Benefits on the Margin from Public Spending across Healthcare Levels and Geopolitical Zones in Nigeria

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Abstract

The healthcare sector has been a core target of government in Nigeria because of the perceived multiplier or spillover effect on other sectors. Though series of policies, laws and spending have been put in place, indicators of healthcare in Nigeria have been poor and burdened by regional and location disparities. This study sets out to find which segment of the society that might likely benefit from extra investment in the sector. Utilizing the harmonised living standard dataset and employing a marginal benefit incidence analysis, the study found that marginal odds estimates were pro-poor for most southern regions with little urban bias for primary and secondary healthcare different from results from northern regions. On the reflex, the tertiary level estimates were decidedly pro-rich at the margin across regions and locations. The study recommended reforms in the sectors that will be reflected in budgeting and legal frameworks to achieve targets by impact and by need. Reforms that will consider regional specific issues will improve cost efficiency of additional spending. This must be done before additional funding to different levels for sustainable efficiency and effectiveness.

JEL: D61; H51; H53; H61; P16

Key Words: *Public Spending, Benefits on Margin, Healthcare, Regions, Nigeria*

INTRODUCTION

Nigeria having been crowned the poverty capital of the world in 2018 although the country remained the largest economy in Africa with a Gross Domestic Product (GDP) of US$404.65

billion in 2018 and a population of approximately 200 million people (Akabueze, 2019). A key contributor to this unimpressive situation has been the healthcare input-outcome mechanisms which many believe are not commensurate.

Despite increase in healthcare funding over the last two decades by different tiers of government, Nigeria's indicators of healthcare are yet to be adjudged moving in the right direction. A telling indicator is the fact that Percentage Distribution of Children of 5 Years and below who were vaccinated by type of Vaccine by Sector, State and Zone have much regional (geopolitical zones) and location (rural and urban) variations as depicted in Table 1 below.

Table 1: Percentage Distribution of Children 5 Years and below who were vaccinated by type of Vaccine by Location and Region (geopolitical zone)

	DPT	POLIO	MEASLES	BCG
NATIONAL	2.2	14.4	8.0	75.3
URBAN	1.5	8.5	5.7	84.3
RURAL	2.9	19.9	10.2	67.0
North-central	1.4	10.1	11.5	77.0
North-East	6.0	26.8	10.3	56.9
North-West	2.8	31.4	8.9	56.9
South-East	0.7	2.6	7.7	88.9
South-South	3.1	9.0	8.5	79.4
South-West	1.2	8.6	4.5	85.7

Source: NBS 2022

Such regional and locational variations have become a cause for concern and the need to find a way to improve such situations in future public spending across different levels of healthcare in Nigeria is crucial. Therefore, this paper is concerned with finding out the effect of additional public spending on healthcare. In other words, the study is an evaluation of further public spending impact using the Marginal Benefit Incidence Analysis developed as a political economy model in which different population groups such as poor and the non-poor have different political power and different costs and benefits from a given public spending using the Harmonised National Living Standard Survey (HNLSS) data set.

Understanding the impact of future spending is crucial because it will provide first-hand information on the effectiveness of the already spent funds and thus provide an insight on marginal increases. Furthermore, it will help policy makers to know if will be adding value to undertake such spending or the need for doing the first things first to be able to achieve value for money in the end and turn the unfavourable healthcare indicators in the right direction.

METHODS, DATA AND SOURCES
The standard methodology for benefit incidence analysis involves application of subsidy rates on each public-sector service (program) on average participation rates of households categorized in accordance with their levels of welfare. Examples of works done along this line include that of Meerman (1979) for Malaysia; Hammer, et al (1995) also for Malaysia; and Van de Walle (1995) for Indonesia.

Unlike the standard benefit incidence analysis, the Marginal Benefit Incidence measures increments in access rates for a given public service of a certain income group when there is a change in aggregate participation or in spending. Such a type of analysis normally requires panel data or repeated cross sections. But, in their pioneering works, Ajwad and Wodon (2002) and Lanjouw and Ravallion (1999) produced results that by-passed the problem. Approaches from both works were utilized in this study. At the level of conception[i], the approaches used by Ajwad and Wodon (2001) and Lanjouw and Ravallion (1999) differ in the method used for ranking individuals, regions (geopolitical zones), location, or any other entities that are the basic units of observations. At the empirical level, two differences exist between the two approaches. The first difference lies in the way the endogeneity bias in the estimation of the marginal benefit incidence analysis is dealt with.

