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

Countdown to 2030
Multi-country Analysis Project

LIBERIA 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 *Liberia*

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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 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 Liberia. 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

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[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 stage.[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.
- 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 favorable MNH-related policy and systems characteristics, and identify where related adjustments or additions in future plans and investments are needed to reach the next transition stage(s).

Data sources and indicators

Data sources

- Population-level household surveys: DHS or MICS 2019/2020

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[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 Management Information System (HMIS): DHIS2 for 2022
- 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)

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 who 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 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 maneuvers 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

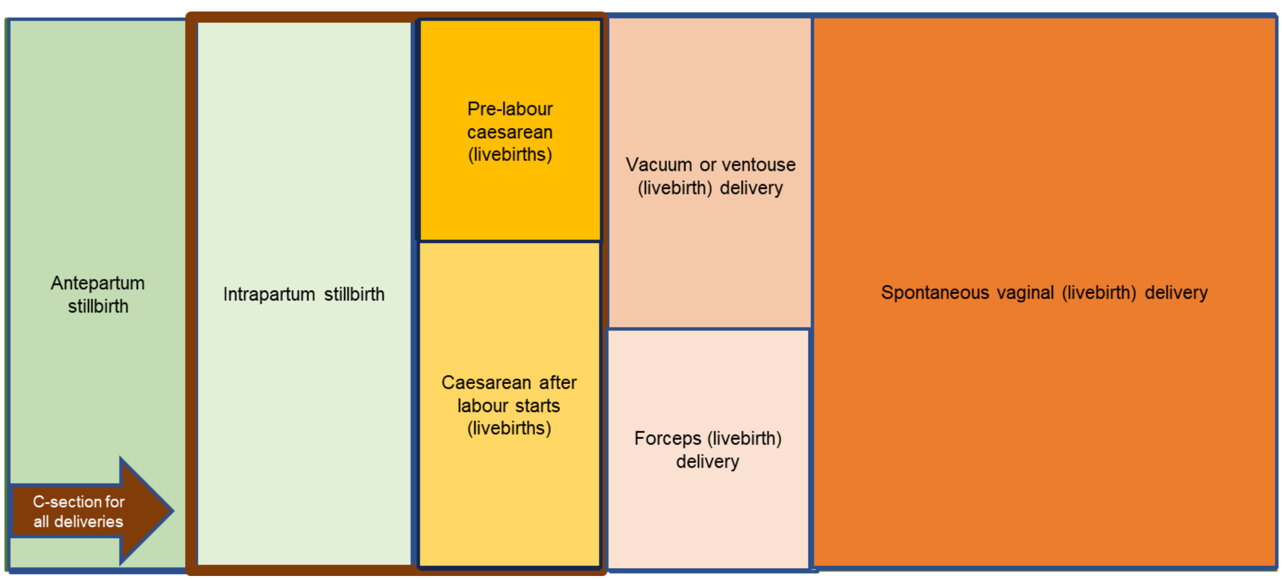
Birth outcomes: Births can be live or still

- 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 labor 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 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 it 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 consistency of estimates throughout time. Any peaks or valleys that were incompatible with what was expected were individually evaluated.
- The prevalence for the C-section indicator was compared to the place of delivery and 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 in order to have information on the district, level and ownership of the health facilities, which comes from the Administrative recorded joined to the MNH facility records.
- There were 732 number of facilities on the administrative list and 729 facilities that reported MNH indicators (MNH facilities).
- There were 2 number of facilities on the administrative list that did not report any deliveries.

- There were 729 number of those reporting births or deliveries that matched with the administrative data, reflecting that 99.5% of facilities in DHIS2 database merging with the facilities Master list.
- The reason this facility (Camp wood Health Post) is only reporting delivery is because it is reporting through another facility when comes to other service but for delivery, it reported by itself.
- The 109 number of facilities on the administrative list but not reporting births (12%) were the following: (for e.g., specialist, labs, lower level not providing deliveries etc.).

