Maternal and Newborn Health (MNH) Strategies for Essential and Emergency Obstetric and Newborn Care

Countdown to 2030 Multi-country Analysis Project

SIERRA LEONE SYNTHESIS REPORT

DECEMBER

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Maternal and newborn health (MNH) strategies for essential and emergency obstetric and newborn care

Countdown to 2030 multi-country analysis project

Phase 1 Synthesis Report for *Sierra Leone*

December 2023

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Background

Good-quality obstetric and newborn care in health facilities is central to reducing maternal and neonatal deaths and stillbirths, and to improving future health of women and children. Globally, institutional births have increased dramatically, but places where births occur vary enormously and are not well understood. Simply increasing coverage of institutional births is very unlikely to reduce mortality if facilities lack basic requirements for emergency obstetric and neonatal care, have inadequate staffing, or cannot refer in emergencies. [1] [2] In many parts of sub-Saharan Africa, births have mostly increased in lower-level facilities, probably because these facilities are closer to where women live.[3] These facilities tend to have low volumes of births (few births each month) and to have lower "readiness" to provide care, in part because they are lower-level, so for example, they are not expected to perform certain procedures such as caesarean section. [4] In addition, such facilities are often less ready to perform even those functions they are meant to, may be less supplied with commodities and drugs and are often less supervised.

Larger facilities, notably hospitals, are fewer but have larger volumes, more and better trained staff and equipment, and are more likely to be able to provide emergency care. Poor-quality obstetric care in lower-level facilities has led some to recommend a policy on hospital births rather than in dispensaries or clinics, though there is no global consensus on where women should deliver.[5] Country and cross-country evidence is needed to understand the tension between Maternal and Newborn Health (MNH) care provided at physically close but low-capacity facilities, versus further-away but higher capacity facilities and to inform national and global decisions on future strategies for MNH service organization and resourcing.

This MNH multi-country analysis project aims to better characterize the environment of births over time, using quantitative analyses to describe trends over time in where and with whom women deliver by level and public/private sector, by what mode (vaginal or C-section) nationally, and by rural-urban, wealth, region/province, as well as neonatal mortality and stillbirths. This will be contextualized by assessing country's policies and health systems data related to the organization and integration of delivery care services at different levels and sectors.

This report is on Sierra Leone. The synthetic analyses in this report will position the study results within a maternal, stillbirth and neonatal mortality transition model to aid comparative analysis and

[1] Elmusharaf, K., et al., *Patterns and determinants of pathways to reach comprehensive emergency obstetric and neonatal care (CEmONC) in South Sudan: qualitative diagrammatic pathway analysis.* BMC Pregnancy and Childbirth, 2017. **17**(1): p. 278.

[2] Cavallaro, F.L. and T.J. Marchant, *Responsiveness of emergency obstetric care systems in low-and middle-income countries: A critical review of the "third delay".* Acta obstetricia et gynecologica Scandinavica, 2013. **92**(5): p. 496-507.

[3] Kruk, M.E., et al., *High-quality health systems in the Sustainable Development Goals era: time for a revolution.* The Lancet Global Health, 2018. **6**(11): p. e1196-e1252.

[4] Kruk, M.E., et al., *Quality of basic maternal care functions in health facilities of five African countries: an analysis of national health system surveys.* The Lancet Global Health, 2016. **4**(11): p. e845-e855.

[5] Fink, G. and J. Cohen, *Delivering quality: safe childbirth requires more than facilities.* The Lancet Global Health, 2019. **7**(8): p. e990-e991.

benchmarking at national and subnational levels.[6] The transition model looks at key indicators among countries that have reached one of five phases of maternal, and neonatal and stillbirth mortality. Countries can compare their performance to those of others in the same phase, and seek to understand what is needed to move to a phase with lower mortality. The country report's recommendations can be used to inform strategic discussions on where to prioritize investments in the health system for accelerated reduction of maternal and newborn mortality, including the balance of routine, basic and comprehensive Emergency Obstetric and Newborn Care (EmONC) services across primary to tertiary facilities to adequately provide respectful and life-saving care based on their maternal mortality, stillbirth, and neonatal mortality transition stages.[7] [8] It will also point to areas for future research to inform strategic planning for safe, effective, equitable, accessible and high-quality MNH service provision.

Study objectives

- To understand where women give birth, by what mode (vaginal, C-section), and who attends them (nationally, regionally, by socio-economic groups, and by facility sector/volume/level), using DHS/MICS and HMIS datasets.
- To understand health outcomes* (neonatal mortality, stillbirths) by place, attendant and mode of birth (nationally, sub-nationally, by socio-economic groups, and by facility sector/volume/level), using DHS/MICS & HMIS (*Maternal mortality data does not allow for disaggregated analyses).
- To analyse the intended and actual health policy and system characteristics in place for the provision of safe delivery care, using documents/data.
- To assess the extent to which countries with higher levels of safe, equitable and effective childbirth care also had favourable MNH-related policy and systems characteristics, and identify where related adjustments or additions in plans and investments are needed to reach the next transition stage(s).

Data sources and indicators

Data sources

- Population-level household surveys: DHS 2008, 2013, and 2019
- Health Management Information System (HMIS): DHIS2 for 2022

[6] Boerma T, Campbell OMR, Amouzou A, et al. Maternal mortality, stillbirths, and neonatal mortality: a transition model based on analyses of 151 countries. The Lancet Global Health 2023;**11**(7):e1024-e31 doi: https://doi.org/10.1016/S2214-109X(23)00195-X.

[7] Campbell OMR, Calvert C, Testa A, et al. The scale, scope, coverage, and capability of childbirth care. The Lancet 2016;**388**(10056):2193-208 doi: https://doi.org/10.1016/S0140-6736(16)31528-8.

[8] Boerma T, Campbell OMR, Amouzou A, et al. Maternal mortality, stillbirths, and neonatal mortality: a transition model based on analyses of 151 countries. The Lancet Global Health 2023;**11**(7):e1024-e31 doi: https://doi.org/10.1016/S2214-109X(23)00195-X.

- Health policy document review (WHO policy database 2018/19 and country updates)
- Health facility/HRH density in 2022 from CAM reports 2023
- Health financing data on current health expenditure overall and for maternal conditions since 2013 (WHO Global Health Expenditure database)
- National Health Account Reports (2014-2018? 2019-2020? 2021-2022? 2023 is progress!

Data were analyzed using Stata and Excel and are primarily presented graphically.

Indicators for DHS analysis

- **Assistant at birth** is defined as the proportion of women 15-49 years of age whose last birth was assisted by:
  1. Doctor
  2. Nurse or midwife
  3. Other skilled professional
  4. Other non-skilled (health provider or friend/relative)
  5. No assistance
- **Place of birth** is defined as the proportion of women 15-49 years of age who last birth was at:
  1. Hospital
  2. Lower-level health facility
  3. Home or other place
  - Note that births in private sector facilities may not be possible to stratify by level; so, private sector births are located as being in lower-level facilities
- **Caesarean section** is defined as the proportion of live births that were delivered by caesarean section.

The reference population (denominator) for the above indicators was **women in reproductive age (15-49 years old) who had a birth in the last 2/3 years before the survey (last birth)**. MICS considers children under 2 and DHS under 3.

- **Neonatal mortality rate (NMR)** is defined as the number of deaths among children aged 0 to 30 days per 1000 live births. The reference period for NMR is 10 years before the survey.

All indicators were estimated for the whole country, and stratified by the following characteristics (as available in each survey):

- Wealth quintiles, based on an asset index provided with the surveys, based on asset ownership and on household characteristics, divided in five groups (poorest, poorer, middle, wealthier, wealthiest);
- Area of residence (urban, rural);
- Assistant at birth (doctor, nurse/midwife, other skilled, other non-skilled, no assistance)
- Place of birth (hospital, lower level facility, home birth) – for comparing Caesarean (C-) section rate and NMR

Indicators for HMIS analysis

Essential indicators:

- Livebirths (OR all births) in facilities
- Caesarean section among livebirths (or among all births) in facilities

Optional indicators:

Mode of delivery: There are two main modes of childbirth, vaginal birth and caesarean birth. Note that these can be recorded for all births (live and still) or only for live births. If it is unclear and you are unable to find out what was recorded, look at the number of recorded stillbirths. If these are low, it is best to assume that C-sections etc. were only reported for *live births* and use this term in the results.

- Vaginal births: Further divided into spontaneous (non-instrumental) + assisted (instrumental) vaginal births
    - Spontaneous (non-instrumental) vaginal birth, which sometimes involves manual manoeuvres or episiotomy
    - Assisted (instrumental) vaginal live births, involving forceps live births + vacuum or ventouse
- Caesarean (C-) section births:
    - Pre-labour caesarean + caesarean after labour starts = C-sections among all live births

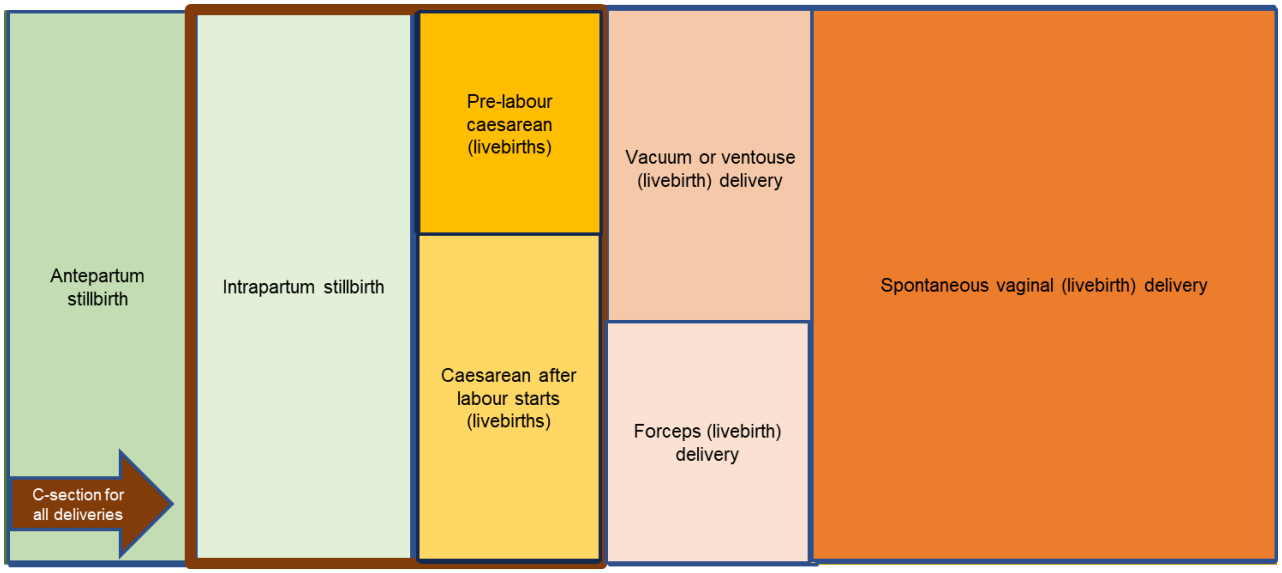
Birth outcomes: Births can be live or still

- Stillbirths (fresh and/or macerated):
    - Macerated stillbirths + fresh stillbirths = all stillbirths
    - Antepartum stillbirths + intrapartum stillbirths = all stillbirths
        - Macerated ≠ Antepartum, but similar
        - Fresh ≠ Intrapartum, but similar

Checks:

- C-section deliveries for intrapartum stillbirths + C-sections for live births (pre-labour caesarean + caesarean after labour starts) = C-sections among all deliveries
- Assisted vaginal live births + spontaneous (normal) vaginal live births = all vaginal live births
- Stillbirths + live births = all births

Figure 1a: MNH indicator definitions



Data management and quality

DHS and MICS

- Before the analyses, original categories for place of delivery and professional assistance during labour were listed and organized into Excel spreadsheets (one for each country). In each spreadsheet, all MICS and DHS surveys available for each country were added to ask country teams to recategorize into the new categories.
    - Place of delivery: home, lower-level facility, or hospital
    - Professional: doctor, nurse or midwife, other skilled professional, other non-skilled, which can be a health provider or a friend/relative, or no assistance
- After countries re-categorization, the new place of delivery variable was compared to the standardized institutional delivery indicator from the international Center for Equity in Health (ICEH) mega database. Consistency was evaluated by adding the lower-level and hospital categories and comparing them to the institutional delivery coverage. Differences larger than 2 pp were individually assessed.
- A similar process was conducted for assistance at birth, for which the doctor, nurse, and other skilled categories were combined and compared to the standardized skilled birth attendance (SBA) indicator from the ICEH mega database.
- For countries with at least 3 surveys available, trend analyses were performed to check the consistency of estimates throughout time. Any peaks or valleys that were incompatible with what was expected were individually evaluated.

