Assessment of Determinants of Child Survival in South-west Nigeria

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Abstract

Introduction: Child survival (CS) is an essential component of public health concerned with reducing child morbidity and mortality. Despite the gains attained during the MDG era, 14,000 children less than five years of age still die every day and 11 every minute. Therefore, this study sought to evaluate the determinants of CS in South-west Nigeria.

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Methods: A randomized cluster sampling technique involving a four-stage random sampling technique was used to select 1308 mothers of under-five children in southwest Nigeria. Information on demographic and socio-economic characteristics, child-related, maternal, paternal, and environmental factors were collected using a pre-tested, interviewer-administered semi-structured questionnaire. Data were analysed using SPSS version 20, descriptive statistics, and regression was performed at a 5% level of significance.

Results: Mean age of respondents was 30.7±6.1years. Factors that significantly ($p<0.05$) influenced the survival of the under-five children were; mothers' literacy level, residence, low parity, mothers' educational qualification, type of flooring materials, and mothers' age at first birth. The odds of CS is twice as higher in **literate than non-literate mothers** (OR:1.9; CI:1.2-2.8), urban than rural dwellers (OR:2.2; CI:1.1-4.8), mothers with at least **a secondary education than uneducated** (OR:2.1; CI:1.3-3.5), type of flooring materials (OR:4.3; CI:2.3-8.2) and respondents age at first birth (OR:1.1; CI:1.0-1.1). Also, women with low parity had less likelihood of under-five death than mothers with higher parity (OR:0.5; CI:0.3-0.9).

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Conclusion: The study identified literacy level, residence, low parity, mothers' educational qualification, and type of flooring materials as determinants of CS in southwest Nigeria. Therefore, all stakeholders should develop a more effective response to these determinants to ensure sustainable, realistic, and practical measures that will increase the survival of under-five children in the area.

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Keywords: Under-five, Mothers, Child survival, children

1. INTRODUCTION

Comment [H12]: It is bulky. Please summarize it in 4-5 paragraph by margining paragraphs which have the same concept and by avoiding literature review.
Focus on the general background of the problem, burden of the problem and significance of the study in short and precise way

Substantial progress in improving child survival has been made worldwide in the past 25 years. Globally, the under-five mortality rate had dropped by 60%, from 93 in 1990 to 37 deaths per 1,000 live births in 2020. Over the same period, the annual number of under-five deaths dropped from 12.6 million to 5.0 million and 1 in 11 children died before reaching age 5 in 1990, compared to 1 in 27 in 2020 (IGME, 2020; 2021; WHO, 2021). Despite the gains attained during this period, 14,000 children under the age of 5-years still die every day; this remaining burden of child mortality is not evenly distributed among or within

countries (IGME, 2020). About 49% of all under-five child deaths occur in only five countries of the world, namely, India, Nigeria, the Democratic Republic of the Congo, Pakistan, and Ethiopia with Nigeria contributing nearly 0.9 million of these deaths thus the highest contributor to under-five mortality (U5M) in the world (Strong *et al.*, 2021; IGME 2020). Unfortunately, many of the under-five children died from preventable or treatable diseases.

With an under-five mortality rate (U5MR) of 74 deaths per 1,000 live births, 14 times higher than the risk for U5 children in Europe and Northern America, children born in sub-Saharan Africa continued to face the steepest odds of survival in the world. According to the United Nations report, some African countries fare better than Nigeria. For instance, Libya had 11 deaths per 1000 live births, and Seychelles had 14 deaths per 1000 live births, among West African countries Senegal and Ghana fared better than Nigeria with under-five mortality rates of 38/1,000 and 45/1,000 live births, respectively (World Bank, 2022). ////One in every 15 Nigerian children dies before reaching age one, and more than one in every eight does not survive to his or her fifth birthday (NDHS, 2013; 2018). Most of these deaths or conditions leading to death in children are preventable or treatable largely through proven, cost-effective preventive interventions and early care at household, community, and primary health care levels such as promotion of adequate nutrition and weight gain during pregnancy, antenatal care, skilled health workers assisting at birth, access to emergency services and after delivery care for both mother and newborn, promotion of breastfeeding, infant and young child caring and feeding practices, hygiene, sanitation, case management of common illnesses at the home and community management of acute malnutrition (NDHS, 2013; 2018).

