Socio-economic inequalities in adult mortality among the different geopolitical zones in Nigeria

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Abstract

Background: Increased longevity is the desire of every individual and no one will rationally ignore minimizing the risk of untimely death in spite of numerous challenges in daily life. Mortality numbers are an interesting source of information on the national health because they are objective figures that can provide a broad image of the health situation of groups of interest. Hence, this paper examines the size and pattern of socio-economic inequalities in adult mortality across the six geopolitical zones in Nigeria using 2008 NDHS datasets.

Methods: Mortality was calculated based on the sibling mortality reports of the respondents. In total, the estimates are based on mortality histories of 48,871 individuals covered in the survey. Mortality levels are measured with household's socio-economic status in each zone, that is, the degree to which adult mortality is more unequally distributed among different wealth quintiles in the six geopolitical zones in the country.

Results: Analysis reveals that in all the observed zones, relative inequalities became larger, implying that the existing burden of mortality became more unequally distributed across socioeconomic groups. Socioeconomic inequalities in mortality size were relatively large among the northern zones compared to their southern counterparts. These variations are not surprising since the three southern zones are more urbanised with higher literacy rate and greater proportions of their populations are in the higher wealth quintiles than the northern zones. Variations in the relationship is also linked to behavioural risk factors like smoking, alcoholism and an unhealthy diet are more common among those in higher socioeconomic quintiles in southern zones than among those in lower quintiles.

Conclusion: Family ties are generally very close which to some extent cushions the adverse effects of low socioeconomic status and may have contributed to the relatively small mortality inequalities in the south. There is the need to reduce the socioeconomic inequality so as to increase adult healthy years of life in Nigeria to specifically curb the five leading causes of death (HIV/AIDS, lower respiratory tract infections, malaria, measles and perinatal conditions). One way will be to replicate the relative success story of National Health Insurance Scheme (NHIS) among the public servant of the federal government in the states as well as the highly populated informal sector.

Keywords: Inequality, Mortality, Nigeria, Population, Socio-economic Status

Introduction

Increased longevity is the desire of every individual and no one will rationally ignore minimising the risk of untimely death in spite of numerous challenges in daily life. For most developing societies, growth in real incomes is associated with increasing life expectancy and declining mortality rate. The economic value of increased longevity has been about as large as the value of measurable growth in non-health goods and services (Nordhaus, 2002). Besides, better educated persons are more likely to have a good knowledge of what a person should do to be healthy (Kenkel, 1991). In developing countries, several challenges have constrained health improvement; these include high incidence of infectious and communicable diseases, growing burdens of chronic and non-communicable diseases, poor health systems and inadequate human and material resources (Mwageni *et al*, 2005). Studies on the health of regional populations offer hints about the basic health inequalities that exist within a country and may therefore be useful for planners and providers of health care. A sizeable number of studies on regional/ethnic inequalities in health have been done in the last few decades[1]. Also, mortality numbers are an interesting source of information on the national health because they are objective figures that can provide a broad image of the health situation of groups of interest.

Pre-independent Nigeria consists of various cultural, ethnic, and linguistic groups who live in kingdoms and communities with traditional but sophisticated systems of government. At independence in 1960, Nigeria comprises of three regions (North, East and West). This most populous African country, located at the eastern edge of the West African sub-region, currently operates a federal structure with three tiers of government - federal, states and local governments. It comprises of 36 States and the Federal Capital Territory (FCT), as well as 774 Local Government Areas (LGAs) with total population of over 140 million (2006 Census). The country is presently structured into six geo-political zones of North-Central, North-East, North-West, South-East, South-South and South-West.

Health care delivery in Nigeria has been shaped by its federalism whereby the three tiers of government collaborate in organization, management and financing of health care system. This is demarcated along the primary, secondary and tertiary heath cares as provided by the federal, state and LGAs. Primary Health Care (PHC) in Nigeria is expected to cover all Nigerians in their respective societies. It covers health centres (clinics, dispensaries and health posts) responsible for the provision of general preventive, curative, promotive, rehabilitative and pre-referral care as the opening point for health care delivery. Since most of the health care provisions are at the primary and secondary levels, the differential roles of state and LGAs then becomes major factors in determining health status in the different states of the federation (World Bank, 2005).

The Nigerian health sector is characterized by wide zonal disparities in health status, service delivery, and resource availability

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[1] Bos (2005) articulates excellent studies on the issues involved.

