

# Government Spending And Effect On The Incidence Of Catastrophic Out-Of-Pocket Health Expenditure Among Households In Nigeria

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## **Abstract**

*Healthcare financing reforms till today still receive much attention in developing and some developed countries. However, out-of-pocket payment still takes a large portion of total health expenditure and in a case where such payments involve expenditures above some given proportion of household resources; they are often deemed 'catastrophic'. Literatures abound on this subject matter but it is still not exhaustive therefore, this current study comes in handy. This study estimated and compared the incidence of catastrophic health expenditure Pre and Post government health expenditure using the Harmonized Nigerian Living Standard Survey 2009/2010 data set. The study estimated the incidence and intensity of catastrophic healthcare expenditure indices at varied threshold of 20%, 30% and 40% to further observe the difference/sensitivity due to pre and post government health expenditure. The study found that the incidence of catastrophic health expenditure varies across threshold for both pre and post government health expenditure catastrophic headcount indices and that pre per-capita government healthcare catastrophic incidence is higher than the post per-capita government healthcare catastrophic incidence implying that government's expenditure on health actually reduces the incidence of catastrophic health expenditure in Nigeria but the difference between the pre and post government healthcare expenditure across thresholds does not vary. Also, the study found that the incidence of CHE is progressive implying that the rich suffer the most which implies that the poor are being excluded from healthcare access. The study therefore concluded that the government should improve on their contribution to healthcare financing and it should be targeted at covering the poor and rural dwellers.*

**Keywords:** *Government spending, effect, incidence, catastrophic, out-of-pocket, health expenditure, households, Nigeria.*

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## **I. Introduction**

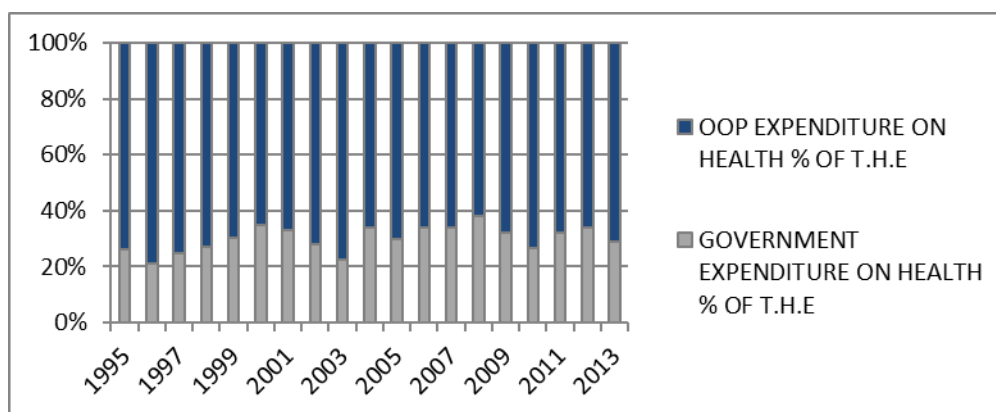
Empirical evidence reveals that the health of a nation significantly enhances its economic development, and vice versa. Nonetheless, it has been enunciated that the pursuit of better health should not await an improved economy; rather measures to improve health will themselves contribute to economic growth (Alsan, Bloom, and Canning, 2006) in Olakunde (2012). This explains why advanced countries invest and spend so much on the healthcare sector. The way a country finances its healthcare system is a key determinant of the health of its citizenry; the selection of an adequate and efficient method of financing in addition to organizational delivery structure for health services is important if a country is set to achieve its national health objective of providing good, efficient, equitable healthcare for her citizens.

A healthcare financing system involves the means by which funds are generated, allocated, and utilized for healthcare. It has three basic functions of collecting revenues, pooling resources, and purchasing healthcare services. The commonly used mechanisms for implementing these functions according to (Olakunde, 2012) include tax-based financing (by the government), out-of-pocket payments (by individuals/households), donor funding, and health insurance (social and private). Often times, most health systems adopt a mixture of various methods. The success of the different health financing methods can be measured by the overall effect on equity of access, health outcomes, revenue generation/efficiency, and the effects on user behaviour and provider.

Poverty, equity of access to healthcare, inequality, and market failures as well as other existing negative externalities creates the need for government involvement in major public service provisions such as healthcare particularly in developing countries (Musgrove, 1996). It is worthy of note that, even with the availability of such government interventions in the form of healthcare policies and financing, households/individuals still suffer catastrophe in accessing healthcare. This is evident from available data and existing studies. Studies on economic consequences of healthcare expenditure decisions provide important and workable insight for policy makers to work on for an economy to grow. Therefore, studies that examine out-of-pocket spending (OOPs) on health, exposes more the effects of illness (a major reason for OOPs) on economic wellbeing of a given household.

Heavy reliance on out-of-pocket (OOP) financing of healthcare in most developing countries leaves households exposed to the risk of unforeseen medical expenditure. This is because; illness which is a major reason for OOPs for health can bring a difficult choice between diverting resources towards medical care or foregoing treatment with the risk of long-term deterioration in health and earnings capacity (World Health Organization, 2005). Responding to medical needs can absorb a large share of the household budget, which may be considered catastrophic in view of the required sacrifice of current consumption or the long-term consequences upon household's welfare of borrowing or depleting assets to pay for healthcare (Berki 1986). According to (Berki, 1986) catastrophic OOP expenditure is one which constitutes large part of household budget and thus, affects household's ability to maintain customary standard of living. The idea behind this approach is that if healthcare spending constitutes large portion in household budget, then it will affect consumption of other items.

Healthcare financing systems which depend on OOPs, are particularly likely to generate catastrophic levels of health expenditure. OOPs are most dominant in Nigeria and in many sub-Saharan African (SSA) countries because of lack of financial risk pooling mechanisms (African Health Economics and Policy Association (AFHEPA), 2011). Despite commitments to increase the share of government expenditure that is devoted to health, private expenditure on health has remained very high in Nigeria resulting from user fees for health services (O.A.U, 2001) in Onwujekwe, et al (2012). In Nigeria, private expenditure accounts for almost 70% of total expenditure on health of which 90% of these private expenditures are non-pooled as most of it takes place via out-of-pocket spending. This high level of out-of-pocket expenditure implies that healthcare can place a significant financial burden on households (Onoka, et al 2010). The graph below shows a picture of the percentage of out-of-pocket health and government health expenditure in Nigeria between 1995 and 2013.



