Differentials in Infant and Child Mortality Rates in Nigeria: Evidence from the Six Geopolitical Zones

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Abstract

Infant and child mortality rates are important indicators of the health status of a country. This paper presents the spatial analysis of infant and child mortality rates among the geopolitical zones of Nigeria with the objective of highlighting the unevenness in childhood mortality rates among the regions. Data for the study was obtained from the Nigeria Demographic and Health Surveys of 1999 and 2008. The findings of the research show that there were significant spatial differences in infant mortality rates and under-five mortality rates among the country's geo-political regions in 1999 and 2008 and by rural urban residence. Under-five mortality rates showed significant clustering among the geopolitical zones with the Northeast depicting clusters of highest under-five mortality rates while the Southwest had the lowest under-five mortality rate clusters. The Moran's I values were significant at p<0.01 confirming the spatial clustering of under-five mortality rates. The infant mortality rate of 75 deaths per 1,000 live births and the under-five mortality rate of 157 deaths per 1,000 live births in Nigeria in 2008 are considered high compared to those of developed countries and to the expected two-third reductions in the rates by 2015. The paper recommends improvement in public health services, enhanced accessibility to medical services, and the education of mothers on the importance of healthy child care practices as panacea for the reduction of childhood mortality rates to acceptable levels.

Keywords: Childhood mortality, geopolitical zones, rates, clustering.

1. Introduction

The increasing concern about the high rates of childhood mortality in Nigeria and the desire for significant reduction in the rates are mainly due to the negative effects of the incidence of death. Infant and child mortality rates are widely accepted index of socio-economic development and a reflection of a country's health care system and quality of life. Many studies and national surveys like the Nigerian Demographic and Health Surveys (NDHS) have focused on the analysis of the pattern of infant and child mortality rates and they are of the consensus that the rates are declining (Adebayo and Fahrmier, 2005; NDHS, 2008). The rates of decline have however been slow in developing countries prompting the United Nations among other challenges to adopt in year 2000, the eight Millennium Development Goals (MDGs) of which the fourth MDG aims at reducing child mortality by two thirds by year 2015.

Worldwide, mortality in children younger than 5 years has dropped from 11.9 million deaths in 1990 to 7.7 million in 2010. About 33.0% of deaths of children younger than 5 years occur in South Asia and 49.6% occur in sub-Sahara Africa with less than 1% of deaths occurring in high income countries (Rajaratnam et al, 2010). In Nigeria, the infant mortality rates have remained steady at 75 deaths per 1,000 births for 1999 and 2008 while under-five mortality rates show increase between 1999 and 2008. Under-five mortality rates increased from 140 deaths per 1,000 live births in 1999 to 157 deaths in 2008. The 2008 under-five mortality indicate that one in every six children in Nigeria dies before their fifth birthday.

The rates also show striking spatial differences in rural and urban areas as well as among the geopolitical regions (NDHS, 1999 and NDHS, 2008). Analysis of mortality rates by residence showed that rural areas recorded higher mortality rates than urban centers. In 2008, infant mortality rate was 67 deaths per 1,000 live births in the urban centre compared to 95 deaths per 1,000 live births in the rural area. Also, childhood mortality was 191 deaths per 1,000 live births in the rural areas as against 121 deaths per 1,000 live births in the urban area (NDHS, 2008). This paper compliments past efforts at establishing the rates of infant and child mortality by analyzing the spatial differences in the rates at regional levels, that is within the six geopolitical zones of Nigeria. Regional and community studies show more local variations compared to national or aggregate level studies which has been the focus of most studies on mortality decline. The findings of the study will aid the understanding of childhood mortality rates, differences in the rates among the geopolitical regions of Nigeria, as well as highlight the policy implications for achieving lower and more uniform decline in infant and child mortality in the country.

2. Study Area

Nigeria lies between $4^0 16^1$ and $13^0 53^1$ north of the equator and $2^0 40^1$ and $14^0 41^1$ east of the Greenwich Meridian. The country is located in the West African sub-region and is bordered in the north by the Republic of Niger in the north, by Chad in the northeast, Cameroon in the east, and Benin Republic in the West. To the south, Nigeria is bordered by approximately 800 kilometers of the Atlantic Ocean, stretching from Badagry in the West to the Rio del Rey in the east, (NPC, 2000). Nigeria is the fourth largest country in Africa with a total land area of 923,768 square kilometers and an average density of $171/km^2$ (United Nations, 2010).

