Determinants of Child Mortality in Rural Nigeria

Abimbola O., Adepoju*, Akanni O.* and Falusi A.O.*

* Department of Agricultural Economics,University of Ibadan,Oyo State, Nigeria
adepoju.abimbola6@gmail.com

Abstract: This study examined the determinants of child mortality in rural Nigeria employing the 2008 Nigeria Demographic and Health Survey (NDHS) data. Data were analyzed using Descriptive Statistics and the Logit regression model. The result of analysis showed that while the average age of the respondents at first birth is 19 years, more than half of them had no formal education and about three-fifths had less than 24 months birth interval. Secondary and higher education of mother, age of mother at first birth, place of delivery, type of birth, child ever breastfed, sex of child, were among the significant factors influencing child mortality in rural Nigeria. Hence, maternal education, access to adequate health care (especially for pregnant women and children under five years) and increased awareness of benefits of breastfeeding were identified as the key factors to reducing child mortality in rural Nigeria.

1. Introduction

Child mortality defined as the likelihood for a child born alive to die between its first and fifth birthday, is one of the most sensitive and commonly used indicators of the social and economic development of a population. Thus, it is frequently on the program of public health and international development agencies and has received renewed attention as a part of the United Nation's Millennium Development Goals (MDG; Espo, 2002). The MDG target is to reduce child mortality by two thirds in the year 2015. This is pertinent as the progress and future of any country depends on how healthy the children are. This is reflected in their access to basic health care, nutritious food and a protective environment, and if these are not available, the country's mortality rates would increase and economic potentials diminish (WHO, 2008). Globally, according to the UN Inter-agency Group on Child Mortality Estimation (2011) a significant amount of progress has been made towards achieving the target of reducing mortality rate by two thirds among children under five. For instance the number of under-five deaths worldwide has declined from more than 12 million in 1990 to 7.6 million in 2010. However, the highest rates of child mortality are still in Sub-Saharan Africa-where 1 in 8 children dies before the age of 5 years, more than 20 times the average for industrialized countries (1 in 167) and South Asia (1in 15) despite action plans, interventions and broad approaches toward improving child's health in the region (WHO, 2005). Further, West African countries in particular experienced mortality up to three times higher than neighbouring countries in Northern and Southern Africa (Balk *et al.,* 2004) and of all the under-five deaths which occur, five countries namely; India, Nigeria, Democratic Republic of the Congo, Pakistan and China account for about 50% with India (22%) and Nigeria (11%) together accounting for a third of all under-five deaths.

Nigeria, despite its wealth of human and natural resources, the Federal Ministry of Health's Integrated Maternal, Newborn and Child Health Strategy and the fact that it is one of the first African countries with an integrated plan to look after mothers, newborns and children right through from conception to the child's fifth birthday, is one of the least successful of African countries in achieving improvements in child survival in the past four decades (Nigeria Health Journal, 2011).

Childhood deaths in Nigeria are usually caused by avoidable environmental threats to health which stem most often than not from traditional problems that have long been resolved in the wealthier countries, such as a lack of clean water, sanitation, adequate housing, and protection from mosquitoes, other insects and animal disease vectors and in people's beliefs and attitudes concerning childcare and behavioural practices into health strategies (Feyisetan & Adedokun, 1992; Ogunjuyigbe, 2004). Children from poor households are more vulnerable to these attendant risks compared with children born to better off families. They are usually more exposed to risks such as inadequate water and sanitation, indoor air pollution, crowding and exposure to disease vectors and are more likely than not to be undernourished. They are ,therefore, at greater risk of severe disease, and are more likely to suffer from more than one disease when ill. They are less likely to have access

and use preventive and curative interventions, and those who do receive treatment are less likely to receive appropriate quality services (Wagstaff *et al.,* 2004). Thus, at the dawn of the 21st century, childhood mortality which is an indicator of health status of a country is very crucial and remains a daunting issue for these developing countries and rural Nigeria in particular where poverty rates are disproportionately high. Based on this foregoing, apart from contributing to literature on child mortality in Nigeria, this study attempts to provide empirical information on the factors that contribute to high childhood mortality, its slow decline in the country and help suggest appropriate health interventions or programs.