- The prevalence of the c-section indicator was compared to the place of delivery. A face validity check was performed in which the prevalence should be zero (or very close to zero) in home births and the highest prevalence in hospital deliveries.
- Additionally, face validity checks were also performed for place of delivery and assistance at birth according to wealth quintiles and area of residence. It was expected that a higher share of hospital deliveries would happen in wealthier quintiles and in urban areas. Similarly, a higher share of births assisted by doctors would also happen in these extracts.

DHIS2/HMIS

- In preparing the HMIS/DHIS2 data, the first step was to merge the Administrative and MNH facility records to have information on the district, level and ownership of the health facilities, which comes from the administrative records joined to the MNH facility records. According to Table 1a:
    - There were 1,451 number of facilities on the administrative list and 1407 facilities that reported MNH indicators (MNH facilities).
    - There were 44 number of facilities on the administrative list that did not report any deliveries.
    - There were 1,407 those reporting births or deliveries that matched with the administrative data, reflecting that 97% of facilities in the DHIS2 database merged with the facilities Master list.
    - The 44 number of facilities on the admin list but not reporting births (3%) were the following: (e.g. specialists, labs, NGOs and lower level facilities not providing deliveries etc.).

Table 1a: Summary of the health facility data quality assessment for 2018-2022 (Stata code #2 output)

	Metric		2022
1	Indicators vs Reporting datasets	Number of facilities merged	1,407
		Number of facilities from Indicators not merging with Reporting data	489
		Number of facilities from Reporting not merging with Indicators data	1
2		Number of facilities merged	1,407
		Number of facilities from Admin not merging with indicators data	1
		Number of facilities from indicator not merging with Admin data	44
3	Facilities with 0 births per year	Number of facilities with 0 births per year	7

The assessment of health facility data quality used the monthly facility reports and focused on 1) report completeness, 2) extreme outliers and missingness, and 3) internal data consistency. Data quality adjustments for reporting completeness (yearly) and extreme outliers (monthly) were done before further analyses of annual data. We:

- Checked for extreme outliers using the Hampel X84 Method with a cutoff of 5 standard deviations from the median and adjusted the outlying points and missing data with the monthly median.

- Adjusted for incomplete reporting using the yearly data points.
- Checked for inconsistencies between 1) births, livebirths, and stillbirths, 2) livebirths, C-sections (CS), vaginal births, and assisted vaginal deliveries (AVD), and 3) Stillbirths, fresh stillbirths (FSB) and macerated stillbirths (MSB)

Table 1b: Summary of the health facility data quality assessment for 2022 (Stata code #2 output)

	Metric		2022	Excel sheet	Cell no
1a	Completeness of monthly facility reporting for deliveries	a) % of expected monthly facility reports (national)	90	Average RR	B3
1b		b) % of facilities with 12 data points	76	RR = 100(facilities)	B3
2	Percentage of facilities with no missing monthly values in the year (*facilities which reported at least one delivery in the year)*	a) Total births	90	Missing (facilities)	C3
		b) Livebirths	79	Missing (facilities)	D3
		c) Stillbirths	0	Missing (facilities)	B3
		d) Mean percentage of the individual percentages	80	Missing (facilities)	E3
3	Percentage of facilities with no inconsistencies between, stillbirths, live births and total births (*Births=Stillbirths + Livebirths (monthly))*	% with no inconsistency at 2- standard deviations cutoff (monthly)	90	Difference (Facilities)	B3
4	Extreme outliers over time	a) % of monthly values that are not extreme outliers	90	Outliers	J3
		b) % of facilities with no monthly extreme outliers in the year	78	Outliers (Facilities)	J3
5	**Overall data quality score (mean)**		82	Overall	B3

*Includes all facilities, not possible to isolate those meant to perform CS in the check so excluded from overall score.

Table 1b reveals an overall DHIS2 data quality score of 87%. This is below the expected 90% quality score of the Ministry of Health. There is also a 100% consistency between total births compared to stillbirths and live births. There was also above 90% of monthly values and facilities that did not have extreme outliers.

The completeness of monthly facility reporting for deliveries is 94%. Slightly below the data completeness target (95%) of the Ministry of Health.

Stillbirths and Caesarean Sections have a very high percentage of missing values. This is because the DHIS2 does not hold zeros and all blank cells are seen as missing values.

Table 1c: Summary of adjustments made to the raw health facility data in preparation of a clean data set for the endline analysis

Problem	Action	Adjustment

Incomplete reporting by facility, variable over time, affecting trend assessment	If a facility did not have all the 12 months reports for the year, an assumption was made about the volume of services provided for the missing data points	Adjustment was made by multiplying the yearly volume by the reciprocal of the reporting rate
Extreme outliers can greatly affect coverage trend assessments	If a monthly value was greater or smaller than **5 times the median absolute deviation (MAD) from monthly median** value, an adjustment was made	Extreme monthly outliers are corrected and given the median value for the same year
Missing values	If there is a missing value, data were imputed	Median monthly values for the year were imputed for the month with missing value

- The data analysis team made adjustments of the data to ensure that corrections were made for missing values, data outliers and completeness of reporting

Health outcomes by delivery place and attendant

Trends in national maternal mortality ratio (MMR)

Although Sierra Leone is classified among countries with the highest Maternal Mortality Ratio (MMR) in the world, the country has experienced a decline in MMR from 1,165 per 100,000 live births in 2013 to 717 per 100,000 live births in the 2019 Demographic Health and Survey (DHS), and from 1,682 per 100,000 live births in 2000 to 443 per 100,000 live births in 2020 according to the UN Estimates.

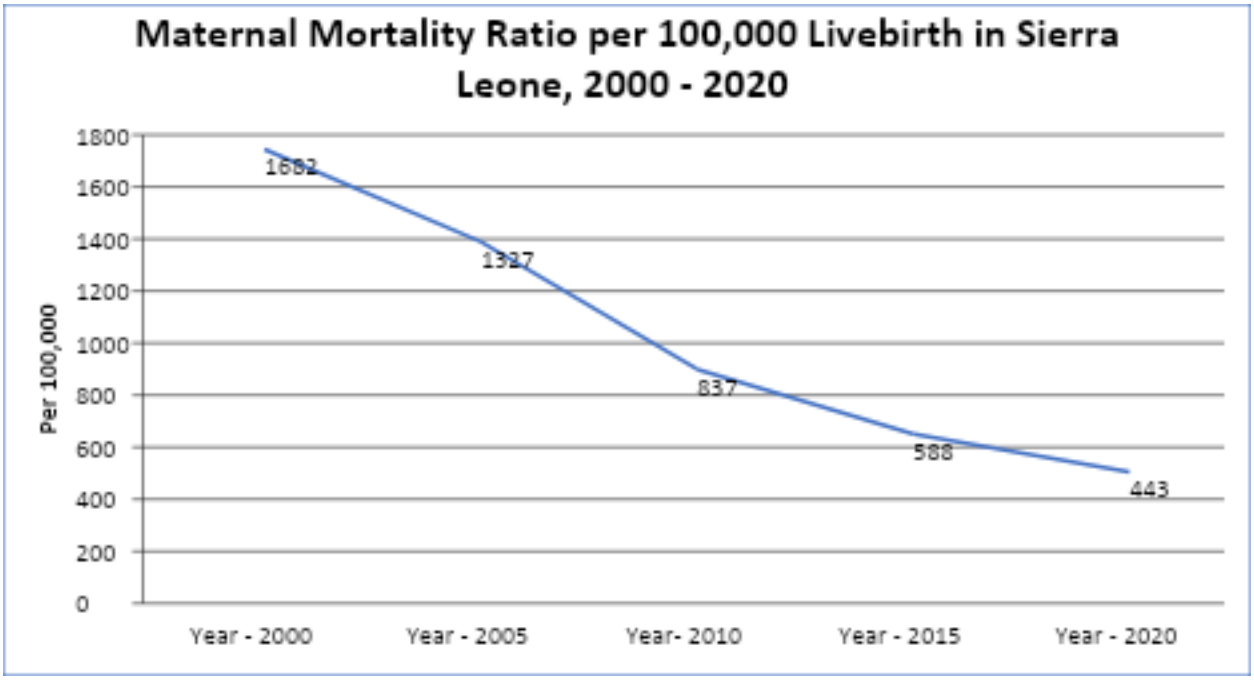


Figure 1 shows a declining trend of the MMR from 2000 to 2020 according to the UN Estimates. The high MMR in 2000 (1,682 per 100,000 live births) can be attributed to the Sierra Leone Civil War (1991 – 2002), which ruined almost all the health facilities in the country.

As a strategy to reduce Maternal Mortality, the Ministry of Health started conducting maternal death reviews on an ad hoc basis in health facilities in 2005. Building on the lesson learned, the Ministry of Health developed a national technical guideline to strengthen systems and structures for Maternal Death Surveillance and Response (MDSR) in July 2015. This led to the establishment of national and district MDSR committees nationwide as well as the integration of MDSR into the national Integrated Disease Surveillance and Response (IDSR) system. The MDSR system started full operation in 2016; during this period, all maternal deaths are captured and reported on the weekly IDSR surveillance and reporting systems. Deaths in health facilities are also reported to the MoH through the DHIS2 system. Deaths in communities are tracked by community health workers (CHWs) present in each community, who have been trained to report Maternal Deaths as part of ten priority conditions identified through the National Community-Based Surveillance (CBS) system (part of the IDSR system.

Prior to operationalizing the MDSR in 2016, the Ministry of Health launched a Free Health Care Initiative for pregnant women, lactating mothers, and children under five in 2010. This initiative gave room to expanding the number of health facilities in the country, thereby improving access to care; ensuring the availability of drugs and medical supplies across health facilities in the country; providing free maternal services in all government health facilities; etc.

In addition to ensuring access to healthcare by increasing the number of health facilities, the ministry introduced a National Emergency Medical Service to address the second delay that was contributing significantly to maternal death in Sierra Leone.

Despite the strides made to reduce MMR through the aforementioned strategies, the Ministry still regard improving the health outcomes of mother and children as a top priority. So, in 2018, the president of Sierra Leone indicated reducing maternal mortality as the president's core initiative and the need to focus on increasing access to care for mothers and children during his inaugural address.