*Data Source: WHO (2015), Nation Health Accounts. Graph: Author*  
 Figure 1: Out-of-pocket health expenditure versus Government health expenditure

The graph above shows on each bar the percentage of OOPs on healthcare and government expenditure on healthcare respectively as a percentage of total health expenditure (THE) in the economy from 1995 to 2013. We can see from the graph that, government expenditure on health has not been stable over the years and has also not risen above 40% of total health expenditure. This has resulted in OOPs for healthcare being dominant over the years and attaining a high of 75% in 2003. One direct consequence of this is to expose Nigerians to catastrophic financing of healthcare.

From the foregoing, the issue of catastrophic health expenditure can be said to be of great concern to different economies of the world especially to developing countries. This gives the reason for increase in research into this area in order to understand the concept and associated theories better so as to be able to make policies and device measures to control or reduce its effect on individuals or households. This study therefore seeks to estimate the Incidence of Catastrophic Health Expenditure in the Nigerian economy assuming that the government does not spend on health (Pre government health expenditure) and assuming that the government spends on health (Post government health expenditure) using current NHLSS (2009/2010) data set.

**Statement Of The Problem**

According to Culyer and Wagstaff (1993) in Ichoku and Fonta (2009), ill health is a random variable and financing the cost of treatment can push a household into poverty or deeper into poverty. Households who finance cost of treatment most times face at least two important economic consequences; the direct costs of the service (demonstrating itself as out-of-pocket expenditure), and the loss of income and productivity (Kavosi, Rashidian, Pourreza, Majdzadeh, Pourmalek, Hosseinpour, Mohammed and Arab, 2012). Direct healthcare costs have often presented serious repercussions for household's wellbeing; they discourage people from accessing healthcare services and encourage them to postpone health checks (WHO, 2010).

Health policy makers have long been concerned with protecting people from the possibility that ill health will lead to catastrophic financial payments and subsequently into impoverishment because of overdependence on out-of-pocket payment. To solve this problem, several nations of the world including Nigeria has adopted systems of financial risk pooling in a bid to control and probably eliminate out of pocket health expenditure. For instance, building and financing of government hospitals; establishment of the National Health Insurance Scheme (NHIS) in 1999; establishment of the National Health Policy and Strategy aimed at achieving health for all Nigerians promulgated in 1988 (Federal Ministry of Health (FMOH), 2004); the establishment of National Health Financing Policy prescribed by the National Health Policy aimed at achieving accessible, sustainable, affordable, equitable and efficient healthcare deliver; and most recently, the National Health Bill in 2014 which establishes the National Primary Healthcare Development Fund (NPHCDF) and offers a comprehensive framework for the development, regulation, and management of the health system, including the setting of standards. Despite all these efforts, the negative effect of ill health and its accompanying problems still continue to put Nigeria at the bottom end of Human Development Index according to ranking by WHO (2004).

Amidst all the studies carried out on this subject matter in Nigeria, none has estimated the incidence of catastrophic out of pocket health expenditure with (Post) government health expenditure and without (Pre) government health expenditure in other to compare the results and clearly bring out the percentage reduction in the incidence of catastrophic out of pocket health expenditure due to the presence of government health expenditure.

This study is important because, it will be useful to the government in assessing the impact of her spending on health, it will also evaluate the success of one of the country’s goals of eradicating extreme hunger and poverty due to healthcare expenditure by households. It will show the percentage of the incidence of catastrophic health expenditure that the fraction of government health expenditure in total health expenditure has been able to reduce. This will be clear from the pre and post government health expenditure estimates.

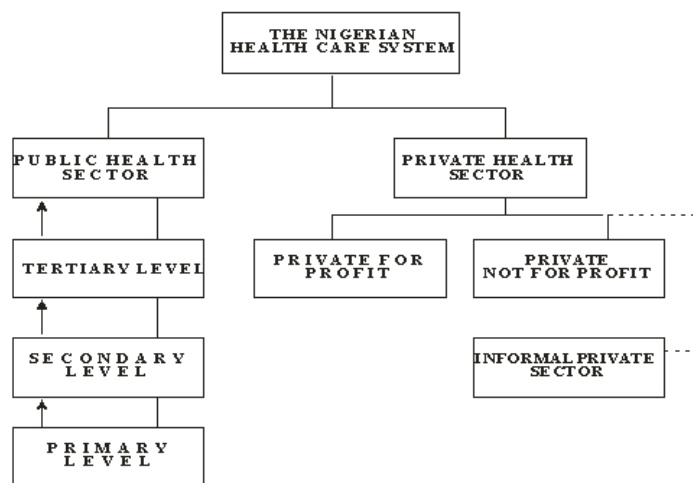
**Aim of the Study**

The aim of this study is to estimate the incidence of catastrophic out of pocket health expenditure in Nigeria pre and post government health expenditure.

**Public Healthcare Financing In Nigeria**

*The Nigerian Healthcare Sector*

The Nigerian health sector operates as a decentralized healthcare system; it is structured along the political tiers of governance each of which is semi-autonomous. It includes the Federal Ministry of Health (FMOH), States' Ministries of Health (SMOH) and Local Governments' Health Departments (LGHD). At present there are 36 SMOHs and 774 LGHDs (Ichoku and Fonta, 2009). The FMOH is supposed to formulate national healthcare policies, co-ordinate the healthcare activities of the other tiers of government, and manage specialized tertiary healthcare institutions. Unfortunately, the coordinating role of the FMOH is most times not pronounced because the different SMOH claim autonomy and formulate their own policies and execute their own programmes (Johnson and Stoskopf, 2010). According to Ichoku and Fonta (2009), the decentralization efforts in the 1970s led to the creation of health management boards (HMBs) in each state to oversee the management of state hospitals. Attempts were made to create district health boards (DHBs) but they had little impact. The SMOH also provide technical assistance to the LGHDs. See figure 1 below for a quick review of the Nigerian health system.



Source: Johnson and Stoskopf, 2010

**Figure 1: Overview of the Nigerian Health System**

From Table 1, it can be seen that the Nigerian healthcare system is broadly divided into two namely; public health sector and the private health sector. The public health sector is further disaggregated into tertiary, secondary and primary levels of public healthcare, while the private healthcare sector on the other hand can be disaggregated into; private for profit, private not for profit and the informal private sector respectively.

