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Factors associated with child mortality among antenatal care attendees in Ado-Odo/Ota, Ogun State, Nigeria

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Abstract

The study examined the determinants of child mortality among attendees at a government health care facility in Ado-Odo/Ota in Ogun State, Nigeria. The study, based on a descriptive cross-sectional study, used a mixed-methods research approach and utilized an interviewer-administered structured pretested questionnaire. A total of 1350 respondents constituted the sample size. Data analysis consisted of descriptive and regression analysis with STATA Version 12. Furthermore, the study employed focus group discussions to reinforce the quantitative results of the investigation. Results showed the place of delivery (P = 0.000), distance from house to health facility (P = 0.022), immunization status (P = 0.000), duration of breastfeeding (P = 0.000), cost of treatment at the health facility (P = 0.627), household waste disposal practice (P = 0.000), and ever used oral rehydration solution (P = 0.000) as being significantly associated with child mortality. The study created awareness of behavioral practices affecting child mortality and insights on possible interventions for reducing child mortality. We conclude that community-based educational strategies and the improvement of health facilities will reduce child mortality. *(Afr J Reprod Health 2021; 25[5s]: 116-125).*

Keywords: Child mortality, SDG 3, institutional health care, intervention, focus group discussions

Résumé

L'étude a examiné les déterminants de la mortalité infantile chez les participants d'un établissement de santé gouvernemental à Ado-Odo/Ota dans l'État d'Ogun, au Nigéria. L'étude, basée sur une étude transversale descriptive, a utilisé une approche de recherche à méthodes mixtes et a utilisé un questionnaire structuré prétesté administré par un intervieweur. Un total de 1350 répondants constituaient la taille de l'échantillon. L'analyse des données consistait en une analyse descriptive et de régression avec la version 12 de STATA. De plus, l'étude a utilisé des discussions de groupe pour renforcer les résultats quantitatifs de l'enquête. Les résultats ont montré le lieu d'accouchement (P = 0,000), la distance de la maison à l'établissement de santé (P = 0,022), le statut vaccinal (P = 0,000), la durée de l'allaitement (P = 0,000), le coût du traitement à l'établissement de santé (P = 0,627), les pratiques d'élimination des déchets ménagers (P = 0,000) et la solution de réhydratation orale déjà utilisée (P = 0,000) comme étant significativement associés à la mortalité infantile. L'étude a créé une prise de conscience des pratiques comportementales affectant la mortalité infantile et des idées sur les interventions possibles pour réduire la mortalité infantile. Nous concluons que les stratégies éducatives communautaires et l'amélioration des établissements de santé réduiront la mortalité infantile. *(Afr J Reprod Health 2021; 25[5s]: 116-125).*

Mots-clés: Mortalité infantile, ODD 3, soins de santé institutionnels, intervention, discussions de groupe

Introduction

Globally, deaths among children under age five years accounted for 5.3 million in 2018[1]. These deaths reflect limited access to essential health interventions by pregnant women and nursing mothers. Children in developing countries are ten times more likely to die before their fifth birthday than those in developed countries[2]. Children constitute a significant asset to any society, and the mortality of young children under the age of five represents the single most substantial age-specific death. However, notwithstanding the considerable decline in global under-five mortality, the rates

remain high in sub-Saharan Africa (SSA), including Nigeria[3,4]. If the current situation persists, Nigeria may not achieve the Sustainable Development Goal (SDG) -3 to improve health indicators for all by the year 2030. Understanding child mortality determinants is vital towards reducing child mortality and achieving the United Nation's SDG 3. The high risk of fatalities for under-five children in developing countries is linked to inadequate access to and low utilization of health facilities in these countries, as evident by earlier studies[5-8].

Education empowers mothers to learn about the causation, prevention, recognition, and treatment of diseases[9-12]. Knowledge increases the productivity of health inputs through optimal awareness, increase in income, preference for child health care, and limited family size. Empowering women to become self–reliant will have positive effects on children and the entire family. Furthermore, the rising rate of poverty and the non-affordability of various necessities of life compound the situation of under-five health status and mortality rates. Besides, the deplorable level of environmental sanitation worsens the already precarious state of under-five children. The prevalence of unhygienic environmental conditions in low and middle-income countries exacerbates residents' unhealthy conditions and susceptibility to various health problems. It affects the morbidity and mortality level of children in this age bracket. Providing safe drinking water and access to improved sanitation within the household environment can reduce the risk of morbidity and mortality among children underage five[13].

