



## Differential Pattern in Child Mortality Rate in Rural Nigeria

Abimbola O. Adepoju<sup>1\*</sup>

<sup>1</sup>Department of Agricultural Economics, University of Ibadan, Oyo State, Nigeria.

### Author's contribution

The sole author designed, analyzed and interpreted and prepared the manuscript.

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### ABSTRACT

A country's socioeconomic condition and quality of life is reflected in the rate of child mortality in that country. This paper examined the differentials in child mortality rate across socioeconomic, demographic and selected health characteristics in rural Nigeria, employing the 2008 National Demographic and Health Survey data. Analysis of health attributes and morbidity pattern of mother and child revealed that most of the respondents did not have access to good health facilities and antenatal care. As a result, more than three-quarters of the respondents delivered their babies at home and had less than 24 months birth interval between pregnancies. Results showed that child mortality rate was highest among illiterate mothers, mothers without a source of income, under aged women (less than 20 years) and among fathers whose primary livelihood lie in agriculture. Regional analysis showed that the North-Western zone had the highest child mortality rate followed by the North-Eastern zone, while the South-South zone had the lowest. With respect to health attributes, children delivered at home, who were never breastfed and of multiple births had high mortality rates. Gender differentials showed that the rate of mortality was higher for male than for female children but lowest for children who had been fully immunized and whose mothers were aged between 21

\*Corresponding author: E-mail: [abimbola.adepoju@yahoo.com](mailto:abimbola.adepoju@yahoo.com);

and 30 years. Consequently, the design and implementation of policies, projects, and programmes that give priority to essential maternal and child care should be of main concern, if there is to be any improvement in the quality of life of the Nigerian child.

*Keywords: Differential pattern; child mortality; rural; Nigeria.*

## 1. INTRODUCTION

Common as death may be, gathered statistics of mortality rate, when on the high side apparently becomes a cause for concern especially when the death figures are on the increase among young children, as this stresses and indicates a future absence of the human race – our extinction [1]. Hence, health experts and policy makers have taken special interest in checkmating the rising child mortality rates. Not only has this interest stretched into the international scene, it has attracted and resulted into the development of systematic approaches to reducing child mortality by two-thirds among children under the age of five between 1990 and 2015, as tagged in the United Nation's Millennium Development Goals (MDGs) for public health workers, institutions and international development agencies [2]. However, as evident in Table 1, child mortality rates still remain unacceptably high, especially in sub-Saharan African countries, where close to 40 percent of childhood deaths take place, although the region accounts for only one-fifths of the world's child population [3].

Further, some 6.6 million children across the world who died before their fifth birthday in 2012, lived in developing countries and died mostly from preventable diseases, with about 18,000 children still dying every day [4]. Worse still, of the 198 countries and areas examined in the report with respect to under-five mortality rates, Sierra Leone, Mali and Nigeria- all countries in sub-Saharan Africa, ranked 1<sup>st</sup>, 8<sup>th</sup>, and 9<sup>th</sup> followed by Niger, Burkina Faso and Guinea which ranked 10<sup>th</sup>, 14<sup>th</sup> and 15<sup>th</sup> respectively. A number of factors have been acclaimed to be responsible for this threatening trend of high child and infant mortality in the region. These include Vaccines Preventable Diseases (VPD), malaria, acute respiratory infections (ARI), diarrhoea, measles and HIV/AIDS. Data from [5] shows that pneumonia is the most important cause of mortality in children under five across the world while malaria accounts for the leading cause of death among children under five in Nigeria. Besides the health related factors influencing child survival, other non-health related or socioeconomic factors include: mothers literacy

level, level of participation of mothers in household decision making, access to safe and adequate sanitation, poverty, cultural and gender bias [1].