Alongside the public healthcare system, is a free for entry private healthcare market which has emerged as a result of under-resourcing, poor provision and delivery of public health services and the burden of user fees for roughly every treatment item (Onah and Govender, 2014). The members in the private healthcare market range from patent medicine vendors (PMVs), pharmacy shops, traditional medicine sellers, maternity homes, clinics, and private tertiary hospitals, many of which are unregulated (Onah and Govender, 2014; Ichoku and Fonta, 2009). The ease of access to these private healthcare providers due to proximity and their spatial distribution has created a booming private healthcare market that accounts for about 70-80 % (Ogunbekun, 1991) and 66% (Onah and Govender, 2014) of healthcare options/facilities in the country.

The funding of social services, particularly since the 1980s, has been very low. For example, healthcare spending averaged a mere 1.9% of the total federal government expenditure in the 1980s. Presently, public expenditure funded through general tax revenue in Nigeria account for 20–30% of total health expenditures and private expenditures accounts for 70 – 80% of the expenditures and the most dominant private expenditure is OOP, which is about US\$ 22.5 per capita and accounts for 9% of total household expenditures (Federal Office of Statistics (FOS) 2004).

Table 1: National Health Accounts

YEAR	GOVERNMENT EXPENDITURE ON HEALTH % OF T.H.E	PRIVATE EXPENDITURE ON HEALTH % OF T.H.E	OOP EXPENDITURE ON HEALTH % OF T.H.E
1995	25	75	71
1996	20	80	75
1997	24	76	72
1998	26	74	70
1999	29	71	67
2000	33	67	62
2001	31	69	63
2002	26	74	67
2003	22	78	75
2004	33	67	64
2005	29	71	68
2006	33	67	64
2007	33	67	64
2008	37	63	60
2009	31	69	66
2010	26	74	71
2011	31	69	66
2012	33	67	64
2013	28	72	69

Source: WHO (2015), Nation Health Accounts

Table 1 shows respectively the percentage or share of government expenditure on health, private expenditure on health and out of pocket expenditure on health in the total health expenditure (THE) of Nigeria from 1995 – 2013. From table 2.1, it is clear that the percentage of government expenditure on health in the country’s total healthcare could barely rise up to 35% implying that, the government’s contribution to total health expenditure has been very low and as a result, private expenditure which is basically out of pocket has been a major source of healthcare financing in Nigeria. The third column also shows the percentage of out-of-pocket payments for healthcare in the country’s total expenditure on health.

A problem with the Nigerian health sector as noted by (Lambo, 2003) in Ichoku and Fonta (2009) is that, the Nigerian healthcare system is fragmented and uncoordinated. There is an apparent disconnect between the federal, state and private sector healthcare efforts and there is no effective framework for public-private partnership, information from the private sector is ignored by the system, thus making comprehensive planning difficult. The picture that emerges from this characterization of the Nigerian socioeconomic environment is the failure of the existing policy framework to guarantee improvement in social welfare as a result, poverty is increasing and the health of the population is failing (Ichoku and Fonta, 2009).

### **The Nigerian Healthcare Financing System**

Healthcare in Nigeria is financed by a combination of tax revenue, out-of-pocket payments, donor funding, and social/community health insurance (Ichoku and Fonta, 2006). Nigeria's health expenditure is relatively low, even when compared with other African countries. The total health expenditure (THE) as

percentage of the gross domestic product (GDP) from 1998 to 2000 was less than 5%, falling behind THE/GDP ratio in other developing countries such as Kenya (5.3%), Zambia (6.2%), Tanzania (6.8%), Malawi (7.2%), and South Africa (7.5%) (Soyibo, 2005).

Achieving a successful healthcare financing system continues to be a challenge in Nigeria. Limited institutional capacity, corruption, unstable economic, and political context have been identified as factors why some mechanisms of financing healthcare have not worked effectively (Adinma and Adinma, 2010). The different means of financing healthcare in Nigeria are as outlined below:

### **Tax Revenue**

Health financing systems where government revenues are the main source of healthcare expenditure are referred to as tax-based systems (Savedoff, 2004). Funds are usually generated through taxation or other government revenues. Although the Nigerian government generates revenue through taxation, the bulk of the revenue is derived from the sale of oil and gas. Revenues are raised at the federal, state, or local government levels. However, the federally generated revenue which is shared according to a formula forms the majority of the funds for the other tiers of government. The states and local governments being closer to PHC are expected to provide adequate funding for PHC, but owing to their low internal revenue generation capacities, most of them still largely depend on the allocation from the federal government.

The total government health expenditure as a proportion of total health expenditure (THE) was estimated as 22% in 2003, 33% in 2004, and 29% in 2005 (WHO, 2015). Remarkably, the federal budgetary component of health expenditure has increased over the years. It increased from 1.7% in 1991 to 7.2% in 2007 (Soyibo, 2005). Nevertheless, the budgetary allocation for health is still below the 15% signed by the Nigerian government in the Abuja declaration (WHO, 2009). Given this level of government spending, it will be very difficult to provide the essential healthcare services, and with the difficulty in prediction of the oil prices in the world market, a low tax base, and other preponderant issues, healthcare will always be at the danger of under funding by the Nigerian government.

### **Out-of-Pocket Payments**

This involves payment for healthcare at the point of service. The charges levied for healthcare services are referred to as user fees. The scope of user fees is quite variable and can include any combination of drug costs, medical material costs, entrance fees, and consultation fees (Oлакunde, 2012). Out-of-pocket accounts for the highest proportion of health expenditure in Nigeria. Out-of-pocket expenditure as a proportion of THE averaged 64.59% from 1998 to 2002 (Soyibo, 2005). In 2003, it accounted for 74% of THE. It decreased to 66% in 2004 and later increased to 68% in 2005 (Soyibo, Olaniyan and Lawanson, 2009). This implies that households bear the highest burden of health expenditure in Nigeria.

### **Community-Based Health Insurance (CBHI)**

Community-Based Health Insurance (CBHI) is a form of private health insurance whereby individuals, families, or community groups finance or co-finance costs of health services (Adinma and Adinma, 2010). Their kind of private health insurance include non-profit and for-profit plans, usually, private health insurance is voluntary compared with SHI schemes which tend to be mandatory (Oлакunde, 2012).

