

SIERRA LEONE'S SAMPLE REGISTRATION SYSTEM FOR MORTALITY: CHALLENGES FOR A LOW- INCOME COUNTRY AND THE SURPRISINGLY INFORMATIVE FIRST WAVE OF RESULTS ON ADULT MORTALITY

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Ministry of Health and Sanitation and Njala University and University of Toronto



MINISTRY OF HEALTH
AND SANITATION
THE REPUBLIC OF SIERRA LEONE



UNIVERSITY OF TORONTO
DALLA LANA SCHOOL OF PUBLIC HEALTH



CENTRE FOR GLOBAL
HEALTH RESEARCH



Njala University—*fostering intellectual and personal development in Sierra Leone*



Primary goals & objectives

- 1. Establish the Sierra Leone-SRS:** The COMSA investment will support the government of Sierra Leone to develop and implement a sample registration system (SRS) of births and deaths with cause of death (COD) for the whole of the country using verbal autopsy. It will run from 2020-29 (COMSA will fund the 2019-22 start-up period).
- 2. Support integrated MITS clinical-pathological testing in Bo District. **Biological confirmation of child deaths**** is a novel addition to understanding COD. CHAMPS will lead this work.



Why conduct mortality surveillance in Sierra Leone?

- Child mortality rate in Sierra Leone ~ 110/1000 live births, maternal mortality rate (based on models) is 1360/ 100,000 births- both among the highest in the world
- High adult mortality but not well documented
- Only 25% of all deaths reported through the CRVS system
- Currently, there is no comprehensive COD information on Sierra Leoneans

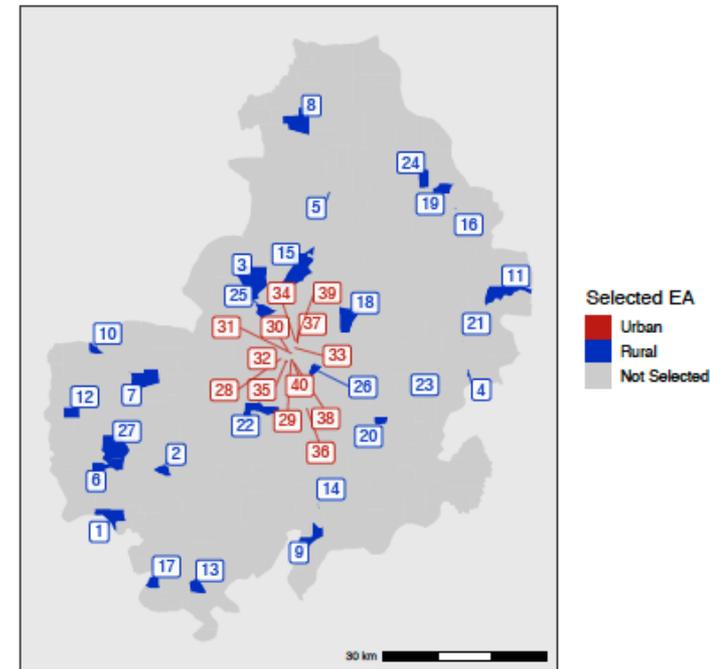


METHODS **SAMPLING**

660 Enumeration Areas (EA) were drawn from 2015/6 census, with about 5% of the population covering all districts

Example of random selection in Bo urban/rural

Bo District, Southern Region:
Sample Enumeration Areas
40 Selected (13 Urban, 27 Rural)
1031 Total



Field surveyor (n=69) tasks

- District Health Management Teams (DHMTs) lead local community mobilization
- Surveyors recruited via DHMTs
- Surveyors gather information on the signs, symptoms, and events that lead to a death
- Surveyors write a detailed narrative of these events focusing on the key symptoms
- Surveyors **do not** determine the cause of death (Central physicians have that role)



Enumeration in each EA (each has ~100 households/600 people)

- Collect basic demographic data
 - Type of house
 - Address & GPS coordinates
 - Details of household members
- Record fertility, ,live births, stillbirths & deaths in last year
 - Who was born, sex
 - Pregnant women
 - Who died, which sex and at what age



Typical week for each survey team of 4

- 660 EAs to cover for 2020 and 2021; on average each EAs will take 5/6 days to finish (including 1 day travel)
- **Optimal schedule in each EA (village) or urban EA**
 - Day 1- sensitize local leaders/draw maps
 - Day 2- Enumerate 100 households (18-25 each surveyor)
 - Day 3- Verbal autopsy: about 4-5/unit or 1 per surveyor
 - Day 4- Resampling (1 per surveyor- i.e. 100% to start) plus close area (locked houses)
 - Day 5/6- Depart for next unit



EA's and Data Collection

Region	Districts (16)	No. of EAs (n=660)	Surveyors in place
Southern (Complete)	Bo, Bonthe, Moyamba, Pujehun	170	28 trained and doing fieldwork since May 2019 (Team 1)
Eastern	Kailahun, Kenema (Ongoing) , Koidu town	102	Areas to be covered by Team 1 after completing Southern Region
North & North Western	Bombali (complete) Falaba, Koinadugu (ongoing) , Tonkolili (complete) , Kambia (ongoing) , Karene (Complete) , Port Loko (Complete)	274	20 trained (Team 2) And Team 3 (currently doing Kambia)
Western Area (Complete)	Western Rural & Western Urban	114	21 Trained (Team 3)



METHODS

SURVEYOR TRAINING

- **Before commencing data collection, all prospective surveyors are trained**

TRAINING OBJECTIVES ARE TO:

- Produce knowledgeable surveyors who can collect & write high quality narratives
- Build a supportive team attitude that will continue during field work



