# REPORT ON CAUSES OF DEATH IN SIERRA LEONE

## 2018 – 2023

## www.healsl.org



NJALA UNIVERSITY
Sierra Leone

CENTRE FOR GLOBAL
HEALTH RESEARCH

## Report team

As the Vice President of the Republic of Sierra Leone, I am honoured to present the report "Causes of Death Report in Sierra Leone, 2018-2023". This comprehensive report, produced by Healthy Sierra Leone—HEAL-SL— a collaborative achievement of the Ministry of Health, Njala University, and the Centre for Global Health Research at the University of Toronto, is a landmark in our nation's health. It represents not just a culmination of data and analysis but symbolizes our relentless commitment to understanding and improving the health of our people.

The journey to produce this report began five years ago, in a nation striving to strengthen its healthcare system. Sierra Leone, rich in culture and spirit, has faced numerous challenges, but none so enduring as ensuring the health and well-being of our citizens. The need for a detailed understanding of the causes of death in our country is more than a matter of statistics. It is about understanding the lives behind these numbers, the communities affected, and the stories that they tell. This report, therefore, is more than just a document; it reflects our nation's heartbeat.

In these pages, you will find numbers and insights into the leading health challenges our people face. From infectious diseases to non-communicable illnesses, from maternal mortality to the impacts of environmental factors, to road traffic accidents, this report provides a comprehensive analysis of the health landscape of Sierra Leone over the past five years. The data presented here result from tireless fieldwork, detailed analysis, and an unwavering commitment to truth and clarity.

I extend my deepest appreciation to the surveyors across Sierra Leone who have collected the information, often in challenging circumstances, contained in this report. I would also like to acknowledge the excellent team of diverse researchers who developed and implemented the novel methods showcased in this report. Indeed, this report also signifies the power of collaboration. The partnership between the Ministry of Health, academic institutions, and international bodies demonstrates what can be achieved when we work together towards a common goal. It is a model of cooperation that I believe can be replicated in other areas of national development.

The findings of this report are a call to action. They highlight the areas where our health system and other aspects of society need to strengthen, where our resources must be focused, and where our policies need to adapt. We are committed to using this information to guide our decisions and actions as a government. We understand that data are not just numbers; they are a tool for change, a means to save lives, and a pathway to a healthier future for all Sierra Leoneans.

Our shared national aspiration is to build a health system that is robust, resilient, and responsive to the needs of our people—a–system where every Sierra Leonean has access to quality healthcare regardless of location or economic status. This report guides us towards this goal, highlighting the key areas where our efforts must be concentrated. It is critical that HEAL-SL continue its work to document the causes of death going forward, with continuous improvement in methods and coverage. With HEAL-SL, we know where we have been and where we are going.

In conclusion, the "Causes of Death Report in Sierra Leone 2018-2023" is more than a collection of data. It is a mirror showing us the current state of our nation's health and a map guiding us towards a healthier future. It is a testament to our commitment to the people of Sierra Leone, a promise to use this knowledge to better their lives.

As we move forward, let us do so with renewed purpose and determination. Let us use the insights from this report to build a Sierra Leone where good health is a reality for every citizen. Together, with a united effort, we can create a brighter, healthier future for our nation.


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**Dr. Mohamed Juldeh Jalloh**
**Vice President of Sierra Leone**

December 4, 2023

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## Abbreviations

| | |
|---|---|
| COD | Cause of Death |
| CRVS | Civil Registration and Vital Statistics |
| DHS | Demographic and Health Surveys |
| EVA | Electronic verbal autopsy |
| HEAL-SL | Healthy Sierra Leone |
| MICS | Multiple Indicator Cluster Surveys |
| MOH | Ministry of Health |
| SDG | Sustainable Development Goals |

## Acknowledgments

This report is dedicated to the hundreds of thousands of Sierra Leoneans who agreed to be included in the collective effort, and by sharing their experiences and information, enabled us to better understand the complex factors contributing to premature mortality in the country.

It is our hope that the insights in this document will contribute to ongoing efforts to improve healthcare, reduce mortality rates, and enhance the well-being of the people of Sierra Leone.

…………………………………                …………………………………                …………………………………
Prof. Foday Sahr                      Prof. Prabhat Jha                     Prof. Bashiru M. Koroma
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## Executive Summary

**About 75,000 Sierra Leoneans died in 2023. Nearly 80 percent of these deaths occurred before age 70, representing one of the highest national premature mortality rates in the world.**

**Death is inevitable, but death before old age is not.** Most of the deaths currently occurring in Sierra Leone, in every age group, could be avoided with proven public health interventions or practicable clinical treatments.

For deaths before age 70, from 2018-2023, fully **one-quarter of those who died succumbed to a single infection—malaria**—an infection that not only can be prevented but cured with effective treatments in nearly all cases. **An additional one-quarter of the deaths before age 70 were attributable to other common infections**—causing diarrhoea, pneumonia, and tuberculosis—many also preventable and treatable.

**One in ten of all deaths occurred during the first month of life (half of these in the first week), and an additional one in four of all deaths occurred before age five.** Before age 70 years, the other leading causes of death include heart disease and stroke, digestive diseases, liver disease and road traffic accidents. Figure 1 shows the total deaths arising from major causes of death before age 70 years.

**Figure 1. Major causes of death in Sierra Leone before age 70 in 2023**
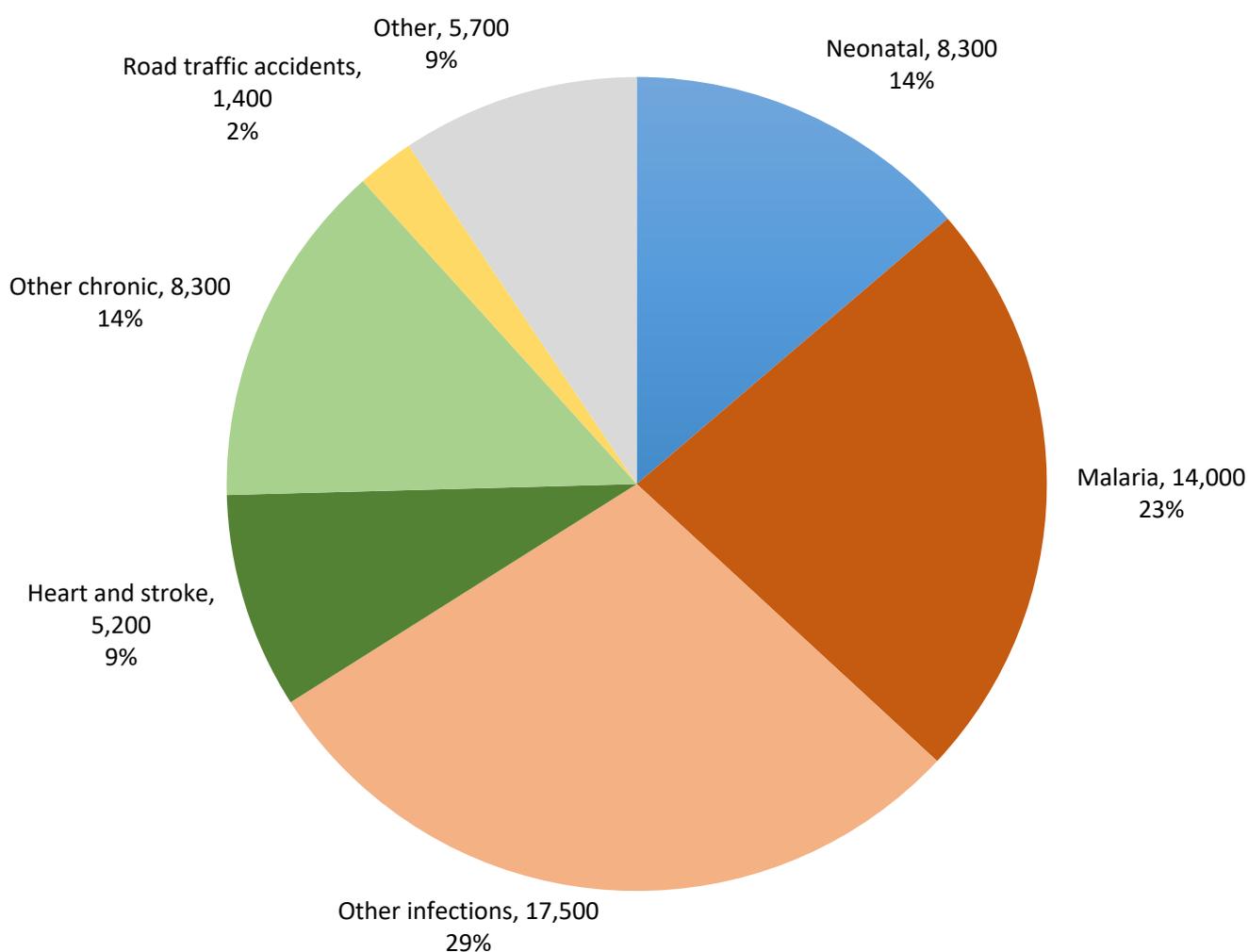


*Notes: "Other infections" includes all infectious diseases excluding malaria. "Other chronic" includes all non-communicable diseases excluding heart diseases and stroke*

Figure 2 shows the risks of death for the major conditions before age 70 years among 100 Sierra Leones. Overall, 45 of 100 Sierra Leones would die prematurely, before age 70 if current death rates continue. Of these, three deaths would be during the first month of life and 42 deaths during ages 1 month to 69 years. Applying the death rates in the study (in the absence of other diseases), six would deaths be from malaria, four from heart diseases, three from stroke, three from diarrhoea and two from road traffic injuries.

**Figure 2. Risk of death before age 70 years among 100 Sierra Leoneans**
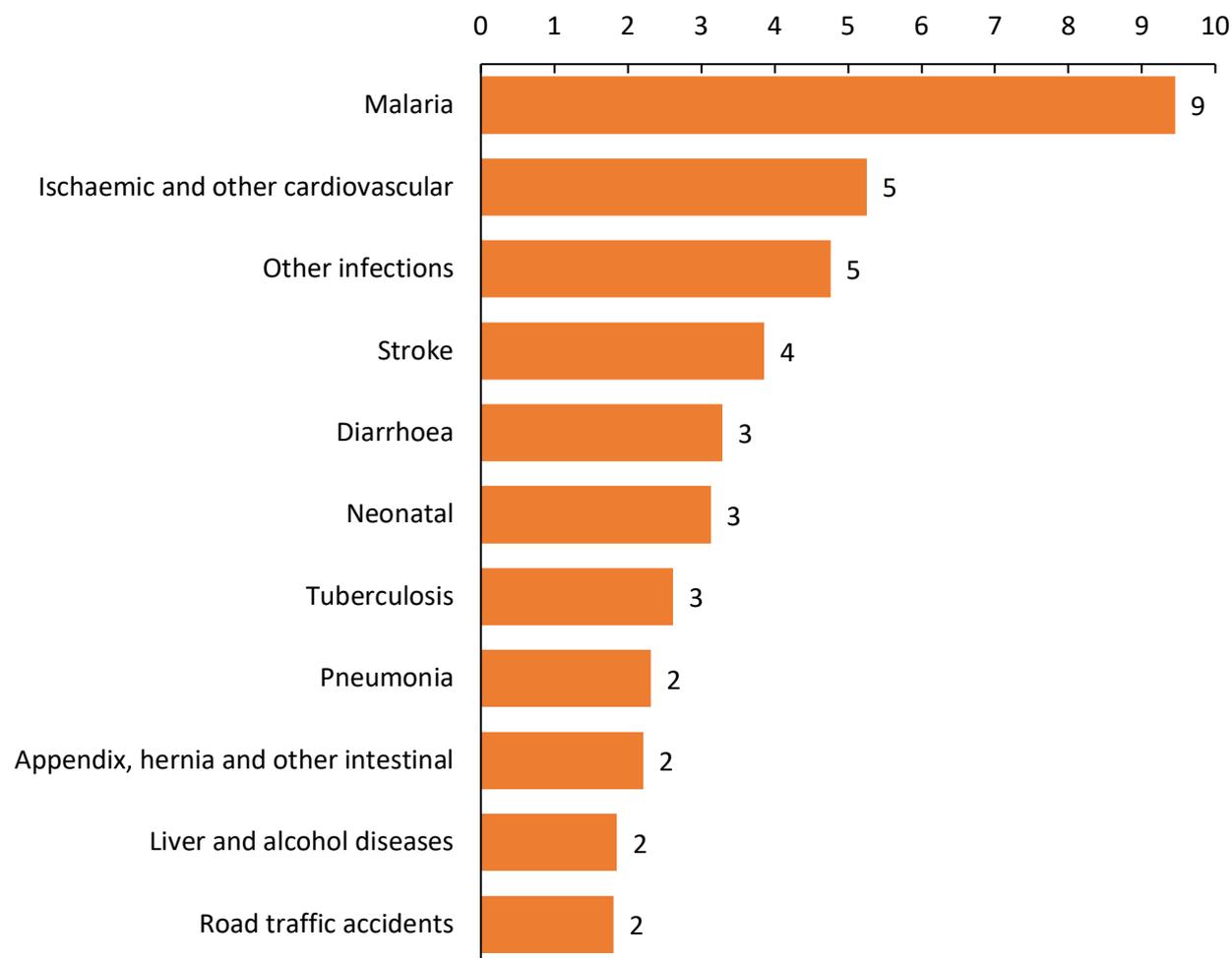


*If 2023 death rates would continue, and ignoring other causes of death; values are rounded*

### Preventing Deaths of Mothers and Babies
The first days, weeks, and months after birth are the riskiest in life in Sierra Leone, and higher risk than in almost all other countries in the world and the region. Even before birth, the rate of stillbirths is exceptionally high: for every two babies who die in the neonatal period—the first month of life—there is one stillbirth, many of which could be avoided. Childbirth is also extraordinarily risky for mothers, but Sierra Leone's maternal mortality rate is far lower than thought earlier and is on the decline.

### Saving Young Children and Adolescents
Malaria is the leading cause of death in children to age 15, causing more than 40% of deaths. Other infections cause another 25-30%. An obvious first target is reducing malaria deaths, *all* of which are potentially preventable or curable. Powerful new interventions, not yet in use in Sierra Leone, include malaria vaccines, which could be hugely important in saving the lives of children and adults alike.

### Keeping Young Adults Alive
Those who survive childhood are likely to live to middle age, but the deaths that do occur are largely preventable or treatable. Malaria remains the single greatest killer through to age 30, causing more than 15% of deaths. Malaria is not just a cause of childhood deaths but also among adults (Figure 3). Road traffic accidents and other injuries grow

in importance among young adults—especially young men, causing more than 10% of deaths in the age group. Tackling road traffic accidents means mobilizing partners within and outside the health sector.

**Figure 3. Malaria death rates and numbers of deaths by age**
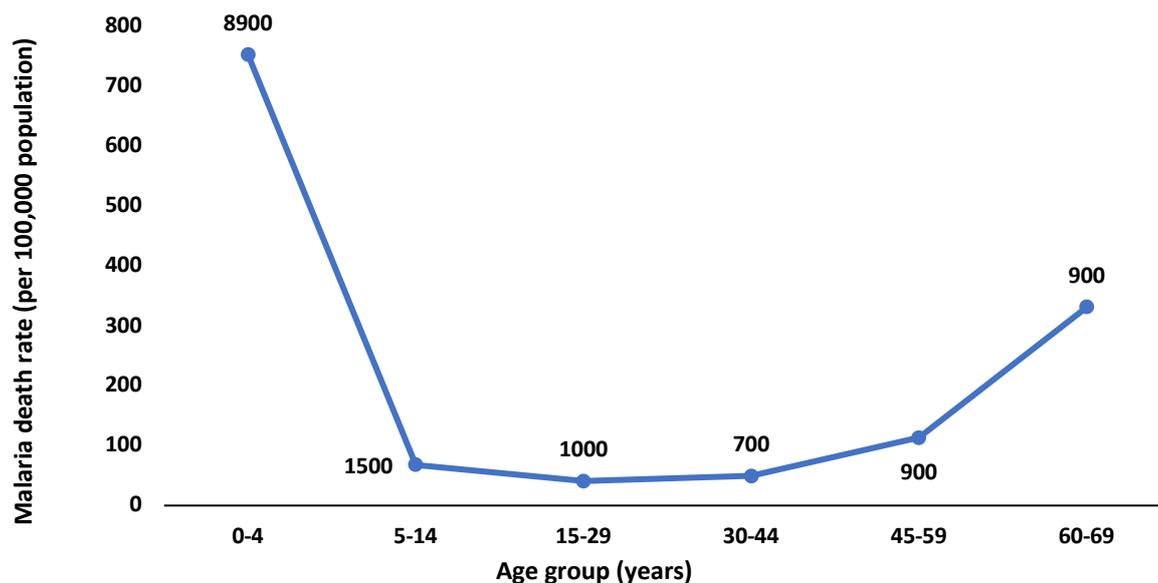


*Note: The numbers above each age group represent the numbers of national deaths from malaria*

### Maintaining Health in Middle Age
Malaria and non-communicable diseases, especially stroke and heart disease, share the lead in causes of death among people 30 years up to 70 years. Effective control measures exist for all these conditions.

### About HEAL-SL
Beginning data collection in 2018, the Healthy Sierra Leone (HEAL-SL) organized by the Ministry of Health, Njala University, and the University of Toronto, has established the first nationwide system for recording births and deaths, efficiently and cost-effectively. HEAL-SL employs electronic verbal autopsy to record the characteristics of those who die and support cause-of-death determination. A representative five percent of the population, including all age groups and all areas of the country, is currently surveyed annually by HEAL-SL. The Bill & Melinda Gates Foundation funded HEAL-SL.

Understanding the causes of death in a population is the bedrock for setting priorities and building programs to reduce premature mortality and move toward a healthier population. HEAL-SL has established a representative profile of the causes of death for the total population from 2018-2023, for each major age group and geographically, and is poised to continue, continually increasing its coverage and improving cause-of-death determinations over years to come.

**For every major killer in Sierra Leone, effective public health and clinical solutions exist.** The HEAL-SL report identifies where deaths occur, differences between females and males, and regional variations. The report provides a clear road map for strengthening public health and clinical services to address the most important causes of illness and death throughout the country, to help meet the challenges from pandemics, and, eventually, to understand and mitigate the effects of climate change.

### The Future of HEAL-SL: A Made-in-Sierra Leone GPS to Better Health
HEAL-SL is the most advanced mortality monitoring system established anywhere in Africa, and a model for many other countries to expand priority systems that help to count the dead, describe causes, and thus help the living.

HEAL-SL is at a critical juncture, with a need to move from an externally funded program to a permanent and continually improving essential element of the public health system in Sierra Leone, including being integrated with the National Public Health Agency.

As actions are taken to address the current avoidable death, HEAL-SL can over the forthcoming years track progress, find out what works and what does not, and adapt to new findings and conditions.

**Table 1. Leading causes of death before age 70 years in Sierra Leone in 2023**

| Cause of death | Study deaths (Male/Female) | National deaths (2023) | % deaths before 70 years | Risk of death at ages 0-69 years |
|---|---|---|---|---|
| Stillbirth | 370 (210/160) | 4,612 | | NA |
| | | | | |
| Neonatal | 807 (449/358) | 8,253 | 14% | 3.1 |
| Malaria | 3,832 (2,017/1,815) | 13,994 | 23% | 9.5 |
| All infections (excluding malaria, diarrhoea, pneumonia, & tuberculosis) | 2,776 (1,458/1,318) | 10,290 | 17% | 9.1 |
| Diarrhoea | 900 (471/429) | 3,292 | 5% | 3.3 |
| Pneumonia | 657 (347/310) | 2,227 | 4% | 2.3 |
| Stroke | 629 (318/311) | 2,157 | 4% | 3.9 |
| Tuberculosis | 465 (268/197) | 1,710 | 3% | 2.6 |
| Appendix, hernia, intestinal | 452 (313/139) | 1,682 | 3% | 2.2 |
| Ischaemic heart and other vascular | 854 (434/420) | 3,012 | 5% | 5.3 |
| Road traffic accidents | 425 (305/120) | 1,364 | 2% | 1.8 |
| Liver and alcohol diseases | 382 (234/148) | 1,215 | 2% | 1.9 |
| Peptic ulcer/gastroesophageal | 346 (207/139) | 1,167 | 2% | 1.8 |
| **All (1 month - 69 years)** | 14,591 (7,850/6,741) | 52,008 | 86% | 50.0 |
| 70 years and over | 1,512 (762/750) | 15,582 | | |
| **\*All deaths in 2023 at all ages** | 17,280 (9,271/8,009) | 75,843 | | |

Notes: Stillbirth % denominator (neonatal & stillbirths). Neonatal risk of death is per 1000 livebirths. *National deaths exclude stillbirths

***Signatories to Executive Summary***

*December 4, 2023*

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# I – Introduction

Half of all deaths in Sierra Leone occur at home and go unrecorded, and even those that occur in hospitals are often not registered, leading to a lack of crucial information on causes of death (COD). This absence of data hampers evidence-based resource allocation, disease outbreak identification, healthcare expenditure accountability, and population-based research on risk factors. The primary goal of the Healthy Sierra Leone (HEAL-SL), which employs electronic verbal autopsy (eVA) to collect COD information efficiently and cost-effectively, is to establish a nationwide system for births and deaths, incorporating COD information.

This report presents the findings from the HEAL-SL 2018-2023. Sierra Leone's need for improved mortality surveillance stems from mortality rates among the highest globally and a lack of comprehensive death records, with only 25% of deaths being reported through the existing system. HEAL-SL bridges this information gap by employing community-based eVAs to gather COD data from a nationwide representative sample of households and including all age groups. With this enhanced mortality data collection and analysis in Sierra Leone, it is possible to make more informed healthcare decisions leading to better health outcomes throughout the country.

Sierra Leone lacks a functional Civil Registration and Vital Statistics (CRVS) system to monitor mortality trends and causes of death (COD). Instead, it has relied on periodic national household surveys like Demographic and Health Surveys (DHS) and Multiple Indicator Cluster Surveys (MICS) for mortality data, which are not regular or timely. HEAL-SL aims to produce mortality and COD data estimates every year at national and subnational levels. This will inform policy decisions, resource allocation, and health program implementation. Sierra Leone aims to achieve the Sustainable Development Goals (SDGs), including a target to reduce under-5 mortality (U5MR) to 25 per 1000 live births by 2030. Accurate and timely mortality and COD information is crucial to track progress toward this goal. The HEAL-SL will help align health programs with regional challenges, enabling targeted interventions and progress towards the SDGs.

## HEAL-SL partners and collaborators.

The project has been jointly developed with Statistics Sierra Leone (Stats SL) and the Ministry of Health (MOH), the University of Toronto, Canada and Njala University, Sierra Leone.

## Methodology

**Design, implementation and cod determination**

HEAL-SL covers 5% of births and deaths annually enabling reliable annual rates of fertility, stillbirths, births, deaths and major COD for all ages in Sierra Leone –nationally and for each of Sierra Leone's 16 districts from 2018-23 powered to detect modest differences in major childhood CODs over 3-year periods.

**HEAL-SL sampling frame**
HEAL-SL covers about 5% of the total population and generates separate urban and rural district-level estimates of age- and cause-specific mortality rates every three years. District-level household sample sizes were calculated based on the Sierra Leone census. The main sampling units are census enumeration areas (EAs), representing urban census blocks or villages, with urban and rural EAs chosen in proportion to the urban/rural populations in each district.