According to Uzochukwu, Onwujekwe, Soludo, Nkoli and Uguru (2009), CBHI is designed for people living in the rural area and people in the informal sector who cannot get adequate public, private, or employer-sponsored insurance. It usually involves some form of community involvement in their management. The effects of CBHI on equity, equality, and efficiency of health services are still ambiguous. Sometimes, even when charges are small, the very poor are unable to enrol. The Nigerian government intends to use CBHI to cover people employed in the informal sector and in the rural area (Adinma and Adinma, 2010).

### **Donor Funding**

This refers to financial assistance given to developing countries to support socioeconomic and health development. Financial assistance to Nigeria has not been tremendous. This is because; it witnessed a declining trend before the return of the democratic governance in 1999.

The annual average official development assistance inflow from 1999 to 2007 was estimated at US\$ 2.335 and US\$4.674 per capita, respectively (Oлакunde, 2012). These figures are way below the Sub-Saharan African average of US\$28 per capita. The contribution of development aid to healthcare financing in Nigeria was estimated as N27.87 billion (4% of THE) in 2003. This increased by 29% to N36.04 billion (4.6% of THE) in 2004 and by just 1% to N36.30 billion (4% of THE) in 2005 (Soyibo et al, 2009). Although the international assistance to the Nigerian health sector is increasing, it still accounts for a small proportion of public health expenditure. The major challenges in Nigeria with donor funding are effective coordination of the funds and tracking donor resource flow (WHO, 2009).

**National Primary Healthcare Development Fund (NPHCDF)**

Primary Healthcare is the cornerstone of the Nigerian health system. However, in the last decades it has been in shambles, with its dismal state having a direct consequence on the overall performance of the health system (Reid, 2008). Poor financing has been highly labelled as one of the problems of PHC in Nigeria. Thus, addressing the perennial under funding that has stifled PHC is high on the policy agenda as evident by the NPHCDF proposed in the recently passed National Health Bill.

NPHCDF is a pool of fund set aside for primary healthcare, with guidelines on how the funds should be allocated. The fund aims to pool resources from the government, international donor, and private sectors. The fund will be allotted for provision of basic minimum package of health services through the NHIS (50%); provision of essential drugs for primary healthcare (25%); the provision and maintenance of facilities, equipment, and transport (15%); and development of Human Resources for Primary Healthcare (10%) (FGN, 2008). It will be disbursed by the NPHCDA through state primary healthcare boards for distribution to local government health authorities on the basis of commitment and adherence to the provision of the act that set up the development fund.

**II. Methodology**

**Analytical Framework**

The theory to be applied in this study is based on the premise that healthcare expenditure should be financed according to ability to pay (Wagstaff and van Doorslaer 2001) in Ichoku and Fonta (2009). Therefore, measuring the incidence of catastrophe in healthcare financing involves relating healthcare payments to households' income or some measure of Ability to pay (ATP). Measures of the incidence and intensity of catastrophic payments can be defined analogous to those for poverty. The incidence of catastrophic payments can be estimated from the fraction of a sample with healthcare cost as a share of total (or non-food) expenditure exceeding the chosen threshold (O'Donnell et al., 2008).

**Model Specification**

*Modelling Government Health Expenditure per Household (GHEperHH)*

Data on government health expenditure (GHE) is time series data while data to capture incidence of catastrophic health expenditure is household health expenditure (HHHE) data which is a cross sectional data. Combining both data sets in the same analysis has always been a problem for economists because most times they do not have any direct link. This study has applied a systematic approach to combining both. This will be made possible by using the per capita estimates (i.e. Per capita Government Health Expenditure (PCGHE) for the case of this study). This is because; PCGHE will convert GHE data to its allocation to individuals after which analysis can be carried out.

Per capita health expenditure is the sum of public and private health expenditure as a ratio of total population of a particular group at a particular point in time (Farnen, 2015). Per capita government expenditure is the average amount of money that is spent by the government on a particular group of people at a particular period. This calculation gives economists a way of measuring the standard of living or relative prosperity of people in a specific area or to measure government's healthcare provision for or available to the people (Farnen, 2015).

Since the analysis in this study is to compare the incidence of catastrophic health expenditure Pre and Post government health expenditure, it will focus on capital and recurrent health budget share of the government of Nigeria while, the population of the country for the year of interest (2010) will be gotten from the National Population Commission estimate published by NBS, 2012.

See equation for PCGHE:

$$PCGHE_{2010} = \frac{TOTGHE_{2010}}{TOTP_{2010}} \text{-----(1)}$$

Where:

**TOTP<sub>2010</sub>** = total population for year 2010.

**TOTGHE<sub>2010</sub>** = total government health expenditure for year 2010.

**PCGHE<sub>2010</sub>** = per capita government health expenditure for year 2010.

Equation one above implies that per capita government health expenditure per household for the year 2010 is gotten by dividing total government health expenditure for the year 2010 by the total population (TOTP) for the year 2010.

Haven achieved the above, to determine GHE per household (GHEperHH), this study will multiply PCGHE by household size gotten from HNLSS (2010) data set thus:

$$PCGHE \times HHsize = GHEperHH \text{-----(2)}$$

GHEperHH will then be applied to HHHE data from the data set and results for incidence of catastrophic health expenditure will be presented for;

- a) When the government does not spend on health i.e. PrePCGHE catastrophic headcount indices.
- b) When the government spends on health i.e. PostPCGHE catastrophic headcount indices.

For PrePCGHE catastrophic headcount indices, it is assumed that the government does not spend on health so, what should trickle down to households as government health expenditure in the form of provision and sustenance of government hospitals, hiring of qualified personnel to manage the hospitals and further provide professional and cheap services to households, provision and distribution of drugs and other hospital equipments, etc will not be available therefore HHHE is assumed to increase by an amount equal to GHEperHH.

Therefore, HHHE data without GHE is given below as;

$$HHHE_{WithoutGHE} = HHHE_{HNLSS\ 2010} + GHEperHH \text{ --- (3)}$$

Where:

HHHE<sub>Without GHE</sub> or (PrePCGHE HHHE) = Household health expenditure when government does not spend on health.

HHHE<sub>HNLSS 2010</sub> = Household health expenditure as given in HNLSS 2010 data set

GHEperHH = Government health expenditure per household.