(Africa Health Workforce Observatory, 2008). The much needed improvement on poor health status indicators has been very slow and this has been linked to low level of education, poor attitude of health care providers and distance to quality health care facility. In addition, user charges in the face of deepening poverty have constrained access for many Nigerian, especially uneducated ones who are mostly economically disempowered. The profile of life expectancy for Nigeria during 1995–2009 periods shows a steady increase from average of 44.7 years in 1995, 45.9 years in 2000, 47.3 years in 2005 to 48.14 years in 2009. The 2009 figure may be a little higher than that of the Sub-Saharan Africa average, but it is lower than the average of 53 years found among the least developed countries (LDCs).

Although, Nigeria is reputed to have one of the largest health workforces in Africa comparable to Egypt and South Africa, workers are unequally distributed in favour of the health care services in urban centers of southern, tertiary (Africa Health Workforce Observatory 2008). For few cadres of health workers, more than 50 percent of them work in the South Western part of the country with the majority living in the commercial city of Lagos.

Several studies have argued that, among others, inadequate resources is one of the many reasons for the low health status of Nigerians and this could also explain the regional variations in health status (Olaniyan and Lawanson, 2010). Although, the relationship between socio-economic status

and health has been given adequate attention by researchers (Mackenbach *et al*, 2003; Savigny *et al*, 2005 and Gwatkin *et al*, 2007), few studies (for example, Orubuloye & Caldwell, 1975; Caldwell, 1979) have paid particular attention to the impact of socio-economic status in reducing mortality among adults in Nigeria. Over the past several years considerable efforts made by the government at various levels are yielding positive results in curbing the infant, child and maternal mortality[2], yet there has been little or no emphasis on reduction of adult mortality especially those in their productive years. Considering how important their contribution is to the national economy[3], it is necessary to look at this issue in a more analytical term.

The objective of this paper is to explore the size and pattern of inequalities in adult mortality in Nigeria, both within and across the zones. It also looks at the role of socioeconomic status in explaining regional variations in adult mortality. This paper advances as follows: The next section (Section 2) presents a brief review on adult mortality in Nigeria; Section 3 provides some details of the data and methods for analysis; Section 4 presents results of the study and Section 5 gives conclusion and some policy implications.

Adult Mortality in Nigeria
Adult mortality, often viewed in the literature as a function of adult health, is generally influenced by three main determinants: the environment, human behaviour and ill health carried into adulthood from childhood. According to the World Health Organisation's

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[2] Though, the fruitful efforts have been linked to the commitments to the achievement of the millennium development goals.

[3] They must produce for themselves and simultaneously provide economic support for the dependent population of a country.

statistics, the mortality patterns of adults in Nigeria are mainly affected by the following causes in order of importance: HIV/AIDS (16 percent), lower respiratory tract infections particularly pneumonia (11 percent), malaria (11 percent), measles (6 percent), perinatal conditions (surrounding women in pregnancy) (5 percent), tuberculosis (4 percent), cardiovascular disease (4 percent), ischemic heart disease (3 percent), whooping cough (2 percent) while collection of other myriad of diseases account for the rest. Among the factors found to have contributed to this state are the problems of poverty, ignorance and inadequate resource provision for health facilities.

The survival of adults mostly lies in the ability of the health systems to provide immediate and quality health care to Nigerians. And socioeconomic status could play a good role in avoiding the deaths which in several ways are preventable.

Socio-economic status has been defined as differential access (realised and potential) to desired resources which fall into three distinct spheres. The spheres, given by Oakes and Rossi (2003) include material endowments (earned and investment income, real property and other fungible goods); skills, abilities and knowledge; and one's social network and the status, power, trustworthiness, and abilities of its members. Morris (2005) labelled the three sphere as material, human and social capitals that can be found at individual, household and community levels.

Individual's socioeconomic status is crucial for adult life and survival since it determines the amount of resources (food, education, employment, and health care) that are available to the individual which then determine the kind of physical and environmental exposure and the ability to prevent death by infections and diseases (Balia & Jones, 2008). The individual characteristics are supplemented by the household-specific characteristics which include the nature of dwelling houses, access to safe water and good sanitation while essential infrastructures are the expected features in the community that influences the socioeconomic status. Accordingly, whatever variation that exists in the socioeconomic status at the various levels has major implication on the individual's health status and Savigny, *et al* (2005) has documented several studies that established the relationship between socio-economic differentials and health status among the developing countries. Obviously these inequalities depend both on the direct impact that the various determinants of health (lifestyles, parental factors, geography, income, education, ethnicity) have on mortality as well as the distribution of these determinants across different socio-economic groups (Wagstaff *et al,* 2001).

