**HOUSEHOLD SANITATION AND CHILD MORBIDITY: IT’S IMPACT ON CHILD SURVIVAL**

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**ABSTRACT**

*The Issues of Households Sanitation and Child morbidity cannot be over emphasized; as it relates to the understanding of how these factors influences the health of children. Therefore, the research tends to examine Household Sanitation and Child Morbidity as its impact on Child’s Health survival. The objective of the study basically aims at examining the effect of Household conditions on the child’s health, assessing the relative importance of Distal determinants on household sanitation, and to ascertain the influence of Home safety* *precaution on the health of children in Nigeria. The study which sets out to empirically investigate the relationship between Household Sanitation and child morbidity in Nigeria uses the 2008 NDHS data for women. A univariate and multivariate analysis was done to analyze the effects of the predictors, making use of the Two way analysis of variance to determine the effect of household condition on child morbidity, a linear regression to determine the effect of Home safety precaution on child morbidity, and finally a Binary regression to show the influence of Distal determinant on child morbidity. In Nigeria today, the present situation of sanitation calls for a very serious reflection on her errors of judgment or neglect, and a determination to take the necessary and bold remedial steps clearly focused on adequate investment on proper sanitation. The study recommends that there is the need to devote more attention to helping the individuals of each household in Nigeria to ensure proper sanitation and ensure good health.*

**Keyword: household sanitation, child morbidity,** [**child mortality**](http://ije.oxfordjournals.org/search?fulltext=child+mortality&sortspec=date&submit=Submit&andorexactfulltext=phrase) **,** [**Water**](http://ije.oxfordjournals.org/search?fulltext=Water&sortspec=date&submit=Submit&andorexactfulltext=phrase) **and** [**diarrhea**](http://ije.oxfordjournals.org/search?fulltext=diarrhoea&sortspec=date&submit=Submit&andorexactfulltext=phrase)

### INTRODUCTION

The history of sanitation in Nigeria is said to be interwoven with the growth and expansion of early settlements especially in Lagos Island. As early as 1862, the colonial government had observed that the streets of Lagos needed straightening, widening, draining and clearing, and made a move to ensure its proper cleaning. This observation become concrete in 1873, after a gazette, which was held by the Acting Colonial Survey, where Households and owners of unoccupied lands throughout the town were requested to keep the streets clean and around their premises, by sweeping them at least once a week as well as cutting and clearing away bushes, grass and removing other sources of nuisance. With all the efforts made by the colonial government, there was still no improvement in sanitation (National Water Sanitation policy, 2004).

In 2004, 131 years after the gazette in 1873, analyzing different statistics, results showed that it was only 59% of the world population that had access to any type of improved sanitation facility. This further explains that 4 out of 10 people around the world have no access to improved sanitation; therefore they are obligated to defecate in the open or use unsanitary facilities, with a serious risk of exposure to sanitation-related diseases (WHO, UNICEF.2012).

According to WHO (2012), more than a billion people in Nigeria still do not have access to safe water and well over 2 billion people live without adequate sanitation. At any given time, more than half of the developing world’s population is suffering from one or more of the main diseases associated with unsafe water and poor sanitation.

For children, the chances of survival dwindle in the absence of these essentials, as everyday, 6,000 children die of water-related diseases.Young children are the first to get sick and die from waterborne and sanitation-related illnesses including diarrhoeal diseases and malaria.(Unicef, 2012). Every year,, nearly 11 million children die before reaching their fifth birthday, most from preventable causes; that is, approximately 30, 000 children per day. Another 300 million children suffer from illnesses caused by lack of clean water, poor nutrition and inadequate health services and care.

The global statistics on sanitation hide the dire situation in some developing regions. With an average coverage in developing regions of 50%, only one out of two people has access to some sort of improved sanitation facility. The regions presenting the lowest coverage are sub-Saharan Africa (37%), Southern Asia (38%) and Eastern Asia (45%). Western Asia (84%) has the highest coverage among developing regions. Out of every three persons unserved, two lived in Southern Asia or Eastern Asia.(Unicef ,2012).

**STATEMENT OF PROBLEM**

According to WHO, 0.8 million children die from diarrhea each year in sub-Saharan Africa, and over 90 per cent of deaths came from diarrhea diseases due to unsafe water and sanitation in the developing world; occur in children below 5 years old. In 2002, 42 per cent of households had no toilets, and one in six people had no access to safe water, which leads to about 4,500 children dying each day due to unsafe water and lack of basic sanitation facilities.

