

Advancing Livelihood Issues on Mortality Through Communicable Diseases in South-East Nigeria

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ABSTRACT: There is no doubt that understanding people's livelihood statuses can be useful in explaining the connection between communicable diseases and mortality as people's livelihoods can be better guaranteed when their well-being are seen from the binocular of clean water supply, affordable housing, good food, education, full employment and other social amenities. This study investigated the effects of livelihood issues on mortality through communicable diseases in South-East Nigeria with the motives of determining the relationship between educational attainment and employment status; and deaths by Malaria and Typhoid respectively. The sample size was 590. Data was generated using structured questionnaire and in-depth interviews; and were analyzed using descriptive and inferential statistics while the hypotheses were tested using Logistic Regression and Pearson Moment Correlation Coefficient. The findings showed that individuals with secondary education (OR = 0.43, $p < 0.001$) and tertiary education (OR = 0.31, $p < 0.001$) had significantly lower odds of malaria mortality than those with no formal education. Employment status itself is not significantly correlated with typhoid mortality ($r = -0.14$, $p = 0.152$) but specific employment types such as public servant roles ($r = 0.38$, $p < 0.001$) and business/trading ($r = 0.42$, $p < 0.001$) do. It was, therefore, recommended that Community-based approaches that combine education with access to disease-preventive tools may be more effective than education alone.

KEYWORDS: advancing, livelihood, mortality, communicable diseases, South-East Nigeria

1 INTRODUCTION

The issue of mortality through communicable diseases triggered by poor livelihoods in the developing world, like Africa, has become a global concern. This is because the impact of communicable diseases on Africa countries has the potential to reverse those gains made in human development over the years (Boutayeb, 2010). Besides, the concern of democracy are the enhancement of people's livelihoods which underscores the growing demands for people-centered policies and programmes (Umar & Tifida, 2015). This democracy and its objective, however, tend not have yielded much fruit in Africa because despite the reduction in the burden of malaria, it still remains a major contributor to child mortality in sub-Saharan Africa (Eisele *et al.*, 2012).

Death rates are still high in Nigeria despite the downward trend. For example, NPC and ICF (2019) report that neonatal mortality decreased from 42 deaths per 1000 births in 1990 to 39 deaths per 1000 births in 2018; Infant Mortality from 87 per 1000 births in 1990 to 67 in 2018; under-five mortality has decreased from 193 in 1990 to 132 in 2018. Most deaths in Nigeria tend to be caused by communicable diseases and these are associated with certain livelihood issues. For example, lack of education, low wealth, living in poorly constructed houses and an individual's occupation may increase the risk of plasmodium infection and other communicable diseases in Nigeria (Degarege *et al.*, 2019; NPC & ICF 2019). Again, not washing hands at critical moments of the day, not washing hands with soap, eating food out in restaurants or food stall (including food vendors) and poor sanitation may also increase the risk of typhoid infection (Alba *et al.*, 2016).

In fact, communicable diseases are responsible for the largest diseases burden and cause the highest number of deaths in sub-Saharan Africa as well as a major cause of chronic illness and disability (Baingana & Bos, 2016). Richard *et al.*, (2007) hold that there is a close relationship between infant mortality and infectious diseases. The fact that mortality, is a component of population change, calls for investigation into its causes and consequences in specific locations as the major events in people's life have demographic consequences and implications.

Many observations have associated communicable diseases as a cause of mortality to certain social and economic explanations. Observation, for example, has it that the odds of malaria infection were higher in the poorest children than in the least poor children and that socio-economic development is germane since in the long run such intervention could be highly effective and sustainable

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against malaria (Tusting *et al.*, 2013). Again, the report of Richards, *et al.*, (2007) prove that per capita income; literacy and absolute poverty significantly affect infant mortality; and that place of residence is a factor in infectious diseases.

In fact, it is on record that improvement in drinking water (that is, in the use of water filters, provision of high-quality piped water, and sewer connections) and sanitation were associated with decreased risk of diarrhoea (Wolf *et al.*, 2014). Again, the vulnerability to largest yellow fever outbreak in Uganda could be largely explained by the economic activities of males around forests (Wamala *et al.*, 2012). Besides, income is an important determinant of access to good food, with a multiplier effect of lowering malnutrition levels, which is a key risk factor for many childhood diseases (Baingana & Bos, 2006). This study focuses on the relationship between peoples livelihoods measured by educational attainment and employment status and mortality by such communicable diseases as Malaria and Typhoid in South-East, Nigeria.

2 OBJECTIVES OF THE STUDY

The general objective of the study is to ascertain the effects of livelihoods on deaths through communicable diseases (Malaria and Typhoid). The specific objectives are to:

1. Determine the relationship between educational attainment and mortality by Malaria in South-East Nigeria..
2. Determine the relationship between employment status and mortality by Typhoid in South-East Nigeria.

3. RESEARCH QUESTIONS

1. What is the relationship between educational attainment and mortality by Malaria in South-East Nigeria?
2. What is the relationship between employment statuses of the people and mortality by Typhoid in South-East Nigeria?

4 RESEARCH HYPOTHESES

1. There is no significant relationship between educational attainment and mortality by Malaria in South-East Nigeria.
2. There is no significant relationship between employment status and mortality by Typhoid in South-East Nigeria.

5 LITERATURE REVIEW

Current mortality Levels

Even though mortality levels have continually been declining as argued by NPC & ICF (2019), mortality rates in Nigeria are still relatively high. NDHS 2018 results show that the adult mortality rate is 3.18 deaths per 1000 population among women and 3.25 deaths per 1000 population among men. Communicable diseases contribute substantially to these deaths. For example, NPC & ICF (2019) stress that Africa still bears over 80% of the global malaria burden, and Nigeria accounts for about 25% of it; and that it is estimated that approximately 57 million cases and nearly 100,000 malaria-related deaths occur each year. In view of the above, Degarege *et al.* (2019) holds that inequalities in health coverage, unimproved educational and economic opportunities of the poor increases the risk of malaria and its attendant mortality rates in Africa

Communicable Diseases

Communicable diseases denote illnesses caused by viruses or bacteria that people spread to one another through contact with contaminated surfaces, bodily fluids, blood products, insect bites, or through the air (Edemekong & Huang, 2022). These authors further argue that there are many examples of communicable diseases and that some of them require reporting to appropriate health departments or government agencies in the locality of the outbreak. Some of the examples of the communicable diseases are HIV, hepatitis A, B, and C, measles, Salmonella, and blood-borne illnesses; and most common forms of spread include fecal-oral, food, sexual intercourse, insect bites, contact with contaminated fomites, droplets, or skin contact (Edemekong & Huang, 2022).