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

	Metric		2022
1	Indicators vs Reporting datasets	No. facilities merged	729
		No. facilities from Indicators not merging with Reporting data	1
		No. facilities from Reporting not merging with Indicators data	2
2		No. facilities merged	729
		No facilities from Admin not merging with indicators data	2
		No facilities from indicator not merging with Admin data	1
3	Facilities with 0 births per year	No. of facilities with 0 births per year	0

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 on 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 #1a and 1b output)

	Metric		2022
1	Completeness of monthly facility reporting for deliveries	a) % of expected monthly facility reports (national)	91%
		b) % of facilities with 12 data points	74.7%
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	100%
		b) Livebirths	100%
		c) Stillbirths	100%
		d) Caesarean section*	100%

		d) Mean percentage of the individual percentages	100%
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 cut-off (monthly)	100%
4	Percentage of facilities with no inconsistencies between livebirths, CS, vaginal births and AVD *(Livebirths= CS+ vaginal births +AVD) (monthly)*	% with no inconsistency at 2- standard deviations cut-off (monthly)	96 %
5	Percentage of facilities with no inconsistencies between stillbirths, FSB and MSB (Stillbirths = FSB + MSB) (monthly)	% with no inconsistency at 2- standard deviations cut-off (monthly)	84%
6	Extreme outliers over time	a) % of monthly values that are not extreme outliers	
		b) % of facilities with no monthly extreme outliers in the year	63%
7	**Overall data quality score (mean)**		

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

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

Problem	Action	Adjustment
Low reporting rates: identifying low rates that were adjusted	If below **75% (default),** data were imputed	Median monthly value for the year was imputed for the month with low reporting
Incomplete reporting by facility, variable over time, affecting trend assessment	If a facility did not have all the 12 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

In Liberia, the missing reports are mostly common among private health facilities. We calculated the volume of services provided by private, concession, faith based and public facilities, and the total number of private and public facilities which reported in 2022. It was observed that private health facilities, on the average, provide 40% of Delivery services. This makes sense because, delivery services are free in any facility. The k-factor was then set for 0.4 for reproductive services.

Health outcomes by delivery place and attendant

Trends in national maternal mortality ratio (MMR)

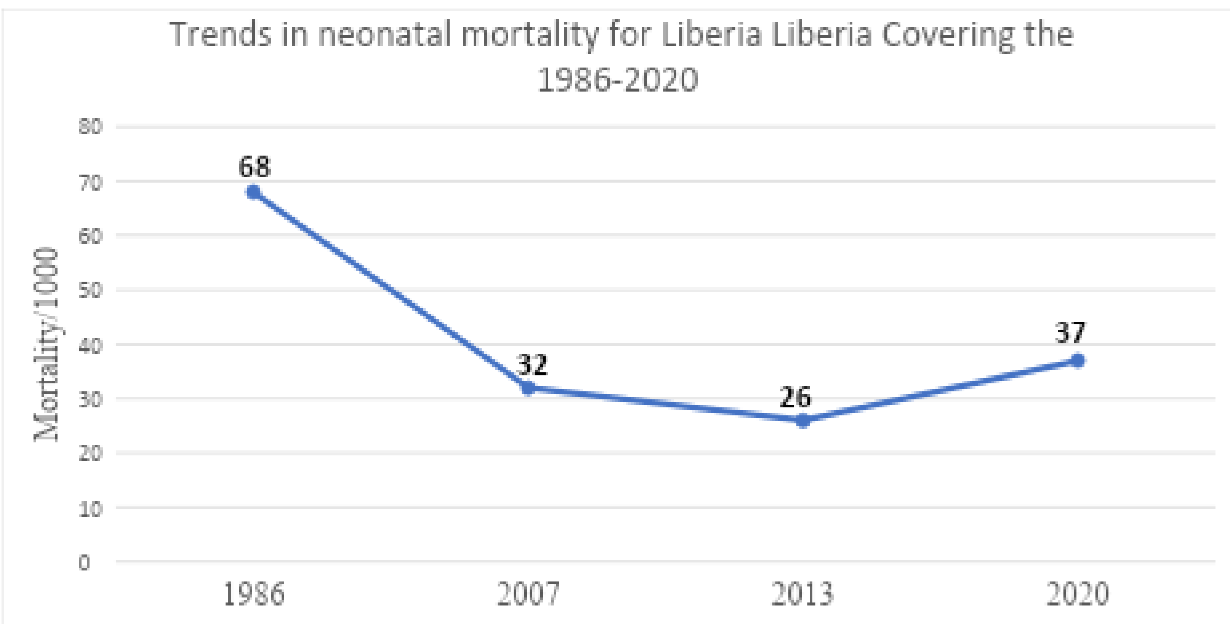
Maternal mortality ratio nationally in 2000 and 2020 (using UN estimates Excel sheet "MMR SBR NMR UN estimates 2000-2021" from your country in Dropbox: Workshop 4 - For countries Data and Codes Mortality estimates, any or all the years if you want to include, and/or your own data source, like DHS to compare - any available time points near 2000 and 2020):

