

Determinants of Maternal and Child Death in Nigeria

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Abstract

Using the Demographic and Health Survey (NDHS) data, the study explores the factors influencing maternal and child mortality rates in Nigeria. This is despite numerous health interventions, suggesting underpinning structural and behavioural issues. We used a cross-sectional analysis, using bivariate and multivariable logistic regressions to identify the key factors. The data reveal socioeconomic status (especially family and community wealth) as a major factor in reducing maternal and child mortality. Improved education, empowerment of women and awareness of health issues also reduced the mortality risks. However, lack of access to medical facilities, living in rural areas and tolerance of domestic violence increased the risk of death. Health care access and behaviour seemed to have a greater effect on child mortality while socioeconomic inequality was more strongly associated with maternal mortality. The authors conclude that multi-faceted approaches that include poverty alleviation, education, gender equality and access to health services are needed to reduce maternal and child mortality in Nigeria.

Keywords: Maternal mortality; Child mortality; Women; Socioeconomic factors; Healthcare

JEL Classification: I15, I12, J13

1. Introduction

Maternal and child mortality continue to be critical public health issues, affecting mostly low- and middle-income countries - especially in sub-Saharan Africa (Oloruntosin *et al.*, 2024). As Africa's most populous nation, Nigeria is a key contributor to global maternal and under-five deaths, which are driven by deficiencies in health care, socioeconomic disparities and inefficiencies. Recent studies provide empirical evidence that Nigeria contributes significantly to global maternal mortality and continues to have one of the highest maternal mortality ratios globally, despite policy initiatives (Ezeh *et al.*, 2024; Olayanju *et al.*, 2024). Likewise, under-five mortality remains a serious health challenge, and studies indicate preventable causes such as infections, malnutrition, and poor quality neonatal care continue to be the main cause of child deaths (Oweibia *et al.*, 2025; Gebremeskel *et al.*, 2022; Orjingene *et al.*, 2022).

The high rates of maternal mortality in Nigeria are due to a mix of direct obstetric and indirect factors. While clinical causes such as haemorrhage, hypertension and infections (sepsis) are major contributors to maternal deaths, they are largely preventable through timely and appropriate medical care (Gebremeskel *et al.*, 2022; Anumudu *et al.*, 2025). This high burden emphasises the lack of quality skilled birth attendant care, ready access to emergency obstetric care and referral services. In addition to these proximate causes, the socioeconomic factors of poverty, low rate of female education and gender inequality also limit women's access to critical maternal health services. Okoli *et al.* (2020) and Oladosun *et al.* (2021) highlight the need to recognise that women

of low socioeconomic status are less likely to access antenatal care and skilled birth attendants and are therefore at higher risk of poor health outcomes.

Nigeria's child mortality is also influenced by a myriad of socioeconomic, environmental and health care factors. Poverty, food insecurity, and lack of access to clean water (Azuh, 2021; Tesfa *et al.*, 2021) have also been shown to significantly contribute to under-five mortality. Furthermore, low vaccine uptake, maternal ill health and lack of access to good quality health care for children also affect child survival (Orjine *et al.*, 2022; Adedokun and Yaya, 2020). Additionally, research shows that maternal health is also strongly associated with child survival, with poor maternal health (nutrition, antenatal care and pregnancy complications) being associated with the risk of newborn and infant deaths (Gebremeskel *et al.*, 2022; Uka, 2020). This points to the need for an integrated approach to addressing maternal and child health.

Despite a range of national and global efforts, including policies geared towards the Sustainable Development Goals (SDGs), there has been varying success in reducing maternal and child mortality in Nigeria. Urban-rural inequalities persist, with rural areas having far more deaths than urban areas because of a weak health infrastructure, lack of health workers and lack of transportation to access health services (Addie *et al.*, 2024; Adeyinka and Muhajarine, 2024). Additionally, health system issues such as underfunding, poor governance and inefficiencies in service delivery hamper the implementation of current strategies (Mao *et al.*, 2023; Adedini *et al.*, 2024). These issues suggest that the current approaches may not effectively tackle key determinants of mortality. In this context, a key problem arises: while maternal and child mortality rates in Nigeria are persistently high despite multiple interventions over the years, suggesting that key determinants may not be properly addressed or understood in current policy settings. While earlier studies have focused on the determinants of either maternal or child mortality, there remains a relative dearth of research which examines both simultaneously and their effects in the Nigerian context (Olayanju *et al.*, 2024; Azuh *et al.*, 2021). Furthermore, little research has been published about the multifaceted effects of these mortality trends on socioeconomic and developmental outcomes, including household well-being, human capital formation and future productivity.