The technique used in previous studies consists of regressing access rate in each quintile against the mean access rate. The mean access rate, though, includes information from the access rates in each quintile. To purge the mean from endogeneity, Ajwad and Wodon (2001) employed what they call "the leave-out mean" as right-hand side (RHS) variable. That is, the access rate in any given quintile is regressed against the average of the access rates across all quintiles, except for the quintile for which the regression is performed. On the reflex, Lanjouw and Ravallion (1999), used an instrumental technique, whereby the actual mean is instrumented by the leave-out mean. The second difference is that Ajwad and Wodon (2001) constrained the estimates of the marginal benefit incidence analysis to sum to one, and show that without such a constraint, the estimates will be biased downward.

This current study used the Lanjouw and Ravallion (1999) and Ogujiuba (2022) model where interplay between these factors determines the relationship between the size of total spending on it, and each group's share of its benefits. "Early capture" by the poor occurs when they receive larger shares of a small programme but their share declines as the programme grows and vice versa[ii]. Lanjouw and Ravallion (1999)[iii] provided the following econometric method thus:

$$\rho i,k,q=\alpha q+\beta q\rho k+\mu i,k,q \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(1)$$

where i indexes a geographic unit (a region (geographic zone) in Nigeria), k indexes a larger one (sector like healthcare), and q indexes the welfare quantile. The left-hand variable is the programme participation rate for a given region and quintile. The regressor is the programme participation rate for the sector in which the region is located. β_q is the marginal effect of an increase in the programme participation rates for the sector on the participation rates of the people in a given region and quintile[iv]. The regressor is run separately for each quintile. In addition, because $\rho_{i,k,q}$ is included in ρ_k there is an upward bias in the estimation but Lanjouw and Ravallion (1999)[v] resolved this by instrumenting ρ_k with the left-out mean[vi], that is the participation for all sector k except those individuals in region i and quintile q under the intuition that observing sector participation variations across the country will make it possible to understand how increased coverage affects the participation of different population groups.

If β_q is greater than one, it indicates that a general expansion in coverage is correlated with a disproportionately large increase in participation for that region and quintile. Again, we estimate this as one regression with group-specific fixed and interaction effects and constrain the marginal effects to account for the total change using the HNLSS. It is true that Nigeria now has some waves of survey data such as the Harmonized National Living Standard Survey (HNLSS), but there exist unique differences that inhibit the merger into a panel data for the marginal

incidence analysis hence the concentration on the latest HNLSS which is more complete than the former. An important assumption here is that across regions, the same political process determines the correlation between programme size or coverage or incidence. Our preference in the study was to define all participation behaviour in per capita terms – normalising health consultations on the quintile population. The analysis of marginal benefit incidence here is restricted to public facilities only. The margin that this model estimates is in line with that of Younger (2003) which is the incidence of an increase in programme participation.

In summary, the entire population was divided into five quintiles with quintile 1 representing the poorest and quintile 5 the richest to generate marginal odds estimates which shows if investment of extra one naira (₦1) in healthcare in the region or location increases or decreases the public expenditure per capita going to that quintile. The quintile coefficient is pro when the value is greater than one (>1) and anti-otherwise.

The study used the healthcare section of the HNLSS collected on individual basis and households and further disaggregated by location, regions and state. The data set contained information on individual's total expenditure on healthcare. Table 2 below shows the distribution of respondents across regions and socio-economic status (quintiles) and the percentage share.

