incidence of benefits (AIBs) is mainly to conceived and to connect the public expenditures of the public services with the members of the households who have used it. This technique has been used to estimate the benefits of healthcare, thus profiting to individuals through socioeconomic groups (McIntyre and Ataguba 2012). Historically, the methodology AIB has been used to analyze the expenditures of the system of public health,
and their performances in terms of equity; and in practice, to improve the efficiency and equity in order to correct the failures of the market, and to increase social welfare (De Walle and Kimberly Nead 1995). However very recently, the AIB has started to be applied to evaluate the global equity of health systems as concerns both the public and private providers (Ataguba and McIntyre 2012).

The approach of the incidence benefits (AIB), also called the classical approach or non comportmental approach, and has opened the way in its use by two studies of the World Bank conducted by Selowasky (1979) and Mermen (1979). Later on, this methodology was used by several authors to analyze the incidence of governmental expenditures (see for example, Chris and Patrinios (2004), Castro-Leal et al. (2000), Jorge (2001) and Sabir (2003)).

The advantage of the incidence analysis of the benefits is that, it allows to focus on important problems such as: how do the programs of public expenditures efficiently target the poor by focusing itself on the different rates of using the goods and services furnished publically?

We will follow the approach of Demery (2000) to carry the analysis of the incidence of benefits in this research. This approach has three main steps to calculate the incidence of benefits:

1) Obtain the estimates of the unit cost or subvention implied by the provision of a particular public service. The data for this step usually come from the accounts of public expenditures. For example, the data of the budget on the cost per patient of subvention by level of establish of health.

2) To impute the subventions to the individual or household identified as user of the service by using the available information on the access to the service by the different groups of income. For example, visits to establishments of health such as reported by the different households in the surveys of consumption expenditures ordered by the level of income of the poor and the rich.

3) Aggregate the individuals or households into ordonnated groups of income by income or any grouping of interests such as the race or the gender, to distribute the benefits among the different groups and to arrive to an estimate of the incidence of the per capita subventions coming back to each group.

These steps may be transformed into mathematical equations as follows:

The subvention of the specific public service received by an individual is given by the following equation:

\[ S_k = q_k C_k - f_k \]  \hspace{1cm} (1)

Where, \( S_k \) represents the subvention received by the individual on the service \( k \), \( q_k \) indicates the quantity of service \( k \) used by the individual, \( C_k \) represents the unit cost of furnishing \( k \) in the region where the individual resides, \( f_k \) represents the amount paid for \( k \) by the individual.

\[ S_j = \sum_{i=1}^{i} H_{ij} E_{ij} = \sum_{i=1}^{i} \frac{H_{ij}}{H_i} E_{ij} \]  \hspace{1cm} (2)

Where \( S_j \) is the value of the total subvention of health imputed to group \( j \), \( H_{ij} \) representing the number of the visits of the health of the group \( j \) in the installations of health at the level of \( i \) (i representing the hospitals/clinics, etc.), \( H_i \) is the total number of such
visits (across all the groups) and \( E_i \) represents the public expenditures on health (with the other costs and the other costs of retrenched establishment). Let us note that \( \frac{E_i}{H_i} \) is the unitary subvention of financing of consultation at the level \( i \) the share of the total subvention to health \( E_i \) coming back to the group is given by:

\[
S_i = \sum_{i=1}^{n} \frac{H_i}{E_i} \left( \frac{E_i}{E} \right) = \sum_{i=1}^{n} b_i e_i
\]  

(3)

Clearly, this part (and in effect global inequality in the incidence of benefits) is the determination of two closed factors: the share of the group in the total of the consultation of health at each level of the installation \( b_i \) and the share of each level of the health cares in the total expenditures of health \( e_i \). The value reflects the decision of the health cares of the household while the health of the household \( e_i \) reflects the allocation of public expenditures.

In this study, benefit incidence analysis uses the constant unit cost method to allocate public health expenditures to households. This method considers the sum of individual fees and public subsidies as constant; thus, all royalties paid for the use of public services result in a reduction of the public subsidy received\(^2\).

4.2 Concentration index and concentration curve

4.2.1 Concentration index

Having estimated the total amount of the subsidies received by every individual in the sample, the next step will be to examine the distribution of the subsidies through the various quintile of income. A concentration index\(^3\) will be used to determine whether the subsidies in the health care are pro poor or pro rich.

The concentration index (CI) is a quantification of the degree of economic related inequality in the variable of interest. The calculation of the CI is given by the equation (4):

\[ IC = \frac{\sum (x_i - \bar{x}) \cdot (y_i - \bar{y})}{\sum (x_i - \bar{x})^2} \]

In general, the benefit incidence analysis uses three different methods for allocating government health expenditure to households, invoking three different assumptions that are described in detail in Wagstaff (2011). The first, the constant unit cost assumption, treats the sum of individual fees and government subsidies as constant, and thus any fees paid when using public services results in a reduction in the government subsidy received. The second, the constant unit subsidy assumption, allocates the same subsidy to each unit of service used, irrespective of the fees paid. Finally, the third, the proportional unit cost assumption, makes the cost of care proportional to the fees paid, which implies that the government subsidy received increases as the fees paid increases.

There are several measures of inequality, but as suggested by Wagstaff et al. (1991), any measure of inequality should meet three minimum requirements: (i) it should reflect the experiences of the entire population, rather than the extremes of social class; (ii) the measure of inequality should be sensitive to changes in the distribution of the population between socio-economic groups; and (iii) the measure of inequality should present socio-economic characteristics to inequalities in health.