Education:

Education can never likely be ruled out as a factor in mortality by communicable diseases since health of an individual is not affected by income or employment status alone (Serap 2008. Muller 2002; Galea & Ahern, 2005). Serap (2008) holds that education is an important variable since a more literate society has greater awareness of affecting health and is therefore better placed to take preventive measure or seek medical assistance when ill. Similarly, Galea & Ahern (2005) argue that there was an association between education distribution and health indicators; and this could likely be associated with long-term accumulation of behavioral and social stressors. NPC (2009) demonstrates that education does not impact significantly on the level of awareness of most Nigerians. This explains the misconceptions that even the educated Nigerians have about certain diseases such as Hiv/Aids, Tuberculosis, Cholera, etc regarding their mode of transmission. More so, there is need to close the knowledge-practice gap with regards to knowledge/awareness of disease prevention and actual implementation of such knowledge as illustrated using mosquito net distribution and what happens to it thereafter (Koenker *et al.*, 2014)

Employment Status

The link between employment status and deaths by diseases cannot be underestimated. Kim, *et al.*, (2015) hold that mortality was higher among the population that experienced a change in economic status from employed to unemployed than those

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who maintained employment. This agrees with the view of Lin, *et al.*, (2003) that there is a higher life expectancy for individuals who were employed than those that were either not employed or not in the labour force. Baingana & Bos (2006) note that higher incomes lead to improved access to and use of preventive and curative interventions, such as antenatal care, immunizations, use of treated bed nets, and receipt of therapy for Diarrhoea and medicine for reducing fever.

6 THEORETICAL FRAMEWORK

This study is anchored in the Social Determinants of Health (SDH) theory, which provides a comprehensive lens for examining how social and economic conditions influence population health outcomes. The theory posits that the environments in which people are born, live, work, and age significantly impact their health risks and life expectancy (World Health Organization [WHO], 2008). These environments are shaped by the distribution of resources, power, and opportunity, which in turn affect access to quality education, safe housing, clean water, adequate nutrition, healthcare, and employment (Marmot & Wilkinson, 2006).

According to the SDH framework, disparities in health are not merely a function of individual behavior or genetics but are primarily the result of structural and systemic inequalities embedded in social and economic institutions. In low-resource settings, such as many parts of South-East Nigeria, poor livelihood conditions—including unemployment, inadequate housing, low income, and lack of access to basic social services—create fertile ground for the transmission of communicable diseases and contribute to higher mortality rates.

This theory helps explain why communities with inadequate livelihoods are more susceptible to diseases such as Malaria, Typhoid, Diarrhoea, Cholera, and Tuberculosis. Limited access to clean water and sanitation increases exposure to waterborne illnesses, while overcrowded housing and poor nutrition weaken immunity and facilitate the spread of infections. Furthermore, low levels of education and income can hinder timely healthcare-seeking behaviour, increasing the risk of preventable deaths (Solar & Irwin, 2010).

Applying the SDH framework, this study aims to move beyond biomedical explanations of disease and mortality to socio-cultural explanations and highlighting how structural livelihood challenges must be addressed to reduce death rates from communicable diseases. This theoretical approach underscores the importance of multi-sectoral interventions that improve education, economic opportunities, healthcare infrastructure, and living conditions (livelihoods) to enhance population health and well-being in South-East Nigeria.

7 METHODOLOGY

Design: mixed research design was adopted for this study because it allowed the researchers to study a large number of respondents at a relatively short period of time and also permitted the use of both quantitative and qualitative methods to collect a robust data for the study.

Area of the study: This study was carried out in South-East Nigeria. This area is one of the six geopolitical zones in Nigeria. It comprises five states namely Abia State, Anambra State, Ebonyi State, Enugu State, and Imo State. It is an Igbo speaking zone with 95 local government areas that cut across its five states (Abia State 17 LGAs; Imo, 27; Ebonyi, 13; Anambra 21 and Enugu, 17). The socio-cultural organization of the South-Eastern people of Nigeria is mainly based on membership in kinship groups and parallel but complementary dual-gender associations which are important to societal integration. The associations take several forms including age grades, men's societies, women's societies, and prestige-title societies such as "Nze" or "Ozo" for men and the "Omu", "Ekwe", or "Lolo" for women. The interaction among these groups prevents the concentration of authority in any one association (Nwoye, 2011).

Population of the study: The total population of South-East Nigeria based on 2006 National Population and Housing Census is 16,395,555 people (8,184,951 for male and 8,210,604 for female). The population was further projected to 28,007,926 people distributed by gender and states on the table as follows:

Table 1: Projected Population of South-East Nigeria by Gender and States

<i>States</i>	<i>2006 Population</i>	<i>Male 2023 Projected Male Population</i>	<i>Female 2006 Population</i>	<i>2023 Projected Female Population</i>	<i>2006 Total Population</i>	<i>2023 Projected Total Population</i>
Abia	1,430,298	2,443,325	1,415,082	2,417,333	2,845,380	4,860,658
Anambra	2,117,984	3,618,075	2,059,844	3,518,756	4,177,828	7,136,831
Ebonyi	1,064,156	1,817,859	1,112,791	1,900,940	2,176,947	3,718,799
Enugu	1,596,042	2,726,460	1,671,795	2,855,866	3,267,837	5,582,326
Imo	1,976,471	3,376,333	1,951,092	3,332,979	3,927,563	6,709,312
Total	8,184,951	13,982,052	8,210,604	14,025,874	16,395,555	28,007,926

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Source: National Population Commission (2010). *2006 population and housing census priority table volume iv. Population distribution by age and sex (state and local government area). Table DS5*, Abuja: NPC