Nigeria is made up of 36 States and a Federal Capital Territory (FCT), which are presently grouped into six geopolitical regions; Northcentral, Northeast, Northwest, Southeast, Southsouth and Southwest as shown in Fig.1. The 1999 NDHS was however based on the existing five geopolitical zones as at 1999 with the exception of the Southsouth.
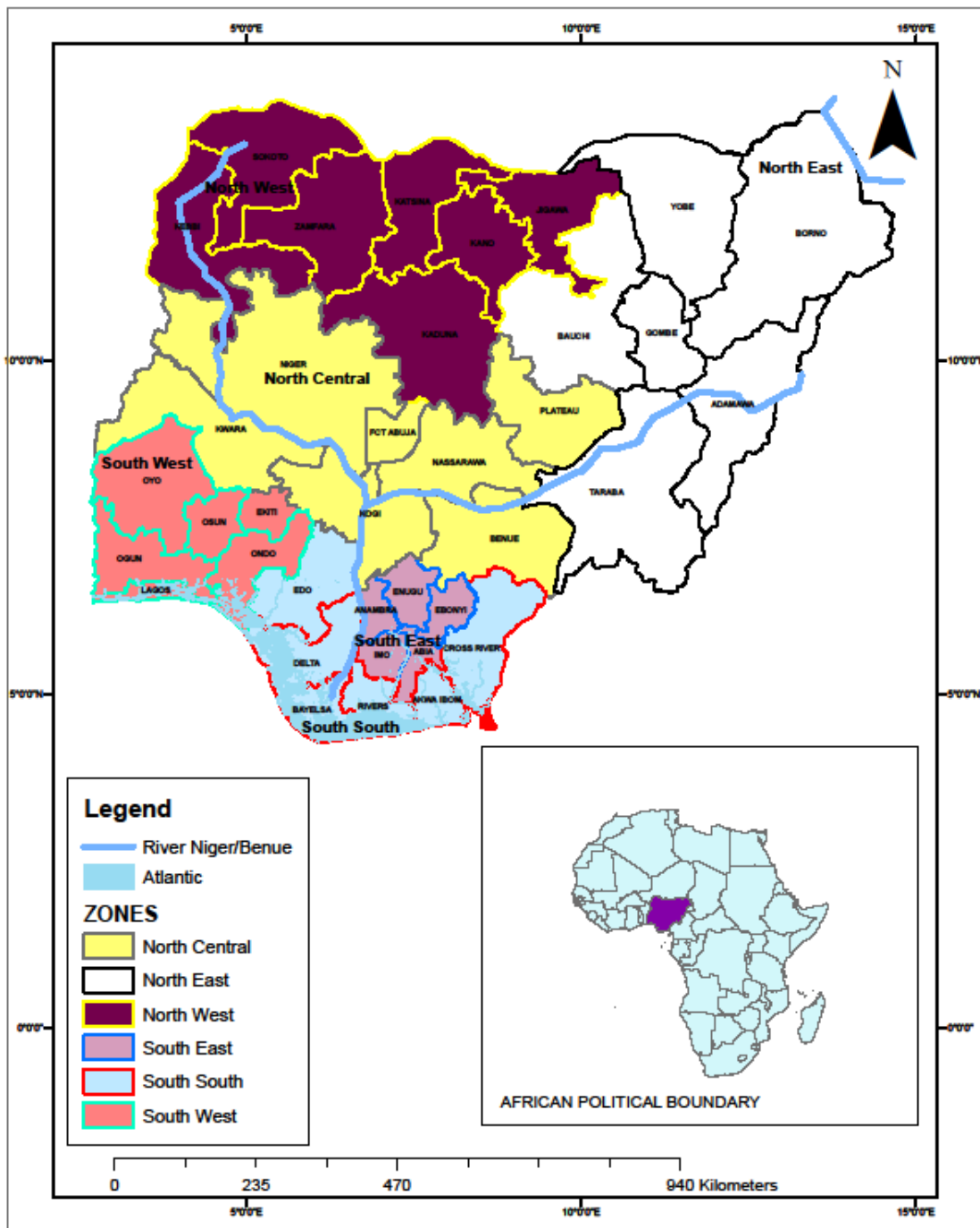
Fig.1: Nigeria's six geopolitical zones