The trend of infant and child mortality in Nigeria is such that the greater proportion of child deaths occurs in the rural areas. For instance, in 2008, infant mortality rate was 67 deaths per 1,000 live births in the urban areas compared to 95 deaths per 1,000 live births in the rural areas. 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 areas [6]. Worthy of note is the fact that majority of the rural populace in Nigeria either depend entirely on farming and farming activities as a means of livelihood or to augment their main sources of income. However, the rural areas are characterized by inadequate healthcare and infrastructural facilities and healthcare costs are high. The Nigerian situation, like in other developing and under-developing countries, is such that health consumers generally have to pay before they are treated but majority cannot do so mainly because they do not have the means to and coupled with the lack of any form of health insurance. In addition, the prevalence of poverty in the rural areas, illiteracy, religious and cultural beliefs, lack of basic infrastructures (health centres) and lack of medical personnel and equipment as well as the attitude and expertise of health personnel have worsened the situation. This is to the extent that most of the people seek medical attention from the cheaper traditional or herbal practitioners as well as spiritualists in the event of any sickness, rather than health centres [7,8,9]. Disturbingly, these categories of people include pregnant and nursing mothers. This situation, despite the enormous wealth of human and mineral resources over the last 40 years has contributed to the high rate of maternal and child mortality in Nigeria particularly in the rural areas. However, there have been various interventions by government to reduce the rate of child morbidity and mortality in Nigeria. Notable ones include: immunization programs against major childhood diseases like polio, yellow fever, Hepatitis and Diphtheria, awareness programs on the benefits of breastfeeding, the use of Oral Rehydration

Therapy (ORT) to reduce complications arising from diarrhea as well as the treatment of malaria [6]. In spite of these efforts and interventions, the decline in child mortality rates is slow and may not result in the achievement of the Millennium Development Goal (MDG) target with respect to child and maternal mortality. For instance, the child mortality rate of 142.90 per 1000 children surviving to 12 months of age as at 2010 is alarmingly high when compared with other countries [10]. These children die mainly from: complications of low birth weight; inability to begin breathing after birth (asphyxia); infections; malaria, pneumonia and other childhood killers which include diarrhea, measles, other vaccine-preventable diseases, as well as HIV/AIDS [11]. Most of them die on the first hour, day or the first week of life as a result of the failure to provide them with interventions that are potent, accessible and within their means [12]. Thus, with less than a year to the target date set for attaining the 4<sup>th</sup> Millennium Development Goal of reducing deaths among children under-5 years old by two-thirds, drastic measures need to be taken to curb this current trend in child health in Nigeria. Moreover, a successful healthcare intervention or health policy requires an understanding of the socioeconomic differences and environmental factors underlying the occurrence of diseases and deaths. This paper therefore, examines the differentials in child mortality rates across socioeconomic, demographic and selected health characteristics in rural Nigeria. This is with the view of assisting policy makers in identifying the contribution of socioeconomic differences to child mortality rate as well as factors which are critical to reducing the high rate of childhood mortality, especially in rural Nigeria.

## 2. MATERIALS AND METHODS

Data used for this study was the 2008 Nigeria Demographic and Health Survey (NDHS) data which were collected using three well structured questionnaires; Household Questionnaire, Women's Questionnaire and the Men's Questionnaire. These questionnaires were adapted to reflect the population and health issues relevant to Nigeria. The sampling procedure used was a stratified two-stage cluster design. The primary sampling unit (PSU) referred to as a cluster for the 2008 NDHS was defined on the basis of census enumeration areas (EA) from the 2006 EA census frame. In the first stage, 286 clusters were selected in the urban areas while 602 clusters were selected in the

rural areas. In the second stage of the selection, 41 households were selected in each cluster by equal probability systematic sampling. Hence, a representative sample of 36,410 households consisting of 24,684 households from the rural areas and 11,726 households from urban areas were selected for the survey. However, for this study, only 21,034 households were used out of the 24,684 rural households canvassed for the study, due to incomplete information by some of the respondents.

Descriptive statistics which include the use of frequencies, mean and percentages was used to profile the health attributes and morbidity pattern among mother and child and was also used to examine the differential pattern of child mortality rate with respect to some selected characteristics in rural Nigeria. The child mortality rate was estimated as follows:

Child Mortality Rate (CMR) =

$$\frac{\text{Child deaths}}{\text{Live births from 1 to 5 years}} \times 1000$$

## 3. RESULTS AND DISCUSSION

In rural Nigeria, the health attributes and morbidity pattern of mother and child as presented in Table 2, revealed that almost three-quarters (72.0%) of the respondents did not receive antenatal care during pregnancy while only 28.0% received antenatal care. Further, while 24.6 percent of the respondents delivered their children at the hospital, more than three-quarters (75.4%) delivered their children at home. This is an indication of inadequate antenatal, obstetric and post partum care which contributes to the high incidence of child mortality in the rural areas.