Table 2: Regional (Geo-political zone) composition of respondents by Quintiles

	North-Central	North-East	North-West	South-East	South-South	South-West	Total
Quintile 1	7,645	17,964	22,815	4,310	5,884	6,753	65,371
Quintile 2	11,048	11,167	21,758	6,318	6,648	8,632	65,571
Quintile 3	12,147	9,930	18,931	7,073	8,260	9,430	65,771
Quintile 4	11,011	8,624	15,728	9,332	10,339	10,337	65,371
Quintile 5	11,719	6,162	12,740	10,226	13,637	11,287	65,771
Total	53,570	53,847	91,972	37,259	44,768	46,439	327,855
% share	16.34	16.42	28.05	11.36	13.65	14.16	100.00

Source: Generated by the Authors from the HNLSS

RESULTS AND FINDINGS

The study was to determine the marginal benefit incidence of Nigeria's healthcare assessing how pro-poor, regional (geo-political zones) as well as location (rural and urban) equalising are the expansion of access to public healthcare.

Primary Healthcare

Primary healthcare in Nigeria is the healthcare services provided by health centers, clinics, dispensaries, maternities, etc[vii]. The results of the marginal benefit incidence analysis (the marginal odds of accessibility) to basic healthcare across regions and location in Nigeria are presented in Table 3.

Table 3: Estimates of marginal odds for all levels of healthcare (primary, secondary and tertiary) in Nigeria by region and location

Primary Healthcare	North-Central		North-East		North-West		South-East		South-South		South-West	
Quintiles	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
1	1.122	1.103**	0.814*	0.927*	0.924*	1.003**	1.622**	1.283*	0.947*	1.029*	1.467*	1.303*
2	1.013*	1.112*	0.941**	1.017	0.981	1.012*	1.293*	1.667*	1.104*	1.072*	1.433*	1.607**
3	1.034**	1.101*	1.237**	1.21*	1.104	1.12^*	0.931	1.723*	1.103**	1.022	1.034**	1.753**
4	1.013*	0.9	1.017	1.012	1.017	1.012	0.687	0.211	1.007	1.072	0.807	0.221
5	0.83***	0.814***	1.007***	0.864***	0.983***	0.864***	0.474****	0.126**	0.847***	0.828***	0.264**	0.136
Secondary Healthcare	North-Central		North-East		North-West		South-East		South-South		South-West	
Quintiles	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
1	0.9142	1.014**	0.802**	0.891	1.017***	1.013**	1.13***	1.0148*	1.01**	0.977***	1.015*	1.121**
2	1.029***	1.003***	0.892***	0.759***	0.953***	0.901***	1.01*	1.1395*	0.93***	1.102**	1.113*	1.122**
3	0.916**	1.113*	1.102**	1.118***	1.129***	1.101*	1.16**	0.9672**	0.94***	1.101***	0.934*	1.025*
4	1.031*	0.75	1.102**	1.121*	0.881	0.876	0.88	1.107	1.1	1.011	1.015	0.931
5	1.113**	1.121*	1.103***	1.113*	1.02***	1.112**	0.81**	0.773	1.02*	0.809**	0.924**	0.802***
Tertiary Healthcare	North-Central		North-East		North-West		South-East		South-South		South-West	
Quintiles	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
1	0.674	0.665*	0.393*	0.447**	0.544*	0.723	0.746**	0.815	0.782*	0.827**	0.663*	0.737**
2	0.7648	0.811*	0.786**	0.781	0.805*	0.824***	0.93*	0.832	0.643	0.757**	0.788	0.912*
3	1.026*	1.013*	1.149**	0.934**	1.137***	1.028**	1.024*	1.121**	0.927***	1.031**	1.031*	0.917
4	1.114*	1.113**	1.019***	1.113*	1.3**	1.114***	1.028*	1.112*	1.365***	1.012***	1.143*	1.122*
5	1.421*	1.401**	1.654***	1.726**	1.215***	1.312**	1.321***	1.120*	1.316**	1.375**	1.375**	1.313***

*Source: Author's estimates based on expenditure data and HNLSS 2009/2010; Note: Coefficients are statistically significant at * (0.1); ** (0.05); *** (0.01); and not statistically significant when there is no star*

