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Catastrophic Health Expenditure Estimates: A Methodological Evaluation and Policy Implication

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Abstract. Evidence-based studies that produce the incidence of catastrophic health expenditure (CHE) and household impoverishment are often used to assess a health system performance and its impact on the well-being of the people. These evidenced-based studies offer rich sources of materials for policy makers to aid the development of policies that will ensure the optimal performance of the health systems. Literature however alludes that the incidence of CHE and household impoverishment are sensitive to the methodology used in their assessment. This poses a challenge as the level of incidence computed may be understated thus undermining urgent policy intervention. Using the same set of data, this study examined the extent to which the incidence of CHE and household impoverishment are responsive to different methodologies - with particular emphasis on how the definitions and operationalisation of variables affect their values. The study arrived at a difference of 53.42% and 21.80% in the incidence of CHE and Household impoverishment respectively due to differences in the definition and operationalisation of variables. The percentage of poor households increased by 20.57% as the definition of household necessity increased beyond food. Since the results showed wide differences in values computed, the study recommended the need to standardize the system of assessing the incidence of CHE and household impoverishment in Nigeria as a result of consuming health care to ensure comparable results that will ease policy making relating to healthcare financing in Nigeria.

Keywords: Catastrophic Health Expenditure, Impoverishment, Methodology, Policy intervention, Nigeria

1. Introduction

1.1 Background

Evidence-based studies that produce the incidence of catastrophic health expenditure (CHE) and household impoverishment are often used to assess a health system performance and its impact on the well-being of the people in addition to the formulation of appropriate policies that will ensure optimal performance of a health system. Using evidence to inform policy making is not a new phenomenon. Evidence based policy (EBP) involves a combination of scientific knowledge, pragmatic knowledge and value-led knowledge (Sutcliffe and Court, 2005). According to the UK Cabinet office (1999), EBP produces policies that really deal with problems; that are forward looking and

shaped by the evidence rather than a response to short-term pressures; that tackle causes not symptoms.

Health care problems are policy issues which require intentional attention. Attention is necessary particularly because of concern for equity and financial protection in accessing health services and achieving the third Sustainable Development Goal which is to ensure healthy lives and promote well-being for all at all ages by the year 2030. Measuring the incidence and magnitude of out-of-pocket payments (OOPPs) for health care, using data from household surveys, forms the basis for assessing and comparing the extent of the problems associated with a system of health care financing. It also reveals the presence or absence of financial protection within the system. The measurement and assessment thus provides the basis for improving the systems' performance with the objective of promoting equity and providing financial protection to the people. It provides information for health system reforms and development of policies with particular emphasis on achieving the primary objective of health systems – improving population health.

The World Health Organization (2017) pointed out clearly that there is a very strong correlation between the level of OOPPs and how well a health system performs. The Organization also noted that there is a very strong correlation between the level of OOPPs and the two indicators that are currently used to monitor how well a health system is performing in terms of financial protection: the incidence of catastrophic and impoverishing health expenditures. Sadly, though, OOPPs often constitute a part of the health financing landscape in many countries, and when it is left unregulated, this system of health financing constitutes a major access barrier to needed health care and leads to Catastrophic Health Expenditure (CHE) which contributes substantially to household impoverishment.

Lu, Chin, Li and Murray (2009) however noted that the capacity to monitor and track the effects of OOPPs on health and care and its catastrophic effects is very limited. Measures of CHE are often hampered by differing survey methods, population, survey design, differences in the operationalization of variables, data recall periods, etc. In addition, Hsu, Flores, Evans, Mills and Hanson (2018), also pointed measuring the incidence of CHE is also affected by the definition of household available resources (denominator) and to the threshold (percentage) used to determine when the OOPP share on health is catastrophic.