Neonatal mortality rates nationally over time

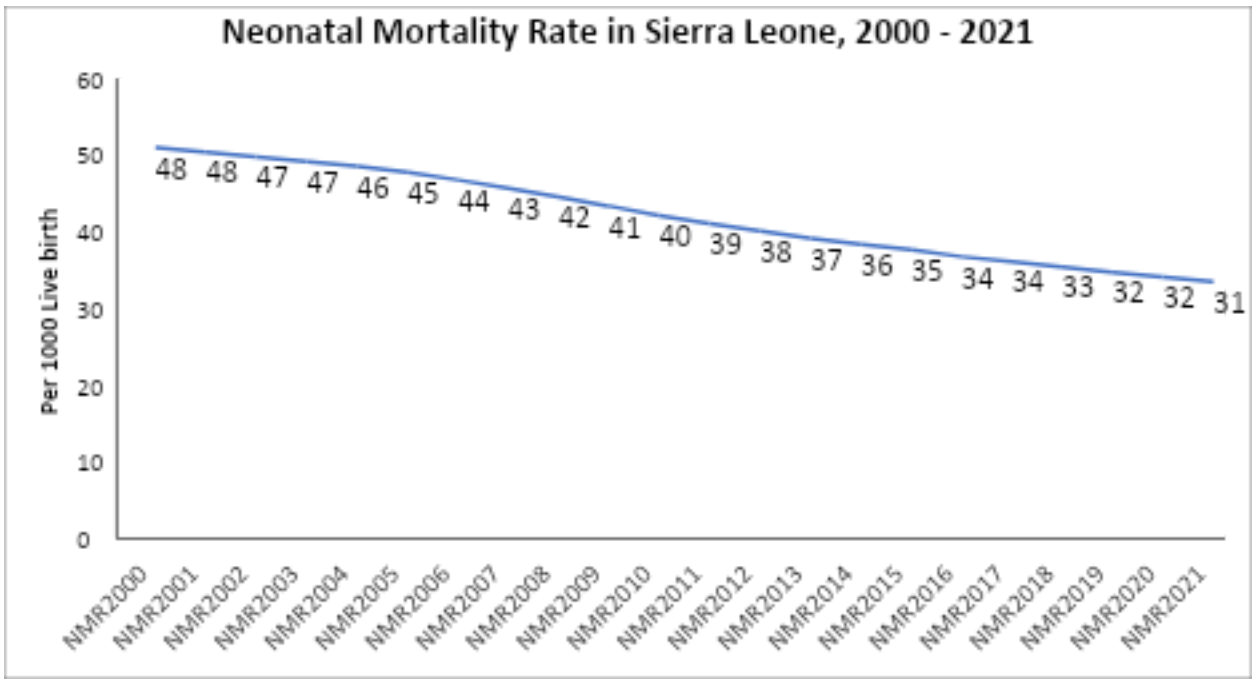


Figure 2: Neonatal Mortality Rate in Sierra Leone, 2000 - 2021

The Ministry of Health has made significant gains in reducing neonatal mortality from 39 in 2011 to 31 in 2021 per 1000 live births. Notwithstanding, Sierra Leone is still among the countries that have high neonatal mortality rates in the world.

The figure 2 above shows a progressive decline in neonatal death from 2000 to 2021 with a reduction of 35.4 percentage points over the past two decades. The significant reduction was a result of improved staff capacities on BEmONC and Essential newborn health care services training for newborns, strengthened referrals system and establishment of Special Care Baby Units (SCBU) to manage neonatal conditions in 14 district hospitals.

Maternal and Perinatal Death Surveillance Reviews (MPDSR) and Child Death Audits carried out at hospital levels every week also provide insight for healthcare workers to understand the main causes of deaths and contributing factors for each death and profound action points to prevent similar deaths.

Over the years, the Ministry of Health has strengthened the maternal and newborn referral system for easy transportation of newborns to referral hospitals for specialised care establishing Special Care Baby Unit (SCBU) facilities in 14 district hospitals to provide special care for low-birth-weight babies and other neonatal conditions and built capacities of health care workers on comprehensive essential newborn health care services. These significant steps have contributed to the decline in neonatal mortality trends.

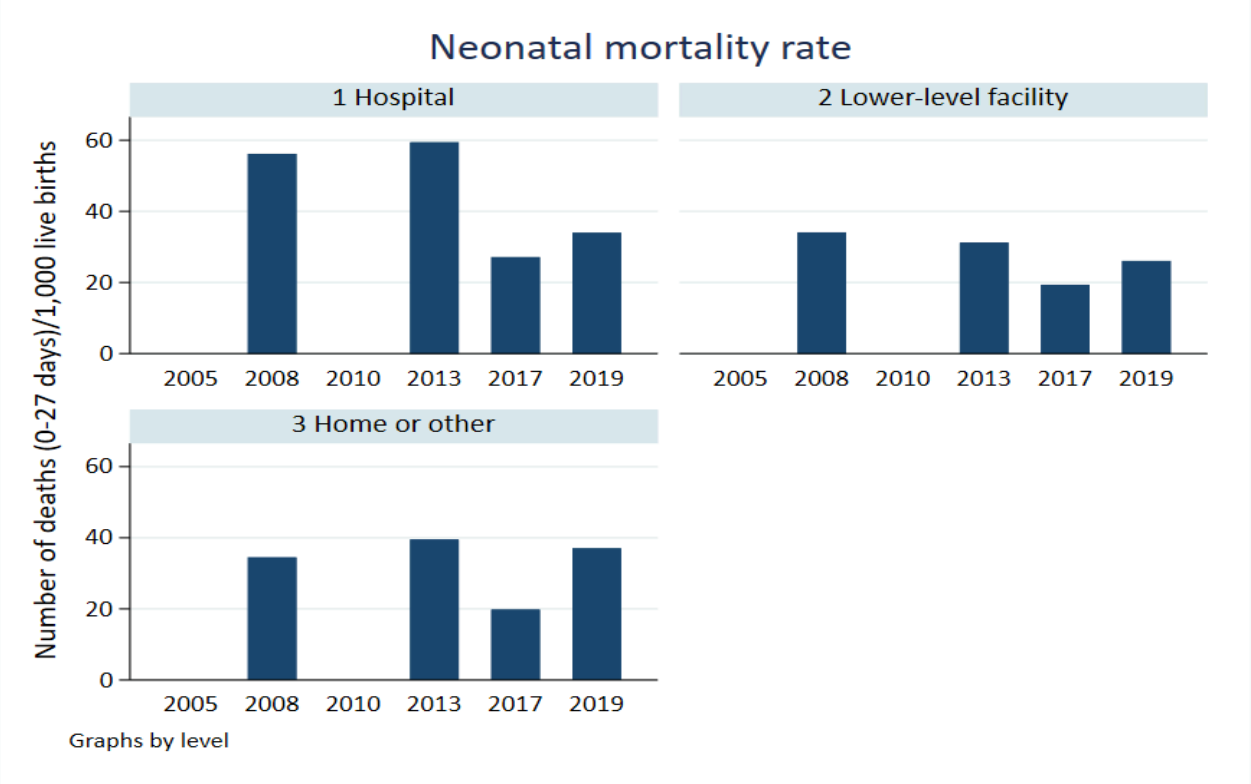


Figure 3: Neonatal mortality rates by place of birth

Figure 3 shows the number of neonatal deaths per 1,000 live births in the DHS. Most of the deaths happened in Hospital compared to the lower-level facilities and homes. This is because most of the deliveries take place at the hospital due to the introduction of the free health care initiative in 2010, which led to most critical cases from the communities being referred to the hospitals for special care.

The sharp drop in neonatal deaths in 2017 across all places of neonatal death could be linked to the Ebola outbreak between 2014 to 2015. During this period, the government instituted a lot of restrictions against movements and social events.

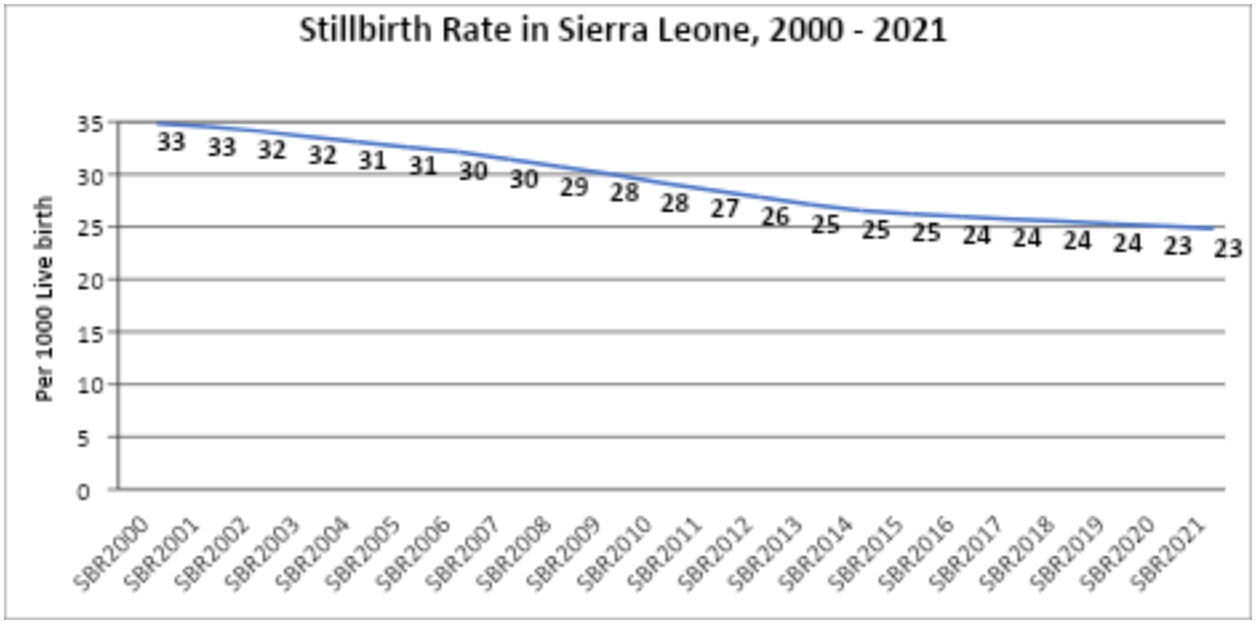


Figure 4: Stillbirth rates nationally in most recent year (2022) Source?

The stillbirth rate shows a similar trend as the neonatal mortality rate in Figure 2 with a progressive decline from 2000 to 2021 and a reduction of 30.3 percentage points over the two decades.

However, a huge effort is still required from the Ministry of Health and its supporting partners to reduce the stillbirth rate from 23 in 2021 to 18 per 1000 live births in 2025 (target in RMNCAH+N).

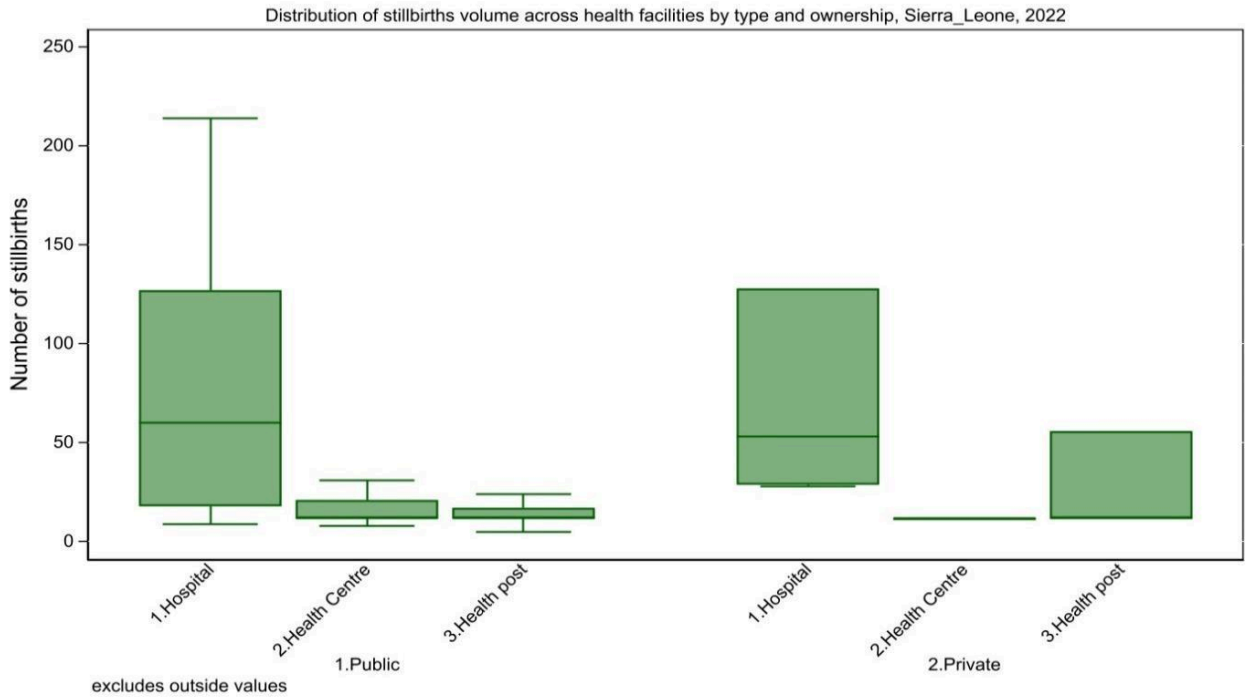


Figure 5: Median stillbirth volumes per facility by level and ownership in HMIS 2022

Hospitals on average had a much higher median volume of stillbirths for both public and private facilities. There were a very minimal number of stillbirths in each public health centre and health post. For private facilities, the number of stillbirths was much higher in health posts than in private health centres as well as public health centres and health posts.