2. Review of Empirical Studies on Determinants of Child Mortality

Determinants of childhood mortality have been viewed from a number of analytical frameworks. This dates back to Mosley and Chen (1984) and Schultz (1984) who made the distinction between variables considered to be exogenous or socio-economic (i.e. cultural, social, economic, community, and regional factors) and endogenous or biomedical factors (i.e. breastfeeding patterns, hygiene, sanitary measures, and nutrition). The effects of the exogenous variables were considered indirect because they operate through the endogenous biomedical factors while the bio-medical factors were called intermediate variables or proximate determinants because they constitute the middle step between the exogenous variables and child mortality.

Empirically, many studies have shown that child mortality is influenced by a number of socio economic and demographic factors such as sex of the child, mother's age at birth, birth order, preceding birth interval among others. For instance, Mondal *et al.* (2009) using the logistic regression model, investigated factors influencing infant and child mortality in Rajshahi District of Bangladesh. Findings revealed that the most significant predictors of neonatal, post-neonatal and child mortality levels are immunization, ever breastfeeding, mother's age at birth and birth interval. In a similar vein, Chowdhury *et al.* (2010) examined the effects of demographic characteristics on neonatal, post neonatal, infant and child mortality also using the logistic regression model. They identified the important predictors of neonatal mortality as breast feeding practice, of post-neonatal period as duration of marriage, order of birth and birth interval and of infant and child mortality as age at marriage, duration of marriage, birth interval, birth order and breast feeding practice.

Uddin et al. (2009) in their study, investigated child mortality in Bangladesh also using the logistic regression. Results of analysis showed that father's education, occupation of father, occupation of mother, standard of living index, breastfeeding status and birth order were significant determinants of child mortality in Bangladesh.

Hong (2006) showed that levels of infant and child mortality in many developing countries remain unacceptably high, and they are disproportionably higher among high-risk groups such as newborn and infant of multiple births. A mother's poor health and poor nutritional status may also have postnatal consequences such as impaired lactation and render her unable to give adequate care to her children (Retherford *et al.,* 1989). Some studies show that child mortality is lower for boys than for girls (Huq and Cleland, 1990; Kabir and Chowdhury, 1992) while, child mortality has been noted to peak in places where living conditions are lowest (Millard, Ferguson and Khali, 1990).

Kumar and File (2005) used data from the Ethiopia Demographic and Health Survey [EDHS] conducted in 2005 to investigate the predictors of child [0-5 years] mortality in Ethiopia. The cross tabulation technique was used to estimate the predictors of child mortality. Results revealed that birth interval with previous child and mother standard of living index were the vital factors associated with child mortality. Furthermore, Mother's education and birth order were found to have substantial impact on child mortality in Ethiopia. The study concluded that an increase in Mothers' education and improved health care services are significant in reducing child mortality in Ethiopia.

Mesike and Mojekwu (2012) in their study examined the environmental determinants of child mortality in Nigeria using principal component analysis and simultaneous multiple regression for child mortality modelling in Nigeria. Estimation from the stepwise regression model showed that household environmental characteristics do have significant impact on mortality as lower mortality rates were experienced in households that had access to immunization, sanitation facilities, good and proper refuse and solid waste disposal facilities, good healthy roofing and flooring materials as well as those using low polluting fuels as their main source of cooking.

3. Materials and Methods

Secondary data used for this study was the 2008 Nigeria Demographic and Health Survey (NDHS) data. The sampling frame used for the 2008 NDHS was the 2006 National Population and Housing Census of the Federal Republic of Nigeria. The survey covered all the 36 states and the Federal Capital Territory, Abuja. The primary sampling unit (PSU), referred to as a cluster, was defined on the basis of Enumeration Areas (EAs) from the 2006 census frame. The sampling procedure used by 2008 NDHS

was a stratified two-stage cluster design. In the first stage, 286 clusters were selected at the urban area 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 were selected for the 2008 NDHS survey with 24,684 households from the rural areas and 11,726 households from urban areas. However, for this study, only 21034 households were used out of the 24,684 households canvassed for the study in the rural areas, due to incomplete information by some of the respondents. These 21,034 households constituted the sample size.