As expected, since most of the respondents did not receive ante-natal care during pregnancy, Tetanus Toxoid injections (TT) given to mothers during pregnancy to prevent neonatal tetanus, a major cause of infant deaths, was not received by most of the respondents. Results show that almost all (97.4%) the respondents did not receive tetanus injection while only 2.6% received tetanus injection during pregnancy. This is an indication that some of the respondents that had received antenatal care still did not take the TT injections either because they were not aware of or enlightened on its benefits or it was not available. The consequence of this is a high risk of neonatal tetanus in the study area.

**Table 1. Child mortality rates in some selected countries**

Sub-Saharan African countries	Mortality Rates (per 1000 live births)	
	Infant mortality rate (2012)	Child mortality rate (2012)
Nigeria	78	124
Niger	63	114
Mali	80	128
Burkina Faso	66	102
Guinea	65	101
Sierra Leone	117	182
Benin	59	90
Senegal	45	60
Liberia	56	75
Ghana	49	72
<b>Other countries</b>		
Norway	2	3
Australia	4	5
Canada	5	5
United States	6	7
Libya	13	15
Norway	2	3
India	44	56
Tunisia	14	16

Source: Human Development Report, 2014

**Table 2. Health attributes and morbidity pattern of mother and child**

Variable	Frequency	Percentage
<b>Place of delivery</b>		
Hospital	5,163	24.6
Home	15,871	75.4
<b>Antenatal consultation</b>		
Yes	5,986	28.0
No	15,048	72.0
<b>Tetanus injection</b>		
Yes	529	2.6
No	20,505	97.4
<b>Ever breastfed</b>		
Yes	12,211	58.1
No	8,823	41.9
<b>Received immunization</b>		
Yes	9,433	44.9
No	11,601	55.1
<b>Health facility used</b>		
Traditional facility (Herbal home)	9,390	44.7
Modern facility (Hospital and Pharmacy)	2,334	11.0
Both	9,309	44.3
<b>Birth interval (Month)</b>		
Less than 24	12,867	61.3
Between 25 – 36	6,703	31.8
Between 37 – 48	1,300	6.1
Greater than 49	164	0.8
<b>Type of birth</b>		
Single birth	20,340	96.7
Multiple birth	694	3.2
Total	21,034	100.0

Source: NDHS, 2008

With respect to breastfeeding, medical experts recommend that children should be exclusively breastfed during the first six months of life because breast milk combats various infectious diseases [13]. In addition, according to [14], “infants not being breastfed have an increased incidence of infectious morbidity, as well as elevated risks of childhood obesity, type 1 and type 2 diabetes, leukemia, and sudden infant death syndrome”. Although, in line with this recommendation, more than half (58.1%) of the respondents breastfed their children, a large proportion (about 41.9%) of the respondents still did not breastfeed their children. This could be one of the likely reasons for the high incidence of infectious morbidity and consequently child mortality in rural areas of Nigeria.

Vaccination of children is an important part of preventive measures designed to reduce child and under-five morbidity and mortality. In rural Nigeria, more than two-fifths (44.9%) of the children had been immunized while more than half (55.1%) had not received any form of immunization. This implies that most of the children in this area are susceptible to these vaccine-preventable diseases such as polio, measles, yellow fever, etc in spite of efforts and progress made in immunizing children in the country. For instance, among all countries of the world, Nigeria is listed among the four polio endemic countries and accounts for 85% of all cases in Africa [15].

The distribution of respondents by health facility use revealed that majority of the respondents (44.7%) used traditional health facilities while very few of the respondents (11%) used modern health facilities. However, a large number of the

respondents used a combination of both types of health facilities (44.3%).

Maternal depreciation is often cited as the primary mechanism responsible for the adverse effects of short birth intervals which is defined as an interval of less than 24 months between pregnancies. Women with short intervals between two pregnancies have insufficient time to restore their nutritional reserves, a situation which is thought to adversely affect fetal growth [16]. Results show that more than three-fifths (61.3%) of respondents had birth interval of less than 24 months, 31.8% had birth interval of between 25 – 36 months while only 6.1% of the respondents had birth interval of between 37 to 48 months. This indicates that majority of the respondents had short birth intervals which could adversely affect fetal growth and consequently increased child mortality in the region. The distribution with respect to type of birth revealed that almost all (96.7%) of the respondents had single births while only 3.3% had multiple births.