The regional cum location disaggregated marginal benefit incidence analysis findings revealed a pro-poor statistically significant marginal odds in additional public spending across some regions except for non-significant rural North-Central, rural and urban North-East, rural North-West and rural South-South. Findings also show that the marginal odds of quintile 4 across the northern regions and the South-South region were almost the same with that of quintiles 1 and 2 in the same regions while North-West region marginal odds for quintile 2 do not support future pro-poor public spending. This implies that for example a further ₦1 investment in primary healthcare in the South-West region for example will increase the public expenditure per capita going to the poorest quintiles (quintiles 1 and 2) by ₦1.467 and ₦1.433 for rural and ₦1.30 and ₦1.607 for urban residents respectively and for the richest quintiles (quintiles 4 and 5) by only 80k and 26k for rural and 27k and 14k for urban resident respectively all other things remaining constant. The case of South-West primary healthcare intervention marginal odds represents an outstanding progressive benefit incidence of further public spending in public primary healthcare. The South-South rural marginal odds estimates are a cause for concern as it can neither be called pro-poor nor pro rich.

The implication of the above finding is that public spending in primary healthcare has been *pro-poor* across regions of the south apart from South-South and hence further increase in public spending for this level of healthcare is expected to improve access for the poorest households' cateris paribus and this may have positive implication on basic healthcare indicators.

The finding that marginal odds estimates were pro-poor for some of the regions and by locations for primary healthcare in Nigeria upholds findings from Van de Walle & Nead (1995) for thirteen developing countries; Demery (1995) & The World Bank (1995a) for Ghana; Rannan-Eliya et al (2001) for Sri Lanka; Heltberg, Simler & Tarp (2001) and (2003) in Mozambique as well as the World Bank 2021 where public service provision was found to be more equal than in many other African countries.

Secondary Healthcare
A perusal of the marginal odds estimates in the table 3 above shows that unlike the primary healthcare there are huge regional and location disparities for secondary healthcare with the north-east (both quintile 1 & and 2), North-West (quintile 2 both rural and urban) and South-South (urban quintile 1 and rural quintile 2) not validating the pro-poorness of any further public spending. Regions from the south show a glimmer of more pro-poorness than the regions from the North. The entire marginal odds both pro-poor and pro-rich were all statistically significant as there were all greater than 1 (>1).

With this finding, the South-East (both rural and urban) marginal odds for example shows that a further public spending of ₦1 for secondary healthcare will increase the public expenditure per capita going to the poorest quintiles (quintiles 1 and 2) by over ₦1 irrespective of location (rural and urban) all other things remaining constant. Apart from the regions and locations, other regions and locations provided hope for a pro-poor further public investment in secondary healthcare. This implies that further increase in public spending for secondary healthcare across the southern regions are more likely to improve access to the poorest households' than their northern counterparts cateris paribus.

Demery and Gaddis (2009)[viii] for Kenya found something like the current study and concluded that distinctly greater inequality emerges in the distribution of marginal spending on hospital-based care (secondary healthcare). The study findings, therefore, suggest that increases

in spending on secondary healthcare services are estimated to be even more unequal in regions across the north.

Tertiary Healthcare

Tertiary healthcare services are specialized consultative care, usually on referral from primary or secondary medical care personnel, by specialists working in a center that has personnel and facilities for special investigation and treatment. Over 60 tertiary healthcare facilities are operational in Nigeria and out of this number less than five (5) are privately owned. Every region (geopolitical zone) has at least 5 public tertiary healthcare centers. The federal government of Nigeria funds over 60 percent of the tertiary healthcare facilities across the country while most states have at least one they are funding. The marginal odds across location and regions for tertiary healthcare services were all less than 1 (<1) for the poorest quintiles (quintiles 1 & 2) based on summaries in Table 3 above.

DISCUSSIONS, POLICY IMPLICATIONS AND CONCLUSIONS

Findings by Castro-Leal (1999) for seven Sub-Saharan African countries; Ajay, Singh and Afridi (2000) for India and its principal states; Sahn & Younger (2000) for eight Sub-Saharan African countries; substantiates the Nigerian pro-poor primary and to an extent secondary healthcare and pro-rich marginal odds for tertiary healthcare. Findings from the current study have thrown up lots of issues about healthcare financing in Nigeria as follows:

- Further increase in public spending for primary healthcare across all regions with the exception of rural north-central and south-south is more likely to improve access for more people from poorest households' groups and individuals irrespective of location (rural and urban) than secondary healthcare cateris paribus.
- There exits location, regional and other inequalities in who will likely benefit from further healthcare funding;
- Healthcare access is uneven regionally and by location (rural and urban);
- Poor people rely on primary care and hardly use referral (tertiary) hospitals;
- Poorer Nigerians will benefit less from further tertiary healthcare spending cateris paribus;
- Burden of higher level of healthcare spending (secondary and tertiary) is greater for the poor hence status quo is not working for the poorest Nigerians.
- At the secondary and tertiary levels, additional healthcare spending will not be cost effective.