METHODS

www.cghr.org/training

Online Training

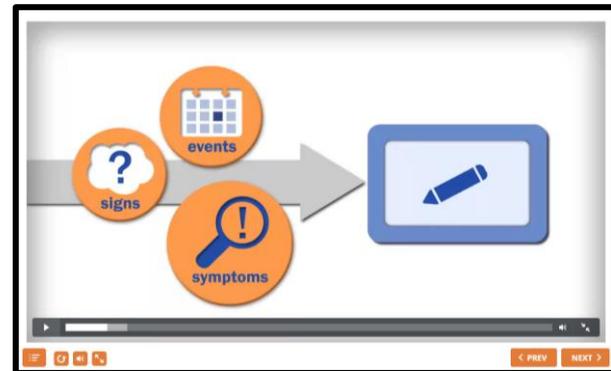
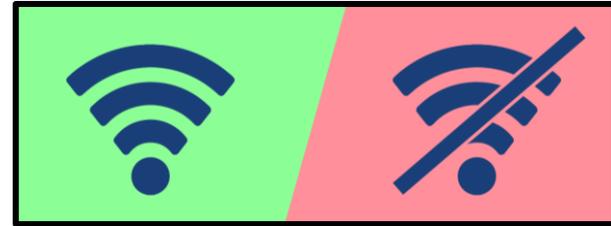
Course length ~4 hours

Online or offline

Computers or mobile devices

Self-guided learning

Interactive activities & videos



METHODS

In-person training

2 week course at Njala University in Bo completed for 60 surveyors

Highly interactive lessons

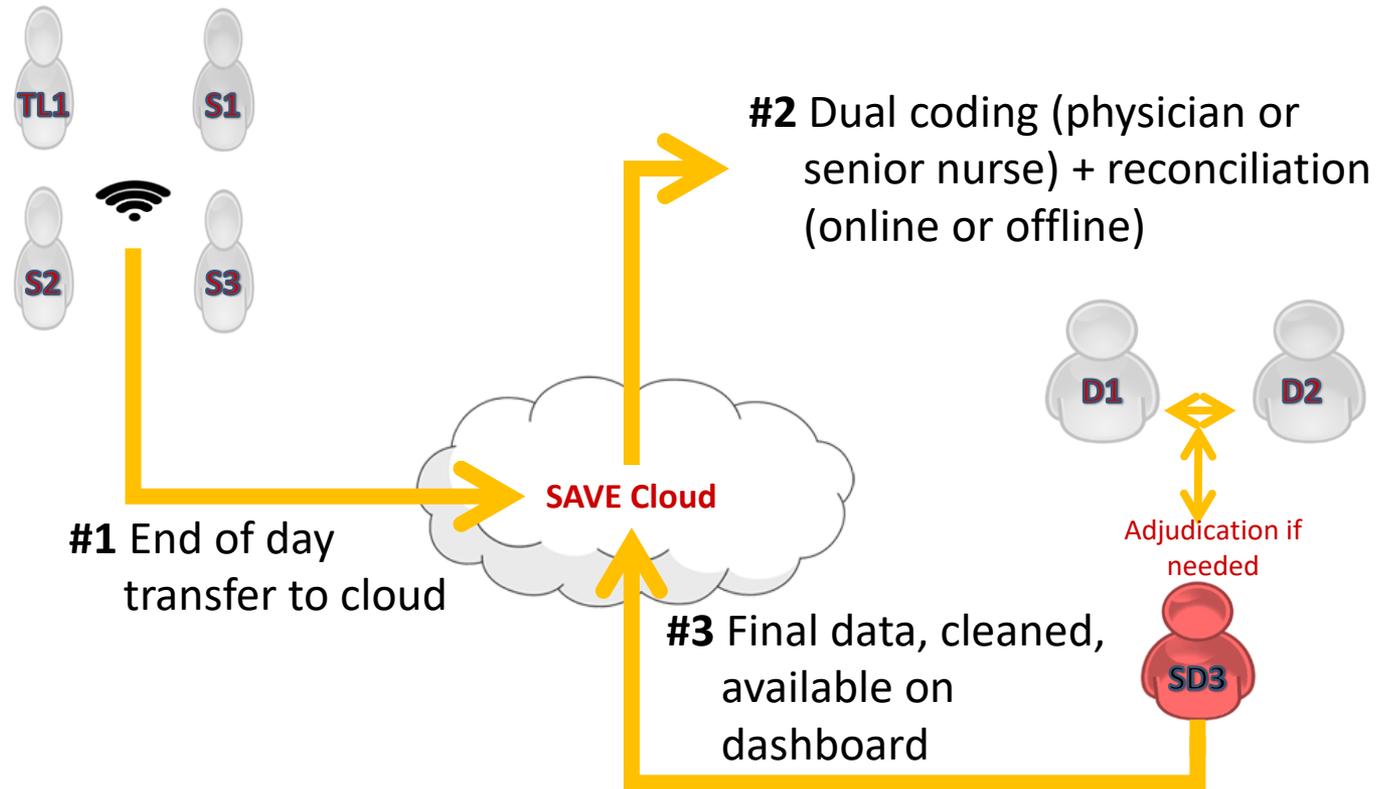
5 days of field practice

Njala/U of Toronto certificate for graduation



METHODS

DEVICE-2-CLOUD SYSTEM



FULLY ELECTRONIC FIELD WORK

Goal: field work to final COD in 25 days



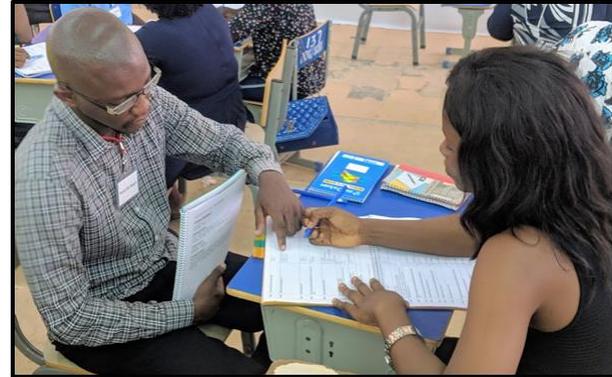
METHODS

Quality assurance

Quality of field work is key to confidence in Verbal autopsy

IT-based quality assurance

- ✓ GPS tracking
- ✓ Interview is recorded: central audio review (every surveyor per week, random)
- ✓ Conduct random re-checks daily
- ✓ Yearly re-sampling (year 2 of year 1)