Nigeria, like most developing countries has a young population with a broad based age pyramid and a relatively high dependency ratio of about 82 per cent. Children aged 0 to 14 years constitute about 40.9% of the country's estimated total population of about 155,215,573 in 2010 (The World Fact Book, 2010). The active age group, those aged 15 to 64 years made up 55.9% of the population while the elderly (those aged 65 years and above) constituted about 3.1 per cent of the population. Specifically, children aged 0 to 5 years were about 16.8% of the country's total population (United Nations, 2010). The country's high dependency rate of about 82 per cent, the low Gross National Income of $1,180 in 2010, and the high incidence of poverty of about 71 % have implications for the health status of Nigeria, particularly for infant and child mortality rates.

3. Method

The paper utilized data from the 1999 and 2008 NDHS reports. The Nigeria Demographic and Health Survey (NDHS) is a nationally representative survey designed to provide information on levels and trends of fertility, family planning practice, maternal and child health, infant and child mortality and maternal mortality as well as awareness of HIV/AIDS and other sexually transmitted diseases (STDs) and female circumcision. The 1999 NDHS consisted of 8,199 women age 15-49 and 3,082 men age 15-64 while the 2008 NDHS covered more than 36,000 households. All women age 15-49 in the households and all men age 15-59 in a sub-sample of half of the households were interviewed. The instrument used for data collection in the NDHS was the questionnaire. The choice of the 1999 and 2008 NDHS reports was predicated on the need to capture the level of decline in mortality rates over a ten year period (1999 to 2008).

Some aspects of infant and under-five mortality rates in the two NDHS reports constituted the basis for the analysis of data which employed both descriptive and quantitative test. The descriptive analysis involved the use of range, simple percentages, graphical and map illustrations while the quantitative analysis utilized the Moran's 1 Statistics and the Z score test to establish the clustering pattern of under-five mortality rates. A positive Moran's I index value indicates spatial clustering of childhood mortality rates while a negative Moran's I index value indicates tendency towards dispersion. The Z score depicts the significance of the findings. The cluster maps generated depicted spatial clustering of under-five mortality rates in the geopolitical zones of Nigeria.

4. Results and Discussion

The incidence of mortality varied among infants aged 0 to 1 year and children under five years and according to socio-economic characteristics of maternal education, urban or rural residence, and geopolitical zones. Urban areas recorded lower childhood mortality rates than rural areas with an under-five mortality of 107.8 for urban areas and 142 for rural areas in 1999. At the geopolitical level, the Northwest had the highest under-five mortality rate of 188 per 1,000 children aged 0 to 5 followed by the Northeast with 175.2 deaths while the lowest rate of 84.4 was recorded in the central region. The cluster map (Fig.2) presents a vivid illustration of the differentials in the mortality rates among the geopolitical zones. The map indicates significant clusters of child mortality rates among the geopolitical zones. Two of the geopolitical regions, the Northwest and the Northeast exhibited clusters of high under- five mortality rates while the Southeast showed medium rates and the Southwest and part of Northcentral presented cluster of low under-five mortality rates.

Table 1: Infant, Child and Under-Five Mortality Rates, NDHS 1999.

Socio-economic Characteristics	Infant Mortality (1qo)	Child Mortality (4q1)	Under-five Mortality (5qo)
Residence Urban	59.3	51.5	107.8
Rural	75.0	73.4	142.9
Region Northeast	79.4	104.1	175.2
Northwest	82.6	115.1	188.2
Southeast	74.3	65.6	135.0
Southwest	69.9	33.9	101.5
Central	50.7	35.5	84.4
Mother's Education No education	76.9	86.6	156.8
Primary	71.2	54.5	121.8
Secondary	59.0	39.3	96.9
Higher	40.5	13.0	53.0

Source: Nigeria Demographic Health Survey, 1999

Furthermore, maternal education largely influenced the incidence of mortality among the children. Childhood mortality was lowest among children of mothers with post- secondary education with a recorded 53 deaths per 1,000 live births and the highest rates occurred among mothers with no formal education, with a high mortality rate of 156.8 per 1,000 live births.