The pattern of childhood morbidity in rural Nigeria, as presented in Table 3, was examined with respect to 3 medical disorders: cough, fever and diarrhoea. This is owing to the fact that empirical studies [17,18,19] have shown that these disorders are the major causes of child mortality in developing countries. Specifically, for young children, especially among children under five years of age, dehydration from diarrhoea infection, cough and fever have been identified as the major causes of mortality [20]. To corroborate this finding, more than three-fifths (76.1%, 71.1% and 76.7%) of the children in rural Nigeria, have had all three medical disorders - cough, fever and diarrhoea respectively. This has implication on the rate of childhood morbidity and ultimately child mortality in the study area.

**Table 3. Pattern of child morbidity in rural Nigeria**

<b>Variable</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Had cough recently</b>		
Yes	16,008	76.1
No	5,026	23.9
<b>Had fever recently</b>		
Yes	15,079	71.7
No	5,955	28.3
<b>Had diarrhoea</b>		
Yes	16,128	76.7
No	4,906	23.3
<b>Total</b>	<b>21,034</b>	<b>100.0</b>

Source: NDHS, 2008

Table 4 reveals the differential pattern of child mortality rate in rural Nigeria with respect to selected socioeconomic and demographic characteristics. The differential pattern by educational status showed that child mortality rate decreased with increase in the level of educational attainment of mothers. Specifically, while mothers with higher education had child mortality rate of 62.3 deaths per 1000 live births aged between 1 and 5 years, mothers with no formal education had child mortality rate of 192.1 deaths per 1000 births. This result confirms the findings of [19] in which children of mothers with one form of education or the other had a lower mortality rate compared with the children of uneducated mothers. The negative relationship between level of educational attainment of mother and child mortality, could be attributed to the fact that educated mothers are not likely to ignore ante and post natal care. On the other hand, they are likely to disallow unqualified medical personnel to attend to their deliveries.

A mother's occupation is usually associated with the well being of the child. This is because mothers who are employed and earn income are in most cases able to provide better health care for their children. Results of the occupational analysis revealed that child mortality was highest among mother's who do not have a source of income (176.8 deaths per 1000 births) and lowest among those that have a source of income (123.7 deaths per 1000 births). Also, the occupational status of the father has been found to be an important predictor of child mortality in a population. This is because it determines the economic status, nutrition, housing condition and access to health care facilities of a family. The pattern of childhood mortality with respect to father's occupation indicates that households' whose heads were engaged in farming as the primary source of livelihood, had the highest childhood mortality rate of 181.4 deaths per 1000 births followed by those involved in trading, while households whose heads were involved in other occupation other than farming had a lower child mortality rate of 151.3 deaths per 1000 births.

Regional analysis showed that out of the six geopolitical zones of the country, North- Western zone had the highest child mortality rate of 200.9 deaths per 1000 births, followed by the North-Eastern zone with a child mortality rate of 195.8 deaths per 1000 births. This could be as a result of the low level of literacy, poor source of drinking water and sanitation (a major determinant of diarrhea) and outbreak of

diseases which characterize these regions [20]. On the other hand, the South-South zone had the lowest child mortality rate of 92.4 deaths per 1000 births. This finding corroborates the findings of [20].

With respect to the wealth index, the results show that poor households had the highest child mortality rate of 189.2 deaths per 1000 births followed by households in the middle class with 152.7 deaths per 1000 births. On the other hand, households' in the rich class had the lowest child mortality rate of 113.1 deaths per 1000 births. This is expected as rich households can afford to provide better health care for their sick children.

**Table 4. Child mortality rate by socioeconomic and demographic characteristics**

<b>Characteristics</b>	<b>Child mortality rate</b>
<b>Mother's educational level</b>	
No Education	192.1
Primary	159.1
Secondary	113.1
Higher	62.3
<b>Mother's occupation</b>	
Unemployed	176.8
Farming	165.2
Trading	156.8
Others	123.7
<b>Father's occupation</b>	
Farming	181.4
Trading	173.0
Others	151.3
<b>Region</b>	
North Central	137.3
North East	195.8
North West	200.9
South East	142.5
South West	137.9
South South	92.4
<b>Wealth index</b>	
Poor	189.2
Middle	152.7
Rich	113.1
<b>Sex of child</b>	
Male	172.4
Female	164.5
<b>Mother's age at first birth (Years)</b>	
Under 20	179.9
21 – 30	128.0
> 31	138.4