IC is one of the few measures that meet this criterion suggested by Wagstaff et al. (1991). Given its usefulness not only for quantifying health inequities, but also for breaking down the contribution of various factors to health inequities, we used CI to examine socio-economic related inequality in the distribution of health care providers across the population of Cameroon.
\[ CI = \frac{2}{\mu} COV (S, W) \]  \hspace{1cm} (4)

In Equation (4), \( S \) is the amount of the subsidy received by individual \( i \) and \( \mu \) is its mean, while \( W \) is a measure of living standard. The concentration index depends on the covariance between the amount of the subsidy received and its association with the measure of living standard.

A positive CI indicates pro-rich distribution of subsidies, and a negative CI reflects pro-poor distribution. The higher the absolute value of the CI, the greater is the degree of concentration of subsidies among the economic group. CI of subsidies could get more pro-poor either due to low utilization of public health facilities by the rich or higher concentration of user fees among the rich.

**Decomposition of Concentration Index**

Inequality can be further explained by decomposing the concentration index into its determining components. Decomposition methods can enable researchers to quantify each determinant’s true contribution to measured income-related inequality with the controlling of other determinants.

In this study, we will use the method proposed by Wagstaff et al. (1991) to decompose the socio-economic inequality in healthcare providers. A decomposition method has an advantage over linear and non-linear regression models as it allows one to estimate the relative contribution of factors to inequality in a health variable (e.g., the gap between poor and rich). For a linear additive regression model; the total providers \( Y_i \) variable is presented in terms of the intercept \( \alpha \), the relative contribution of \( \bar{X}_k \) factors and residual error term \( \epsilon_i \) in equation (5) below

\[
Y_i = \alpha + \sum_k \beta_k \bar{X}_k + \epsilon_i \quad (5)
\]

From the equation (5), the concentration index \( Y_i, C \), can be written as equation (6)

\[
C = \sum_k \left( \frac{\beta_k \bar{X}_k}{\mu} \right) C_k + \frac{GC_e}{\mu} \quad (6)
\]

Equation (6) shows that overall inequality in all providers has two components, i.e., deterministic or “explained” and “unexplained”. In equation (6), the quantity \( \beta_k \) denotes the regression coefficient of all providers variable on determinant \( k \), \( \bar{X}_k \) is the mean of the determinant \( k \), \( \mu \) is the mean of all providers index; \( C_k \) is the concentration index for determinant \( k \) and \( GC_e \) denotes the generalised concentration index for the error term.

The explained component in equation (6) is equal to a weighted sum of the concentration indices of the regressors where the weights are simply the elasticities (elasticity is a unit-free measure of (partial) association, i.e. the percentage change in the dependent variable associated with a percentage change in the explanatory variable). However, the unexplained
component reflects inequality in all providers across socio-economic groups which cannot be explained by the selected predictors (Hosseinpoor, Van Doorslaer, Speybroeck et al., 2006).

4.2.2 The concentration curve

In addition to the CI, the concentration curve will be used to illustrate the share of subsidies received by cumulative proportions of individuals in the population across the income distribution.

Davoodi, Tiongson, and Asawanuchit (2003) provide a theoretical framework for analyzing the incidence of the benefits (AIB) of public expenditures and of the targeting by using the curves of concentration.

*Figure 1* Concentration Curves and Public Expenditure Benefit Incidence

A curve of concentration is derived starting from the tracings of the net fiscal incidence on y-axis (axis of the ordinates) and the cumulative tracings of the quintiles of per capita consumptions of the population on the axis of abscissas (axis of the xs).

The progressivity or regressivity of a public expenditure is analyzed by comparing the curve of concentration of the benefits to the diagonal at 45%, as well as the curve of reference based on the revenue/consumption (see figure 1 below).
The neutrality of the incidence of benefits is represented by the diagonal line. She captures perfect equality in the distribution of benefits. If the curve of concentration of benefits lies above the 45% line, the benefits coming from the service provided by the public sector are said to be pro poor (Milanovic 1995; Sahn and Younger 1999, 2000; Demery 2000; Davoodi, Tiongson, and Asawanuchit 2003). Such a curve of concentration is concave rather than convex. According to the interpretation of the authors Davoodi, Tiongson, and Asawanuchit (2003), an implication of the concavity for the quintiles is that quintile Q1 exceeds quantile Q5 and that quantile Q1 is larger than 20 percent, this is to say that, the benefits of public expenditures go disproportionately to an inferior quintile in absolute terms and relative to their part in the population. Similarly, the benefits are said to be pro-riches when Q1 is inferior to Q5 or when the curve of concentration for the benefits lies below the 45% line.

To analyze the incidence of benefits consequently concerns the problem of the ciblage of public expenditures and of progressivity. Regarding the rule based on the fiscal Framework (fiscal responsability and management framework) there is an increasing reconnaissance of the ciblage as a tool to concentrate the benefits of public expenditures on the poorest segments, thus to reduce or to keep constant, the amount spent on tutelary goods; to reduce or to keep constant the amount spent on the tutelaires goods. Coady, Grosh and Hoddinott (2004) have interpreted the ciblage as a way to increase the efficiency of expenditures by increasing the benefits which the poor may have with a budget of a fixed program. At the first sight, a well-targeted program will appear as the one which will accomplish a minimal loss to the non poor, so that any transfer of resources will have the maximum impact on poor households (Mateus 1983, Grosh 1992).

Cornia and Stewart (1993) have made it remarqued that this could be incorrect for a number of reasons, including the administrative costs and the efficiency costs, political factors, and the other effects of general equilibrium, as well as the errors of ciblage. The reason for which the criteria of minimization of the loss would not be the good criterion resides from the existence of two errors – the omission errors of the poor of this program (type I), as well as the errors of inclusion of the non poor in this program (type II). Both of these errors which coexist with the ciblage cannot be captured by the analysis of the incidence of benefits (AIB).