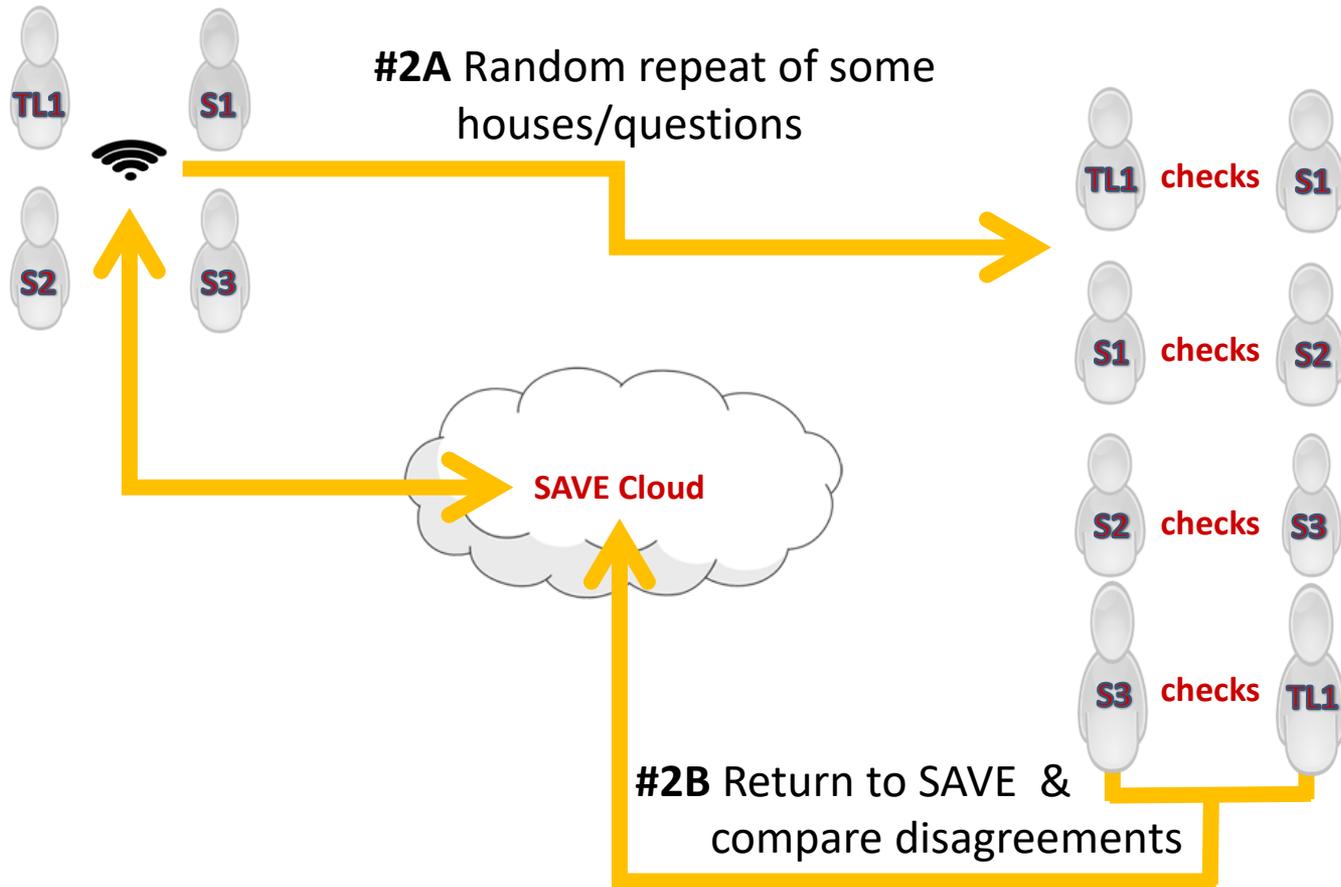


METHODS

Resampling

- After all verbal autopsies have been completed, random resampling is done
- This is for quality control
- A random 50-100% of the VA records will be checked for accuracy
- 10 random questions are asked – not the whole questionnaire