The target population for the study, however, was 10,408 persons, being the population of some six (6) relevant population categories for this study which cut across the study area. The population categories were as follows:- men, women, youths, teachers, health workers and religious leaders,. The target population is shown in the table 2

Table 2: Target population for the Study

<i>States/communities</i>	<i>Population categories</i>	<i>Population</i>
Abia /Amibo	Men	905
	Women	987
	Youths	1550
	Teachers	94
	Health workers	320
	Religious Leaders	105
Ebonyi/Ishiagu	Men	827
	Women	1002
	Youths	950
	Teachers	81
	Health workers	45
	Religious Leaders	130
Imo/Ubaha	Men	1075
	Women	1310
	Youths	943
	Teachers	21
	Health workers	36
	Religious Leaders	27
Total		10,408

Sources: Official records/registers of primary health centres/hospitals/clinics, official records/registers of community unions/associations, official records/registers of men/women, official records/registers of schools, and official records/registers of churches in the study area.

Scope of the Study: The study was limited to livelihood issues on mortality by communicable diseases in South-East Nigeria focusing on Abia, Ebonyi, and Imo states. The states were selected by simple random sampling.

Sample Size: The sample size for this study was 590 persons. This was statistically generated by using Taro Yamane Statistical method of determining sample size as follows:

$$n = \frac{N}{1+N(e)^2}$$

where: n = Sample size

N = Target Population

e = error of sample (it could be 0.10 down to 0.01, but in this work, 0.04 was used)

1 = unity or constant

Therefore;

$$n = \frac{10,408}{1+10,408(0.04)^2}$$

$$n = \frac{10,408}{1+10,408(0.0016)}$$

$$n = \frac{10,408}{1+16.6528}$$

$$n = 10,408$$

17.6528
n = 589.5948
n = 590

Sampling Technique: Multi-stage stratified cluster sampling was adopted. First, three out of the five states were selected. The five states were numbered and three out of the five were selected. The selected states were Abia, Ebonyi and Imo states. Next, three local government areas, one from each of the selected states were selected. All the Local Government Areas (LGAs) in each of the selected states were numbered and one selected from each state making it a total of three LGAs. The selected LGAs are: Umuahia-South (Abia State), Ivo (Ebonyi State), Okigwe (Imo State). Furthermore, all the communities in each of the selected LGAs were numbered and one was selected from each, making it a total of 3 communities. The selected communities were Amibo (Umuahia-South, Abia State), Ishiagu (Ivo, Ebonyi State), and Ubaha (Okigwe, Imo State). In order to collect appropriate data for the study, six relevant population categories were created in each community. The members of each population category formed the respondents for the study. The stratified proportionate sampling technique was used in selecting the respondents from each population category in view of the fact that the population categories were not of equal sizes. The availability sampling technique was used to select the actual respondents from each population category as shown in table 3.

Table 3: proportionate Stratified Random Sampling Technique for the Study

<i>Selected Areas in Aba Urban</i>	<i>Population Category</i>	<i>Total</i>	<i>Proportionate calculations</i>
Amibo	Men	905	$905/10408 \times 590/1 = 51$
	Women	987	$987/10408 \times 590/1 = 56$
	Youths	1550	$1550/10408 \times 590/1 = 88$
	Teachers	94	$94/10408 \times 590/1 = 5$
	Health workers	320	$320/10408 \times 590/1 = 18$
	Religious Leaders	105	$105/10408 \times 590/1 = 6$
Ishiagu	Men	827	$827/10408 \times 590/1 = 47$
	Women	1002	$1002/10408 \times 590/1 = 57$
	Youths	950	$950/10408 \times 590/1 = 54$
	Teachers	81	$81/10408 \times 590/1 = 5$
	Health workers	45	$45/10408 \times 590/1 = 3$
	Religious Leaders	130	$130/10408 \times 590/1 = 7$
Ubaha	Men	1075	$1075/10408 \times 590/1 = 61$
	Women	1310	$1310/10408 \times 590/1 = 74$
	Youths	943	$943/10408 \times 590/1 = 53$
	Teachers	21	$21/10408 \times 590/1 = 1$
	Health workers	36	$36/10408 \times 590/1 = 2$
	Religious Leaders	27	$27/10408 \times 590/1 = 2$
Total		10,408	590

For the qualitative data (in-depth interview data), 15 people were purposively selected for interview, 5 from each of the 3 communities based on their leadership positions in the relevant qualitative population categories as follows:

1. Three Titled men (one from each of the communities)
2. Three women leaders (one from each of the communities)
3. Three Youths Leaders (one from each of the communities)
4. Three doctors/senior matrons (one from each of the communities)
5. Three head teachers/principals (one from each of the communities)

Instruments for data collection:

The instruments for data collection of this study were questionnaire and in-depth interview because of the need for a mixed-methods research. The questionnaire, specifically, was used to collect quantitative data, and it was highly structured with only few unstructured questions. It also had two different sections. The first section contained the socio-demographic characteristics of respondents while the other sections addressed the substantive issues in livelihood factors and mortality by communicable diseases in South-East Nigeria.

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The in-depth interviews on the other hand, were employed to gather qualitative data to complement the quantitative data for deeper understanding of the livelihood issues in deaths by communicable diseases in South-East Nigeria. The IDIs were anchored mainly on unstructured questions with necessary probes.

Administration of Instrument: The questionnaire was administered by the principal researcher himself and his 3 research team mates with the help of 4 research assistants. The research assistants were recruited on the basis of ability to read and write, speak and understand both English and the local dialects of the communities. They were trained for three (3) days on the objectives of the study, relevance of the study, administration and retrieval of questionnaire. The in-depth interviews were conducted by the researcher and 3 research team mates only.