**Table 2. Sample units and population covered in HEAL-SL, 2018-2023**

| Region & District | Enumeration areas | | | Population covered | | |
|---|---|---|---|---|---|---|
| | Total | Urban | Rural | Total | Urban | Rural |
| | | | | | | |
| **Western region** | 114 | 111 | 3 | 42,894 | 41,728 | 1,166 |
| Western area urban | 84 | 84 | 0 | 30,925 | 30,925 | 0 |
| Western area rural | 30 | 27 | 3 | 11,969 | 10,803 | 1,166 |
| | | | | | | |
| **Northern region** | 275 | 61 | 214 | 126,593 | 26,116 | 100,477 |
| Bombali | 33 | 12 | 21 | 15,154 | 5,415 | 9,739 |
| Karene | 9 | 1 | 8 | 5,188 | 265 | 4,923 |
| Tonkolili | 50 | 9 | 41 | 25,239 | 4,469 | 20,770 |
| Port Loko | 28 | 8 | 20 | 14,307 | 3,875 | 10,432 |
| Kambia | 49 | 7 | 42 | 18,706 | 1,841 | 16,865 |
| Koinadugu | 56 | 17 | 39 | 24,878 | 7,299 | 17,579 |
| Falaba | 50 | 7 | 43 | 23,121 | 2,952 | 20,169 |
| | | | | | | |
| **Southern region** | 170 | 29 | 141 | 78,677 | 14,049 | 64,628 |
| Bo | 40 | 13 | 27 | 18,825 | 5,750 | 13,075 |
| Moyamba | 29 | 3 | 26 | 13,661 | 1,661 | 12,000 |
| Pujehun | 45 | 3 | 42 | 16,368 | 1,333 | 15,035 |
| Bonthe | 56 | 10 | 46 | 29,823 | 5,305 | 24,518 |
| | | | | | | |
| **Eastern region** | 102 | 35 | 67 | 44,445 | 16,407 | 28,038 |
| Kenema | 29 | 14 | 15 | 15,886 | 8,495 | 7,391 |
| Kailahun | 27 | 8 | 19 | 12,300 | 3,245 | 9,055 |
| Kono | 46 | 13 | 33 | 16,259 | 4,667 | 11,592 |
| | | | | | | |
| **Total** | **661** | **236** | **425** | **292,609** | **98,300** | **194,309** |

**Enumeration, baseline survey, and electronic verbal autopsy**

HEAL-SL field work comprises three modules: enumeration, electronic verbal autopsy (eVA), and re-sampling. The eVA employs the 2016 World Health Organization (WHO) Verbal Autopsy Standard tool for various age groups and stillbirths, operating offline on laptops with embedded databases. Data validation occurs in real-time. The eVA application includes GPS tracking and audio recordings and involves random re-sampling in approximately 10% of households to ensure quality control.

The survey employs multiple teams of four or five trained surveyors per region to complete enumeration, eVA, and re-sampling in one enumeration area (EA) within a week before moving to the next. Local sensitization by district teams preceded survey activities. Re-sampling involves re-interviewing households using random questions from the eVA, and additional quality control includes central review and audiotaping of eVA interviews.

**Figure 4. Map of Sierra Leone showing enumeration areas, regions, and numbers of study deaths**



Legend:
- National capital
- Eastern
- North East
- North West
- Southern
- Western
- Sampling units
- Major cities

North West
1842, 1337853, 14562

North East
3627, 1481953, 11091

Makeni

Freetown

Western
2052, 1442710, 10860

Bo

Kenema

Eastern
2778, 2186167, 21538

Southern
6981, 2064677, 17792

Province
study deaths, total population, total deaths
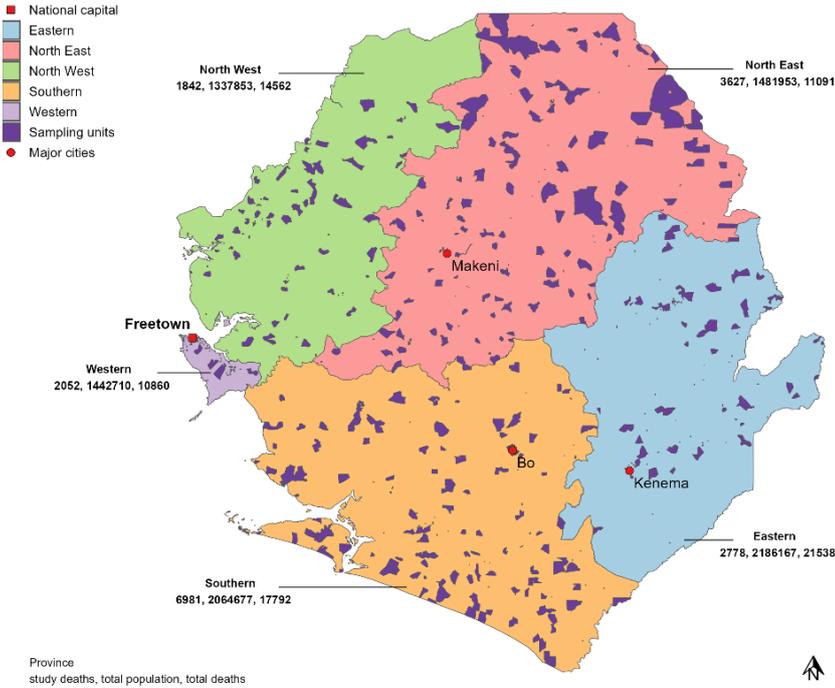
## Cause of death determination and collation

Each death is assigned an International Classification of Diseases (ICD-10) code to identify the underlying cause of death by trained physicians who independently and anonymously assigned causes, resolving discrepancies through blind adjudication by a senior physician. The coding is done electronically, allowing for rapid cause assignment within days of data collection. The coded deaths are categorized according to a standard classification system based on the WHO Global Health Estimates.

**Figure 5. HEAL-SL Field activities and cause of death determination process**



- Enumerated areas / Persons enumerated
- Deaths - All age groups
- Electronic Verbal Autopsy, automated range checks, 5% random resampling
- Field reports - server
- eVA record assigned anonymously to 2 physicians
- Missing data
- Agreement on cause of death
- Initial disagreement
- Anonymous reconciliation
- Adjudicated by senior physician
- Final ICD-10 code (underlying causes) for deaths

## Summary of findings from first report (published in 2021)

The first report of HEAL-SL, covering 2018-2020 examined the factors contributing to mortality in Sierra Leone among individuals under the age of 70. In the perinatal period, both on a national scale and across various regions, the most prevalent causes of death were stillbirth, birth asphyxia, and prematurity. The estimated national neonatal mortality rate stood at 31.1 deaths per 1,000 live births. Notably, nearly two-thirds of deaths in children aged 1 month to 14 years were attributed to infectious diseases, with malaria alone accounting for at least half of these fatalities.

Maternal mortality primarily stemmed from issues such as uterine rupture and postpartum sepsis, constituting 32% of deaths in this category. Overall, maternal deaths comprised 8.6% of all female deaths among those aged 15 to 49, resulting in a maternal mortality rate of around 456 deaths per 100,000 live births annually.

Among adults aged 15 to 69, malaria also emerged as the leading cause of death, contributing to up to 20% of the total mortality and an approximate annual rate of 200 deaths per 100,000 individuals. This finding was consistent across regions, where malaria ranked either first or among the top 5 causes of death. Additionally, other significant contributors to mortality in the adult population included infectious diseases and injuries among those aged 15 to 29, while stroke and other vascular conditions were prominent among those aged 30 to 69, with each category accounting for roughly 20% of all deaths in their respective age groups.

## Included in this report are updated results from 2018 to 2023

This report includes the distribution of deaths and their causes for all age groups for the 2018 to 2023 period including 2018-2020 results.

## II – Overall mortality patterns and leading causes of death

**Table 3. Study deaths by locality (region and residence), sex and age group, 2018-2023**

|  | % Deaths | Female | Male | Total |
|---|---|---|---|---|
| **Sierra Leone** | 100 | 8,009 (46.4%) | 9,271 (53.7%) | 17,280 |
| **Residence** | | | | |
| Rural | 62.9 | 5,074 (46.7%) | 5,793 (53.3%) | 10,867 |
| Urban | 37.1 | 2,935 (45.8%) | 3,478 (54.2%) | 6,413 |
| **Region** | | | | |
| South | 40.4 | 3,331 (47.7%) | 3,650 (52.3%) | 6,981 |
| North East | 21.0 | 1,696 (46.8%) | 1,931 (53.2%) | 3,627 |
| East | 16.1 | 1,238 (44.6%) | 1,540 (55.4%) | 2,778 |
| West | 11.9 | 917 (44.7%) | 1,135 (55.3%) | 2,052 |
| North West | 10.7 | 827 (44.9%) | 1,015 (55.1%) | 1,842 |
| **Age group** | | | | |
| Stillbirth | 2.1 | 160 (43.2%) | 210 (56.8%) | 370 |
| Neonate | 4.7 | 358 (44.4%) | 449 (55.6%) | 807 |
| 1 to 59 months | 25.1 | 2,118 (48.9%) | 2,211 (51.1%) | 4,329 |
| 5 to 14 years | 8.6 | 660 (44.4%) | 827 (55.6%) | 1,487 |
| 15 to 29 years | 12.4 | 1,045 (48.8%) | 1,097 (51.2%) | 2,142 |
| 30 to 69 years | 38.4 | 2,918 (44.0%) | 3,715 (56.0%) | 6,633 |
| 70 years + | 8.6 | 750 (49.6%) | 762 (50.4%) | 1,512 |

**Table 4. Place of death, 2018-2023**

| Death site | Deaths | % |
|---|---|---|
| Home | 8,995 | 52.1 |
| Hospital/Health facility | 6,784 | 39.3 |
| On route to hospital or facility | 853 | 4.9 |
| Other | 648 | 3.8 |
| **Total deaths** | **17,280** | **100** |

**Table 5. National deaths by age group, 2018-2023**

| Age group | Total national deaths |
|---|---|
| **Child ~ 30,600** | |
| Stillbirths | 4,612 |
| Neonates | 8,253 |
| 1-59 months | 18,651 |
| 5-14 years | 3,705 |
| **Adults ~ 45,000** | |
| 15-29 years | 5,917 |
| 30-69 years | 23,735 |
| 70+ years | 15,582 |
| **All deaths (excluding stillbirths)** | 75,843 |

**Table 6. Distribution of deaths by major cause groups, 2018-2023**

| Major cause group | Number of deaths (%) | | |
|---|---|---|---|
| | Male | Female | Total |
| **Communicable, maternal, perinatal, nutritional** | 5,569 (51) | 5,281 (49) | 10,850 (63) |
| **Non-communicable** | 2,517 (55) | 2,099 (45) | 4,616 (27) |
| **Injuries** | 1,014 (71) | 414 (29) | 1,428 (8) |
| **Ill-defined or cause unknown** | 171 (44) | 215 (56) | 386 (2) |
| **Total** | **9,271 (54)** | **8,009 (46)** | **17,280 (100)** |

**Table 7. Cause specific distribution of deaths, 2018-2023**

| Cause of death | Study deaths (male/female) | National annual deaths | % Total |
|---|---|---|---|
| Malaria | 4,045 (2,104/1,941) | 16,075 | 21.2 |
| Other infections | 1,785 (928/857) | 8,350 | 11.0 |
| Ischaemic heart and other vascular | 1,108 (549/559) | 5,747 | 7.6 |
| Diarrhoea | 994 (525/469) | 4,285 | 5.6 |
| Stroke | 828 (415/413) | 4,262 | 5.6 |
| Pneumonia | 749 (389/360) | 3,074 | 4.1 |
| Severe systemic infection | 320 (178/142) | 2,538 | 3.3 |
| Birth asphyxia and birth trauma | 236 (139/97) | 2,431 | 3.2 |
| Tuberculosis | 532 (312/220) | 2,399 | 3.2 |
| Appendix, hernia, intestinal | 499 (350/149) | 2,162 | 2.9 |
| Peptic ulcer/gastroesophageal | 403 (241/162) | 1,744 | 2.3 |
| Low birth weight/preterm | 159 (78/81) | 1,570 | 2.1 |
| Asthma and chronic respiratory | 285 (164/120) | 1,551 | 2.0 |
| Liver and alcohol diseases | 409 (248/161) | 1,478 | 1.9 |
| Road traffic accidents | 435 (315/120) | 1,460 | 1.9 |
| Cancer | 310 (138/172) | 1,252 | 1.7 |
| Falls | 271 (195/76) | 1,226 | 1.6 |
| Other unintentional injuries | 311 (200/111) | 1,153 | 1.5 |
| Other perinatal conditions | 140 (83/57) | 1,121 | 1.5 |
| Maternal | 333 (0/333) | 1,032 | 1.4 |
| HIV/AIDS and STIs | 287 (132/155) | 1,008 | 1.3 |
| Kidney failure and genitourinary | 222 (131/91) | 936 | 1.2 |
| Other non-communicable | 181 (103/78) | 894 | 1.2 |
| Severe localized infection | 227 (120/107) | 889 | 1.2 |
| Fever of unknown origin | 145 (72/73) | 672 | 0.9 |
| Meningitis/encephalitis | 201 (101/100) | 671 | 0.9 |
| Epilepsy | 170 (85/85) | 649 | 0.9 |
| Hepatitis | 206 (142/64) | 647 | 0.9 |
| Animal/plant venom | 143 (98/45) | 521 | 0.7 |
| Sickle-cell | 135 (67/68) | 470 | 0.6 |
| Other injuries | 106 (87/19) | 376 | 0.5 |
| Drownings | 105 (81/24) | 360 | 0.5 |
| Malnutrition | 61 (26/35) | 270 | 0.4 |
| Measles | 72 (30/42) | 236 | 0.3 |
| Other neuropsychiatric disorders | 56 (26/30) | 222 | 0.3 |
| Other transport accidents | 56 (38/18) | 113 | 0.1 |
| Ill-defined/unknown | 385 (171/214) | 1,998 | 2.6 |
| **All deaths (excluding stillbirths)** | | **75,843** | **100.0** |
| Stillbirths | 370 (210/160) | 4,612 | 35.8 |

Stillbirth % denominator based on neonatal deaths & stillbirths.

## III – Mortality patterns and leading causes of death in specific age groups

This section presents mortality patterns by age groups – stillbirths, neonates (0-28 days), children (1-59 months), 5 to 14 years, young adults (15 to 29 years and 30 to 69 years), and older adults aged 70 years and over.

### Neonate (0 to 28 days)

**Table 8. Leading causes of death for neonates, 2018-2023**

| Cause of death | Study deaths (male/female) | National annual deaths | % Total | Annual mortality rate (95% CI) per 1000 livebirths* | Risk of death % |
|---|---|---|---|---|---|
| **Stillbirth** | 370 (210/160) | 4,612 | 31.8 | 16.9 (16.4-17.4) | NA |
| **Neonatal deaths** | | | | | |
| Birth asphyxia and birth trauma | 236 (139/97) | 2,431 | 29.5 | 9.1 (8.7-9.5) | 0.92 |
| Severe systemic infection | 216 (116/100) | 2,170 | 26.3 | 8.1 (7.8-8.4) | 0.82 |
| Low birth weight/preterm | 159 (78/81) | 1,570 | 19.0 | 5.9 (5.6-6.2) | 0.60 |
| Other perinatal conditions | 91 (58/33) | 937 | 11.4 | 3.5 (3.3-3.7) | 0.36 |
| Other infections | 54 (35/19) | 584 | 7.1 | 2.2 (2-2.4) | 0.22 |
| Non-communicable | 21 (8/13) | 244 | 3.0 | 0.9 (0.8-1) | 0.09 |
| Pneumonia | 23 (11/12) | 215 | 2.6 | 0.8 (0.7-0.9) | 0.08 |
| Injuries | 4 (3/1) | 38 | 0.5 | 0.1 (0.1-0.1) | 0.01 |
| Ill-defined/unknown | 3 (1/2) | 65 | 0.8 | 0.2 (0.2-0.3) | 0.02 |
| **All neonatal deaths** | **807 (449/358)** | **8,253** | **100.0** | **30.9 (30.2-31.6)** | **3.13** |

*Stillbirths rate per 1000 births (livebirths and stillbirths).
See notes section on page 44 for specific causes

The birth process and the first month of life are the riskiest periods for Sierra Leoneans. More than 3% of babies die during that period and about half as many full-term babies are stillborn. The main causes leading to both stillbirths and neonatal deaths are birth asphyxia—oxygen deprivation during the birth process—and birth trauma. Severe infections and low birthweight are also important contributors to these early losses of life.

*Neonatal mortality rates*
Sierra Leone: 31/1,000 live births
Neonatal global: 18/1,000 live births
WHO African region: 27/1,000 live births

### Stillbirths

**Table 9. Ratio of stillbirths to neonatal deaths, 2023**

| Group | Study death | National annual deaths | % total | Mortality rate (1000 births) | SBR/ENNM |
|---|---|---|---|---|---|
| **Stillbirth** | 370 | 4,612 | 31.8 | 16.9 (16.4 – 17.4) | 1.0 |
| **Neonatal deaths** | | | | | |
| Day 0/1 deaths | 348 | 3,443 | 41.7 | 12.9 (12.5 - 13.3) | 1.3 |
| Day 0-6 deaths | 579 | 5,866 | 71.1 | 22.0 (21.4 - 22.6) | 0.8 |
| Late (day 7+) | 228 | 2,387 | 28.9 | 8.9 (8.6 - 9.3) | 1.9 |
| **All neonatal deaths** | 807 | 8,253 | 100 | 30.9 (30.2 - 31.6) | 0.5 |

## Children 1-59 months

**Table 10. Leading causes of death in children 1-59 months, 2018-2023**

| Cause of death | Study deaths (male/female) | National annual deaths | % Total | Annual mortality rate (95% CI) per 1000 livebirths | Risk of death % |
|---|---|---|---|---|---|
| **Deaths at 1-59 months** | | | | | |
| Malaria | 2,032 (1,056/976) | 8,881 | 47.6 | 33.3 (32.6-34) | 3.38 |
| Other infections | 951 (484/467) | 4,225 | 22.7 | 15.8 (15.3-16) | 1.61 |
| Diarrhoea | 308 (159/149) | 1,344 | 7.2 | 5 (4.7-5) | 0.51 |
| Pneumonia | 260 (125/135) | 954 | 5.1 | 3.6 (3.4-4) | 0.36 |
| Injuries | 127 (71/56) | 570 | 3.1 | 2.1 (1.9-2) | 0.22 |
| Meningitis/encephalitis | 91 (46/45) | 329 | 1.8 | 1.2 (1.1-1) | 0.13 |
| Non-communicable | 64 (37/27) | 285 | 1.5 | 1.1 (1-1) | 0.11 |
| Fever of unknown origin | 60 (33/27) | 262 | 1.4 | 1.0 (0.9-1) | 0.10 |
| Epilepsy | 59 (18/41) | 254 | 1.4 | 1.0 (0.9-1) | 0.10 |
| Appendix, hernia, intestinal | 47 (24/23) | 228 | 1.2 | 0.9 (0.8-1) | 0.09 |
| Malnutrition | 49 (20/29) | 219 | 1.2 | 0.8 (0.7-1) | 0.08 |
| Other perinatal conditions | 49 (25/24) | 184 | 1.0 | 0.7 (0.6-1) | 0.07 |
| Measles | 46 (20/26) | 175 | 0.9 | 0.7 (0.6-1) | 0.07 |
| Asthma/chronic respiratory | 29 (12/17) | 123 | 0.7 | 0.5 (0.4-1) | 0.05 |
| HIV/AIDS and STIs | 30 (17/13) | 121 | 0.7 | 0.5 (0.4-1) | 0.05 |
| Severe systemic infection | 25 (13/12) | 98 | 0.5 | 0.4 (0.3-0) | 0.04 |
| Hepatitis | 22 (10/12) | 75 | 0.4 | 0.3 (0.2-0) | 0.03 |
| Cancer | 9 (5/4) | 21 | 0.1 | 0.1 (0.1-0) | 0.01 |
| Ill-defined/unknown | 71 (36/35) | 303 | 1.6 | 1.1 (1-1) | 0.12 |
| **All 1-59 months deaths** | **4,329 (2,211/2,118)** | **18,651** | **100.0** | **69.9 (68.9-71)** | **7.10** |

See notes section on page 44 for specific causes

About 7% of children who survive the neonatal period die before their fifth birthday. Malaria causes nearly half of these deaths, and another quarter are caused by other infections, including those that cause diarrhoea and pneumonia. Most of these deaths are preventable or curable with interventions that should be accessible all over the country. Measles, a vaccine-preventable disease, claims close to 1% of children under 5, malnutrition is the direct cause of another 1% and injuries are the cause of 3% of deaths.

*Under-5 death rates*
Sierra Leone: 70/1,000 live births
Global: 38/1,000 live births
WHO African region: 72/1,000 live births

## Children 5 - 14 years

**Table 11. Leading causes of death in children 5-14 years, 2018-2023**

| Cause of death | Study deaths (male/female) | National annual deaths | % Total | Annual mortality rate (95% CI) per 100,000 pop | Period risk % |
|---|---|---|---|---|---|
| **5-14 years** | | | | | |
| Malaria | 584 (311/273) | 1,453 | 39.2 | 68 (64.6-71.6) | 0.64 |
| Other infections | 272 (136/136) | 719 | 19.4 | 33.7 (31.3-36.3) | 0.31 |
| Diarrhoea | 116 (72/44) | 280 | 7.6 | 13.1 (11.7-14.7) | 0.12 |
| Sickle-cell | 47 (23/24) | 146 | 3.9 | 6.8 (5.8-8) | 0.06 |
| Other injuries | 55 (42/13) | 146 | 3.9 | 6.8 (5.8-8) | 0.06 |
| Appendix, hernia, intestinal | 54 (32/22) | 130 | 3.5 | 6.1 (5.1-7.2) | 0.06 |
| Non-communicable | 52 (25/27) | 124 | 3.3 | 5.8 (4.9-6.9) | 0.05 |
| Falls | 40 (30/10) | 92 | 2.5 | 4.3 (3.5-5.3) | 0.04 |
| Pneumonia | 40 (20/20) | 80 | 2.2 | 3.8 (3.1-4.7) | 0.04 |
| Road traffic accidents | 29 (17/12) | 71 | 1.9 | 3.3 (2.6-4.2) | 0.03 |
| Drownings | 31 (22/9) | 68 | 1.8 | 3.2 (2.5-4.1) | 0.03 |
| Meningitis/encephalitis | 30 (17/13) | 68 | 1.8 | 3.2 (2.5-4.1) | 0.03 |
| Hepatitis | 27 (18/9) | 66 | 1.8 | 3.1 (2.4-3.9) | 0.03 |
| Epilepsy | 30 (17/13) | 65 | 1.8 | 3.0 (2.4-3.8) | 0.03 |
| Liver and alcohol diseases | 21 (14/7) | 57 | 1.5 | 2.7 (2.1-3.5) | 0.02 |
| Peptic ulcer/gastroesophageal | 20 (12/8) | 51 | 1.4 | 2.4 (1.8-3.2) | 0.02 |
| Cancer | 9 (4/5) | 16 | 0.4 | 0.8 (0.5-1.3) | 0.01 |
| Ill-defined/unknown | 30 (15/15) | 74 | 2.0 | 3.5 (2.8-4.4) | 0.03 |
| **All 5-14 years death** | **1,487 (827/660)** | **3,705** | **100.0** | **173.5 (168-179.2)** | **1.62** |

At ages 5-14, malaria remains dominant, causing 39% of deaths in the age group. Other infections continue to be important, causing an additional 30% (including those causing diarrhoea, pneumonia, and meningitis/encephalitis). Sickle-cell disease begins taking a toll in this age group, accounting for 4% of deaths. Another 6% die from road traffic accidents and other injuries.