This paper therefore seeks to investigate the effect of methodology on measuring the incidence of CHE in Nigeria. Specifically, the paper seeks to determine how definitions and operationalization of variables used to measure the incidence of CHE affects the final results. This is achieved by applying the WHO methodology on the same set of data but with modifications and redefinition of some of the concepts in the methodology as proposed by Pal (2012). The paper is motivated by the fact while the proportion of households that incur CHE in a country is widely used as an indicator of the extent to which the health system protects households needing health care from financial hardship, the capacity to monitor and track meaningfully the extent of CHE among households is influenced by the methodology adopted. If the severity of CHE is underestimated for instance because of how variables are defined, measured and operationalised, policy makers may downplay the need for practicable reforms in the health sector and it could have a debilitating effect on the health of the entire population. However, where the incidence of CHE reflects prevailing realities, relative to the prevalence of OOPPs as a major source of financing health care, discernible steps can be taken towards improving financial protection for Nigerians and the achievement of Universal Health Coverage (UHC) would be fast tracked in the country.

2. Literature Review

2.1 Overview of the Concept of CHE

The concept of CHE was first introduced by Berki (1986) who defined CHE as when the expenditure for medical care endangers a family's ability to maintain its customary

standard of living. Berki (1986) further posited that expenditures per family rather than per capita expenditure on health care should constitute the appropriate units of analysis and of policy relating to health care since the basic spending unit is the family and not the individual and also because the welfare of each individual within the family is interdependent. In other words, expenditure for healthcare which threatens the households' financial capacity to maintain daily living, such that it leads the household to sacrifice consumption of other items that are necessary for their well-being, sell assets, and borrow, so as to pay for healthcare is deemed catastrophic (Rashad and Sharaf (2015) Onoka, Onwujekwe, Hanson and Uzochukwu (2010); O'Donnell, van Doorslaer, Wagstaff and Lindelow (2008).

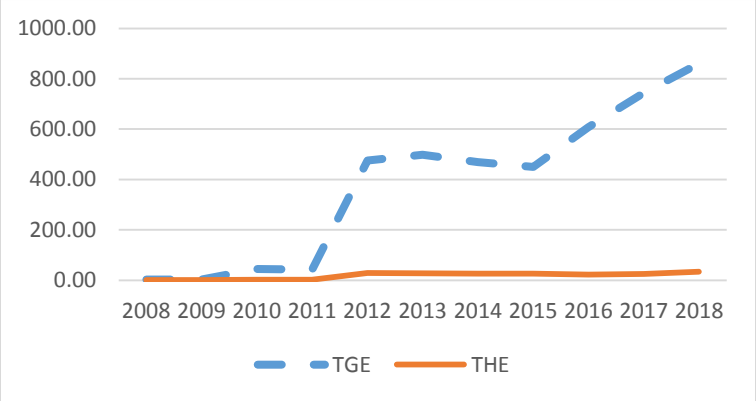
Naga and Lamiraud (2008) however notes that a household incurs CHE if its health OOPPs for healthcare exceeds a pre-determined critical threshold. This threshold according to Berki (1986) is defined relative to family income or expenditure. While there is no consensus in the existing literature on the most appropriate threshold, many studies have used 5%, 10%, 15% (Berki, 1986; Wagstaff, and van Doorslaer, 2003; O'Donnell et al, 2008). For instance, the WHO, identifies a household with CHE when its OOPPs equal or exceeds 40% of its capacity to pay. Capacity to pay is defined as household non-subsistence expenditure (household expenditure less household food consumption expenditure).

CHE does not necessarily equate to high health care costs since very small expenditures on health can be financially disastrous for poor households (Ngcamphalala and Ataguba, (2018). Xu et al, (2005) identified three factors that have to be present for catastrophic payments to arise: the availability of health services requiring OOPPs; low household capacity to pay; and lack of prepayment mechanisms for risk pooling. The WHO recommended that countries must intentionally move away from reliance on OOPPs for funding health care to protect households from CHE (World Health Report, 2010).

2.2 Trend in Health Care Financing in Nigeria

The health financing system in Nigeria from a cursory look appears to induce CHE as OOPPs remains the major source of financing health care in the country. For instance, health budget has remained low relative to total government budget as evident in the diagram below.