Davoodi, Tiongson, and Asawanuchit (2003) have also cautioned that it was problematic to conclude that the ciblage which was more pro poor also the best ciblage; for example, to spend only a small amount on the poorest users is the most pro poor possible, but it could not be preferred at one distribution of more equilibrated benefits. Moreover, a health care universal or a universal public education is preferred at all the alternatives, despite the fact that it is not pro poor. It is not reasonable to conclude that more grand is the proportionate part of expenditures, better is the ciblage (Davoodi, Tiongson, et Asawanuchit 2003). In this regard, a point of reference less extreme than the ciblage is progressivity.

Figure 1 above provides three possible curves of concentration, namely: the line of equality (line of 45%) and the curve of reference of income or of consumption. The benefits issued from public expenditures are said to be progressive if the concentration curves of these benefits is above the curve of reference for the revenue or consumption, but below the 45%
degree line. A line of concentration which satisfies this criterion perhaps may be either convex or concave. A falling tendency from Q1 to Q5 (the parts of the quintile of the benefits to the poorest and to the richest) may be considered without equivoque as the evidence of progressivity.

Moreover, a public fourniture of a service is regressive when the benefits coming from the service are distributed less equally than the revenue or consumption. However, a tendency to the increase of Q1 to Q5 (the parts of the quintile of the benefit) cannot without ambiguity be considered as the proof of regresivity. In this case, additional informations are either necessary or on the Lorenz curve of the income or on the part of consumption or the income of each quintile. However, it is usually said that at first sight, it is said that public expenditures are regressive i.e the spending on Q1 is inferior to expenditures on Q5 when each of the expenditures is expressed as the fraction of income or when the curve of benefits lies below the curve of reference of the revenue or consumption. The theatrical framework for analyzing the incidence of benefits has weak points, for the results of the incidence of benefits represent a result « of equilibrium» of the decisions of the government and of the household and they do not specify the underlying model of the behavior of the government or of households (for more details, see Davoodi, Tiongson, and Asawanuchit 2003).

The IC and the concentration curve are powerful tools to estimate the distribution of subsidies of the health sector. However, the visual inspection of the concentration curve is not sufficient to conclude if the subsidies are pro rich or pro poor. A formal test of statistical dominance is necessary to definitively conclude if the subsidies to the health sector benefit more the poor people or not.

According to the dominance test of concentration curve, the concentration curve of outpatient care is statistically pro poor if at least a point of quintile for which a concentration curve of outpatient care is significantly situated above the 45% line, and there is not any point of quintile to which the line of 45%, lies above the concentration curve.

Besides the dominance test of concentration curve, we will also use the Kakwani’s progressivity index as test of robustness. This test evaluate if the subsidies to the health sector reduce inequality (weak progressivity) by comparing the distribution of income with the distribution of subsidies. The Kakwani’s progressivity index (KI), widely used in public finance; is defined by the following formula

\[ \eta_k = C - G \] (7)

Where, \( C \) is the concentration index of subsidies and \( G \) is the Gini coefficient for income (or consumption, expenditure) (Kakwani, 1997). \( C \) equals to -1 when the whole financial charge is concentrated in the hands of the poorest person, and 1 if the financial burden is concentrated in the hands of the richest person. \( G \) equals 0 where there is perfect income equality (every individual has the same income), and 1 where there is perfect income inequality (one individual has all the income whilst every other individual has zero income). The Gini coefficient is considered as the gold standard of the economic analysis of inequality assessment.
is positive in a progressive system and \( \eta_k \) is negative in a regressive system. The value of \( \eta_k \) range from -2 (= -1-G) in the most regressive system to +1 (= 1-G) in the most progressive system. Kakwani’s progressivity index at 0 means that the system is proportional and health payments account for the same proportion of income, irrespective of the individuals’ income (Wagstaff et Doorslaer, 2000).

In this research, Benefit Incidence and the concentration curves and indices were undertaken using both Stata and the Data Analysis Stata Package (DASP 2.3).

5. The Data

Data from Cameroon's fourth nationally representative household survey, ECAM4, is used in this study (National Institute of Statistics (NIS), 2014).

The ECAM 4 sample consists of 12,847 households drawn using a stratified two-stage random sampling design. The strata were obtained by combining the 12 survey regions with the place of residence (urban, semi-urban, and rural). A total of 32 survey strata were formed, including 12 urban (Yaoundé, Douala, and the urban strata of each of the 10 regions of the country), 10 semi-urban strata and 10 rural strata of one stratum per region. At first level, enumeration areas (EAs) are drawn independently in each stratum with a probability proportional to their size in number of households. A total of 1,024 ZDs are drawn, including 639 in the urban strata, 99 in the semi-urban strata and 286 in the rural strata. In the second degree, in each of the first-degree EAs, a sample of households is selected by the equal probability systematic draw procedure from the lists of households established at the time of enumeration. The number of households sampled by ZD is 10 in Douala and Yaoundé, 12 in the other urban strata and 15 in the semi-urban and rural strata (NIS) (2014).

ECAM4 data contain sociodemographic variables, household consumption expenditures, health care utilization of individuals, and health expenditures, plus other key variables for this study. These data provide us with an opportunity to observe the distribution of health service utilization across socioeconomic groups. To conduct the Benefit Incidence Analysis, we will use both the data of ECAM4 survey and those of the National Health Account (NHA) of Cameroon. Data on public spending on healthcare are computed from the Cameroonian National Health Accounts (NHA). Information on the utilization of the entire population of all types of healthcare, and all types of health facilities is coming from ECAM4 survey. The unit cost is assumed to be the same for a given type of provider of healthcare.