It is on this new household health expenditure variable that results will be estimated and presented for PrePCGHE catastrophic headcount indices. While for PostPCGHE catastrophic headcount indices, it will be assumed that the government spends on health so, there are available and to some extent accessible government owned health facilities that households can access therefore, they may not have to pay high fees to access healthcare as was the case when the government did not spend on health (i.e. PrePCGHE HHHE). So, household health expenditure will be taken as it is given in the HNLSS 2010 data set i.e.

$$HHHE_{withGHE} = PostPCGHEHHHE = HHHE_{HNLSS\ 2010} \text{ --- (4)}$$

Where:

PostPCGHE HHHE = Household health expenditure when the government spends on health (HHHE<sub>withGHE</sub>)

HHHE<sub>HNLSS2010</sub> = Household health expenditure as given in HNLSS 2010 data set

The above will then be used to present result for PostPCGHE catastrophic headcount indices. After computing results for Pre and Post PCGHE catastrophic headcount indices, the results will be compared to show changes in the incidence of catastrophic health expenditure due to government health expenditure.

### Incidence of Catastrophic Health Expenditure

The incidence of catastrophic payment will be estimated from the fraction of the sample with healthcare cost as a share of total household non-food expenditure exceeding a chosen threshold. This study will use the threshold proposed by Ke Xu et al (2005); that financial catastrophe occurs with healthcare payments at or exceeding 40 percent of a household's capacity to pay in any year, the choice of this threshold is to enable it measure up to internationally accepted standards.

The method of estimating the incidence of catastrophic healthcare financing inherent in a population is the catastrophic Headcount financing indicator and an accompanying catastrophic payment gap indicator. While the catastrophic headcount financing indicator like the headcount poverty, measures the proportion of the population who financed healthcare catastrophically (i.e. incidence), the catastrophic payment gap or overshoot indicator like the severity of poverty indicator, measures the intensity of catastrophic healthcare financing in any given population or it captures deviations on the average from the catastrophic threshold.

Given the following definitions,

**oop<sub>h</sub>** = annual amount spent out of pocket on healthcare by households.

**nf<sub>dexp</sub>** = ability to pay captured by household non-food expenditure.

$\frac{oop_h}{nf_{dexp}}$  = fraction of out of pocket health expenditure in household total income captured as non-food expenditure.

**cata<sub>h</sub>** is an indicator that tells when a household is experiencing catastrophe in healthcare payment defined below as;

$cata_h = 1 \text{ if } \frac{oop_h}{nf_{dexp}} \geq 0.4$  Household experiences catastrophe

$cata_h = 0 \text{ if } \frac{oop_h}{nf_{dexp}} \leq 0.4$  Household does not experience

catastrophe

PrePCGHE = Pre-per capita government health expenditure (PrePCGHE) will be used to represent the scenario where there is no government expenditure on health. Therefore, household health expenditure will be higher than the scenario where there is the presence of government health expenditure.

PostPCGHE= Post-per capita government health expenditure (PostPCGHE) will be used to represent the scenario where there is the presence government expenditure on health.

The catastrophic headcount indicator is given as

$$H'_{cat} = N^{-1} \left( \sum_{i=1}^N cata'_h \right) = \mu'_{cata_h} \text{----- (5)}$$

Where  $\mu'_{E'}$  is the mean of  $cata'_h$ , and  $N$  is the total sample size. Equation (5) above means that household catastrophic headcount ratio is given by; the summation of all household in the data set those experiences catastrophic healthcare financing divided by the total sample. This is also equal to the mean of households that experience catastrophic health expenditure.

While, the catastrophic payment gap or overshoot (G) is given as;

$$G'_{cat} = N^{-1} \left( \sum_{i=1}^N O'_i \right) = \mu'_{O'} \text{----- (6)}$$

Where  $O'_i = cata'_h (oop_h / nfdexp) - 0.4$  is the respective household overshoot.

Equation (6) above means that, the catastrophic gap  $G'_{cata}$  is derived by summing the respective household catastrophic overshoots and dividing the answer by the total sample size. This is also equal to the mean ( $\mu'_{O'}$ ) of catastrophic overshoot.

**Adjusting catastrophic spending estimates for socio-economic status**

The indicators in equations 5 and 6 do not differentiate between poor and rich households. The headcount ( $H'_{cat}$ ) for example counts all households whose levels of OOP payments exceed a certain threshold equally. The overshoot ( $G'_{cat}$ ) counts the payments in excess of the threshold equally, irrespective of whether these payments are made by poor or rich households. This should be taken into account because; the opportunity costs of catastrophic healthcare payments will differ between rich and poor households.

To account for differences in the distribution of catastrophic payments between rich and poor households, results will be presented for weighted and un-weighted headcounts/overshoot. The distribution of catastrophic payments in relation to household welfare is measured by the concentration indices for  $cata'_h$  and  $O'_i$ . The concentration index ranges from -1 to +1. If we label these indices  $C_{cata_h}$  and  $C_{O'_i}$ , it is negative ( or positive) if the variable of interest is concentrated among the poor (or rich) (O'Donnell et al., 2008). For example, a positive value of  $C_{cata_h}$  indicates a greater tendency for the richer households to exceed the payment threshold, while a negative value indicates that the poor are more likely to exceed the threshold.

One way of adjusting the head count and overshoot measures of catastrophic payments to take into account the distribution of the payments is to multiply each measure by the complement of the respective concentration index (O'Donnell et al., 2008). This is shown below:

$$WH'_{cat} = H'_{cat} \times (1 - C_{cata_h}) \text{----- (7)}$$

$$WG'_{cat} = G'_{cat} \times (1 - C_{O'_i}) \text{----- (8)}$$

Where normative interpretation of catastrophic payments is necessary, it is considered appropriate to give more weight to excess payments made by poorer households. So, the weighted headcount ( $WH'_{cat}$ ) gives a weight of two to the lowest consumption expenditure (income) and the weight declines linearly with the rank in socio-economic measure such that the richest households receive a weight of zero (O'Donnell et al., 2008).

To capture the objective of this study, the following models will suffice;

$$H'_{cat(PrePCGHE)_i} = N^{-1} \left( \sum_{i=1}^N cata'_{h(PrePCGHE)_i} \right) = \mu'_{cata_{hi}} \text{----- (13)}$$

$$H'_{cat(PostPCGHE)_i} = N^{-1} \left( \sum_{i=1}^N cata'_{h(PostPCGHE)_i} \right) = \mu'_{cata_{hi}} \text{----- (14)}$$

Equations (13) and (14) respectively are meant to capture the pre and post per capita government healthcare expenditure catastrophic headcount for Nigeria.