- Add graph of how MMR has changed in this time period.
- Add related interpretation about how much MMR has changed over time
- Include data sources and years for data that you included

Trends in national neonatal mortality rate (NMR)

(using UN estimates from Excel sheet "MMR SBR NMR UNEstimates 2000-2021" from your country in Dropbox: Workshop 4 - For countries Data and Codes Mortality estimates, any or all the years if you want to include, and/or your own data source, like DHS to compare)

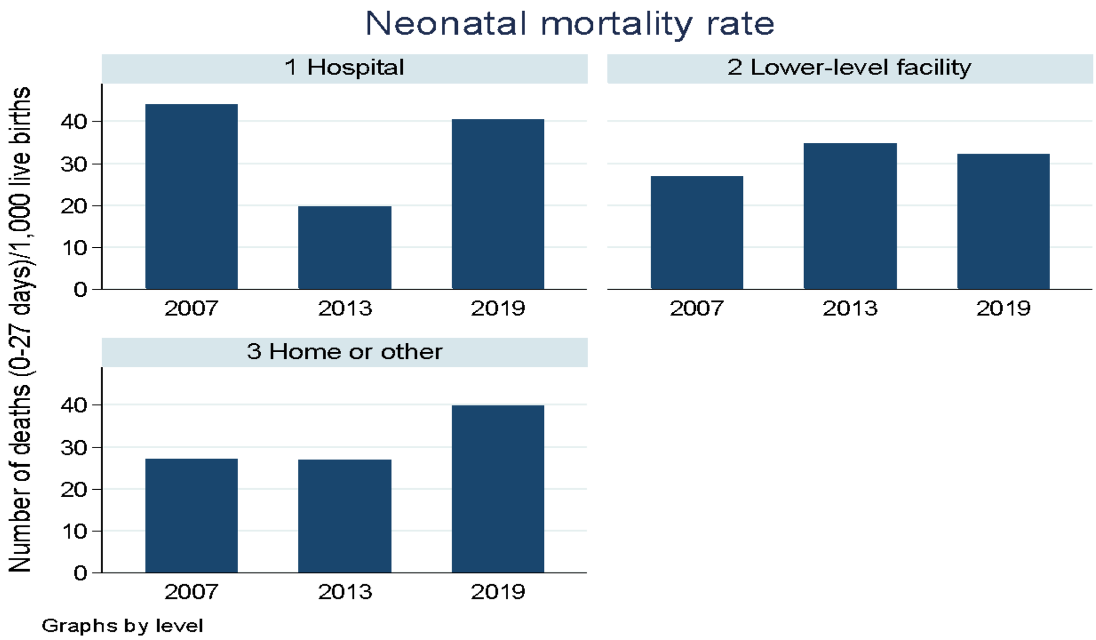
Graph showing: Trends of neonatal mortality rate (NMR) per 1,000 live births in Liberia



Source Liberia DHS:

According to the above-mentioned graph, neonatal mortality was high in 1986 (68); it dropped to 26 in 2013 and later rose to 37 in 2020. The undulating movement could be due to situation created by the national social economy conditions.