Method of Data Analysis: The quantitative data were processed with Statistical Package for Social Sciences (SPSS) Version 20.0. The socio-demographic characteristics of respondents and the substantive issues in all sections of the questionnaire were analyzed using descriptive statistics such as simple frequency distribution tables and percentages. Inferential statistics, particularly, Logistic Regression and Pearson Moment Correlation Coefficient were used to test the stated hypotheses and predict the relationship between the independent and dependent variables. The qualitative data, on the other hand, was analyzed using QDA-Miner

8 RESULTS

Out of 590 copies of questionnaire distributed, only 555 (94.07%) copies were retrieved and valid while 35(5.93) were either not retrieved or invalid

Table 4: Socio-demographic Characteristics of Respondents (N=555)

<i>Characteristic</i>	<i>Category</i>	<i>Frequency</i>	<i>Percentage</i>
Age (years)	18-25	55	9.9%
	26-33	50	9.0%
	34-41	77	13.9%
	42-49	238	42.9%
	50-57	50	9.0%
	58-65	53	9.5%
	66 & Above	32	5.8%
Gender	Male	293	52.8%
	Female	262	47.2%
Marital Status	Single	194	35.0%
	Married	297	53.5%
	Divorced/separated	15	2.7%
	Widow/widower	49	8.8%
Educational Qualification	No formal education	98	17.7%
	First school leaving certificate	143	25.8%
	O' level	120	21.6%
	NCE/OND	52	9.4%
	First degree	113	20.4%
	MSc/PhD	29	5.2%
Occupational Status	Unemployed	27	4.9%
	Student	25	4.5%
	Self-employed	130	23.4%
	Public servant	159	28.6%
	Business/trading	190	34.2%
	Apprentice	15	2.7%
	Other	9	1.6%
Annual Income	No income at all	17	3.1%
	Below 25,000	71	12.8%
	25,000 - 49,999	26	4.7%
	50,000 - 74,999	103	18.6%
	75,000 - 99,999	18	3.2%
	100,000 & Above	320	57.7%

Table 4 descriptively provides data on the socio-demographic characteristics of respondents from the sampled population. The results show that the age group most represented in the sample is 42–49 years, accounting for 42.9% of the respondents followed

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by age category 34–41 years (13.9%). The 18–25, 26–33, 50–57, and 58–65 age categories each constitute approximately 9%–10% of the sampled population, while the 66 and above age group is the least represented (5.8%). The data suggests that a majority of the respondents are middle-aged, indicating that this age group may be the most active or engaged within the context of the study.

The gender distribution is relatively balanced, with a slight male predominance. This suggests a near-equal representation of perspectives from both genders. A significant portion of the population 297(53.5%) is married, which may influence their economic responsibilities, purchasing behavior, or social outlook.

More of the respondents 143(25.8%) possess a First School Leaving Certificate, followed by those with O' level education 120(21.6%) and First Degree holders 113(20.4%). A notable 98(17.7%) have no formal education, while only 29(5.2%) possess postgraduate qualifications (MSc/PhD). The educational profile leans towards basic and secondary education, indicating a potential gap in higher-level skills and literacy that may affect employment opportunities or access to information.

The high representation of business people 190(34.2%) and public servants 159(28.6%) suggests a diversified workforce, with a strong presence in both formal and informal economic sectors. Income distribution indicates that most respondents are earning a moderate to high income (that is, between N50,000- N74,999 and N100,000 & above), potentially reflecting economic stability among the surveyed population, especially among and business owners and public servants

Analysis of Substantive Issues

Research Question 1: What is the relationship between educational attainment and mortality by Malaria in South-East Nigeria? The responses were presented in tables 5, 6, 7, 8, and 9.

Table 5: Bereavement Experience and Cause of Death (N=555)

<i>Characteristic</i>	<i>Category</i>	<i>Frequency</i>	<i>Percentage</i>
Bereaved in the past	Yes	372	67.0%
	No	183	33.0%
Cause of death (n=372)	Malaria	130	34.9%
	Typhoid	98	26.3%
	Diarrhea	52	14.0%
	Other	92	24.7%

Source: Field Survey 2025

Table 5 shows the bereavement experiences of the respondents and the causes of death in South-East Nigeria, the data show that 372(67%) of the 555 respondents reported having experienced bereavement, at most, in the past one year to the time of the field work for this study in 2025 due to communicable diseases, while 183(33.0%) have not experienced such bereavement. This shows that more than two-thirds of the respondents had been bereaved. This corroborated the IDI data as more of the IDI respondents admitted that they have experienced bereavement close to the time of study.

The data also show that more deaths 130(34.9%) occur in South-East Nigeria from Malaria followed by Typhoid 98(26.3%), and other causes 92(24.7%) which most likely include kidnapping, banditry, road accidents, heart attack. This shows that Malaria and Typhoid are major contributors to the loss of loved ones in South-East Nigeria. This also corroborated the qualitative data. One of the IDI respondents, for example, said: “my aunty died of Acute Malaria from what we were told and she was not even sick for long” (**Female, student, 24 years old, Abia State**). Another said: “yes, I lost my grandpa last year because of Malaria, typhoid ..., even my mum has actually been in the hospital for some time now because of malaria parasite” (**Female, student, 21 years old, Ebonyi State**). A respondent also said: “like we said nah the person suffered from malaria but not well treated, so it led to his death” (**Male, Teacher, aged 50 years, Imo State**). This shows a majority of the respondents have lost someone to a communicable disease, suggesting a high burden of communicable disease-related mortality within South-East Nigeria. These insights highlight the urgent need for public health interventions including improved disease prevention, sanitation, access to healthcare and education in South-East Nigeria.

Table 6: Age of the Deceased

<i>Age Group</i>	<i>Frequency</i>	<i>Percentage (%)</i>
Under 1	95	21.8%
Under 5	102	23.4%
5–8 years	25	5.7%
9–13 years	19	4.4%
14–17 years	23	5.3%
18 years & above	108	24.8%
Total	372	100%

Source:

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Table 6 shows that the highest proportion of deaths occurred in the 18 years and above age group, representing 108(24.8%); closely followed by children under 5 years, which together (Under 1 and Under 5) represent 197(45.2%) of all deaths. These findings show the vulnerability of both infants and adults in the face of communicable diseases. The results suggest a bimodal pattern in mortality—first among young children (especially under age 5), and then among adults, which may reflect differences in immunity, exposure, and access to healthcare. This finding corroborated the IDI data, for example, one of the IDI data said: ehh, my mother died at the age of 84” (**Male, Engineer/public servant, 40 years old, Abia State**). Another also said: “One of them was about 55 years; we had the one of 50 as well; another one I think around 55 or thereabout, I also lost two children below five years in my compound here” (**Male, Teacher, aged 50 years, Imo State**)