Countless others suffer from poor health, diminished productivity and missed opportunities for education, and a child born in Europe or the United States is 520 times less likely to die from diarrhea disease than an infant in sub-Saharan Africa, this is so because we have only 36 per cent of the population having access to hygienic sanitation.(WHO,2012).

### OBJECTIVES OF THE STUDY

**General Objective**

The main focus of this study is to examine and investigate the effect of Household Sanitation on child morbidity and its impact on child’s health.

**Specific Objectives**

1. To analyze the effect of household conditions on the child’s health.
2. To examine the relative importance of distal determinant on household sanitation.
3. To ascertain the influence of home safety precaution on the health of the child.

### HYPOTHESIS OF STUDY

**HYPOTHESIS ONE**

*H0*: Household condition is not likely to cause child morbidity

*H1*: Household condition is likely to cause child morbidity

**HYPOTHESIS TWO**

*H0*: Home safety precautions is not likely to influence child morbidity

*H1:* Home safety precautions is likely to influence child morbidity

**HYPOTHESIS THREE**

*H0*: Distal determinant is not likely to influence child morbidity

*H1*: Distal determinant is likely to influence child morbidity

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### LITERATURE REVIEW

### INTRODUCTION

The persistence effect of environmental factors on health over the decades cannot be over emphasized. It has greatly impacted the health of adults, and more effect is said to be seen on that of the children. Different literature has shown that sanitation has a strong influence on child morbidity, which ends up impacting the health of the child. For any social and economic development, adequate sanitation in conjunction with good hygiene and safe water are essential to good health (Mara, et al, 2005).

Lack of proper sanitation causes diseases. Most of the diseases resulting from sanitation have a direct relation to poverty. Lack of clean water and poor sanitation has caused many diseases and the spread of diseases. Sanitation is very important in order to keep good health. One of the most significant diseases that arise from poor sanitation is diarrhea. Deaths resulting from diarrhea are estimated to be between 1.6 and 2.5 million deaths every year (Mara et al, 2005). Most of the affected are young children below the ages of five. Other diseases that are caused by poor sanitation include schistosomiasis, trachoma, and soil transmitted Helminthiases.

Poor sanitation accounts for almost 50 percent of underweight child since it has a direct link to diarrhea. Children suffering for diarrhea are more vulnerable to become underweight. According to Mara, Lane, and Scott and Trouba. About 26 percent acute respiratory infections occur in children who are malnourished, which has a direct link to diarrhea. Sanitation is a serious issue that is affecting most parts of the world especially the developing countries.

On a global scale, the most affected are children who in most cases lose their lives due to diseases caused by poor sanitation. Major initiatives need to be set up if the MDG goal on sanitation is to be achieved by 2015. While looking for the right answer and the right cure to the issue of sanitation, they have come to realized that individual sanitation done by the member of each household in every community can have a great effect, and is a contributing factor in analyzing the modern issue of child morbidity, which is impacting the health of a child, as a lot of factors are to be considered in ensuring proper safety of children staying at home, especially young children that are prone to more disease. Therefore there is a need for the government to look into it.

According to (WHO/UNICEF,2010), 42% of households in Sub-Saharan Africa remain without access to safe drinking water, and 64% of households remain without access to basic sanitation. The leading MDG reports to conclude that rapid acceleration of progress is needed to bring improved sanitation. At the present rate of progress, the 2015 sanitation target will be missed (UN, 2009).The slow progress made in providing households with adequate water and sanitation infrastructure is disconcerting from a global health perspective. Estimates on the combined health effects of improved water and sanitation are large, with an estimated value of 20 to 40 percent of diarrhea prevalence with access to both improved water and sanitation (Günther and Fink, 2010).

### CONCEPTUAL FRAMEWORK:

### The conceptual framework shows the relationship between the independent and the dependent variables. The dependent variable is the child health, while the independent variable includes household sanitation and the child morbidity. The intervening variable is water supply, literacy level, and tuberculosis by sharing.