To address this, this study aims to offer a holistic analysis of the factors driving and the consequences of maternal and child mortality in Nigeria. Particularly, the study will explore the socioeconomic, demographic and health system factors that affect maternal and child mortality, along with the effects of maternal and child deaths on household well-being and national development. Through its integrated analytical framework, the research aims to provide knowledge that will enhance policy-making for context-specific interventions and help to address Nigeria's mortality rates. In the end, tackling these issues is crucial for both health outcomes and sustainable development, as well as for enhancing the overall resilience of Nigeria's health system.

2. Methodology

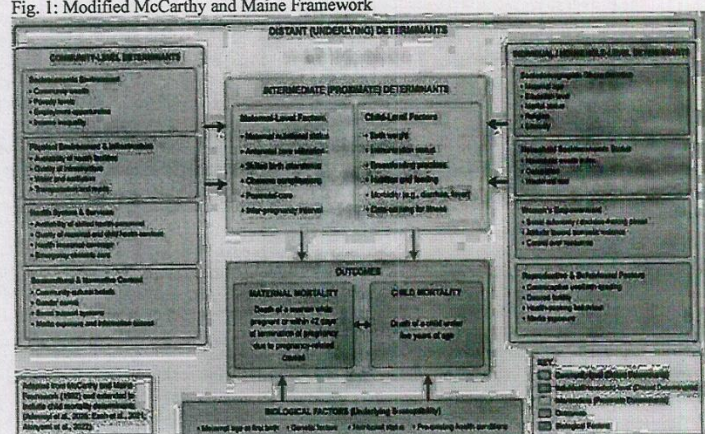
Framework

This study uses an adapted conceptual framework based on one developed by McCarthy and Maine, which is one of the most commonly used frameworks for analysing the determinants of maternal mortality. The current study adopts the framework to include child mortality since there is a significant association between maternal and child health outcomes. This allows for a holistic understanding of mortality in Nigeria by incorporating both dimensions of health.

This modified framework envisages maternal and child mortality as the result of a web of socioeconomic, cultural, environmental, behavioural and biological determinants. It categorises the determinants as intermediate (proximate) and distant (underlying) determinants based on their

relative proximity to the mortality outcomes. Intermediate determinants have a direct influence on maternal and child survival outcomes, and include maternal age, health care services, birth spacing and access to health care. On the other hand, long-term determinants - including education, household wealth, place of residency, and sociocultural values and beliefs - impact survival indirectly, through health-related behaviours and access to health care (Gebremeskel *et al.*, 2022; Orjigene *et al.*, 2022).

Fig. 1: Modified McCarthy and Maine Framework



Source: Authors Developed

Further, the framework recognises individual and community determinants. Individual-level determinants are individual- and household-level determinants, while community-level determinants are contextual determinants such as socioeconomic environment and health systems. This approach is important for a country like Nigeria, where inequality in infrastructure, health services and socioeconomic development has profound impacts on health (Adeyinka and Muhajarine, 2024; Dauda *et al.*, 2024). In conclusion, the framework offers a strong theoretical foundation to understand the causes and consequences of maternal and child mortality in Nigeria.

Data Source

This study uses data from the Nigeria Demographic and Health Survey (NDHS) carried out by the National Population Commission and ICF International. The NDHS is a household survey that gathers information on population, health and nutrition indicators, and is implemented every five years or so. The current study intends to use data from the 2013 and 2018 NDHS, which are the most recent and most comprehensive data on maternal and child health indicators in Nigeria. The pooling of the datasets is based on the need to increase the sample size, thereby enhancing statistical power, to allow for the analysis of relatively rare events, such as maternal death. The NDHS uses a two-stage cluster sampling technique, with strata defined by all states and geopolitical zones in Nigeria.

The survey provides comprehensive data on fertility, maternal and child health, mortality and socioeconomic information of women aged 15-49 years. It also has a sibling history module, which allows for the indirect estimation of maternal mortality. The NDHS dataset is rich and representative of the country and is appropriate for a study examining the determinants of maternal and child mortality in Nigeria (Umesi, 2023).