Graph: Showing Neonatal mortality rates by place of birth in DHS:



Source: DHS

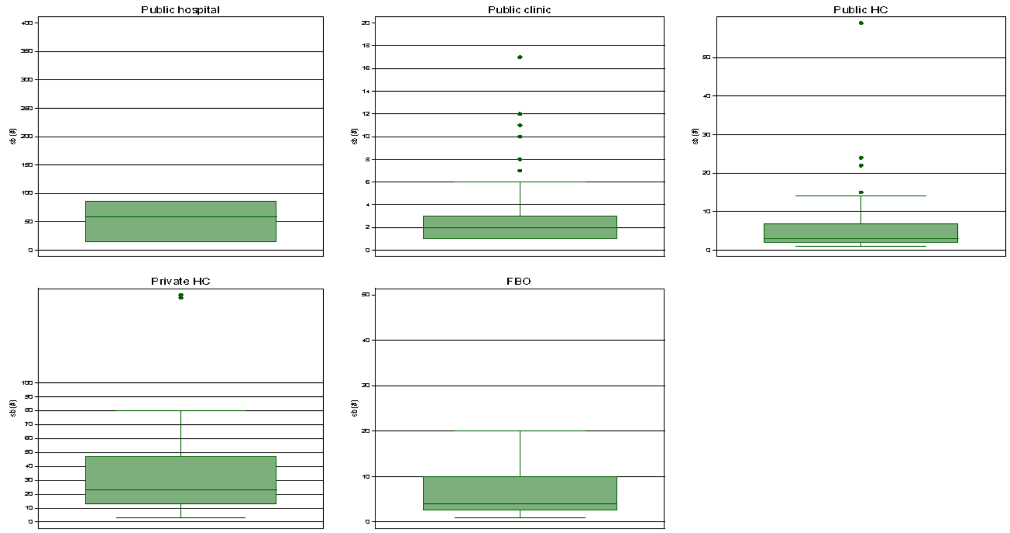
The trend of neonatal mortality has increased in hospitals and home birth. This partum is difficult to interpret because more women deliver health facility while fewer deliver at home. This means, we cannot be sure if the quality of quality of care has gotten worse or more high risk are delivering at home or in hospitals.

Trends in national stillbirths

Stillbirth rates over time (using UN estimates Excel sheet "MMR SBR NMR UN estimates 2000-2021" from your country in Dropbox: Workshop 4 - For countries Data and Codes Mortality estimates, any or all the years if you want to include)

- Add bar graph from UN estimates and related interpretation on how stillbirth rates changed over time
- Include data sources and years for data that you included

Stillbirth volumes nationally in most recent year (HMIS 2022):

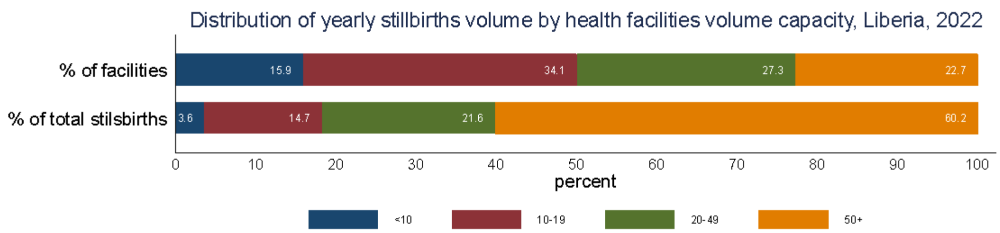


Source: HMIS

In the overall analysis of still birth volume at the national level was observed that public hospitals and public clinics received the highest average of still birth. A comparative analysis of public versus private and faith-based health services showed that public facilities received the highest average of still birth. The overall highest of still birth volume in Liberia was found in public hospitals with a mean of 70 followed by private hospitals with a mean of 23. Public clinics, public health centers and private Clinics received low volume still birth in 2022.