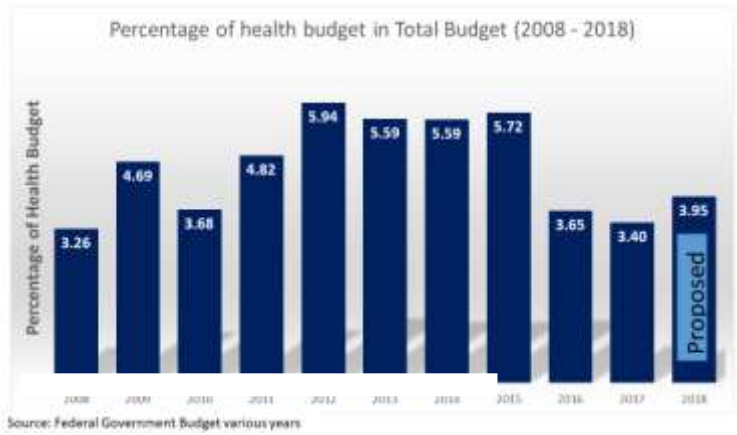
Figure 1. Relationship between Total Government Budget and Health Budget 2008 - 2018



Source: Federal Government Budget 2008 – 2018)

The total health budget has also consistently remained below the 15% of total budget recommended at the Abuja declaration in 2001 as evident in the diagram below.

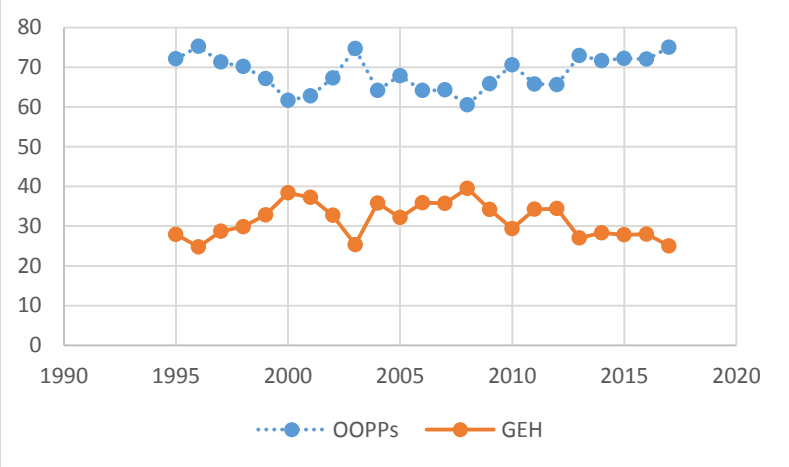
Figure 2: Percentage of Health Budget in Total Budget (2008-2018)



Source: Federal Government Budget 2008 – 2018)

The near absence of government contribution to health care financing has led to over dependence on OOPPs for health care over the years in Nigeria with the gap between OOPPs and government health expenditure quite alarming.

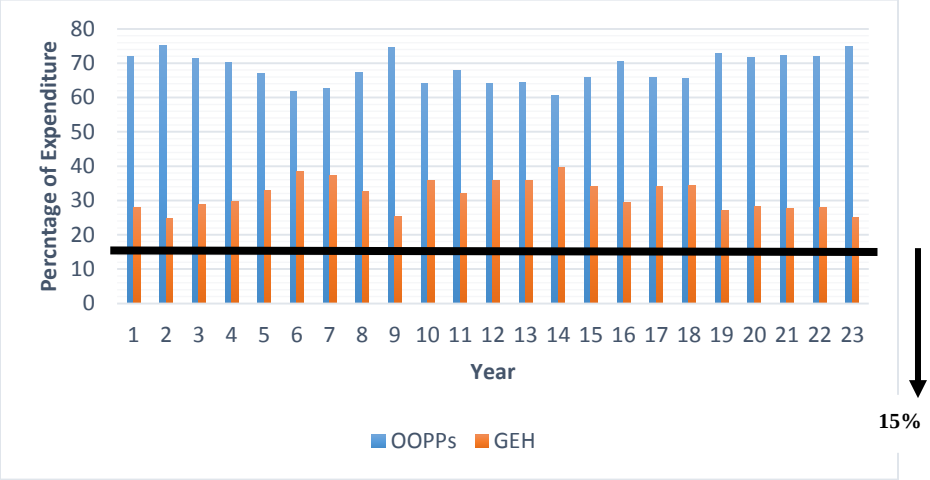
Figure 3 Relationship between OOPPs and Government health expenditure as a share of Total health expenditure 1995 – 2017



Source: World Health Organization Global Health Expenditure Database.