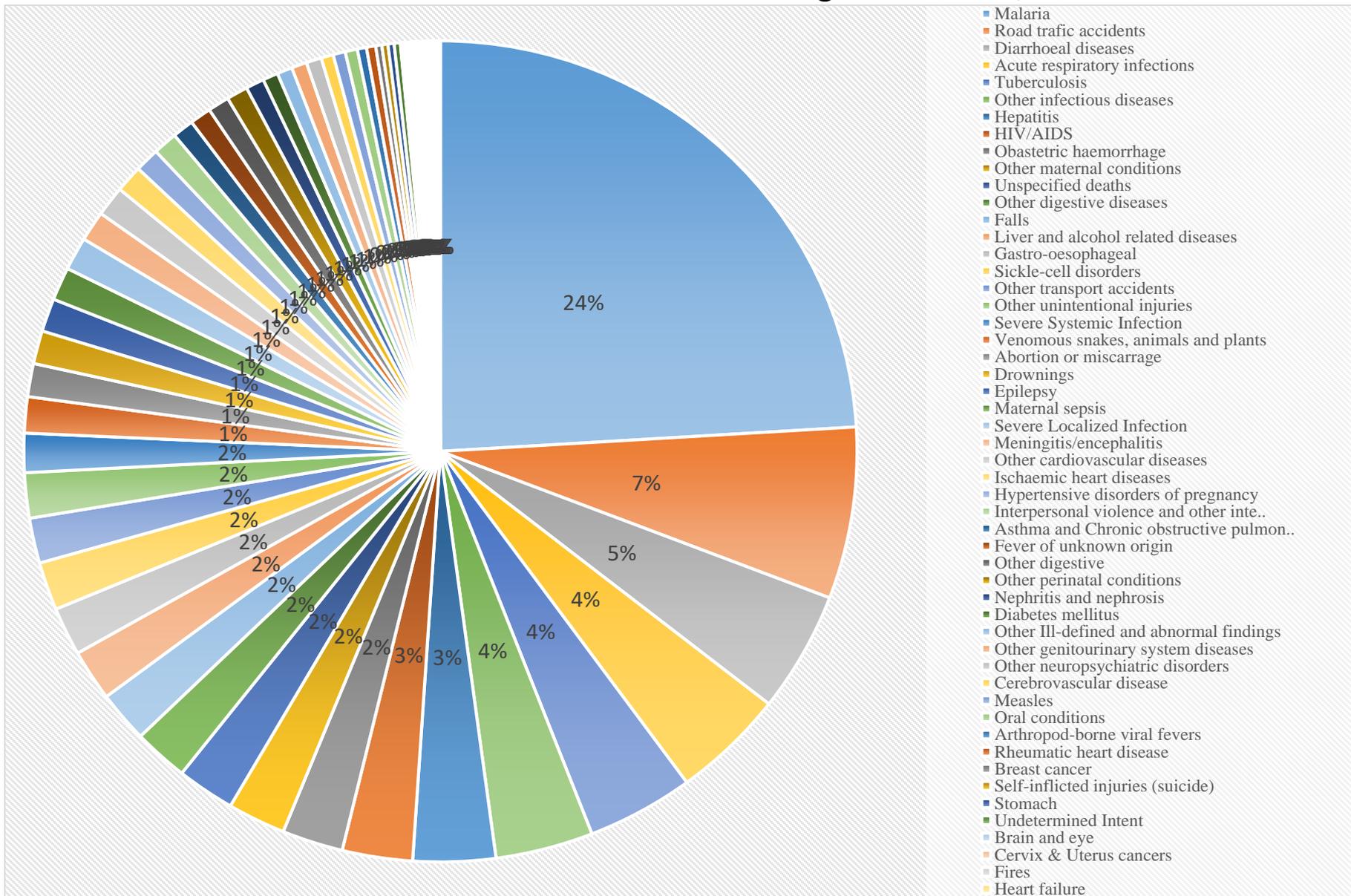
METHODS

Dual physician coding-to determine causes of deaths

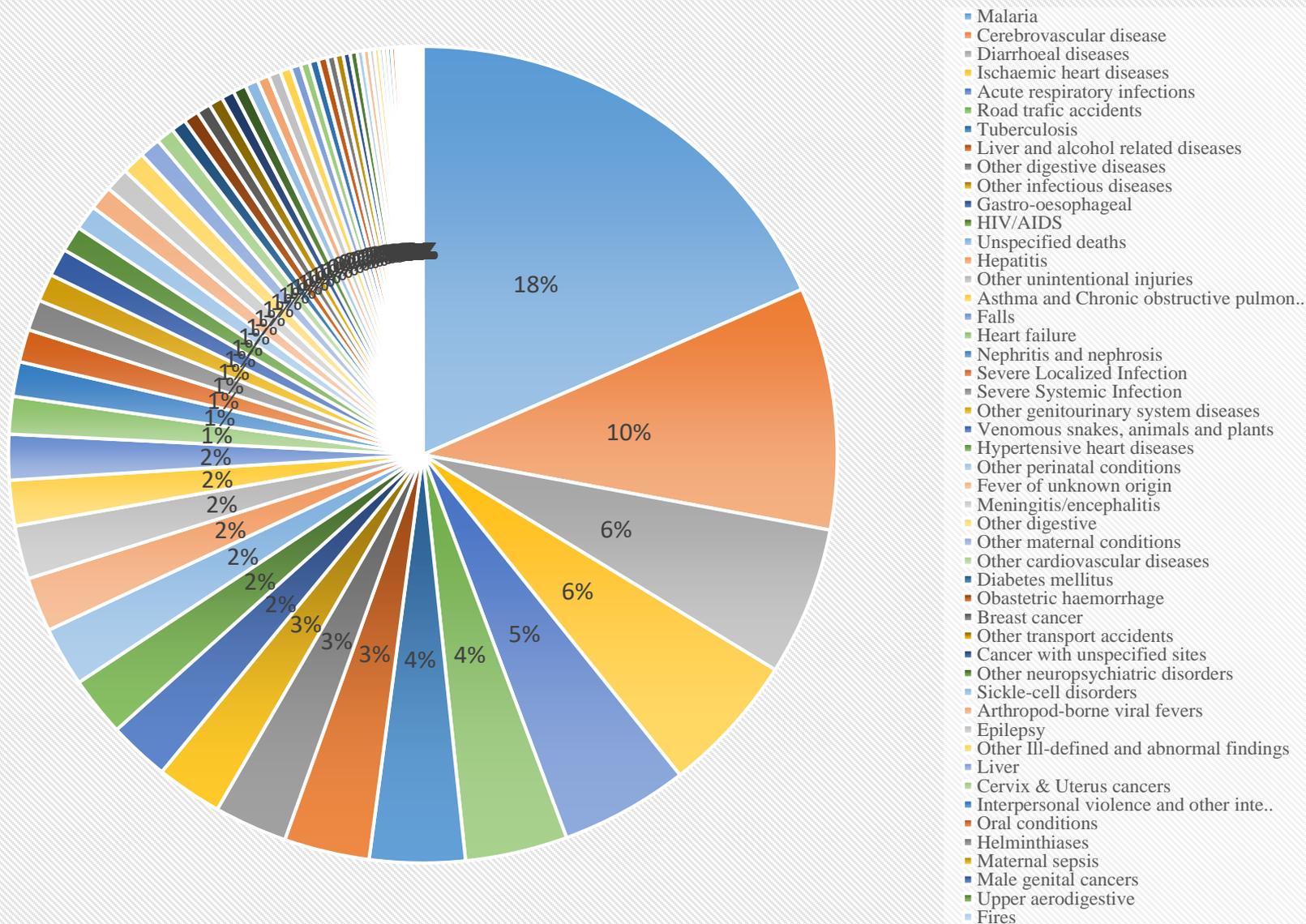
- The best quality COD = **dual, independent physician coding**, with reconciliation of differences and adjudication by a senior physician if needed
- **Currently 8 coders code for deaths.**
- **Pilot work in BHCS: 5 coders were able to code ~500 child deaths within 2 weeks**
- **Subsequent computer coding will be run also, and likely integrated into the electronic platform to aid physician coders**