**Data and Source**

The data to capture the incidence of catastrophic health expenditure will be drawn from the Harmonized Nigeria Living Standard Survey (HNLSS) 2009/2010 which is a follow up of the Nigeria Living Standard Survey (NLSS) 2003/2004. The NLSS was combined with the Core Welfare Indicators Questionnaire to form what is now HNLSS. The HNLSS provides information on the average Nigerian household’s livelihoods for the period. The data was collected by Nigeria Bureau of Statistics (NBS) and was funded by the World Bank and the UK Department for International Development (DFID). The survey covered all the 36 states of the federation and the federal Capital Territory (FCT). The welfare approach was conducted in over 70,000 households which is an average of one hundred households per local government area, while the consumption approach covered 50 households in each local government area. Total government expenditure on health will be extracted from the 2010 budget.

**III. Results**

In Table 2, results are presented for the situation where catastrophic indices are computed using total household non-food consumption expenditure as the measure of ability to pay. Results are also presented for various thresholds of 20%, 30% and 40%. It can be observed that as the value of the threshold increases from 20% to 40%, the estimates of the incidence of catastrophic health expenditure ( $H_{cata}$ ) pre/post PCGHE reduces. This implies that, the incidence and intensity of catastrophic health expenditure is sensitive to threshold adopted. For instance, the headcount index for Pre/Post PCGHE at 20% threshold is 84.5%/80.3%, it reduced to 78.9%/74.8% at 30% then it further reduced to 73.5%/69.3% at 40% threshold. This is consistent with *a priori* as noted by O’Donnell et al (2008), Ichoku and Fonta (2009) and Ataguba (2012). The same pattern can also be observed for the weighted headcount ( $WH_{cata}$ ), weighted gap ( $WG_{cata}$ ) and the mean positive gap ( $PG_{cata}$ ).

The catastrophic headcount indicator ( $H_{cata}$ ) measures the incidence of catastrophic spending in the population or it counts the number of persons who exceeds the catastrophic threshold. From table 2, at 40% threshold, 73.5% of households experience catastrophic health expenditure assuming the government does not spend on health (i.e. Pre PCGHE scenario) and this 73.5% overshoots the 40% threshold on average by 30.01%. While for the Post PCGHE scenario, 69.3% suffer catastrophe due to healthcare expenditure and this number overshoots the threshold on average by 26.3%. At 30% threshold, 78.9% of the population suffer catastrophe due to healthcare payments assuming the government does not spend on healthcare (Pre PCGHE) and this number overshoots the threshold by 37.7% while if the government spends on healthcare 74.8% of the population suffer catastrophe due to healthcare expenditure with 33.5% overshooting the threshold on average. Lastly, at 20% threshold, 84.5% and 80.3% of the population suffer catastrophe due to healthcare expenditure at the Pre and Post PCGHE respectively with 45.8% and 41.3% overshooting the threshold on the average.

Table 2: Incidence and Intensity of Catastrophic Out-of-Pocket Health Expenditure in Nigeria (2010)

Incidence and Intensity of Catastrophic Out-of-Pocket Health Expenditure in Nigeria (2010)									
	40% Threshold			30% Threshold			20% Threshold		
	Pre GHECHE	Post GHECHE	Difference	Pre GHECHE	Post GHECHE	Difference	Pre GHECHE	Post GHECHE	Difference
<b>Headcount</b>									
$H_{cata}$	0.734859	0.6932205	0.04164	0.789188	0.7484118	0.041078	0.844946	0.802675	0.04227
Stand Err	0.007539	0.0075693		0.006974	0.0072302		0.006473	0.00697	
CI (Cata <sub>i</sub> )	0.285077	0.374259		0.265523	0.342896		0.2446365	0.314173	
$WH_{cata}$	0.525367	0.433776	0.09159	0.579640	0.491784	0.08786	0.638241	0.550497	0.08774
<b>Gap Measures</b>									
$G_{cata}$	0.300536	0.263100	0.037436	0.376648	0.3352826	0.04137	0.458326	0.4127756	0.04555
Stand Err	0.004520	0.003719		0.005093	0.0043472		0.005587	0.0049351	
CI (O <sub>i</sub> )	0.285077	0.374260		0.265523	0.342896		0.244637	0.314173	
$WG_{cata}$	0.214860	0.164632	0.05023	0.276639	0.220316	0.05632	0.346203	0.283093	0.06311
$PG_{cata}$	0.408971	0.3795334	0.02944	0.477260	0.4479922	0.02927	0.542433	0.51425	0.02818

Note: Estimates are base on household non-food total consumption expenditure

Source: Authors Calculations.

The catastrophic gap index ( $G_{cata}$ ) measures the average intensity above the catastrophic threshold or the average rate at which household that experience catastrophe overshoots the threshold. For example, the intensity of catastrophic spending from table 2 at 40% threshold for pre/post PCGHE scenario respectively is given as 30.05%/26.31%. While at 30% and 20%, this overshoot increased from 37.7%/33.5% to 45.8%/41.3% for the Pre/Post PCGHE respectively.

The concentration index measures the distribution of catastrophic payments in relation to household income. If concentration indices is negative, it indicates that the worse-off are more likely to exceed the threshold (or that catastrophic payments are regressive that is, they do not rise with household total resources) but, if concentration indices is positive, it implies a greater tendency for the better-off to exceed the payment threshold

(or that catastrophic payments are progressive meaning that, catastrophic payments rises with household total resources). In table 2, it can be observed that estimates of concentration indices for all the respective thresholds for the different states for both the pre/post PCGHE scenario are positive implying that, the better-off or the rich households are the ones who exceed the threshold more or that, OOP health budget share tends to rise with household total resources in Nigeria.

To buttress this, the weighted headcount ( $WH_{cata}$ ) and weighted gap ( $WG_{cata}$ ) estimates for the different thresholds are smaller than their respective unweighted headcount ( $H_{cata}$ ) and gap estimates ( $G_{cata}$ ) i.e.  $H_{cata} > WH_{cata}$  and  $G_{cata} > WG_{cata}$  implying that, at both lower and higher thresholds, the rich tend to spend proportionally more catastrophically than the poor. In table 2 for instance, at 40% threshold, the pre/post weighted headcount ( $WH_{cata}$ ) estimates are 52.5%/43.4% while the unweighted headcount ( $H_{cata}$ ) gives 73.5%/69.3% reason being that, the incidence of catastrophic health payment is high among the rich or wealthy. One possible reason for this conclusion is that, a vast majority of the poor suffer exclusion from healthcare utilization as a result, undertake zero-naira healthcare expenditure.