Stillbirth volumes by facility level, type and ownership in HMIS 2022:

- Add graph and related interpretation on the volume of stillbirths recorded at facilities (all, and if available, macerated or antepartum versus fresh or intrapartum) by facility level or volume (higher or lower numbers of births) and facility ownership (private, public etc.) in the most recent year.



Distribution of yearly still birth by facilities showed that some low volume facilities received high still birth while some high-volume facilities received low still birth. For an example 15.9% volume facilities delivering 3.6 of still birth while 22.7% of high-volume facilities are delivering 60.2 of still birth. Similarly, high volume of facilities of 27.3% is attended to 21.6% of still birth.

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 can

[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.

be updated with additional information you know about policies that have come into place since 2018/19.

Health policy context for MNH

Please review the provided Table 1 MNH policy and systems tracker tool found in Dropbox⍰Workshop 4 – for countries ⍰ Data and codes ⍰ Health policy and systems ⍰ (choose your country folder) ⍰ Country MNH policy and systems tables FINAL ENG – (your country name), and update the far right two columns where any new policy(-i.es) may have been introduced since 2018/19 in the country.

- Using Table 1, add some summary sentences or paragraphs here on what national policies, laws, plans, guidelines, or strategies related to MNH have been put in place or not, in what years (and whether updated), and how strong the implementation has been, related to the following topics:
    - Governance for MNH
    - Health facilities and referral transport
    - Health workers
    - Supplies, medicines and commodities
    - Service delivery to improve quality of care
    - Financing
    - Information

Table 2: Structural organization of childbirth health services and referral pathways

HMIS category ***(change or remove levels as needed)***	**Number of facilities in Administrative database**	**Number (and % of total) facilities providing MNH services**	**Name of facility type**	**Category used in the DHS analysis (hospital or lower level facility)**	**To which other levels should they make emergency referrals for complicated cases, if any?**
Public sector					
Level 1	318	318 (100%)	Hospital	Hospital	Hospital
Level 2	122	122(100%)	Health	Health	Health
Level 3	24	24(100%)	Clinic	Clinic	
Private sector ***(if applicable and available, adapt levels or leave empty if not)***					
Level 1	184	184	Hospital	Hospital	Hospital
Level 2	70	70	Health	Health	Health
Level 3	13	13	Clinic	Clinic	

Please fill and include Table 3 here on the facility levels and health worker cadres that are meant to provide routine, BEmONC, CEmONC and sick/small newborn services according to national policies/guidelines. The health workers column has been filled using WHO 2018/19 policy survey data, but please review and update as needed.

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]	Hospital, health center and clinic	Doctors, physician assistant, nurse, midwife
Basic EmONC [16]	health center and clinic	physician assistant, nurse, midwife
Comprehensive EmONC (i.e. C-sections) [17]	Hospital and health center	Doctors, physician assistant,
Specialized care for small/ sick newborns [18]	Clinics	nurse, midwife
Private sector (if applicable and available, adapt levels or leave empty if not)		
Routine (uncomplicated) childbirth care [a]	Hospital, health center and clinic	Doctors, physician assistant, nurse, midwife
Basic EmONC [b]	health center and clinic	physician assistant, nurse, midwife
Comprehensive EmONC (i.e. C-sections) [c]	Hospital and health center	Doctors, physician assistant,
Specialized care for small/sick/ vulnerable newborns [d]	Clinics	nurse, midwife

Health system inputs relevant to MNH care

Please review Table 4 containing data on infrastructure and health workers provided by the Countdown country collaboration team for the Country Annual Meeting 2023, and include in the report if available and of interest.