Defining and estimating the variables

Measurement of socio-economic status

There is a debate about the relevance of the different measures of socio-economic status (O’Donnell et al., 2008) for the analysis of health equity. However, according to studies

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4 The Data Analysis Stata Package is one of the recent methods of measuring benefit incidence. It was developed by Araar Abdelkrim and Jean Yves Duclos in 2007. Among the characteristics of this software is its ability to estimate the most popular statistics (indices, curves) used to analyze poverty, inequality, social well-being and equity, estimate differences in such statistics, estimate standard errors and confidence intervals taking full account of survey design, supports distributive analysis across multiple databases, executes Distributive composition procedures the most common, verify the ethical validity of distributive comparisons, unify the syntax and parameters used various estimation procedures for distributive analysis.
similar to our research (Akazili et al. 2012, Ataguba and McIntyre, 2012), and in the context of a developing country, we use in this study annual consumption expenditure per adult equivalent as a measure of socio-economic status. An alternative commonly used measure of socio-economic status is a composite socio-economic index. However, this index cannot be used to calculate progressivity indices (O'Donnell et al., 2008). The equivalence scale used by the National Institute of Statistics (INS) of Cameroon to construct the adult equivalent consumption expenditure, used in this work, is 1 for each adult and 0.5 for each child.

**Provider categories**

In the ECAM4 survey, one question asked was the following: In what type of care structure was he / she consulted? The modalities for the response are a First class hospital, a Regional Hospital, a District Hospital, a District Medical Center, an Integrated Health Center / Health Center, a Pharmacy, a Clinic / Medical Office, an Infirmary of the school, at the place of job; a Home / visit of doctor or personal health, At the traditional practitioner, a GIC / NGO Health, At the informal vendor of modern drugs, an Advice by phone and, an Other (to be specified). These thirteen categories of providers were recorded. In this study, those providers have been recoded into three broader categories, namely: i) public, ii) private and iii) NGO. Services from health workers and medical doctors in public hospitals and clinics were considered as public provision. Healthcare from medical doctors, practicing in private facilities (like, GP chambers, hospitals, clinics) were regarded as private provision. Finally, any services from medical staff (like, health workers, doctors) from NGO health facilities were classified as NGO provision.

**Healthcare utilization**

Healthcare utilization data are available in the ECAM4 survey at the individual level over the 30 days prior to the survey date. A maximum of two visits for healthcare were recorded in the survey. No distinction of out- and inpatient visits was made in the survey. For NGO providers, all services were assumed to be outpatient.

**Socioeconomic groups**

In keeping with the generally accepted convention, households were ranked from the poorest to richest according to their consumption expenditure per adult equivalent. We have chosen an adjusted version of the Oxford scale which assigns a coefficient of 1 to any adult 15 years old and more, and of 0.5 to children less than 15.

6. **Empirical results**

We present in this section the results of Benefit Incidence Analysis where benefits are defined in terms of consultation of different type of provider of public health services. Anyone who utilizes the tree different type of provider of public health facility is considered to be a beneficiary of public health subsidies. Benefit Incidence Analysis will reveal the percentage share of each socio-economic group in the total utilization of a particular provider health

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5 The widely used Oxford scale assigns a coefficient of 1 to the household head, of 0.7 to the other adults and of 0.5 to children less than 15 living in the household.
service. Based upon this information, we will be able to comment on whether the benefit of a particular provider of health service is more concentrated among the rich or the poor. We will also compute concentration indices and construct concentration curves for each type of provider. With the help of Dominance Testing, we will be able to conclude whether particular health service provider is pro-poor and progressive. Concentration indices and Kakwani Indices will also be reported to predict the extent to which these providers’ of health services are progressive and pro-poor. Finally, we will present the results of the decomposition analysis to assess to what extent each of the needs, non-needs and consumption factors contributes to the inequality in health care utilization.

Table 1 reports the rate of participation and the share of each wealth quintile in the public subsidies for public provider, private provider and NGOs provider, respectively.

Results show that, the utilization of public health provider remains low compared to that of private provider (See, Table 1). Private Service providers were used more frequently (9.86%) than public (8.14%) and ONG providers (1.4%) irrespective of the individual’s background characteristics. Despite the low utilization of public provider health services, public health spending seemed to be pro-poor in 2014. In fact, in the case of public provider, around 36.9 percent of public health spending going to the poorest households and only 8.2 percent to the richest. Concerning the private provider, around 48 percent of public health spending going to the poorest households and only 5.5 percent to the richest. Finally, concerning the NGOs provider, around 26.8 percent of public health spending going to the poorest households and only 13.8 percent to the richest. These results definitely show that poorer income groups benefitted more in terms of utilizing provider health spending than the richer income groups in 2014.

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6 The Benefit Incidence Analysis provides us estimates of the shares of public health subsidies accruing to various population groups ranked by their living standards. Likewise, the Utilization Incidence Analysis gives us estimates of the benefits in terms of the participation of each population group in the utilization of a particular public health service.

7 The result of the incidence of benefits can be presented; either as a simple percentage share of the total benefits accruing to each quintile, or by means of curves and concentration indices. This article presents two ways to clearly highlight the impact of benefits.

8 The individual participation rate for each type of service is calculated by dividing the actual number of users by the number of eligible members in the households. The larger the value of the participation rate, the greater the public service benefits received.