National policy and health system context for MNH

This section covers the national policy and health systems context for MNH care in the areas of 1) health governance, 2) organization and resources for MNH (facilities, human resources, and supplies); 2) service delivery processes (to improve quality of skilled and respectful care); 3) financing; and 4) information systems. These areas of focus align with previous global evidence and conceptual frameworks for MNH.[9,10,11,12,13] The data in this section is taken from the WHO 2018/19 SRMNCAH policy survey (https://platform.who.int/data/maternal-newborn-child-adolescent-ageing/national-policies), and was updated with additional information about policies that have come into place since 2018/19.

Health policy context for MNH

Governance: Policies, guidelines and manuals in place for the following:

- EmONC participant manual 2017,
- Basic Package of Essential Health Services Guideline 2015,
- IPC Guideline 2015,
- EmONC Trainers Manual 2018
- National post-abortion care guidelines
- Offences Against the Person Act 1861

Health organization and resources: Policies, manuals, and Action plans available:

- Sl ENC participant manual 2017, Every Newborn Action Plan 2017
- Every Newborn Action Plan 2017
- EmONC Ambulance referral guidelines for pregnant women and newborn, in 2023
- RMNCH&N Strategy, 2021 – 2025
- Creation of the QoC Programme?
- Child Health Programme?
- Basic Package of Essential Health Services Guideline 2015 and National Medicine List 2016

[9] World Health Organization (WHO). Monitoring the building blocks of health systems: a handbook of indicators and their measurement strategies. Geneva, Switzerland: WHO;2010.
[10] Koblinsky M, Moyer CA, Calvert C, et al. Quality maternity care for every woman, everywhere: a call to action. The Lancet 2016;**388**(10057):2307-20 doi: 10.1016/S0140-6736(16)31333-2.
[11] Chou D, Daelmans B, Jolivet RR, Kinney M, Say L. Ending preventable maternal and newborn mortality and stillbirths. BMJ : British Medical Journal 2015;**351**:h4255 doi: 10.1136/bmj.h4255.
[12] Singh NS, Blanchard AK, Blencowe H, et al. Zooming in and out: a holistic framework for research on maternal, late foetal and newborn survival and health. Health Policy and Planning 2021 doi: 10.1093/heapol/czab148.
[13] Raven JH, Tolhurst RJ, Tang S, van den Broek N. What is quality in maternal and neonatal health care? Midwifery 2012;**28**(5):e676-e83 doi: https://doi.org/10.1016/j.midw.2011.09.003.

Service delivery

- Quality of Care (QoC) Patient Safty Policy, 2020
- Facility Management Committee (FMC)
- Environment health and sanitation policy

Financing:

- Services should be provided free at the point of care for Pregnant Women, Lactating Mothers, and Children Under Five including Newborns, C-sections and other birth or newborn complications – Free Health Care Initiatives

Information: There is a national policy/law on birth registration:

- The National Civil Registration Act 2016
- Maternal Death Surveillance and Response Guideline 2015
- Maternal and Perinatal Death Surveillance and Response (MPDSR), 2023

Please see annexe 1, Health policy tracker table, for more details

Table 1: Structural organization of childbirth health services and referral pathways

HMIS category *(change or remove levels as needed)*	**Number of facilities in the administrative database**	**Name of facility type**	**DHS category (hospital or lower level facility)**	**To which other levels should they make emergency referrals for complicated cases, if any?**
Public sector				
Level 1	654	MCHP	Lower facility	L4. District Hospital
Level 2	434	CHP	Lower facility	L4. District Hospital
Level 3	268	CHC	Lower facility	L4. District Hospital
Level 4	20	District Hospital	Hospital	L5 & L6. Regional Hospital, Tertiary Hospital
Level 5	4	Regional Hospital	Hospital	L6. Tertiary Hospital
Level 6	2	Tertiary Hospital	Hospital	Self
Private sector (if applicable and available, adapt levels or leave empty if not)				
Level 1	4			
Level 2	3			
Level 3	52	Clinic	Lower facility	District Hospital
Level 4	10	Hospital	Hospital	Regional Hospital, Tertiary Hospital
Level 5		Hospital	Hospital	Regional Hospital, Tertiary Hospital
Level 6	1	Hospital	Hospital	Regional Hospital, Tertiary Hospital

Table 3: Health resources – facilities and health workers for each type of childbirth care

Type of MNH care	Facilities: what facilities are meant to provide each type of care?	Health workers: what cadres are meant to be trained to attend each type of care?[14]
Public sector		
Routine (uncomplicated) childbirth care [15]	All Levels	Nurses, Midwives
Basic EmONC [16]	Health Post, Health Centers	Nurses, Midwives
Comprehensive EmONC (CEmONC) (i.e. C-sections) [17]	Hospital	Clinical Officers, Medical Doctors, Obstetricians/Gynecologists, SACHO
Specialized care for small/ sick newborns [18]	Hospital	Clinical Officers, Medical Doctors, paediatricians, Nurses, Midwives
Private sector		
Routine (uncomplicated) childbirth care [a]	All Levels	Nurse, Midwives
Basic EmONC [b]	Clinics	Nurses, Midwives
Comprehensive EmONC (i.e. C-sections) [c]	Hospital	Clinical Officers, Medical Doctors, Gynecologists
Specialized care for small/sick/ vulnerable newborns [d]		

Health system inputs relevant to MNH care

Table 4: Health system input indicators for health resources (2022)

Year	Total pop	Facilities per 10000	Hospitals per 10000	Health centers per 10000	For-profit to all facilities (%)	Beds per 10000	Total health workers per 10,000	Nurse: physician ratio
National	**8076881**	**1.67**	**0.09**	**0.33**	**10.87**	**3.59**	**No data**	**No data**

[14] Filled partially using WHO 2018/19 SRMNCAH survey responses for the country- edit as needed.

[15] Routine care refers to safe uncomplicated childbirth care, including: water supply, continuous electricity, soap, latex gloves, 24 hour services or not, routine partograph use and infection prevention

[16] BEmONC signal functions include: parenteral antibiotics, parenteral oxytocin, parenteral anticonvulsants, manual removal of placenta, removal of retained products of conception, assisted vaginal delivery, and neonatal resuscitation (bag and mask, oxygen)

[17] CEmONC signal functions includes BEmONC plus: Caesarean section and blood transfusion

[18] Care for small/sick newborns may include: Oxygen/CPAP, intravenous fluids, antibiotics, phototherapy and/or exchange transfusion

Eastern Region	2136850	1.45	0.04	0.30	4.21	2.77	No data	No data
North-west Region	1277399	1.93	0.09	0.38	9.72	4.24	No data	No data
Northern Region	1231853	2.10	0.05	0.28	1.54	4.28	No data	No data
Southern Region	2103443	2.06	0.08	0.42	4.62	2.71	No data	No data
Western Region	1327336	0.78	0.20	0.26	82.69	5.06	No data	No data

Source: Country Annual Meetings data 2023 (Excel: Health System Data CAM for 2022)
*Total health workers includes physicians + nurses + non-clinical physicians

Table 5: Health system input indicators for financing

Indicator	2013	2014	2015	2016	2017	2018	2019	2020	Average across years
Current Health Expenditure (CHE) per capita in constant 2020 US$	81.7	138.6	118.6	85.2	45.5	43.1	44.8	43.2	75.1
Health Expenditure on Maternal Conditions as % of Current Health Expenditure (all sources)					5.6	4.0			4.8
Domestic General Government Health Expenditure on Maternal Conditions as % of Current Health Expenditure					1.1	1.5			1.3
External sources of funding on Maternal Conditions as % of Current Health Expenditure					4.4	2.5			3.4
Domestic Private Expenditure on Maternal Conditions as % of Current Health Expenditure					<	<			

Source: Global Health Expenditure Database of National Health Accounts (https://apps.who.int/nha/database/ViewData/Indicators/en)

According to the Global Health Expenditure Database of National Health Accounts, the current health expenditure of Sierra Leone increased from 81.7 USD per capita in 2013 to 138.6 USD per capita in 2014. The expenditure started declining gradually from 2016 by 85.2 USD per capita to 2020 at 43.2 with an average expenditure of 75.1 USD per capita over these five years.

Health expenditure on maternal conditions as a percentage of current health expenditure stands at an average of 4.8% with 2017 and 2018 having health expenditures on maternal conditions as a percentage of health expenditures of 5.6% and 4.0% respectively. There is no health expenditure reported on maternal condition as a percentage of current health expenditure for 2013 to 2016 and 2019 to 2020.

Domestic general government expenditure on maternal condition as a percentage of current health expenditure averagely stood at 1.3% with 2017 and 2018 reports showing 1.1% and 1.5% respectively.

There is no reported health expenditure on domestic general government expenditure on maternal conditions as a percentage of current health expenditure for 2013 to 2016 and 2019 to 2020.

External sources of funding for maternal conditions as a percentage of current health expenditure averagely stood at 3.4% with 2017 and 2018 external sources of funding on maternal conditions as a percentage of current health expenditure at 4.4% and 2.5% respectively. There is no health expenditure on external sources of funding for maternal condition as a percentage of current health expenditure for 2013 to 2016 and 2019 to 2020.