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	4650677.0	1.8	0.8	1.4	*7.6*	5.9	6.2	*8:1*
North Central	1434515.0	1.3	0.9	0.69	2.3	8.1	6.1	*N/A*

[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

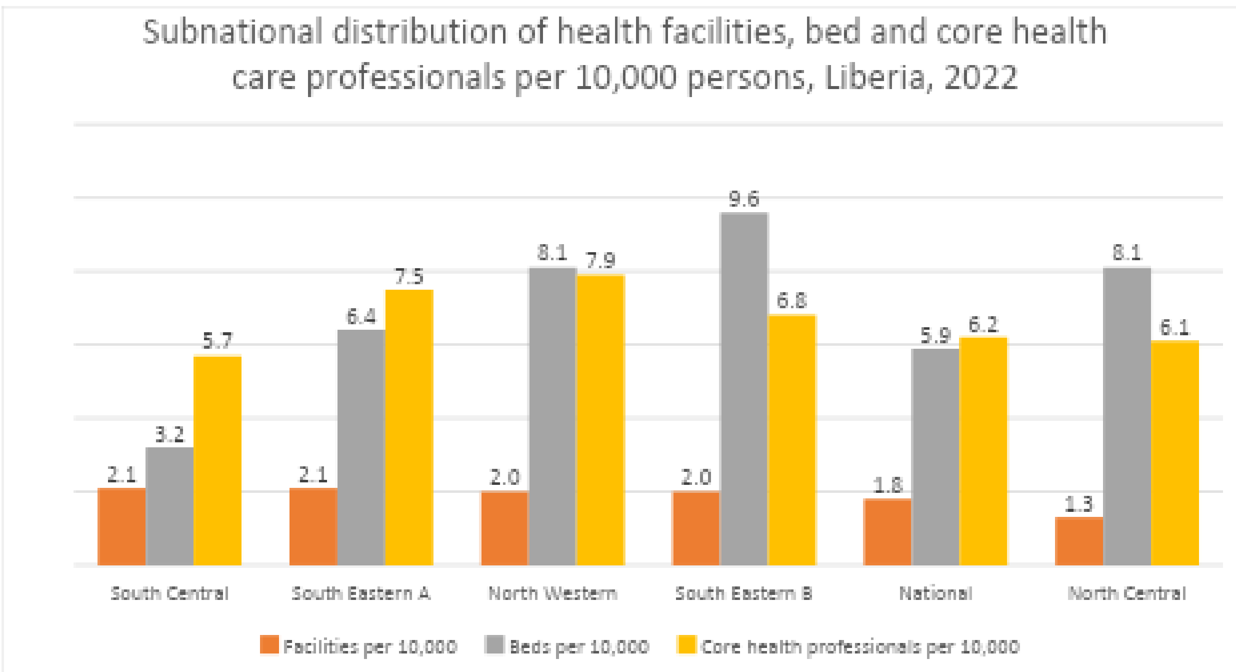
[16] BEmONC signal functions include: parenteral antibiotics, parenteral oxytocin, parenteral anticonvulsants, manual removal of placenta, removal of retained products of conception, assisted vaginal delivery, and neonatal resuscitation (bag and mask, oxygen)

[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

Northwestern	394065.0	2.0	0.76	1.2	1.26	8.1	7.9	*N/A*
South Central	2073252.0	2.1	0.79	2.0	2.4	3.2	5.7	*N/A*
Southeastern A	400185.0	2.1	1.0	0.8	1.5	6.4	7.5	*N/A*
Southeastern B	697320	1.0	0.8	2.5	1.3	4.3		*N/A*
Mean	348660.0	1.9	1.0	1.7	1.3	6.9	6.7	*N/A*

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



The graph above shows the subnational level comparison of number of health facilities, beds and core health care professions per 10,000 persons of the population.