The Nigeria Demographic and Health Survey (2018) revealed that under-five mortality declines with increasing mother's education and household wealth from 170 and 173 death per 1, 000 live births among children whose mother has no education and is from the lowest wealth quintile to 56 and 53 deaths per 1,000 live births among children whose mothers have more than secondary education and from the highest wealth quintile respectively. Furthermore, demographic characteristics of mothers and children such as sex of the child, place of residence, mother's age at birth, birth order, previous birth interval, and infant's size at birth was found to play an important role in the survival of children less than five years of age in Nigeria(reference).

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Recent data indicated the U5M rate in Nigeria as 114 deaths per 1,000 live births in 2020, as against 210 per 1000 live birth in 1990 (IGME, 2021). Even though there has been a gradual decline in Under-five Mortality in the country, the low rate of decline and the possible effect of COVID-19 on current progress made in improving child survival is a major cause of concern. Hence, the need to improve on the current progress to enhance the achievement of the child survival goals and prevent a possible reversal of progress in child survival via universal access to effective, high-quality, and affordable care and the continued safe provision of life-saving interventions for women, children, and young people will be required.

Even as evidence began to emerge in 2020 showing COVID-19's very modest direct impact on child and young people's mortality, numerous governments, organizations, and scientific institutions is concerned with the possible increase in indirect deaths among children and youth due to disruption of specific interventions and services that have proven to be critical in saving children and women's lives in low- and middle-income countries (IGME, 2021). The early scenario-based modeling warned that increases in wasting coupled with a severe and sustained reduction in the coverage of basic life-saving interventions – antenatal care, childbirth delivery care, postnatal care, vaccinations, and early childhood preventative and curative services – could substantially increase under-five deaths, essentially reversing a decades-long decline in global under-five mortality (Roberton et.al., 2020; IGME, 2021).

Child survival is an essential component of public health concerned with reducing child morbidity and mortality (WHO, 2006). It was developed by WHO, UNICEF, and World Bank in 2006 to address the issue of the high mortality rate of under-five children in the African region (WHO, 2006). Child survival is the concentrated efforts by governments, the United Nations, organizations, and communities to use effective, low-cost solutions to protect children from illness during their first five years of life (UNICEF, 2008; 2012). The steps taken to ensure the survival of under-five children are known as child survival strategies. Child survival strategies (CSS) is defined as steps taken by individuals and communities to reduce the risk, duration, or severity of an adverse health condition that detrimentally affects the survival of infants and children less than five years of age (USAID, 2002). These include breastfeeding, immunization, oral rehydration therapy, zinc supplementation to treat diarrhoea, basic immunizations for common ailments, micronutrient supplementation to

treat malnutrition, growth monitoring, and promotion, female education, family planning, and food fortification (WHO, 2006; Habiman et al., 2010). Many countries are now devoted to child survival interventions as a way of reducing child mortality. Child mortality, also known as under-five mortality or child death, refers to the probability of a child dying between birth and exactly 5 years of age. It is the death of infants and children under the age of five years and a core indicator for child health and well-being (IGME, 2015; 2019; 2020). Infant and under-five mortality is an important indicator of the country's socio-economic development and quality of life (NDHS, 2018)

Since infant mortality is extremely high in some parts of the world, the priority in promoting effective child development is to ensure that children survive the early years when they are most vulnerable to disease and malnutrition. This research work is based on the analytical framework of child survival for developing countries by Mosley and Chen (1984), which incorporate both social and biological variables, in providing the measure of morbidity and mortality in a single variable. The framework is based on the premise that all social and economic determinants of child mortality necessarily operate through a common set of biological mechanisms, or proximate determinants, to exert an impact on mortality, thereby advancing research on social policy and medical interventions to improve child survival (Mosley and Chen 1984).

The death of under-five children is an important indicator that defines the well-being of a population which is usually taken as one of the development indicators of health and socioeconomic status that indicate the quality of life of a given population, as measured by life expectancy. It is very important for evaluation and public health strategy (Desta, 2011). The knowledge of variables that significantly influence child survival in society will provide valuable practical leads for combating the low pace in the reduction of under-five mortality witnessed in the nation and also maximize the use of available lifesaving interventions. It is against this background that this study was conducted to evaluate factors influencing the survival of under-five children in South-west Nigeria

An analysis across 118 low- and middle-income countries (LMICs) showed that severe disruptions to the delivery of basic life-saving interventions along with increases in wasting could result in millions of additional under-five deaths in as little as six months (Roberton et

al., 2020), thus access to life-saving interventions is critical to ensuring steady mortality declines in low- and middle-income countries. Globally, communicable and infectious diseases, including pneumonia, diarrhoea, and malaria, remain a leading cause of under-five deaths, along with preterm birth and intrapartum-related complications. Moreover, malnourished children, particularly those suffering from severe acute malnutrition, are at a higher risk of death from these common childhood illnesses. Access to basic lifesaving interventions such as childbirth delivery care, postnatal care vaccinations, and early childhood preventive and curative services to address these causes is critical (WHO, 2018; Liu et al., 2022)