Though, a number of studies have related adult mortality to socio-economic status (Preston 1975, 1985, Kahn, *et al* 2005, Ratcliffe, *et al* 2005, Balia and Jones 2008), nonetheless, socioeconomic inequalities have also been thought to lead to regional inequalities in mortality while the strength of the relation between socioeconomic status and mortality vary among regional groups (Nazroo, 2003).

Methods

The 2008 Nigeria Demographic Health Survey (NDHS), a nationally representative survey of 33,385 women and 15,486 men of age 15–49 and 15–59 respectively was used

for this study. The 2008 survey updated 2003 survey by including information on adult mortality among other updates. Respondents were asked to supply information on the survivorship of their siblings[4]. The sibling history has been widely used to estimate adult mortality indirectly (Balia and Jones 2008, Hoffmann 2011), hence, it was used to estimate adult mortality in this study. However, a major limitation of this measurement involves the data accuracy. The ability and the precision of the respondents depend mainly on how they could vividly recall about the life and time of their diseased siblings, especially when they live in different household or having different socio-economic status. However, paucity of vital statistics system and inadequate knowledge of health status of the Nigerian populace makes the indirect measure of adult imperative (Bamgboye, 2006).

In obtaining the sibling history, each respondent was asked to give the total number of his/her mother's live births, provide a list of all of the children born to the mother in ascending order, indicates if each of these siblings was still alive at the survey date. For deceased siblings, the age at death and number of years since the person's death were collected with cut-off age pegged at 12 years and the rates for female and male mortality (15-60 years) were selected in this study[5] for the period zero to six years before the survey. This seven-year period is taken as a compromise between the desire for the most recent data and the need to minimise the level of sampling errors. The product of total number of siblings of the respondents and year-period gives Person-Years

Observed (PYOs).

Also, socio-economic status was measured by the individuals' wealth index quintiles. The wealth index is often used to measure the household socioeconomic status and serves as a proxy for measuring the long-term standard of living based on household asset ownership. This methodology of constructing an index of household economic status based on an asset index built from weights chosen by principal components was proposed by Filmer and Pritchett (2001). And a consistent method for estimating household wealth from surveys allows comparisons across zones in the wealth gaps for a range of socioeconomic outcomes. Beside its wealth effects use, the index also control for household economic status conveniently. The statistical procedure of Principal Component Analysis (PCA) (closely related to factor analysis) by Filmer and Pritchett (2001) and extensively applied in Savigny *et al* (2005), is often used to determine the weights for an index of the asset variables. This is a technique for extracting few orthogonal linear combinations of the variables that best capture the common information from a large number of variables. It involves breaking down assets or household service access into categorical or interval variables. The variables are then processed in order to obtain weights and principal components. The results obtained from the first principal component (explaining the most variability) are linear asset index for each household. Based on the index, the socio-economic statuses of individuals were assigned to the residents of those individuals, and the

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[4] Information on siblings' history was only recorded in section for men and 20 siblings were provided for in the survey.

[5] While good number of 15-year olds are involved in informal labour market, 60-year represent a generally accepted retirement age in Nigeria public sector.

resulting population was divided into quintiles that then represent proxies for socio-economic status. The quintiles developed were thus expressed in terms of quintiles of individuals of the total population at risk for all measures. The five quintiles were assigned in the continuum of poorest, poorer, middle, richer and richest (Mwageni *et al*, 2005) as recorded in the survey.

Two popular measures of inequalities in the literature are relative (Rate Ratios) and absolute (Rate Differences) measures. In absolute measures of inequality, information on the magnitude of mortality differences between comparison groups is retained in the computation of the measure while information on the magnitude of mortality differences is not retained in the computation of the measure in the case of relative measures[6]. Both measures of inequalities are applied in this paper since it expresses the dispersion across socioeconomic strata as a proportion of the mean or value for a particular group (Mustard and Etches, 2003). This preference is informed by the expression of the extent to which the mortality burden is unequally distributed between socio-economic groups and such a distributional measure is a useful complement to measures of the overall level of mortality in a country. Other statistical measures of inequality adopted for this study include:

➢ Poorest-Richest ratio which compares the prevailing mortality rate in the poorest and richest quintiles.
➢ Concentration index which measures the extent to which deaths are distributed unequally across all five socio-economic

quintiles (inequality concentration). This was calculated following the method of Kakwani *et al*, (1997). The closer this index is to zero, the less concentrated the distribution of inequality (Mwageni *et al*, 2005). This distributional measure is a useful complement to measures of the overall level of mortality in a country.

Empirical Results
From the seven year-period preceding the 2008 NDHS, there were 16,224 reported deaths, out of this figure, 4,859 (represent about 30 percent) were of the productive age (15–60 years); this has serious implication on the dependency ratio. Table 1 below shows both zonal and national spreads of adult mortality across socio-economic groups.