The analytical tools employed in this study include: Descriptive statistics and the Logistic Regression model. Descriptive statistics include the use of frequencies, mean, percentages and tables which was used to analyse the socio-economic characteristics of the respondents while the logistic regression method was used to identify the variables that have significant influence on under-five mortality among rural households.

The logistic regression model expresses a qualitative dependent variable as a function of several independent variables. It is used when the dependent variable is dichotomous and the independents are of any type. In this analysis, child mortality (Z) is the dependent variable which takes the value of 1, if mortality occurs among under- five year old children in the household and 0 if otherwise, i.e.

$$Z = \begin{cases} 1, \text{If mortality occurs for any child between ages 1 to 5 in the household} \\ 0, \text{otherwise} \end{cases}$$

The logit model postulates the probability (P_1) that child mortality is a function of an index (Z_i)
Where:
(Z_i) is an inverse of the standard logistic cumulative function of P_i i.e. $P_i(y) = f(Z_i)$
(Z_i) is also an inverse of the standard logistic cumulative function of P_i i.e $P_i(y=1) = f(Z_i)$
The probability of child mortality is given by
$P_i(y=1) = \frac{1}{1+e}{}^{-zi}$
The probability of no child mortality is given by $Q_1(y=0) = 1 - P_i(y=1)$
Since,
$1 - P_i(y=1) = 1 - \frac{1}{1+e^{-zi}}$
$1 - P_i(y=1) = \frac{1+e^{-zi}-1}{1+e^{-zi}}$
$1 - P_i(y=1) = \frac{e^{-zi}}{1+e^{-zi}}$
But
$\frac{1}{P_i(y=1)} = 1 + e^{-zi}$

Thus, $\frac{P_i(y=1)}{1-P_i(y=1)} = \frac{1}{e^{-zi}}$
and $\frac{P_i(y=1)}{1-P_i(y=1)} = e^{zi}$
The probability that child mortality occurs is calculated from Z_i value
$Z_i = b_0 + b_1X_1 + b_2X_2 - + b_nX_n$
Where:
$X_1 - X_n$ are the independent variables
Z = Under-five mortality in household (1 if yes, 0 Otherwise)
B_0 = constant
B_1 is the coefficient of the X's variables

4. Results and Discussion
4.1 Socio-economic and Demographic Characteristics of Respondents

The distribution by educational status of the respondents (table 1) revealed that more than half of the mothers (58%) do not have formal education as expected. This could be as a result of the fact that in the rural areas, formal education is not a requirement for fitting into the way of life. However, the implication of this is a low level of welfare of the child as a mother's education is directly related with the health of a child. This is because education makes a mother highly developed, free from traditional values, which leads to changes in behavioural patterns, attitude and improved welfare of the child (Mondal *et al.,* 2009).

With respect to the age of the respondents at first birth which ranged between 15 to 45 years, almost three-quarters (72.0%) were aged below 20 years at first birth with an average age at first birth of 19 years. This could indicate a higher probability of child mortality due to complications in pregnancy and delivery, premature birth and other related causes.

The incidence of infant and child mortality is expected to be lower among working women than those unemployed since a mother's occupation is usually associated with the nutritional status of their children. Women/mothers that have a source of income are able to provide food in the right quantity and quality and other essential needs for their children which otherwise would have been impossible if they were unemployed. According to Table 1, 32.0% of the respondents are unemployed, 24.4% are farmers while 29.6% are involved in trading as their primary occupation. Also, more than half of the children born were males while 49% were females.

Poverty influences health because it largely determines environmental risks, as well as access to resources to deal with those risks. Wealth index was used to evaluate the influence of social class on fertility behaviour and health of mother and child. The index was estimated using the respondent's assets and

their standard of living (NDHS, 2008). Results from table 1 show that 64.6% of the respondents are poor, 19.7% are in the middle class while 15.7% are rich. This reveals the extent of poverty and inequality in rural Nigeria. It also corroborates the findings of IFAD (2010) in which about 80 % of the rural households in Nigeria were found to be poor.