*Annual mortality rates for children and adolescents aged 5-14 years*
Sierra Leone: 17/1,000
Global: 6/1,000
WHO African region: 15/1,000

**Table 12. Leading causes of death in adults 15-29 years, 2018-2023**

| Cause of death | Study deaths (male/female) | National annual deaths | % Total | Annual mortality rate (95% CI) per 100,000 pop | Period risk % |
|---|---|---|---|---|---|
| **Communicable, maternal, perinatal & nutritional** | | | | | |
| Malaria | 380 (192/188) | 1,000 | 16.9 | 40.9 (38.4-43.5) | 0.58 |
| Maternal | 183 (0/183) | 508 | 8.6 | 20.8 (19.1-22.7) | 0.30 |
| Other infections | 134 (66/68) | 348 | 5.9 | 14.2 (12.8-15.8) | 0.20 |
| Diarrhoea | 111 (54/57) | 313 | 5.3 | 12.8 (11.5-14.3) | 0.18 |
| Tuberculosis | 86 (36/50) | 272 | 4.6 | 11.1 (9.9-12.5) | 0.16 |
| Pneumonia | 79 (40/39) | 210 | 3.6 | 8.6 (7.5-9.8) | 0.12 |
| HIV/AIDS and STIs | 69 (23/46) | 207 | 3.5 | 8.5 (7.4-9.7) | 0.12 |
| Non-communicable | 56 (27/29) | 160 | 2.7 | 6.6 (5.7-7.7) | 0.09 |
| Severe localized infection | 50 (27/23) | 136 | 2.3 | 5.6 (4.7-6.6) | 0.08 |
| Hepatitis | 51 (37/14) | 95 | 1.6 | 3.9 (3.2-4.8) | 0.06 |
| Meningitis/encephalitis | 24 (14/10) | 56 | 0.9 | 2.3 (1.8-3) | 0.03 |
| **Non-communicable** | | | | | |
| Appendix, hernia, intestinal | 90 (56/34) | 282 | 4.8 | 11.6 (10.3-13) | 0.17 |
| Peptic ulcer/gastroesophageal | 79 (56/23) | 218 | 3.7 | 8.9 (7.8-10.2) | 0.13 |
| Ischaemic heart and other vascular | 64 (30/34) | 175 | 3.0 | 7.2 (6.2-8.4) | 0.10 |
| Sickle-cell | 51 (23/28) | 157 | 2.7 | 6.4 (5.5-7.5) | 0.09 |
| Liver and alcohol diseases | 68 (36/32) | 156 | 2.6 | 6.4 (5.5-7.5) | 0.09 |
| Cancer | 39 (11/28) | 129 | 2.2 | 5.3 (4.5-6.3) | 0.08 |
| Epilepsy | 39 (28/11) | 106 | 1.8 | 4.4 (3.6-5.3) | 0.06 |
| Kidney failure and genitourinary | 33 (9/24) | 79 | 1.3 | 3.2 (2.6-4) | 0.05 |
| Stroke | 24 (13/11) | 58 | 1.0 | 2.4 (1.9-3.1) | 0.03 |
| **Injuries** | | | | | |
| Road traffic accidents | 139 (99/40) | 384 | 6.5 | 15.7 (14.2-17.4) | 0.22 |
| Other injuries | 106 (83/23) | 294 | 5.0 | 12 (10.7-13.5) | 0.17 |
| Drownings | 40 (36/4) | 138 | 2.3 | 5.7 (4.8-6.7) | 0.08 |
| Falls | 42 (36/6) | 121 | 2.1 | 5 (4.2-6) | 0.07 |
| Animal/plant venom | 39 (31/8) | 93 | 1.6 | 3.8 (3.1-4.7) | 0.05 |
| **Ill-defined/unknown** | 66 (34/32) | 220 | 3.7 | 9 (7.9-10.3) | 0.13 |
| **All 15-29 years** | **2,142 (1,097/1,045)** | **5,917** | **100.0** | **242.3 (236.2-248.6)** | **3.46** |

Teens and young adults are among the healthiest in the population, having survived childhood and not yet subject to most diseases of older age. Still, malaria takes the largest toll, responsible for 17% of deaths. Other infections are the next largest group of causes, now including 5% of deaths from tuberculosis and 4% from HIV/AIDS and other sexually-transmitted infections, as well as the many endemic pathogens in the region. For young women, childbirth is a dangerous time. Road traffic accidents also rise in importance, especially among young men.

*Annual mortality rates for teens and young adults aged 15-29 years*
Sierra Leone: 242/100,000
Global: 130/100,000
WHO African region: 319/100,000

**Table 13. Leading causes of death in adults 30-69 years, 2018-2023**

| Cause of death | Study deaths (male/female) | National annual deaths | % Total | Annual mortality rate (95% CI) per 100,000 pop | Period risk % |
|---|---|---|---|---|---|
| **Communicable, maternal, perinatal & nutritional** | | | | | |
| Malaria | 836 (458/378) | 2,661 | 11.2 | 102.6 (98.8-106.6) | 4.85 |
| Other infections | 389 (221/168) | 1,553 | 6.5 | 59.9 (57.0-63.0) | 2.83 |
| Diarrhoea | 365 (186/179) | 1,355 | 5.7 | 52.2 (49.5-55.1) | 2.47 |
| Tuberculosis | 350 (217/133) | 1,324 | 5.6 | 51 (48.3-53.8) | 2.41 |
| Pneumonia | 278 (162/116) | 983 | 4.1 | 37.9 (35.6-40.3) | 1.79 |
| HIV/AIDS and STIs | 167 (78/89) | 600 | 2.5 | 23.1 (21.3-25) | 1.09 |
| Maternal | 148 (0/148) | 522 | 2.2 | 20.1 (18.4-21.9) | 0.95 |
| Severe localized infection | 126 (67/59) | 505 | 2.1 | 19.5 (17.9-21.3) | 0.92 |
| Hepatitis | 96 (72/24) | 298 | 1.3 | 11.5 (10.3-12.9) | 0.54 |
| Fever of unknown origin | 50 (24/26) | 182 | 0.8 | 7 (6.1-8.1) | 0.33 |
| Severe Systemic Infection | 48 (29/19) | 145 | 0.6 | 5.6 (4.8-6.6) | 0.26 |
| Meningitis/encephalitis | 47 (21/26) | 142 | 0.6 | 5.5 (4.7-6.5) | 0.26 |
| **Non-communicable** | | | | | |
| Ischaemic heart and other vascular | 782 (401/381) | 2,821 | 11.9 | 108.8 (104.9-112.9) | 5.14 |
| Stroke | 605 (305/300) | 2,099 | 8.8 | 80.9 (77.5-84.4) | 3.83 |
| Appendix, hernia, intestinal | 261 (201/60) | 1,043 | 4.4 | 40.2 (37.8-42.7) | 1.90 |
| Liver and alcohol diseases | 282 (178/104) | 940 | 4.0 | 36.2 (34.0-38.6) | 1.71 |
| Cancer | 238 (109/129) | 896 | 3.8 | 34.5 (32.3-36.8) | 1.63 |
| Peptic ulcer/gastroesophageal | 241 (137/104) | 883 | 3.7 | 34.1 (31.9-36.4) | 1.61 |
| Asthma and chronic respiratory | 162 (97/65) | 635 | 2.7 | 24.5 (22.7-26.5) | 1.16 |
| Kidney failure and genitourinary | 144 (89/55) | 507 | 2.1 | 19.5 (17.9-21.3) | 0.92 |
| Other non-communicable | 84 (53/31) | 334 | 1.4 | 12.9 (11.6-14.4) | 0.61 |
| Epilepsy | 36 (20/16) | 134 | 0.6 | 5.2 (4.4-6.2) | 0.24 |
| Other neuropsychiatric disorders | 36 (19/17) | 121 | 0.5 | 4.7 (3.9-5.6) | 0.22 |
| Sickle-cell | 24 (11/13) | 78 | 0.3 | 3.0 (2.4-3.7) | 0.14 |
| **Injuries** | | | | | |
| Road traffic accidents | 241 (177/64) | 834 | 3.5 | 32.2 (30.1-34.5) | 1.52 |
| Other unintentional injuries | 166 (111/55) | 576 | 2.4 | 22.2 (20.5-24.1) | 1.05 |
| Falls | 136 (101/35) | 539 | 2.3 | 20.8 (19.1-22.6) | 0.98 |
| Animal/plant venom | 73 (44/29) | 256 | 1.1 | 9.9 (8.8-11.2) | 0.47 |
| Other injuries | 61 (50/11) | 224 | 0.9 | 8.7 (7.6-9.9) | 0.41 |
| Other transport accidents | 26 (16/10) | 52 | 0.2 | 2.0 (1.5-2.6) | 0.09 |
| Ill-defined/unknown | 135 (61/74) | 494 | 2.1 | 19 (17.4-20.8) | 0.90 |
| **All 30-69 years death** | **6,633 (3,715/2,918)** | **23,735** | **100.0** | **915.2 (903.6-926.9)** | **43.26** |

See notes section on page 44 for specific causes

Non-communicable diseases dominate the deaths in this age group, including 9% from cerebrovascular disease (mainly stroke) and 12% from heart attacks and other cardiovascular conditions. Malaria, however, remains a significant killer, accounting for 11% of the deaths. Other infections, including tuberculosis, HIV/AIDS, pneumonia, continue to be important causes of death, as are road traffic accidents and injuries. Overall, more than one-third of Sierra Leoneans who reach age 30 will die before they are 70 years.

*Annual mortality rates for adults through middle age, aged 30-69 years*
Sierra Leone: 915/100,000
Global: 593/100,000
WHO African region: 1,053/100,000

## Adult 70 and over

**Table 14. Leading cause of death in adults 70 years and over, 2018-2023**

| Cause of death | Study deaths (male/female) | National annual deaths | % Total | Annual mortality rate (95% CI) per 100,000 pop | Period risk % |
|---|---|---|---|---|---|
| **Communicable, maternal, perinatal & nutritional** | | | | | |
| Malaria | 213 (87/126) | 2,080 | 13.4 | 1,351 (1,294.2-1,410.3) | 13.35 |
| Other infections | 205 (100/105) | 2,053 | 13.2 | 1,333.1 (1,276.7-1,392) | 13.17 |
| Diarrhoea | 86 (48/38) | 908 | 5.8 | 590 (552.9-629.6) | 5.83 |
| Tuberculosis | 67 (44/23) | 688 | 4.4 | 447 (414.8-481.7) | 4.42 |
| Pneumonia | 69 (31/38) | 632 | 4.1 | 410.1 (379.3-443.4) | 4.05 |
| **Non-communicable** | | | | | |
| Ischaemic heart and other vascular | 254 (115/139) | 2,735 | 17.6 | 1,776.1 (1,710.8-1,843.9) | 17.55 |
| Stroke | 199 (97/102) | 2,105 | 13.5 | 1,366.8 (1,309.6-1,426.5) | 13.51 |
| Asthma and chronic respiratory | 65 (41/24) | 702 | 4.5 | 456 (423.5-491) | 4.51 |
| Peptic ulcer/gastroesophageal | 57 (34/23) | 577 | 3.7 | 374.6 (345.2-406.5) | 3.70 |
| Appendix, hernia, intestinal | 46 (36/10) | 456 | 2.9 | 296.2 (270.2-324.7) | 2.93 |
| Other Non-communicable | 32 (16/16) | 360 | 2.3 | 233.7 (210.8-259.1) | 2.31 |
| Kidney failure and genitourinary | 25 (21/4) | 279 | 1.8 | 181.3 (161.2-203.9) | 1.79 |
| Liver and alcohol diseases | 27 (14/13) | 264 | 1.7 | 171.1 (151.6-193.1) | 1.69 |
| Cancer | 15 (9/6) | 190 | 1.2 | 123.4 (107-142.3) | 1.22 |
| **Injuries** | | | | | |
| Falls | 35 (17/18) | 357 | 2.3 | 232.1 (209.2-257.5) | 2.29 |
| Other injuries | 37 (28/9) | 354 | 2.3 | 229.6 (206.9-254.8) | 2.27 |
| Ill-defined/unknown | 80 (24/56) | 842 | 5.4 | 547.1 (511.4-585.3) | 5.41 |
| **All 70+ years** | **1,512 (762/750)** | **15,582** | **100.0** | **10,119.2 (9,961.6-10,279.3)** | **100.0** |

See notes section on page 44 for specific causes

About one-third of the deaths in this oldest age group result from cardiovascular disease, cerebrovascular disease (mainly stroke), and other non-communicable diseases. Malaria remains, however, among the leading causes, responsible for 13% of deaths. Other infections—including tuberculosis and pneumonia—common among older people claim up to 10% of these lives.

*Annual mortality rates for older adults aged 70+ years*
Sierra Leone: 10,119/100,000
Global: 5,876/100,000
WHO African region: 9,200/100,000

## IV – Mortality from special conditions

Geospatial distribution of selected leading causes of death by age group

Malaria

**Figure 6. Malaria mortality per 100,000 population, 2018-2023**
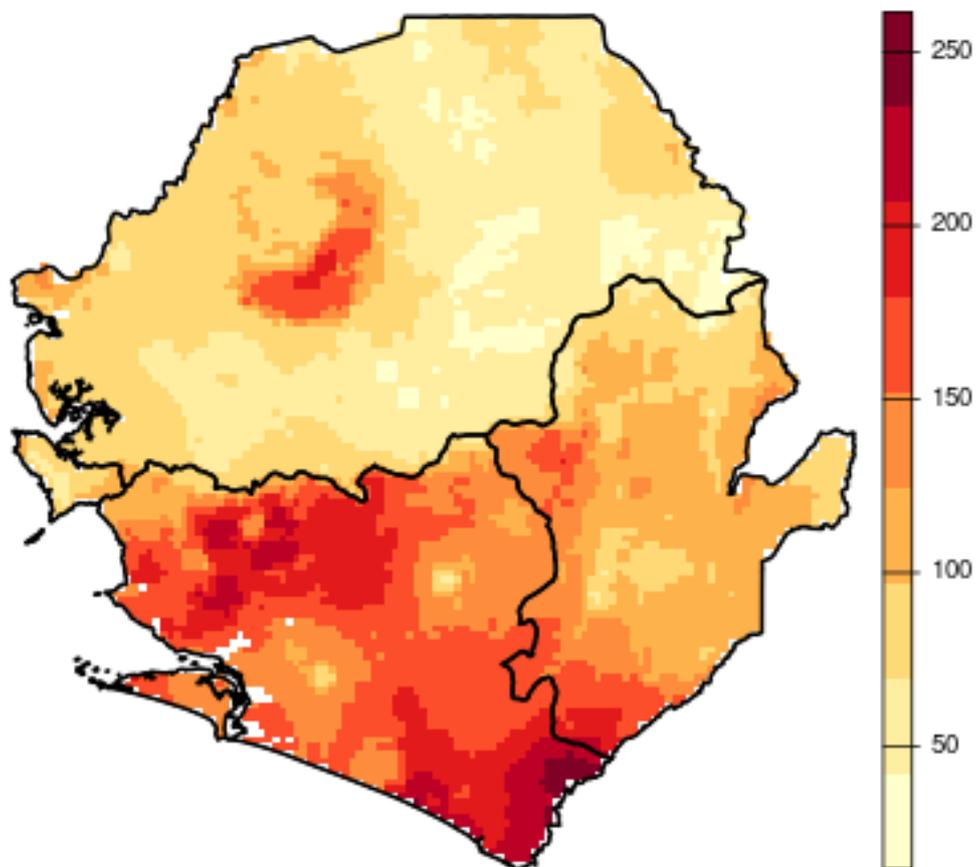
**Figure 7. Malaria mortality per 100,000 population by age and sex, 2018-2023**

## Diarrhoea, road traffic accidents and stroke
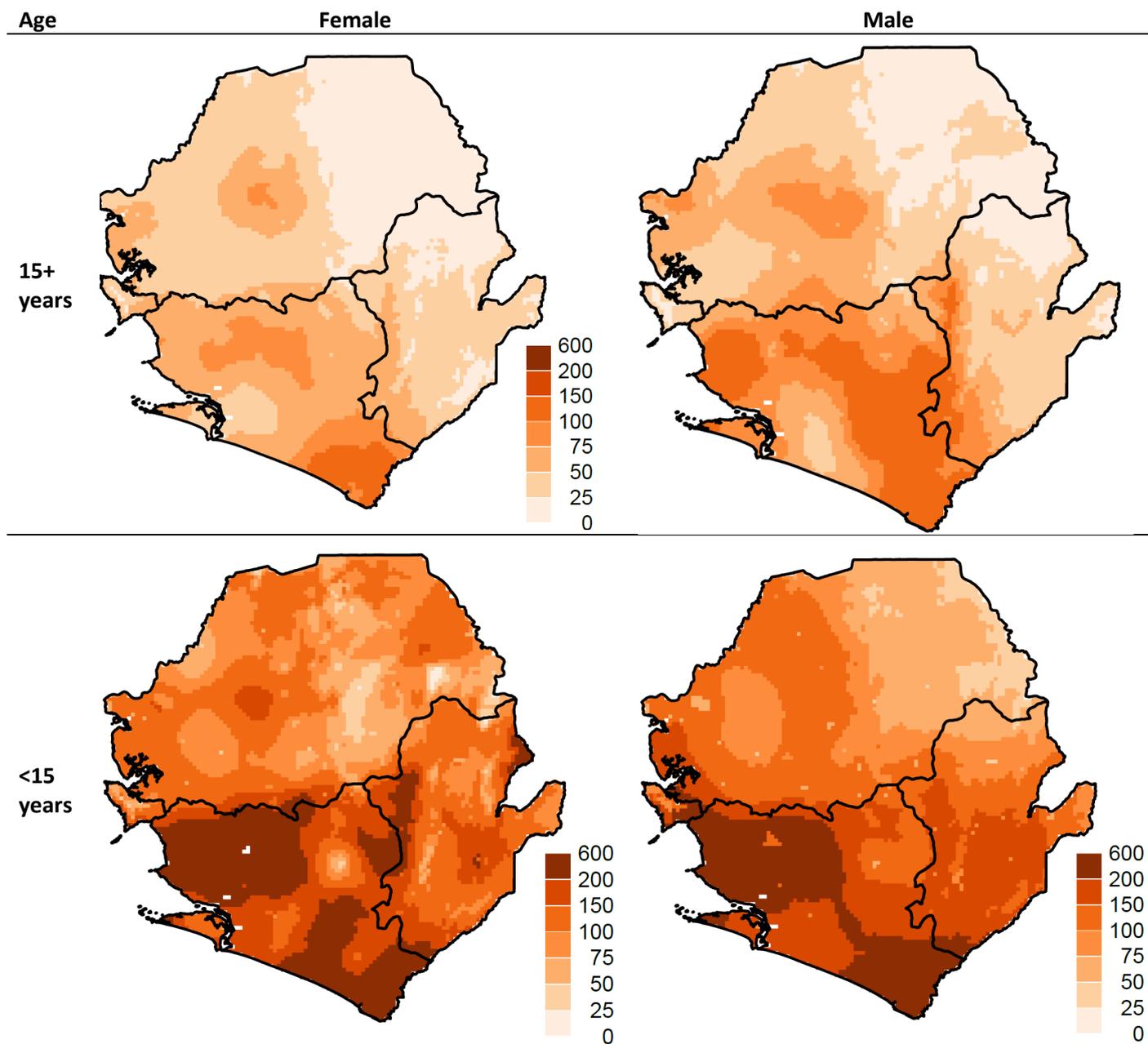
**Figure 8. Diarrhoea, road traffic accidents and stroke mortality per 100,000 population, 2018-2023**

**Diarrhoea (<15 years)**
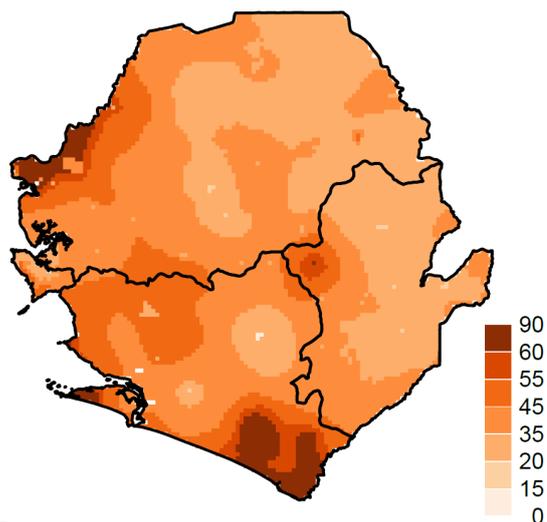
**Road traffic accident (All ages)**
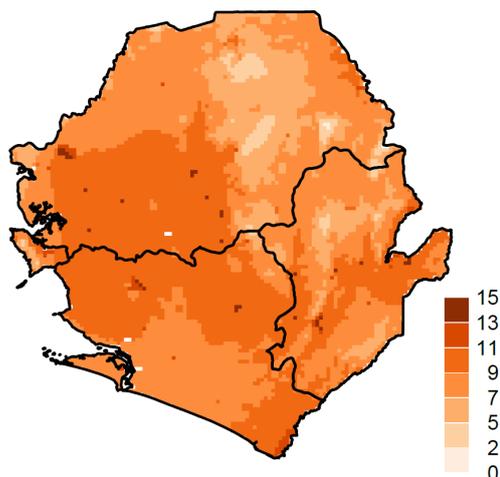
**Stroke (30+ years)**
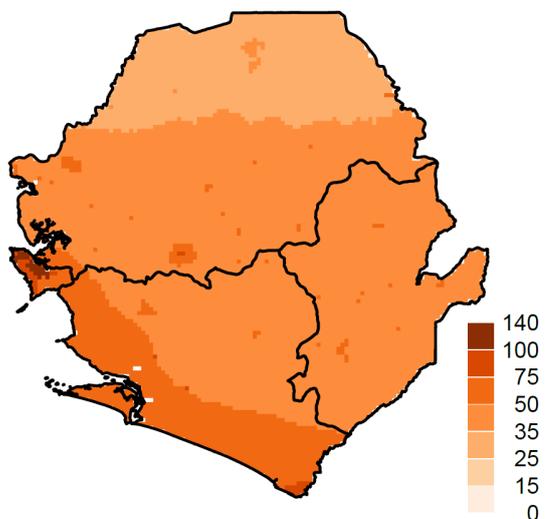
## Access to hospital or health facility and treatment received

**Table 15. Treatment and care seeking histories of malaria-attributed deaths in hospital/health facility among 1199 children and 545 adults, 2018-2023**

| | Children | | Adult | |
|---|---|---|---|---|
| **Treatments received** | % | (n) | % | (n) |
| **Any treatment for malaria** | 91% | (1,078) | 85% | (462) |
| Intravenous fluids (drip) treatment | 59% | (639) | 77% | (357) |
| Injectable antibiotics | 48% | (519) | 59% | (274) |
| Oral rehydration salts | 44% | (478) | NR | NR |
| Blood transfusion | 18% | (193) | 11% | (53) |
| Treatment/food through a nose tube | 6% | (70) | 3% | (15) |
| **Health care access** | | | | |
| Total costs of care and treatment prohibited other household payments | 19% | (225) | 21% | (116) |
| Takes more than two hours to get to the nearest hospital or health facility | 16% | (190) | 14% | (77) |
| *Problems getting medications or diagnostic tests in the hospital or health facility. | NR | NR | 7% | (28) |
| *Traditional medicine used | 7% | (56) | 9% | (37) |
| **Diagnostic tests received** | | | | |
| Recent positive test for malaria | 21% | (230) | 43% | (221) |
| Diagnosis of tuberculosis | 2% | (19) | 2% | (10) |
| HIV test ever positive | 1% | (6) | 3% | (15) |
| **Tested for other infectious disease | NR | NR | 20% | (38) |
| Malaria detected | | | 97% | (37) |
| Typhoid detected | | | 24% | (9) |

Total deaths attributed to malaria at ages 1 month and above was 4,049 (43% occurred in a hospital or other health facility);
*Pertain to rounds 1 and 2 only for a total of 812 child and 407 adult deaths;
**Pertain to rounds 2 and 3 only for a total of 188 adult deaths; Response not relevant or not available (NR) for certain age groups.