Furthermore, the United Nations identified the major causes of death among children under the age of five years as preterm birth complications, birth asphyxia/trauma, pneumonia, congenital anomalies, diarrhoea, and malaria, which can be prevented or treated with access to simple, affordable interventions including immunization, adequate nutrition, safe water, and food and quality care by a trained health provider when needed (IGME, 2020). Likewise, an earlier study examined the prevalence, and determinants of under-five mortality in Benue State, Nigeria using a purposive random sampling technique to administer 1,500 questionnaires to women aged 15 to 49 years, who has ever given birth in 30 communities from 10 sampled local government areas in the state and focus group discussions and key informant interviews observed that the pattern of the prevalence of infant and child mortality showed there were three major causes of child mortality: malaria (38.2%), complications at birth (29.5%), and measles (16.9%). The survival probability results revealed that the children born to parents living in an urban area have more chances (72.6%) of survival, as against 71.4% for children born to parents living in a rural area, pregnancies ever had by the mothers have a greater marginal effect on child survival (6.7%) than the current age of mothers at birth (3.7%) and the age of mother at marriage (0.9%) (Abu et al., 2015)

In the same vein, A study by Osika et al., (2021) on Under-5 Mortality and Its Associated Factors in Northern Nigeria: Evidence from 22,455 Singleton Live Births (2013–2018) using an adjusted model revealed that geopolitical zone, poor households, paternal occupation, perceived children's body size at birth, caesarean delivery, and mothers and fathers' education were highly associated with increased odds of U5M. Other significant factors that

influenced U5M included children of fourth or higher birth order with shorter intervals ≤ 2 years (adjusted odds ratio [OR] = 1.68; CI: 1.42–1.90) and mothers who did not use contraceptives (OR = 1.41, CI: 1.13–1.70). Sanni et.al., (2020) established that socio-economic and proximate factors were important determinants of under-five mortality in Benin. The study on the proximate and socio-economic determinants of under-five mortality in Benin revealed that the risk of death was found to be higher in children born in the Plateau region (aOR=3.05; 95% CI: 1.29 to 7.64), in rural areas (aOR=1.45; 95% CI: 1.07 to 1.98) and children with ≥4 birth rank and >2 years of birth interval (aOR=1.52; 95% CI: 1.07 to 2.17) and higher in children whose mothers had no postnatal check-up (PNC) visits after delivery (aOR=1.79; 95% CI: 1.22 to 2.63).

Adeyinka et al., (2021) also identified the social determinants of age-specific childhood (0–59 months) mortalities, which were disaggregated into neonatal mortality (0–27 days), post-neonatal mortality (1–11 months), and child mortality (12–59 months), and estimated the within-and between-community variations of mortality among under-five children in Nigeria, revealed that the determinants of under-five mortality differ across the neonatal, post-neonatal, and toddler/pre-school stages in the nation. Unexpectedly, attendance of skilled health providers during delivery was associated with increased neonatal mortality risk, although its effect disappeared during post-neonatal and toddler/pre-school stages. Also, the study found maternal-level factors such as maternal education, contraceptive use, maternal wealth index, parity, death of previous children, and quality of perinatal care accounted for high variation (39%) in childhood mortalities across the communities.

2. METHODOLOGY

Study areas: The study was conducted in 36 communities comprised of 18 rural and 18 urban communities in South-west Nigeria.

Study design: The study design was a randomized cluster sampling technique

Sampling procedure: it was conducted in a four-stage sampling technique:

A simple random technique was used to select three states from the six states in South-west, Nigeria. The Local Government Areas (LGAs) in each of the selected states were drawn and stratified into urban and rural areas based on World Bank classification, 6 rural and 6 urban communities/areas were selected from each state. A total of 1308 households were

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selected from the 36 sampled communities using a systematic random sampling technique and every eligible respondent (mothers that currently have an under-five child) from the selected households was sampled.

Sampling size determination

The sample size for the study was determined using the Kasiulevicius et al., (2006) method. Using this sample size formula, the sample size was calculated as:

$$N = \frac{(Z\alpha/_2)^2 P(1-P)}{e^2}$$

$Z\alpha/_2$ = standard normal deviation corresponding to 95% confidence interval set at 1.96.