Similarly, good sanitation services were available to only 39 percent of the global population of 7.8 billion people[14]. The proportion of child mortality in Nigeria is currently far from satisfactory, with the country ranking as one of six high-risk six countries for under-five mortality in the world[15]. The 2019 NDHS reported that under-5 mortality rate in Nigeria to be 132 deaths per 1,000 live births. This under-five mortality situation implies that more than 1 in 10 children in Nigeria dies before their 5th birthday[16-18]. The high rate of child mortality is attributable to several factors, including diarrhea, malnutrition, injury, HIV/AIDS, tetanus, and measles.

Gupta et al.[19] found that factors associated with child mortality in Rwanda included multiple gestations, lack of adequate vaccinations, household size, maternal education levels, mother's non-use of family planning, and lack of household electricity. Rufus et al.[20] found an expanded program on immunization in Nigeria significantly reduced the under-five mortality rate. According to Sanne et al.[21], children vaccinated out-of-sequence had higher mortality compared with children treated in-sequence. Berhanu[22] found that maternal educational attainment, women's age at first birth, women's current age, childbirth order, preceding birth interval, birth type, and occupation of the mother were significant predictors of under-five mortalities. A recent NDHS study in 2018 reported that interventions such as immunization, early treatment of common childhood illnesses were some of the most cost-effective ways of preventing many under-five deaths. However, only 31 percent of children aged 12 to 23 months completed a full course of prescribed routine immunization in Nigeria[16]. Environmental health risks are sources of ill health to under-five children and a severe threat to their survival chances. At the same time, Edward Bbaale[23] found that breastfeeding and health knowledge reduce child mortality. Some studies have found maternal age and education strongly correlated with child morality[24,25].

Though some of the earlier studies were urban and secondary based, these studies' empirical findings cannot provide a basis for critical sectoral policy decisions and interventions in rural settings where the bulk of the population resides. Therefore, this article presents the results of a study that explored the determinants of persistently high under-5 mortality in a rural part of Ogun State, Southwest Nigeria. The study's specific objective was to examine the determinants of under-five mortality in a public health facility in Ado-Odo/Ota in Ogun State, Nigeria. We believe that the results will enable the formulation of intervention measures to reduce child mortality and achieve Sustainable Development Goal 3 in the State.

Methods

The study was a cross-sectional survey and used a multi-stage sampling design to select respondents

from the study area. The survey was conducted in Ado-Odo/Ota Local Government Area (LGA) in Ogun State, Southwest Nigeria. In the first sampling stage, Ado-Odo/Ota Local Government Area was chosen purposively out of the 20 LGAs. In the second stage, all the political wards were listed, and 75% of political wards were selected at random from 16 political communities in the LGA. Furthermore, all 16 Primary Health Centres (PHCs) were listed from the selected political communities, and 12 health facilities were randomly chosen. The only State secondary referral hospital in the LGA was included as a higher-level institution for reference. Pregnant women who attended antenatal care and had given birth to at least one child in the last three years preceding the survey were included in the study. The patients' list formed the sampling frame; pregnant women were grouped according to their clinic days, and all present during the clinic days that fell within the period of the study were interviewed and included in the sample. Proportionate sampling was used to select 1350 respondents across the selected 12 health facilities, which constituted the sample size. Two experts, a demographer, and health care personnel validated the research instrument. The Cronbach Alpha index, which yielded 0.75, confirmed the reliability of the instrument.

The data collection instrument was pretested, and questions were modified to perfect its reliability. The authors adopted a few aspects of the 2013 Nigeria Demographic and Health Survey (NDHS) questionnaire to suit local circumstances[26]. The structured questionnaire administered obtained responses from pregnant women on demographic characteristics, child mortality, and survival characteristics. Skilled and trained health personnel carried out the survey. The questionnaire administrators were fluent in English and Yoruba, the local dialect of the community members.