Study Design

The current study uses a cross-sectional analysis design using secondary data from the NDHS. The cross-sectional design enables us to analyse the association between explanatory variables and deaths for a given period. The direct sisterhood method is used to estimate maternal mortality, a common method in Demographic and Health Surveys that relies on information on sisters to assess pregnancy-related deaths. A woman is defined as a maternal death if she died during pregnancy, at childbirth or within two months of giving birth. This approach is well-suited for areas with poor or limited vital registration (Ogundele *et al.*, 2020)

The study uses data on the birth history of women, which includes information on all live births and whether they survived and the age at which they died. The study examines under-five mortality, an important indicator of health status and population health. The study's approach to include maternal and child mortality in a single framework also allows a more unified analysis of health. The study covers women of reproductive age (15-49 years old), including the surveyed women (living) and their deceased sisters. Women without a birth history are excluded from the child mortality analyses, if needed. This approach is similar to what has been adopted in other empirical studies of maternal and child health in Nigeria (Adedokun and Yaya, 2020; Gebremeskel *et al.*, 2022).

Study Population

Our population of interest is women of reproductive age (15-49 years) in the NDHS. This includes living women and reported deceased siblings and their children. The selections of living women include parous women (women who have had at least one live birth), as they provide information on maternal and child health. Dead women are identified in the sibling history module and are defined as maternal mortality if they died during pregnancy, delivery or within 2 months after delivery. Further, children under five years of age are included in the child mortality analysis, using respondents' reports of their children. There is limited data on deceased siblings, so respondent characteristics are used as a proxy for their deceased siblings. This method is justified in the literature, which assumes that brothers and sisters share the same socioeconomic and environmental factors, and so can be used as a proxy to get a good estimate when no data is available (Meh *et al.*, 2019; Imo *et al.*, 2022).

Variables

Dependent Variables - Two main outcomes are considered in this study: maternal mortality and child mortality. Maternal mortality is modelled as a binary variable in which one represents a maternal death (i.e., a dead sibling who died either during pregnancy, childbirth or within two months of giving birth), and zero represents a live respondent. Child mortality is also a binary variable, with a value of one representing a deceased child (i.e., a deceased child who died before the age of five), and zero representing a living respondent.

Independent Variables - The predictor variables are divided into intermediate (proximate) and distant (underlying) determinants, as per the conceptual approach adopted. Intermediate determinants are factors that have a key impact on mortality, such as maternal age, access to health services, antenatal care (ANC) visits, skilled birth attendance during delivery, contraceptive methods, child spacing, and exposure to media. These variables represent behaviour- and health-

related factors that impact the chances of survival of mothers and children (Gebremeskel *et al.*, 2022; Oladosun *et al.*, 2021). The distant determinants include demographic and socioeconomic factors such as educational background, wealth status of the household, religion, ethnicity, area of residence, access to improved water and sanitation, mother's autonomy and beliefs about domestic violence. These are indirectly related to mortality, as they affect access to resources, health-seeking behaviour and living conditions (Okoli *et al.*, 2020; Azuh *et al.*, 2021). The study also includes community-level factors to control for community-level determinants of maternal and child mortality, in addition to individual variables. These variables are measures of community socioeconomic status (welfare) and other measures of community-scale development (such as urbanisation and health infrastructure). Community-level features are important in accounting for differences in health outcomes that result from environmental and service-related factors and the socioeconomic status of communities. Studies have shown such factors are important in influencing maternal and child health in Nigeria (Adeyinka and Muhajarine, 2024; Madichie *et al.*, 2026).

Analytical Approach

The study begins with descriptive statistics to describe the characteristics of the population and variables. Then, a bivariate analysis to assess the relationship between each independent variable and the dependent variable. Multivariate logistic regression will be used to determine the factors associated with maternal and child mortality. These models analyse the probability of mortality outcomes while adjusting for confounding factors. To account for the nested nature of the data, we could also use multilevel modelling approaches to allow for clustering at the community level and better capture the effects of the community environment. The analyses perform appropriate statistical tests using statistical software and report the odds ratios and 95% confidence intervals. Appropriate levels of statistical significance are used to ensure the validity and reliability of the results (Bixby *et al.*, 2022).

3. Result

Descriptive Analysis of Socioeconomic and Demographic Characteristics

The descriptive statistics in Table 1 provide a comprehensive picture of the socio-economic, demographic, behavioural and community factors of women of childbearing age and under-five children in Nigeria using the NDHS data. These findings provide valuable information on the population characteristics and provide critical context for possible factors that may impact maternal and child mortality outcomes.

