

Micro-Economic Analysis of the Drivers of Under-Five Mortality in Kano Metropolis, Nigeria



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ABSTRACT: Nigeria is among the major countries contributing a significant quarter to death of children under the age of five in the world. This study was designed to analyze the drivers of child mortality in Kano Metropolis, Nigeria. Survey data was used, sourced via a structured questionnaire. Simple percentage and Negative Binomial Poisson Regression Model were used in the analysis of the data. It was found that education level of the household head, years of marriage experience, income level of the household, location, and vaccine are the significant drivers of child mortality in the study area. The results further revealed that, education level, years of marriage experience and location negatively influence under-five child mortality, while income of the household head and vaccine influence the under-five mortality of the household positively. The study recommends that, government should subsidize medical services and made it affordable to all individuals in the State, and that both government, NGOs and health institutions should embark on public enlightenment to educate the public on the importance of vaccines, natal care, and nutrition.

KEYWORDS: Poisson regression; HDI; Child mortality; Under-5 mortality

1. INTRODUCTION

Under-five mortality is a fundamental indicator of socioeconomic development as well as quality of life of every nation. This could be the reason why it appears to be a major aspect of the global development agenda. Child mortality serves as a vital component of Human Development Index (HDI) which is the famous instrument for measuring development used by international community particularly United Nations Development Program (UNDP) in its annual report.

Many developing countries particularly sub-Saharan Africa were unable to achieve the target of reducing under-five mortality rate by two-third, as targeted by the immediate past global development agenda popularly known as Millennium Development Goals (MDGs). A significant progress in the reduction of child mortality was recorded at a global level looking at some recent statistics. In 1990, about 12.7 million under 5 years children died, the figure reduced to 6.3 million in 2013 (World Health Organization, 2022). However, it was revealed that the children of Sub-Saharan Africa are 14 times more likely to die before the age of five than children of developed regions (WHO, 2022). This could be attributed to the failure of such countries to improve their medical care services resulting from poor budgetary allocation to the sector coupled with mismanagement of funds. It was reported that every year, 3 million children in developing countries die for lack of clean water (UNDP, 2015).

Nigeria is currently regarded as the worlds' largest contributor to death of children under the age of five. It was estimated that, there was an average of 858,000 under-five death in Nigeria out of 5.2 million under-five death global (UNICEF, 2001). Similarly, in 2000 World Health Organization (WHO) ranked Nigeria as 187th in term medical care out of 191 countries of the world (Federal Ministry of Health, 2004). This could be attributed to lack of access to medical care by a large portion of households in the country, coupled with unavailability of the service providers especially in rural areas. Other problems include distance to health facilities, lack of money for the treatment and unavailability of drugs (NPC, 2008). National Health Insurance Scheme failed to cover a significant portion of the Nigeria's population. About ninety percent of Nigerians are not in any kind of health insurance (Muanya, 2020). This implies that 90% of Nigerian are paying-of-pocket to access medical care services, which increases the household's expenditure and decreases their propensity to save.

In Nigeria many children are under-nourished, various research confirmed that there is food insecurity in the country. Malnutrition remains one of the major challenges to children's health in the country owing to the economic situations in the country ranging from inflation, rising poverty and inequality. As a result of this, many children suffer from diseases that could

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have otherwise been prevented by eating good food and proper sanitation. Diseases increase children's probability of death before reaching five years of age which invariably deteriorates human capital in the country.

Nigeria government has been coming up with programs aimed at reducing child mortality in line with global development agenda (MDGs and SDGs). This includes National Immunization Program, Maternal and Child Health Project, National Health Insurance Scheme among others aimed at reducing the child and maternal death in the country. Despite the high incidence of child mortality in Nigeria over the years, though a marginal reduction was witnessed, yet it was not enough to achieve the target set by MDGs. Nigeria constitutes just 1% of the world population, but accounts for 10% of the world's maternal and under-five mortality rates in 2010 (Adeyele and Ofoegbu, 2013). The country had been ranked second in the world in terms under-five mortality rate until recently when it overtook India and emerged as number one (UNICEF, 2021).

The under-five mortality rate is highest in north-western region than any other geopolitical region in the country (NPC, 2020). The current security situation in the region is one of the major challenges for addressing the issue of child mortality. For half of the decade many villages (towns) in the region have been devastated by the activities of bandits. This displaced many households and rendered them in a state of famine and destitution. Moreover, rising poverty, unemployment and climatic factors (flood) could aggravate the menace in the north-western region.