For data analysis, we employed univariate and bivariate analyses using STATA Version 12. The focus group discussion (FGD) were carried out to buttress quantitative results and perhaps aid in designing interventions to reduce mortality among under-five children.

Qualitative method

In addition to the quantitative method applied in the present study, qualitative data were generated through focus group discussion (FGD) technique. The use of qualitative approaches in explaining social and demographic phenomena has increased among researchers in recent times[27-30]. Purposive sampling technique was employed to select FGD participants drawing from diverse background of stakeholders who are knowledgeable about maternal and child health, reproductive health, and child bearing. In order to attain theoretical representation on the issues discussed, break characteristics techniques was used to identify sub-groups from which participants were selected. The criteria used to identify sub-groups are (1) women who are knowledgeable about childbearing, (2) health professionals, and (3) decision makers at community level. A FGD of 12 participants was conducted composing of two representatives each from health personnel (matrons, nurses), mothers, and women attending antenatal clinic at the time of study, trained traditional birth attendants, mother-in-laws, and community leaders. The FGD instrument employed had open ended and probe questions on maternal and child health care practices, and problems; awareness of causes of under-five deaths; decision maker on choice of the place of delivery, immunization, and duration of children breastfeeding; and perceptions about cost of treatment, household waste disposal, and use of oral rehydration salt. The demographer and health personnel who participated in the quantitative survey, led the qualitative data collection and analysis effort. The qualitative data collected was transcribed and analyzed using thematic content analysis techniques.

Results

Table 1 presents the socio-demographic characteristics of the respondents. About 39.7 percent and 35.3 percent of the women interviewed for this study were between ages 25-30 years and 31-40 years, respectively. However, well above half of the women (61.33%) interviewed were within 30

Table 1: The socio-demographic characteristics of respondents

Variables	n= 1,350	%	Variables	n= 1,350	%
Dependent Variable			**Respondent Occupation**		
Child Mortality			Not working	152	11.26
No	1, 085	80.37	Self-employed	626	46.37
Yes	265	19.63	Civil/Public Servant	183	13.56
Age			Private Sector Employee	177	13.11
20 -24	292	21.63	Farming	18	1.33
25 -30	536	39.70	Trading	165	12.22
31 – 40	477	35.33	Artisan	29	2.15
40 – 44	34	2.52	**Spouse Occupation**		
45 years and above	11	0.81	Not working	76	5.63
Religion			Self-employed	518	38.37
Christianity	946	70.07	Civil/Public Servant	234	17.33
Islam	373	27.63	Private Sector Employee	251	18.59
Traditional	28	2.07	Farming	27	2.00
Other	3	0.22	Trading	209	15.48
Marital Status			Artisan	35	2.59
Single	53	3.93	**Type of Dwelling**		
Married	1,256	93.04	Mud/Grass/Hut	42	3.11
Divorce/Separated	24	1.78	One room	298	22.07
Widow	17	1.26	Room and Parlour	406	30.07
Husband had another wife			2/3 Bedroom	559	41.41
Yes	157	11.63	Detached House/Mansion	45	3.33
No	1, 193	88.37	**Spouse Education**		
Respondent Education			None	86	6.37
None	13	0.96	Primary	126	9.33
Primary	361	26.74	Secondary	459	34.00
Secondary	534	39.56	Post-secondary	337	24.96
Post-secondary	335	24.81	Professional	342	25.33
Professional	107	7.93			

years. On consideration of religion, a very high proportion (70.1 percent) of the respondents reported that they were Christians at the study time. In comparison, only 27.63 percent mentioned that they practice Islam. Similarly, marital status showed that 93.0 percent of the women were married, and 88.37 percent conveyed that their husbands did not have another wife. The study area showed a high level of child mortality, just like the country as a whole. While child survival was also increased at the time of the survey (80.37%), deaths among under-five children were unacceptable (19.63%). Furthermore, the respondents' education showed that 1 percent, 26.7 percent, and 39.6 percent had no education, primary and secondary education levels, respectively. Up to 66.4 percent of the women had no education beyond the secondary level. Nevertheless, slightly less than one-fourth (24.8%) had post secondary education. However, one-fourth (25%) of the respondents had education beyond the secondary level and 7. 9% had additional peofessional qualification.