It is pertinent to note that the foregoing under-five mortality analysis presented above also suffice for infant mortality rates and child mortality rates as both measures exhibit similar rates and pattern. Similarly, the spatial pattern of childhood mortality rates in 2008 is comparable to those of 1999. Under-five mortality was higher in the rural areas with a rate of 191 per 1,000 live births compared to 121 deaths per 1,000 live births in the urban areas.
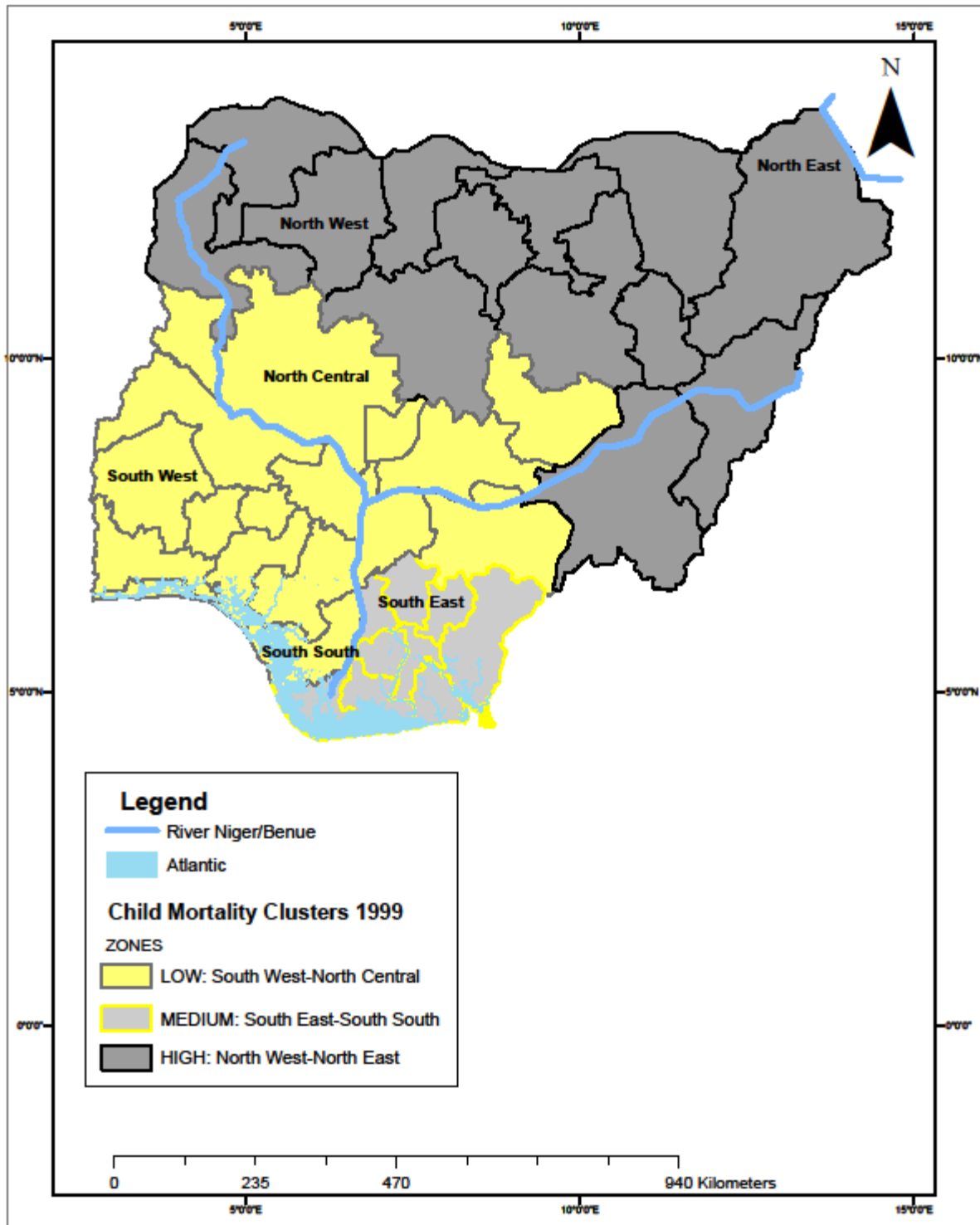

Fig.2: Clusters of Under-5 mortality rates in 1999

On regional bases, the Northeast had the highest under - five mortality rate of 222 followed by 217 for the Northwest while the Southwest recorded the lowest rate of 89 deaths per 1,000 live births.