In north-central zone, mortality levels rise rapidly with socio-economic status in from poorest (20 percent) to middle (27 percent) individuals and decline afterwards. While in North East, poverty was a major cause of mortality as the poorest as it account for 51 percent of total zonal mortality figure. South-East and South-South Zones reveal a similar trend where richer individuals contribute 36 and 33 percent (highest) of their respective mortality figures. However, in the South West Zone, highest number of deaths is recorded among the richest individuals.

Globally, more death is seen to occur in the northern parts of the country than it does in the southern parts and the distribution shows a direct relationship between poverty and mortality in the north while they proved to be inversely related in the south. Nationally, the

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[6] Absolute involves the difference between the rates for the poorest and richest socioeconomic groups while relative involves the ratio of these rates.

richest fellows have least mortality figure while the poorest have the highest figure. The PYOs were obtained for each of the quintile in each zone and dividing the number of death by the PYO gives the mortality rate

of the following table.

The results in Table 2 indicate that the adult mortality rate was 10.12 deaths per 1,000

Table 1: Size of the zonal socio-economic inequalities in adult mortality in Nigeria

	North Central		North East		North West		South East		South South		South West		National	
Poorest	205	20%	509	51%	362	32%	16	4%	56	8%	27	5%	**1,175**	24%
Poorer	227	22%	187	19%	371	32%	35	8%	76	11%	73	13%	**969**	20%
Middle	280	27%	177	18%	206	18%	106	24%	162	24%	91	16%	**1,022**	21%
Richer	171	17%	93	9%	119	10%	161	36%	226	33%	134	24%	**904**	19%
Richest	142	14%	23	2%	88	8%	128	29%	167	24%	241	43%	**789**	16%
Total	**1,025**	100%	**989**	100%	**1,146**	100%	**446**	100%	**687**	100%	**566**	100%	**4,859**	100%

years of exposure for poorest individuals in Nigeria and keeps decreasing with an increasing socio-economic status. The effect of the decrease ensures that the average national mortality rate stands at 8.32 which is somewhat closer to the middle quintile. The findings show an inverse pattern such that adult mortality rate declines with increase in the socio-economic status of the individual.

Within the geopolitical zones, adult mortality rate fell from 10.32 deaths per 1,000 years of exposure for poorest individuals in North Central zone to 7.44 for richest individuals. North East reveals a little lower zonal rate compare to North Central Zone, it starts from 10.15 deaths for poorest individuals but declines sharply with increasing socio-economic status up till 6.61 for richest individuals. The same trend was observed for the North West zone but highest among the poorest and poorer individuals with 10.45 and 10.60 deaths, the rate declines from

9.05 for middle individuals to 6.04 for richer individuals and increasing thereafter.

The findings in the southern zones are interesting with particular reference to the South East zone where there exists a direct relationship between adult mortality rates and socio-economic status. Specifically, the rate rises steadily from 6.83 for poorer individuals to 7.66 for middle individuals and the increase was sustained afterward. The changes in mortality rate across the socio-economic grouping in the South South zone shows higher concentration among the poorest with 10.77 but sharply declined to 7.02 for poorer individuals, slightly increases for middle individuals and decline thereafter. Finally, in the South West, adult mortality rate was 6.86 deaths for poorest individuals and increases to 7.26 deaths for poorer individuals but declines marginally to 7.19 for middle individuals; it further declines to 5.73 for richer individuals but later increases to

6.60 for richest individuals.

Aggregately, North West zone has the highest rate in the country; it has 7.52 per 1,000 years of exposure while South West has the lowest mortality rate in the country

(6.54 deaths per 1,000 years of exposure) when compared to other zones. It was particularly obvious that the mortality rates were higher in the three northern zones than their southern counterparts with each of them contributing higher than the national

Table 2: Zonal mortality rate by socio-economic status in Nigeria

Quintile	North Central	North East	North West	South East	South South	South West	Total
Poorest	10.32	10.15	10.45	6.84	10.77	6.86	**10.12**
Poorer	9.41	7.39	10.60	6.83	7.02	7.26	**8.77**
Middle	9.44	8.84	9.05	7.66	7.78	7.19	**8.54**
Richer	7.80	6.66	6.04	8.16	7.74	5.73	**7.07**
Richest	7.44	6.61	8.32	8.61	6.60	6.60	**7.18**
Total	**8.94**	**8.76**	**9.34**	**7.98**	**7.52**	**6.54**	**8.32**
Poorest-Richest Ratio	1.39	1.54	1.26	0.8	1.63	1.04	1.41
Concentration Index	-0.062	-0.074	-0.078	0.038	-0.044	-0.014	-0.060

figure while each of the southern zones had a lower figure than the national mortality rate.