Access to electricity and television were used as proxies for access to infrastructure and information respectively. Table 1 revealed that while more than three-quarters of the respondents did not have access to electricity, more than four- fifths did not have access to television. This is an indication of inadequate infrastructure as well as decreased awareness about child health since households learn about childcare, proper hygiene and sanitation through the various programmes on public health. Usually, poor households rely on biomass fuels for cooking and heating because they are unable to afford clean fuels such as kerosene and gas. In line with this, results show that the major cooking fuel in the study area is wood. Also, more than half of the respondents (53.1%) do not have toilet facilities i.e. they make use of bush as their toilet while approximately 43.5% use pit latrine and only 3.4% use flush toilet. This is an indication of poor sanitary conditions in the rural areas of Nigeria.

Access to good sanitation facilities is believed to reduce morbidity and diarrhea which is one of the major causes of under-five mortality in Nigeria. Water could act as a medium for many diseases that is waterborne such as diarrhea, which poses the greatest threat to child survival in Sub-Saharan Africa countries. As shown in table 1 a greater proportion of the respondents (76.6%) do not have access to safe drinking water and as such are exposed to diseases and infection.

The household head (which is the father in most cases in rural households of Nigeria) is the main income earner and decision maker of a family. Highlights of the occupational distribution shows that most household heads (55.4%) are farmers while the remaining are engaged in other activities which include trading, teaching e.t.c. This confirms previous findings in other studies (Fayehun & Omololu, 2009; Uddin *et al.,* 2009; Mondal *et al.*, 2009) that farming is the predominant occupation in rural areas.

4.2 Determinants of Child Mortality in Rural Nigeria

Results of the logistic regression (table 2) identifies factors such as secondary education, higher education, age at first birth squared, place of delivery, type of birth, ever breastfed, sex of child, father's education, father's occupation, type of toilet facility, rich class, North East, North West and South East as the major factors influencing child mortality in rural Nigeria. While the square of age at first birth, sex of child, North East, North West and South East increased child mortality in rural Nigeria, secondary education, higher education, place of delivery, type of Birth, ever breastfed, father's education, father's occupation and rich class were the factors associated with a reduction in child mortality in rural Nigeria. The chi-square value of 814.88 which is significant at 1% implies that all the independent variables jointly explain the likelihood of child mortality.

Secondary and tertiary education of the respondents had a negative impact on child mortality in rural Nigeria implying that the higher the level of educational attainment of the respondents the lower the level of child mortality in the household. This could be attributed to the fact that women or mothers with no or low educational attainment are unable to inculcate modern health knowledge and practices which are basic requirements for enhancing child health. The coefficient of primary education although not significant, was however positive indicating that respondents with primary education had a higher level of child mortality. This is consistent with the findings of (Chowdhury *et al.,* 2010) and (Iyun, 2000) that child mortality is higher among women with primary education and lower among women with higher education.

Proper medical attention and hygienic condition during delivery can reduce the risk of infections and facilitate management of complications that can be the cause death or various illnesses for the mother or the newborn child (Uddin *et al.,* 2009). The negative and significant coefficient of place of delivery implies that children born in hospital and maternity clinic have a lower risk of mortality as expected, owing to proper healthcare and attention from professionals compared with those born at home.

With respect to type of birth, the result indicates that the risk of childhood mortality is significantly lower among single births than multiple births. This could be as a result of the fact that babies of multiple births usually become physically weak when they are born (Chowdhury *et al.,* 2010). These children may face competition for resources such as food and medical care leading to increase in mortality.