**INDEPENDENT VARIABLE**

* Household Conditions
* Source Of Drinking water
* Type Of Toilet Facility
* Home Safety Precautions
* Type Of Bed net Used
* Disposal Of young child stool
* Distal Determinant
* Age
* Religion
* Educational Attainment
* Wealth Index(Income Proxy)

INTERVENING VARIABLE

Place of resident (Urban and Rural

Availability of health services

Region

DEPENDENT VARIABLE

Child Morbidity

* Fever or cough
* Diarrhea
* Polio
* Measles
* Diabetes

Source : Computed by the author

**RESEARCH METHODOLOGY**

### RESEARCH DESIGN

This is the strategy adopted to integrate the different components of this study in a cohesive and coherent way in order to address the defined set of questions. Data from the Demographic and Health Survey (2008) was used for the required variables. The SPSS- Statistical package for Social Science (A set of instructions prepared to facilitate statistical manipulation of data, particularly social data) was also used for proper analysis of the data which has been collected from the Demographic and Health Survey.

### MODEL SPECIFICATION

The research model adopted in researching the residential influence on child survival and its impact on the Nigerian economy is given below.

This relationship between the dependent and independent variables can be expressed functionally as given below:

Child Morbidity = f (Household Sanitation)

CM = f f (SOD,TF,TB,DOS,WAH,AC,RE,EA,WI)

Expressing the equation in econometric form, we have

CM=

Where CM = Child Morbidity

F= functional relationship

SOD: Source of Drinking Water

TF: Type of Toilet Facility

TB: Type of Bed net

DOS: Disposal of Young Child Stool

WAH: Washing of Hands before meal

AC: Age of Child

RE: Religion

EA: Educational Attainment

WI: Wealth Index

### DATA SOURCE AND INSTRUMENT

The study relied mainly on nationally representative Demographic and Health Survey (DHS) data collected in Nigeria. The 2008 Nigeria Demographic and Health Surveys (NDHS 2008) is the most current nationally representative sample survey designed to provide up-to-date information from 33,385 women age 15-49 years and 15, 486 men age 15-59 years in randomly selected households across Nigeria. It is the fourth comprehensive survey conducted in Nigeria as part of the Demographic and Health Surveys (DHS) programme. The NDHS 2008 is not only expanded in content as a follow-up to the 1990, 1999 and 2003 NDHS surveys, it is the first Demographic Health Survey in the country to collect data on basic demographic and health indicators at the state level. The previous three NDHS (1990, 1999, and 2003) collected data at the national and zonal levels. The main objectives of the 2008 NDHS project were to provide researchers and policy makers with up-to-date information on fertility level, household sanitation, nuptiality etc.

The basis for selecting this data is basically due to its representativeness to the sub-Sahara Africa and also expected to share similar experience with respect to good representative household sanitation and child morbidity.

### METHOD OF DATA PRESENTATION

The information supplied from the DHS was entered and processed using the SPSS. Frequency of coded options and it was examined and tabulated and also a cross-tab for analytical purpose. Furthermore, the hypotheses were tested using a multi-variate analysis, which includes the two way analysis of Variance (Two Way Anova), and Multiple Regression, which includes the linear regression, and the binary regression.

### DATA ANALYSIS, PRESENTATION AND INTERPRETATION

This chapter presents the information that was collected from the respondents and an analysis of the variables that affects the dependent variable child morbidity. It also presents the analysis of the independent variables that affect this study. It includes the result of the hypothesis set on a univariate, and a multivariate analysis, which were vividly and clearly expatiated and explained, using the secondary data, which is the DHS data.