The world Health Organization recommends that OOP payments for health should not exceed 15 percent of total health expenditure if households are to be protected from CHE. But the reality in Nigeria portrays that households have at times borne almost 80% of total health expenditure as evident in figure 4.

Figure 4: Government and Private Spending on Health in Nigeria (1995 – 2017)



Source: World Health Organization Global Health Expenditure Database

The high level of OOPPs as a major source of health care financing limits the ability of poor and vulnerable households, and sometimes rich households without health insurance to access and utilize necessary healthcare services. This inability maybe behind the persistent deplorable health statistics often associated with Nigeria and thus necessitates the need for health issues to be brought to the forefront of policy makers in the country.

2.3 Theoretical Literature: An Evidence-Based Model

Evidence based policy is a set of methods which determines the policy process It advocates a more rational and systematic approach to policy making on the premise that policy decisions should be better informed by available evidence. This is because policy which is based on systematic evidence is seen to produce better outcomes (Sutcliffe and Court, 1999). EBP' approach helps policy makers make well informed decisions about policies, programmes and projects by putting the best available evidence from research at the heart of policy development and implementation according to Davies (2004)

Health policies are developed basically to improve the physical, social, economic or environmental conditions, and to reduce health inequities in a country (Glossary, 2001). For health policies to be effective, they must be evidence-based, from empirical research, to reveal the prevailing realities in a country.

In conducting analysis which may be geared towards improving the health policy in a selected area, Walt, Shiffman, Schneider, Murray, Brugha and Gilson (2008) recommends that it is important to contextualize the study environment in order to understand the challenges a methodology might pose in the study. This is particularly important since some of the ideas and concepts in a methodology may have been derived from studies in countries that are not comparable to the present one where the study is being conducted. In their study, 'Doing' health policy analysis: methodological and conceptual reflections and challenges' Walt et al, (2008) further noted that in a bid to perform its health care purchasing, regulatory and reform functions, the state is usually heavily reliant on essential information about the health sector which may only be assessed from private research efforts which must be properly contextualized in both place and time to capture the prevailing realities in the country.Tannahill (1980) developed a model with three overlapping activities to describe health promotion. as shown in the diagram below:

Source: Tannahill (2008)

The Tannahill model recognised health protection as a policy issue and also drew attention to the need for EBP – using available evidence to inform the nature and application of policies in the health sector. EBP according to Davis (2004) is the integration of experience, judgement and expertise with the best available external evidence from systematic research, it involves a shift away from opinion-based decision making towards decisions based on the opinions and judgements of experts (that) constitute high quality valid and reliable evidence from empirical research work. In other words, studies that reveal the true state of the health sector in Nigeria will serve as a veritable tool in the hands of the policy makers for coming up with the best policies for the sector and also giving the sector the priority it deserves.

2.4 Variations in Measures of CHE in Nigeria

Catastrophic health spending is not a new problem in Nigeria but the possibility that it is a worsening problem due to collapsed and ineffective mechanisms for risk pooling demands its constant analysis. Ibukun and Komolafe (2018) reported varying incidence of CHE based on the threshold level with the highest being 72.5 percent at 10 percent. Her study however covered only 4,581 households mostly in the farming region. Aregbesola (2017) recorded an incidence of 29.3 with a threshold of 10 percent. Adisa (2015) reported that 9.6% households experienced CHE in Nigeria. His study covered households with at least one elderly member (one with a member older than or 50 years old). Okoronkwo, Ekpemiro, Okwor, Okpala, and Adeyemo (2015), in the same year recorded an incidence of CHE of 45% though their study covered only people living with type II diabetes mellitus in Nigeria. Amakom and Ezenekwe (2012) reported that 24% of Nigerian households incurred CHE using the Nigerian Living Standard Survey (NLSS) 2003/2004 with 19,158 households. Onoka, Onwujekwe, Hanson and Uzochukwu (2011) calculated CHE intensity as 14.8%. Their study was however focused on Enugu and Anambra states with only 1,128 households. Using data from the Harmonized Nigerian Living Standard Survey (HNLSS) 2009/2010 Omotosho and Ichoku (2016) reported that 19.5% of Nigerians suffered financial catastrophe. 48% incidence of CHE was reported by Ichoku and Fonta (2009) and the data for the study were derived from the 1999 General Household Surveys with 7,667 households. Comparability is impossible because of the differences in the study population. This setback is however minimised as different methodologies are used on the same data set. Comparability is facilitated and policy requirements enhanced.