Understanding population trends in where women give birth and who is attending them (DHS)

Figure 6: Institutional deliveries nationally by place of birth and type of birth attendant

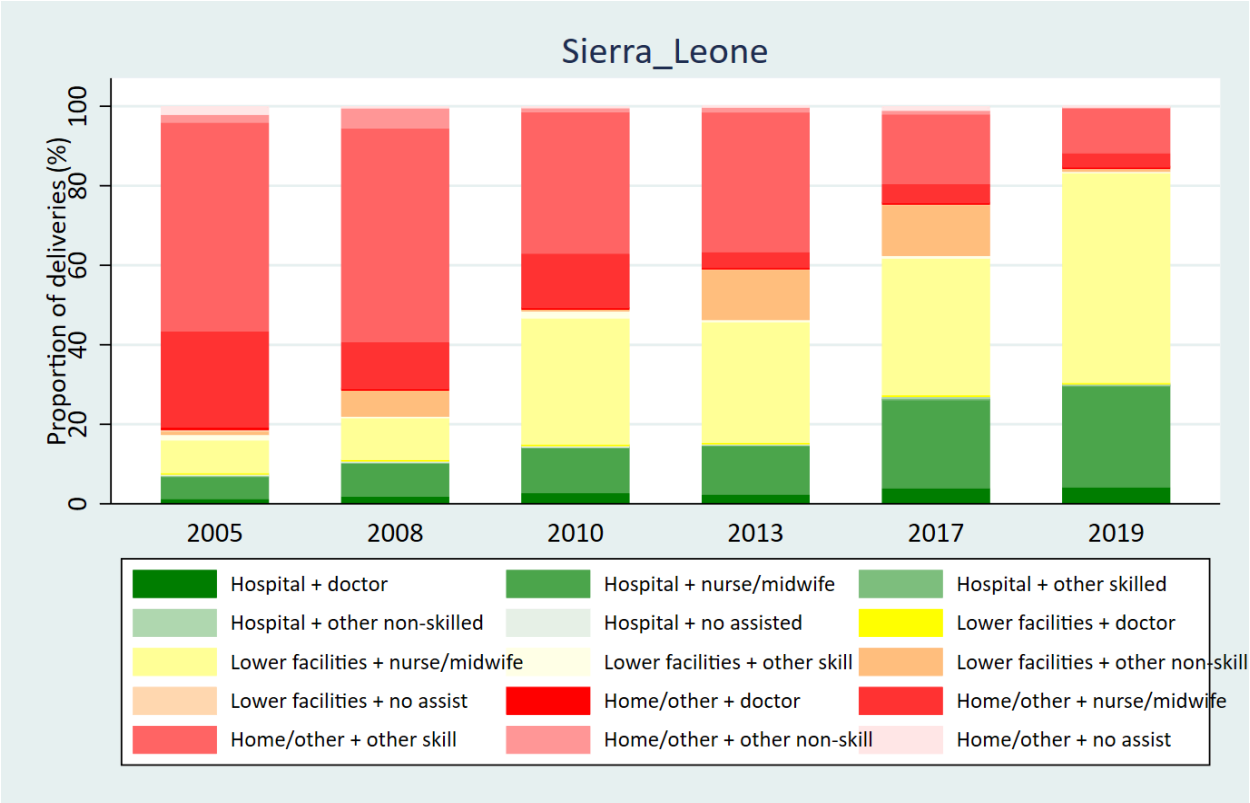


Figure 6 shows the trend of deliveries by person and place from 2005 to 2019. Generally, there is a drastic increase in facility delivery with a corresponding decrease in home delivery. The biggest growth in facility delivery occurs at the lower level. Home deliveries by unskilled healthcare workers were highest in 2005 and 2008, but gradually decreased from 2010 to 2019. The higher percentages of home deliveries by unskilled health personnel could be ascribed to the limited number of health facilities and health workers across the country, which is an aftermath of the 1991 – 2001 civil war in Sierra Leone.

Around 2010, the ministry started to increase the number of health facilities and also started a training program for MCH Aide - a lower level of healthcare staff. The ministry also launched the Free Health Care Initiative around that same time to improve maternal and under-five health indicators. These strides by the Ministry led to an increase in facility delivery with skilled health personnel from 2010 upwards.

Additionally, the Ministry of Health in collaboration with community leaders instituted by-laws against community delivery and also encouraged the Traditional Birth Attendance (TBA) to work in lower health facilities under the supervision of skilled health personnel, since community people repose high confidence in them for maternal issues. Furthermore, the ministry launched a Community Health Workers (CHW) program.

Figure 7: Institutional deliveries by subnational region, wealth and residence groups

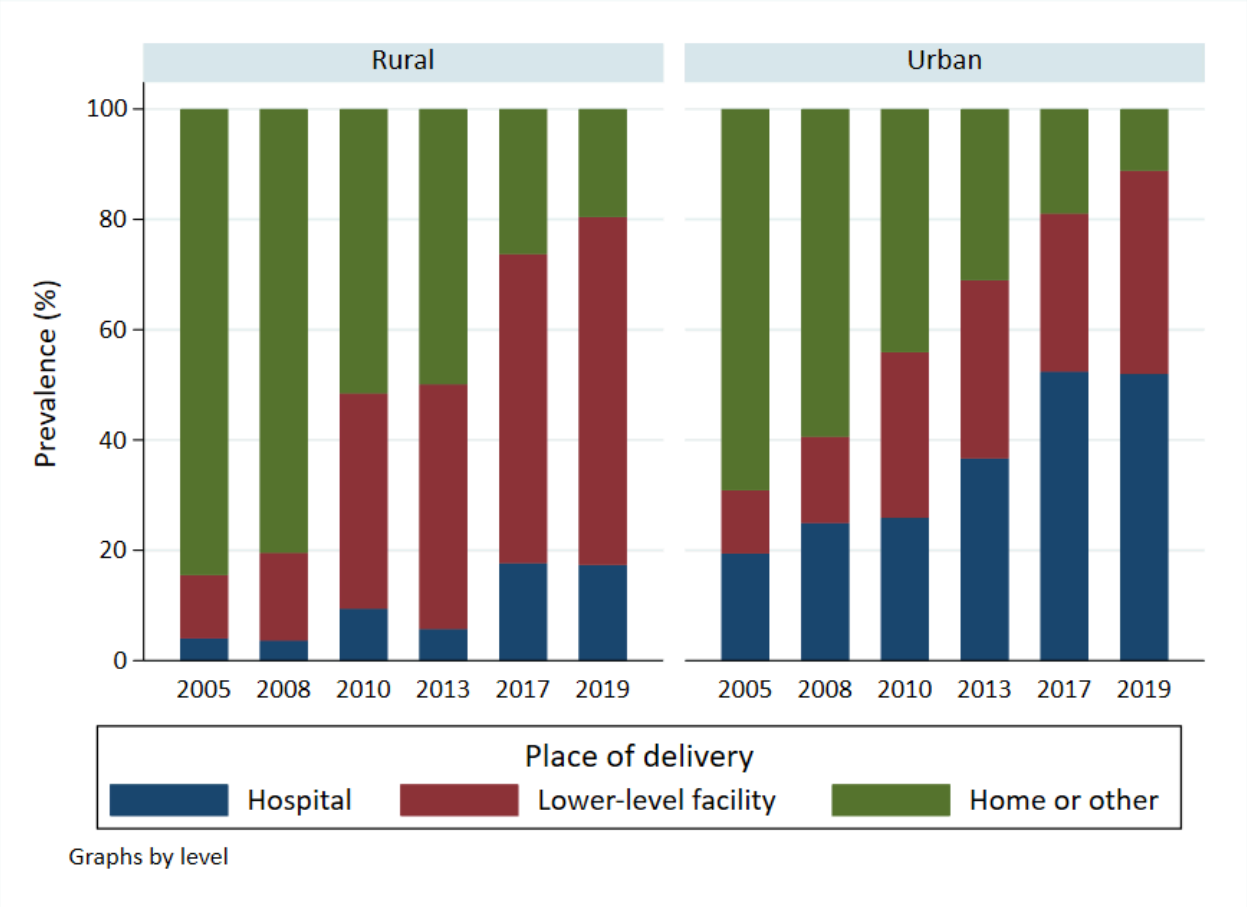


Figure 7 shows deliveries recorded by person, place (urban/rural) and time. It shows a high proportion of home or other deliveries reported in 2005 and 2008 with an approximate percentage of 80%. Hospital deliveries remain significantly low with a slight increase in lower-level facilities. This high number of community deliveries resulted from the negative effect of the eleven-year civil war that instilled fear in beneficiaries seeking care at health facilities.

The hospital deliveries were still much higher proportion in urban than rural areas, where lower facilities accounted for much more, but the overall institutional delivery rates were very similar in rural and urban areas (80-85%).

The introduction of the Free Health Initiative that provides free services to the most vulnerable groups (Pregnant women, Lactating mothers and children under five) triggers facility attendance and utilization of services that resulted in a slight increase in hospital deliveries and a correspondingly high increase in lower-level facility deliveries in rural areas.

The overall hospital and lower-level facilities deliveries gradually increased due to the motivation package of the free services provided in all public health facilities, the increase in several health care providers through the establishment of the MCH Aide training school and the establishment of peripheral health units in the hard-to-reach area to ease long walking distances to access health care services and enforcement of community by-laws on home deliveries. This contributed greatly to the reduction of home or other deliveries in rural settings.

On the other hand, hospital deliveries and lower-level facility deliveries have increased gradually from 2005 to 2019 with a corresponding decrease in community deliveries across the review period.

Caesarean section rates in the country rose slightly over ten years from 1.5% in 2008 to 4.1% in 2019. This was consistently highest at hospitals, at just under 15% of live births in hospitals in 2019.