However, the poorest-richest ratio implies that the poorest adults are about 39 percent more likely to die than the richest adults in North Central while the poorest individuals are 54 percent more likely to die than those in the richest in North East and 26 percent more likely to die in North West. Meanwhile, adults in the richest individuals are about 20 percent more likely to die than those in the poorest individuals in South East while they are about 63 percent more likely to die than the richest individuals in South South but and only 4 percent of adults in the poorest individuals likely to die than those in the richest individuals in the South West.

Furthermore, the negative concentration

index almost across board indicates a disproportionate concentration of the mortality among the poor individuals, implying a lopsided concentration of the mortality to the disadvantages of the poor. It was observed that the North West zone has the highest asymmetrical concentration of the mortality inequality distribution while South West has the lowest. But in the South East, the positive concentration index signifies an unequal concentration of the mortality towards the rich individuals. Nonetheless, the concentration index shows a less concentration of the distribution of mortality inequality in South West zone.

Our findings reveal north-south segregation in the pattern of adult mortality across the socio-economic status with an inverse and a direct relationship existing among the

northern and southern zones respectively. Socioeconomic inequalities in total mortality were relatively large among the northern zones as its figure submerged that of the southern zones. Though, in each all the observed zones, relative inequalities became larger, implying that the existing burden of mortality became more unequally distributed across socioeconomic groups.

These findings are not surprising since the three southern zones are more urbanised with higher literacy rate and have greater proportions of their populations in the higher wealth quintiles than the northern zones. Also, the three northern zones altogether contributes more siblings and more mortality (60 and 65 percent respectively) than the three southern zones (40 and 35 percent respectively).

Variations in the socioeconomic inequalities in mortality may be attributable to variations in the relationship between behavioural risk factors and socioeconomic status. In southern zones of the country, smoking, alcoholism and an unhealthy diet are more common among those in higher socioeconomic quintiles than among those in lower quintiles.

Conclusion and Policy Implications

This paper has been able to examine the size and pattern of socio-economic inequalities in adult mortality across the geopolitical zones in Nigeria using 2008 NDHS datasets. Mortality was calculated based on the sibling mortality reports of the respondents. In total, the estimates are based on mortality histories of 48,871 individuals. Mortality levels are measured with socio-economic status, that is, the degree to which adult mortality is more unequally distributed to the

disadvantage of poor in the six geo-political zones of the country. Nationally, the result revealed that 44 percent of the adult mortality occurs among the poor, 21 percent among the middle class while the remaining 35 percent are among the rich. But basically, two important revelations from our analysis are that mortality varies across quintiles within all six zones; and that it also varies across the zones, particularly between the northern and the southern zones.

Paucity of data, notwithstanding, socioeconomic inequalities in mortality can also be associated with levels of social support (Vermeulen and Penninx, 1994; Wilkinson, 1999). A strong social support can improve upon the socioeconomic inequalities within some zones, that is, when family ties are generally very close (in South West for instance). This, to some extent, can cushion the adverse effects of low socioeconomic status in the region and may have contributed to the relatively small mortality inequalities in the zone. The small socioeconomic inequalities in the South East Zone are rather less likely to be attributable to the protective effect of a social support, because within this zone there is considerable disunity and suspicion.

From the findings, the high adult mortality rates generally reflect poor levels of adult health, while this population are the means of bridging the gap between the rich and the poor groups since the government, on its own, may possibly do everything to bridge the gap. Hence, pro-poor policies are needed more so as to raise their income levels; such policies should be much beneficial to the rich to avoid more inequality. Also, show that more deaths would be eliminated if the poor could be elevated to the

level of the rich (as measured by the difference between poorest and richest mortality rate). This confirms that socioeconomic status exerts major influence on health seeking behaviours and access to health which ultimate impact on mortality.

Though, the three tiers of government in Nigeria are recently making concerted effort to improve health care utilization of the poor by making it readily available and more affordable, apparently, much more are needed to be done especially in reducing the socioeconomic inequality so as to increase adult healthy years of life in Nigeria. Moreover, the Primary Health Care (PHC), which is the closest to the masses, should be provided within accessible range to reduce the travel time and cost, especially to rural dwellers while giving proper attitudinal training to health care providers coupled improved health education awareness in the country. The relative success story of National Health Insurance Scheme (NHIS) among the public servant of the federal government should be replicated in the states as well as the highly populated informal sector.

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