Table 7: Gender of the Deceased

<i>Gender</i>	<i>Frequency</i>	<i>Percentage (%)</i>
Male	238	64.0%
Female	134	36.0%
Total	372	100%

The gender distribution of deceased highlights a notable disparity in mortality due to communicable diseases. Data show that more males 238(64.0%) than 134(36.0%) females died in the area of study at the time of this study. This also corroborated the qualitative data. For example, an IDI respondent said: “I lost three kinsmen just last year” (**Male, Teacher, aged 50 years, Imo State**). This gender imbalance suggests that males were disproportionately affected, which could be attributed to a combination of behavioral, biological, occupational, or healthcare access factors. It may also reflect greater exposure to infection risks among males, possibly due to socioeconomic roles or late health-seeking behavior.

Table 8: Educational Status of Deceased from Malaria (n=130)

<i>Educational Status</i>	<i>Frequency</i>	<i>Percentage</i>
No formal education	51	13.7%
First school leaving certificate	53	14.2%
O' level	156	41.9%
NCE/OND	75	20.2%
First degree	23	6.2%
Above first degree	14	3.8%

Source: Field Survey 2025

Data in Table 8 show the educational status of the deceased in South-East Nigeria. Out of the 130 persons who died by malaria, 156(41.9%) had O'Level certificates while only 14(3.8%) had above first degree. This shows that more of the deceased who died through malaria had high school (secondary school) certificates. This corroborated the qualitative data. One IDI respondent, for example, said: “the person I lost had O'Level” (**Female, Nurse, 52 years old, Imo State**). Another one said: “She stopped at standard six and could not further her education...; and started learning trade...by today's standard; I can say she had O'Level because she could read English and Igbo fluently” (**Female, civil servant/farmer, aged 47 years old, Imo State**). One also stated: “...they should either be of primary or secondary education category” (**Male, Teacher, aged 50 years, Imo State**)

Table 9: Malaria Prevention Knowledge and Practices

<i>Measure</i>	<i>Category</i>	<i>Frequency</i>	<i>Percentage</i>
Perceived educational category most affected by malaria	Highly educated persons	33	5.9%
	Lowly educated persons	385	69.4%
	No difference in education	137	24.7%
Deceased was aware of malaria prevention	Yes	294	79.0%
	No	78	21.0%
Deceased using bed nets	Yes	55	14.8%
	No	185	49.7%
	Sometimes	79	21.2%
	Don't Know	53	14.2%
Deceased using insecticides	Yes	71	19.1%
	No	115	30.9%
	Sometimes	57	15.3%
	Don't Know	129	34.7%

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A majority of respondents 385(69.4%) perceived that lowly educated individuals are most affected by Malaria; 33(5.9%) believed that highly educated persons are the most affected; while 137(24.7%) felt that there is no difference in Malaria impact across education levels. This suggests a prevailing belief that educational attainment plays a significant role in vulnerability to Malaria, possibly due to differences in awareness, access to preventive tools, and living conditions. This corroborated the qualitative data as some of the IDI respondents narrated as thus:

Ok, people that are educated tend to know more about malaria; people that are not educated ... believe in taking um um..., 'Agbo', believing 'Agbo' will cure them the Malaria but people that are educated and knows the consequences of Malaria, will not go and meet them to mix fifty naira 'Agbo' for them for Malaria instead they will go for check-up and go to hospital and take treatment, that's how education impacts on death rates by Malaria. In another instance, you can't a kind of compare a mother who is educated taking care of her kid with one who is not educated. Some people, don't just care, when you just tell them that they are exposing their children to ... factors like mosquito bites, they will tell you that it is God that is protecting them, such mentality can make your children die of one illness or the other, like Malaria. **(Female, student, 21 years old, Ebonyi State).**

As I am now, if I have Malaria..., I will first go to test and find out what is wrong with me to know the exact treatment to take. That shows that I am educated. As a mother, if my baby is feeling somehow, maybe having such symptoms as headache and fever, I will take him to the lab for medical examination not just going to chemist to buy drugs. Someone that is not educated will go to the bush to get herbs and roots or get any other herbal medicine that may not match the body system of the child to give to the child... Let me just say education has a role to play because if someone like me knows what to do to be healthy today and remain alive, it is education that taught me **(Female, trader/woman leader, 35 years old, Abia State)**

...our people, they say that the cause of Malaria is taking too much oil, which I used to counsel them that it is not too much oil or drinking too much alcohol that causes Malaria, Malaria is being caused by a plasmodium, a parasite is the main cause of malaria. So, sometimes when they are sick, they come here, I teach them or they come to our hospital we treat them. Last em was two days ago, we lost a child, about six months, the child was sick, instead of them taking the child to the hospital, they went the native way, they lost the baby... People around them will tell them that it is 'Apa afo' and you see that sometimes, they will loose their babies, ignorance. Some adults they don't believe coming to the hospital, I'm telling you! Sometimes when they come to the hospital is when they are seriously down, and by that time, it's late. Any woman that is pregnant, during antenatal, we carry out some test, and Malaria Parasite is one the test we recommend to them, we give them drugs to prevent Malaria and, a times, to treat Malaria so the baby will not get the parasite but sometime after giving them the drugs, some of them will not still take because of fear of taking medicine **(Female, Nurse, 52 years old, Imo State)**

A majority of the deceased 294(79.0%) were reported to be aware of malaria prevention methods, indicating that knowledge of prevention is widespread. The remaining 78 (21.0%), however, were not aware, which may signal gaps in health communication or outreaches in certain communities. This also corroborated the qualitative data as almost all the IDI respondents admitted they know one form of malaria preventive measure or the other especially insecticide treated mosquito nets. For example, an IDI respondent said: "... they know about insecticide treated mosquito nets, they know about it..." **(Female, student, 21 years old, Ebonyi State).** A respondent also said: our people know about insecticide treated mosquito net" **(Female, Nurse, 52 years old, Imo State).** Another said:

Ehh, I told you, we know what treated mosquito net is, it was distributed some time ago through our king...he told us to come and collect mosquito nets, we went and collected them nah. Even when I went to give birth to my daughter in Owerri, I was still given one but I didn't use it, check my body nah does it look like mosquito is biting me? **(Female, civil servant/farmer, 47 years old, Imo State).**

Despite the high level of awareness, only 55(14.8%) of the deceased were reported to regularly use bed nets, with an additional 79(21.2%) using them occasionally. A significant 185(49.7%) did not use bed nets at all, and 53(14.2%) of respondents were unsure of the deceased's usage habits. These figures suggest lack of consistency in bed net usage, which remains a major challenge to effective Malaria prevention. This corroborated the IDI data as some of the IDI respondents said:

In this community, I can't even trace anyone that is even making use of the insecticide-treated mosquito nets or any insecticide spray or something like that...yes, the people of my community may know about it but I tell you, they don't have any idea of how to use it. **(Male, Engineer/public Servant, 40 years old, Abia State)**

Some of them have used treated net but they used it to do "Mgbala", that is, fence in their farms to prevent fowls entering their farms instead of using it for what it is meant for. When you give to them they come home they will use it but sometimes they will remove it, go to their farms and put it there, eh... they don't believe that it's mosquito that causes malaria **(Female, Nurse, 52 years old, Imo State).**

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For where! If they give me insecticide-treated net, I will take it to my farm. Some use it to sell palm kernel, others use it to cover palm nuts. The one I was given, I did not use it for a day because we don't live in the bush, we have no need for it, and we are not white men... **(Female, civil servant/farmer, 47 years old, Imo State).**

The use of insecticides followed a similar trend, with only 71(19.1%) of the deceased that consistently used insecticides and 57(15.3%) used them occasionally. A considerable proportion 115(30.9%) were not using insecticides; while more of the respondents 129(34.7%) were unaware of whether the deceased used insecticides or not in their lifetime. The high level of uncertainty and non-use further reflects the need for better education and accessibility regarding household vector control practices. This also corroborated the IDI data. Some IDI respondents, for example, narrated:

But if you ask me of insecticides, I will tell you that people that have the money, can go to the market and get for their personal use but those that cannot afford it, they prefer sleeping like that let the mosquito bite them than going to the market to buy insecticides" **(Male, Engineer/public Servant, 40 years old, Abia State).**

I'm not seeing anybody using those ones here, it's only the learned ones that can go and get em the insecticides. You know the poverty level nah! I have not seen them using this snipper or insecticide, it is rare. Some people say when you get Nchawu, that is, saint leave and put the saint leave on the charcoal, it drives away mosquito. If you ask me to rate the level of use of both treated mosquito nets and insecticides in this community, I will say it is low **(Female, Nurse, 52 years old, Imo State)**

Research Question 2: What is the relationship between employment statuses of the people and mortality by Typhoid in South-East Nigeria? The responses are presented in tables 10 and 11.

Table 10: Employment Status of Deceased from Typhoid (n=98)

<i>Employment Status</i>	<i>Frequency</i>	<i>Percentage</i>
Unemployed	21	5.6%
Student	12	3.2%
Self-employed	73	19.6%
Public servant	105	28.2%
Business/trading	134	36.0%
Apprentice	4	1.1%
Other	23	6.2%

Source: Field survey 2025

Data on Table 10 show that more of those who died from typhoid were business men and women/ traders 134(36.0%) and public servants 105(28.2%) while 4(1.1%) were apprentices. This corroborated the qualitative data as more of the IDI respondents reported that those that they lost were traders.

Table 11: Deceased knowledge and Respondents perception of Typhoid Risk Factors

<i>Factor</i>	<i>Category</i>	<i>Frequency</i>	<i>Percentage</i>
Water source of the deceased	Boiled water	25	6.7%
	Well water	10	2.7%
	Borehole water	306	82.3%
	Water from stream	31	8.3%
Eating habits of the deceased	Anywhere	131	35.2%
	Only in the house	210	56.5%
	Selected restaurant	25	6.7%
	Other	6	1.6%
Deceased History of typhoid	Yes	264	71.0%
	No	39	10.5%
	Can't remember	69	18.5%
Perception: eating outside increases risk	Yes	447	80.5%
	No	78	14.1%
	Not sure	30	5.4%
Perception: unemployment causes typhoid	Yes	211	38.0%
	No	260	46.8%
	Not sure	84	15.1%

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The data in Table 11 indicates that a majority of deceased 306(82.3%) relied on borehole water as their primary source of drinking water. This is followed by water from streams (8.3%), boiled water (6.7%), and well water (2.7%). This corroborated the IDI data as some of the IDI respondents said:

Boreholes, people are afraid going to our streams because of the level of kidnapping, insecurity, they manage to buy the borehole water, people no longer go to their farms, talk more of going to streams, they prefer going to borehole but it's just that the boreholes are not treated" **(Female, Nurse, 52 years old, Imo State).**

Ok my community has a problem with water, actually we do dig well but bringing out water from the ground is very hard and only people that have money can afford it, it is very costly, not everybody can afford it. Even me in my father's house now, we draw water from the well, we don't have borehole, before you see borehole... even the borehole water self is just the same thing with well water, it just that it is coming out from the tap or something. I will say our major sources of water are well water, river and boreholes. **(Female, student, 21 years old, Ebonyi State).**

Another respondent also said: "...we don't have pipe-borne water; so it is streams with some boreholes. Most of the boreholes self are not treated, and this leads to this typhoid we are talking about" **(Male, trader, aged 54 years, Abia State).** The high usage of borehole water suggests a general preference or accessibility, but it also raises concerns regarding the maintenance and sanitation of such sources, especially in areas without regular quality monitoring.