|  |  |  |  |
| --- | --- | --- | --- |
| **VARIABLE** | **FREQUENCY** | **PERCENT** | |
| **SOURCE OF DRINKING WATER** | (N) | **(%)** | |
| Piped Water | 3264 | 9.8 | |
| **Tube well** Water | 8947 | 26.8 | |
| Protected/Unprotected Water | 12372 | 37.1 | |
| Rainwater | 7515 | 22.5 | |
| Bottle water | 505 | 1.5 | |
| Others | 773 | 2.3 | |
| **TYPE OF TIOLET** |  |  | |
| **Flush Toilet** | 5203 | 15.6 | |
| **Pit Latrine** | 16040 | 48.2 | |
| **Bucket Latrine** | 32 | .1 | |
| No facility | 10760 | 32.3 | |
| Others | 1233 | 3.7 | |
| **USE OF BEDNET FOR SLEEPING** |  |  | |
| **No** | 26318 | 78.9 | |
| **Yes** | 7037 | 21.1 | |
| **DISPOSAL OF YOUNG CHILD’S STOOL** |  |  | |
| **Always use toilet/latrine** | 5.8 | 5.8 | |
| **Put/rinsed in toilet/Latrine** | 46.8 | 46.8 | |
| Put/rinsed into drain or ditch | 9.4 | 9.4 | |
| Thrown into garbage | 26.3 | 26.3 | |
| Buried | 3.4 | 3.4 | |
| Left in the open/not disposed Of | 7.1 | 7.1 | |
| Other | 1.1 | 1.1 | |
| **RELIGION** |  |  | |
| Catholic | 10.8 | | 10.8 |
| **CHRISTIAN** | 40.9 | | 40.9 |
| Islam | 46.5 | | 46.5 |
| Traditionalist | 1.6 | | 1.6 |
| Others | 0.2 | | 0.2 |
| **WEALTH INDEX** |  | |  |
| Poorest | 7282 | | 21.8 |
| Poorer | 6819 | | 20.4 |
| Middle | 6582 | | 19.7 |
| Richer | 6546 | | 19.6 |
| Richest | 61.56 | | 18.4 |
| **EDUCATIONAL ATTAINMENT** |  | |  |
| No Education | 13242 | | 39.7 |
| Incomplete Primary | 2165 | | 6.5 |
| Complete Primary | 4426 | | 13.3 |
| Incomplete Secondary | 5874 | | 17.6 |
| Complete Secondary | 5031 | | 15.1 |
| Higher | 2647 | | 7.9 |
| Total | 33385 | | 100.0 |
| **SICKNESS** |  | |  |
| Ever Sick | 32723 | | 98.0 |
| Never Sick | 662 | | 2.0 |

**TABLE: PERCENTAGE DISTRIBUTION OF SELECTED SOCIO-ECONOMIC AND DEMOGRAPHIC FACTORS**

Source: Computed by the author from the 2008 NDHS

### FREQUENCY ANALYSIS FOR RESPONDENTS DEMOGRAPHIC CHARACTERISTICS

The table above shows the frequency distribution of the respondent. From the table above 9.8% represent the respondent that makes use of Piped water, 26.8%represent Tube well water, 37.1% protected/unprotected water, 22.5% Rainwater, 1.5%bottle water, and 1.5% represent the number of respondents that make use of other source of water supply.22.5% of the population make use of rainwater, and 26.8% tube well as a result of larger member of the population living in the rural area. On the table, 48.2% of the respondent make use of pit latrine, 32.3% of them do not even have any toilet facility, 15.6% of the respondent make use of the flush toilet, which is just a percent of those in the rural area, 0.1% represent the respondent that make use of bucket toilet, other toilet facility accounts for 3.7% of the population.

The table also shows that 78.9% of the populations do not indulge in safety practices of using the bed net to protect their children from illness and diseases, while we have only 21.1% making use of bed net before sleeping. 46.8% of the respondent dispose of their young child stool by throwing it into the toilet /latrine, 26.3% of mothers dispose their young child stool by throwing it into the garbage, 7.1% of mothers do not dispose their child’s stool, 5.8% always use the toilet /latrine and only 1.1% of mothers are involved in other method of disposing of your young child stool. Poor disposal of stool is as a result of high illiteracy among women in Nigeria.

### MULTIVARIATE ANALYSIS

***HYPOTHESIS ONE***

*H0*: Safety precaution at home is not likely to influence child morbidity

*H1:* Safety precaution at home is likely to influence child morbidity

**TEST BETWEEN SUBJECT EFFECT**

Dependent Variable: Respondent sickness1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Source | Type III Sum of Squares | Df | Mean Square | F | Sig. |
| Corrected Model | 2318.711(a) | 13 | 178.362 | 13.737 | .000 |
| Intercept | 287182.424 | 1 | 287182.424 | 22118.248 | .000 |
| Disposal of young child stool | 1314.336 | 6 | 219.056 | 16.871 | .000 |
| Having bed net for sleep | 37.340 | 1 | 37.340 | 2.876 | .090 |
| Disposal of young child stool\*Having bednet for sleep | 1177.631 | 6 | 196.272 | 15.116 | .000 |
| Error | 213183.621 | 16419 | 12.984 |  |  |
| Total | 1485059.000 | 16433 |  |  |  |
| Corrected Total | 215502.332 | 16432 |  |  |  |

a R Squared = .011 (Adjusted R Squared = .010)

Source:Computed by the author from the 2008 NDHS

**INTERPRETATION**

The Two way analysis of variance make for easy interpretation on whether there is a significant relationship between the dependent variables and the independent variables and to what extent is the effect the independent variables have on the dependent variables. The analysis shows the relationship between the independent variables: Having bed net for sleep, disposal of young child stool and the dependent variable which is respondent sickness. The variable respondent sickness was created by the merging all the child morbidity which include Polio, Malaria, Diarrhea, Fever and Cough, which was made into a continuous variable.