Causes of Death in 9 Districts in Sierra Leone in Ages 15-29 Yrs., 2016-2020



Causes of Death Ages 30-69 in nine districts from 2016-2020



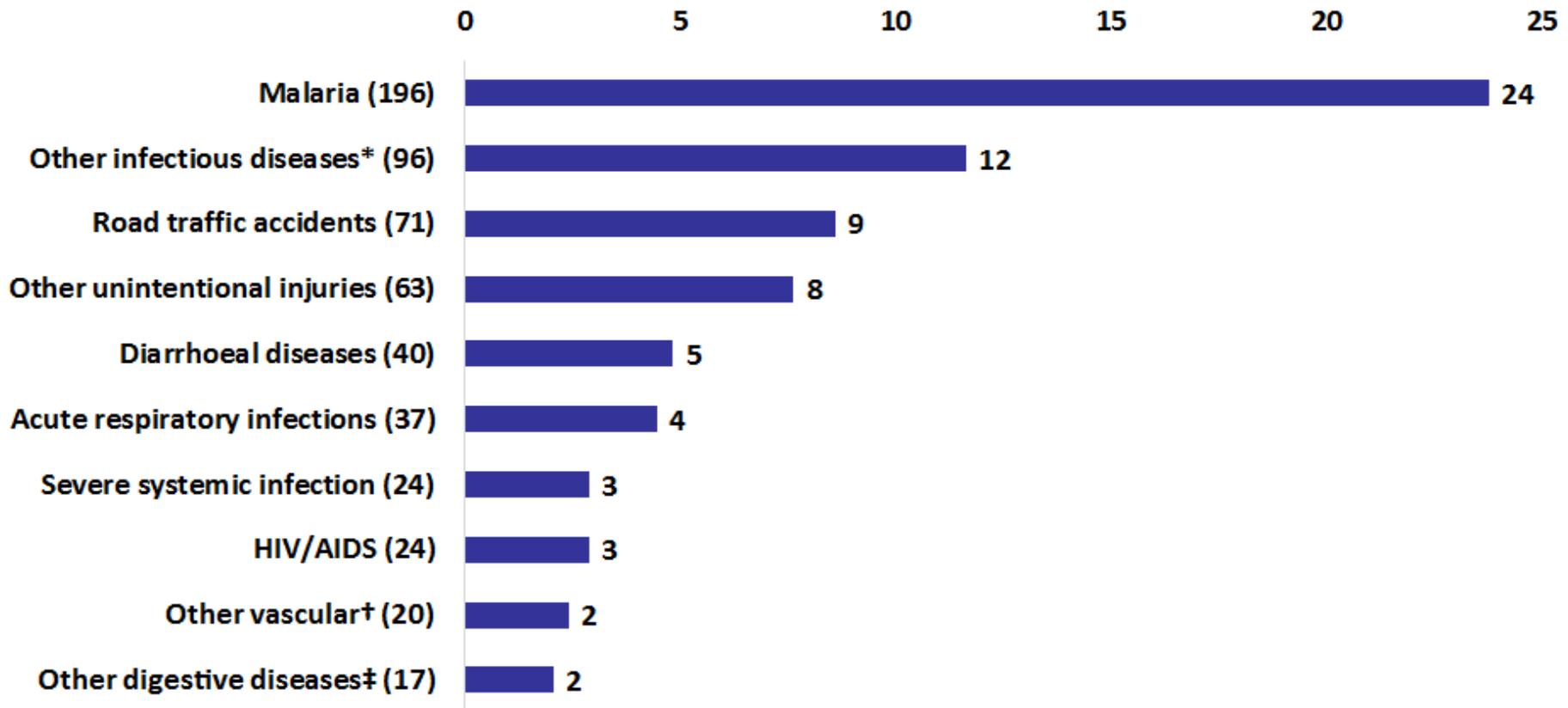
Estimated Sierra Leone adult deaths (2016-2020)

Apply age group % to UN totals

Age group	Total	Female	Male
15-29 years	60,568	32,301	28,267
30-69 years	181,405	87,641	93,764
All ages (UN)	451,000	225,000	226,000



Top causes of mortality as % of total deaths, ages 15-29 (n=818)