Further, 46.4 percent of the women were self-employed at the survey time, while 13.6 percent, 13.1 percent, and 12.2 percent were civil servants, in the private sector and traders. Only 11.3 percent reported that they were unemployed. On the other hand, only 5.6 percent of their spouses were not working. In comparison, 38.8 percent, 18.6 percent, 17.3 percent, and 15.5 percent of their spouses were self-employed, private sector employees, civil servants, and trades. More than 30 percent of these women's husbands had secondary education, while 25.0 percent reported post-secondary education. Besides, respondents' spouses were more professionals (25.3%) than the respondents (7.9%). Respondents lived more in a two-bedroom dwelling (41.4%), followed by those in room and parlor (30.1%) and one-bedroom (22.1%), respectively.

Table 2 shows the bivariate association between the mothers' health factors and their experience of child mortality. The results showed that the proportion of deaths was higher among

children delivered by traditional birth attendants and home delivery than those delivered by government and private health institutions. Hence, there is a significant relationship between the place of delivery and experience of child mortality (Chi-square value = 35.37; P = 0.000). The researchers found that not far/trekkable account for higher child's death than far but trekkable. Nevertheless, the relationship between the distances from the house to the health facility and child mortality showed a reduced significance (Chi-square value = 9.61; P = 0.022). We also observed significant relationship between immunization and child mortality (Chi-square value = 86.15; P = 0.000). Breastfeeding showed a substantial correlation between breastfeeding duration and child mortality (Chi-square value = 77.52; P = 0.000). The household waste disposal practice also had a significant relationship with child mortality in the study area (Chi-square = 47.4; P = 0.000). Children living in homes where waste is disposed of on unauthorized dumpsites died more than those living in households where private agencies collected wastes. Use oral rehydration salt is used against children who are suffering from diarrhea. It showed a significant relationship with child mortality (Chi-square value = 24.53; P = 0.000).

The qualitative angle, thematic content analysis evolved, and the authors recognized four central themes after reading and re-reading the information that affects child mortality. Focus Group Discussion (FGD) revealed the mind-set of participants concerning under-five mortality.

i. Knowledge of causes of under-five deaths

Awareness of causes of deaths among under five years of age was high in the study area though this has not translated into low child mortality due to several other factors. The theme, awareness of causes of sicknesses suffered most among children engenders high preventive measures against child mortality.

One of the participants mentioned during the FGD: "Children die because of poor food, malaria, diarrhea, cold, fever, and convulsion, no money to give them immunization or pay clinic cost" [Participant, 40 years].

Even though there is good knowledge of sicknesses, under-five children suffer most in the study community. Many participants concurred to the above causes; nevertheless, few ascribed deaths of under-five children as fate or bad luck.

Another participant who lost her child after three years said during FGD:

"As far as I know, my child has not come to stay. We will get the children that want to be with us, and they will stay" [participant, 39 years] and me.

ii. Challenges to care-seeking and traditional practices of women that accelerate child mortality

Inadequate healthcare information, poverty, lack of access to transport to a health care facility, the need to obtain permission from our husband before taking the child to the health facility, and confidence in traditional birth attendants were some of the challenges leading to the mortality of under-five children. Most participants undermine the confidence in new health personnel and discourage mothers from patronizing health care facilities. With the above factors in mind, related questions asked include barriers hindering better treatment for sick children. Do you receive proper care whenever you visit a health facility?

One of the participants mentioned in the FGD:

"Health cost is high, and no money for Keke (Tricycle) to the health facility, and the cost of treatment is very high. I was born my three children in Baba doctor's place (traditional doctor's home) and one at home. And all my children took 'agbo' (concoction from local herbs) when they were sick"[participant, 45 years].

Another participant mentioned in the FGD:

"Our 'agbo' is excellent and cheap. Our Baba doctor (traditional doctor) always does us well, and we pay small by small and no shout and but for health facility, they treat us poorly and talk in a wrong way, so they no treat us well" [participant, 38 years].

Another participant mentioned in the FGD:

"Most time they say no medicine for the health center and the people there (health facility personnel)) do treat us with high temper and no mind that we came with pikin (Child) that is sick" [participant, 33 years].