One of the striking features of the mortality pattern is the consistently high mortality rates in the Northern part of Nigeria. The Northwest and the Northeast had the highest mortality rates in 1999 and 2008 respectively. Data in Table 2 show spatial differences in childhood mortality rates while Table 3 and Fig.3 highlight the spatial pattern of clustering of under-five mortality rates for the six geopolitical zones of Nigeria.

Table 2: Infant, Child and Under-Five Mortality Rates, NDHS 2008.

| Socio-economic Characteristics	Infant Mortality (1qo)	Child Mortality (4q1)	Under-five Mortality (5qo)
Residence			
Urban	67	58	121
Rural	95	106	191
Region			
Northeast	109	126	222
Northwest	91	139	217
Southeast	95	64	153
Southwest	59	32	89
Northcentral	77	62	135
Southsouth	84	58	138
Mother's Education			
No education	97	124	209
Primary	89	77	159
Secondary	70	49	116
More than Secondary	48	22	68

Source: Nigeria Demographic Health Survey, 2008
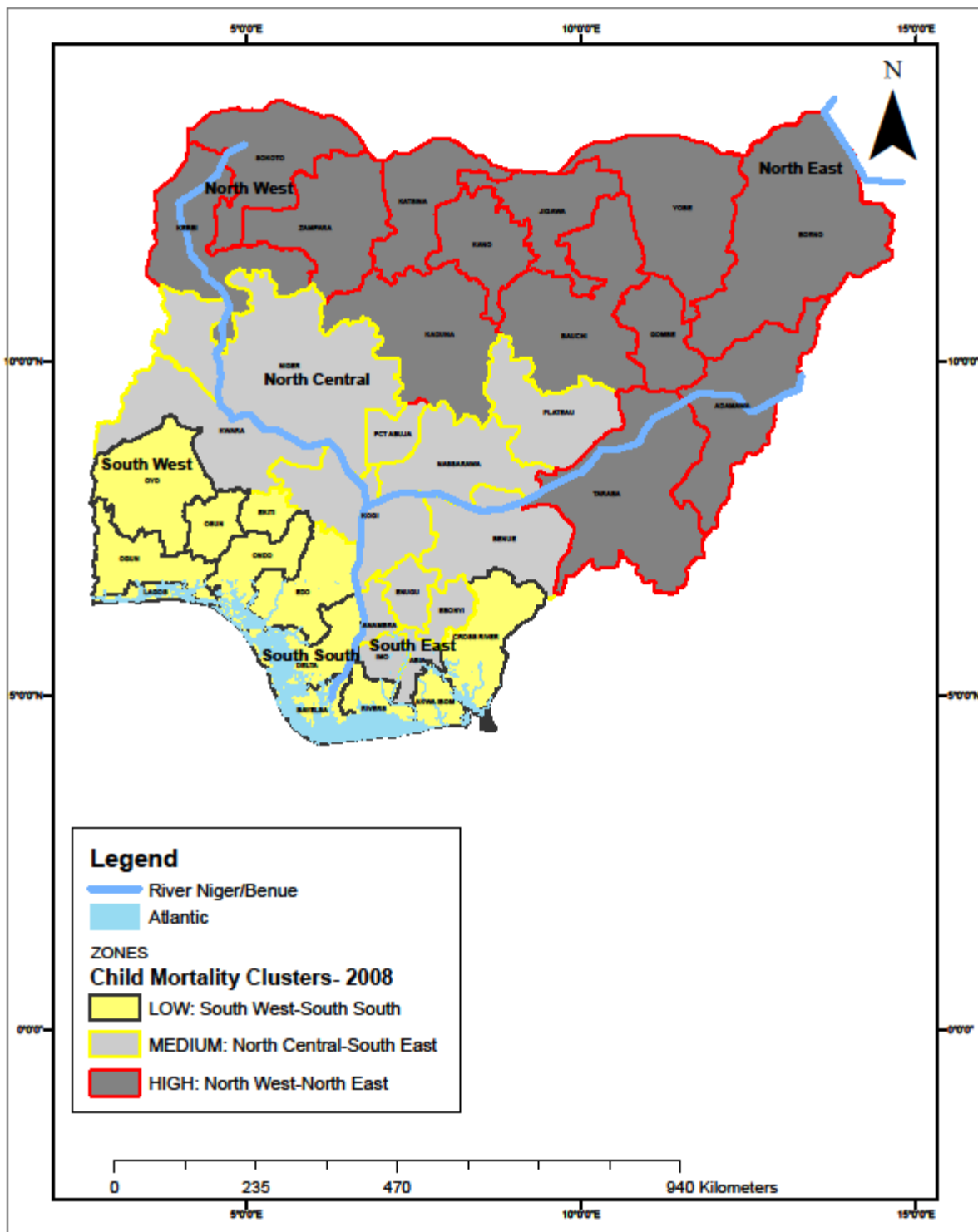
Fig. 3: Clusters of childhood mortality rates in 2008