The proportion of women who were alive at the time of the survey is overwhelmingly high (97.2%), with 2.8% of the sample being composed of maternal deaths. While this may seem a low percentage, this still equates to a significant number of women in a country with a massive population and a high burden of maternal mortality. By comparison, child mortality is significantly lower, with 8.5% of children under the age of five reported dead. This finding implies that child survival continues to be more prevalent than maternal death, underscoring the vulnerabilities in neonatal and early childhood survival, immunisation, nutrition and timely access to health care. This is consistent with other studies that consistently show higher prevalence and variation in child mortality than maternal mortality in sub-Saharan Africa (Orjinegene *et al.*, 2022; Mohammed *et al.*, 2020).

Table 1: Socioeconomic and Demographic Characteristics of Women and Children in Nigeria (Pooled NDHS 2013 & 2018 – Analytical Reconstruction)

Variable	Category / Measure	n (%) / Mean (SD)
Maternal survival status	Alive	47,931 (97.2)
	Maternal death	1,421 (2.8)
Child survival status	Alive (under-5)	8,964 (91.5)
	Child death (under-5)	833 (8.5)
Community level	Community wealth index (0–1)	0.41 (0.22)
<i>Individual-level variables</i>		
Maternal age (years)	Continuous	31.9 (8.6)
Social autonomy (0–4 scale)	Decision-making index	1.76 (1.54)
Domestic violence attitude (0–4 scale)	Acceptance index	1.12 (1.43)
Distance to health facility	Small problem	31,845 (64.3)
	Big problem	17,507 (35.7)
Media exposure	No exposure	12,486 (25.2)
	Low exposure	19,730 (39.8)
	Medium exposure	12,204 (24.6)
	High exposure	4,932 (10.4)
Contraceptive use	No method	38,901 (78.5)
	Traditional	3,412 (6.9)
	Modern	6,839 (14.6)
Maternal education	No education	16,842 (34.0)
	Primary	15,103 (30.5)
	Secondary/higher	17,207 (34.7)
Religion	Christianity	28,741 (58.0)
	Islam	19,206 (38.8)
	Traditional/Other	1,205 (3.2)
Place of residence	Urban	20,418 (41.2)
	Rural	29,234 (58.8)
Wealth status	Poor	21,995 (44.4)
	Middle	13,842 (27.9)
	Rich	13,815 (27.7)

Source: NDHS Data

At the community level, the average community wealth index was 0.41 (SD 0.22), which suggests average but varying levels of economic prosperity across communities in Nigeria. This indicates a high degree of socioeconomic inequality, with some communities enjoying a relatively higher standard of living and other communities experiencing extreme poverty. The community wealth index is a key contextual factor as it captures access to infrastructure, health services, transport and other resources that impact maternal and child health outcomes. Previous research documents that women living in relatively rich communities are more likely to have access to skilled health professionals for childbirth and child health care, thus reducing death risks (Adeyinka and Muhajarine, 2024). The social autonomy score (ranging from 0 to 4) had a relatively low mean (1.76), suggesting low involvement of women in decision-making for health care and households. This is consistent with gender inequality in Nigerian homes, in which women lack autonomy in health-care decision-making, control over income and spending and are less able to go out and seek

care. Low level of autonomy has consistently been linked to healthcare utilisation, antenatal care visits and skilled delivery, which reduces the risks of maternal and childhood mortality (Okoli *et al.*, 2020).

The mean score for attitudes toward domestic violence, which is also on a 0-4 scale, was 1.12, indicating that although low, there is still some level of tolerance of domestic violence in some parts of the population. This is a crucial observation as the acceptance of domestic violence has been associated with lower empowerment and lower likelihood of women accessing timely maternal health services. For example, women's and children's health and well-being are adversely impacted by gender-based violence and acceptance of domestic violence (Oladusun *et al.*, 2021). Health care access is also problematic, with 35.7% of the respondents saying the distance to health care facilities is a "big problem." This suggests serious geographical and infrastructural challenges in accessing healthcare. In Nigeria, distance from health facilities, lack of good roads and limited transportation networks result in delays in accessing emergency obstetric and child health care. This is a risk factor for preventable maternal and child mortality, especially in rural and marginalised populations (Gebremeskel *et al.*, 2022). Patterns of media exposure also indicate limited access to health information. Many women had no exposure (25.2%) or low exposure (39.8%) to media (radio, television, and/or newspaper). This suggests that many women may not have access to health education and promotion messages on maternal health, family planning, vaccination and nutrition. Low media exposure is associated with low knowledge and utilisation of maternal and child health care in developing countries.