Looking at the Levine’s Test of Equality of Error Variances, (where significant value is p>0.05) the value gotten from the analysis is (p=0.000) which is less that (p>0.05) meaning equal variance is not assumed, which is as a result of differences in the percentage of women that use bed net for their children before sleeping and method of disposal of stool. Therefore, we can conclude that the variance is not equal across all independent variable.

**HYPOTHESIS TWO**

*H0*: Household condition is not likely to cause child morbidity

*H1*: Household condition is likely to cause child morbidity

**ANOVA**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Model |  | Unstandardized Coefficients | | Standardized Coefficients | T | Sig. |
| B | Std. Error | Beta | B |  |
| 1 | (Constant) | 10.650 | .362 |  | 29.434 | .000 |
|  | QPIPED WATER | -2.509 | .169 | -.196 | -14.854 | .000 |
|  | Q2 TUBEWELL WATER | -.856 | .081 | -.200 | -10.558 | .000 |
|  | Q4 PROTECTED UNPROTECTED WATER | -.802 | .041 | -.408 | -19.669 | .000 |
|  | Q5 RAIN WATER | -.421 | .033 | -.231 | -12.660 | .000 |
|  | Q7 BOTTLE WATER | -.409 | .027 | -.130 | -15.413 | .000 |
|  | Q11 FLUSH TIOLET | 2.976 | .332 | .284 | 8.970 | .000 |
|  | Q13 BUCKET TIOLET | .662 | .236 | .016 | 2.807 | .005 |
|  | Q14 NO FACILITY | .154 | .082 | .076 | 1.869 | .062 |
|  | Q15 NO TIOLET FACILITY | .893 | .069 | .222 | 12.861 | .000 |
|  | Q12 PIT LATRIN | .315 | .164 | .083 | 1.912 | .056 |

a Dependent Variable: Respondent sickness1

Source: Computed by the author from the 2008 NDHS (2013)

**INTERPRETATION**

The table shows the relationship between the independent variable, Source of drinking water, Type of toilet facility, and the dependent variable, which is respondent sickness.

In order to carry out this linear regression, the independent variable was converted into continuous. Source of drinking water was recode into Piped water, tube well water, protected/unprotected water, rainwater, bottle water and other source of drinking water, Type of toilet facility was recorded, into Flush toilet, Pit latrine, Bucket toilet, No facility, and other source of toilet facility. The dependent variable, child morbidity was computed from several variable like Polio, Measles, Diarrhea, Fever and Cough .

It is clear from the analysis above that there is a significant relationship between household conditions and Child morbidity in Nigeria with (R = 0.361). Also, 13.0% of changes in child morbidity could be explained by Source of drinking water and Type of toilet facility, meaning that there independent variable explains 13.0% of child morbidity, and also the variables that are not in the model. From the table above ,we can conclude that a negative relationship exist between source of water which include:, tube water, protected and unprotected water, rainwater and bottle water, that is to say that an increase in this variables will reduce child morbidity.

**HYPOTHESIS THREE**

*H0*: Distal determinant is not likely to influence child morbidity

*H1*: Distal determinant is likely to influence child morbidity

**BINARY LOGISTIC REGRESSION MODEL ON THE DISTAL AND CHILD MORBIDITY**

|  |  |  |
| --- | --- | --- |
| **VARIABLE** | **P- VALUE** | **ODD RATIO** |
| **EDUCATIONAL ATTAINMENT** |  |  |
| **No Education** | RC |  |
| **Incomplete Primary** | 0.000 | 5.720 |
| **Complete Primary** | 0.000 | 6.745 |
| **Incomplete Secondary** | 0.000 | 7.343 |
| **Complete Secondary** | 0.000 | 7.800 |
| **Higher** | 0.000 | 4.977 |
|  |  |  |
| **RELIGION** |  |  |
| **Catholic** | RC | .902 |
| **Other Christian** | .095 | .215 |
| **Islam** | .000 | 1.932 |
| **Traditionalist** | .000 | 1.419 |
| **Others** | .417 |  |
|  |  |  |
| **WEALTH INDEX** | RC |  |
| **Poorest** | 0.000 | 2.430 |
| **Poorer** | 0.000 | 3.227 |
| **Middle** | 0.000 | 5.229 |
| **Richer** | 0.000 | 7.223 |
| **Richest** |  |  |