$Z\beta$ = power of the study 80% power

e= level of error tolerance set at 5% (effect 0.05)

P= Assumed proportion taken as 50%

N = Minimum required sample size is therefore calculated as:

$$N = \frac{(1.96)^2 (0.5) (1-0.50)}{0.05^2} = 384.16$$

=384 under-five children.

Adjusting the sample size for 10% non – response (NR)

$$\text{Adjusted sample} = \frac{n}{1-NR} = \frac{384}{1-10\%} = \frac{384}{0.9} = 427$$

The total sample size was calculated as

N = 3 * 427= 1281

A total of 1308 mother-child (under-five children) peer was sampled for the baseline survey.

Data collection procedure: A pre-tested interviewer-administered semi-structured questionnaire adapted from other studies, WHO generic, NDHS 2013, and NDHS 2018 was used to collect information on demographic and socio-economic characteristics, child-related, maternal, paternal, and environmental factors from the respondents.

Data analysis: Data collected was sorted, cleaned, and coded before being computed for analysis. Data were analysed using SPSS version 20, descriptive statistics, and multiple regressions were performed at a 5% level of significance.

Comment [H21]: Why is 50%, because the author put different finding in the introduction part like Nigerian DHS, IGME, 2021

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Comment [H23]: Describe how the sample was selected, how data was collected and how supervision was made.

Comment [H24]: Briefly describe this how variable was selected to enter into multivariable, how confounding factors were controlled and how mode fitness was checked????

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Ethical consideration: Ethical approval was obtained from the University of Ibadan / University College Hospital Institution Ethics Review Board. Permission and consent were also sought from the State Ministry of Health and leaders of the communities involved respectively.

3. RESULTS AND DISCUSSION

The mean age of the respondents was 30.7±6.1years. Most (94.9%) of the respondents in the study were married and the mean age of respondents at first birth and mean number of children (parity) in the study were 24.6±4.29 and 2.4±1.4 respectively. Higher proportions of the respondents were literate and had at least a secondary education (78.0% and 78.4% respectively). The majority (91.4%) of the respondents had at least one form of employment.

Table 1: Demographic characteristics of the children

Character		Residence		
		Urban	**Rural**	Total
Age of respondents (years)	≤19	7 (0.7)	5 (1.6)	12 (0.9)
	20-29	422 (42.2)	160 (52.1)	582 (44.5)
	30-39	475 (47.4)	113 (36.8)	588 (45.0)
	≥ 40	97 (9.7)	29 (9.5)	126 (9.6)
	Mean, Std. Deviation	30.9±5.9	30.2±6.8	30.70±6.14
	P<0.05	0.006		
Marital status	Single	30 (3.0)	18 (5.9)	48 (3.7)
	Married	956 (95.5)	285 (92.8)	1241 (94.9)
	Divorced/ Widowed	15 (1.5)	4 (1.3)	19 (1.4)
	P<0.05	0.064		
Age of respondents at first birth	18 and less	49 (4.9)	27 (8.8)	76 (5.8)
	> 18	952 (95.1)	280 (91.2)	1232 (94.2)
	Mean, Std. Deviation	24.76 ±4.20	23.89±4.51	24.56±4.29
	P<0.05	0.010		
Literacy level	Not literate	197 (19.7)	85 (27.7)	282 (21.6)
	literate	804 (80.3)	222 (72.3)	1026 (78.4)
	P<0.05	0.002		
Educational qualification (respondent)	Not educated	25 (2.5)	21 (6.9)	46 (3.5)
	Primary Edu	174 (17.4)	67 (21.9)	241 (18.5)
	Secondary Edu	801 (80.1)	218 (71.2)	1019 (78.0)
	P<0.05	0.000		
Educational qualification	Not educated	70 (7.0)	42 (13.7)	112 (8.6)
	Primary Edu	218 (21.8)	73 (23.9)	291 (22.3)

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(Spouse)	Secondary Edu	712 (71.2)	191 (62.4)	903 (69.1)
	P<0.05	0.000		
Parity	1-2 children (Ref)	623 (62.2)	183 (59.6)	806 (61.6)
	3-4 children	304 (30.4)	86 (28.0)	390 (29.8)
	>4 children	74 (7.4)	38 (12.4)	112 (8.6)
	Mean, Std Deviation	2.37±1.36	2.47±1.48	2.39±1.39
	P<0.05	0.009		
Any form of employment (respondents)	Unemployed	56(5.6)	57 (18.6)	113 (8.6)
	Employed	945 (94.4)	250 (81.4)	1195 (91.4)
	P<0.05	0.000		
Main material for flooring	Natural floor	61 (6.1)	14 (4.6)	1209 (92.4)
	Finished floor	940 (93.9)	293 (95.4)	99 (7.6)
	P<0.05	0.193		
Total	**Number (total)**	1001 (76.5)	1308(100)	1308 (100)