The table also shows that a majority of the deceased 210(56.5%) were eating only at home; 131(35.2%) eat anywhere; 25(6.7%) eat from selected restaurants while only 6(1.6%) were eating from other sources. This finding corroborated the IDI data. Some of the IDI respondents, for example, gave their narratives as thus:

I lost my grandpa last year, he was a farmer and never ate out for a day except in occasions or ceremonies such as wedding, burials, and others, he was always eating at home, you will never find him in a restaurant or buying food from vendors... **(Female, student, 21 years old, Ebonyi State).**

For their eating habit, they cook in their homes, they don't like buying from food vendors, they like cooking their food. Where the problem is the quality of the food, they don't have money, if you have the money you go for the best, somebody that don't have the money will look for cheap ingredients **(Female, Nurse, 52 years old, Imo State).**

Ok eeee, they cook in their homes and eat. It is only in the town that people patronize 'mama put' but they largely cook in their homes and eat, it's just that many do not know the importance of keeping the cooking environment clean; many do not also know the implication of cooking in a dirty environment. It is only few that are well educated, although, it is habit, some have the habit of keeping their cooking environment clean despite that they are not well educated **(Male, teacher, aged 50 years, Imo State)**

This significant proportion of individuals eating only at home may reflect health awareness or economic constraints, while those eating "anywhere" might be more exposed to contaminated food sources, potentially increasing the risk of typhoid infection and mortality

Table 11 also shows that out of the 372 bereaved, 264(71%) reported that the deceased had ever been diagnosed of Typhoid while only 39(10.5%) said the deceased were never diagnosed of Typhoid. The rest of the 69(18.5) did not have any idea with regards to whether the deceased had been diagnosed of typhoid or not. The IDI data corroborated this finding. One of the IDI respondents, for example, said:

People do die of typhoid in our community ooo, people do die ooo! But the problem, sometimes, is knowing what killed them. So many of our people, don't go to hospitals. You know that when you go hospital you will be diagnosed, you will know what that person is suffering from but whereby the person doesn't go to hospital, and the person dies, I don't know! I don't know how you are going to diagnose the person and say whether it is typhoid that killed the person or malaria or other sickness **(Female, Nurse, 52 years old, Imo State).**

People do die of typhoid, eh... I know of a man who died during December time, he was self-medicating, he was taking drugs on his own, him and his pharmacist, I don't know whether it is pharmacist or something else, so at the end of the day when the thing was now too much, he was rushed to the hospital only to find out that this illness has actually taken hold of him and he couldn't bear it and he died **(Female, student, 21 years old, Ebonyi State).** Um, um, one of the persons I lost had ever been diagnosed of typhoid, even though he didn't die of typhoid. However, people do die of typhoid in my community but because of their level of education, they cannot differentiate between typhoid and malaria. So, many die of typhoid **(Male, teacher, aged 50 years, Imo State)**

The high prevalence of reported past typhoid cases is concerning and underscores the need for improved preventive measures, awareness, and healthcare interventions just as some IDI respondents, noted:

Ehh, no knowledge, just as they say that is eating too much oil and drinking too much alcohol that cause Malaria, the same way they don't believe in Typhoid, they have no idea of the causes of typhoid and how to prevent it...

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Their borehole waters are not treated, who treats them? Just you pump the water, you sell, no treatment (**Female, Nurse, 52 years old, Imo State**)

Maybe, they will know about typhoid but they believe they can go to the bush and get herbs and cook, maybe it heals them, I don't know! I believe that their level of awareness is low and people like patronizing patent medicine stores (**Female, student, 21 years old, Ebonyi State**)

Many don't know about the causes of typhoid and their preventive measures, it is only few depending on their level of education, many don't know that cause of typhoid is from drinking water, many don't know, anyway, they cannot even differentiate between typhoid and malaria ok due to their level of education. Once they have feeling of fever, some will say is Malaria, some will say is typhoid and go to roadside medicine stores and ask the people to mix Malaria and Typhoid drugs for them (**Male, teacher, aged 50 years, Imo State**)

The table again shows that a substantial 447(80.5%) of the respondents believe that eating outside increases the risk of contracting Typhoid while 108 (19.5%) either don't believe 78(14.1%) or not sure 30(5.4%) that eating outside increases the risk of contracting Typhoid. This perception aligns with the known transmission routes of Typhoid, which include ingestion of food or water contaminated with *Salmonella typhi*. This finding also corroborated the qualitative finding.

The table also shows that more of the respondents 260(46.8%) believe that unemployment do not cause typhoid while 84(15.1%) were not sure of whether it causes typhoid or not. The qualitative data corroborated this but showed somehow that there is connection between employment status and death by Typhoid. Some of the IDI respondents, for example, narrated that:

Ehhh, when the person doesn't have any money, you know that drugs are costly now, and that's why people are running away from hospital...and that's why people are dying of typhoid. People are dying ooo! When you give them drugs and ask them to come for check-up they won't come. They will use the same drugs, go to chemist. So, unemployment and lack of money make people afraid to go to hospital, they will say if I go to hospital now, they will give me bill...when the baby or children are sick, they will not be able to take them to the hospital, they will be managing the baby in the house. The same thing is applicable to pregnant mothers, if you tell them to go the hospital, they will not go because of money... (**Female, Nurse, 52 years old, Imo State**)

...when a person is employed, the person is definitely earning money, you can't compare someone who is employed with someone who is not employed, that's why people who are employed when they are having health problem, will go to check for it but someone who is not employed will go and pick herbs and cook or maybe go to their quarks... Ok there was this woman I saw, the baby was not feeling fine, she was cooking herbs and giving that baby, a new born baby that should be taken to the hospital, the baby is not up to one year, maybe 9 months or thereabout. People now ask her why and she said she didn't have money and people had to contribute money for her to take her to hospital (**Female, student, 21 years old, Ebonyi State**)

Um... if one is not gainfully employed, he is likely to always have financial problems. Another thing is um..., when one is not gainfully employed, you know the person is struggling to survive... so, lack of employment can be an issue in death by typhoid. When one is not gainfully employed, he cannot take care of his wife when she is pregnant, taking her to appropriate hospital where she will be taken care of, and this may complicate issue that may lead to her death. Also because of unemployment parents may not be able to care for their children whether infants or under-5, giving them proper food, this can make them vulnerable to such infectious diseases like typhoid that is capable of claiming someone's life... (**Male, teacher, aged 50 years, Imo State**)

9 Test of Hypotheses

- (1) **Hypothesis 1:** There is no significant relationship between educational attainment and mortality by Malaria in South-East Nigeria.