Nigerian currently has a Child Right Act (CRA) which is in the concurrent list thereby requiring domestication by the second tier of government (state) for smooth implementation measures that will cover legal, administrative and budgetary allocations that can help boost healthcare of every Nigerian child. The situation today is such that most of the Nigerian states especially states in the north-east and north-west with the exception of Jigawa where findings were negative are yet to domesticate the Child Right Law (CRL). Oladiji (2017) opined that Nigerian states where the CRL has been domesticated have improved healthcare indicators and children's rights under the law cover every aspect of the lives of children and adolescents, broken down into survival, development, participation, and protection.

Marginal benefit incidence of spending on social utilities in Nigeria indicated that the poorest group can only benefit more than the richest group from extra spending on the social utility in which the current accessibility is high. This current study extended the entire quest by

using the most recent households' survey data and individual survey data and by focusing more on the regional and location disparities. This is justified by the fact that social indicators especially as it relates to healthcare in Nigeria exhibit regional (zonal) and locational (urban) bias and hence negates equity issues. Development indicators vary from region/zone to region/zone just as income inequality widened from 0.429 in 2004 to 0.447 in 2010.

Scaling up of funding in healthcare should not follow the usual incremental budgeting system but rather targeted by *impact* and *need* for it to be meaningful and create equity. In the presence of regional inequality in healthcare access, region specific healthcare policy may be helpful just as the domestication of Child Rights Law across all states. This will improve the cost efficiency of such additional spending when these first things are done first. The following healthcare policy messages have emerged from this study:

- Improve healthcare at the primary level, especially access and quality.
- Encourage greater use by poor people of primary and secondary healthcare centres.
- Have out-posts of secondary and tertiary healthcare centres in rural locations.

The Nigerian healthcare policy recognizes that primary healthcare is key to attaining the goal of health for all people and refers to it as an essential healthcare based on practical, scientifically sound and socially acceptable methods and technology made universally accessible to individuals and families in the community through their full involvement and at a cost that the community and state can afford to maintain at every stage of their development in the spirit of self-reliance. This must be at the heart of every policy maker if the country must realize the goal of health for all. To that end, all levels of government must work together and co-operate among themselves in a spirit of partnership and service to ensure primary health care for all citizens.

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[i] See Lanjouw and Ravallion (1999) and Ajwad and Wodon (2001) for details.

[ii] See Lanjouw and Ravallion (1999) for details.

[iii] Same method was used by Kamgnia et al, (2008) and Demery and Gaddis (2009)

[iv] The current study followed Lanjouw and Ravallion (1999)

[v] Note that In Lanjouw and Ravallion's specification, the non-poor bear all the program costs and hold all the political power in the sense that the poor cannot impose on them a program that lowers their welfare. In such cases, the convexity of the program cost function is sufficient to guarantee "early capture" by the poor.

[vi] See Ajwad and Wodon (2002), Lanjouw and Ravallion (1999) for details.

[vii] The nature of the survey data encouraged this study to include the basic immunization services for children such as Diphtheria, Pertussis (whooping cough) and Tetanus (DPT) 1, 2 & 3, Polio 1 & 2, measles, Bacillus Calmette Guerin (BCG), malaria prevention in terms of provision of bed nets and service provision for ante-natal and post-natal.

[viii] At the margin, the poorest groups stand to gain the least from an expansion in hospital-based healthcare in some regions and this applies as much to poor males as to females. If per capita spending on regional hospital care were to be raised by KSh100, the poorest quintile is predicted to gain on average by only KSh61, which is in striking contrast to the richest quintile, which is likely to gain KSh166 per capita.