4.5. Factors influencing the survival of under-five children in the selected LGAs

Logistic regressions were performed to ascertain the factors influencing the survival of under-five children in South-west Nigeria. The factors that were significantly ($p<0.05$) associated with the likelihood of increasing the survival of the under-five children studied were literacy level of the mother, place of residence, low parity, educational qualification of mothers, living in a house with finished floor, and mothers age at first birth.

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The odd of children from literate mothers surviving is 1.85 times higher than children from non-literate mothers given that all other variables in the models are held constant. For the place of residence, the odd of children surviving is 2.24 times higher in urban than the rural residence, given that all other variables in the model remain constant. For parity, it is an inverse relationship indicating that the likelihood of a child surviving is greater among mothers with fewer (low parity) numbers of children. Children of mothers with at least a secondary education are more likely (1.02 times) to survive than children from uneducated mothers. Households with Finished/polished floors are 4.30 times more likely to survive than those from households with natural floors. Mothers' age at first birth is also a significant factor that increases the likelihood of child survival in the study.

Comment [H29]: Add AOR and Confidence interval in bracket

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Table 2: Factors influencing the survival of under-five children in the selected states

Factors	Categories	mortality		Sig.	Odd ratio (Exp. B)	95% C.I.	
		Yes n(%)	no n(%)			Lower	Upper
Literacy level Mothers	Unable to read				1.000		
	Mother's ability to read			.003	1.854	1.240	2.771
Residence	Rural				1.000		
	Urban			.036	2.240	1.053	4.765
Parity	1-2 children (Ref)			.006	1.000		
	3-4 children			.016	.483	.267	.871
	>4 children			.580	.842	.458	1.549
Educational qualification of mother	not educated (Ref)			.005	1.000		
	Primary			.437	1.480	.551	3.978
	At least secondary			.001	2.120	1.342	3.348
Educational qualification of father	not educated (Ref)			971	1.000		
	Primary			.810	1.142	.387	3.374
	At least secondary			.945	1.023	.536	1.952
The main material of the floor)	Natural floors				1.000		
	Finished/polished floors			.000	4.303	2.269	8.159
Mother age at first birth	age at first birth			0.007	1.071	1.019	1.125
Employment status of the mother	Not employed				1.000		
	Employed			.111	1.735	.882	3.412

Note: Ref = reference

The factors influencing the likelihood of survival among under-five children in the study were literacy level of the mother, place of residence, low parity, educational qualification of mothers, living in a house with a finished floor, and mothers' age at first birth. The determinants of CS in this study is similar to the findings of Adeyinka et al., (2021) that maternal-level factors such as maternal education, contraceptive use, maternal wealth index, parity, death of previous children, and quality of perinatal care accounted for high variation (39%) in childhood mortalities across communities. And the report of Osika et al., (2021), that geopolitical zone, poor household, paternal occupation, perceived children's body size at birth, caesarean delivery, and mothers and fathers' education, children of fourth or higher birth order with

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shorter interval ≤ 2 years, and mothers who did not use contraceptives were associated with increased odds of U5M.

NDHS 2018 also reported that demographic characteristics of both mothers and children such as sex of the child (boys are more likely than girls to die), place of residence (U5MR is higher in rural than in urban areas), mother's education, household wealth (mortality decline with increasing mothers' education and household wealth), mother's age at birth, birth order, previous birth interval (under-5 mortality rate is higher among children with birth intervals of less than 2 years and children of mothers who have given birth to seven or more children), and infant's size at birth have been found to play a significant role in the survival of children in Nigeria

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4. CONCLUSION:

The study identified literacy level, place of residence, low parity, educational qualification of mothers, and type of flooring materials as determinants of CS in southwest Nigeria. Therefore, all stakeholders including the Government, Aid Institutions, healthcare providers, and families should develop more effective responses to these determinants of child survival to ensure sustainable and realistic measures within the society to increase the survival of under-five children.

CONSENT

Comment [H35]: Consent for what???

The authors declare that informed consent was obtained from the participants of this study.

Comment [H36]: It shall be written in ethical consideration

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