*Excludes meningitis/encephalitis and fever of unknown origin

†Excludes acute MI & ischemia and stroke

‡Excludes gastro-oesophageal and liver and alcohol-related diseases



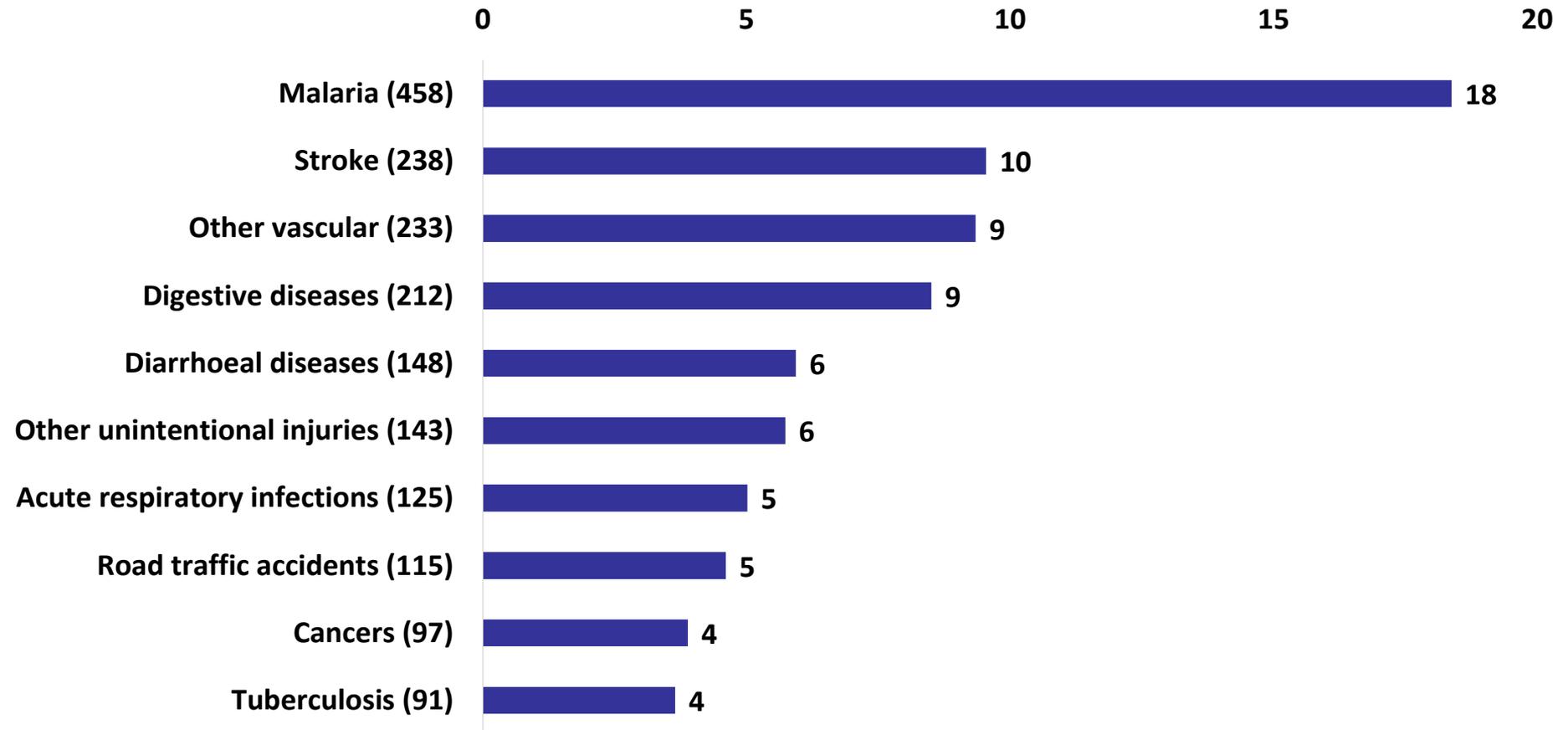
Estimated Sierra Leone cause-specific deaths, 15-29 years (2016-2020)

Apply disease group % to UN totals

Disease group	% of total (sample)	National total	National female	National male
Malaria	23.96	14,425	7,280	7,144
Other infectious diseases	11.74	7,116	3,845	3,272
Road traffic accidents	8.68	5,071	1,800	3,272
Other unintentional injuries	7.70	4,387	982	3,405
Diarrhoeal diseases	4.89	3,016	1,881	1,135
Acute respiratory infections	4.52	2,726	1,391	1,335
HIV/AIDS	2.93	1,768	900	868
Severe systemic infection	2.93	1,768	900	868
Other vascular	2.44	1,561	1,227	334
Other digestive diseases	2.08	1,225	491	734
Sickle-cell disorders	1.96	1,219	818	401



Top causes of mortality as % of total deaths, ages 30-69 (n=2467)



Estimated Sierra Leone cause-specific deaths, 30-69 years (2016-2020)

Apply disease group % to UN totals

Disease group	% of total (sample)	National total	National female	National male
Malaria	18.57	28,457	13,984	14,473
Stroke	9.65	14,762	6,959	7,802
Other vascular	9.44	14,546	7,935	6,611
Digestive diseases	8.59	13,038	4,878	8,160
Diarrhoeal diseases	6.00	9,226	4,878	4,348
Other unintentional injuries	5.80	8,736	2,602	6,135
Acute respiratory infections	5.07	7,735	3,447	4,288
Road traffic accidents	4.66	7,052	2,407	4,646
Cancers	3.93	6,106	3,902	2,204
Tuberculosis	3.69	5,579	1,886	3,693
Sickle-cell disorders	0.53	802	325	476



Estimated Sierra Leone maternal deaths (2016-2020)