**Table 16. Treatment and care seeking histories of 297 stillbirths and 484 neonatal deaths in hospital/health facility, 2018-2023**

| | Stillbirths | | Neonatal (0-28 days) | |
|---|---|---|---|---|
| **Condition-specific information** | **%** | **(n)** | **%** | **(n)** |
| Mother received professional assistance during the delivery | 87% | (256) | 84% | (403) |
| Mother received any vaccinations since reaching adulthood including during this pregnancy | 82% | (242) | 81% | (380) |
| Mother received tetanus toxoid vaccine | 96% | (232) | 92% | (351) |
| Deceased's biological mother ever tested for HIV | 33% | (99) | 37% | (173) |
| Deceased's biological mother ever told she had HIV/AIDS by a health worker | 3% | (10) | 2% | (11) |
| During labour, the baby's mother had fever | 29% | (84) | 22% | (101) |
| Baby's mother had severe anaemia | 16% | (48) | 10% | (48) |
| During the last 3 months of pregnancy, labour or delivery, the baby's mother had high blood pressure | 14% | (42) | 11% | (53) |
| Baby's mother had diabetes mellitus | 1% | (3) | 0% | (2) |
| **Treatments received** | | | | |
| Received any treatment for the illness | 7% | (20) | 61% | (295) |
|     Intravenous fluids (drip) treatment | 59% | (13) | 30% | (88) |
|     Injectable antibiotics | 43% | (9) | 30% | (88) |
|     Oral rehydration salts | 36% | (8) | 13% | (39) |
|     Blood transfusion | 5% | (1) | 3% | (10) |
|     Treatment/food through a nose tube | 0% | (0) | 12% | (36) |
| **Health care access** | | | | |
| Takes more than two hours to get to the nearest hospital or health facility from the deceased's household | 13% | (39) | 14% | (68) |
| Over the course of illness, total costs of care and treatment prohibited other household payments | 10% | (30) | 12% | (59) |
| **\*In the final days before death, traditional medicine used** | 3% | (6) | 3% | (9) |

Total deaths attributed to stillbirth or neonatal causes was 370 and 807, respectively, 80% stillbirths and 60% neonatal deaths occurred in a hospital or health facility.

*Pertain to rounds 1 and 2 only for a total of 202 stillbirths and 360 neonatal deaths.

**Table 17. Treatment and care seeking histories of 186 deaths attributed to road traffic accidents in or on route to hospital/health facility among adults 15 years of age and older, 2018-2023**

| | % | (n) |
|---|---|---|
| **Role of the deceased in the accident‡** | | |
| Driver or passenger of a motorcycle | 51% | (87) |
| Driver or passenger in a car/light vehicle | 19% | (33) |
| Driver or passenger in a bus/heavy vehicle | 6% | (10) |
| Pedestrian | 19% | (32) |
| **Treatments received** | | |
| Received any treatment for injuries related to the accident | 50% | (93) |
|     Intravenous fluids (drip) treatment | 70% | (65) |
|     Injectable antibiotics | 59% | (55) |
|     Blood transfusion | 6% | (6) |
| **Health care access** | | |
| Takes more than 2 hours to get to the nearest hospital or health facility from the deceased's household | 15% | (28) |
| Total costs of care and treatment prohibited other household payments | 14% | (25) |
| *Problems getting medications or diagnostic tests in the hospital or health facility | 8% | (10) |

Total deaths attributed to road traffic accidents at ages 15 years and above was 389 (48% occurred in a hospital or other health facility, or on route to a hospital or health facility).
‡ Out of 172 responses;
*Pertain to rounds 1 and 2 only for a total of 94 deaths at 15 years and above.


**Table 18. Treatment and care seeking histories of 275 deaths attributed to stroke among adults 30 years of age and older, 2018-2023**

| | % | (n) |
|---|---|---|
| **Condition-specific information** | | |
| Normally drank alcohol at least once a week during most weeks in the last 5 years | 9% | (26) |
| Used any form of tobacco within the last 5 years | 12% | (33) |
| **Any diagnosis by a health professional of the following** | | |
|     High blood pressure | 58% | (159) |
|     Stroke | 7% | (19) |
|     Diabetes | 4% | (11) |
|     Other‡ | 7% | (20) |
|     None of the above | 24% | (66) |
| **Treatments received** | | |
| Received any treatment for stroke | 80% | (221) |
|     Intravenous fluids (drip) treatment | 76% | (167) |
|     Injectable antibiotics | 47% | (104) |
|     Treatment/food through a nose tube | 13% | (28) |
| **Health care access** | | |
| Takes more than two hours to get to the nearest hospital or health facility from the deceased's household | 13% | (35) |
| Over the course of illness, total costs of care and treatment prohibited other household payments | 25% | (68) |
| *Any problems getting medications or diagnostic tests in the hospital or health facility | 9% | (16) |
| ***Traditional medicine used** | 7% | (13) |

Total deaths attributed to stroke at ages 30 years and above was 806 (34% occurred in a hospital or other health facility);
‡Includes malaria, tuberculosis, heart disease, asthma, depression, other;
*Pertains to rounds 1 and 2 only for a total of 176 deaths at 30 years and above.

## V – Regional distribution of causes of death by age groups

This section presents mortality patterns by different age groups - children (neonates (0-28 days), 1-59 months, 5 to 14 years, and adults aged 15 to 29 years, 30 to 69 years, and older adults aged 70 years and over in the five regions of Sierra Leone.

### Child mortality: Neonates

**Table 19. Leading causes of death for neonates, 2018-2023 – East**

| Cause of death | Study deaths (male/female) | Regional annual deaths | % Total | Annual mortality rate (95% CI) per 1000 livebirths | Risk of death % |
|---|---|---|---|---|---|
| **Neonatal** | | | | | |
| Severe systemic infection | 30 (14/16) | 572 | 29.6 | 9.9 (9.1-10.7) | 0.99 |
| Birth asphyxia and birth trauma | 31 (15/16) | 551 | 28.6 | 9.6 (8.8-10.4) | 0.96 |
| Low birth weight/preterm | 20 (9/11) | 316 | 16.4 | 5.5 (4.9-6.1) | 0.55 |
| Other perinatal conditions | 12 (10/2) | 204 | 10.6 | 3.5 (3.1-4) | 0.35 |
| Other infections | 7 (4/3) | 151 | 7.8 | 2.6 (2.2-3.0) | 0.26 |
| Non-communicable | 3 (1/2) | 50 | 2.6 | 0.9 (0.7-1.2) | 0.09 |
| Pneumonia | 1 (1/0) | 22 | 1.2 | 0.4 (0.3-0.6) | 0.04 |
| Injuries | 1 (1/0) | 13 | 0.7 | 0.2 (0.1-0.3) | 0.02 |
| Ill-defined/unknown | 2 (1/1) | 52 | 2.7 | 0.9 (0.7-1.2) | 0.09 |
| **All neonatal** | **107 (56/51)** | **1930** | **100.0** | **33.5 (32-35)** | **3.35** |

See notes section on page 44 for specific causes

**Table 20. Leading causes of death for neonates, 2018-2023 – North East**

| Cause of death | Study deaths (male/female) | Regional annual deaths | % Total | Annual mortality rate (95% CI) per 1000 livebirths | Risk of death % |
|---|---|---|---|---|---|
| **Neonatal** | | | | | |
| Birth asphyxia and birth trauma | 60 (35/25) | 374 | 30.8 | 8.9 (8.0-9.8) | 0.89 |
| Low birth weight/preterm | 50 (23/27) | 321 | 26.5 | 7.6 (6.8-8.5) | 0.76 |
| Severe systemic infection | 30 (19/11) | 173 | 14.2 | 4.1 (3.5-4.8) | 0.41 |
| Other infections | 18 (13/5) | 139 | 11.4 | 3.3 (2.8-3.9) | 0.33 |
| Other perinatal conditions | 17 (9/8) | 109 | 9.0 | 2.6 (2.2-3.1) | 0.26 |
| Pneumonia | 5 (3/2) | 45 | 3.7 | 1.1 (0.8-1.5) | 0.11 |
| Non-communicable | 7 (3/4) | 43 | 3.6 | 1 (0.7-1.3) | 0.1 |
| Injuries | 1 (1/0) | 8 | 0.7 | 0.2 (0.1-0.4) | 0.02 |
| **All neonatal** | **188 (106/82)** | **1212** | **100.0** | **28.8 (27.2-30.5)** | **2.88** |

**Table 21. Leading causes of death for neonates, 2018-2023 – North West**

| Cause of death | Study deaths (male/female) | Regional annual deaths | % Total | Annual mortality rate (95% CI) per 1000 livebirths | Risk of death % |
|---|---|---|---|---|---|
| **Neonatal** | | | | | |
| Birth asphyxia and birth trauma | 27 (12/15) | 590 | 34.0 | 10.1 (9.3-10.9) | 1.01 |
| Severe systemic infection | 26 (13/13) | 481 | 27.7 | 8.2 (7.5-9.0) | 0.82 |
| Low birth weight/preterm | 12 (5/7) | 321 | 18.5 | 5.5 (4.9-6.1) | 0.55 |
| Other infections | 6 (4/2) | 142 | 8.2 | 2.4 (2.0-2.8) | 0.24 |
| Other perinatal conditions | 6 (3/3) | 120 | 6.9 | 2.0 (1.7-2.4) | 0.2 |
| Pneumonia | 3 (0/3) | 82 | 4.7 | 1.4 (1.1-1.7) | 0.14 |
| **All neonates** | **80 (37/43)** | **1735** | **100.0** | **29.6 (28.2-31)** | **2.96** |

**Table 22. Leading causes of death for neonates, 2018-2023 – South**

| Cause of death | Study deaths (male/female) | Regional annual deaths | % Total | Annual mortality rate (95% CI) per 1000 livebirths | Risk of death % |
|---|---|---|---|---|---|
| **Neonates** | | | | | |
| Severe systemic infection | 115 (59/56) | 803 | 35.7 | 13.4 (12.5-14.4) | 1.34 |
| Birth asphyxia and birth trauma | 85 (57/28) | 473 | 21.0 | 7.9 (7.2-8.6) | 0.79 |
| Low birth weight/preterm | 58 (30/28) | 348 | 15.4 | 5.8 (5.2-6.4) | 0.58 |
| Other perinatal conditions | 45 (27/18) | 336 | 14.9 | 5.6 (5.0-6.2) | 0.56 |
| Other infections | 22 (13/9) | 161 | 7.2 | 2.7 (2.3-3.2) | 0.27 |
| Non-communicable | 7 (2/5) | 66 | 2.9 | 1.1 (0.9-1.4) | 0.11 |
| Pneumonia | 11 (5/6) | 39 | 1.7 | 0.7 (0.5-1.0) | 0.07 |
| Injuries | 2 (1/1) | 15 | 0.7 | 0.3 (0.2-0.5) | 0.03 |
| Ill-defined/unknown | 1 (0/1) | 10 | 0.5 | 0.2 (0.1-0.4) | 0.02 |
| **All neonates** | **346 (194/152)** | **2,251** | **100.0** | **37.7 (36.2-39.3)** | **3.77** |

**Table 23. Leading causes of death for neonates, 2018-2023 – West**

| Cause of death | Study deaths (male/female) | Regional annual deaths | % Total | Annual mortality rate (95% CI) per 1000 livebirths | Risk of death % |
|---|---|---|---|---|---|
| **Neonates** | | | | | |
| Birth asphyxia and birth trauma | 33 (20/13) | 439 | 39.0 | 9.1 (8.3-10.0) | 0.91 |
| Low birth weight/preterm | 19 (11/8) | 241 | 21.5 | 5.0 (4.4-5.7) | 0.5 |
| Severe systemic infection | 15 (11/4) | 201 | 17.9 | 4.2 (3.7-4.8) | 0.42 |
| Other perinatal conditions | 11 (9/2) | 138 | 12.3 | 2.9 (2.5-3.4) | 0.29 |
| Non-communicable | 4 (2/2) | 55 | 4.9 | 1.1 (0.8-1.4) | 0.11 |
| Pneumonia | 3 (2/1) | 37 | 3.3 | 0.8 (0.6-1.1) | 0.08 |
| Other infections | 1 (1/0) | 14 | 1.2 | 0.3 (0.2-0.5) | 0.03 |
| **All neonates** | **86 (56/30)** | **1,125** | **100.0** | **23.2 (21.9-24.6)** | **2.32** |

## Child mortality: 1 – 59 months

**Table 24. Leading causes of death for 1 to 59 months, 2018-2023 – East**

| Cause of death | Study deaths (male/female) | Regional annual deaths | % Total | Annual mortality rate (95% CI) per 1000 livebirths | Risk of death % |
|---|---|---|---|---|---|
| **Deaths at 1-59 months** | | | | | |
| Malaria | 277 (151/126) | 1,845 | 42.1 | 32 (30.6-33.5) | 3.20 |
| Other infections | 197 (98/99) | 1,371 | 31.3 | 23.8 (22.6-25.1) | 2.38 |
| Diarrhoea | 37 (19/18) | 257 | 5.9 | 4.5 (4.0-5.1) | 0.45 |
| Injuries | 31 (19/12) | 214 | 4.9 | 3.7 (3.2-4.2) | 0.37 |
| Pneumonia | 18 (8/10) | 117 | 2.7 | 2.0 (1.7-2.4) | 0.20 |
| Non-communicable | 13 (8/5) | 94 | 2.1 | 1.6 (1.3-2.0) | 0.16 |
| Epilepsy | 9 (1/8) | 63 | 1.4 | 1.1 (0.9-1.4) | 0.11 |
| Fever of unknown origin | 9 (6/3) | 63 | 1.4 | 1.1 (0.9-1.4) | 0.11 |
| Appendix, hernia, intestinal | 7 (4/3) | 45 | 1.0 | 0.8 (0.6-1.1) | 0.08 |
| Other perinatal conditions | 6 (3/3) | 45 | 1.0 | 0.8 (0.6-1.1) | 0.08 |
| Measles | 6 (0/6) | 44 | 1.0 | 0.8 (0.6-1.1) | 0.08 |
| Severe systemic infection | 6 (3/3) | 43 | 1.0 | 0.7 (0.5-0.9) | 0.07 |
| Malnutrition | 6 (5/1) | 34 | 0.8 | 0.6 (0.4-0.8) | 0.06 |
| HIV/AIDS and STIs | 3 (2/1) | 24 | 0.6 | 0.4 (0.3-0.6) | 0.04 |
| Asthma and chronic respiratory | 3 (2/1) | 19 | 0.4 | 0.3 (0.2-0.5) | 0.03 |
| Meningitis/encephalitis | 3 (0/3) | 15 | 0.3 | 0.3 (0.2-0.5) | 0.03 |
| Hepatitis | 1 (1/0) | 8 | 0.2 | 0.1 (0.1-0.2) | 0.01 |
| Ill-defined/unknown | 11 (4/7) | 77 | 1.8 | 1.3 (1-1.6) | 0.13 |
| **All 1-59 months** | **643 (334/309)** | **4,379** | **100.0** | **76 (73.8-78.3)** | **7.60** |

**Table 25. Leading causes of death for 1 to 59 months, 2018-2023 – North East**

| Cause of death | Study deaths (male/female) | Regional annual deaths | % Total | Annual mortality rate (95% CI) per 1000 livebirths | Risk of death % |
|---|---|---|---|---|---|
| **Deaths at 1-59 months** | | | | | |
| Malaria | 408 (194/214) | 1,328 | 48.3 | 31.6 (29.9-33.3) | 3.16 |
| Other infections | 198 (105/93) | 553 | 20.1 | 13.2 (12.1-14.3) | 1.32 |
| Diarrhoea | 69 (33/36) | 224 | 8.1 | 5.3 (4.6-6.0) | 0.53 |
| Pneumonia | 47 (20/27) | 176 | 6.4 | 4.2 (3.6-4.9) | 0.42 |
| Injuries | 22 (12/10) | 80 | 2.9 | 1.9 (1.5-2.4) | 0.19 |
| Meningitis/encephalitis | 18 (5/13) | 56 | 2.0 | 1.3 (1-1.7) | 0.13 |
| Non-communicable | 12 (8/4) | 40 | 1.5 | 1.0 (0.7-1.4) | 0.1 |
| Malnutrition | 10 (4/6) | 39 | 1.4 | 0.9 (0.7-1.2) | 0.09 |
| Appendix, hernia, intestinal | 10 (6/4) | 38 | 1.4 | 0.9 (0.7-1.2) | 0.09 |
| Epilepsy | 11 (3/8) | 33 | 1.2 | 0.8 (0.6-1.1) | 0.08 |
| Fever of unknown origin | 9 (3/6) | 33 | 1.2 | 0.8 (0.6-1.1) | 0.08 |
| Measles | 9 (5/4) | 27 | 1.0 | 0.6 (0.4-0.9) | 0.06 |
| Other perinatal conditions | 6 (1/5) | 25 | 0.9 | 0.6 (0.4-0.9) | 0.06 |
| Asthma and chronic respiratory | 9 (4/5) | 22 | 0.8 | 0.5 (0.3-0.8) | 0.05 |
| Cancer | 3 (3/0) | 11 | 0.4 | 0.3 (0.2-0.5) | 0.03 |
| HIV/AIDS and STIs | 3 (2/1) | 11 | 0.4 | 0.3 (0.2-0.5) | 0.03 |
| Severe systemic infection | 2 (2/0) | 6 | 0.2 | 0.1 (0-0.2) | 0.01 |
| Hepatitis | 1 (0/1) | 2 | 0.1 | 0.0 | 0.00 |
| Ill-defined/unknown | 12 (7/5) | 45 | 1.6 | 1.1 (0.8-1.5) | 0.11 |
| **All 1-59 months** | **859 (417/442)** | **2,750** | **100.0** | **65.5 (63.1-68)** | **6.55** |

**Table 26. Leading causes of death for 1 to 59 months, 2018-2023 – North West**

| Cause of death | Study deaths (male/female) | Regional annual deaths | % Total | Annual mortality rate (95% CI) per 1000 livebirths | Risk of death % |
|---|---|---|---|---|---|
| **Deaths at 1-59 months** | | | | | |
| Malaria | 223 (125/98) | 2,004 | 50.9 | 34.2 (32.7-35.7) | 3.42 |
| Other infections | 121 (54/67) | 815 | 20.7 | 13.9 (13.0-14.9) | 1.39 |
| Diarrhoea | 45 (20/25) | 384 | 9.7 | 6.5 (5.9-7.2) | 0.65 |
| Pneumonia | 14 (5/9) | 115 | 2.9 | 2.0 (1.7-2.4) | 0.20 |
| Meningitis/encephalitis | 12 (6/6) | 114 | 2.9 | 1.9 (1.6-2.3) | 0.19 |
| Epilepsy | 11 (3/8) | 83 | 2.1 | 1.4 (1.1-1.7) | 0.14 |
| Appendix, hernia, intestinal | 9 (4/5) | 64 | 1.6 | 1.1 (0.9-1.4) | 0.11 |
| Malnutrition | 6 (3/3) | 59 | 1.5 | 1.0 (0.8-1.3) | 0.10 |
| Injuries | 9 (4/5) | 57 | 1.4 | 1.0 (0.8-1.3) | 0.10 |
| Measles | 5 (2/3) | 45 | 1.1 | 0.8 (0.6-1.1) | 0.08 |
| Fever of unknown origin | 6 (3/3) | 29 | 0.7 | 0.5 (0.3-0.7) | 0.05 |
| Other perinatal conditions | 3 (0/3) | 28 | 0.7 | 0.5 (0.3-0.7) | 0.05 |
| Non-communicable | 6 (4/2) | 25 | 0.6 | 0.4 (0.3-0.6) | 0.04 |
| Asthma and chronic respiratory | 2 (0/2) | 23 | 0.6 | 0.4 (0.3-0.6) | 0.04 |
| Hepatitis | 5 (3/2) | 21 | 0.5 | 0.4 (0.3-0.6) | 0.04 |
| HIV/AIDS and STIs | 1 (0/1) | 19 | 0.5 | 0.3 (0.2-0.5) | 0.03 |
| Severe systemic infection | 1 (1/0) | 8 | 0.2 | 0.1 (0.1-0.2) | 0.01 |
| Ill-defined/unknown | 6 (4/2) | 44 | 1.1 | 0.8 (0.6-1.1) | 0.08 |
| **All 1-59** | **485 (241/244)** | **3,937** | **100.0** | **67.1 (65-69.2)** | **6.71** |

**Table 27. Leading causes of death for 1 to 59 months, 2018-2023 – South**

| Cause of death | Study deaths (male/female) | Regional annual deaths | % Total | Annual mortality rate (95% CI) per 1000 livebirths | Risk of death % |
|---|---|---|---|---|---|
| **Deaths at 1-59 months** | | | | | |
| Malaria | 965 (496/469) | 2,682 | 52.5 | 44.9 (43.2-46.6) | 4.49 |
| Other infections | 352 (182/170) | 864 | 16.9 | 14.5 (13.6-15.5) | 1.45 |
| Diarrhoea | 136 (76/60) | 377 | 7.4 | 6.3 (5.7-7.0) | 0.63 |
| Pneumonia | 153 (78/75) | 340 | 6.7 | 5.7 (5.1-6.3) | 0.57 |
| Injuries | 61 (35/26) | 164 | 3.2 | 2.7 (2.3-3.1) | 0.27 |
| Meningitis/encephalitis | 47 (30/17) | 89 | 1.7 | 1.5 (1.2-1.8) | 0.15 |
| Fever of unknown origin | 29 (19/10) | 80 | 1.6 | 1.3 (1.0-1.6) | 0.13 |
| Malnutrition | 23 (5/18) | 66 | 1.3 | 1.1 (0.9-1.4) | 0.11 |
| Other perinatal conditions | 30 (18/12) | 56 | 1.1 | 0.9 (0.7-1.2) | 0.09 |
| Epilepsy | 23 (8/15) | 50 | 1.0 | 0.8 (0.6-1.1) | 0.08 |
| Non-communicable | 23 (9/14) | 47 | 0.9 | 0.8 (0.6-1.1) | 0.08 |
| HIV/AIDS and STIs | 19 (12/7) | 39 | 0.8 | 0.7 (0.5-1.0) | 0.07 |
| Measles | 22 (12/10) | 36 | 0.7 | 0.6 (0.4-0.8) | 0.06 |
| Appendix, hernia, intestinal | 13 (5/8) | 34 | 0.7 | 0.6 (0.4-0.8) | 0.06 |
| Severe systemic infection | 16 (7/9) | 34 | 0.7 | 0.6 (0.4-0.8) | 0.06 |
| Hepatitis | 13 (5/8) | 31 | 0.6 | 0.5 (0.4-0.7) | 0.05 |
| Asthma and chronic respiratory | 10 (4/6) | 26 | 0.5 | 0.4 (0.3-0.6) | 0.04 |
| Cancer | 5 (2/3) | 4 | 0.1 | 0.1 (0.0-0.3) | 0.01 |
| Ill-defined/unknown | 36 (18/18) | 90 | 1.8 | 1.5 (1.2-1.8) | 0.15 |
| **All 1-59 months** | **1,976 (1021/955)** | **5,108** | **100.0** | **85.5 (83.2-87.9)** | **8.55** |