Figure 8: Trends in C-section rates nationally

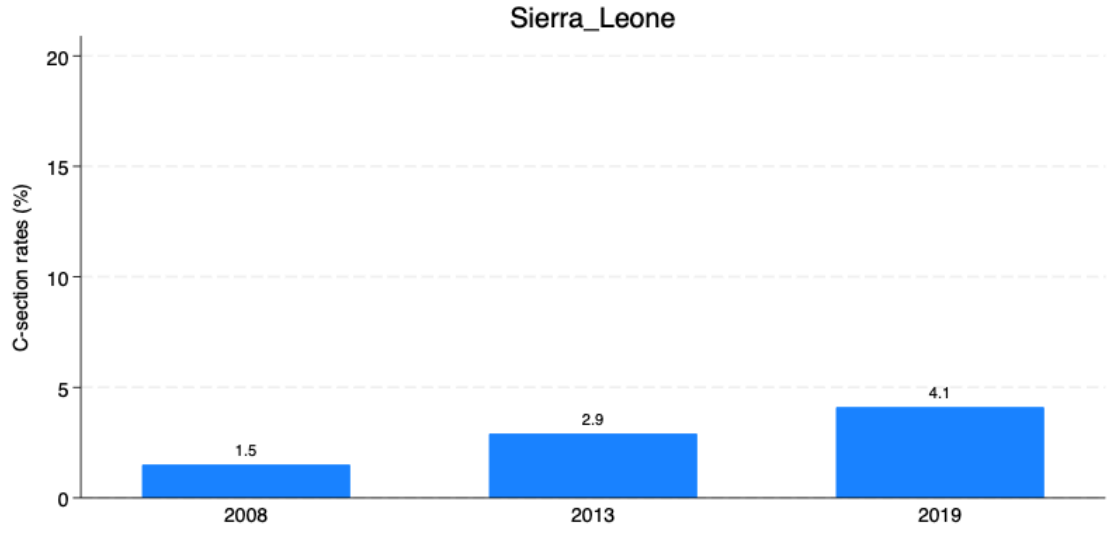


Figure 9: Trends in C-section rates nationally by facility level/type

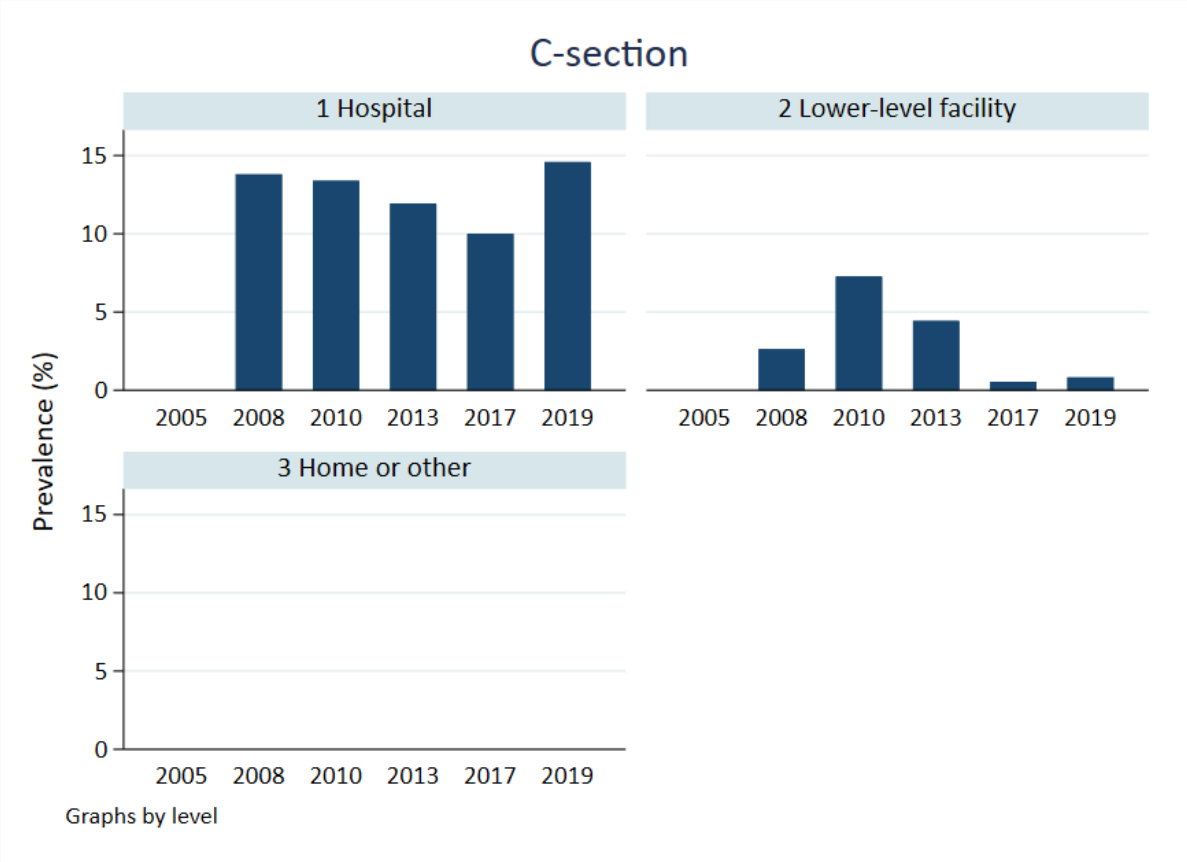
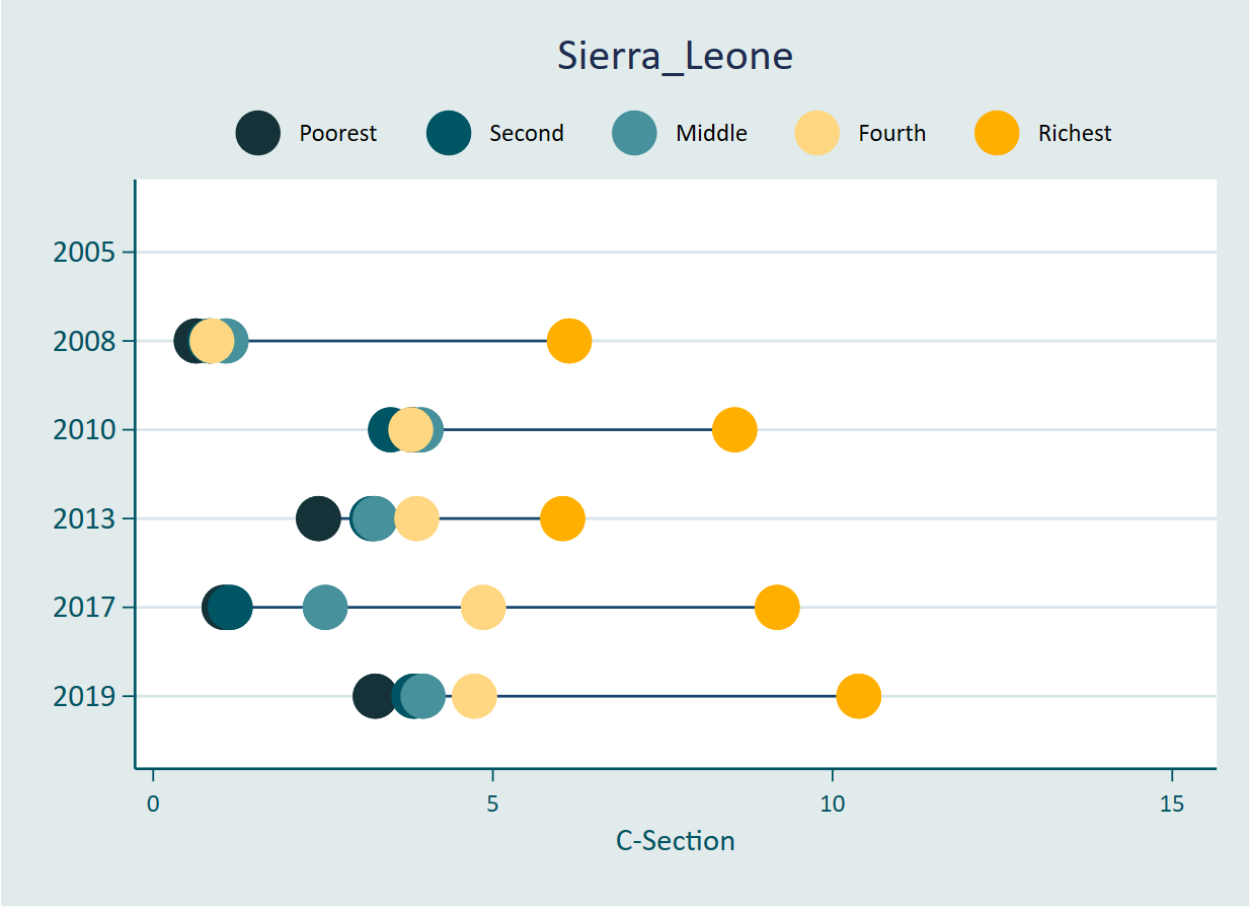


Figure 10: C-section rates (per 100 births) by wealth quintile equiplot



Caesarean section rate per 100 livebirths shows a very big margin between people in the poorest, second, middle, fourth and richest wealth quintiles in 2018 with an average number of caesarean sections done on 6 pregnant women per 100 live births among the richest and 1 caesarean section done among poor income earners.

The trend of CS rate changes in 2010 with the poorest, second, middle, and fourth wealth quintiles having an increase in CS rate to 4 CS per 100 live births, with a corresponding increase among the richest to 8 CS per 100 live births.

The margin between the richest and the other wealth categories continued to narrow in 2013 but declined in the number of CS done per 100 live births for all categories.

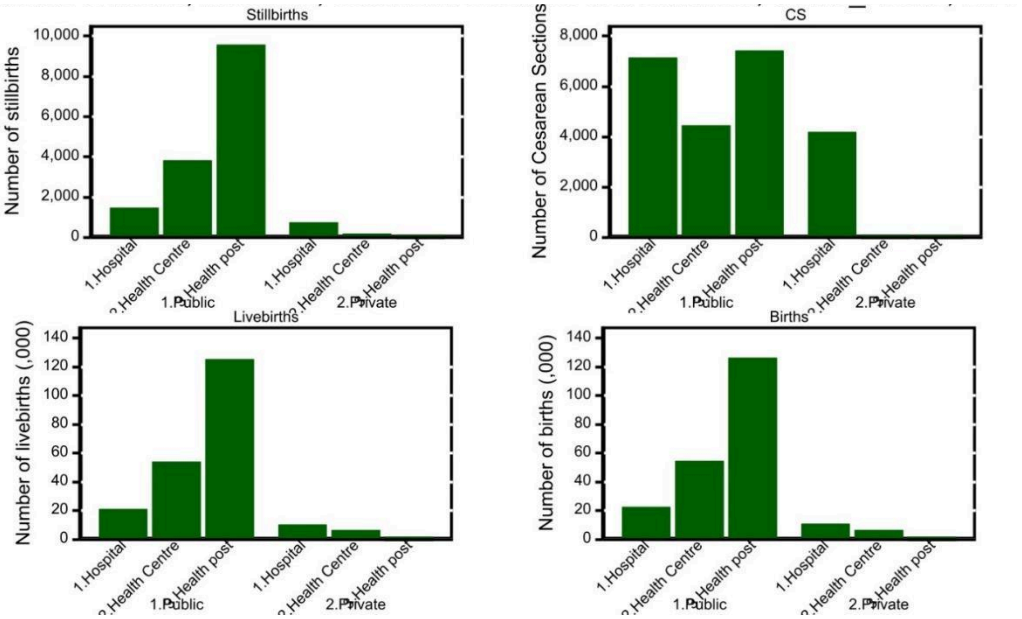
The trend continued to increase with CS rate done on an average of 9 pregnant women among the richest, 5 among the fourth and 3 among the middle-income earners.

2019 shows a significant improvement in the CS rate with 11 CS done among the richest and 3 among the poorest, but also shows that the wealth gap remained over time.

Understanding sizes and volumes of facilities where women give birth (HMIS)

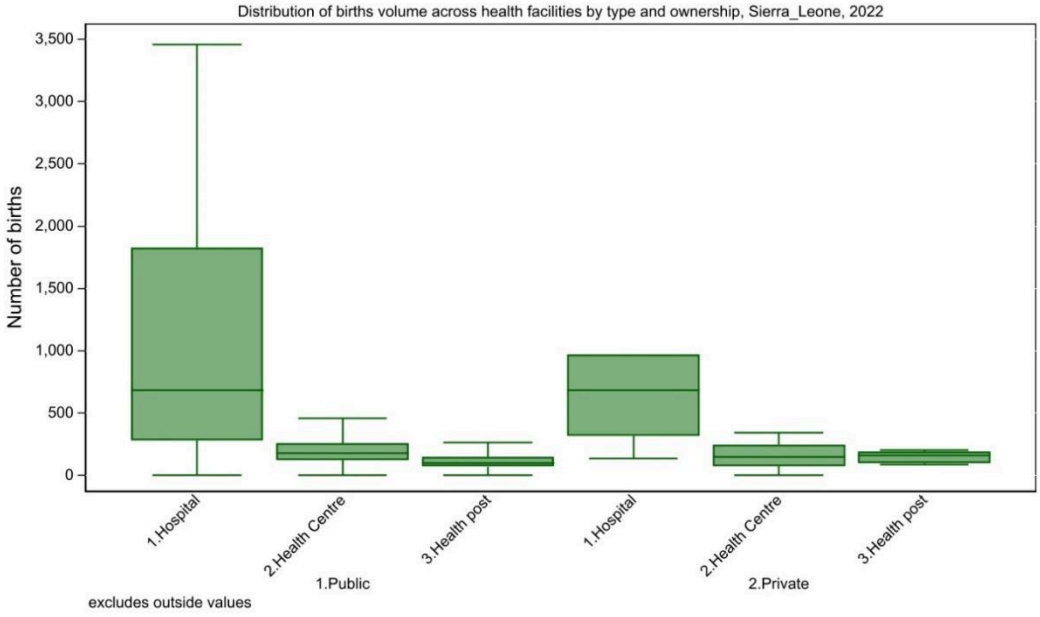
The total numbers of livebirths were overall higher at health posts, health centres followed by hospitals in 2022 (Figure 10).

Figure 11: Volume of births, livebirths, Cesarean Sections and stillbirths, Sierra Leone, 2022



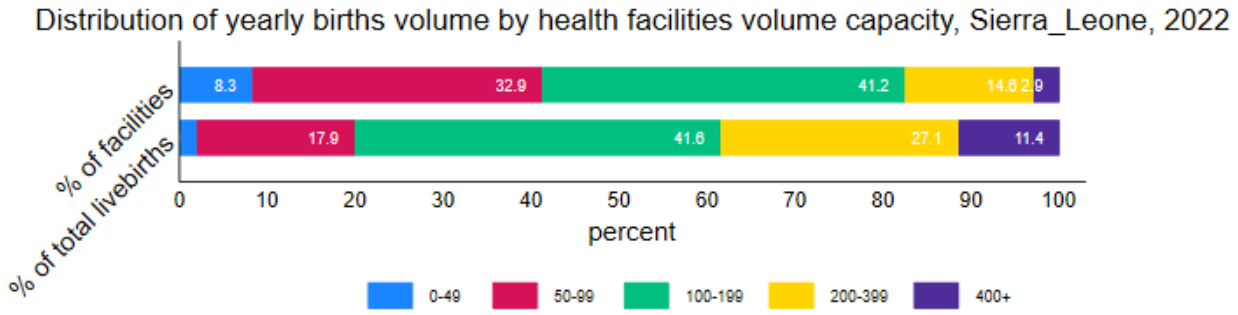
In contrast, the median number of live births per facility was higher per hospital than the health centres or posts (lower-level facilities) (Figure 12).