The patterns of contraceptive use show that most women (78.5%) did not use any contraception, with 14.6% relying on modern contraception methods. This is an indicator of low family planning service utilisation, which leads to high fertility and short birth intervals, both of which have been identified as risk factors for maternal complications, maternal and child death (Azuh *et al.*, 2021). The low contraception uptake also puts a strain on family resources and health systems, making women more vulnerable to negative health outcomes (Oladusun *et al.*, 2021). There are significant education inequality indicators - 34.0% of women are uneducated, 30.5% have primary education, and 34.7% have secondary or higher education. Education plays a pivotal role in health behaviours, as it increases knowledge, empowerment and access to and use of health services (Adewole *et al.*, 2020). Highly educated women are more likely to engage in antenatal care and childbirth care using skilled attendants, and follow improved child care practices, which in turn reduces the risk of death (Azuh *et al.*, 2021).

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The place of residence shows that a higher percentage of women live in rural areas (58.8%) than in urban areas (41.2%). Living in rural areas is often characterised by inadequate health services

and health professionals, a poor transport network and inconvenient access to health facilities. This plays a significant role in rural areas having higher MMR and CMR than urban areas (Adeyinka and Muhajarine, 2024). The distribution of household wealth also emphasises socioeconomic disparities, with 44.4% of households being poor, 27.9% middle, and 27.7% rich. This means that almost half of the population is poor, which affects access to and affordability of healthcare, nutritional status, housing and access to basic services. Household wealth is indeed one of the most important predictors of both maternal and child survival; wealthy households are more likely to have access to the necessary health care services (Ogunniyi *et al.*, 2024). In summary, the descriptive analysis paints a picture of a population with high levels of socioeconomic inequality, low educational levels, low access to health services, gender inequality, and a high rural population. These numerous factors combine to put maternal and child health at high risk in Nigeria. The results presented here indicate that mortality is not only driven by medical factors but also by underlying structural and social inequalities, affecting health behaviours and the use of health services.

Bivariate Analysis of Determinants of Maternal and Child Mortality

Table 2: Bivariate Logistic Regression of Determinants of Maternal and Child Mortality in Nigeria (Pooled NDHS 2013 & 2018)

Variable	Category	Maternal Mortality OR (95% CI)	Child Mortality OR (95% CI)
<i>Community wealth index</i>	Continuous	0.29 (0.21–0.41)*	0.34 (0.25–0.46)*
<i>Maternal age</i>	Continuous	0.93 (0.91–0.95)*	0.95 (0.93–0.96)*
<i>Social autonomy</i>	Continuous (0–4)	0.94 (0.89–0.99)*	0.91 (0.87–0.95)*
<i>Attitude to domestic violence</i>	Continuous (0–4)	1.08 (1.02–1.15)*	1.12 (1.05–1.19)*
<i>Distance to health facility</i>	Small problem (ref)	1.00	1.00
	Big problem	1.07 (0.92–1.25)	1.21 (1.05–1.39)*
<i>Media exposure</i>	None (ref)	1.00	1.00
	Low exposure	1.22 (1.05–1.41)*	1.28 (1.12–1.47)*
	Medium exposure	0.95 (0.78–1.16)	0.92 (0.80–1.06)
	High exposure	0.74 (0.52–1.06)	0.69 (0.51–0.93)*
<i>Contraceptive use</i>	None (ref)	1.00	1.00
	Traditional	0.89 (0.63–1.25)	0.97 (0.74–1.26)
	Modern	0.81 (0.64–1.03)	0.76 (0.61–0.94)*
<i>Education</i>	No education (ref)	1.00	1.00
	Primary	0.86 (0.72–1.03)	0.81 (0.70–0.93)*
	Secondary/higher	0.78 (0.65–0.94)*	0.69 (0.59–0.82)*
<i>Religion</i>	Christianity (ref)	1.00	1.00
	Islam	1.12 (0.92–1.36)	1.18 (1.01–1.38)*
	Traditional/Other	1.21 (0.84–1.74)	1.09 (0.76–1.56)
<i>Place of residence</i>	Urban (ref)	1.00	1.00
	Rural	1.11 (0.95–1.29)	1.24 (1.09–1.42)*
<i>Wealth status</i>	Poor (ref)	1.00	1.00
	Middle	0.84 (0.71–0.99)*	0.79 (0.68–0.92)*
	Rich	0.71 (0.59–0.86)*	0.63 (0.54–0.74)*