Apply age group % to UN totals

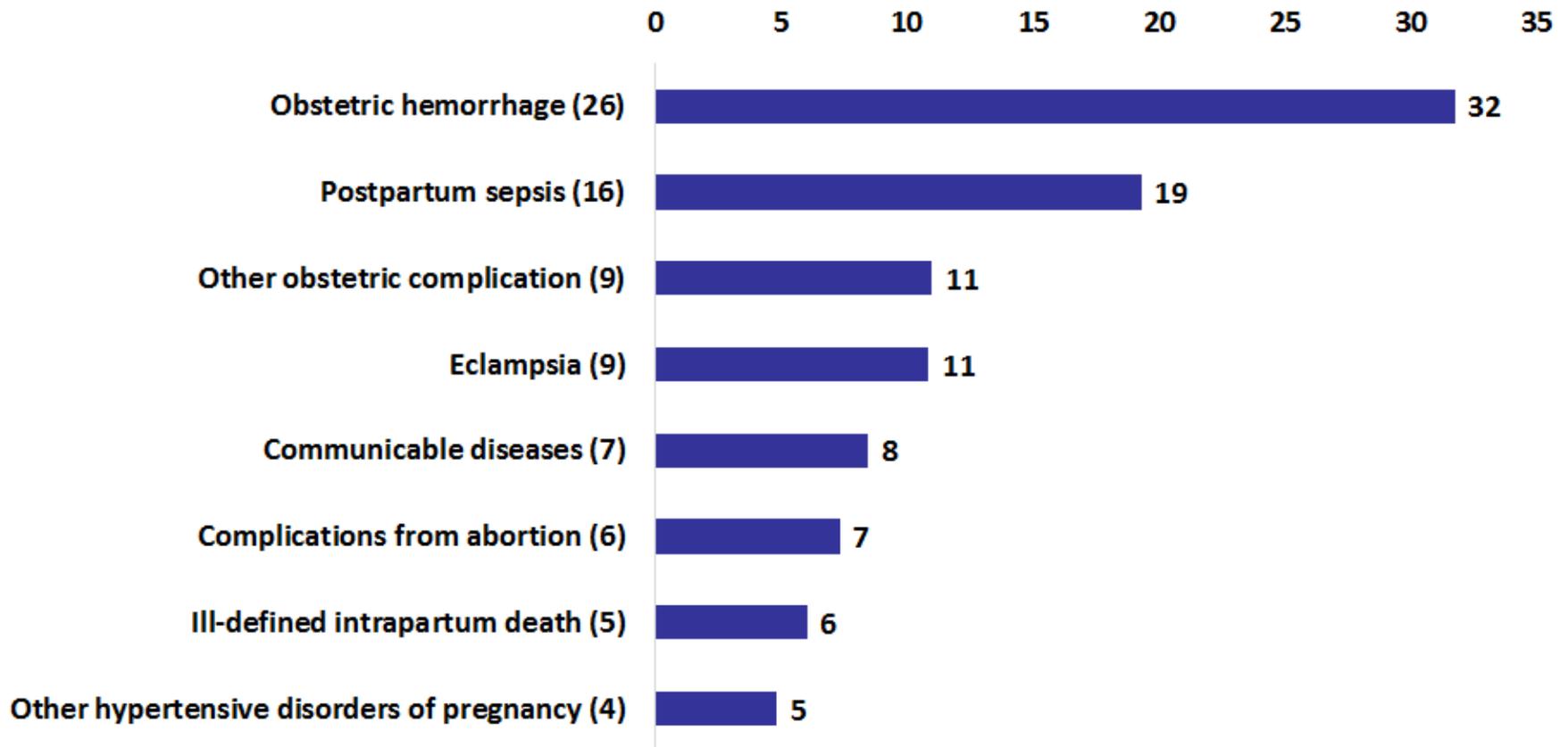
Age group	Total	UN	National estimate
Female 15-49 years	985	68,000	62,622 females 15-49y

Maternal deaths*	National estimate (absolute deaths/year)	National estimate (deaths/100,000 LB)
111	1533 (1272-1846)	600 (498-723)

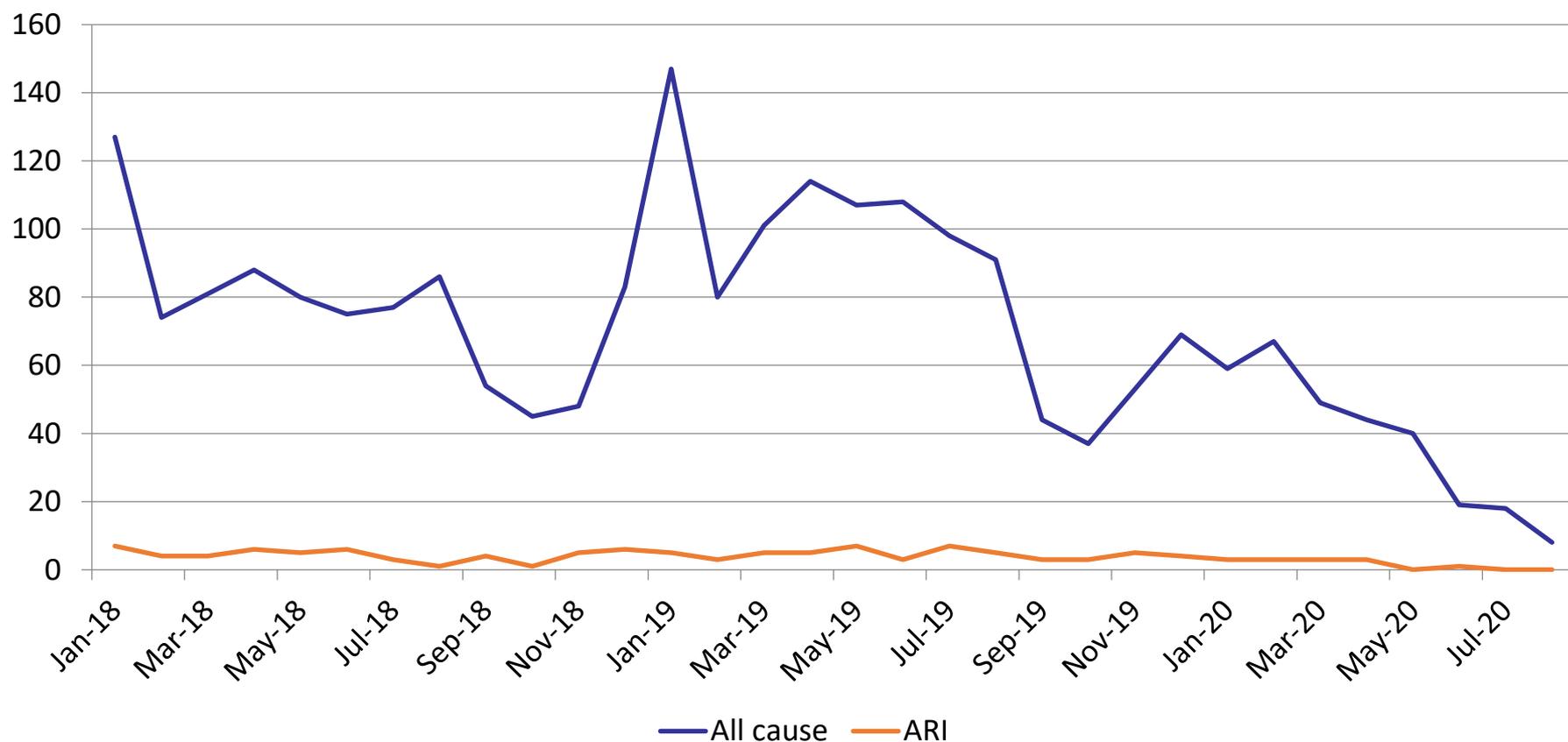
*Maternal death: female 15-49y, died while pregnant or within 6 weeks of delivery