Figure 12: Distribution of births by median volume of births across health facilities in 2022



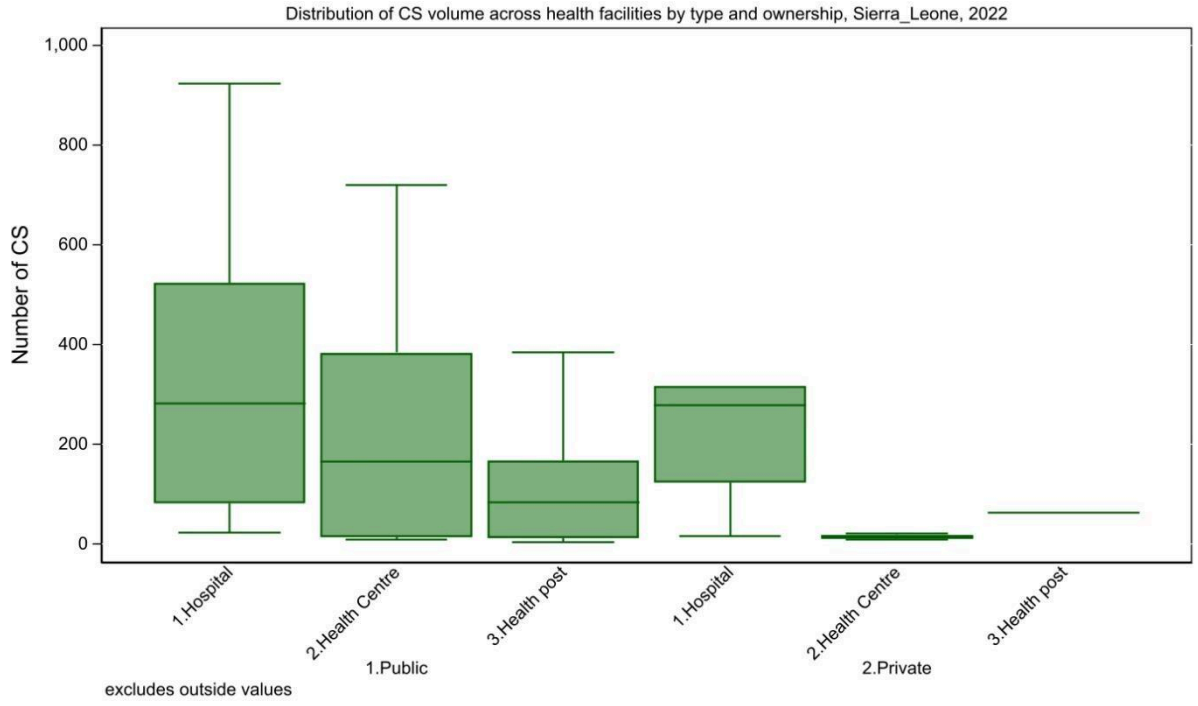
The majority of facilities (74%) with a moderate volume of livebirths (50-199) in the year also conducted 70% of total livebirths. Only 18% of the facilities with higher volumes (over 200 livebirths) per year contributed nearly 40% of total livebirths. Less than 10% of facilities conducted 0-49 live births in the year.

Figure 13: Distribution of yearly births volume by health facilities volume capacity in 2022



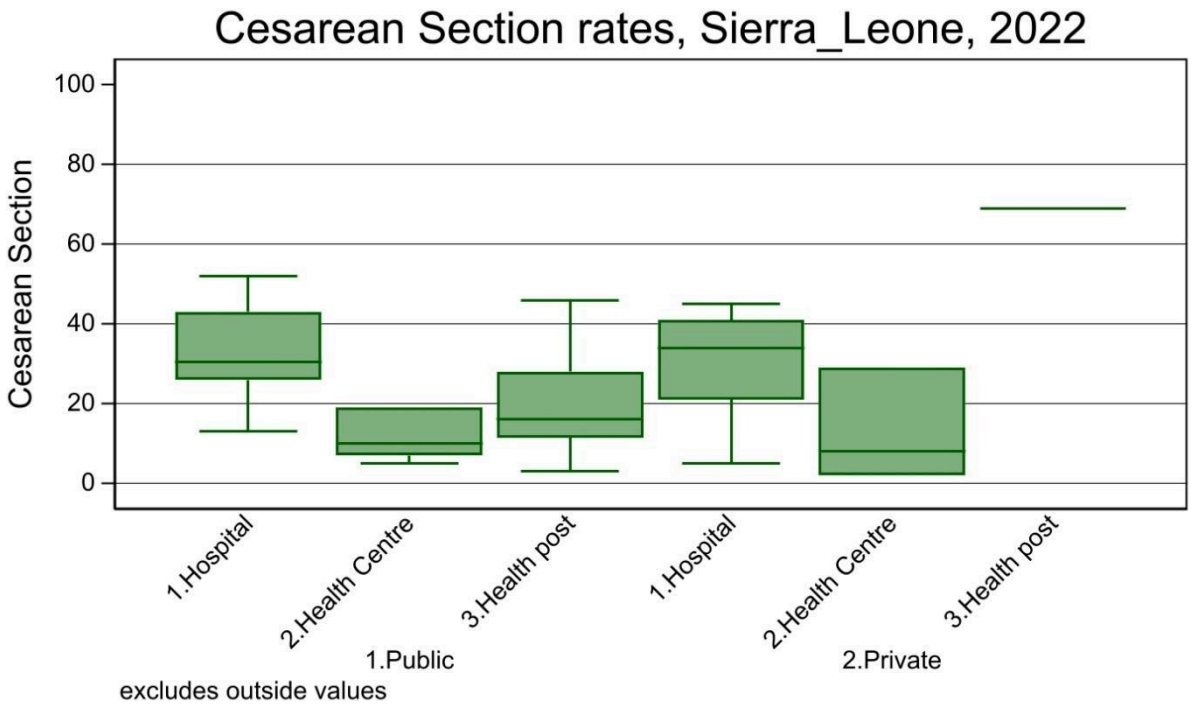
As for Caesarean sections, the median volume per facility was highest for public and private hospitals, followed by health centres, but were few among health posts as these are not usually meant to perform them.

Figure 14: C-section volumes by facility ownership, Sierra Leone, 2022



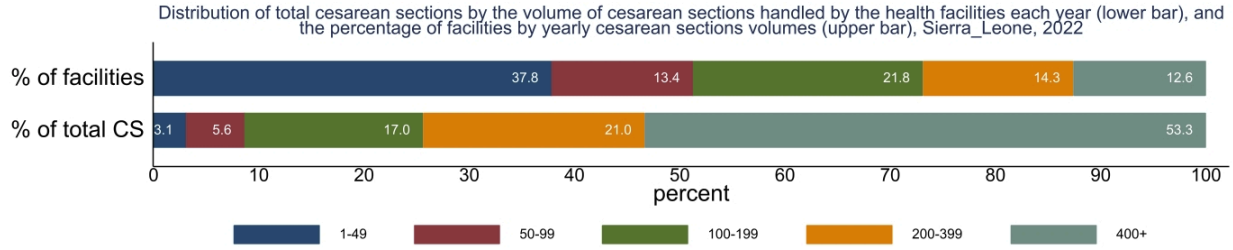
Facility rates of C-sections were also much higher at hospitals with a median of 31% in public hospitals and 32% in private hospitals, than in lower-level facilities, suggesting a greater proportion of births at hospitals were C-sections.

Figure 15: Facility C-section rates (per 100 livebirths) by facility type & ownership (public/private)



Looking at the distribution of C-sections by facility volumes of CS shows that almost 40% of facilities with low volumes of CS (less than 50 C-sections or 50-99) accounted for about 9% of the countries C-sections in 2022. In comparison, only 13% of facilities that did high volumes of CS (over 400 annually) accounted for over 50% of the country's total C-sections in the year. Another 14% of facilities that did 200-399 CS in a year accounted for another 21% of the country's total CS.

Figure 16: Distribution of C-sections the volume of CS handled by the health facilities each year (lower bar) and the percentage of facilities by yearly CS (upper bar) in 2022



Maternal mortality, stillbirths and neonatal mortality transition model stages

The following table shows the maternal mortality, stillbirth and neonatal mortality transition model stages (stage 1 being the highest mortality and stage with the lowest mortality), with their median or

interquartile range values using empirical data from around 150 countries for mortality levels and causes, fertility transition, childbirth intervention coverage, health system inputs and MNH care strategies. For more information on the source of this model, see the related article and related appendix Table 6 below.[19] Many of these select characteristics of each mortality transition stage are useful to consider in the synthesis and recommendations from this study.

Table 6: Summary of mortality transition stages and their characteristics[20]

Transition stage	**1 Highest mortality**	**2**	**3**	**4**	**5 Lowest mortality**
Mortality trends					
MMR, per 100,000 live births	≥700	300-700	100-300	20-100	<20
NMR, per 1000 live births	>45	30-45	15-30	<10-15	<5
SBR, per 1000 live births	35+	25-35	15-25	10-15	<10
Cause of death patterns	Infections, health status, and peri-partum complications all major causes	Infections and peri-partum causes decline, health status more important	Infections and peri-partum causes further decline, health status more important	Health status causes for mother/ baby decline but still important	Mostly unpreventable health status related deaths remain
Fertility transition					
Total fertility rate	Very high	High	Moderate	Moderate to low	Low
Abortion policy	Most restrictive				Most permissive
Intervention coverage (interquartile range)					
Institutional delivery	25-48%	43-75%	57-88%	88-99%	Nearly 100%
Hospital deliveries	11-28%	16-34%	28-68%	76-98%	98-100%
C-sections	Below 5%	7-10%	15%	20-30%	30% or more
C-sections among the poorest	0-2%	1-3%	2-11%	7-22%	14-29%
Health system inputs					
Health workforce (physicians, nurses, midwives)	Low density of health workers	Increase in nurses and midwives	Major increase in density, nurse to physician ratio declining	Continued increase in density, due to more physicians	Core health workforce over 100 per 10,000 population

[19] Boerma T, Campbell OMR, Amouzou A, et al. Maternal mortality, stillbirths, and neonatal mortality: a transition model based on analyses of 151 countries. The Lancet Global Health 2023;**11**(7):e1024-e31 doi: https://doi.org/10.1016/S2214-109X(23)00195-X.

[20] Boerma T, Campbell OMR, Amouzou A, et al. Maternal mortality, stillbirths, and neonatal mortality: a transition model based on analyses of 151 countries. The Lancet Global Health 2023;**11**(7):e1024-e31 doi: https://doi.org/10.1016/S2214-109X(23)00195-X. [Appendix, page 29.]

Health financing	Low per capita expenditure, high out of pocket spending (OOPS)	Increasing expenditure, low government share as % of GDP, high OOPS	Same as phase II, continuing	Same as phase III, continuing	Very high health spending, low OOPS
Delivery of MNH care strategies					
Main challenges	Expanding access to all, demand generation	Access/ quality	Access/ quality	Quality	Quality and reaching poorest
Major MNH interventions	Infection control; primary/ essential MNH care	+BEmONC, expanding CEmONC for complications	+BEmONC, full CEmONC	+ specialized care; small, sick newborn	+Universal access to CEmONC and specialized small/ sick newborn care

Please indicate in the table below the MMR, NMR (and SBR) mortality levels that your country was at in 2000 and 2020, and what phase of mortality transition that corresponds in each year using Table 6 above.