9 The share of benefits between quintiles is a useful way of presenting results to policy makers in order to express inequalities of benefits across socio-economic groups in a simple and visually attractive way (McIntyre, Ataguba, 2011).
Table 1: Benefit Incidence Analysis of Public Spending on Healthcare Providers

<table>
<thead>
<tr>
<th>Quintile</th>
<th>Public</th>
<th>Ong</th>
<th>Prive</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate of Participation</td>
<td>Share by Group</td>
<td>Rate of Participation</td>
</tr>
<tr>
<td>Quintile 1</td>
<td>8.146</td>
<td>0.369</td>
<td>9.867</td>
</tr>
<tr>
<td>Quintile 2</td>
<td>5.198</td>
<td>0.236</td>
<td>4.684</td>
</tr>
<tr>
<td>Quintile 3</td>
<td>3.986</td>
<td>0.181</td>
<td>2.915</td>
</tr>
<tr>
<td>Quintile 4</td>
<td>2.892</td>
<td>0.131</td>
<td>1.944</td>
</tr>
<tr>
<td>Quintile 5</td>
<td>1.814</td>
<td>0.082</td>
<td>1.120</td>
</tr>
<tr>
<td>All</td>
<td>4.406</td>
<td>1.000</td>
<td>4.101</td>
</tr>
</tbody>
</table>

Note. The first column in each type of provider indicates the participation rate which shows the utilization rate of each type of provider of public health services. The second column in each type of provider indicates the percentage share of each income group in the total consultation conducted in each type of provider health facilities. These shares add up to 100 per cent.

Source: author’s calculations by using DASP software

Figure 1 below, provides a comprehensive picture of the inclusiveness of public spending on health care providers. The concentration curves for spending on public provider; private provider, and NGOs provider lie above the 45 degree line, suggesting that spending on them is pro-poor.

Figure 1 Concentration Curves Cameroon

Source: author’s estimation by using DASP software

The concentration indices of total health benefits demonstrate that the benefits were pro-poor for all types of providers (See, Table 2). The public providers appeared to be the most pro-poor with a concentration index of −0.224. NGO providers also favored the poorest people as
shown in the concentration index of -0.170. Private providers is less pro-poor with a concentration index of −0.151. These results were confirmed by the negative sign of the Kakwani index for all types of suppliers. This indicates that subsidies associated with all types of providers have narrowed the income gap between rich and poor.

**Table 2. Concentration indices Kakwani indices of healthcare benefits in different types of healthcare providers in Cameroon, 2014**

<table>
<thead>
<tr>
<th>Provider</th>
<th>CI</th>
<th>STD</th>
<th>(LB, UB)</th>
<th>Gini</th>
<th>Kakwani</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public</td>
<td>-0.224839</td>
<td>0.015968</td>
<td>(-0.256139; -0.256139)</td>
<td>0.478199</td>
<td>-0.70304</td>
</tr>
<tr>
<td>Private</td>
<td>-0.151865</td>
<td>0.050744</td>
<td>(-0.251332; -0.052397)</td>
<td>0.475231</td>
<td>-0.62507</td>
</tr>
<tr>
<td>Ong</td>
<td>-0.170163</td>
<td>0.034258</td>
<td>(-0.237315; -0.103011)</td>
<td>0.469070</td>
<td>-0.63926</td>
</tr>
<tr>
<td>All Providers</td>
<td>-0.201059</td>
<td>0.008481</td>
<td>(-0.217683; 0.184434)</td>
<td>0.471709</td>
<td>-0.67276</td>
</tr>
</tbody>
</table>

*Source: Authors’ calculations by using DASP software*

In order to make definite conclusions about whether healthcare provider’s subsidies in Cameroon are pro-poor or pro-rich, we need to look at the concentration curves and concentration indices. The result from Dominance Tests will confirm whether the concentration curves dominate the 45-degree line or vice versa.

Results of the dominance tests (See Figure2, Figure 3, Figure 4 and table 4), conducted to investigate whether healthcare providers subsidies are significantly pro-poor at the 5% significance level, reject the null hypothesis that the concentration curves are indistinguishable from the line of equality. This indicates that public healthcare provider subsidies are pro-poor. Moreover, testing the concentration curves against the income distribution shows that the concentration curves for public provider, private provider and ONG provider dominate the income distribution curve. This suggests that subsidies associated with the public provider, private provider and ONG provider are inequality-reducing (progressive).

**Figure 2 Lorenz and Concentration Curves for Public**
**Source:** author’s estimation by using DASP software

**Figure 3** Lorenz and Concentration Curves for Privé

**Figure 4** Lorenz and Concentration Curves for ONG
Source: author’s estimation by using DASP software

Table 3: Dominance Test for consultation of provider Incidence

<table>
<thead>
<tr>
<th>Providers</th>
<th>Public</th>
<th>Private</th>
<th>NGO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Against Lorenz Curve</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Against 45 Line</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Note: Dominance Test: + indicate Concentration curve dominates 45 degree line/Lorenz curve. Dominance is rejected if there is at least one significant difference in one direction and no significant difference in the other, with comparisons at 19 quintiles and 5% significant level.

Source: Authors’ calculations by using DASP software

The result of the decomposition is presented in Table 4, which shows, in the first column, the list of variables used in our analysis. We grouped the predictors of healthcare use into need, non-need, and economic status. Needs factors are biological determinants used as an indirect indicator of healthcare needs, including age, sex and morbidity (O’Donnell et al., 2008). We included 9 of the 10 most commonly reported diseases / symptoms (malaria, diarrheal disease, respiratory infection, arterial hypertension, hepatitis (a, b, c), diabetes, eye diseases, typhoid and yellow fever) as morbidity variables. Factors other than need (non need factors) are predictors of socioeconomic healthcare utilization, which include the person’s level of education (primary or lower, secondary or higher) (O’Donnell et al., 2008). Trani and Barboudes-Courières (2012) and marital status (never married, currently married, divorced / separated / widowed).
In keeping with the generally accepted convention, economic status was household consumption expenditure per adult equivalent, which was converted to the log of equivalent consumption (Deaton and Zaidi, 2002). We also used adult equivalent consumption expenditure as a ranking variable for the wealth status of the individual.