Table 1: Socioeconomic and Demographic Characteristics of Respondents

Variable	Frequency	Percent
Level of Education		
No education	12,204	58.0
Primary	4,820	22.9
Secondary	3,577	17.0
Higher	433	2.1
Age of Mother at first birth		
Under 20	15,287	71.0
21-30	5503	26.2
>30	244	2.8
Sex of Child		
Male	10,744	51.1
Female	10,290	48.9
Mother's Occupation		
Unemployed	6,752	32.0
Farming	5,125	24.4
Trading	6,216	29.6
Others	2,941	14.0
Wealth Index		
Poor	13,587	64.6
Middle	4,149	19.7
Rich	3,298	15.7
Access to Electricity		
Yes	5,148	24.5
No	15,886	75.5
Access to Television		
Yes	3,967	18.8
No	17,067	81.2
Types of Cooking Fuel		
Wood	12729	60.8
Charcoal	6225	30.2
Kerosene	1655	7.8
Gas	425	1.2
Type of Toilet Facility		
No facility	11,158	53.1
Pit latrine	9,143	43.5
Flush Toilet	733	3.4
Source of Drinking Water		
Tap water/Borehole	4,931	23.5
Well Water	6,125	29.1
Stream/River/Lake	9,978	47.4
Household Head's Occupation		
Farming	11,648	55.4
Trading	3,039	14.4
Others	6,347	30.2

Source: NDHS, 2008

The coefficient of ever breastfed was negative and significant at 1% indicating that children who are breastfed have a lower risk of mortality than those not breastfed. This could be attributed to the fact that breastfeeding combats various infectious disease and strengthens essential antibody system of the children (Chowdhury *et al.,* 2010). This finding also corroborates the findings of (Mondal *et al.*, 2009) and (Uddin *et al.*, 2009) that breastfeeding has a beneficial effect on the nutritional status, morbidity and mortality of infants.

The negative correlation between father's education and child mortality indicates that the higher the level of education of the father the lower the level

of mortality. The fact that the father's education plays an important role in earning income, which in turn ensures adequate nutrition, clothing and housing for the household, is a reflection of the direct relationship between father's education and access to child health facilities (Mondal *et al.,* 2009). Moreover, it is likely that higher educated people belong to higher economic class. This finding is consistent with (Uddin *et al.*, 2009) and(Iyun, 2000) that mortality is higher among children whose father's have no formal education and lower among children whose father's have higher education.

The positive co-efficient of father's occupation implies higher level of child mortality with fathers who are engaged in farming as the primary source of income. For many households in Nigeria, especially in the rural areas, agriculture is the main occupation. However, previous and current analyses of poverty have shown that poverty is disproportionately concentrated among households whose primary livelihood depends on agriculture. This can be attributed to the fact that farming is highly prone to natural hazards like drought, flood, pest and disease infestation and so on. These factors and many more (low prices during peak of harvesting, poor infrastructural facilities) contribute to a reduction in the returns that can be reaped from farming which invariably leads to a sizeable reduction in incomes of the individuals belonging to these households and consequently lead to a low level of welfare of the households.

The negative effect of type of toilet facilities on child mortality implies that access to sanitary means of excreta disposal reduces the risk of mortality and is a strong predictor of infant mortality. In other words, access to modern sanitation facilities (flush toilets) reduces diarrhea incidence which is a major cause of child mortality. This result is consistent with the findings of (Mondal *et al.,* 2009) and (Jacoby *et al.*, 2003). Similarly, there is a negative association between the wealth index for the rich class and child mortality indicating that children born in wealthier households experience lower mortality (Uddin *et al.*, 2009). This is because a child born to a financially privileged and well educated family is less likely at risk of dying prenatally or within the first month of life, since the mother was probably well nourished during pregnancy, and is likely to have delivered at a health facility.

The square of age of mother at first birth had a positive effect on child mortality indicating that as age of mother at first birth increases, child mortality increases. This is because older mothers are usually at a higher risk of pregnancy related complications. On the other hand, the significant and negative coefficient of 0.165 of sex of child indicates that mortality is higher among female children than male children in the study area. This is expected particularly in the context of Nigeria, where gender discrimination in favour of the male child is the norm. This is because the male child is expected to continue the family lineage and provide old age security.

The positive and significant coefficient of the North East, North West and South East regional dummies implies that the rate of child mortality is higher in these zones. This differential in childhood mortality among various zones in Nigeria is a pointer to where resources should be effectively targeted for the country to achieve the MDG on child mortality.