Note: *Statistically significant at $p < 0.05$; Source: Authors Computation

The findings in Table 2 (bivariate analysis) and Table 3 (multivariable analysis) paint a detailed picture of the maternal and child mortality in Nigeria using pooled NDHS data. Overall, the results reveal that success in maternal and child mortality is driven by a multitude of factors, including socioeconomic status, demographic factors, health-related behaviours and access to health services. Bivariate analysis (Table 2) revealed multiple factors are significantly associated with both

maternal and child deaths. A strong protective factor was community wealth - the higher the community wealth, the lower the likelihood of both maternal and child deaths. This suggests that women and children residing in wealthier communities enjoy enhanced infrastructure, access to health care and social services. Likewise, the age of the mother was consistently related to mortality outcomes, with higher age during childbearing years associated with reduced mortality, perhaps reflecting greater maturity and experience, better health-seeking, and family planning skills.

We also found that the following indicators of women's empowerment had critical associations with mortality. Greater levels of social autonomy were found to significantly decrease the risk of both maternal and child mortality, whereas greater acceptance of violence was found to increase the risk of maternal and child mortality, especially for children. This underscores the importance of gender equality and autonomy in decision-making in determining maternal and household health outcomes. Our results indicate that the power of women to participate in decision-making plays an important role in determining their access to health care and the ability to promote the health of their children.

Table 3: Multivariable Logistic Regression of Determinants of Maternal and Child Mortality in Nigeria (Pooled NDHS 2013 & 2018)

Variable	Category	Maternal Mortality AOR (95% CI)	Child Mortality AOR (95% CI)
Community wealth index	Continuous	0.42 (0.28–0.63)	0.48 (0.35–0.66)
Maternal age	Continuous	0.95 (0.92–0.98)	0.97 (0.95–0.99)
Social autonomy	Continuous (0–4)	0.91 (0.84–0.99)	0.88 (0.82–0.95)
Domestic violence attitude	Continuous (0–4)	1.12 (1.03–1.22)	1.18 (1.08–1.30)
Distance to health facility	Small problem (ref)	1.00	1.00
	Big problem	1.14 (0.93–1.39)	1.26 (1.07–1.49)
Media exposure	None (ref)	1.00	1.00
	Low exposure	1.19 (1.01–1.42)	1.21 (1.05–1.41)
	Medium exposure	0.97 (0.78–1.21)	0.89 (0.76–1.05)
	High exposure	0.76 (0.51–1.13)	0.72 (0.53–0.98)
Contraceptive use	None (ref)	1.00	1.00
	Traditional	0.92 (0.66–1.30)	0.98 (0.74–1.30)
	Modern	0.83 (0.63–1.10)	0.74 (0.58–0.94)
Education	No education (ref)	1.00	1.00
	Primary	0.88 (0.71–1.09)	0.83 (0.70–0.98)
	Secondary/higher	0.74 (0.59–0.93)	0.67 (0.55–0.82)
Religion	Christianity (ref)	1.00	1.00
	Islam	1.08 (0.88–1.34)	1.14 (0.97–1.35)
	Traditional/Other	1.19 (0.82–1.73)	1.07 (0.74–1.55)
Place of residence	Urban (ref)	1.00	1.00
	Rural	1.09 (0.92–1.31)	1.22 (1.06–1.40)
Wealth status	Poor (ref)	1.00	1.00
	Middle	0.86 (0.71–1.04)	0.80 (0.67–0.95)
	Rich	0.69 (0.55–0.86)	0.61 (0.50–0.74)

Source: Authors Computation

Access to health care and media exposure were significant factors. Geographical distance to health services was significantly associated with increased child mortality, suggesting limitations to the effectiveness of health-care interventions for children. Exposure to the media had a positive impact, with increasing exposure linked to lower risks of mortality, particularly for children. This indicates

that media exposure to health information enhances awareness and utilisation of health care services such as immunisation, antenatal care and good child feeding practices.