Source: Computed by the author from the NDHS

**INTERPRETATION**

This table above shows the effect of distal determinant on child morbidity and the significant effect of each if the independent variable on the dependent variable. The dependent variable that was used to run this logistic regression is child morbidity, which was a continuous variable that was dichotomized, into never sick and ever sick. Independent variables include current age of a child, the educational attainment of the parents, religion and the wealth index, if it can cause the child to ever be sick, or has been an effect of the child never being sick.

It could be observed from the table that all the independent variables have significant effect on the dependent variable which is sickness. Age is significantly impact child morbidity. Religion and the education have an effect on the health of a child. If a woman is educated she would be able to ensure a clean environment and she does the right things to prevent the children from sickness, and some religion do not allow for a clean household. In this analysis the (p=0.00<0.05), which is significant, meaning that the model fit the data well.

### RECOMMENDATION

Based on the relative importance of the study in line with the research findings, the following recommendations may be required to improve the living condition of households and child’s health:

* Policies should be made by the government on the need for families to ensure the proper sanitation of their house as it is of great impact on the health of the child.
* Both parents should be involved in the caring of the child, and taking turns to ensure safety for the children at home, and it should not be left to only the mothers at home
* Government should look into the fact that its not only Source of water in the house that affect the health of the child, and cause illness or disease. There should look into other variables which has been proven by this analysis has major cause of illness and sickness.
* Proper development of the Primary health care system, as a proper development of the PHC will help in preventing and the rehabilitating the health of the child, as they are also involved in the sanitation of people especially at the grass root level. They can ensure safety in the rural areas which are seen as the areas with the high number of children that fall ill. Immunization can also be provided for these children to prevent sickness.

**REFERENCE**

Abdulraheem I. S.1, Oladipo A. R.and Amodu M. (2012): Primary health care services in Nigeria: Critical issues and strategies for enhancing the use by the rural communities.

Adeyemi, S. L., Raheem, U. A. & Olorunfemi, F. B. (2008). Under-Five Mortality and the Environment of Health in the Third World: A Nigerian Example. Journal of Human Ecology, 24 (2), 117-124.

Ajao,I.O, Obafemi, O.S and Ewumi ,T.O(2011):Household Sanitation And Mortality Rate In Nigeria: An expository Analysis.

Boschi-Pinto, Cynthia, Lana Velebit, and Kenji Shibuya. 2008. “Estimating Child Mortality Due to Diarrhoea in Developing Countries.” World Health Organization. Bulletin of theWorld Health Organization 86: 710-717.

Briscoe, J. 1984b. Water supply and health in developing countries: Selective primaryhealth care revisited. American Journal of Public Health 74: 1009-1013.

Burger, S., and S. Esrey. 1995. Water and sanitation: Health and nutrition benefits to children. In Child growth and nutrition in developing countries, ed. P. Pinstrup Andersen, D. Pelletier, and H. Alderman. Ithaca, N.Y., U.S.A.: Cornell University Press.

Caldwell, J. C. (1979). Education as a Factor in Mortality Decline: An Examination of Nigerian Data.Population Studies, 33 (3), 395-413. <http://dx.doi.org/10.2307/2173888>.

Caulfield, Laura E., Mercedes de Onis, Monika Blössner, and Robert E. Black. 2004.Undernutrition as an underlying cause of child deaths associated with diarrhea,pneumonia, malaria, and measles.” American Journal of Clinical Nutrition 80: 193-198.

Cebu Study Team. 1992. A child health production function estimated from longitudinal data. Journal of Development Economics 38 (2): 323-351.

DaVanzo,Julie.(1988). "Infant Mortality and Socioeconomic Development: Evidence fromMalaysian Household Data." Demography 25.4: 581-595.