5. Conclusion

Nigeria has an accelerated population growth with the resources not growing at the same rate. Thus poverty level has increased in the country drastically and has led to illiteracy, increased risks of illnesses, such as malaria and diarrhea, due to poor living conditions, limited access to safe water and other basic infrastructure, inadequate sanitation, malnutrition from household food insecurity, child labour, early marriage and other causes of child mortality.

Since child mortality is a powerful indicator for measuring the overall health situation of a country and also a powerful social indicator, special attention should be given to it as children are not only assets but they are the future of a country or a nation. Based on the findings of this study, this study suggests that:

- maternal education should be advocated as a strategy to reduce child mortality. This could be achieved through female literacy programmes in the rural areas. Also, women should be enlightened on the attendant risk of early marriage and child birth, small birth interval and its implication on child mortality. This could be incorporated into the female literacy programmes.
- government should see to the provision of more primary healthcare facilities in the rural areas to ensure adequate coverage of and accessibility to the health facilities.
- there is a need to intensify awareness on the benefits of breastfeeding since breastfeeding has been found to combat various infectious diseases and strengthens essential antibody system of the children. This could be achieved through awareness campaigns and enlightenment programs by effective participation of government, NGOs, religion leaders and mass media. .
- government should intensify efforts at providing rural infrastructure for instance potable water, modern waste disposal

facilities to reduce the risk of exposure to diseases such as malaria and diarrhea which are the leading causes of infant and child mortality as well as make public and private investments in health infrastructure.

- appropriate health interventions be targeted to regions with high infant and child mortality in rural Nigeria.

Table 2: Logistic Regression of the Determinants of Child Mortality in Rural Nigeria

Variables	Coefficients	Standard Error	Z-statics
Constant	-0.021	0.405	-0.05
Primary education	0.083	0.066	1.26
Secondary education	-0.278	0.086	-3.24***
Higher education	-0.920	0.228	-4.03***
Age at 1st birth	0.041	0.036	1.14
Age at 1st birth squared	0.034	0.020	1.65*
Mother's occupation	-0.053	0.048	-1.11
Place of delivery	-0.221	0.064	-3.47***
Type of birth	-1.106	0.089	-12.38***
Ever breastfed	-0.975	0.044	-22.04***
Sex child	-0.165	0.043	-3.81***
Father's Education	-0.323	0.112	-2.88***
Father's occupation	0.082	0.049	1.68*
Access to electricity	-0.046	0.068	-0.67
Access to television	0.049	0.089	0.55
Type of floor materials	0.086	0.066	1.31
Type of cooking materials	0.084	0.124	0.68
Source of water	-0.033	0.047	-0.70
Type of toilet facility	-0.158	0.051	-3.09***
Middle class	-0.079	0.092	-0.86
Rich class	-0.422	0.216	-1.96**
North East	0.203	0.077	2.65***
North West	0.226	0.077	2.94***
South East	0.172	0.103	1.66*
South West	-0.058	0.092	-0.63
South South	-0.003	0.056	-0.06

Source: Regression Results, 2010
Log likelihood = -7372.116; Chi Squared (X^2) = 814.88; Pseudo R^2 = 0.0524;
[xxx]Significant at 1%, [xx] Significant at 5%, [x] Significant at 10%

References
1. Balk D, Tom P, Adam S, Fern G , Melissa N. A spatial analysis of childhood mortality in West Africa: Population, Space and Place; 2004: 10:175-216.
2. Chowdhury QH, Rafiqul IR, Hossain K. Socio-economic determinants of neonatal, post neonatal, infant and child mortality. International Journal of Sociology and Anthropol 2010 :2: 118-125
3. Espo, M. Infant mortality and its underlying determinants in rural Malawi', [PhD thesis] University of Tampere Medical School. Kaleventie 4, FI-33014, University of Tampere, Finland, 2002.
4. Fayehun OA, Omololu OO. Prevalence and Treatment of childhood diarrhea among Nigerian ethnic groups. *The* Nigerian Journal of Sociology and Anthropology; 2009:7: 14-28.
5. Feyisetan BJ, Adedokun LA. Impact of child care and disease treatment on infant mortality. In: Van de Walle, E., G. Pison and M. Sala-Diakanda (eds.). Research Issues in Child Health and Child Care. Oxford University Press, USA, 1992.
6. Hong R. Effect of multiple births on infant mortality in Bangladesh. Journal Pediatric Child Health*;* 2006:42 (10): 630-635(6).