**Table 28. Leading causes of death for 1 to 59 months, 2018-2023 – West**

| Cause of death | Study deaths (male/female) | Regional annual deaths | % Total | Annual mortality rate (95% CI) per 1000 livebirths | Risk of death % |
|---|---|---|---|---|---|
| **Deaths at 1-59 months** | | | | | |
| Malaria | 159 (90/69) | 1,110 | 43.5 | 22.9 (21.6-24.3) | 2.29 |
| Other infections | 83 (45/38) | 584 | 22.9 | 12.1 (11.2-13.1) | 1.21 |
| Pneumonia | 28 (14/14) | 194 | 7.6 | 4.0 (3.5-4.6) | 0.40 |
| Diarrhoea | 21 (11/10) | 147 | 5.8 | 3.0 (2.6-3.5) | 0.30 |
| Meningitis/encephalitis | 11 (5/6) | 80 | 3.1 | 1.7 (1.4-2.1) | 0.17 |
| Non-communicable | 10 (8/2) | 69 | 2.7 | 1.4 (1.1-1.8) | 0.14 |
| Appendix, hernia, intestinal | 8 (5/3) | 55 | 2.2 | 1.1 (0.8-1.4) | 0.11 |
| Fever of unknown origin | 7 (2/5) | 48 | 1.9 | 1.0 (0.8-1.3) | 0.10 |
| Epilepsy | 5 (3/2) | 36 | 1.4 | 0.7 (0.5-1.0) | 0.07 |
| Asthma and chronic respiratory | 5 (2/3) | 34 | 1.3 | 0.7 (0.5-1.0) | 0.07 |
| Malnutrition | 4 (3/1) | 28 | 1.1 | 0.6 (0.4-0.9) | 0.06 |
| Measles | 4 (1/3) | 27 | 1.1 | 0.6 (0.4-0.9) | 0.06 |
| Other perinatal conditions | 4 (3/1) | 27 | 1.1 | 0.6 (0.4-0.9) | 0.06 |
| Injuries | 4 (1/3) | 26 | 1.0 | 0.5 (0.3-0.7) | 0.05 |
| HIV/AIDS and STIs | 4 (1/3) | 26 | 1.0 | 0.5 (0.3-0.7) | 0.05 |
| Hepatitis | 2 (1/1) | 14 | 0.5 | 0.3 (0.2-0.5) | 0.03 |
| Cancer | 1 (0/1) | 7 | 0.3 | 0.1 (0.0-0.2) | 0.01 |
| Ill-defined/unknown | 6 (3/3) | 40 | 1.6 | 0.8 (0.6-1.1) | 0.08 |
| **All 1-59** | **366 (198/168)** | **2,552** | **100.0** | **52.7 (50.7-54.8)** | **5.27** |

## Child mortality: 5 to 14 years

**Table 29. Leading causes of death for 5 to 14 years, 2018-2023 – East**

| Cause of death | Study deaths (male/female) | Regional annual deaths | % Total | Annual mortality rate (95% CI) per 100,000 pop | Period risk % |
|---|---|---|---|---|---|
| **5-14 years** | | | | | |
| Malaria | 88 (46/42) | 361 | 36.0 | 63.7 (57.5-70.6) | 0.64 |
| Other infections | 58 (28/30) | 247 | 24.6 | 43.6 (38.5-49.4) | 0.44 |
| Diarrhoea | 10 (7/3) | 41 | 4.1 | 7.2 (5.3-9.8) | 0.07 |
| Sickle-cell | 9 (5/4) | 41 | 4.1 | 7.2 (5.3-9.8) | 0.07 |
| Appendix, hernia, intestinal | 11 (6/5) | 38 | 3.8 | 6.7 (4.9-9.2) | 0.07 |
| Drownings | 12 (10/2) | 37 | 3.6 | 6.5 (4.7-9.0) | 0.07 |
| Falls | 9 (6/3) | 36 | 3.6 | 6.4 (4.6-8.9) | 0.06 |
| Non-communicable | 8 (3/5) | 29 | 2.8 | 5.1 (3.5-7.3) | 0.05 |
| Liver and alcohol diseases | 5 (2/3) | 23 | 2.3 | 4.1 (2.7-6.2) | 0.04 |
| Other injuries | 5 (4/1) | 22 | 2.2 | 3.9 (2.6-5.9) | 0.04 |
| Meningitis/encephalitis | 6 (4/2) | 21 | 2.0 | 3.7 (2.4-5.7) | 0.04 |
| Epilepsy | 4 (1/3) | 18 | 1.8 | 3.2 (2.0-5.1) | 0.03 |
| Road traffic accidents | 4 (2/2) | 16 | 1.6 | 2.8 (1.7-4.6) | 0.03 |
| Pneumonia | 4 (3/1) | 14 | 1.4 | 2.5 (1.5-4.2) | 0.03 |
| Hepatitis | 2 (1/1) | 11 | 1.1 | 1.9 (1.1-3.4) | 0.02 |
| Peptic ulcer/gastroesophageal | 2 (2/0) | 10 | 1.0 | 1.8 (1.0-3.3) | 0.02 |
| Cancer | 1 (0/1) | 3 | 0.3 | 0.5 (0.2-1.6) | 0.01 |
| Ill-defined/unknown | 8 (4/4) | 36 | 3.6 | 6.4 (4.6-8.9) | 0.06 |
| **All 5-14 years** | **246 (134/112)** | **1,002** | **100.0** | **176.9 (166.3-188.2)** | **1.77** |

**Table 30. Leading causes of death for 5 to 14 years, 2018-2023 – North East**

| Cause of death | Study deaths (male/female) | Regional annual deaths | % Total | Annual mortality rate (95% CI) per 100,000 pop | Period risk % |
|---|---|---|---|---|---|
| **5-14 years** | | | | | |
| Malaria | 128 (70/58) | 245 | 39.6 | 62 (54.7-70.3) | 0.62 |
| Other infections | 46 (17/29) | 92 | 14.9 | 23 (18.7-28.2) | 0.23 |
| Diarrhoea | 33 (20/13) | 57 | 9.2 | 14 (10.8-18.1) | 0.14 |
| Appendix, hernia, intestinal | 21 (12/9) | 35 | 5.6 | 9.0 (6.5-12.5) | 0.09 |
| Other injuries | 11 (9/2) | 27 | 4.4 | 7.0 (4.8-10.2) | 0.07 |
| Pneumonia | 13 (7/6) | 23 | 3.7 | 6.0 (4.0-9.0) | 0.06 |
| Hepatitis | 8 (5/3) | 19 | 3.0 | 5.0 (3.2-7.8) | 0.05 |
| Road traffic accidents | 8 (5/3) | 19 | 3.0 | 5.0 (3.2-7.8) | 0.05 |
| Peptic ulcer/gastroesophageal | 10 (7/3) | 16 | 2.6 | 4.0 (2.5-6.5) | 0.04 |
| Meningitis/encephalitis | 7 (3/4) | 15 | 2.4 | 4.0 (2.4-6.6) | 0.04 |
| Epilepsy | 6 (3/3) | 14 | 2.2 | 4.0 (2.4-6.8) | 0.04 |
| Falls | 7 (5/2) | 14 | 2.2 | 4.0 (2.4-6.8) | 0.04 |
| Liver and alcohol diseases | 7 (4/3) | 12 | 1.9 | 3.0 (1.7-5.3) | 0.03 |
| Sickle-cell | 3 (2/1) | 10 | 1.6 | 3.0 (1.6-5.6) | 0.03 |
| Non-communicable | 4 (0/4) | 9 | 1.4 | 2.0 (1.0-3.8) | 0.02 |
| Cancer | 2 (0/2) | 3 | 0.4 | 1.0 (0.3-3.1) | 0.01 |
| Drownings | 1 (0/1) | 1 | 0.2 | 0.0 | 0.00 |
| Ill-defined/unknown | 5 (2/3) | 9 | 1.5 | 2.0 (1.0-3.8) | 0.02 |
| **All 5-14 years** | **320 (171/149)** | **617** | **100.0** | **155 (143.2-167.7)** | **1.55** |

**Table 31. Leading causes of death for 5 to 14 years, 2018-2023 – North West**

| Cause of death | Study deaths (male/female) | Regional annual deaths | % Total | Annual mortality rate (95% CI) per 100,000 pop | Period risk % |
|---|---|---|---|---|---|
| **5-14 years** | | | | | |
| Malaria | 58 (33/25) | 237 | 29.5 | 69 (60.8-78.4) | 0.69 |
| Other infections | 32 (18/14) | 131 | 16.2 | 38.1 (32.1-45.2) | 0.38 |
| Diarrhoea | 27 (20/7) | 122 | 15.2 | 35.5 (29.7-42.4) | 0.36 |
| Non-communicable | 8 (3/5) | 50 | 6.2 | 14.5 (11.0-19.1) | 0.15 |
| Appendix, hernia, intestinal | 10 (7/3) | 48 | 6.0 | 14.0 (10.6-18.6) | 0.14 |
| Other injuries | 8 (8/0) | 41 | 5.1 | 11.9 (8.8-16.2) | 0.12 |
| Sickle-cell | 5 (2/3) | 36 | 4.5 | 10.5 (7.6-14.6) | 0.11 |
| Pneumonia | 6 (4/2) | 27 | 3.3 | 7.9 (5.4-11.5) | 0.08 |
| Falls | 8 (6/2) | 26 | 3.2 | 7.6 (5.2-11.2) | 0.08 |
| Liver and alcohol diseases | 4 (4/0) | 22 | 2.7 | 6.4 (4.2-9.7) | 0.06 |
| Peptic ulcer/gastroesophageal | 4 (2/2) | 19 | 2.4 | 5.5 (3.5-8.6) | 0.06 |
| Hepatitis | 3 (2/1) | 17 | 2.1 | 4.9 (3.0-7.9) | 0.05 |
| Epilepsy | 4 (2/2) | 13 | 1.6 | 3.8 (2.2-6.5) | 0.04 |
| Meningitis/encephalitis | 2 (1/1) | 7 | 0.9 | 2.0 (1.0-4.2) | 0.02 |
| Drownings | 1 (1/0) | 3 | 0.3 | 0.9 (0.3-2.8) | 0.01 |
| Ill-defined/unknown | 2 (2/0) | 5 | 0.6 | 1.5 (0.6-3.6) | 0.02 |
| **All 5-14** | **182 (115/67)** | **804** | **100.0** | **233.9 (218.3-250.6)** | **2.34** |

**Table 32. Leading causes of death for 5 to 14 years, 2018-2023 – South**

| Cause of death | Study deaths (male/female) | Regional annual deaths | % Total | Annual mortality rate (95% CI) per 100,000 pop | Period risk % |
|---|---|---|---|---|---|
| **5-14 years** | | | | | |
| Malaria | 249 (126/123) | 378 | 48.1 | 71.9 (65.0-79.5) | 0.72 |
| Other infections | 99 (55/44) | 116 | 14.8 | 22.1 (18.4-26.5) | 0.22 |
| Diarrhoea | 37 (19/18) | 60 | 7.6 | 11.4 (8.9-14.7) | 0.11 |
| Other injuries | 23 (15/8) | 32 | 4.1 | 6.1 (4.3-8.6) | 0.06 |
| Sickle-cell | 21 (11/10) | 28 | 3.6 | 5.3 (3.7-7.7) | 0.05 |
| Non-communicable | 25 (13/12) | 21 | 2.6 | 4.0 (2.6-6.1) | 0.04 |
| Pneumonia | 16 (5/11) | 20 | 2.5 | 3.8 (2.5-5.9) | 0.04 |
| Epilepsy | 15 (10/5) | 18 | 2.3 | 3.4 (2.1-5.4) | 0.03 |
| Hepatitis | 13 (9/4) | 18 | 2.4 | 3.4 (2.1-5.4) | 0.03 |
| Road traffic accidents | 13 (8/5) | 18 | 2.3 | 3.4 (2.1-5.4) | 0.03 |
| Falls | 15 (12/3) | 17 | 2.2 | 3.2 (2.0-5.1) | 0.03 |
| Drownings | 15 (9/6) | 15 | 2.0 | 2.9 (1.7-4.8) | 0.03 |
| Appendix, hernia, intestinal | 9 (4/5) | 12 | 1.5 | 2.3 (1.3-4.0) | 0.02 |
| Meningitis/encephalitis | 11 (6/5) | 11 | 1.4 | 2.1 (1.2-3.8) | 0.02 |
| Liver and alcohol diseases | 5 (4/1) | 6 | 0.7 | 1.1 (0.5-2.4) | 0.01 |
| Cancer | 4 (3/1) | 1 | 0.1 | 0.2 (0.0-1.4) | 0.00 |
| Peptic ulcer/gastroesophageal | 1 (0/1) | 1 | 0.1 | 0.2 (0.0-1.4) | 0.00 |
| Ill-defined/unknown | 13 (6/7) | 14 | 1.7 | 2.7 (1.6-4.6) | 0.03 |
| **All 5-14 years** | **584 (315/269)** | **785** | **100.0** | **149.3 (139.2-160.1)** | **1.49** |

**Table 33. Leading causes of death for 5 to 14 years, 2018-2023 – West**

| Cause of death | Study deaths (male/female) | Regional annual deaths | % Total | Annual mortality rate (95% CI) per 100,000 pop | Period risk % |
|---|---|---|---|---|---|
| **5-14 years** | | | | | |
| Malaria | 61 (36/25) | 194 | 39.1 | 64.4 (55.9-74.1) | 0.64 |
| Other infections | 37 (18/19) | 119 | 24.0 | 39.5 (33.0-47.3) | 0.40 |
| Diarrhoea | 9 (6/3) | 28 | 5.6 | 9.3 (6.4-13.5) | 0.09 |
| Sickle-cell | 9 (3/6) | 28 | 5.7 | 9.3 (6.4-13.5) | 0.09 |
| Other injuries | 8 (6/2) | 27 | 5.4 | 9.0 (6.2-13.1) | 0.09 |
| Non-communicable | 7 (6/1) | 23 | 4.6 | 7.6 (5.1-11.4) | 0.08 |
| Meningitis/encephalitis | 4 (3/1) | 13 | 2.5 | 4.3 (2.5-7.4) | 0.04 |
| Road traffic accidents | 4 (2/2) | 13 | 2.5 | 4.3 (2.5-7.4) | 0.04 |
| Peptic ulcer/gastroesophageal | 3 (1/2) | 11 | 2.2 | 3.7 (2.0-6.7) | 0.04 |
| Appendix, hernia, intestinal | 3 (3/0) | 10 | 2.0 | 3.3 (1.8-6.1) | 0.03 |
| Cancer | 2 (1/1) | 7 | 1.5 | 2.3 (1.1-4.8) | 0.02 |
| Drownings | 2 (2/0) | 6 | 1.2 | 2.0 (0.9-4.5) | 0.02 |
| Epilepsy | 1 (1/0) | 3 | 0.6 | 1.0 (0.3-3.1) | 0.01 |
| Falls | 1 (1/0) | 3 | 0.6 | 1.0 (0.3-3.1) | 0.01 |
| Hepatitis | 1 (1/0) | 3 | 0.7 | 1.0 (0.3-3.1) | 0.01 |
| Pneumonia | 1 (1/0) | 3 | 0.6 | 1.0 (0.3-3.1) | 0.01 |
| Ill-defined/unknown | 2 (1/1) | 6 | 1.2 | 2.0 (0.9-4.5) | 0.02 |
| **All 5-14** | **155 (92/63)** | **497** | **100.0** | **165 (151.1-180.2)** | **1.65** |

## Adult mortality: 15 to 29 years

**Table 34. Leading causes of death for 15 to 29 years, 2018-2023 – East**

| Cause of death | Study deaths (male/female) | Regional annual deaths | % Total | Annual mortality rate (95% CI) per 100,000 pop | Period risk % |
|---|---|---|---|---|---|
| **Communicable, maternal, perinatal & nutritional** | | | | | |
| Malaria | 39 (25/14) | 222 | 13.1 | 35.2 (30.9-40.1) | 0.53 |
| Maternal | 34 (0/34) | 178 | 10.5 | 28.2 (24.3-32.7) | 0.42 |
| Other infections | 24 (15/9) | 126 | 7.4 | 20.0 (16.8-23.8) | 0.30 |
| Diarrhoea | 15 (7/8) | 77 | 4.6 | 12.2 (9.8-15.3) | 0.18 |
| HIV/AIDS and STIs | 13 (4/9) | 66 | 3.9 | 10.5 (8.2-13.4) | 0.16 |
| Tuberculosis | 11 (7/4) | 57 | 3.3 | 9.0 (6.9-11.7) | 0.14 |
| Pneumonia | 7 (5/2) | 40 | 2.4 | 6.3 (4.6-8.6) | 0.09 |
| Meningitis/encephalitis | 5 (4/1) | 31 | 1.8 | 4.9 (3.4-7.0) | 0.07 |
| Hepatitis | 5 (4/1) | 29 | 1.7 | 4.6 (3.2-6.6) | 0.07 |
| Severe localized infection | 5 (2/3) | 26 | 1.5 | 4.1 (2.8-6.0) | 0.06 |
| **Non-communicable** | | | | | |
| Appendix, hernia, intestinal | 23 (15/8) | 117 | 6.9 | 18.6 (15.5-22.3) | 0.28 |
| Sickle-cell | 18 (9/9) | 90 | 5.3 | 14.3 (11.6-17.6) | 0.21 |
| Cancer | 11 (4/7) | 60 | 3.5 | 9.5 (7.4-12.2) | 0.14 |
| Peptic ulcer/gastroesophageal | 9 (6/3) | 52 | 3.1 | 8.3 (6.3-10.9) | 0.12 |
| Ischaemic heart and other vascular | 8 (8/0) | 47 | 2.7 | 7.5 (5.6-10) | 0.11 |
| Other non-communicable | 8 (5/3) | 38 | 2.2 | 6.0 (4.4-8.2) | 0.09 |
| Kidney failure and genitourinary | 8 (2/6) | 37 | 2.2 | 5.9 (4.3-8.1) | 0.09 |
| Liver and alcohol diseases | 8 (2/6) | 36 | 2.1 | 5.7 (4.1-7.9) | 0.09 |
| Stroke | 3 (2/1) | 15 | 0.9 | 2.4 (1.4-4) | 0.04 |
| Epilepsy | 1 (0/1) | 6 | 0.4 | 1.0 (0.4-2.2) | 0.02 |
| **Injuries** | | | | | |
| Road traffic accidents | 18 (13/5) | 90 | 5.3 | 14.3 (11.6-17.6) | 0.21 |
| Other injuries | 15 (11/4) | 73 | 4.3 | 11.6 (9.2-14.6) | 0.17 |
| Drownings | 12 (12/0) | 61 | 3.6 | 9.7 (7.5-12.5) | 0.15 |
| Animal/plant venom | 5 (5/0) | 23 | 1.3 | 3.6 (2.4-5.4) | 0.05 |
| Falls | 5 (5/0) | 20 | 1.2 | 3.2 (2.1-5.0) | 0.05 |
| Ill-defined/unknown | 16 (6/10) | 84 | 4.9 | 13.3 (10.7-16.5) | 0.20 |
| **All 15-29 years** | **326 (178/148)** | **1698** | **100.0** | **269.4 (256.9-282.5)** | **4.04** |

**Table 35. Leading causes of death for 15 to 29 years, 2018-2023 – North East**

| Cause of death | Study deaths (male/female) | Regional annual deaths | % Total | Annual mortality rate (95% CI) per 100,000 pop | Period risk % |
|---|---|---|---|---|---|
| **Communicable, maternal, perinatal & nutritional** | | | | | |
| Malaria | 71 (34/37) | 163 | 17.1 | 39.7 (34.1-46.3) | 0.60 |
| Maternal | 42 (0/42) | 90 | 9.4 | 21.9 (17.8-26.9) | 0.33 |
| Diarrhoea | 30 (17/13) | 65 | 6.8 | 15.8 (12.4-20.1) | 0.24 |
| Tuberculosis | 17 (3/14) | 43 | 4.6 | 10.5 (7.8-14.2) | 0.16 |
| Other infections | 21 (9/12) | 38 | 4.0 | 9.3 (6.8-12.8) | 0.14 |
| Pneumonia | 14 (6/8) | 28 | 2.9 | 6.8 (4.7-9.8) | 0.10 |
| Severe localized infection | 12 (8/4) | 28 | 2.9 | 6.8 (4.7-9.8) | 0.10 |
| Hepatitis | 11 (10/1) | 23 | 2.5 | 5.6 (3.7-8.4) | 0.08 |
| HIV/AIDS and STIs | 8 (0/8) | 18 | 1.9 | 4.4 (2.8-7.0) | 0.07 |
| Meningitis/encephalitis | 3 (0/3) | 6 | 0.7 | 1.5 (0.7-3.3) | 0.02 |
| **Non-communicable** | | | | | |
| Peptic ulcer/gastroesophageal | 34 (24/10) | 62 | 6.5 | 15.1 (11.8-19.4) | 0.23 |
| Appendix, hernia, intestinal | 20 (14/6) | 41 | 4.3 | 10.0 (7.4-13.6) | 0.15 |
| Liver and alcohol diseases | 18 (9/9) | 40 | 4.2 | 9.7 (7.1-13.2) | 0.15 |
| Epilepsy | 14 (10/4) | 29 | 3.1 | 7.1 (4.9-10.2) | 0.11 |
| Falls | 10 (10/0) | 20 | 2.1 | 4.9 (3.2-7.6) | 0.07 |
| Kidney failure and genitourinary | 9 (2/7) | 16 | 1.6 | 3.9 (2.4-6.4) | 0.06 |
| Sickle-cell | 7 (1/6) | 11 | 1.2 | 2.7 (1.5-4.9) | 0.04 |
| Non-communicable | 5 (2/3) | 8 | 0.9 | 1.9 (1.0-3.8) | 0.03 |
| Cancer | 2 (0/2) | 6 | 0.7 | 1.5 (0.7-3.3) | 0.02 |
| Stroke | 4 (2/2) | 6 | 0.7 | 1.5 (0.7-3.3) | 0.02 |
| Ischaemic heart and other vascular | 4 (1/3) | 9 | 1.0 | 2.2 (1.1-4.2) | 0.03 |
| **Injuries** | | | | | |
| Road traffic accidents | 34 (28/6) | 75 | 7.9 | 18.3 (14.6-22.9) | 0.27 |
| Other injuries | 30 (23/7) | 65 | 6.8 | 15.8 (12.4-20.1) | 0.24 |
| Animal/plant venom | 18 (14/4) | 36 | 3.8 | 8.8 (6.3-12.2) | 0.13 |
| Drownings | 5 (5/0) | 12 | 1.3 | 2.9 (1.6-5.1) | 0.04 |
| Ill-defined/unknown | 6 (5/1) | 12 | 1.2 | 2.9 (1.6-5.1) | 0.04 |
| **All 15 -29 years** | **449 (237/212)** | **950** | **100** | **231.3 (217-246.5)** | **3.47** |