Table 12: Logistic Regression of Education Level and Malaria Mortality

<i>Variable</i>	<i>Odds Ratio</i>	<i>95% CI</i>	<i>p-value</i>
No formal education (ref)	-	-	-
Primary education	0.89	0.57-1.39	0.608
Secondary education	0.43	0.27-0.68	<0.001
Tertiary education	0.31	0.19-0.49	<0.001
Knowledge of prevention	0.62	0.41-0.92	0.018
Use of preventive measures	0.37	0.24-0.57	<0.001

Model summary: McFadden's $R^2 = 0.28$, $p < 0.001$

The logistic regression analysis shows that higher education levels are associated with lower odds of malaria mortality. Compared to those with no formal education, individuals with secondary education (OR = 0.43, $p < 0.001$) and tertiary education (OR = 0.31, $p < 0.001$) had significantly lower odds of malaria mortality. Additionally, both knowledge of prevention methods (OR

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= 0.62, $p = 0.018$) and actual use of preventive measures ($OR = 0.37$, $p < 0.001$) were significantly associated with reduced malaria mortality.

Hypothesis 2: There is no significant relationship between employment status and mortality by Typhoid in South-East Nigeria.

Table 13: Correlation Analysis of Employment Type and Typhoid Mortality

<i>Employment Type</i>	<i>Correlation Coefficient (r)</i>	<i>p-value</i>
Unemployed	-0.14	0.152
Student	-0.09	0.368
Self-employed	0.22	0.028
Public servant	0.38	<0.001
Business/trading	0.42	<0.001
Eating outside home	0.45	<0.001
Poor water quality	0.31	0.002

The correlation analysis reveals that employment status itself (unemployed vs. employed) is not significantly correlated with typhoid mortality ($r = -0.14$, $p = 0.152$). However, specific employment types show significant positive correlations with typhoid mortality, particularly public servant roles ($r = 0.38$, $p < 0.001$) and business/trading ($r = 0.42$, $p < 0.001$). Additionally, eating outside the home ($r = 0.45$, $p < 0.001$) and poor water quality ($r = 0.31$, $p = 0.002$) show significant positive correlations with typhoid mortality.

10 DISCUSSIONS

Educational Attainment and Malaria Mortality

This study focused on advancing livelihood issues on mortality through communicable diseases in South-East Nigeria. The findings shows that a majority of the respondents have currently faced bereavement due communicable diseases and that there is a significant inverse relationship between educational attainment and malaria mortality, with individuals having secondary or tertiary education experiencing substantially lower odds of malaria-related death compared to those with no formal education. This corroborated the qualitative data and aligns with previous studies that have shown education to be a protective factor against malaria mortality (Eisele *et al.*, 2012; Tusting *et al.*, 2013).

The gap between knowledge of prevention methods (79% aware) and actual implementation (only 14.8% consistently using bed nets) suggests that education alone is insufficient. This "knowledge-practice gap" has been documented in other studies (Koenker *et al.*, 2014) and highlights the need for interventions that not only provide information but also address barriers to implementing preventive behaviours.

Employment Status and Typhoid Mortality

The analysis revealed an unexpected relationship between employment status and typhoid mortality. Rather than unemployment being a risk factor, specific types of employment—particularly in public service and business/trading—showed stronger positive correlations with typhoid mortality. This also corroborated the IDI data and contrasts with the traditional view that unemployment, through economic deprivation, increases disease vulnerability (Wamala *et al.*, 2012).

The strong correlation between eating outside the home and typhoid mortality ($r = 0.45$, $p < 0.001$) suggests that workplace-related behaviours, rather than employment status itself, may mediate this relationship. Public-facing occupations may fuel exposure to typhoid risk factors through greater reliance on outside food sources and varying water quality. These findings are in tandem with Alba *et al.*, (2016) highlighted food handling practices as critical in typhoid transmission.

11 CONCLUSIONS

This study provides evidence of significant relationships between livelihoods and communicable disease mortality in South-East Nigeria. Educational attainment, particularly secondary and tertiary education, is associated with reduced malaria mortality. Employment in public-facing sectors, rather than unemployment itself, is associated with increased typhoid mortality, likely mediated by food consumption patterns. These findings underscore the importance of addressing social determinants of health alongside biomedical interventions in efforts to reduce communicable disease mortality. Integrated approaches that combine education, behavioral interventions, and infrastructure improvements are likely to yield the greatest health benefits in this region.

12 LIMITATIONS

The preference for mixed research design instead of a more robust qualitative option, necessitated by short period of time for the study resulted in the difficulty in balancing the results of the quantitative and qualitative data; and this affected the interpretation of findings and the conclusion arrived at. This limitation could not be overcome because the area of the study was largely rural-based that could have required more time to do a thorough qualitative study using combined instruments of Focused

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Group Discussion, In-depth Interview and Key Informant Interview. Again, the sample size and generalization may have been negatively affected by the researchers' biased creation of relevant population categories because of the short period of time for the study. There could have been some other relevant population categories that escaped the researchers' mind at the time of the study.

13 RECOMMENDATIONS/POLICY OPTIONS

These findings suggest several policy implications:

1. **Education-based interventions** should focus not only on increasing knowledge but also on addressing barriers to implementing preventive behaviors. Community-based approaches that combine education with access to preventive tools may be more effective than education alone.
2. **Workplace health programs** targeting food safety and hygiene practices are needed, particularly in public service and business/trading sectors. These should include safe food handling practices and access to clean water and sanitation facilities in workplaces.

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AUTHORS' CONTRIBUTIONS

OI conceptualized the idea and wrote the manuscript; JAI and VN commented on it. All the authors participated in the data collection. OI did the statistical analysis and interpretation, JAI the qualitative analysis and the three authors read and approved the final manuscript

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DATA AVAILABILITY

The data that support the findings of this study are available on request from the corresponding author

DECLARATIONS:

Ethics approval and consent to participate

The study was conducted in compliance with ethical principles. Ethical approval for this study was obtained from the Directorate of Research and Publications- Abia State University, Uturu

CONSENT FOR PUBLICATION

Not applicable

COMPETING INTERESTS

The authors declare no competing interests

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