7. Huq MN, Cleland J. Bangladesh Fertility Survey 1989. Main report. National Institute of Population Research and Training (NIPORT). Dhaka, Bangladesh, 1990.

8. International Fund for Agricultural Development: Rural poverty in Nigeria, 2010 Report. IFAD, Rome.

9. Iyun BF. Environmental factors, situation of women and child mortality in SouthWestern Nigeria. Soc. Sci. Med., 2000:51:1473 -89.

10. Jacoby H, Wang L. Environmental Determinants of Child Mortality in Rural China: A Competing Risks Approach. Washington DC: World Bank, 2003.

11. Kabir M, Chowdhury RI. Infant and child mortality levels and trends Secondary analysis of the 1989 BFS data. National Institute of Population Research and Training. Dhaka, Bangladesh 1992.

12. Kumar PP, File G. Infant And Child Mortality In Ethiopia: A Statistical Analysis Approach. Ethiopian Journal of Educuation and Science; 2010: 5(2):51-7

13. Mesike CG, Mojekwu JN. Environmental Determinants of Child Mortality in Nigeria. Journal of Sustainable Development; 2012: 5 (1): 65-75

14. Millard AV, Ferguson AE, Khalia SW. Agricultural development and malnutrition: A causal model of child nutrition. Health Transition; 1990: 1: 285-289.

15. Mondal NI, Hossain K, Korban A. Factors Influencing Infant and Child Mortality: A Case Study of Rajshahi District, Bangladesh. Journal of Human Ecology; 2009: 26: 31-39

16. Mosley WH, Chen LC. An analytical framework for the study of child survival in developing countries. Population and Development Review, A Supplement; 1994: 10: 3-48.

17. National Planning Commission (NPC) and United Nations Children's Fund (UNICEF)

18. Children's and Women's Rights in Nigeria: A Wake-up Call, Situation Assessment and Analysis. Lagos, Nigeria: NPC and UNICEF, 2001.

19. Nigeria Demographic Health Survey, 2008. DHS surveys. [electronic resource]. Calverton, MD: MacroInternationalInc. http://www.measuredhs.com/aboutsurveys/dhs/start.cfm

20. Nigeria Health Journal,2011 [electronic resource]. http://nigerianhealthjournal.com/?p=661

21. Ogunjuyigbe PO. Under-Five Mortality in Nigeria: Perception and Attitude of the Yoruba towards the Existence of Abiku. Demographic Research ; 2004:11: 43-56

22. Retherford RD, Choe MK, Thapa S , Gubhaju BB "To what extent does breastfeeding explain birth interval effects on early children mortality?" Demography; 1989:26(3): 439-450.

23. Schultz TP. "Studying the Impact of Household and Community Variables on Child Mortality", Population and Development Review, Supplement; 1984:10: 215-35.

24. Uddin J, Hossain Z, Ullah MO. Child Mortality in a Developing Country: A Statistical Analysis, Journal of Applied Quantitative Methods; 2009: 4: 270-283.

25. United Nations. World Population Prospects: The 2000 revision to Vol. III analytical reports. New York. United Nations publication, 2002

26. UN Inter-agency Group on Child Mortality Estimation: Levels and Trends in Child Mortality, Report 2011.[electronic resource] http://www.childinfo.org/mortality.html

27. Wagstaff A, Bustreo F, Bryce J, Cleason M. Child health: reaching the poor. American Journal of Public Health; 2004: 94: 726-736

28. World Health Organization: World Health Report: Make every mother and child count. Geneva: The World Health Organization, 2005.

29. World Health Organization: The World Health Report. WHO Geneva, 2008.

5/5/2012