The cluster map (Fig.3) show cluster of high under-five mortality rates in two regions, the Northeast and Northwest, clusters of moderate rates in two regions, the Southeast, and Northcentral while the Southwest and Southsouth showed clusters of low under-five mortality rates.

Table 3: Moran's 1 and Z score values for Under-five mortality rates, 1999 and 2008

Year	Moran's I value	Z score value	Critical value
1999	0.10629	3.069	2.576
2008	0.65770	3.025	2.576

The Z score values of 3.069 and 3.025 are statistically significant at $p < 0.01$. The positive Moran'1 values in 1999 (0.10629) and in 2008 (0.65770) indicate clustering of under-five mortality rates among the geopolitical zones of Nigeria.

Apart from the clustering of the rates which are also considered relatively high, another worrisome feature of under-five mortality rates in 2008 is the increase in the rates over those of 1999. While under-five mortality rates in the geopolitical zones ranged from 84.4 to 188.2 deaths per 1,000 live births in 1999, it was 89 to 222 deaths per 1,000 live births in 2008 as Fig. 4 depicts. Put differently, the rates for 1999 translates to one out of every seven children dying before their fifth birthday while that of 2008 means that one out of six children die before their fifth birthday. The increase in childhood mortality rates in 2008 over those of 1999 negates the current trend of worldwide decline in infant and child mortality rates. Four out of the five geopolitical zones in 1999 and 2008 recorded over 10 per cent increase in under- five mortality rates in 2008.
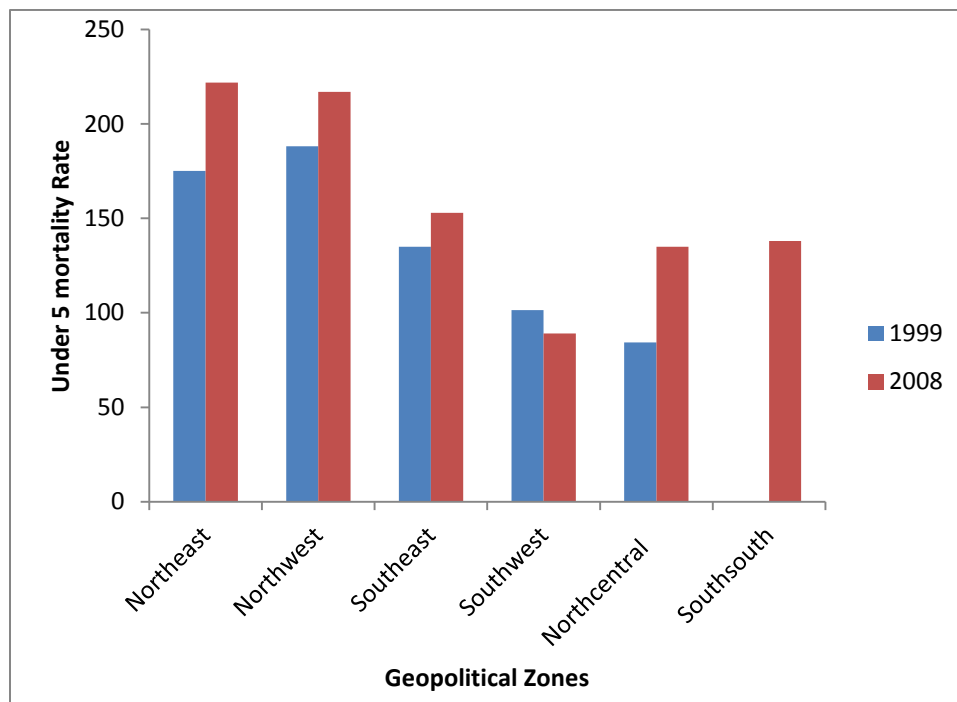