The objectives of this paper are to identify the incidence of child mortality among households in the study area and to investigate the major micro-economic drivers of infant mortality in Kano State, Nigeria. Therefore, the outcome of this study is expected to shed light on the appropriate micro economic factors that affects child mortality to policymakers to come up with appropriate policy on human capital in Kano State or Nigeria at large. It is hoped that the study will contribute to the ongoing debate on the health economics. The rest of the paper was organised as follows. Section two centered on the literature review, section three focused on methodology, section four presented the result and discussions, and section five captured the conclusion and recommendations.

2. LITERATURE REVIEW

The mortality of children is an undesirable phenomenon in every country, as it reflects negatively in the human capital development of the economy. Conceptually, children mortality is categorized into five categories: Neonatal mortality, Post neonatal mortality, Infant mortality, Child mortality and Under-5 mortality. The mortality is explained by what is called mortality rate, that is, the probability of a child dying out of one thousand live births. According to the National Population Commission (2022), neonatal mortality is the likelihood of dying within the first month of life. Post neonatal mortality is the likelihood of dying between the first month of life and the first birthday. Infant mortality is the likelihood of dying between birth and the first birthday. Child mortality is the likelihood of dying between the first and the fifth birthday. Finally, Under-5 mortality is the likelihood of dying between birth and the fifth birthday. This implies that under-five mortality comprises all the categories of children mortality. This could be the reason why it is used as a socioeconomic development indicator globally.

Empirically, many studies have tried to reveal the determinants of under-five mortality. The determinants range from numerous socio-economic factors. For instance, Bhatti, Shahzad and Shaukat (2019) investigated the socioeconomic determinants of child mortality in Punjab, Pakistan using binary logit approach. The independent variables that are found to be significant are location of the household, level of mothers' education, wealth quantity, awareness, and access to clean water. Similarly, Ghosh and Bharati (2010) examine the determinants of child mortality in Kolkata city of India based on two distinct communities. The result of their study reveals that high prevalence of child death was found in community with poor medical facility. Another study was carried out by Kusneniwar, Mishra, Balasubramania and Reddy (2013) on Determinants of Infant Mortality in Developing Region of India. The study found that education of the mother, socioeconomic status of the household and sanitation were the significant determinants of child mortality in the regions. High standard of living was also associated with lower infant mortality. Similar study was conducted in Bangladesh by Awan and Khan (2017) on the determinants of child mortality rate using binary logistic regression model. The independent variables that were found to be significant in model include mothers working status, parental educational level, and maternal age at first birth.

However, in African countries some studies were conducted to investigate the socioeconomic determinants of child mortality. For instance, Nyaaba, Dadzie and Aymga (2020) analyzed the determinants of under-five mortality in Ghana. Sequential logit regression was employed in the study. The dependent variable was the probability of child died before fifth birthday in the household. While the independent variables are of three groups: socioeconomic, maternal and environmental factors. Three models were analyzed (model I, II and III) in which model III which comprises all the three factors was found to be the best model that explained the contribution of the covariates to under-five mortality. The result reveals that education and wealth status were significantly associated with under-five mortality. Under maternal factors, age at first birth, birth order, place of delivery was found to be significant. While environmental factors that were significantly associated with under-five mortality include toilet facility

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and source of drinking water. Similarly, Ayele, et al (2022) investigated the determinants of under-five mortality in Ethiopia using Ethiopian Demographic and Health Survey data. Semi-parametric nested shared frailty survival analysis was employed to identify the determinants of under-five mortality in the study. The result reveals that sequence of birth, birth interval and age at first delivery are significantly associated with under-five mortality in Ethiopia.

Similarly, in the studies conducted in Nigeria, the association between household socioeconomic attributes and under-five mortality was also established. Olusegun, Abdullahi and Adamu (2016) analyze under-five mortality in Zaria using simple regression and correlation analysis. Deliveries were considered as independent variable while under-five mortality was the dependent variable. Both results reveal that there was a strong association between under-five mortality and delivery rate. Although the study doesn't investigate the socioeconomic factors. Onatunji and Adesina (2016) investigated the determinants of child mortality in Nigeria using National Demographic and Health Data. Logistic regression was used to examine the determinants of child mortality and COX regression was used to find out effect of the explanatory variable and survival of child in Nigeria. The logit results show that the variables that are significant determinant of child mortality are educational level of parents, household income and location of the household. The result of cox regression shows that household income and location of the residence significantly decrease the risk of death, while delivery at home significantly increase the risk of death. Another study was carried out by Ayodele and Ofoegbu (2013) which analyses the infant mortality in Nigeria using national demographic and health data. Regression analysis was used to analyze the socioeconomic variable as determinants of child mortality in Nigeria. Variables that were found to be significant in the model include mother's educational level and mother's ability to make decision and control resources in the house. These factors reduce the risk of child mortality according to the study.