Other reproductive health factors had an impact. Use of modern contraception was found to be protective against child mortality, highlighting the role of fertility spacing and regulation in improving child health. Education has a strong protective effect for both maternal and child mortality, where increasing levels of education are associated with lower risk. This highlights the importance of education in improving health literacy and promoting health-seeking behaviours and the use of maternal and child health services. Wealth status also had a strong gradient, with individuals in wealthier households having a much lower risk of death from maternal and child causes than individuals from poor households, suggesting the important role of wealth status in shaping access to health services and providing nutrition.

In the multivariable analysis (Table 3), after adjusting for all the variables, many variables remained significant, indicating their independent impact on maternal and child mortality. This included strong protective effects of community wealth status, suggesting that area-level socioeconomic status plays an independent role in survival, even when controlling for individual-level characteristics. Maternal age continued to be significant, confirming its constant negative association with maternal and child mortality. Women's autonomy maintained its protective effect, and acceptance of domestic violence remained positively associated, indicating that gender inequality and intra-household power dynamics independently impact mortality outcomes. This confirms the need for policies that tackle the issue of gender inequality.

Access to health care remained significant, and distance to health facilities was strongly related to child mortality. This suggests that distance to health facilities remains an important determinant of child mortality, even after controlling for socioeconomic and demographic factors. Media exposure also showed a significant association with child mortality, with increased media exposure being protective against child mortality, suggesting the benefits of information for child health. Education continued to be protective in the multivariable model, with secondary and higher education significantly lowering the risk of maternal and child mortality. This highlights that education is an independent path to better health through increased knowledge, empowerment and health care use. Wealth status remained significant, with households with higher wealth status having lower risks of maternal and child mortality, reflecting the role of socioeconomic inequalities.

Overall, the interplay between Table 2 and Table 3 reveals that maternal and child mortality in Nigeria are the consequence of structural inequities, behavioural factors and barriers to accessing health care. Some variables display significant association in the bivariate analysis, but the multivariate analyses confirm the strongest associations between mortality and community wealth, education, household wealth, women's autonomy and healthcare access. The results emphasise the importance of a combination of policy approaches that target socioeconomic inequality and health system barriers to reduce maternal and child mortality in this country.

Discussion

This study investigated the determinants of maternal and child mortality in Nigeria using data from the National Demographic and Health Surveys (NDHS) in Tables 2 and 3. The results show that factors that contribute to maternal and child mortality are diverse, ranging from socioeconomic inequality and barriers to health system access, to behavioural factors and structural limitations of the health system. The findings from the bivariate (Table 2) and multivariable (Table 3) analyses enhance confidence in the estimated associations and provide some information on important policy-relevant determinants.

A key insight from our study is the strong protective association of socioeconomic status (household and community wealth). Tables 2 and 3 reveal that the odds of mortality for women and children living in households and communities with more wealth are lower. This result is consistent with recent empirical evidence, which suggests that poverty is one of the strongest predictors of maternal and child mortality in developing countries. For instance, Adetut *et al.* (2024) reported that household poverty and food insecurity are predictors of under-five mortality in Nigeria. Likewise, Gebremeskel *et al.* (2022) found that socioeconomic disadvantage restricts access to quality care and emergency obstetric care, contributing to preventable deaths. These findings are supported by those from wider sub-Saharan African studies where wealth inequality is a prominent structural driver of survival inequalities (Tekelah *et al.*, 2019; Azuh *et al.*, 2021). The persistence of these inequalities in the current study supports the call for mortality reduction strategies to focus on tackling poverty, rather than medical interventions.

Maternal age was another important predictor of maternal and child mortality, with increasing age (within the child-bearing period) having a protective effect. These results are in line with other studies showing that young mothers are more likely to experience complications related to biological immaturity and lower levels of health care service use. Orjiingene *et al.* (2022) also found that adolescent mothers in Nigeria are more at risk of neonatal and child mortality due to their low autonomy and health service utilisation. Older mothers, on the other hand, are more likely to be experienced and have better health-care utilisation. Another significant determinant is women's empowerment. Social autonomy was a protective factor for mortality in both models, with an increased risk for acceptance of domestic violence. Our finding is supported by recent studies, which show that gender inequality is an upstream factor affecting maternal and child health. Okoli *et al.* (2020) have shown that women with greater decision-making authority have increased utilisation of antenatal care services and skilled birth attendants in Nigeria. And Oladosun *et al.* (2021) found empowerment is significantly associated with increased contraceptive use and health care utilisation. The current study extends these findings, with autonomy predicting maternal and child survival, independent of socioeconomic characteristics.