3. Materials and Methods

The study is focused on Nigeria using the Harmonized Nigeria Living Standard Survey (HNLSS) 2009/2010 the most comprehensive household survey in Nigeria. The household survey covers the thirty-six states of the federation including the federal capital territory – Abuja. The project was funded by the World Bank and the UK Department for International Development (DFID). The Federal Government of Nigeria represented by the National Bureau of Statistics implemented the survey by providing professional leadership.

The household survey covered 34,769 households with a total of 153,831 individuals. It covered 9,327 urban households and 25,442 rural households. The survey included national and state findings carried out throughout all the 774 local government areas in the country. For the results of the survey to be more useful, states were zoned according to the six geo-political zone structure of the country as enshrined in the

1999 Constitution of the Federal Republic of Nigeria.

Since studies on the incidence of CHE and its impoverish effects is influenced by the type of data (survey) and the methodology adopted (Buigut, Ettarh, and Amendah (2015); Raban, Dandona and Dandona (2013); Pal (2012); Lu, Chin, Li, and Murray 2009; Xu, Evans, Kawabata, Zeramdini, Klavus, Murray (2003)), the two methodologies that are compared in this study, using the same data set are the WHO Methodology proposed by Xu (2005) and a modification by Pal (2012).

In the discussion paper on the Distribution of Health Payments and Catastrophic Expenditures Methodology, Xu (2005) presents a formal methodology for assessing the catastrophic effects of health payments. Two important features of this methodology are (1) the adoption of a threshold of 40% to determine households that are exposed to CHE and impoverished as a result of OOPPs for health care. (2) The methodology defines food as the only basic necessity for households. Thus the capacity-to-pay for healthcare is defined as income left over after providing for food consumption

Pal (2012) methodology is an adaptation of the WHO methodology with two basic deviations. Firstly, Pal (2012) proposes a relationship that computes a threshold that is unique to each household given its level of expenditure, secondly, she extends the definition of basic necessities beyond food expenditure and argues that that capacity-to-pay should exclude expenditure on all items of necessity and not just food.

Pal (2012) identified nine categories of consumption items as potential necessities namely, cereal, sugar, salt, egg/fish, vegetables, pulses, clothing, rent and cooking fuel. In this study, we merged the first six items as food items and also included household expenditure on education as a necessity because it is one of the most important components of human capital (Groot and Brink, 2006). Thus, we define household necessary expenditures (HH_{NE}) to include:

(i) ood_h – Total household expenditure on food less expenditure on alcoholic beverages and expenditure on food eaten in the restaurant.

(ii) Cook fuel (CKF_h) – Household expenditure on cooking gas, firewood and kerosene

(iii) $Clothing_h$ – Household total expenditure on clothing as reported

(iv) $Rent_h$ – Household expenditure on furnishing and routine household maintenance, actual and imputed rent and repairs of dwelling place

(v) Education (Edu_h) – Household total expenditure on education less education insurance.

Mathematically we have that

$$HH_{NE} = Food_h + CKF_h + Clothing_h + Rent_h + Edu_h$$

4. Results

The data were analysed using STATA version 13.0. Since the HNLSS is an instrument for regular monitoring of welfare and social trends for different population groups in Nigeria particularly the poor, 73.17% of the population were from the rural area. While healthcare needs may be greater in these regions, studies have shown that many people in the developing world particularly in the rural areas go without health care from which they could benefit greatly (O'Donnell, 2007); not necessarily because they do not want to consume enough but affordability as noted by Banerjee et al., (2012), still remains a major barrier to accessing adequate health care for the poor in the rural areas. Thus, utilization of health care is often lowest among the rural poor who may need it the most.