The foregoing reviews enable us to know that education of parent has a great influence on probability of child survival. Research carried out in different part of the world emphasize the influence of education and standard of living in reducing under-five mortality. However, the common instrument of data analysis used in the works reviewed was binary logit model. For instance, Bhatti, Shahzad and Shaikat (2019); Ghosh and Bharati (2010); Kusneniwar, Mishra, Balasubramania and Reddy (2013) they used binary logit to conduct the study in Pakistan and India respectively. Awan and Khan (2017) used the same in Bangladesh. On the contrast, the studies conducted in Africa used different models to analyze the determinants of child mortality. This includes Nyaaba, et al (2020) which used sequential logit model. In the work explanatory variable was categorized into three groups. Onatunji and Adesina (2016) used Cox model to analyze the risk of child mortality in Nigeria. This study fills the gap by employing Poisson Regression to analyze the major drivers of child mortality in Kano State, Nigeria.

3. METHODOLOGY

3.1 Data Description

The study uses a cross sectional survey design to enable effective data management and generalization in attempt to determine the drivers of child mortality in Kano State, Nigeria. The population of the study comprises all the households living in Kano Metropolis. A total of two hundred and fifty (250) households were drawn as a sample of the study. A two-stage cluster sampling technique was utilized, in which five local government areas in the Kano metropolis were randomly selected. The selected local government areas include Dala, Gwale, Kano Municipal, Kumbotso and Fagge Local Government Area. In the second stage of the sampling, 50 households were selected from each of the selected Local Government Area, using probability sampling. Thus, the sample size was selected in accordance with Bryman and Bell (2007) who opined that, the decision about sample size represents a compromise between the constraint of time and the need for precision. Furthermore, structured questionnaire was used as instrument of data collection after its contents were validated by some senior academic advisors and was designed to include both open and close ended questions guided by the objective of the study. The instrument was administered directly by the researchers themselves who waited to retrieve it instantly to avoid high instrument mortality.

The data collected for the study was analyzed using descriptive statistics particularly for assessing the demographic information of the respondents and Poisson Regression Model to determine the drivers of the child mortality among the households living in Kano State.

3.2 Model Specification

The Poisson Regression Model was adopted for this study following the work of Aku (2017). The rationale was due to the count and intensity nature of the dependent variable, that is, prevalence of under five children under five in a household. The probability distribution that is specifically suited for the count data is the Poisson probability distribution (Gujarati, 2005), and that the Poisson model meets the classical assumptions except that the dependent variable assumes Poisson distribution. Therefore, the following model is specified for Poisson distribution:

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$$\Pr(Y = y_i) = \frac{e^{-\mu}(\mu)^{y_i}}{y_i!} \dots \dots \dots 3.1$$

From equation 3.1, Y is a discrete variable that can only take one value y_i at any given time t. μ is the mean value representing the prevalence, intensity, or rate parameter, and it is non-negative i.e $\mu > 0$. The prevalence of the under-five children mortality in this study were defined as the number of times an under-five child died over the past 5 years in a household in Kano. Therefore, if the prevalence of the mortality is analyzed as a function of other explanatory variables (x_i), and is measured as a count variable denoting the rate or intensity of the mortality in five years (y_i), the Poisson regression may be re-specified as

$$\Pr(Y = y_i|x_i) = \frac{e^{-\mu(x_i\beta)}\mu(x_i\beta)^{y_i}}{y_i!} \dots \dots \dots 3.2$$

From equation 3.2, y_i is the rate of the child mortality in a household, μ is the mean level of the mortality which must be positive, and is a function of x_i , where x_i represents the explanatory variables, β is the estimated parameter, and e is the exponential function with a value of 2.71. Therefore, in the context of this study, $y_i = 0, 1, 2, \dots, n$, where zero means no under-five mortality is recorded in the household in the past 5 years, while numbers 1, 2, ..., n represent the number of time an under five child dead is recorded in a household in the past 5 years.