Other factors influencing mortality were related to healthcare access. Nearness to the health facility was an important predictor of child mortality in bivariate and multivariable models, showing how distance plays an important role. Our result is in agreement with Addie *et al.* (2024), who found that transport constraints have a significant impact on childhood outcomes in Nigeria. The finding suggests that children are at higher risk of negative outcomes from the delay in access to emergency and preventive healthcare services, particularly in rural and remote areas. But the smaller effect size found for maternal mortality, compared to child mortality, implies that factors such as household decision-making factors and socioeconomic status may be more significant for maternal mortality. Another factor that was consistently associated with child mortality was media exposure. Increasing media exposure was linked to lower mortality risks, implying that exposure to health information increases knowledge of immunisation, nutrition and other child health care practices. This is in line with the findings of Talukder *et al.* (2021), which report that exposure to health media messages greatly increases maternal and child health service utilisation in Nigeria. It also supports existing evidence that mass media interventions are effective in improving health behaviours in low-resource settings.

In this study, education was one of the most significant and consistent protective factors. Women with secondary and higher education were at decreased odds of both maternal and child mortality. This echoes the results of Azuh *et al.* (2021), which show that, in Nigeria, child mortality can be reduced through increased health literacy and utilisation of health services associated with maternal

education. Likewise, Orjinege *et al.* (2022) discovered that highly educated women are more likely to access and use skilled care and engage in better reproductive health practices. Hence, education serves as a key structural determinant that has an impact on multiple pathways to better maternal and child health. The use of contraceptives also had a protective effect on child mortality in the multivariate model. Users of modern contraceptives had reduced odds of child death, which may be due to the benefits of birth spacing in preventing neonatal and under-five deaths. This result is in line with other studies, including Oladosun *et al.* (2021), which found modern contraceptive use enhances maternal and child survival by decreasing the number of high-risk pregnancies and giving mothers time to recover. It is consistent with the global evidence of the impact of family planning on child mortality.

Residence was also significant for child mortality, with higher odds for rural residence. This was likely driven by rural-urban inequities in Nigeria's health system. Health facilities in rural areas may have a lack of well-trained medical staff, inadequate infrastructure and accessibility to emergency services. Adeyinka and Muhajarine (2024) also reported considerable regional and rural disparities in child health outcomes in Nigeria, which are linked to the disparity of health resources. Socio-demographic variables were significant in the multivariable model, but religion had a marginal effect, implying that the impact of religion may be through socioeconomic and cultural factors. This finding is consistent with the views of Orjinege *et al.* (2022) that differences in health outcomes by religion reflect structural inequalities.

Crucially, recent national-level data are in line with the findings of this study on persistent inequalities in maternal and child health. Gebremeskel *et al.* (2022) conducted a scoping review that confirmed that maternal mortality in Nigeria can be attributed to a delay in seeking health care, poor health system quality and socioeconomic inequality. In addition, recent analyses from NDHS data highlight that disparities in the improvement of child health indicators persist, with rural and poor communities still facing higher mortality when compared to the rest of the country Nigeria Demographic and Health Survey 2018 (NPC and ICF, 2019; Oweibia *et al.*, 2025). Moreover, a recent global study shows that Nigeria continues to experience disproportionate maternal deaths globally as a result of weak health systems and inequity (WHO-aligned analyses, 2024-2025).

4. Conclusion

The results of this study show that maternal and child mortality in Nigeria result from an intricate combination of socioeconomic inequality, limited access to health care, behavioural and structural factors. The most consistent factors for both outcomes are wealth, education, women's autonomy and accessibility of health care. Whereas service delivery and behaviour have stronger impacts on child mortality, structural socioeconomic factors are more important for maternal mortality. The findings of this study demonstrate the need for comprehensive policy strategies that focus on reducing poverty, increasing female education, improving access to health services and empowering women. Improving the health system in Nigeria will not be enough unless structural factors are also tackled.

Limitations of the Study

While this study provides valuable insights, it has some limitations. First, the cross-sectional nature of the NDHS data means we cannot infer causality between the factors identified and mortality. Second, the use of self-reported data has the potential for recall bias, especially concerning sibling deaths. Third, using proxy variables for the deceased might add some measurement error, but it is common practice in demographic studies. Fourth, lack of information in the data on some important clinical variables, such as quality of care, facility readiness, and cause-specific mortality, may limit

our understanding of mortality. Finally, the study does not account for time-varying policy and health system reform that could be influencing mortality.

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