**Table 36. Leading causes of death for 15 to 29 years, 2018-2023 – North West**

| Cause of death | Study deaths (male/female) | Regional annual deaths | % Total | Annual mortality rate (95% CI) per 100,000 pop | Period risk % |
|---|---|---|---|---|---|
| **Communicable, maternal, perinatal & nutritional** | | | | | |
| Malaria | 34 (20/14) | 216 | 17.1 | 61.6 (53.9-70.4) | 0.92 |
| Tuberculosis | 12 (4/8) | 90 | 7.1 | 25.7 (20.9-31.6) | 0.39 |
| Maternal | 14 (0/14) | 82 | 6.5 | 23.4 (18.8-29.1) | 0.35 |
| HIV/AIDS and STIs | 14 (5/9) | 65 | 5.1 | 18.5 (14.5-23.6) | 0.28 |
| Diarrhoea | 13 (8/5) | 63 | 5.0 | 18.0 (14.1-23.0) | 0.27 |
| Pneumonia | 7 (5/2) | 43 | 3.4 | 12.3 (9.1-16.6) | 0.18 |
| Other infections | 9 (5/4) | 40 | 3.2 | 11.4 (8.4-15.5) | 0.17 |
| Severe localized infection | 7 (5/2) | 25 | 2.0 | 7.1 (4.8-10.5) | 0.11 |
| Hepatitis | 3 (3/0) | 10 | 0.8 | 2.9 (1.6-5.4) | 0.04 |
| Meningitis/encephalitis | 1 (1/0) | 3 | 0.3 | 0.9 (0.3-2.8) | 0.01 |
| **Non-communicable** | | | | | |
| Appendix, hernia, intestinal | 17 (9/8) | 82 | 6.5 | 23.4 (18.8-29.1) | 0.35 |
| Epilepsy | 8 (5/3) | 57 | 4.5 | 16.2 (12.5-21) | 0.24 |
| Peptic ulcer/gastroesophageal | 10 (6/4) | 53 | 4.2 | 15.1 (11.5-19.8) | 0.23 |
| Non-communicable | 7 (5/2) | 47 | 3.7 | 13.4 (10.1-17.8) | 0.20 |
| Ischaemic heart and other vascular | 5 (3/2) | 38 | 3.0 | 10.8 (7.9-14.8) | 0.16 |
| Cancer | 4 (2/2) | 36 | 2.8 | 10.3 (7.4-14.3) | 0.15 |
| Liver and alcohol diseases | 7 (6/1) | 24 | 1.9 | 6.8 (4.6-10.1) | 0.10 |
| Sickle-cell | 3 (2/1) | 21 | 1.7 | 6.0 (3.9-9.2) | 0.09 |
| Kidney failure and genitourinary | 3 (1/2) | 10 | 0.8 | 2.9 (1.6-5.4) | 0.04 |
| Stroke | 2 (1/1) | 9 | 0.7 | 2.6 (1.4-5.0) | 0.04 |
| **Injuries** | | | | | |
| Road traffic accidents | 15 (11/4) | 112 | 8.9 | 31.9 (26.5-38.4) | 0.48 |
| Falls | 6 (5/1) | 46 | 3.6 | 13.1 (9.8-17.5) | 0.20 |
| Other injuries | 4 (4/0) | 41 | 3.3 | 11.7 (8.6-15.9) | 0.18 |
| Animal/plant venom | 5 (3/2) | 20 | 1.6 | 5.7 (3.7-8.8) | 0.09 |
| Drownings | 1 (1/0) | 3 | 0.3 | 0.9 (0.3-2.8) | 0.01 |
| Ill-defined/unknown | 3 (2/1) | 28 | 2.2 | 8.0 (5.5-11.6) | 0.12 |
| **All 15-29 years** | **214 (122/92)** | **1265** | **100.0** | **360.6 (341.3-381)** | **5.41** |

**Table 37. Leading causes of death for 15 to 29 years, 2018-2023 - South**

| Cause of death | Study deaths (male/female) | Regional annual deaths | % Total | Annual mortality rate (95% CI) per 100,000 pop | Period risk % |
|---|---|---|---|---|---|
| **Communicable, maternal, perinatal & nutritional** | | | | | |
| Malaria | 194 (91/103) | 230 | 22.8 | 40.4 (35.5-46) | 0.61 |
| Maternal | 72 (0/72) | 78 | 7.8 | 13.7 (11-17.1) | 0.21 |
| Other infections | 65 (27/38) | 72 | 7.1 | 12.7 (10.1-16) | 0.19 |
| Diarrhoea | 37 (16/21) | 50 | 4.9 | 8.8 (6.7-11.6) | 0.13 |
| Pneumonia | 39 (20/19) | 47 | 4.7 | 8.3 (6.2-11.0) | 0.12 |
| Hepatitis | 31 (19/12) | 25 | 2.5 | 4.4 (3.0-6.5) | 0.07 |
| Severe localized infection | 18 (8/10) | 24 | 2.4 | 4.2 (2.8-6.3) | 0.06 |
| Tuberculosis | 26 (12/14) | 24 | 2.4 | 4.2 (2.8-6.3) | 0.06 |
| HIV/AIDS and STIs | 21 (11/10) | 22 | 2.2 | 3.9 (2.6-5.9) | 0.06 |
| Meningitis/encephalitis | 14 (9/5) | 10 | 1.0 | 1.8 (1.0-3.3) | 0.03 |
| **Non-communicable** | | | | | |
| Ischaemic heart and other vascular | 33 (11/22) | 25 | 2.5 | 4.4 (3.0-6.5) | 0.07 |
| Non-communicable | 27 (12/15) | 34 | 3.4 | 6.0 (4.3-8.4) | 0.09 |
| Liver and alcohol diseases | 29 (15/14) | 31 | 3.1 | 5.5 (3.9-7.8) | 0.08 |
| Appendix, hernia, intestinal | 19 (10/9) | 25 | 2.5 | 4.4 (3.0-6.5) | 0.07 |
| Cancer | 19 (3/16) | 22 | 2.2 | 3.9 (2.6-5.9) | 0.06 |
| Peptic ulcer/gastroesophageal | 15 (11/4) | 21 | 2.1 | 3.7 (2.4-5.7) | 0.06 |
| Stroke | 13 (8/5) | 17 | 1.7 | 3.0 (1.9-4.8) | 0.05 |
| Epilepsy | 12 (9/3) | 15 | 1.5 | 2.6 (1.6-4.3) | 0.04 |
| Sickle-cell | 16 (7/9) | 13 | 1.3 | 2.3 (1.3-4.0) | 0.03 |
| Kidney failure and genitourinary | 12 (4/8) | 12 | 1.2 | 2.1 (1.2-3.7) | 0.03 |
| **Injuries** | | | | | |
| Road traffic accidents | 51 (34/17) | 50 | 5.0 | 8.8 (6.7-11.6) | 0.13 |
| Other injuries | 40 (32/8) | 46 | 4.5 | 8.1 (6.1-10.8) | 0.12 |
| Drownings | 16 (13/3) | 29 | 2.9 | 5.1 (3.5-7.3) | 0.08 |
| Falls | 16 (13/3) | 25 | 2.4 | 4.4 (3.0-6.5) | 0.07 |
| Animal/plant venom | 11 (9/2) | 18 | 1.8 | 3.2 (2.0-5.1) | 0.05 |
| Ill-defined/unknown | 29 (16/13) | 42 | 4.2 | 7.4 (5.5-10) | 0.11 |
| **All 15-29** | **875 (420/455)** | **1,007** | **100.0** | **177.1 (166.5-188.4)** | **2.66** |

**Table 38. Leading causes of death for 15 to 29 years, 2018-2023 – West**

| Cause of death | Study deaths (male/female) | Regional annual deaths | % Total | Annual mortality rate (95% CI) per 100,000 pop | Period risk % |
|---|---|---|---|---|---|
| **Communicable, maternal, perinatal & nutritional** | | | | | |
| Malaria | 42 (22/20) | 147 | 14.8 | 30.5 (25.9-35.9) | 0.46 |
| Maternal | 21 (0/21) | 76 | 7.6 | 15.8 (12.6-19.8) | 0.24 |
| Tuberculosis | 20 (10/10) | 73 | 7.3 | 15.2 (12.1-19.1) | 0.23 |
| Diarrhoea | 16 (6/10) | 57 | 5.7 | 11.8 (9.1-15.3) | 0.18 |
| Other infections | 15 (10/5) | 54 | 5.4 | 11.2 (8.6-14.6) | 0.17 |
| HIV/AIDS and STIs | 13 (3/10) | 47 | 4.7 | 9.8 (7.4-13) | 0.15 |
| Pneumonia | 12 (4/8) | 43 | 4.4 | 8.9 (6.6-12) | 0.13 |
| Severe localized infection | 8 (4/4) | 30 | 3.0 | 6.2 (4.3-8.9) | 0.09 |
| Hepatitis | 1 (1/0) | 3 | 0.3 | 0.6 (0.2-1.9) | 0.01 |
| Meningitis/encephalitis | 1 (0/1) | 3 | 0.3 | 0.6 (0.2-1.9) | 0.01 |
| **Non-communicable** | | | | | |
| Ischaemic heart and other vascular | 14 (7/7) | 52 | 5.2 | 10.8 (8.2-14.2) | 0.16 |
| Appendix, hernia, intestinal | 11 (8/3) | 40 | 4.0 | 8.3 (6.1-11.3) | 0.12 |
| Peptic ulcer/gastroesophageal | 11 (9/2) | 39 | 3.9 | 8.1 (5.9-11.1) | 0.12 |
| Non-communicable | 9 (3/6) | 32 | 3.2 | 6.6 (4.7-9.3) | 0.10 |
| Sickle-cell | 7 (4/3) | 25 | 2.5 | 5.2 (3.5-7.7) | 0.08 |
| Liver and alcohol diseases | 6 (4/2) | 21 | 2.1 | 4.4 (2.9-6.7) | 0.07 |
| Epilepsy | 4 (4/0) | 14 | 1.5 | 2.9 (1.7-4.9) | 0.04 |
| Cancer | 3 (2/1) | 11 | 1.1 | 2.3 (1.3-4.2) | 0.03 |
| Stroke | 2 (0/2) | 7 | 0.7 | 1.5 (0.7-3.1) | 0.02 |
| Kidney failure and genitourinary | 1 (0/1) | 5 | 0.5 | 1.0 (0.4-2.4) | 0.02 |
| **Injuries** | | | | | |
| Road traffic accidents | 21 (13/8) | 73 | 7.4 | 15.2 (12.1-19.1) | 0.23 |
| Other injuries | 17 (13/4) | 60 | 6.0 | 12.5 (9.7-16.1) | 0.19 |
| Drownings | 6 (5/1) | 21 | 2.1 | 4.4 (2.9-6.7) | 0.07 |
| Falls | 5 (3/2) | 18 | 1.8 | 3.7 (2.3-5.9) | 0.06 |
| Ill-defined/unknown | 12 (5/7) | 44 | 4.4 | 9.1 (6.8-12.2) | 0.14 |
| **All 15-29** | **278 (140/138)** | **997** | **100.0** | **207.1 (194.6-220.4)** | **3.11** |

## Adult mortality: 30 to 69 years

**Table 39. Leading causes of death for 30 to 69 years, 2018-2023 – East**

| Cause of death | Study deaths (male/female) | Regional annual deaths | % Total | Annual mortality rate (95% CI) per 100,000 pop | Period risk % |
|---|---|---|---|---|---|
| **Communicable, maternal, perinatal & nutritional** | | | | | |
| Other infections | 120 (70/50) | 812 | 10.8 | 121.5 (113.4-130.2) | 4.86 |
| Malaria | 88 (51/37) | 614 | 8.2 | 91.9 (84.9-99.5) | 3.68 |
| Diarrhoea | 60 (31/29) | 467 | 6.2 | 69.9 (63.8-76.5) | 2.80 |
| Tuberculosis | 54 (35/19) | 362 | 4.8 | 54.2 (48.9-60.1) | 2.17 |
| Pneumonia | 39 (26/13) | 264 | 3.5 | 39.5 (35.0-44.6) | 1.58 |
| Severe localized infection | 29 (17/12) | 206 | 2.7 | 30.8 (26.9-35.3) | 1.23 |
| HIV/AIDS and STIs | 27 (16/11) | 173 | 2.3 | 25.9 (22.3-30.1) | 1.04 |
| Maternal | 20 (0/20) | 153 | 2.0 | 22.9 (19.5-26.8) | 0.92 |
| Hepatitis | 9 (7/2) | 67 | 0.9 | 10.0 (7.9-12.7) | 0.40 |
| Fever of unknown origin | 10 (7/3) | 65 | 0.9 | 9.7 (7.6-12.4) | 0.39 |
| Meningitis/encephalitis | 9 (1/8) | 56 | 0.7 | 8.4 (6.5-10.9) | 0.34 |
| Severe systemic infection | 3 (1/2) | 19 | 0.3 | 2.8 (1.8-4.4) | 0.11 |
| **Non-communicable** | | | | | |
| Ischaemic heart and other vascular | 127 (67/60) | 847 | 11.3 | 126.8 (118.5-135.6) | 5.07 |
| Stroke | 92 (48/44) | 630 | 8.4 | 94.3 (87.2-102.0) | 3.77 |
| Appendix, hernia, intestinal | 52 (45/7) | 376 | 5.0 | 56.3 (50.9-62.3) | 2.25 |
| Cancer | 48 (20/28) | 347 | 4.6 | 51.9 (46.7-57.7) | 2.08 |
| Liver and alcohol diseases | 47 (25/22) | 324 | 4.3 | 48.5 (43.5-54.1) | 1.94 |
| Peptic ulcer/gastroesophageal | 31 (15/16) | 233 | 3.1 | 34.9 (30.7-39.7) | 1.40 |
| Asthma and chronic respiratory | 30 (17/13) | 222 | 3.0 | 33.2 (29.1-37.9) | 1.33 |
| Kidney failure and genitourinary | 20 (14/6) | 146 | 1.9 | 21.9 (18.6-25.8) | 0.88 |
| Epilepsy | 14 (7/7) | 88 | 1.2 | 13.2 (10.7-16.3) | 0.53 |
| Non-communicable | 8 (5/3) | 58 | 0.8 | 8.7 (6.7-11.3) | 0.35 |
| Other neuropsychiatric disorders | 7 (6/1) | 45 | 0.6 | 6.7 (5.0-9.0) | 0.27 |
| Sickle-cell | 4 (2/2) | 32 | 0.4 | 4.8 (3.4-6.8) | 0.19 |
| **Injuries** | | | | | |
| Other unintentional injuries | 31 (22/9) | 197 | 2.6 | 29.5 (25.7-33.9) | 1.18 |
| Road traffic accidents | 28 (21/7) | 188 | 2.5 | 28.1 (24.4-32.4) | 1.12 |
| Falls | 25 (18/7) | 163 | 2.2 | 24.4 (20.9-28.4) | 0.98 |
| Other injuries | 11 (10/1) | 88 | 1.2 | 13.2 (10.7-16.3) | 0.53 |
| Animal/plant venom | 12 (8/4) | 82 | 1.1 | 12.3 (9.9-15.3) | 0.49 |
| Ill-defined/unknown | 29 (15/14) | 190 | 2.5 | 28.4 (24.6-32.7) | 1.14 |
| **All 30-69 years** | **1,084 (627/457)** | **7,514** | **100.0** | **1,124.5 (1,099.4-1,150.2)** | **44.98** |

**Table 40. Leading causes of death for 30 to 69 years, 2018-2023 – North East**

| Cause of death | Study deaths (male/female) | Regional annual deaths | % Total | Annual mortality rate (95% CI) per 100,000 pop | Period risk % |
|---|---|---|---|---|---|
| **Communicable, maternal, perinatal & nutritional** | | | | | |
| Malaria | 144 (78/66) | 389 | 11.3 | 91.1 (82.5-100.6) | 3.64 |
| Tuberculosis | 100 (63/37) | 257 | 7.4 | 60.2 (53.3-68.0) | 2.41 |
| Diarrhoea | 100 (45/55) | 249 | 7.2 | 58.3 (51.5-66.0) | 2.33 |
| Other infections | 74 (41/33) | 182 | 5.3 | 42.6 (36.8-49.3) | 1.70 |
| Pneumonia | 55 (32/23) | 158 | 4.6 | 37.0 (31.7-43.2) | 1.48 |
| Severe localized infection | 30 (11/19) | 89 | 2.6 | 20.8 (16.9-25.6) | 0.83 |
| HIV/AIDS and STIs | 27 (14/13) | 74 | 2.1 | 17.3 (13.8-21.7) | 0.69 |
| Maternal | 28 (0/28) | 53 | 1.5 | 12.4 (9.5-16.2) | 0.50 |
| Hepatitis | 17 (12/5) | 52 | 1.5 | 12.2 (9.3-16) | 0.49 |
| Fever of unknown origin | 8 (1/7) | 25 | 0.7 | 5.9 (4.0-8.7) | 0.24 |
| Severe systemic infection | 8 (3/5) | 21 | 0.6 | 4.9 (3.2-7.5) | 0.20 |
| Meningitis/encephalitis | 7 (4/3) | 17 | 0.5 | 4.0 (2.5-6.4) | 0.16 |
| **Non-communicable** | | | | | |
| Stroke | 109 (48/61) | 270 | 7.8 | 63.2 (56.1-71.2) | 2.53 |
| Liver and alcohol diseases | 84 (60/24) | 189 | 5.5 | 44.3 (38.4-51.1) | 1.77 |
| Appendix, hernia, intestinal | 73 (55/18) | 181 | 5.3 | 42.4 (36.7-49.0) | 1.70 |
| Ischaemic heart and other vascular | 116 (60/56) | 298 | 8.6 | 69.8 (62.3-78.2) | 2.79 |
| Peptic ulcer/gastroesophageal | 71 (36/35) | 163 | 4.7 | 38.2 (32.8-44.5) | 1.53 |
| Cancer | 40 (16/24) | 112 | 3.2 | 26.2 (21.8-31.5) | 1.05 |
| Kidney failure and genitourinary | 27 (18/9) | 66 | 1.9 | 15.5 (12.2-19.7) | 0.62 |
| Asthma and chronic respiratory | 31 (20/11) | 62 | 1.8 | 14.5 (11.3-18.6) | 0.58 |
| Non-communicable | 14 (8/6) | 32 | 0.9 | 7.5 (5.3-10.6) | 0.30 |
| Epilepsy | 4 (2/2) | 10 | 0.3 | 2.3 (1.2-4.3) | 0.09 |
| Sickle-cell | 5 (2/3) | 10 | 0.3 | 2.3 (1.2-4.3) | 0.09 |
| Other neuropsychiatric disorders | 2 (1/1) | 3 | 0.1 | 0.7 (0.2-2.2) | 0.03 |
| **Injuries** | | | | | |
| Road traffic accidents | 59 (41/18) | 155 | 4.5 | 36.3 (31-42.5) | 1.45 |
| Falls | 39 (28/11) | 106 | 3.1 | 24.8 (20.5-30) | 0.99 |
| Other unintentional injuries | 40 (29/11) | 103 | 3.0 | 24.1 (19.9-29.2) | 0.96 |
| Animal/plant venom | 19 (10/9) | 47 | 1.4 | 11.0 (8.3-14.6) | 0.44 |
| Other injuries | 9 (8/1) | 26 | 0.8 | 6.1 (4.2-9.0) | 0.24 |
| Other transport accidents | 1 (0/1) | 3 | 0.1 | 0.7 (0.2-2.2) | 0.03 |
| Ill-defined/unknown | 18 (10/8) | 51 | 1.5 | 11.9 (9.0-15.7) | 0.48 |
| **All 30-69** | **1,359 (756/603)** | **3,453** | **100.0** | **808.5 (782-835.9)** | **32.34** |

**Table 41. Leading causes of death for 30 to 69 years, 2018-2023 – North West**

| Cause of death | Study deaths (male/female) | Regional annual deaths | % Total | Annual mortality rate (95% CI) per 100,000 pop | Period risk % |
|---|---|---|---|---|---|
| **Communicable, maternal, perinatal & nutritional** | | | | | |
| Malaria | 65 (35/30) | 389 | 9.1 | 96.9 (87.7-107.0) | 3.88 |
| Tuberculosis | 46 (31/15) | 338 | 7.9 | 84.2 (75.7-93.7) | 3.37 |
| Diarrhoea | 37 (19/18) | 282 | 6.6 | 70.2 (62.5-78.9) | 2.81 |
| Other infections | 44 (25/19) | 215 | 5.0 | 53.6 (46.9-61.3) | 2.14 |
| Pneumonia | 31 (20/11) | 202 | 4.7 | 50.3 (43.8-57.7) | 2.01 |
| Maternal | 21 (0/21) | 130 | 3.0 | 32.4 (27.3-38.5) | 1.30 |
| HIV/AIDS and STIs | 19 (7/12) | 100 | 2.3 | 24.9 (20.5-30.3) | 1.00 |
| Severe localized infection | 9 (4/5) | 62 | 1.4 | 15.4 (12.0-19.8) | 0.62 |
| Hepatitis | 5 (0/5) | 33 | 0.8 | 8.2 (5.8-11.5) | 0.33 |
| Severe systemic infection | 4 (4/0) | 29 | 0.7 | 7.2 (5.0-10.4) | 0.29 |
| Fever of unknown origin | 3 (2/1) | 10 | 0.2 | 2.5 (1.3-4.6) | 0.10 |
| Meningitis/encephalitis | 3 (2/1) | 10 | 0.2 | 2.5 (1.3-4.6) | 0.10 |
| **Non-communicable** | | | | | |
| Ischaemic heart and other vascular | 79 (45/34) | 534 | 12.5 | 133.0 (122.2-144.8) | 5.32 |
| Stroke | 51 (27/24) | 347 | 8.1 | 86.4 (77.8-96.0) | 3.46 |
| Appendix, hernia, intestinal | 36 (30/6) | 256 | 6.0 | 63.8 (56.4-72.1) | 2.55 |
| Asthma and chronic respiratory | 30 (19/11) | 221 | 5.2 | 55.0 (48.2-62.8) | 2.20 |
| Peptic ulcer/gastroesophageal | 31 (21/10) | 219 | 5.1 | 54.6 (47.8-62.3) | 2.18 |
| Liver and alcohol diseases | 23 (15/8) | 156 | 3.6 | 38.9 (33.3-45.5) | 1.56 |
| Cancer | 25 (14/11) | 136 | 3.2 | 33.9 (28.7-40.1) | 1.36 |
| Non-communicable | 14 (8/6) | 109 | 2.6 | 27.2 (22.5-32.8) | 1.09 |
| Kidney failure and genitourinary | 11 (7/4) | 64 | 1.5 | 15.9 (12.4-20.3) | 0.64 |
| Other neuropsychiatric disorders | 3 (1/2) | 10 | 0.2 | 2.5 (1.3-4.6) | 0.10 |
| **Injuries** | | | | | |
| Road traffic accidents | 17 (15/2) | 136 | 3.2 | 33.9 (28.7-40.1) | 1.36 |
| Falls | 11 (9/2) | 92 | 2.1 | 22.9 (18.7-28.1) | 0.92 |
| Animal/plant venom | 13 (8/5) | 71 | 1.7 | 17.7 (14-22.3) | 0.71 |
| Other unintentional injuries | 10 (6/4) | 43 | 1.0 | 10.7 (7.9-14.4) | 0.43 |
| Other injuries | 1 (1/0) | 16 | 0.4 | 4.0 (2.5-6.5) | 0.16 |
| Other transport accidents | 1 (1/0) | 3 | 0.1 | 0.7 (0.2-2.2) | 0.03 |
| Ill-defined/unknown | 9 (4/5) | 66 | 1.5 | 16.4 (12.9-20.9) | 0.66 |
| **All 30-69** | **652 (380/272)** | **4,280** | **100.0** | **1,066.1 (1,034.6-1,098.5)** | **42.64** |