Assuming a Poisson distribution, there is a defined likelihood function that warrants the possibility to develop the Maximum Likelihood Estimator (MLE). Within the Poisson model, unknown regression parameters $\beta_0, \beta_1, \beta_2, \beta_k$ could be estimated as the case is with other regressions, to explain the distribution of y_i or the expected value y_i by the set of explanatory variable x_i .

From the Poisson regression model, μ being the intensity or rate parameter is expressed as:

$$\mu = \exp(x_i'\beta) \dots \dots \dots 3.3$$

There are two important properties of the Poisson distribution that must be observed, that is, the equality of conditional variance of y_i and the mean μ , and this condition is referred to as equi-dispersion express as follows:

$$E(y_i|x_i) = \text{var}(y_i|x_i) = \mu \dots \dots \dots 3.4$$

If the above property (3.4) is violated, that may lead to problem of over-dispersion or under-dispersion given as $\text{var}(y_i|x_i) = \mu + \alpha \mu^2$ or $\text{var}(y_i|x_i) = \mu + \alpha$ respectively. In such a situation, Normal Poisson Model (NPM) could not be effective, instead Negative Binomial Model (NBM) is most appropriate. The second property however was the issue of excess zero which if presence in the model only the use of Zero Inflated Poisson (ZIP) is necessary.

In a count data models, given x_i , the count variable y_i has a Poisson distribution with expectation $\mu_i = \exp(X'\beta)$. Thus the marginal effect or probability mass function of y_i conditional upon x_i , is given by

$$\frac{\partial E(y_i|x_i)}{\partial X_i} = \Omega_j \exp(x_i'\beta) \dots \dots \dots 3.5$$

However, the empirical model used in the study to analyze the drivers of under-five mortality in Kano State is expressed in mathematical functional form as below:

$$\text{UFM} = f(\text{educ, mexp, incm, loct, vacn, care, nutr}) \dots \dots \dots 3.6$$

Specifically, the model is further re-specified econometrically as follows:

$$\text{UFM} = \beta_0 + \beta_1 \text{educ} + \beta_2 \text{mexp} + \beta_3 \text{incm} + \beta_4 \text{loct} + \beta_5 \text{vacn} + \beta_6 \text{care} + \beta_7 \text{nutr} + \varepsilon_i \dots \dots \dots 3.7$$

Where:

UFM = Under-five mortality in a household

Educ = Level of education of the household head

Mexp = Years of marriage experience

Incm = Income of the household head

Loct = Location or area of residenc

Vacn = Child vaccine

Care = Ante natal and post-natal care

Nutr = Nutrition and food security

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Table 3.1 Variables Description

S/N	Variable Name	Variable Measurement
1	Under-five mortality	Number of children below five years of age that died in the last six month
2	Level of education of the household head	1= no formal education, 2= primary education, 3=secondary education, 4=
3	Years of marriage experience	Quantitative and continuous variable
4	Income of the household head	Monthly earning of the household head from all the sources
5	Location or area of residence	1= household reside in the city, while 2 represents household reside outside the city
6	Child vaccine	1 if children in the household are vaccinated, zero otherwise.
7	Antenatal & postnatal care	1 if mother attend antenatal care and give birth at hospital, zero otherwise
8	Nutrition & food security	Intake of balanced diet and three-square meals in a typical day. Ordinal scale: ranges from 1 to 4 (represents daily, twice a week, weekly and occasionally)

Source: Authors conception

4. RESULT AND DISCUSSION

The result of the analysis is presented in this section. Two hundred and fifty (250) questionnaires were administered to the respondents, only eight (13) were not returned or returned with an incomplete response. This marked a returned rate of 94.8%, and therefore the analysis is conducted on the returned questionnaires.

4.1 Demographic Characteristic of the Respondent

Socio-economic and demographic information of the respondents were especially important in the conduct of empirical analysis as it provides useful features of the respondents in the study area. The profiles were examined under some variables that include location, level of education, years of marriage experience and size of the family.

Table 4.1: Socio-economic and Demographic Characteristics of the Respondents

s/n	Variable(s)	Frequency	Percentage (%)
1.	Location		
	within the city wall	128	54.01
	Outside the city wall	109	45.99
	Total	237	100.00
2.	Level of Education		
	Primary education	79	33.33
	Secondary education	71	29.96
	Tertiary education	46	19.41
	Post graduate education	41	17.30
	Total	237	100.00
3.	Years of Marriage Experience		
	3 years and below	17	7.17
	4 – 7 years	60	25.32
	8 – 12 years	52	21.94
	13 – 16 years	47	19.83
	17 – 20 years	26	10.97
	Above 20 years	35	14.77
	Total	237	100.00
4.	Size of the Family		
	Less than 2 children	36	15.19
	2 – 5 children	124	52.32
	6 – 9 children	54	22.78
	10 and above children	23	9.70
	Total	237	100.00

Source: Field survey, 2022.