It can be observed also from Table 2 that, Concentration indices increase with increasing threshold signifying that, as threshold increases, the concentration of catastrophic spending increases among the rich households and reduces among the poor households.

On a final note, for the pre and post PCGHE scenario, differences exist between them with the pre PCGHE having higher estimates for the incidence of catastrophic payments than the post PCGHE. At 40% threshold for instance, pre-PCGHE catastrophic headcount gives 73.5% while post-PCGHE gives 69.3% signifying a 4.2% reduction in the incidence of catastrophic healthcare financing. At 30% threshold, Pre PCGHE estimate is 78.9% while Post PCGHE estimate is 74.8% signifying a 4.1% reduction in the incidence of CHE. At 20% threshold, Pre PCGHE estimate is 84.5% while Post PCGHE estimate is 80.3% signifying a 4.2% reduction in the incidence of CHE. This shows the percentage by which government's expenditure on healthcare reduces the incidence of catastrophic healthcare expenditure amongst households in Nigeria. From the result of the difference between Pre and Post PCGHE for all thresholds, one can observe that the percentage reduction is the same thing for all. This implies that the percentage reduction due to government health expenditure on the incidence of catastrophic health expenditure is not sensitive to threshold. So, no matter the threshold, the percentage decrease in the incidence of catastrophic health expenditure is approximately the same.

#### **IV. Conclusion**

This study estimated and compared the incidence of catastrophic out-of-pocket health expenditure among households in Nigeria; Pre and Post government healthcare expenditure. It was motivated by the increasing concerns on the widening rate of poverty, inequality, exclusion from healthcare utilization and backward international rating of the standard of healthcare in Nigeria due to high OOP health expenditure.

The result of the analysis showed that;

1. The presence of government health expenditure reduces the incidence of catastrophic health expenditure among households in Nigeria.
2. The percentage reduction in the incidence of catastrophic health expenditure is even across thresholds.
3. The estimated percentage reduction is actually low (average of 4.0%)
4. The rich suffer catastrophe more due to healthcare expenditure.

From the foregoing, it can be said that, if the government can increase on the amount they spend on healthcare, the incidence of catastrophic health expenditure will further be reduced and might even eventually be eliminated but this depends on the efficient utilisation of the said expenditure. This is because, the result above indicated that a large proportion of the poor are excluded from healthcare utilisation as shown by the concentration indices. So, poverty reduction, inequality and equity in healthcare access and utilisation can be achieved if the government of Nigeria can derive strategies to better include the poor and the less privileged in healthcare utilisation by extending health insurance to better cover the poor and moving healthcare facilities close to the poor.

The result further showed that the reduction in the incidence of catastrophic health expenditure due to government health expenditure does not depend on the threshold adopted. So, no matter the threshold adopted, the difference between Pre and Post government healthcare expenditure catastrophic headcount indices will be the same.

#### **References**

- [1]. Adinma, E.D. & Adinma, B. J. (2010). Community Based Healthcare Financing: An Untapped Option To A More Effective Healthcare Funding In Nigeria. Nigerian Medical Journal, 51, 95-100.
- [2]. African Health Economics And Policy Association (AFHEPA), (2011). Key Issues From The 2011 AFHEPA Conference: Toward Universal Health Coverage In Africa. Senegal: AFHEPA.