As shown in Table 4 (column 2), more than 62% of the population is comprised of people between 30 and 59 years old and the majority of the population (71%) is male. About 46.96% of the population is located in rural areas. Just over 34% of adults reported malaria in the 30 days preceding the survey, 2.30% of cases of diarrhea, 8.85% of respiratory infections, 8.44% of high blood pressure, 0.18% hepatitis (a, b, c) and 1.06% diabetes. 2.79% eye diseases, 4.29% typhoid and 1.13% yellow fever.

Educational attainment is very low among individuals, with only 32% and 36% having completed primary or lower education and secondary or higher education. Just over 54% of individuals are currently married and 23% are divorced / separated / widowed.

Interestingly, as shown in Table 4, age 60+ (CI = -0.147579), male (CI = -0.016563), malaria (CI = -0.034618), respiratory infection (CI = -0.081864), hepatitis (a, b, c) (CI = -0.085784), eye diseases (CI = -0.025241), yellow fever (CI = -0.023601), primary or lower education (CI = -0.11420), currently married (CI = -0.062812) and rural (CI = -0.280258) are significantly concentrated among the poor. In contrast, between 30 and 59 years (CI = 0.009088), diarrheal disease (CI = 0.007550), high blood pressure (CI = 0.189883), diabetes (CI = 0.162467), typhoid (CI = 0.139482), secondary or higher education (CI = 0.1886930), divorced / separated / widowed (CI = 0.053321) and household consumption per adult equivalent (CI = 0.032434) are generally highly concentrated among the rich (Table 4).

On the other hand, a decomposition of the concentration index shows that all the needs and non-needs factors (except hypertension and the 30-59 age group) contribute to the pro-poor nature of the use of health care providers as a whole (see Table 4).

**Table 4. Detailed contributions to inequality in probability of healthcare utilization by need, non-need and consumption factors, Cameroon, 2014**

<table>
<thead>
<tr>
<th>All providers</th>
<th>Mean of the variable (in percentage)</th>
<th>Concentration indexes (CI)</th>
<th>95% Confidence interval</th>
<th>Absolute Contributions to CI</th>
<th>Relative Contributions to CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concentration index for actual healthcare use (CI)</td>
<td></td>
<td>-0.201059</td>
<td>(-0.217683; -0.184434)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residual</td>
<td></td>
<td>0.231084</td>
<td>0.485082</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Need factors</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Under 30 years</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30–59 years</td>
<td>62%</td>
<td>0.009088</td>
<td>(0.000312; 0.017865)</td>
<td>0.000127</td>
<td>0.000267</td>
</tr>
<tr>
<td>60 and above</td>
<td>-0.147579</td>
<td>(-0.174737; -0.120421)</td>
<td>-0.001491</td>
<td>-0.003130</td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>71%</td>
<td>-0.016563</td>
<td>(-0.023837 ; -0.009288)</td>
<td>-0.001354</td>
<td>-0.002842</td>
</tr>
<tr>
<td>-------------------</td>
<td>---------</td>
<td>------------</td>
<td>-------------------------</td>
<td>-------------</td>
<td>-------------</td>
</tr>
<tr>
<td>*Female</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Self-reported disease</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malaria</td>
<td>34%</td>
<td>-0.034618</td>
<td>(-0.064729 ; -0.004506)</td>
<td>-0.000043</td>
<td>-0.00091</td>
</tr>
<tr>
<td>diarrheal disease</td>
<td>2.30%</td>
<td>0.007550</td>
<td>(-0.128152 ; 0.143252)</td>
<td>-0.000380</td>
<td>-0.000797</td>
</tr>
<tr>
<td>respiratory infection</td>
<td>8.85%</td>
<td>-0.081764</td>
<td>(-0.178458 ; 0.014930)</td>
<td>-0.000189</td>
<td>-0.000396</td>
</tr>
<tr>
<td>arterial hypertension</td>
<td>8.44%</td>
<td>0.189883</td>
<td>(0.074593 ; 0.305172)</td>
<td>0.000013</td>
<td>0.000027</td>
</tr>
<tr>
<td>hepatitis (a, b, c)</td>
<td>0.18%</td>
<td>-0.085784</td>
<td>(-0.484249 ; 0.312681)</td>
<td>-0.000028</td>
<td>-0.000058</td>
</tr>
<tr>
<td>Diabetes</td>
<td>1.06%</td>
<td>0.162467</td>
<td>(-0.032898 ; 0.357832)</td>
<td>-0.000020</td>
<td>-0.000043</td>
</tr>
<tr>
<td>eye diseases</td>
<td>2.79%</td>
<td>-0.025241</td>
<td>(-0.153104 ; 0.102622)</td>
<td>-0.000019</td>
<td>-0.000039</td>
</tr>
<tr>
<td>Typhoid</td>
<td>4.29%</td>
<td>0.139482</td>
<td>(0.035115 ; 0.243850)</td>
<td>-0.000532</td>
<td>-0.001118</td>
</tr>
<tr>
<td>yellow fever</td>
<td>1.13%</td>
<td>-0.023601</td>
<td>(-0.264633 ; 0.217432)</td>
<td>-0.000106</td>
<td>-0.000223</td>
</tr>
<tr>
<td>other illness</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Non-need factors</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Education level</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary or lower</td>
<td>32%</td>
<td>(-0.128899 ; -0.093941)</td>
<td>-0.001382</td>
<td>-0.002900</td>
<td></td>
</tr>
<tr>
<td>Secondary or higher</td>
<td>36%</td>
<td>-0.111420</td>
<td>(-0.128899 ; -0.093941)</td>
<td>-0.000699</td>
<td>-0.001468</td>
</tr>
<tr>
<td>Secondary or higher</td>
<td></td>
<td>0.186930</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Never-married</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Currently married</td>
<td>54%</td>
<td>-0.062812</td>
<td>(-0.070838 ; -0.054785)</td>
<td>-0.006221</td>
<td>-0.013059</td>
</tr>
<tr>
<td>Divorced/separated/widowed</td>
<td>23%</td>
<td>0.053321</td>
<td>(0.028731 ; 0.077911)</td>
<td>-0.000116</td>
<td>-0.000244</td>
</tr>
<tr>
<td>Rural</td>
<td>46.96%</td>
<td>-0.280258</td>
<td>(-0.291328 ; -0.269188)</td>
<td>-0.007670</td>
<td>-0.016100</td>
</tr>
<tr>
<td>Household consumption (log of consumption per adult equivalent)</td>
<td>0.032434</td>
<td>(0.031880 ; 0.032988)</td>
<td>-0.028478</td>
<td>-0.059780</td>
<td></td>
</tr>
</tbody>
</table>