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Table 4.1 presents the socioeconomic and demographic information of the respondents. The result shows that most of the households (54.01%) in the metropolitan resides or are located within the old-Kano city wall and 45.99% outside the city wall. Furthermore, 33.33% of the household acquired primary education, 29.96% secondary, 19.41% tertiary (diploma and undergraduate) and 17.30% possessed post graduate education; this shows that, most of the household in Kano metropolitan have at least primary education. On the part of years of marriage experience of the respondent, majority of them representing 25.32% had 4 – 7 years of marriage experience, followed by 21.94% with 8 – 12 years of marriage experience and 19.3% with 13-16 years. Lastly, the number of children born by the household revealed that 52.32% of the respondents had 2 – 5 children and 22.78% had 6 – 9 children, while 15.19% and 9.70% have less than 2 and 10 to above children respectively. This shows that much of the household in Kano Metropolitan have an average of 2 – 5 children.

4.2 The Incidence of Under-five Mortality among Households

In the study area, the incidence of child mortality or rate at which an under-five child died in the household in the past 5 years is measured using descriptive statistics and the result is presented in table 4.2 below.

Table 4.2: Weekly returns of the small-scale industries

S/N	Item (#)	Frequency	Percentage (%)
1.	No Under-five mortality recorded	89	37.55
2.	1 under-5 mortality recorded	66	27.84
3.	2 Under-5 mortality recorded	33	13.92
4.	3 Under-5 mortality recorded	16	6.75
5.	4 Under-5 mortality recorded	11	4.64
6.	5 and above Under-five mortality recorded	19	8.02
TOTAL		237	100.00

Source: Field Survey, 2022.

From the result of incidence of under-five child mortality presented in table 4.2, it shows that only 37.55% of the household in the study area did not experience any case of child mortality during the past five years while about 62.55% experience 1 or above number of under-five child death. Precisely, 27.84% had only 1 child mortality, 13.92% experience 2 child mortality, 6.75% experience 3 child mortality, 4.64% had 4 number of child death and 8.02% had 5 and above under-five children that died in the past five years. The result therefore revealed that, majority of the respondent experience child mortality in their household.

4.3 Poisson Result for Drivers of Child Mortality in Kano State

The drivers of under-five mortality are fundamental indicators of socioeconomic development and quality of life in a country and among its inhabitants as it can be used for appropriate policies and planning. The Poisson regression model was used to analyze the drivers or factors influencing children mortality rate among households in the Kano metropolis. The number of times household losses his under-five child for the past 5 years was used as a dependent variable against independent variables as shown in table 4.2 below.

Table 4.3: Results of the estimated Poisson regression model

Child Mortality	Poisson Model			Negative Binomial Model		
	Coeff.	P-value	Marginal effect	Coeff.	P-value	Marginal effect
Education	-0.243	0.000	-0.259	-0.243	0.001	-0.258
Years of Marriage Experience	0.196	0.000	0.208	0.194	0.000	0.207
Marriage Experience Squared	-0.375	0.193	-0.040	-0.331	0.329	-0.035
Household Income Level	0.236	0.023	0.251	0.253	0.038	0.269
Location	-0.243	0.095	-0.258	-0.242	0.163	-0.258
Vaccine	0.372	0.017	0.397	0.363	0.064	0.386
Heal care (anti natal)	0.270	0.075	0.288	0.271	0.150	0.289
Food and Nutrition	-0.047	0.408	-0.050	-0.049	0.473	-0.052
Alpha (Over-dispersion parameter)				Chi ² = 12.86	p-value = 0.000	

Source: Authors Computation using STATA 14

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In table 4.3, both the result of normal poisson and negative binomial poisson regression were presented. Looking at the significant value of Alpha (0.000), the null hypothesis of Alpha = 0 or the equi-dispersion property is rejected at 1 percent, this shows that there is problem of over-dispersion and hence the result of the Negative Binomial Model (NBM) is most appropriate and will be reported in the analysis although the two model coefficients are very much close and they may give the same prediction. Moreover, from the result of the NBM, the following variables were found to have significant influence on under-five mortality in Kano state: education level of household head, years of marriage experience, income level of the household, location, and vaccine. The number of years of formal education of the household head was found significant at 1 percent and its influence on child mortality is negative. The coefficient of education shows that a 1-year increase in the household education level, the intensity of child mortality will decrease by 0.24 units. This concurs with findings of Awan and Khan (2017); Awan et al (2017); Nyaaba et al (2020); Onatunji et al (2016), and it is in line with the priori expectation that education would create more awareness and adoption of appropriate medical care and advice.