Table 7: Mortality transition stages since 2000

	NMR	**SBR**	**MMR**	**Transition phase based on mortality levels in Table 6**
2000 (or similar year)	**48**	**33**	**1682**	**1**
2020 (or similar year)	**31**	**23**	**443**	**2**

- Intervention coverage:
    - Institutional deliveries: increased greatly from just below 20% in 2005 to 85% in 2019
    - Hospital deliveries: increases from below 5% to around 25%
    - C-section deliveries (overall, and among the poorest): rose slightly from 1.5% to 4.1% between 2008 and 2019
- Health system inputs:
    - Health worker densities – total and Nurse: Physician ratios (not known)
    - Health financing overall and for maternal conditions – and proportion government, external and private expenditure: health financing was at 75 USD per capita between 2013-2020, but reduced over the years. The proportion going to maternal conditions was around 5%, 1.3% of which was from government sources.

- MNH service delivery strategies:
    - The policies set by the Ministry of Health focused greatly on expanding the numbers of facilities, and health workers and removing user fees. This helped to expand access. There was some effort made to improve skilled attendance and task shifting as well.
    - The policies had a focus on expanding childbirth with skilled attendants at lower-level facilities, as seen by the increase in deliveries in health centres and posts, especially in rural areas. There was also an effort to offer Special baby care units, and to improve staff capabilities for BEmONC to address complications. Caesarean section rates increased slightly but most were at hospitals and among the richer groups.

Synthesis of findings

Safe: Overall institutional delivery rates increased greatly since 2000, with a greater proportion of the increase at lower-level facilities in rural areas, and hospitals in urban areas. While efforts were put in place to improve access to facilities and skilled birth attendance, BEmONC skills, and referrals, there are still challenges in ensuring emergency care for complicated deliveries.

Equitable: Institutional delivery rates improved among wealth groups and urban and rural areas, but hospital deliveries and C-section rates only improved among the wealthier and urban areas, suggesting emergency care is not as equitable as routine care to date.

Effective: The NMR appeared to reduce somewhat at lower-level facilities, and even more among hospital deliveries, but not at home births. This suggests that facility-based care has become more effective at saving newborn lives over time.

Mortality transition: Sierra Leone moved from transition stage 1 to 2, and can target further reaching phase 3 by increasing the proportion of hospital births and emergency C-sections, improving the numbers of health workers and facilities offering these services, and continuing to invest in maternal and newborn health services.

The policies in Sierra Leone have increasingly focused on improving access as well as quality care for routine and emergency births. Addressing barriers to strong implementation of these policies will help continually improve the outcomes of MNH care.

Recommendations for future strategies

- Health financing for maternal and health care should be enhanced to remove financial barriers to accessing RMNCH services. In this regard there is a need to promote public-private partnership by engaging and consolidating the Private sector contribution to maternal health expenditure.
- Health facilities in rural and underserved areas should be equipped with the necessary infrastructure and personnel to provide emergency and high quality maternal and newborn care.
- Enhance targeted training of health providers in rural and underserved areas on skills for maternal and newborn care.
- Global policy discussions could be informed about striking the optimal balance of equipping low -volume lower-level health facilities that are more accessible to women but lack basic facilities to

offer emergency services or equipping few high-volume high-level hospitals that have the requisite capacity to provide routine, emergency and specialized MNH services.

- The policies that focus on expanding childbirth with skilled attendants at lower-level facilities and byelaws against community delivery, and the Free Health Care Initiative should be maintained
- Maternal and Perinatal Deaths Surveillance and Response (MPDSR) where the main aim is to provide information, recommendations, and actions to be taken to eliminate preventable maternal and perinatal deaths an exploration of the feasibility of offering more comprehensive emergency obstetric care at lower facilities.

Annexures

Annexe 1: Health policy tracker table

Topic	Yes or No? – WHO survey 2018/19	If yes, what is the name and years (and any related documents)?	If no, anything new in place since 2018/19 (name, year, documents/ URL)?	Add a comment on the strength or intensity of implementation of this policy/ law/ guideline
Governance: How are services meant to be governed to provide childbirth care for all women and newborns?				
Which national strategies/plans for the areas of Maternal and Newborn Health does your country currently have?	National Reproductive, Maternal, Newborn, Child and Adolescent Health (RMNCAH) Policy 2017-21, SIERRA LEONE NATIONAL RMNCAH STRATEGY 2017 TO 2021			
1. Is there a national coordinating body that looks at RMNCAH or its components? (indicator)	Yes	RMNCAH country platform, MNH TWG,		
2. Is there a national law or provision to guarantee universal access to primary health care to all?	No		The Ministry has now developed the UHC roadmap	This document guides how health services is assured to the entire population in the country
3. Are there national policies/guidelines on childbirth?	Yes	EmONC participant manual 2017, Basic Package of Essential	The national obstetric care guidelines, MNH guidelines,	Staff across the country are being trained on these guidelines

		Health Services Guidline 2015, IPC Guidline 2015, EmONC Trainers Manual 2018		
4. Does the country have a national policy/guideline on the right of every woman to have access to skilled care at childbirth?	Yes	Basic Package of Essential Health Services Guideline 2015	National Obstetric care guidelines, essential Health Services package - 2022, National Health Sector Strategic Plan -2022-2025.	
5. Is there any policy or legislation on abortion care in cases to protect the health or life of the woman? [21]	Yes	Offences Against the Person Act 1861		The Ministry is now developing the Safe Motherhood and Reproductive Health bill that awaits Parliament's approval
6. Is there a national guideline on post-abortion care?[22]	Yes	National Guidelines for Post-Abortion Care		
Organization and resources: How are services organized and resourced (with facilities, health workers, and supplies) to provide childbirth care for all women and newborns?				
Health facilities				
7. If in place, does the national policy/guideline indicate designated health facilities as the preferred place of childbirth? ☐ Also complete Tables 2 and 3 below	No			

[21] Any document to specify if any legal grounds for abortion to preserve the health or life of a pregnant woman [https://bmcinthealthhumrights.biomedcentral.com/articles/10.1186/s12914-018-0183-1]. Data from Data from WHO Global Abortion Policies database: https://abortion-policies.srhr.org/

[22] Data from WHO Global Abortion Policies database: https://abortion-policies.srhr.org/

8. Are there national policies/guidelines on postnatal care for mothers and newborns?	Yes	Sl ENC participant manual 2017, Every Newborn Action Plan 2017	The national Obstetric Care guidelines, The UHC roadmap and the National Essential Health	There is a revised RMNCH&N Strategy, 2017 - 2025
9. Does the national policy recommend length of stay under observation of skilled attendant for the mother and the baby after normal childbirth at the facility? If yes, how long?	Yes, 12-24 hrs	Every Newborn Action Plan 2017		
10. Is there any guideline in place for ensuring transport and/or emergency referrals specifically for childbirth? Also complete Table 2	Yes	NEMS Ambulance referral SOPs		The referral SOPs are somehow ambiguous, especially for the referral of children. The referral process also usually challenged by funding issues that lead to gaps in operations from time to time
Health workers				
11. Are there national policies/guidelines that set forth a competency framework for maternal and/or newborn health care? Also complete Table 3	Yes	RMNCH&N Strategy, 2017 – 2025, Essential Health Services Package		
12. Is there a continuous professional education system in place for primary health care clinicians and/or nurses to receive maternal and newborn health specific training?	No			Most of the in-service trainings are adhoc and usually do not contribute to career growth

Supplies, drugs and commodities				
13. Are there national policies/guidelines on essential medicines and equipment?	Yes	Essential Health Services Package, 2022 National medicine list 2016, Standard treatment guidelines, National Policy on the maintenance and management of medical equipment, 2021.		–The standard treatment guidelines and national medicines list guide the procurement of medicines in the country. The implementation of the equipment management policy is challenging because of the lack of a suitable anchoring program or directorate
14. If present, does the national childbirth policy/guidelines recommend the use of any of the following specific drugs (oxytocin or misoprostol) for the prevention and treatment of postpartum haemorrhage?	Yes	This is articulated in the updated national obstetric care guidelines		These medicines are present in most health facilities
15. Does the country have a national policy/guideline on the availability of essential equipment in facilities where births take place?	Yes	National Medicine List 2016, the National Obstetric Care Guidelines and the Sierra Leone Every Newborn Action Plan		The absence of a strong program of directorate to provide oversight for equipment makes implementation constrained
16. Are self-inflating bag (newborn size) with neonatal and paediatric masks of different size and valve included in the national list of commodities indicated for use of pregnancy, childbirth and postpartum care?	Yes	National medicine list 2016		

17. Are blood and blood products included in the national list of commodities indicated for use of pregnancy, childbirth and postpartum care?	Yes	National medicine list 2016		
Service delivery: What supports are meant to improve the quality of childbirth care (technical competence and experiences of care)?				
18. Is there a national policy/guideline to improve quality of care (QoC) for health facilities?	Yes	QoC Patient Safty Policy, 2020		
19. Does the national policy/guideline to improve quality of care address maternal health?	Yes			
20. Does the national policy/guideline to improve quality of care address newborn health?	Yes			
21. Are there mechanisms in place at the facility level to solicit feedback on quality and access from community members (e.g users, family?)	Yes	Client exit interviews		The exit interviews are not undertaken regularly enough to get a big enough quantum of information
22. If present, does the national childbirth policy/guidelines recommend presence of a companion of choice during labour and birth?	Yes			
23. If present, does the national childbirth policy/guidelines recommend for the woman to choose the birthing position?	Yes			
24. Does the country have a national policy/guideline on the availability of clean water and sanitation in the facilities where the births take place?	Yes	Environment health and sanitation policy		
Financing: how are childbirth care for mothers and newborns meant to be financed?				
25. Is there a national policy/legislation on free access to health services in the public sector at the point of use for newborns (0-4 weeks)?	Yes	Free healthcare services for pregnant and lactating women and young children in Sierra Leone 2009		

26. Are the following health services provided free of charge at point of use in the public sector for women of reproductive age: Caesarean section?	Yes, for all women	Free healthcare services for pregnant and lactating women and young children in Sierra Leone 2009		
27. Are the following health services provided free of charge at point of use in the public sector for women of reproductive age: Management of other birth complications?	Yes, for all women	Free healthcare services for pregnant and lactating women and young children in Sierra Leone 2009		
28. Are the following health services provided free of charge at point of use in the public sector for newborns: Management of birth complications (asphyxia, prematurity, sepsis, congenital anomalies)?	Yes, for all newborns	Free healthcare services for pregnant and lactating women and young children in Sierra Leone 2009		
Information: What data are meant to inform action, accountability, or advocacy on childbirth care for mothers and newborns?				
29. Is there a national policy/ law that requires every birth to be registered?	Yes	THE NATIONAL CIVIL REGISTRATION ACT, 2016		
30. Is there a national policy/ law that requires every death to be registered?	Yes	THE NATIONAL CIVIL REGISTRATION ACT, 2016		
31. Is there a national policy/guideline/law requiring all maternal deaths to be reviewed?	Yes	Maternal Death Surveillance and Response		

		Guideline 2015		
32. Is there a national policy/guideline/law requiring all stillbirths (fresh or macerated) to be reviewed?	Yes	Maternal and Perinatal Death Surveillance and Response (MPDSR) guidelines 2023		
33. Is there a national policy/guideline/law requiring all neonatal deaths (0-28 days) to be reviewed?	Yes	Maternal and Perinatal Death Surveillance and Response (MPDSR), 2023and the child death audits		The child death audits are presently only limited to a fraction of child deaths that happen in facilities
34. Have any SARAs or SPAs been conducted in the country, and in what year?	Yes (SARA) No (SPA)			