Fig.4: Under-five mortality rates (1999 and 2008)

Specifically, the Southeast, Northwest and Northeast recorded 13, 15 and 27 per cent increase respectively in under-five mortality rates in 2008 over the rates for 1999. The percentage increase of 60 for the Northcentral is disturbing as the rate increased from 84.4 in 1999 to 135 deaths per 1,000 live births (NDHS, 1999; NDHS, 2008).

The Southwest was the only geopolitical zone in Nigeria that recorded a reduction in under-five mortality rates over a ten year period from 1999 to 2008 with a percentage reduction of about 12 per cent. The reduction in the under-five mortality rates in the Southwest can largely be attributed to three related factors. The Southwest is the most urbanized region in Nigeria and it is the region with the mega city (Lagos) with more health care and educational facilities. Access to and use of modern health care facilities is therefore expected to be relatively higher compared to other regions of the country. In addition, the primacy of Lagos State and the early exposure of the other Southwestern States to formal education support improved child survival practices. Kandala et al. (2007) in their study of risk factors for childhood morbidity in Nigeria noted that people in the Southwestern States benefitted from free education, agricultural settlements, and industrial development.

Thus, these categories of parents are still likely to have more health-care knowledge and enjoy better health conditions which could effectively lower the association with childhood mortality. Furthermore, educated mothers have better access to resources needed for improved child survival. In more concrete terms, the variations in childhood mortality rates by mother's level of education attest to the importance of maternal education in the reduction of deaths among children. Data in Table 2 shows that mothers with no formal education (97 deaths per 1,000 live births) are about two times as likely to have an infant die in the first year of life as those with postsecondary education (48 deaths per 1,000 live births).

5. *Conclusion and Policy Implication*

Infant and child mortality rates in Nigeria varied spatially among the geo-political zones of the country and between rural and urban residence. The Northeast and the Northwest recorded the highest under-five mortality rates while the Southwest had the lowest rates among the geopolitical zones. Collectively, under-five mortality rates were relatively high for both 1999 and 2008 with even higher rates for 2008 except in the Southwest zone. The unevenness in the rates between rural and urban areas and among the geopolitical zones on one hand, the observed increase in the rates for 2008 over those of 1999 and the clustering of the rates call for more concerted efforts geared towards the reduction of childhood mortality rates. All the regions, particularly, the rural areas, the Northeast and the Northwest need urgent attention in terms of the implementation of preventive and curative medical interventions.

Improvement in the living condition in the rural areas is a panacea for achieving low infant and child mortality rates in Nigeria. The Integrated Maternal, Neonatal and Child Health (IMNCH) strategy adopted by the Federal Ministry of Health in 2007 is a positive action plan. The goal of IMNCH strategy is to reduce maternal, neo-natal and child morbidity and mortality at community and health facility levels in line with the Millennium Development Goals. At full implementation, the IMNCH strategy is expected to achieve a reduction of about 72 percent of neo-natal deaths, 70 percent of under-five deaths and two third of maternal deaths, thereby reducing the rates significantly. The provision of adequate and accessible health care services is a key factor for child survival. Also, proper public enlightenment and education of mothers on best health care practices is imperative for infant and child survival.

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