Years of marriage experience of the household was found to positively influence child mortality of the household and was statistically significant at 1 percent level. However, to model the influence of age more accurately in the analysis, the function age squared was included. This was necessary because the results show that household higher age of marital experience was more likely to have better family education. The result showed that at much higher marriage experience the rate of child mortality was negative and this is consistent with a priori expectation.

The level of the household income was also found to positively affect the rate of child mortality and is significant at 5 percent. The coefficient reveals that, a ₦1000 increase in the income of the household, under-five child mortality increases by 0.04 unit. However, this is contrary to the finding of Nyaaba et al (2020), and it is contrary to the expectation. The results here suggest that most of the households do not spend much of their additional income on their family health but other luxury items to compete with people in the city.

Location of the household was found positive and significant at 10 percent that is place of living of the household is negatively and significantly affecting child mortality in Kano Metropolis. This is in line with the finding of Onatunji et al (2016), and it's consistent with expectation that people living in the city or within the city wall of Kano are educated and aware of the importance of medical services and improve family lifestyle. It revealed that as a household live within the old city of Kano, the rate of his child mortality decreases to 0.24 as against those living outside the city wall.

Vaccines is another significant variable that affect the rate of child mortality in Kano state. However, the variable is contrary to a priori expectation as it positively affects the under-five child mortality of the household in the study area. This could be attributed to the way and way the vaccines are taken. The vaccines required to be taken at a right time and required dose has to be taken for any vaccine to be effective. Some parents due to ignorance skip doses of vaccines and still claim they vaccinate their children.

4.3 Post-estimation Test Result

The chi-squared value from the result of both models were significant at 1%, thus implying that all the variables jointly determine the dependent variable. Pseudo R^2 of 11.68%, is sufficiently high. However, the Poisson Model produces no natural counterpart to the R^2 in linear regression model, (Greene, 2012). It is therefore difficult to assess the goodness of fit of the model based on the R^2 therefore GOF test was conducted, and the result of the Deviance and Pearson goodness of fit rejected the null hypothesis at 1%.

Similarly, the test for over dispersion was conducted using the Negative Binomial Regression command, and the result of the Alpha proves the rejection of equal-dispersion property, hence the Poisson regression will not be correctly applied. Therefore, the need to report the result for the Negative Binomial Regression.

5. CONCLUSION AND RECOMMENDATIONS

Child mortality, being a vital component of human development index serves as a major tool for assessing development. However, the rate is high in developing countries particularly sub-Saharan Africa compared to their developed countries counterpart, likely due to increasing poverty, poor health, and nutritional services; and this was indicated in the analysis that, income, health care and vaccine positively influence child mortality.

The study found that, the intensity of child mortality in Kano metropolis is high given that only 37.55% of the respondent did not experience any case of child mortality in their household in the past five years, and that its rate is most especially and strongly influenced by socioeconomic characteristics of the household. The results revealed that education level, years of marriage experience, and location have negative significant influence on the under-five child mortality, while income of the household head and vaccine have positive significant influence on the under-five child mortality of the household in Kano State. Therefore, socioeconomic characteristics of households in Kano are major drivers of child mortality in the state.

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Based on the findings of the study, and in tandem with the importance of child mortality as an indicator of development, the following recommendations were drawn:

- i. Government should subsidize medical services and make it affordable to all individuals in the State so that poor households can have access to improved health care facilities. An effective health insurance scheme could really help less privileged families to access medical care facilities in the state.
- ii. Government, NGOs, and health institutions should embark on massive public awareness and enlightenment to educate the public on the importance of vaccines, natal care and nutrition.

FUTURE STUDY

This investigates the socioeconomic factors that affect the likelihood of under-five mortality in Kano State using household survey data. However, the survey was conducted only in five Local Government Areas located in the Kano Metropolis. These local government areas are in urban areas of the state. However, the local government areas in the rural area of the state were not studied due to limited resources at the disposal of the researchers. The future study should be conducted in both rural and urban areas of the state. The further study should consider sanitation as well as health insurance among the explanatory variables of under-five mortality.

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