**Table 42. Leading causes of death for 30 to 69 years, 2018-2023 – South**

| Cause of death | Study Total deaths (male/female) | Regional annual deaths | % Total | Annual mortality rate (95% CI) per 100,000 pop | Period risk % |
|---|---|---|---|---|---|
| **Communicable, maternal, perinatal & nutritional** | | | | | |
| **Malaria** | 458 (254/204) | 827 | 18.5 | 131.5 (122.8-140.8) | 5.26 |
| Other infections | 110 (62/48) | 214 | 4.8 | 34.0 (29.7-38.9) | 1.36 |
| Diarrhoea | 124 (66/58) | 199 | 4.5 | 31.7 (27.6-36.4) | 1.27 |
| Pneumonia | 117 (61/56) | 199 | 4.5 | 31.7 (27.6-36.4) | 1.27 |
| Tuberculosis | 100 (60/40) | 184 | 4.1 | 29.3 (25.4-33.9) | 1.17 |
| Maternal | 61 (0/61) | 118 | 2.7 | 18.8 (15.7-22.5) | 0.75 |
| Severe Localized Infection | 47 (25/22) | 103 | 2.3 | 16.4 (13.5-19.9) | 0.66 |
| HIV/AIDS and STIs | 58 (22/36) | 85 | 1.9 | 13.5 (10.9-16.7) | 0.54 |
| Hepatitis | 48 (40/8) | 58 | 1.3 | 9.2 (7.1-11.9) | 0.37 |
| Meningitis/encephalitis | 25 (13/12) | 42 | 0.9 | 6.7 (5.0-9.1) | 0.27 |
| Severe systemic infection | 27 (17/10) | 42 | 0.9 | 6.7 (5.0-9.1) | 0.27 |
| Fever of unknown origin | 21 (10/11) | 37 | 0.8 | 5.9 (4.3-8.1) | 0.24 |
| **Non-communicable** | | | | | |
| Ischaemic heart and other vascular | 320 (160/160) | 518 | 11.6 | 82.4 (75.6-89.8) | 3.30 |
| Stroke | 246 (130/116) | 361 | 8.1 | 57.4 (51.8-63.6) | 2.30 |
| Peptic ulcer/gastroesophageal | 77 (46/31) | 151 | 3.4 | 24.0 (20.5-28.2) | 0.96 |
| Liver and alcohol diseases | 99 (62/37) | 149 | 3.3 | 23.7 (20.2-27.8) | 0.95 |
| Cancer | 85 (35/50) | 128 | 2.9 | 20.4 (17.2-24.3) | 0.82 |
| Appendix, hernia, intestinal | 66 (45/21) | 125 | 2.8 | 19.9 (16.7-23.7) | 0.80 |
| Kidney failure and genitourinary | 58 (33/25) | 91 | 2.0 | 14.5 (11.8-17.8) | 0.58 |
| Asthma and chronic respiratory | 48 (26/22) | 79 | 1.8 | 12.6 (10.1-15.7) | 0.50 |
| Non-communicable | 31 (21/10) | 60 | 1.3 | 9.5 (7.4-12.2) | 0.38 |
| Other neuropsychiatric | 18 (8/10) | 31 | 0.7 | 4.9 (3.4-7.0) | 0.20 |
| Epilepsy | 15 (10/5) | 23 | 0.5 | 3.7 (2.5-5.6) | 0.15 |
| Sickle-cell | 11 (6/5) | 14 | 0.3 | 2.2 (1.3-3.7) | 0.09 |
| **Injuries** | | | | | |
| Road traffic accidents | 94 (71/23) | 141 | 3.2 | 22.4 (19.0-26.4) | 0.90 |
| Other unintentional injuries | 64 (39/25) | 123 | 2.8 | 19.6 (16.4-23.4) | 0.78 |
| Falls | 41 (29/12) | 92 | 2.1 | 14.6 (11.9-17.9) | 0.58 |
| Animal/plant venom | 25 (16/9) | 50 | 1.1 | 8.0 (6.1-10.6) | 0.32 |
| Other injuries | 32 (24/8) | 49 | 1.1 | 7.8 (5.9-10.3) | 0.31 |
| Other transport accidents | 24 (15/9) | 39 | 0.9 | 6.2 (4.5-8.5) | 0.25 |
| Ill-defined/unknown | 65 (26/39) | 126 | 2.8 | 20.0 (16.8-23.8) | 0.80 |
| **All 30-69** | **2,615 (1,432/1,183)** | **4,460** | **100.0** | **709.4 (688.9-730.5)** | **28.38** |

**Table 43. Leading causes of death for 30 to 69 years, 2018-2023 – West**

| Cause of death | Study deaths (male/female) | Regional annual deaths | % Total | Annual mortality rate (95% CI) per 100,000 pop | Period risk % |
|---|---|---|---|---|---|
| **Communicable, maternal, perinatal & nutritional** | | | | | |
| Malaria | 81 (40/41) | 352 | 8.7 | 75.2 (67.7-83.5) | 3.01 |
| Tuberculosis | 50 (28/22) | 219 | 5.4 | 46.8 (41.0-53.4) | 1.87 |
| Diarrhoea | 44 (25/19) | 192 | 4.8 | 41.0 (35.6-47.2) | 1.64 |
| Other infections | 41 (23/18) | 181 | 4.5 | 38.7 (33.5-44.8) | 1.55 |
| Pneumonia | 36 (23/13) | 161 | 4.0 | 34.4 (29.5-40.1) | 1.38 |
| HIV/AIDS and STIs | 36 (19/17) | 155 | 3.9 | 33.1 (28.3-38.7) | 1.32 |
| Maternal | 18 (0/18) | 78 | 1.9 | 16.7 (13.4-20.8) | 0.67 |
| Hepatitis | 17 (13/4) | 72 | 1.8 | 15.4 (12.2-19.4) | 0.62 |
| Severe localized infection | 11 (10/1) | 49 | 1.2 | 10.5 (7.9-13.9) | 0.42 |
| Fever of unknown origin | 8 (4/4) | 35 | 0.9 | 7.5 (5.4-10.4) | 0.30 |
| Severe systemic infection | 6 (4/2) | 28 | 0.7 | 6.0 (4.1-8.7) | 0.24 |
| Meningitis/encephalitis | 3 (1/2) | 13 | 0.3 | 2.8 (1.6-4.8) | 0.11 |
| **Non-communicable** | | | | | |
| Ischaemic heart and other vascular | 140 (69/71) | 602 | 15.0 | 128.6 (118.7-139.3) | 5.14 |
| Stroke | 107 (52/55) | 459 | 11.4 | 98.1 (89.5-107.5) | 3.92 |
| Cancer | 40 (24/16) | 174 | 4.3 | 37.2 (32.1-43.2) | 1.49 |
| Appendix, hernia, intestinal | 34 (26/8) | 150 | 3.7 | 32.1 (27.4-37.7) | 1.28 |
| Peptic ulcer/gastroesophageal | 31 (19/12) | 137 | 3.4 | 29.3 (24.8-34.6) | 1.17 |
| Liver and alcohol diseases | 29 (16/13) | 130 | 3.2 | 27.8 (23.4-33.0) | 1.11 |
| Kidney failure and genitourinary | 28 (17/11) | 122 | 3.0 | 26.1 (21.9-31.2) | 1.04 |
| Asthma and chronic respiratory | 23 (15/8) | 98 | 2.4 | 20.9 (17.1-25.5) | 0.84 |
| Non-communicable | 17 (11/6) | 80 | 2.0 | 17.1 (13.7-21.3) | 0.68 |
| Other neuropsychiatric disorders | 6 (3/3) | 26 | 0.6 | 5.6 (3.8-8.2) | 0.22 |
| Sickle-cell | 4 (1/3) | 17 | 0.4 | 3.6 (2.2-5.8) | 0.14 |
| Epilepsy | 3 (1/2) | 13 | 0.3 | 2.8 (1.6-4.8) | 0.11 |
| **Injury** | | | | | |
| Road traffic accidents | 43 (29/14) | 191 | 4.7 | 40.8 (35.4-47.0) | 1.63 |
| Other unintentional injuries | 21 (15/6) | 90 | 2.2 | 19.2 (15.6-23.6) | 0.77 |
| Falls | 20 (17/3) | 85 | 2.1 | 18.2 (14.7-22.5) | 0.73 |
| Other injuries | 8 (7/1) | 38 | 0.9 | 8.1 (5.9-11.1) | 0.32 |
| Animal/plant venom | 4 (2/2) | 20 | 0.5 | 4.3 (2.8-6.7) | 0.17 |
| Ill-defined/unknown | 14 (6/8) | 59 | 1.5 | 12.6 (9.8-16.3) | 0.50 |
| **All 30-69** | **923 (520/403)** | **4,027** | **100.0** | **860.5 (834.3-887.5)** | **34.42** |

## Adult mortality: 70 years and older

**Table 44. Leading causes of death for 70+ years, 2018-2023 – East**

| Cause of death | Study deaths (male/female) | Regional annual deaths | % Total | Annual mortality rate (95% CI) per 100,000 pop | Period risk % |
|---|---|---|---|---|---|
| **Communicable, maternal, perinatal & nutritional** | | | | | |
| Other infections | 43 (23/20) | 689 | 13.7 | 1,828.5 (1,696.9-1,970.3) | 18.29 |
| Malaria | 32 (20/12) | 551 | 10.9 | 1,462.3 (1,345.2-1,589.6) | 14.62 |
| Diarrhoea | 25 (14/11) | 427 | 8.5 | 1,133.2 (1,030.7-1,245.9) | 11.33 |
| Tuberculosis | 16 (12/4) | 247 | 4.9 | 655.5 (578.6-742.6) | 6.56 |
| Pneumonia | 11 (7/4) | 160 | 3.2 | 424.6 (363.7-495.8) | 4.25 |
| **Non-communicable** | | | | | |
| Ischaemic heart and other vascular | 49 (18/31) | 738 | 14.7 | 1,958.5 (1,822.2-2,105.0) | 19.59 |
| Stroke | 41 (19/22) | 629 | 12.5 | 1,669.3 (1,543.8-1,805.0) | 16.69 |
| Peptic ulcer/gastroesophageal | 13 (9/4) | 252 | 5.0 | 668.8 (591.1-756.7) | 6.69 |
| Asthma and chronic respiratory | 15 (12/3) | 220 | 4.4 | 583.8 (511.5-666.3) | 5.84 |
| Non-communicable | 9 (6/3) | 159 | 3.2 | 422.0 (361.2-493.0) | 4.22 |
| Appendix, hernia, intestinal | 9 (9/0) | 134 | 2.7 | 355.6 (300.2-421.2) | 3.56 |
| Liver and alcohol diseases | 7 (2/5) | 108 | 2.1 | 286.6 (237.3-346.1) | 2.87 |
| Kidney failure and genitourinary | 7 (5/2) | 87 | 1.7 | 230.9 (187.1-284.9) | 2.31 |
| Cancer | 3 (2/1) | 45 | 0.9 | 119.4 (89.1-159.9) | 1.19 |
| **Injuries** | | | | | |
| Falls | 9 (3/6) | 159 | 3.2 | 422 (361.2-493) | 4.22 |
| Other injuries | 8 (5/3) | 114 | 2.3 | 302.5 (251.8-363.5) | 3.03 |
| Ill-defined/unknown | 21 (8/13) | 315 | 6.3 | 836 (748.6-933.6) | 8.36 |
| **All 70 years and over** | **318 (174/144)** | **5,033** | **100.0** | **13,356.9 (12,992.9-13,731.1)** | **133.57** |

**Table 45. Leading causes of death for 70+ years, 2018-2023 – North East**

| Cause of death | Study deaths (male/female) | Regional annual deaths | % Total | Annual mortality rate (95% CI) per 100,000 pop | Period risk % |
|---|---|---|---|---|---|
| **Communicable, maternal, perinatal & nutritional** | | | | | |
| Other infections | 44 (21/23) | 301 | 14.2 | 1,131.5 (1,010.6-1,266.8) | 11.32 |
| Malaria | 39 (17/22) | 242 | 11.4 | 909.7 (802-1,031.8) | 9.10 |
| Diarrhoea | 22 (14/8) | 140 | 6.6 | 526.3 (446.0-621.1) | 5.26 |
| Tuberculosis | 17 (14/3) | 131 | 6.2 | 492.4 (414.9-584.4) | 4.92 |
| Pneumonia | 16 (10/6) | 87 | 4.1 | 327.0 (265.0-403.5) | 3.27 |
| **Non-communicable** | | | | | |
| Ischaemic heart and other vascular | 56 (27/29) | 318 | 15.0 | 1,195.4 (1,071.0-1,334.3) | 11.95 |
| Stroke | 43 (22/21) | 291 | 13.7 | 1,093.9 (975.2-1,227.1) | 10.94 |
| Peptic ulcer/gastroesophageal | 19 (12/7) | 103 | 4.9 | 387.2 (319.2-469.7) | 3.87 |
| Liver and alcohol diseases | 12 (7/5) | 68 | 3.2 | 255.6 (201.5-324.2) | 2.56 |
| Kidney failure and genitourinary | 8 (8/0) | 64 | 3.0 | 240.6 (188.3-307.4) | 2.41 |
| Appendix, hernia, intestinal | 10 (7/3) | 62 | 2.9 | 233.1 (181.7-299.0) | 2.33 |
| Asthma and chronic respiratory | 9 (4/5) | 61 | 2.9 | 229.3 (178.4-294.7) | 2.29 |
| Non-communicable | 9 (3/6) | 59 | 2.8 | 221.8 (171.8-286.3) | 2.22 |
| Cancer | 1 (0/1) | 4 | 0.2 | 15.0 (5.6-40.0) | 0.15 |
| **Injuries** | | | | | |
| Other injuries | 7 (6/1) | 36 | 1.7 | 135.3 (97.6-187.6) | 1.35 |
| Falls | 7 (4/3) | 38 | 1.8 | 142.8 (103.9-196.3) | 1.43 |
| Ill-defined/unknown | 17 (4/13) | 114 | 5.4 | 428.5 (356.6-514.8) | 4.29 |
| **All 70 years and over** | **336 (180/156)** | **2,119** | **100.0** | **7,965.5 (7,633.5-8,312)** | **79.66** |

**Table 46. Leading causes of death for 70+ years, 2018-2023 – North West**

| Cause of death | Study deaths (male/female) | Regional annual deaths | % Total | Annual mortality rate (95% CI) per 100,000 pop | Period risk % |
|---|---|---|---|---|---|
| **Communicable, maternal, perinatal & nutritional** | | | | | |
| Other infections | 38 (16/22) | 373 | 14.6 | 1,328.7 (1,200.5-1,470.6) | 13.29 |
| Malaria | 21 (8/13) | 271 | 10.6 | 965.3 (857.0-1,087.3) | 9.65 |
| Pneumonia | 11 (3/8) | 134 | 5.2 | 477.3 (403.0-565.4) | 4.77 |
| Tuberculosis | 4 (2/2) | 83 | 3.2 | 295.7 (238.5-366.7) | 2.96 |
| Diarrhoea | 6 (2/4) | 42 | 1.6 | 149.6 (110.6-202.4) | 1.50 |
| **Non-communicable** | | | | | |
| Ischaemic heart and other vascular | 31 (13/18) | 575 | 22.5 | 2,048.2 (1,887.4-2,222.6) | 20.48 |
| Stroke | 21 (13/8) | 293 | 11.4 | 1,043.7 (930.8-1,170.3) | 10.44 |
| Asthma and chronic respiratory | 16 (12/4) | 230 | 9.0 | 819.3 (720.0-932.3) | 8.19 |
| Peptic ulcer/gastroesophageal | 7 (4/3) | 101 | 4.0 | 359.8 (296.0-437.3) | 3.60 |
| Appendix, hernia, intestinal | 8 (7/1) | 80 | 3.1 | 285.0 (228.9-354.8) | 2.85 |
| Cancer | 2 (2/0) | 63 | 2.5 | 224.4 (175.3-287.3) | 2.24 |
| Liver and alcohol diseases | 4 (3/1) | 58 | 2.3 | 206.6 (159.7-267.2) | 2.07 |
| Kidney failure and genitourinary | 1 (1/0) | 31 | 1.2 | 110.4 (77.6-157.0) | 1.10 |
| Non-communicable | 1 (1/0) | 7 | 0.3 | 24.9 (11.9-52.2) | 0.25 |
| **Injury** | | | | | |
| Other injuries | 6 (5/1) | 72 | 2.8 | 256.5 (203.6-323.1) | 2.57 |
| Falls | 4 (3/1) | 28 | 1.1 | 99.7 (68.8-144.4) | 1.00 |
| Ill-defined/unknown | 12 (3/9) | 115 | 4.5 | 409.6 (341.2-491.7) | 4.10 |
| **All 70 years and over** | **193 (98/95)** | **2,557** | **100.0** | **9,108.5 (8,762.2-9,468.5)** | **91.09** |

**Table 47. Leading causes of death for 70+ years, 2018-2023 – South**

| Cause of death | Study deaths (male/female) | Regional annual deaths | % Total | Annual mortality rate (95% CI) per 100,000 pop | Period risk % |
|---|---|---|---|---|---|
| **Communicable, maternal, perinatal & nutritional** | | | | | |
| Malaria | 101 (36/65) | 963 | 22.9 | 2,210.4 (2,075.1-2,354.5) | 22.10 |
| Other infections | 58 (28/30) | 545 | 13.0 | 1,251 (1,150.3-1,360.6) | 12.51 |
| Pneumonia | 25 (8/17) | 231 | 5.5 | 530.2 (466.1-603.2) | 5.30 |
| Tuberculosis | 26 (12/14) | 231 | 5.5 | 530.2 (466.1-603.2) | 5.30 |
| Diarrhoea | 23 (10/13) | 216 | 5.2 | 495.8 (433.9-566.5) | 4.96 |
| **Non-communicable** | | | | | |
| Ischaemic heart and other vascular | 69 (33/36) | 644 | 15.3 | 1,478.2 (1,368.3-1,596.9) | 14.78 |
| Stroke | 53 (20/33) | 462 | 11.0 | 1,060.4 (968-1,161.6) | 10.60 |
| Asthma and chronic respiratory | 17 (8/9) | 149 | 3.5 | 342.0 (291.3-401.6) | 3.42 |
| Non-communicable | 9 (5/4) | 105 | 2.5 | 241.0 (199.0-291.8) | 2.41 |
| Appendix, hernia, intestinal | 11 (9/2) | 96 | 2.3 | 220.4 (180.4-269.2) | 2.20 |
| Peptic ulcer/gastroesophageal | 13 (8/5) | 87 | 2.1 | 199.7 (161.9-246.4) | 2.00 |
| Kidney failure and genitourinary | 5 (4/1) | 51 | 1.2 | 117.1 (89.0-154.1) | 1.17 |
| Liver and alcohol diseases | 3 (1/2) | 30 | 0.7 | 68.9 (48.2-98.5) | 0.69 |
| Cancer | 4 (1/3) | 28 | 0.7 | 64.3 (44.4-93.1) | 0.64 |
| **Injury** | | | | | |
| Falls | 12 (5/7) | 125 | 3.0 | 286.9 (240.8-341.9) | 2.87 |
| Other injuries | 10 (8/2) | 79 | 1.9 | 181.3 (145.4-226) | 1.81 |
| Ill-defined/unknown | 17 (3/14) | 158 | 3.8 | 362.7 (310.3-423.9) | 3.63 |
| **All 70 years and over** | **456 (199/257)** | **4,201** | **100.0** | **9,642.6 (9,355.4-9,938.6)** | **96.43** |

**Table 48. Leading causes of death for 70+ years, 2018-2023 – West**

| Cause of death | Study deaths (male/female) | Regional annual deaths | % Total | Annual mortality rate (95% CI) per 100,000 pop | Period risk % |
|---|---|---|---|---|---|
| **Communicable, maternal, perinatal & nutritional** | | | | | |
| Other infections | 22 (12/10) | 179 | 10.7 | 990.9 (855.9-1,147.2) | 9.91 |
| Malaria | 20 (6/14) | 160 | 9.6 | 885.7 (758.6-1,034.1) | 8.86 |
| Diarrhoea | 10 (8/2) | 80 | 4.8 | 442.9 (355.7-551.4) | 4.43 |
| Pneumonia | 6 (3/3) | 48 | 2.9 | 265.7 (200.2-352.6) | 2.66 |
| Tuberculosis | 4 (4/0) | 31 | 1.8 | 171.6 (120.7-244) | 1.72 |
| **Non-communicable** | | | | | |
| Ischaemic heart and other vascular | 49 (24/25) | 389 | 23.3 | 2,153.5 (1,949.8-2,378.5) | 21.54 |
| Stroke | 41 (23/18) | 327 | 19.6 | 1,810.2 (1,624.3-2,017.4) | 18.10 |
| Appendix, hernia, intestinal | 8 (4/4) | 66 | 4.0 | 365.4 (287.1-465.1) | 3.65 |
| Asthma and chronic respiratory | 8 (5/3) | 63 | 3.7 | 348.8 (272.5-446.5) | 3.49 |
| Peptic ulcer/gastroesophageal | 5 (1/4) | 39 | 2.3 | 215.9 (157.7-295.5) | 2.16 |
| Cancer | 5 (4/1) | 38 | 2.3 | 210.4 (153.1-289.2) | 2.10 |
| Kidney failure and genitourinary | 4 (3/1) | 34 | 2.0 | 188.2 (134.5-263.4) | 1.88 |
| Non-communicable | 4 (1/3) | 31 | 1.8 | 171.6 (120.7-244.0) | 1.72 |
| Liver and alcohol diseases | 1 (1/0) | 8 | 0.5 | 44.3 (22.2-88.6) | 0.44 |
| **Injury** | | | | | |
| Other injuries | 6 (4/2) | 47 | 2.8 | 260.2 (195.5-346.3) | 2.60 |
| Falls | 3 (2/1) | 23 | 1.4 | 127.3 (84.6-191.6) | 1.27 |
| Ill-defined/unknown | 13 (6/7) | 111 | 6.7 | 614.5 (510.2-740.1) | 6.15 |
| **All 70 years and over** | **209 (111/98)** | **1,673** | **100.0** | **9,261.6 (8,828.3-9,716.2)** | **92.62** |

| Neonates | Specific cause | SL | E | NE | NW | S | W |
|---|---|---|---|---|---|---|---|
| Perinatal conditions | Conditions originating in the perinatal period | 40 | 5 | 6 | 2 | 26 | 1 |
| | Sudden infant death syndrome | 17 | 3 | 3 | 2 | 8 | 1 |
| | Feeding problems of newborn | 15 | 1 | 4 | 0 | 4 | 6 |
| | Neonatal jaundice from unspecified causes | 6 | 1 | 1 | 1 | 2 | 1 |
| | Disorders linked to long gestation/low birth weight | 4 | 1 | 0 | 0 | 2 | 1 |
| | Hypothermia of newborn | 3 | 0 | 2 | 0 | 0 | 1 |
| | Intestinal obstruction of newborn | 2 | 0 | 1 | 0 | 1 | 0 |
| | Kernicterus | 1 | 1 | 0 | 0 | 0 | 0 |
| | Neonatal jaundice due to excessive hemolysis | 1 | 0 | 0 | 1 | 0 | 0 |
| | Other neonatal hemorrhages | 1 | 0 | 0 | 0 | 1 | 0 |
| | Umbilical hemorrhage of newborn | 1 | 0 | 0 | 0 | 1 | 0 |
| Other infections | Fever of unknown origin | 25 | 3 | 9 | 3 | 10 | 0 |
| | Unspecified infections | 20 | 3 | 6 | 0 | 11 | 0 |
| | Diarrhea | 8 | 1 | 2 | 3 | 1 | 1 |
| | Severe Localized Infection | 1 | 0 | 1 | 0 | 0 | 0 |
| Non-communicable | Congenital anomalies | 16 | 2 | 6 | 0 | 5 | 3 |
| | Epilepsy | 2 | 1 | 0 | 0 | 1 | 0 |
| | Asthma and chronic respiratory | 1 | 0 | 0 | 0 | 1 | 0 |
| | Digestive condition | 1 | 0 | 0 | 0 | 0 | 1 |
| | Neuropsychiatric disorders | 1 | 0 | 1 | 0 | 0 | 0 |