Table 2: Bivariate association between health factors and child mortality

Variables	Child Mortality No	Yes	Chi-square/P-value
Place of Delivery of the last child			
PHC/Hospital	461 (84.59%)	84 (15.41%)	35.37
Home	70 (77.78%)	20 (22.22%)	P = 0.000
Private Clinic	411 (82.20%)	89 (17.80%)	
Traditional Birth Attendant	108 (64.67%)	59 (35.33%)	
Other	35 (72.92%)	13 (27.08%)	
The distance from House to Health Facility			
Not far/trekkable	307 (75.99%)	97 (24.01%)	9.61
Far but treatable	282 (83.43%)	56 (16.57%)	P = 0.022
Very far	470 (82.17%)	102 (17.83%)	
I don't know	26 (72.22%)	10 (27.78%)	
Immunization status of the last child			
Complete	663 (84.46%)	122 (15.54%)	86.15
Not complete	315 (84.45%)	58 (15.55%)	P = 0.000
No immunization	107 (55.73%)	85 (44.27%)	
Duration of breastfeeding the last child			
Below 6 months	270 (80.8%)	64 (19.2%)	77.52
6 -9 months	495 (85.3%)	85 (14.7%)	P = 0.000
10 -12 months	130 (59.4%)	89 (40.6%)	
Above 12 months	190 (87.6%)	27 (12.4%)	
Cost of treatment at the health facility			
Very expensive	147 (80.77%)	35 (19.23%)	2.60
Expensive	345 (79.49%)	89 (20.51%)	P = 0.627
Moderate	418 (81.80%)	93 (18.20%)	
Cheap	106 (80.92%)	25 (19.08%)	
Very cheap	69 (75.00%)	23 (25.00%)	
Household waste disposal practice			
Government collection	397 (82.37%)	85 (17.63%)	47.42
Private agency collection	246 (85.12%)	43 (14.88%)	P = 0.000
Disposal within the compound	329 (83.08%)	67 (16.92%)	
Use unauthorized dump	113 (61.75%)	70 (38.25%)	
Ever used ORS			
Yes	592 (75.80%)	189 (24.20%)	24.53
No	493 (86.64%)	76 (13.36%)	P = 0.000

iii. Wastes disposal and sanitation practice and consequence of poor disposal practice

When asked questions on sanitation, waste disposal around the house or on the road, and whether they know that such exercise can cause diseases among children.

Another participant mentioned in the FGD:
"We have no money to pay push-push people (private refuse collectors who charge money per weight of the refuse). Hence, we put wastes beside our homes and wait for government people (public waste collectors). I no know if the wastes that I keep for the house can cause disease for my children" [participant, 43 years].

iv. The essence of immunization and the benefits of breastfeeding

When asked questions on the importance of vaccination and children's protection from diseases and the benefits of breastfeeding in children's healthy lives, it is revealed.
All the FGD participants chorus the awareness and importance of vaccination even though not all immunized their children.
"I go there and give my child once only because the health center is far and no money for transport and the nurse the give us too much 'wahala'(trouble)" [Participant, 33 years].
On breastfeeding, another participant mentioned in the FGD:

"I know giving breast (breast milk) to children is good and will give my child good health. I give breast to all my children, and if the breast is not coming after birth, Baba doctor (traditional doctor) will give medicine and breast milk will come plenty" [Participant, 45 years].

Discussion

The results of this study indicate that behavioral practices of the mother, which are most often governed by the disposition of the husband as head of the family, affect the risk of mortality of children under the age of five. The observations are critical in a middle-income and developing country like Nigeria, where the husband's hegemony is prevalent and patriarchal tendencies are the guiding norms among communities. The health and behavioral factors noticed include the delivery of the last child, distance from house to health facility, and the previous child's immunization status. Others were breastfeeding duration, cost of treatment at the health facility, household waste disposal practice, and ever-used oral rehydration salts (see Table 2). This study established that children who had institutional delivery in either government or private clinics had higher chances of living to their fifth birthdays than their counterparts born at non-institutional health facilities. Institutional delivery affords trained and competent health personnel to handle childbirth complications and hygienic environment, and typical infection tolerance. The findings are in line with earlier studies[31-34].