The values of some key variables computed from the WHO methodology and the modified version are presented in the table 1

Table 1: Comparative Results of Variables from the two Approaches for Examining CHE

	WHO Methodology	Percentage of the study Population	Modified methodology	Percentage of the study Population
Poverty Line	₦54,345.04	-	₦79,105.64.	-
Poor Households	9,235	26.35	16,315	46.92
Households with CTP	15,238	43.82	18,454	53.08
Households with CHE	22, 858	65.74	24,641	70.87
Household who paid for health care and experienced CHE	5,874	46.56	12,614	99.98
Households with CHE by Sector				
Rural	4,717	18.54	19,240	75.62
Urban	1,157	12.40	5,401	57.91
Household Impoverishment	9,235	26.56	16,315	46.92
Household Impoverishment as a result of OOPPs for health	11, 258	32.38	18,838	54.18
Households impoverished by Sector				
Rural	9,625	37.83	15,534	61.06
Urban	1,633	17.51	3,304	35.42

5. Discussion of Results

The results revels significant differences in computed values, indicating that the methodology adopted greatly influences the final results for CHE studies. Using the 40 percent threshold recommended by the WHO methodology, with food defined to be the only necessary expenditure for households, the poverty line was estimated as ₦54,345.04, with the modified definition of necessity, the poverty line increases to ₦79,105.64 which is 68.70 percent greater. The wide difference in the poverty line is basically due to the fact that the variable is sensitive to the items that are included in its measurement. It is obtained by specifying a consumption bundle considered adequate for basic consumption needs and then by estimating the cost of these basic needs. The poverty line represents the threshold level of consumption needed for a household to live above poverty. Thus the poor are those whose expenditure as in our study falls below the computed poverty line.
Using food as the only basic necessity, 26.56 percent of households are poor.

However, as households' basic needs increases the number of poor households increases to 16, 315, representing 46.92 percent level of poverty. Literally, this will suggest that about 84.5 million Nigerians which is almost half of the population of the country are consuming below the estimated poverty line.

Since CHE is only incurred when households pay for health care, the incidence of CHE is greatest when more items are included as household necessity. Consuming health care alongside other necessities exposes almost all households to CHE with an incidence of 99.98 percent. This reveals that of the 12,616 households who paid for health care, only two households did not experience CHE while 12,614 households suffered CHE. However, using the 40 percent threshold, 46.56 percent experienced CHE. The incidence of CHE is high particularly because financial protection is completely lacking in Nigeria and households are expected to pay for their health needs. Data used for the study reveals that only 8 households or 0.02 percent have a form of insurance policy.

After accounting for more necessary household expenditure besides food, more households (54.18 percent) are impoverished, that is pushed into poverty or further into poverty as a result of health payments. In both cases, rural households are more affected with the incidence of CHE and impoverishment. This is to be expected as poverty is highest in the rural sector and even small health payments might prove disastrous to these households.

6. Conclusion

The major objective of this paper was to assess the sensitivity of the incidence of CHE and impoverishment to methodological choices. This was achieved by applying the WHO methodology and a modified version as proposed by Pal (2012) to the same set of data. The differences in the results suggest clearly that CHE studies are sensitive to methodologies with particular reference to how variables are defined and measured.

The measure of CHE has serious policy implications as a method may understate the intensity of CHE and thus dampen the need for policy intervention in the health sector. The differences in methodology also poses a problem in terms of monitoring the extent of financial risk protection in the country particularly in relation to the achievement of the third goal of the SDGs

Based on the results, methods used to assess the intensity and incidence of CHE in Nigeria needs to be standardised to produce valid and reliable results that are representative of the prevailing situation in the country. Since household data is often used to assess CHE, appropriate definitions of the variables must be clearly stated. This will produce identical estimates that will assist in the implementation of the right kinds of policies that will provide financial risk protection for the consumers of health care and also intensify the pursuit of Universal Health Care (UHC) in Nigeria.

Though none of the estimates generated in the study can be described as perfect, it is however logical to assume that a high OOPPs for health care will likely correspond to a similarly high incidence of CHE. Thus the modified version of the WHO methodology as proposed by Pal (2012) appears to provide more reliable results considering the high level and dependence on OOPPs in Nigeria. Thus it is only logical to insist on a policy prescription which advocates a move away from reliance on OOPPS for healthcare towards a system that encourages a form of pre-payment to enhance financial risk protection for consumers of health care in Nigeria and also to protect households from CHE if they experience health shocks.

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