- [3]. Ataguba, J. E. (2012). Distributional Impact Of Healthcare Finance In South Africa: A Thesis Presented For The Degree Of Doctor Of Philosophy, Department Of Economics, University Of Cape Town, South Africa.
- [4]. Ataguba, J. E. (2012). Reassessing Catastrophic Healthcare Payments With A Nigerian Case Study. *Health Economics, Policy And Law* 7(3):309-326. DOI: 10.1017/S1744133110000356
- [5]. Berki, S.E (1986). A Look At Catastrophic Medical Expenses And The Poor. *Health Affairs*, 5(4): 138-145.
- [6]. Farnen, K. (2015). How To Calculate Per Capita Income. [Http://Www.Ehow.Com/How\\_4555597\\_Calculate-Per-Capita-Income.Html](http://Www.Ehow.Com/How_4555597_Calculate-Per-Capita-Income.Html) Accessed On: 10/09/2015
- [7]. Federal Office Of Statistics (FOS) (2004), National Living Standard Survey (NLSS) 2003/2004, Abuja, Nigeria.
- [8]. Federal Republic Of Nigeria, (2004). Revised National Health Policy, Federal Ministry Of Health Abuja. [Http://Cheld.Org/Wp-Content/Uploads/2012/04/Nigeria-Revised-National-Health-Policy-2004.Pdf](http://Cheld.Org/Wp-Content/Uploads/2012/04/Nigeria-Revised-National-Health-Policy-2004.Pdf)
- [9]. Federal Republic Of Nigeria (2008). National Health Bill. [Http://Www.Unicef.Org/Nigeria/Ng\\_Publications\\_National\\_Health\\_Bill\\_2008.Pdf](http://Www.Unicef.Org/Nigeria/Ng_Publications_National_Health_Bill_2008.Pdf)
- [10]. Ichoku, H. E., & Fonta, W. M., (2009). Catastrophic Healthcare Financing And Poverty: Empirical Evidence From Nigeria. *Journal Of Social And Economic Development*, 11(2). [Http://Www.Freepatentsonline.Com/Article/Journal-Social-Economic-Development /213956972.Html](http://Www.Freepatentsonline.Com/Article/Journal-Social-Economic-Development /213956972.Html)
- [11]. Johnson, J.A. & Stoskopf, C.H. (2010). Comparative Health Systems: Global Perspectives. [Https://Books.Google.Com/Ng/Books?Id=Gurfdmucyi0c&Pg=PA311&Lpg=PA311&Dq=Out-Of-Pocket+Spending+As+A+Percentage+Of+Total+Health+Expenditures%2bnigeria&Source=Bl&Ots=Ynulfqyam&Sig=SccapuhwcGtpp2yx4dhvm2agla&Hl=En&Sa=X&Ei=Soufvdv6n-HY7Aawjr-Ocq&VEd=0CEYQ6AEwBw#V=Onepage&Q=Out-Of-Pocket%20Spending%20as%20a %20Percenta Ge%20of%20Total%20 Health%20Expenditures%2bnigeria&F=False](https://Books.Google.Com/Ng/Books?Id=Gurfdmucyi0c&Pg=PA311&Lpg=PA311&Dq=Out-Of-Pocket+Spending+As+A+Percentage+Of+Total+Health+Expenditures%2bnigeria&Source=Bl&Ots=Ynulfqyam&Sig=SccapuhwcGtpp2yx4dhvm2agla&Hl=En&Sa=X&Ei=Soufvdv6n-HY7Aawjr-Ocq&VEd=0CEYQ6AEwBw#V=Onepage&Q=Out-Of-Pocket%20Spending%20as%20a %20Percenta Ge%20of%20Total%20 Health%20Expenditures%2bnigeria&F=False) Accessed On: 11/07/2015
- [12]. Kavosi, Z., Rashidian, A., Pourreza, A., Majdzadeh, R., Pourmalek, F., Hossempour, A R., Mohammed, K & Arab, M. (2012). Inequality In Household Catastrophic Healthcare Expenditure In A Low-Income Society Of Iran. [Http://Heapol.Oxfordjournals.Org/Content/27/7/613.Full](http://Heapol.Oxfordjournals.Org/Content/27/7/613.Full)
- [13]. Ke Xu Et Al., (2005). Designing Health Financing Systems To Reduce Catastrophic Health Expenditure, Technical Briefs For Policy-Makers No. 2 (Geneva: World Health Organization)
- [14]. Musgrove, P. (1996). Public And Private Roles In Health. Theory And Financing Patterns. International Bank For Reconstruction And Development/World Bank, Washington DC.
- [15]. O'Donnell, O., Van Doorslaer, E., Wagstaff A. & Lindelow, M. (2008). Analyzing Health Equity Using Household Survey Data: A Guide To Techniques And Their Implementation. Washington, D.C: The World Bank.
- [16]. Ogunbekun I., Adeyi, O., Wouters, A. & Morrow R.H. (1996). Costs And Financing Of Improvements In The Quality Of Maternal Health Services Through The Bamako Initiative In Nigeria. *Health Policy Plan*, 11:369-380.
- [17]. Olakunde, B.O. (2012). Public Healthcare Financing In Nigeria: Which Way Forward? *Annual Nigerian Medical Journal* 6:4-10. DOI: 10.4103/0331-3131.100199 [Http://Www.Anmjournals.Com/Text.Asp?2012/6/1/4/100199](http://Www.Anmjournals.Com/Text.Asp?2012/6/1/4/100199)
- [18]. Onah, M. N. & Govender, V. (2014). Out-Of-Pocket Payments, Healthcare Access And Utilisation In South-Eastern Nigeria: A Gender Perspective. *Plos ONE* 9(4), E93887. DOI:10.1371/Journal.Pone.0093887
- [19]. Onoka., C. A., Onwujekwe, O. E., Hanson, K., & Uzochukwu, B., (2010). Measuring Catastrophic Healthcare Expenditures In Nigeria: Implications For Financial Risk. Department For International Development. [Www.Cresh.Lshtm.Ac.Uk](http://Www.Cresh.Lshtm.Ac.Uk)
- [20]. Onwujekwe, O., Hanson, K., & Uzochukwu, B. (2012) Examining Inequities In Incidence Of Catastrophic Health Expenditures On Different Healthcare Services And Health Facilities In Nigeria. *Plos ONE* 7(7): E40811. DOI:10.1371/Journal.Pone.0040811
- [21]. Reid, M. (2008). Nigeria Still Searching For The Right Formula. *Bulleting Of World Health Organization*, , 86:663-665.
- [22]. Savedoff, W. (2004). Tax-Based Financing For Health System: Options And Experiences. Geneva: WHO.
- [23]. Soyibo, A. (2005). National Health Accounts Of Nigeria 1999-2002. Final Report Submitted To World Health Organization. Ibadan: University Of Ibadan. [Http://Apps.Who.Int/Nha/Country/Nigeria\\_Report\\_1998-2002.Pdf](http://Apps.Who.Int/Nha/Country/Nigeria_Report_1998-2002.Pdf)
- [24]. Soyibo, A., Olaniyan, O. And Lawanson, A.O. (2009). National Health Accounts Of Nigeria 2003-2005: Incorporating Sub-National Health Accounts Of States. Main Report Submitted To Federal Ministry Of Health. Ibadan: University Of Ibadan. [Http://Apps.Who.Int/Nha/Country/Nga/Nigeria\\_Nha\\_2003-2005\\_Report.Pdf](http://Apps.Who.Int/Nha/Country/Nga/Nigeria_Nha_2003-2005_Report.Pdf)
- [25]. Uzochukwu, B., Onwujekwe, O., Soludo, E., Nkoli, E. & Uguru, N. (2009). The District Health System In Enugu State, Nigeria: An Analysis Of Policy Development And Implementation. Consortium For Research On Equitable Health Systems. [Http://Www.Crehs.Lshtm.Ac.Uk/Downloads/Publications/District\\_Health\\_System\\_In\\_Enugu\\_State.Pdf](http://Www.Crehs.Lshtm.Ac.Uk/Downloads/Publications/District_Health_System_In_Enugu_State.Pdf)
- [26]. Wagstaff, A. & Van Doorslaer, E., (2003). Catastrophe And Impoverishment In Paying For Healthcare: With Applications To Vietnam 1993 – 1998. *Journal Of Health Economics*, (12):921 – 934.
- [27]. World Health Organization (2004). The Impact Of Health Expenditure On Households And Options For Alternative Financing. Technical Paper EM/RC51/4, Agenda Item 6(A).
- [28]. World Health Organization (2005). Distribution Of Health Payments And Catastrophic Expenditures Methodology. Discussion Paper Number-2.
- [29]. World Health Organization (2009). WHO Country Cooperation Strategy: Nigeria 2008-2013. Brazzaville: WHO Regional Office For Africa.
- [30]. World Health Organization (2015). National Health Accounts. [Http://Apps.Who.Int/Nha/Database/Select/Indicators/En](http://Apps.Who.Int/Nha/Database/Select/Indicators/En) Accessed On: 15/07/2015
- [31]. World Health Organization. (2010). The World Health Report: Health Systems Financing: The Path To Universal Coverage. Geneva: World Health Organization.