Source: NDHS, 2008

Gender differentials of child mortality rate showed that child mortality was higher for boys (172.4 deaths per 1000 births) than for girls (164.5 deaths per 1000 births). This is consistent with the findings of [21] that male mortality exceeds female mortality as a result of higher biological risks faced by male children. However contrary to this findings, [22,23] revealed that child mortality was lower for boys than for girls especially in a patriarchal society where preference for sons over daughters seems to be stronger. Thus male children always get better care in terms of food, clothing and medical care when compared with their female counterparts.

The age of the mother at the time of the child's birth is also an important factor for infant and child survival. According to [24], infants born to mothers who were less than 20 years of age and greater than 35 years of age were at higher risk of dying in infancy. Consistent with this finding, child mortality rates were higher for children whose mothers were aged below 20 years (129.9 deaths per 1000 births) and those above 31 years (138.4 deaths per 1000 births) and lowest for mothers aged between 21 and 30 years (128.0 deaths per 1000 births) in rural Nigeria.

Further, the differential pattern of child mortality rate with respect to selected health related characteristics presented in Table 5 showed that child mortality was higher among children born at home than children born in hospitals. This could be attributed to the fact that deliveries at home are likely to be attended to by untrained workers while deliveries in hospitals are likely to be attended to by professionals. This finding is consistent with the findings of [18,25] who found out that mortality rate was higher for children born at home than those born in hospitals owing to the availability of sanitary delivery facilities in the hospitals.

Infant feeding has an impact on both the child and mother. Thus, feeding practices are important determinants of a child's nutritional status. To corroborate this, many studies have shown the beneficial effects of breast feeding on the nutritional status, morbidity and mortality of infants while medical experts also recommend that children should be exclusively breast-fed during the first six months of life [26-31]. Consistent with the findings of [18], results showed that children not breast-fed had a higher mortality rate of 204 deaths per 1000 births compared with those breastfed (142.7 deaths per 1000 births) in the study area.

**Table 5. Child Mortality Rate by selected Health related Characteristics**

Characteristics	Child mortality rate
<b>Place of delivery</b>	
Home	181.5
Hospital	128.4
<b>Breastfeeding</b>	
Yes	142.7
No	204.1
<b>Type of birth</b>	
Single births	166.3
Multiple births	230.4
<b>Immunization</b>	
Yes	126.1
No	245.2

Source: NDHS, 2008

Multiple births contribute more to higher infant mortality rate than single births. This could be attributed to the fact that babies of multiple births usually become physically weak when they are born [13,32]. In the study area, the rate of mortality for single births stood at 166.5 deaths per 1000 births while that of multiple births stood at 230.4 deaths per 1000 births.

Childhood diseases such as neonatal tetanus, whooping cough, polio, measles, tuberculosis and diphtheria, all of which contribute significantly to high childhood mortality, have been adequately prevented through immunization of children against these diseases. Thus immunization of children is an important factor that contributes to the chances of a child's survival. In line with this, child mortality rate was lower for children that had been fully immunized (126.1 death per 1000 births) than for children that had not been immunized (245.2 deaths per 1000 births).

#### 4. CONCLUSION

In rural areas of Nigeria, where health care facilities are inadequate, child morbidity and mortality are strongly associated with illnesses such as fever, diarrhea, vaccine preventable diseases, early pregnancies, spacing and number of births, unhygienic delivery environment as well as education and reproductive health of mothers. Thus, the need to improve the quality of life of Nigerian children as well as the overall health situation of a country is pertinent. This could be done through the design and implementation of well- thought out policies, projects, and programmes that give priority to essential maternal and child care. This could

include: immunizing mothers against tetanus, ensuring clean delivery practices in a hygienic birthing environment, continuous sensitization on the benefits of immediate and continued breastfeeding as well as spacing of births and continued immunization against vaccine preventable childhood diseases. Further, access to good health facilities and antenatal care, improved sanitation and access to clean drinking water which could reduce childhood infections and diarrhea should be of utmost priority in any government intervention, if the country is to achieve its goal of adequate reduction in childhood mortality.

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### COMPETING INTERESTS

Author has declared that no competing interests exist.

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