| 1-59 months | Specific cause | SL | E | NE | NW | S | W |
|---|---|---|---|---|---|---|---|
| Other infections | Unspecified infections | 896 | 184 | 184 | 114 | 331 | 83 |
| | Severe Localized Infection | 18 | 7 | 4 | 3 | 4 | 0 |
| | Tuberculosis | 17 | 5 | 6 | 1 | 5 | 0 |
| | Arthropod-borne viral fevers | 12 | 1 | 0 | 0 | 11 | 0 |
| | Poliomyelitis | 4 | 0 | 2 | 2 | 0 | 0 |
| | Helminthiases | 2 | 0 | 2 | 0 | 0 | 0 |
| | Vaccine preventable diseases | 1 | 0 | 0 | 0 | 1 | 0 |
| | Tetanus | 1 | 0 | 0 | 1 | 0 | 0 |
| Non-communicable | Congenital anomalies | 15 | 3 | 1 | 0 | 8 | 3 |
| | Liver and alcohol diseases | 11 | 4 | 2 | 1 | 2 | 2 |
| | Sickle-cell | 11 | 3 | 1 | 1 | 5 | 1 |
| | Kidney failure and genitourinary | 8 | 3 | 3 | 0 | 0 | 2 |
| | Gastro-oesophageal | 6 | 0 | 3 | 0 | 3 | 0 |
| | Skin disease | 6 | 0 | 1 | 2 | 2 | 1 |
| | Sense organ disorders | 3 | 0 | 0 | 1 | 1 | 1 |
| | Other neuropsychiatric disorders | 2 | 0 | 1 | 0 | 1 | 0 |
| | Endocrine and immune disorders | 1 | 0 | 0 | 1 | 0 | 0 |
| | Musculoskeletal disorders | 1 | 0 | 0 | 0 | 1 | 0 |
| Perinatal conditions | Sudden infant death syndrome | 49 | 6 | 6 | 3 | 30 | 4 |

| 5-14 years | Specific cause | SL | E | NE | NW | S | W |
|---|---|---|---|---|---|---|---|
| Other infections | Unspecified infections | 186 | 42 | 30 | 27 | 59 | 28 |
| | Measles | 16 | 3 | 5 | 0 | 6 | 2 |
| | Severe localized infection | 16 | 3 | 4 | 0 | 6 | 3 |
| | HIV/AIDS and STIs | 14 | 0 | 2 | 1 | 10 | 1 |
| | Tuberculosis | 12 | 3 | 3 | 0 | 6 | 0 |
| | Fever of unknown origin | 8 | 2 | 0 | 0 | 6 | 0 |
| | Helminthiases | 7 | 3 | 1 | 3 | 0 | 0 |
| | Severe systemic infection | 6 | 2 | 0 | 0 | 3 | 1 |
| | Tetanus | 4 | 0 | 1 | 0 | 1 | 2 |
| | Arthropod-borne viral fevers | 3 | 0 | 0 | 1 | 2 | 0 |
| Other injuries | Unintentional injuries | 24 | 3 | 4 | 4 | 8 | 5 |
| | Animal/plant venom | 16 | 1 | 6 | 2 | 7 | 0 |
| | Other transport accidents | 6 | 0 | 0 | 1 | 5 | 0 |
| | Fires | 3 | 0 | 0 | 0 | 1 | 2 |
| | Interpersonal violence | 2 | 0 | 0 | 1 | 1 | 0 |
| | Poisonings | 2 | 1 | 0 | 0 | 1 | 0 |
| | Suicide | 2 | 0 | 1 | 0 | 0 | 1 |
| Non-communicable | Asthma and chronic respiratory | 12 | 1 | 1 | 1 | 7 | 2 |
| | Kidney failure and genitourinary | 12 | 2 | 1 | 1 | 7 | 1 |
| | Ischaemic heart and other vascular | 8 | 1 | 0 | 2 | 4 | 1 |
| | Congenital anomalies | 5 | 1 | 0 | 0 | 3 | 1 |
| | Skin disease | 4 | 1 | 0 | 2 | 1 | 0 |
| | Other neuropsychiatric disorders | 3 | 1 | 0 | 0 | 0 | 2 |
| | Musculoskeletal disorders | 2 | 0 | 1 | 1 | 0 | 0 |
| | Oral conditions | 2 | 1 | 1 | 0 | 0 | 0 |
| | Maternal | 2 | 0 | 0 | 1 | 1 | 0 |
| | Malnutrition | 2 | 0 | 0 | 0 | 2 | 0 |

| 15 – 29 years | Specific cause | SL | E | NE | NW | S | W |
|---|---|---|---|---|---|---|---|
| Other infections | Other infections | 83 | 15 | 13 | 9 | 37 | 9 |
| | Severe systemic infection | 18 | 0 | 1 | 0 | 14 | 3 |
| | Fever of unknown origin | 11 | 1 | 1 | 0 | 7 | 2 |
| | Arthropod-borne viral fevers | 8 | 3 | 2 | 0 | 3 | 0 |
| | Measles | 6 | 1 | 1 | 0 | 4 | 0 |
| | Helminthiases | 5 | 4 | 0 | 0 | 0 | 1 |
| | Tetanus | 3 | 0 | 3 | 0 | 0 | 0 |
| Non-communicable | Oral conditions | 14 | 1 | 4 | 2 | 7 | 0 |
| | Other neuropsychiatric disorders | 11 | 0 | 0 | 2 | 6 | 3 |
| | Asthma and chronic respiratory | 16 | 3 | 0 | 2 | 9 | 2 |
| | Skin disease | 6 | 1 | 1 | 0 | 3 | 1 |
| | Endocrine and immune disorders | 3 | 1 | 0 | 1 | 0 | 1 |
| | Musculoskeletal disorders | 3 | 1 | 0 | 0 | 1 | 1 |
| | Sense organ disorders | 2 | 0 | 0 | 0 | 1 | 1 |
| | Malnutrition | 1 | 1 | 0 | 0 | 0 | 0 |
| Other injuries | Other unintentional injuries | 53 | 7 | 21 | 2 | 18 | 5 |
| | Other transport accidents | 17 | 1 | 2 | 0 | 14 | 0 |
| | Interpersonal violence | 13 | 3 | 1 | 1 | 7 | 1 |
| | Fires | 12 | 2 | 0 | 0 | 1 | 9 |
| | Suicide | 5 | 0 | 3 | 0 | 0 | 2 |
| | Undetermined intent | 4 | 1 | 3 | 0 | 0 | 0 |
| | Poisonings | 2 | 1 | 0 | 1 | 0 | 0 |

| 30-69 years | Specific cause | SL | E | NE | NW | S | W |
|---|---|---|---|---|---|---|---|
| Other infections | Unspecified infections | 342 | 111 | 64 | 39 | 90 | 38 |
| | Arthropod-borne viral fevers | 24 | 5 | 4 | 3 | 10 | 2 |
| | Helminthiases | 17 | 3 | 5 | 2 | 7 | 0 |
| | Measles | 4 | 0 | 1 | 0 | 2 | 1 |
| | Tetanus | 2 | 1 | 0 | 0 | 1 | 0 |
| Non-communicable | Oral conditions | 28 | 2 | 3 | 6 | 13 | 4 |
| | Skin disease | 27 | 0 | 6 | 5 | 9 | 7 |
| | Musculoskeletal disorders | 11 | 2 | 0 | 1 | 4 | 4 |
| | Malnutrition | 7 | 0 | 2 | 1 | 3 | 1 |
| | Sense organ disorders | 7 | 3 | 2 | 1 | 1 | 0 |
| | Congenital anomalies | 4 | 1 | 1 | 0 | 1 | 1 |
| Other injuries | Interpersonal violence | 19 | 3 | 3 | 0 | 11 | 2 |
| | Drownings | 15 | 2 | 1 | 1 | 9 | 2 |
| | Undetermined intent | 11 | 6 | 2 | 0 | 3 | 0 |
| | Fires | 10 | 0 | 3 | 0 | 5 | 2 |
| | Suicide | 6 | 0 | 0 | 0 | 4 | 2 |
| Other transport accidents | Accident to watercraft causing drowning | 16 | 0 | 0 | 0 | 16 | 0 |
| | Water-transport drowning, no watercraft accident | 10 | 0 | 1 | 1 | 8 | 0 |

| 70+ years | Specific cause | SL | E | NE | NW | S | W |
|---|---|---|---|---|---|---|---|
| Other infections | Unspecified infections | 142 | 31 | 31 | 24 | 36 | 20 |
| | Severe localized infection | 16 | 0 | 4 | 3 | 8 | 1 |
| | Fever of unknown origin | 14 | 5 | 1 | 5 | 3 | 0 |
| | Hepatitis | 10 | 4 | 3 | 2 | 1 | 0 |
| | Meningitis/encephalitis | 9 | 0 | 4 | 3 | 2 | 0 |
| | HIV/AIDS and STIs | 7 | 1 | 1 | 1 | 4 | 0 |
| | Severe systemic infection | 7 | 2 | 0 | 0 | 4 | 1 |
| Other injuries | Other unintentional injuries | 15 | 5 | 4 | 2 | 2 | 2 |
| | Road traffic accidents | 9 | 1 | 1 | 1 | 2 | 4 |
| | Animal/plant venom | 6 | 2 | 1 | 3 | 0 | 0 |
| | Drownings | 2 | 0 | 0 | 0 | 2 | 0 |
| | Fires | 2 | 0 | 0 | 0 | 2 | 0 |
| | Interpersonal violence | 1 | 0 | 1 | 0 | 0 | 0 |
| | Other transport accidents | 1 | 0 | 0 | 0 | 1 | 0 |
| | Undetermined intent | 1 | 0 | 0 | 0 | 1 | 0 |

| Cause | ICD-10 Codes |
|-------|--------------|
| Maternal | A09, A16, A85, B20, B24, B53, B54, B90, B99, C50, D57, I09, I33, I64, I67, J45, K04, K76, O00, O03-O08, O10, O14-O16, O21, O22, O26, O31, O41, O44-O46, O60, O64, O66, O67, O72, O73, O75, O82, O85-O88, O90, O91, O94-O99, R17, R50, W01, Z98 |
| Pneumonia | H66, J02, J06, J11-J13, J15, J16, J18 J20, J21, J22, J36, J86, P23, U07, U08 |
| Asthma and chronic respiratory | J39, J40, J44-J47, J60, J64, J69, J80, J90, J98, R04, R05 |
| Birth asphyxia and birth trauma | P02, P03, P12, P15, P20, P21, P24, P90 |
| Cancer | C03, C06, C08, C10, C14-C18, C21, C22, C26, C30, C32-C34, C40, C41, C44, C49, C50, C53, C55-C57, C61, C64, C67,-C69, C71, C73, C76, C77, C80, C81, C83, C95, C96, D01, D13, D25, D33, D37, D41, D43, D48, N63 |
| Stroke | I60-I64, I67-I69 |
| Non-communicable | D59, D62, D76, E04, G83, H18, H57, H59, H92, H93, K03, K08, K10-K12, L40, L89, L97, L98, M06, M08, M13, M24, M40, M43, M47, M54, M72, M80, M89, M90, Q02-Q06, Q18, Q20, Q21, Q24, Q42, Q45, Q61, Q66, Q68, Q75, Q89, R21, R22 |
| Diarrhea | A01, A03, A05, A06 A09 |
| Drownings | W65, W69, W70, W73, W74 |
| Epilepsy | G40, G41, R56 |
| Falls | W01-W04, W06-W08, W10, W11, W13, W14, W16-W19 |
| Fever of unknown origin | R50 |
| Other injuries | X00, X01, X04, X08, X09, X44, X46, X48, X49, X64, X66, X70, X71, X78,X85, X89, X94, X99, Y00-Y04, Y08, Y09, Y14, Y19, Y21, Y23, Y24, Y28, Y29, Y34, Y87 |
| Gastro-oesophageal | I85, K22, K25, K27, K29, R13 |
| HIV/AIDS and STIs | A53, A54, A64, B20-B24, N70, N73, N74, R75 |
| Hepatitis | B15-B17, B19 |
| Cardiovascular | E10, E11, E14, I01, I10-I13, I27, I42, I49, I50-I52, I73, I80, I89, I95, I99 |
| Malnutrition | D50, D53, D64, E40-E46, E56, E64 |
| Ischaemic heart | I20-I22, I24, I25, I46, I84, R55 |
| Liver and alcohol diseases | B18, F10, K70-K77, R17, R18, Y15 |
| Low birth weight/preterm | P01, P05, P07, P22, P28, P61 |
| Malaria | B50-54 |
| Measles | B01, B05 |
| Meningitis/encephalitis | A39, A82, A85-A89, G00-G05 |
| Kidney failure and genitourinary | N04, N08, N11-N13, N15, N17, N18, N19, N25, N28, N29, N35, N39, N40, N42, N43, N45, N80, N83, N85, N91, N93, N94, R33, R39 |
| Ill-defined/unknown | R07, R51, R52, R54, R58, R60-R62, R68, R69, R96, R99 |
| Digestive conditions | K35-K37, K40-K42, K44-K46, K50, K52, K55, K56, K58, K59, K62, K63, K85, K86, K91, K92, R10, R11, R19, R63 |
| Other infections | A33, A35, A80, A90-A96, A98, A99, B02, B08, B09, B26, B33, B34, B37, B49, B65, B68, B74, B76, B77, B81-B83, B86, B94, B99 |
| Other neuropsychiatric disorders | F03, F09, F20, F29, F32, F43, F99, G20, G37, G43, G44, G91, G93, G95, G96, R40, R45 |
| Other perinatal conditions | P08, P51, P54, P57-P59, P76, P80, P92, P96, R95 |
| Other transport accidents | V90, V91, V92, V94 |
| Other unintentional injuries | W20-W23, W25-W27, W30, W31, W33, W34, W36, W44, W45, W49, W50, W53-W56, W58, W77-W80, W85, W87, X10-X13, X19, X30, X33, X36-X38, Y59, Y60, Y65, Y83, Y84, Y86, Y88 |
| Road traffic accidents | V02-V04, V09, V13, V18-V29, V32, V34, V38, V40, V43, V44, V46-V49, V53, V54, V57-V59, V64, V67--V69, V78, V79, V84, V87-V89, V99, Y85 |
| Severe Localized Infection | H60, I30, K02, K04, K05, K61, K65, L01-L04, L08, M00, N10, N30, N49, N61 |
| Severe Systemic Infection | A25, A40, A41, A49, A77, P36-P39 |
| Sickle-cell | D57 |
| Stillbirth | P95 |
| Tuberculosis | A15, A16, A18, B90 |
| Animal/plant venom | W57, W60, X20, X23, X29 |

# ScienceTimes

### The New York Times



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# Gift From the Grave

By STEPHANIE NOLEN

With better counting of who died and how, developing countries can help the living.

FUNKOYA, SIERRA LEONE — Augustine Alpha begins gently. "Who lives in this home?" he asks the young man, who has come in from the fields to answer his questions.

Your name? Age? Religion? Marital status? In what grade did you leave school? Do you own a bicycle? Mr. Alpha taps the young man's answers into the laptop perched on his thin knees.

Then comes the key question: "Did anyone die in your home in the last two years?"

"Yes," the young man says, "my mother." Mr. Alpha expresses his sympathy, asks him her name — it was Mabini Kamara — then plunges in: Was she sick? How long? Fever? Rising and falling, or steady? Vomiting? Diarrhea? Tremors? Did she see a doctor? Get medication? Have pain? Where was the pain, and how long did it last?

Ms. Kamara's son is reticent at first but is soon caught up recounting the story of those last few weeks of his mother's life, describing the fruitless trips to the local clinic. Mr. Alpha taps away until every detail has been entered in the software of a public health survey called the Countrywide Mortality Surveillance for Action, or COMSA. Then he snaps his laptop closed, applies a sticker to the wooden shutter of the front window marking the Kamara house as surveyed, reiterates his condolences and moves on to the next home.

In this way, Mr. Alpha and three colleagues will, over a few days, gather the details of every death that took place in the village of Funkoya since 2020, using a process called an electronic verbal autopsy. The data they collect goes to the project's head office at Njala University, in the city of Bo, a few hundred kilometers to the east. There, a physician reviews the symptoms and de-

Above, the body of Francis Kailie being carried to a plot behind the family home in the city of Bo in Sierra Leone in February. Nearly half the deaths around the world are not recorded.

# In a Gift From the Grave, the Dead Help the Living

scription, and classifies each death according to its cause.

It is an extraordinarily labor-intensive way of establishing who has died, and how, but it's necessary here because only a quarter of deaths in Sierra Leone are reported to a national vital statistics registry system, and none of the deaths have a cause assigned. Life expectancy here is just 54 years, and the vast majority of people die from preventable or treatable causes. But because there is no data about the deaths of its citizens, the Sierra Leonean government plans its programs and health care budget based on models and projections that are, ultimately, only best guesses.

There are a variety of reasons families do not report the deaths of people like Ms. Kamara to a national registry, none of them complex. The registry office may be far away, and they can't afford the transportation costs, or find the time to go there, or pay the nominal fee for the death certificate. It may be that they've never even heard of the practice; the state has very little presence in their lives. The dead are buried behind their homes or in small village plots, as Ms. Kamara was; the local chief might then make a note in a ledger, the contents of which never travel out of the village. Sierra Leonean hospitals don't automatically share their death records either.

Sierra Leone is not an anomaly. Vital statistics collection across the developing world is weak. While progress has been made in recent years in terms of birth registration (which is increasingly tied to access to education and social benefits), nearly half of the people who die around the world each year do not have their deaths recorded.

"There is no incentive in death registration," said Prabhat Jha, who heads the Center for Global Health Research in Toronto. He pioneered these kinds of efforts to count the dead two decades ago in India; doing it now in Sierra Leone, one of the world's poorest countries, has shown that the model will work anywhere, and has helped bolster a government eager to root its policies in evidence and hard facts.

The topic of vital statistics registration is not glamorous, but it is critically important for understanding public health and socioeconomic inequality. Covid-19 has brought new attention to the topic. Debate over how many people have died from the coronavirus, and who they were, has become political, and in countries such as India, lower death counts have served the agenda of national governments hoping to downplay the role of failed pandemic policies.

It matters that we know not only how many people died, but who they were and when they died, said Stephen MacFeely, director of data and analytics for the World Health Organization: "As we come out of the eye of the storm, this is when you talk about learning lessons."

There is, for example, fierce debate among epidemiologists about whether Africans are dying of Covid-19 at the same rate as people elsewhere in the world, and, if they are not, about what might be protecting them.

When countries don't know who has died or how, it complicates efforts to reduce preventable deaths. The government of Sierra Leone allocates its budget, as many developing countries do, based in part on models provided by UNICEF, the W.H.O., the World Bank and other multilateral agencies that project the number of people who will be killed there each year by malaria, typhoid, car accidents, cancer, AIDS and childbirth. These models are built on global estimates and draw on dozens of studies and individual research projects, which can do a reasonably good job of estimating the larger picture but are sometimes far less accurate at the national level. As Dr. Jha explains it, malaria data that came from Tanzania or Malawi isn't necessarily going to be accurate for Sierra Leone, even though all three countries are in Africa.



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From top: Issa Kaisongi, center right, gathering data in Mabin; a backyard grave being dug in Bo; and Alpha Mohammed Kamara in Mabin showing Kadijatu Jiallo where he buried his wife.

The information collected through this painstaking door-to-door work has shown that the models can be drastically wrong. "When you count the dead, you just get information that you didn't expect," Dr. Jha said.

The first COMSA study looked at the households of 343,000 people in 2018 and 2019, of whom 8,374 died. The verbal autopsies produced discoveries so surprising that Dr. Rashid Ansumana, a co-principal investigator for the project, refused to believe them for months, until the revelations had been checked and rechecked a number of ways.

"I got convinced with facts and evidence," said Dr. Ansumana, the dean of the college of community health at Njala University. "And now I can convince anyone: The data is awesome."

The first big surprise involved malaria. The research showed it to be the biggest killer of adults in Sierra Leone. Dr. Ansumana said that in medical school he was taught that malaria killed children under 5, but people who survived childhood had an immunity that kept repeated malaria infections from taking their lives.

Pretty much everyone working in health

care in Sierra Leone believed that, he said. In fact, the plotted data showed that malaria deaths formed a U-shape curve, with very high numbers among young children and lower ones for young adults; the numbers then rose again in people over age 45.

The second shock was regarding maternal mortality. The study found that 510 of every 100,000 women die in childbirth — a staggeringly high rate, but still only half of what the United Nations bodies reported for Sierra Leone. The finding was a relief for the government, Dr. Ansumana said, because it showed that resources being poured into making childbirth safer for women and babies was paying off.

Now a second round of the national survey is underway, seeking to illuminate, among other things, the health impact of Covid-19.

To secure this kind of data without having to go from door to door, Sierra Leone is working on reforms to its civic registration, and is one of many countries trying to figure out how to make certain that more deaths are counted.

Many of these fixes are straightforward and don't cost much, said Jennifer Ellis, who leads a program called Data for Health, run by Bloomberg Philanthropies, that aims to increase health data collection in low- and middle-income countries.

It starts with overhauling an extant death certificate to collect usable information on who died and why, and training doctors to be aware of why a specific cause of death is important (that is, for instance, why it matters whether a death is logged as "pancreatic cancer" as opposed to "abdominal pain").

"You need to change how the data flows," she said, because it may be collected by a national interior ministry and not shared with a health ministry. Data should be digitized, so it doesn't just sit moldering in ledgers. It should be easy for people to go somewhere to register a death, and free.

Another step is routine collection of verbal autopsies for all who die outside a health system. This involves identifying and training people at the community level, such as midwives or community health workers and others who might do basic primary care in low-income countries, to collect information on every death.

Digitization is expensive, Ms. Ellis said, but the other steps cost very little. Fewer than 5 percent of deaths in Zambia included a recorded cause when Data for Health joined up with the government there in 2015; by 2020, that figure had risen to 34 percent. Peru introduced a digitized cause-of-death reporting system that now makes death information available in real time; because it had solid and swiftly accessible data, it reported some of the highest Covid death rates in Latin America.

Information captured by new death registration systems has quickly been translated into health policies. When improved cause-of-death collection revealed that road accidents were among the top causes of death in Colombia, its government moved quickly to introduce safety protections in the worst-affected areas. In India, the recorded number of people dying of snakebite exceeded the W.H.O.'s estimate for the entire world; antivenom was made available at more primary care centers in heavily affected areas.

But while many countries are eager to transform what they learn from death statistics into policy, others are hesitant. "I'm not sure all governments really understand the power of data — and let's be frank, a lot of governments probably don't want to measure it, either," Mr. MacFeely of the W.H.O. said. Some view higher Covid death counts as an indictment of their pandemic responses, he said.

Still, he said, the W.H.O. is encouraging countries to treat vital statistics data as they do other forms of infrastructure, such as gas systems or electrical grids.

"This is part of managing a modern country," he said.

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