Ellen, Van de Poel E., O. O’Donnell and E. Van Doorslaer, (2007). Are Urban Children really healthier? Tinbergen Institute Discussion Paper TI 2007-035/3.

Esrey, S. A., R. Feachem, and J. Hughes. 1985. Interventions for the control of diarrheal diseases among young children: Improving water supplies and excreta disposal facilities. Bulletin of

Ewbank, D. C. & Gribble, J. N. (1993). Effects of Health Programmes on Child Mortality in Sub-SaharanAfrican. Washington: National Academy Press.

Folake, O. Samuel1, Abiodun H. Cole1 and Wilna H. (2008) Oldewage-Theron21Department of Human Nutrition, Faculty of Public Health, University of Ibadan, Nigeria2Institute of Sustainable Livelihoods, Vaal University of Technology,Private Bag X021, Vanderbijlpark, 1900, South Africa.

Fotso, J.C., 2006. Child health inequities in developing countries: differences across urban and rural areas. Int. J. Equity in Health, 5, 9.

Gamper-Rabindran, Shanti; Shakeeb Khan, and Christopher Timmins. 2009. "The impact of piped water provision on infant mortality in Brazil: A quantile panel data approach."

Günther and Fink, (2010) Water Sanitation and Children’s Health Evidence from 172DHS survey. health care revisited. American Journal of Public Health 74: 1009-1013.

Haddad, L., M.T. Ruel and J. Garrett, 1999. Are Urban Poverty andUndernutrition Growing? WorldDevelop., 27: 1891-1904.

Haddad, L., S. Bhattarai, M. Immink, and S. Kumar. 1995. Household food security and diarrhea as determinants of nutrition: New trade-offs and new opportunities towards 2020? Draft 2020 Discussion Paper. International Food Policy Research Institute, Washington, D.C.

Jinadu, M. K., Olusi, S. O., Agun, J. I. & Fabiyi A. K. (1991). Childhood diarrhoea in rural Nigeria: Studies on prevalence, mortality and socio-environmental factors. Journal of Diarrhoea Diseases Research, 9 (4), 323-327.

Journal of Development Economics 92: 188-200. Accessed on October 14, 2010.<http://www.nber.org/papers/w14365.pdf>.

Kimberly Moore Waggoner, B.A.(2011) Evalauting the impact of water and sanitation in sub-saharan,Georgetown Public Policy Copyright 2011 by Kimberly Moore WaggonerAll Rights Reserved Hutton, Guy and Laurence Haller. 2004.

M, Perez P, Dray A (2008). Safe water for people in low, small island Pacific nations: The Rural–Urban dilemma. Dev., 51: 282–287.

Menon, P., M. Ruel and S. Morris, 2000. Socio-economic differentials in child stunting: Results from 11 DHS data sets. Food Nutr. Bull., 21: 282-289.

Mesike, Chukwunwike Godson Environmental Determinants of Child Mortality in Nigeria Mesike, Chukwunwike GodsonDepartment of Actuarial Science & Insurance, University of Lagos NigeriaMojekwu, Joseph Nnamdi.

Mutunga, C. J. (2007). Environmental Determinants of Child Mortality in Kenya. UNU-WIDER Research paperNo. 2007/83. Helsinki: United Nations University World Institute for Development Economics Research.

NDHS. (2008). Nigeria Demographic and Health Survey.

Nwankwoala HO (2009). Sustainable groundwater development and management in Nigeria: Mission achievable or mission impossible?Water Resour. J., 19: 63–68.

Ogunjuyigbe, P. O. (2004). Under-Five Mortality in Nigeria: Perception and Attitude of the Yoruba towards the Existence of Abiku. Demographic Research, 11 (2).

Ogunlesi, T.O. (1961): “Respiratory infections in the preschool child: A review of 435 cases admitted to Adeoyo Hospital, Ibadan” West African Journal, 10:231.

Peter O. Ogunjuyigbe (2004)Under-Five Mortality in Nigeria:Perception and Attitudes of the Yorubas towards the Existence of “Abiku” demographic research volume 11, article pages 43-46 published in 13 august 2004.

Prüss-Üstün, Annette, and Carlos Corvalán. 2007. “How much disease burden can be preventedby environmental interventions?” Epidemiology 18.1167-178. Accessed on November13, 2010. <http://www.ncbi.nlm.nih.gov/pubmed/16971860>.