*Note: Concentration index
* Reference category: Under 30 years, female, other illness, non-educated, Never-married, urban residence.

**Source:** Authors’ calculations
**Discussion**

The benefit incidence analysis conducted in this study shows that in Cameroon, total public health expenditures to health care providers are pro-poor, with a slightly varying inequality in the types of health care supplies. This study therefore provides clear and consistent evidence of pro-poor government health subsidies for public, private and NGO providers in 2014, which preferentially benefited the poorer quintiles compared to the richest quintile of the population.

More concretely, the analysis of distribution of public spending on Healthcare providers shows that public spending on public provider in Cameroon is more pro-poor which highlights the commitment of authorities to provide affordable healthcare services to needy people. More precisely, health policy and strategy, the delivery system platform and the demand accountability system can be cited as a good way to change the curve to make it pro-poor. However, concerning the private provider, the distribution of public spending on healthcare is just pro-poor. The less pro-poor distribution of private facility utilization may be due to the fact that that private chemists and pharmacies may be used more often by the poor.

The findings of this study were very much in the line with other studies. Riboud (1990) examines 1986 data for Costa Rica and notes that health expenditures in that country are significantly pro-poor. Hanuer et al. (1992) examine the data of Malaysia and find that health expenditures in Malaysia favour the poor more in 1989 than in 1974. A report by Begum et al. (2001) on Benefit Incidence Analysis, conducted in Bangladesh found that the benefits in public facilities were pro-poor. In the case of Thailand, Limwattananon et al. (2014) conducted a Benefit incidence analysis and found a pro-poor outcome of public subsidies to healthcare.

In another study, Burger et al. (2012) examined whether public health expenditures and access to health services in South Africa have become more or less pro-poor over time. They found that public health expenditures became more pro-poor between 1993 and 2008, with an increase in the share of spending on public clinics and hospitals going to the poor. Moreover, physical and financial access to public health services has been improved, which has greatly helped poor households, who use hospitals and public clinics more often than those who are richer. Onwujekwe et al. (2012) showed that even though the coverage of priority public health services was well below the target levels in Nigeria, the poorest quintiles and the poorest rural residents drew the most from the net benefits of providing these health services.

Pro-rich bias in the distribution of Government health spending is a common finding across several countries (Castro-Leal F, et al: (2001), Mahal A et al. (2001), Sahn D, Younger S (2000)).

In the case of African countries, Government health spending was in favor of the rich; for instance, the poorest quintiles in Ghana benefited 10%, 13% and 11% at primary facilities, hospital outpatient and inpatient services respectively; while the richest Ghanaian’s benefited 31%, 35% and 32% at these facilities (Limwattananon et al., 2014). Similar results were also reported from Kenya, Tanzania, Madagascar and Guinea (Castro-Leal F. et al. 2000).
Mtei et al. (2012) found that in Tanzania, the total outpatient care benefits from the public sector were marginally concentrated in richer groups (CI=0.010), while such benefits from the private sector were highly concentrated in richer groups (CI=0.370). Inpatient care benefits from public providers slightly favored the richer groups (CI=0.027), but such benefits from private providers were largely concentrated to richer groups (CI=0.680). In a study on South Africa, McIntyre and Ataguba (2012) found that in the public sector, outpatient care benefits were concentrated on poorer populations (CI=-0.021), though inpatient care benefits on richer groups (CI= 0.383). Inpatient care benefits from both public (CI=0.112) and private (CI=0.532) providers favored the richer populations.

According to Limwattananon et al. (2014), among eleven countries in Asia, with the exception of Hong Kong, Malaysia, Sri Lanka and Thailand, the poor get much less than their population share of the public health subsidy. The pro-poor benefit incidence in some of these Asian countries are the results of limiting the use of user fees, effective protection of the poor from payment, and building a wide network of health facilities (O'Donnell O et al., 2007) so that the poor can effectively use these services.

On the other hand, the decomposition of need and non-need factors in this study consistently showed that need factors such as age, sex, and self-reported health status (except hypertension) were acting in a supportive direction to the poor. These results are similar to those of the Doorslaer et al. (2004); Elwell-Sutton et al. (2013); and Bonfrer et al. (2014). The fact that the self-reporting of high blood pressure (hypertension), which is a need factor, largely contributes to a distribution of health care use favorable to the rich, may be due to the fact that the self-reported prevalence of hypertension is concentrated among the richest individuals in Cameroon, although we cannot exclude the possibility of undiagnosed cases.