However, from the FGD, some participants still patronize home delivery, and the factors mentioned include low cost, proximity, better care, and treatment. For distance from house to health facility, the study revealed that not far/trekkable accounts for higher child's deaths than far but trekkable. This only abnormal finding might be because people living close to health facilities procrastinate in their actions towards a situation, resulting in a fatality. The study noted that children who received full immunization had a reduced incidence of death. Whereas this significant relationship reduced among children who received partial immunization, those without immunization registered astronomically high mortality (44.27%) among the under-five children. Thus, immunization status relates to under five children's survival chances with a significantly high level, as bivariate analysis showed. This finding agrees with the earlier findings[21,35,36,20] that there is a tremendous significant relationship between the child's immunization status and their chance of living up to age five years. Again, though immunization is crucial to child survival, most FGD participants ascribed child death to fate. Others mentioned the behavior of health personnel and long distances as retarding factors. Also, a notable observation was found in the duration of breastfeeding in the study area. Although breastfeeding duration had a substantial significant relationship with child mortality, the study showed that the optimal breastfeeding period for reduced child mortality (14.7%) is between 6-9 months in the study area.

Another behavioral factor that influenced significantly under-five mortality was the method of waste disposal in the household. The study equally revealed that household waste disposal practices had a significant relationship with child mortality. The use of unauthorized dumpsite had the highest child mortality level (38.25%), thus aligning with an earlier study[37]. Nevertheless, participants showed ignorance of the essence of better waste disposal and lack of money to store wastes in their compounds. Another important finding of this study is Oral Rehydration Salt (ORS), a simple therapy that saves children's lives from acute diarrhea infection and prevents water loss among under-five children. Oral rehydration salts (ORS) showed a significant relationship with child mortality, which aligns with earlier findings[38,39]. As the study revealed, children who used ORS had high child mortality than those who did not use it. This high mortality prevalent among children who used the ORS might be due to poor management or the salt solution's late administration.

Ethical considerations

The study was survey-based carried out in Ado-Odo/Ota Local Government Area, Ogun State Nigeria, through the administration of questionnaires. The study involved no human tissues or animals. However, verbal consent was

obtained from the respondents before they were interviewed or participated in the FGD exercise. Permission to use an audio recording device was sought and brought before the FGD meeting. Apart from informed consent, respondents were told everything about the study, participants' confidentiality was thoroughly assured, maintained, and no personal identification codes were deployed. Also, no respondent was coarse to take part in the exercise. Instead, respondents were informed that they could decide to withdraw from the study once they no longer wish to continue without penalty. The study also got approval from Ado-Odo/Ota Local Government (No. AOLG. 49T/155) and Covenant University Ota (CUCRID RG 029. 03.15/FS) respectively.

Conclusion

The study examined the determinants of child mortality among rural and semi-rural women who attended government institutional health care facilities in Ado Odo/Ota LGA in Nigeria. The study was based on cross-sectional survey data using a mixed-methods research approach. Empirical findings confirmed that the mother's or women's behavioral health practices attending institutional health care facilities were essential predictors of under-five mortality in the study area. The results showed the place of delivery (P = 0.000), distance from house to health facility (P = 0.022), immunization status (P = 0.000), duration of breastfeeding (P = 0.000), household waste disposal practice (P = 0.000), and ever used oral rehydration solution (P = 0.000) have a significant influence on child mortality. The study findings have created awareness of behavioral practices affecting child mortality and insight into manipulating intervention factors to reduce child mortality. Therefore, the study advocates both spouses' health education and community-based health education strategies to accommodate the public. Besides providing more health facilities to reduce child mortality in the study area and entire Nigeria in order to achieve SDG-3, there is a need to straighten other related SDGs for effective reduction in under-five mortality.

Conflict of interest

There is no competing interest among the authors.

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Contributions of authors

DEA- conception, design, collection of data and manuscript preparation,
AEA- Processing of data, review of literature and manuscript preparation,
MO - Review of literature, manuscript preparation,
OOE-data analysis review and preparation of manuscript,
EIB- review of literature and preparation of manuscript,
GWS-data analysis and manuscript preparation,
OPO-data analysis review and preparation of manuscript, and all authors read and approved the manuscript.

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