Causes of maternal mortality as % of total maternal deaths (n=82)

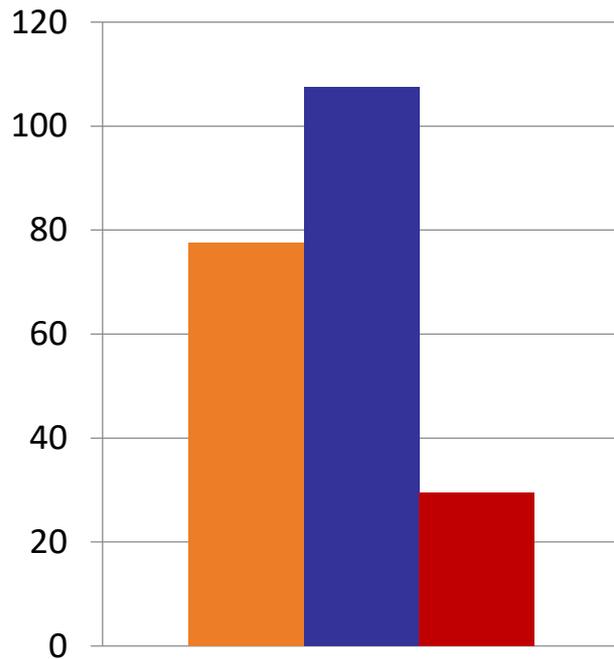


Deaths from all causes and acute respiratory infection, by month

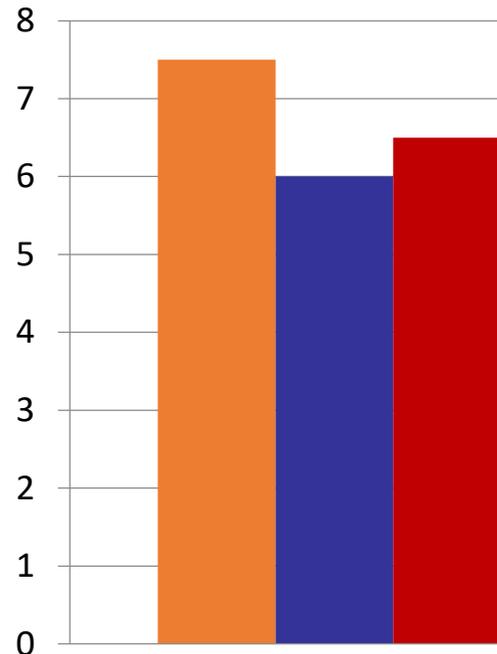


Average deaths in peak COVID period (May-Jun), by year

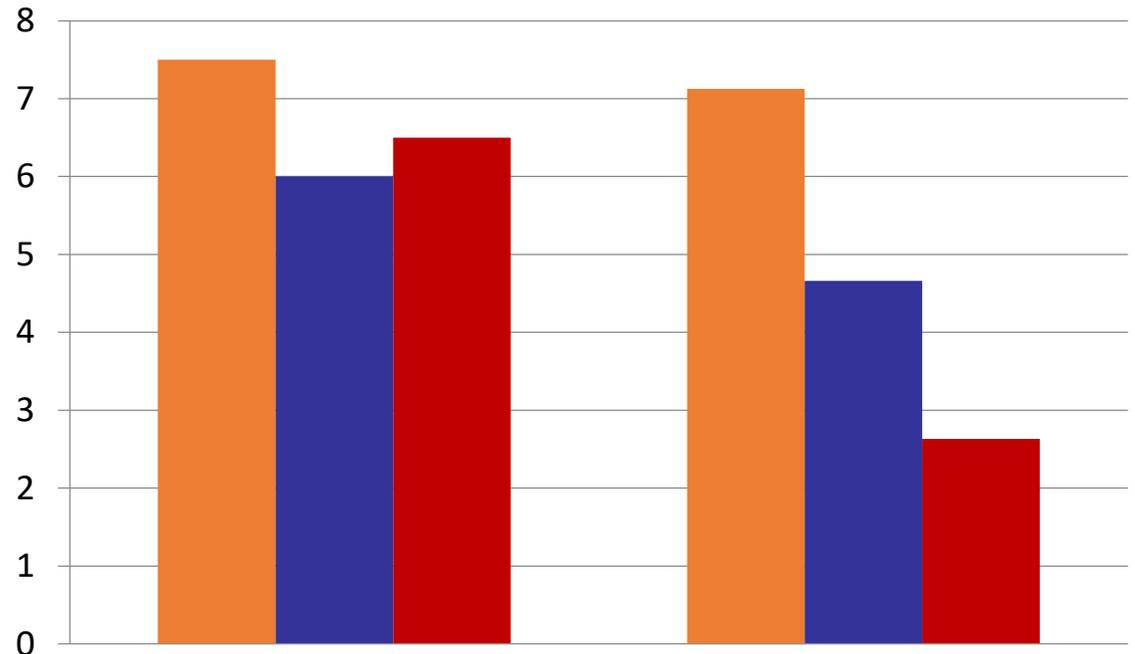
All causes, Sierra Leone



All causes, WAU



ARI, Sierra Leone



2018 2019 2020





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Thank you