In this study, we used "self-reported diseases and symptoms"10 as the health care needs’ indicator. Sauerborn et al. (1996) noted that self-reported diseases may be a poor measure of health needs, given that poor people cannot afford to become ill (because of the high cost of time lost or limited access to health services), while high-income groups probably have relatively easy access to health services and sick leave benefits in their formal sector jobs (McIntyre and Ataguba 2011, Jahangir et al. (2017)). Our study is based on self-reported diseases, while the healthcare needs for no communicable diseases are best estimated by physical measurements and blood tests, which are not included in our database (ECAM4). For this reason, some potential health needs may not have been calibrated in our study.

In our study, among non-needs factors, having a primary or secondary education has a pro-poor effect on the use of health care. This contradicts the findings of earlier studies that higher education contributes to the use of health care for the rich (Liu et al 2002, Van Doorslaer and Masseria 2004).

However, our results are in line with those of other low-income countries, such as English-speaking African countries (Bonfrer et al., 2014). The role of secondary or higher education in

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10 Self-reported health status is not generally considered to be the best measure of a population's health status. It is subjective and may have certain heterogeneity of reporting. Although several studies have used this measure and made solid contributions to the policy (Hanibuchi et al., 2010, French et al., 2012), it is important that researchers use other measures to measure differences in health to avoid this bias.
pro-poor use may be that educated people are able to identify, make decisions, and use affordable health services (Navaneetham and Dharmalingam 2002).

Our results also showed that household consumption makes by far the greatest pro-poor contribution in healthcare utilization. These results contradict those of Doorslaer et al. (2004); Lu et al. (2007); Leung et al. (2009); Elwell-Sutton et al. (2013); Bonfrer et al. (2014), which show that household consumption makes by far the greatest pro-rich contribution in healthcare utilization.

On the other hand, our analysis revealed that the use of health services of public providers by the poor remains low, despite the provision of free consultation services in public institutions. This result is similar to that of Nepal (Saito et al., 2016) and contradicts the findings of Hong Kong, where public services are mainly used by the less affluent (Leung et al., 2009). Previous studies have shown that dissatisfaction with factors such as long waiting times, drug shortages and medical equipment reduce utilization rates (Basu et al., 2012). Improving the management of public service providers may encourage the use of public facilities among the poorest.

The purpose of this study was to conduct a benefit incidence analysis using the latest national-level representative data on health care utilization from the 2014 Cameroon Household Survey (ECAM4) and National Health account (NHA) data on health expenditure of different types of providers. Although ECAM4 and NHA provided an excellent opportunity to conduct healthcare benefit analysis in Cameroon, some limitations are worth mentioning. The nature of the health care utilization data did not allow us to separately analyze the impact of ambulatory and hospital care benefits, unlike the South African study (McIntyre and Ataguba 2012).

Moreover, data on the first-class hospital, regional hospital, district hospital, integrated medical centers, etc. exist in ECAM4; but their subsidies do not exist in detail in national health account (NHA), which precludes a detailed analysis of the impact of healthcare subsidies.

Furthermore, the data used in this study include utilization of healthcare in the past 30 days and recorded a maximum of two healthcare visits during this period, which could have affected to some extent the estimation of the inequalities of the Cameroonian health system.

On the other hand, the common BIA assumption used in this analysis is that the unit cost per healthcare provider service is the same across all income groups, which might not likely to be true.

The methodological limitation in benefit incidence analysis is that it does not provide specific reasons for incidence outcomes, particularly as they involve individual behavior. However understanding the specific cause would have been important to provide evidence which helps for decision making and policy design.

Finally, the cross-sectional nature of the survey used in this study limits the possibility of inferring causality and examining how aspects of equity-related public subsidies change over time. The future availability of longitudinal data would encourage further research to study the dynamics of the problem, which would help design more effective policies to address it.
7. Conclusions and policy implications.

The main objective of this study was to examine to what extent health benefits are distributed throughout socio-economic groups and how the different types of providers contribute to iniquity in health benefits in Cameroon. On the benefits of health across socio-economic groups is estimated by using the indices of concentration and the curves of concentration. The benefits coming from three formal types of providers of health (public, private and ONG) are analyzed for the national population. The decomposition analysis is used assess to what extent each of the needs, non-needs and consumption factors contributes to the inequality in health care utilization. We use in this study, both the data of the last Cameroonian households survey (ECAM4) conducted by the National Institute of Statistic of Cameroon in 2014, and those of public expenditures on health of the Ministry of Health (National Health Account ((NHA)).

The results show a global pro-poor distribution of health care benefits (CI= -0.201). The public providers appeared to be the most pro-poor with a concentration index of −0.224. NGO providers also favoured the poorest people as shown in the concentration index of − 0.170. Private providers is less pro-poor with a concentration index of − 0.151. The overall benefits of public health spending on health care providers are pro-poor in Cameroon, demonstrating that the authorities have a policy that targets the poorest segments of society. As it has been found that most people in the poorest segments of society have access to health services in public health facilities, it is logical that the distribution of public spending on health care benefits the poor.

The pro-poor distribution of probability in general healthcare utilization was attributable to the needs and non-needs factors (except hypertension and the 30-59 age group). Despite the provision of free services by public healthcare providers, our analysis found that the utilization rate of public healthcare provider services remains low compared to that of private provider.

Policy recommendations

The study recommends several policy strategies that the Cameroonian government will need to implement in order to ensure better targeting of resources.

1) Considering that most persons belonging to disadvantaged economic groups have access to health care in public health facilities, it is essential that the funding and implementation authorities invest more in public health facilities, so that to benefit the smallest economically lower number of society.

2) Measures should be initiated to improve the management of public service providers to encourage the utilization of public facilities amongst the poorest.

3) Interventions should be made to reduce the household economic burden of major illnesses.
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