Sub nationally, the south central has more health facilities per 10,000 persons, but with least number of hospital beds and least number of core health professionals. The region with the highest number of beds per 10,000 of the population is the south eastern B and the one with the highest number of core health care professionals per 10,000 persons is the North wester.

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$	N/A	N/A	78.50%	69.9	64.5	87.80	89.96	N/A	
Health Expenditure on Maternal Conditions as % of Current Health Expenditure (all sources)	N/A	N/A	3.78%	NA	NA	13.39	13.09	N/A	
Domestic General Government Health Expenditure on Maternal Conditions as % of Current Health Expenditure	N/A	N/A	0.84%	NA	NA	0.37%	1.74%	N/A	
External sources of funding on Maternal Conditions as % of Current Health Expenditure	N/A	N/A	0.59%	N/A	N/A	0.17%	1.32%	N/A	
Domestic Private Expenditure on Maternal Conditions as % of Current Health Expenditure	N/A	N/A	2.94%	N/A	N/A	1.33%	20.28 %	N/A	

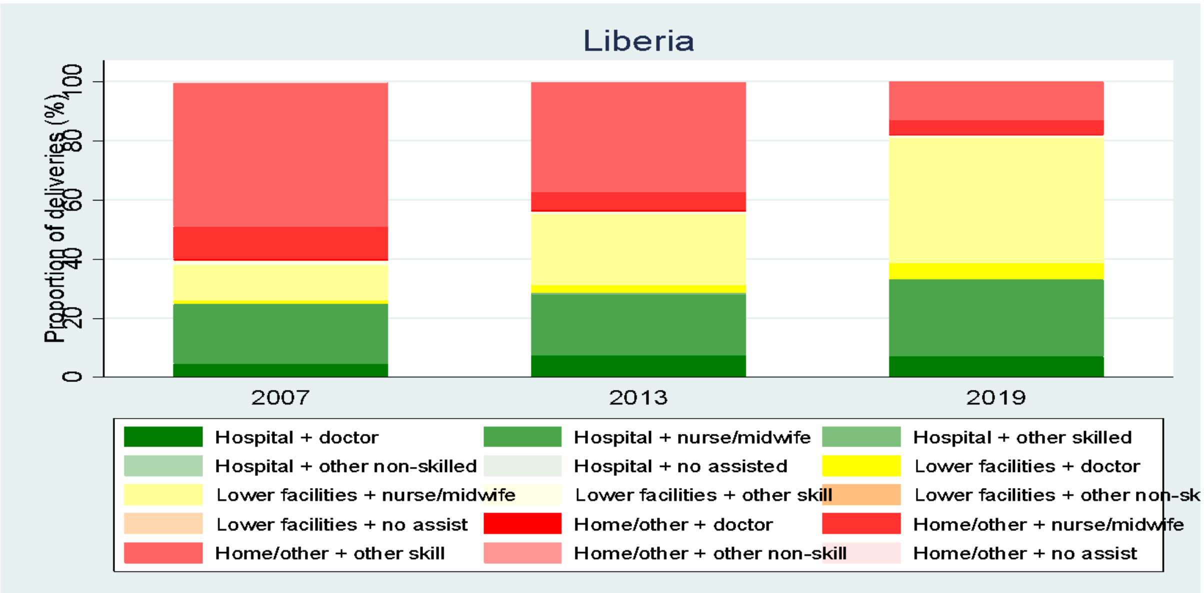
Source: Global Health Expenditure database of National Health Accounts (https://apps.who.int/nha/database/ViewData/Indicators/en)

- Add bullet points to interpret the table on the country's current health expenditure overall, and the proportion invested into maternal conditions (and whether this was higher among government, external or private sources)

Trends in where and with whom women give birth

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

Graph Showing: Institutional deliveries nationally by place of birth and type of birth attendant:

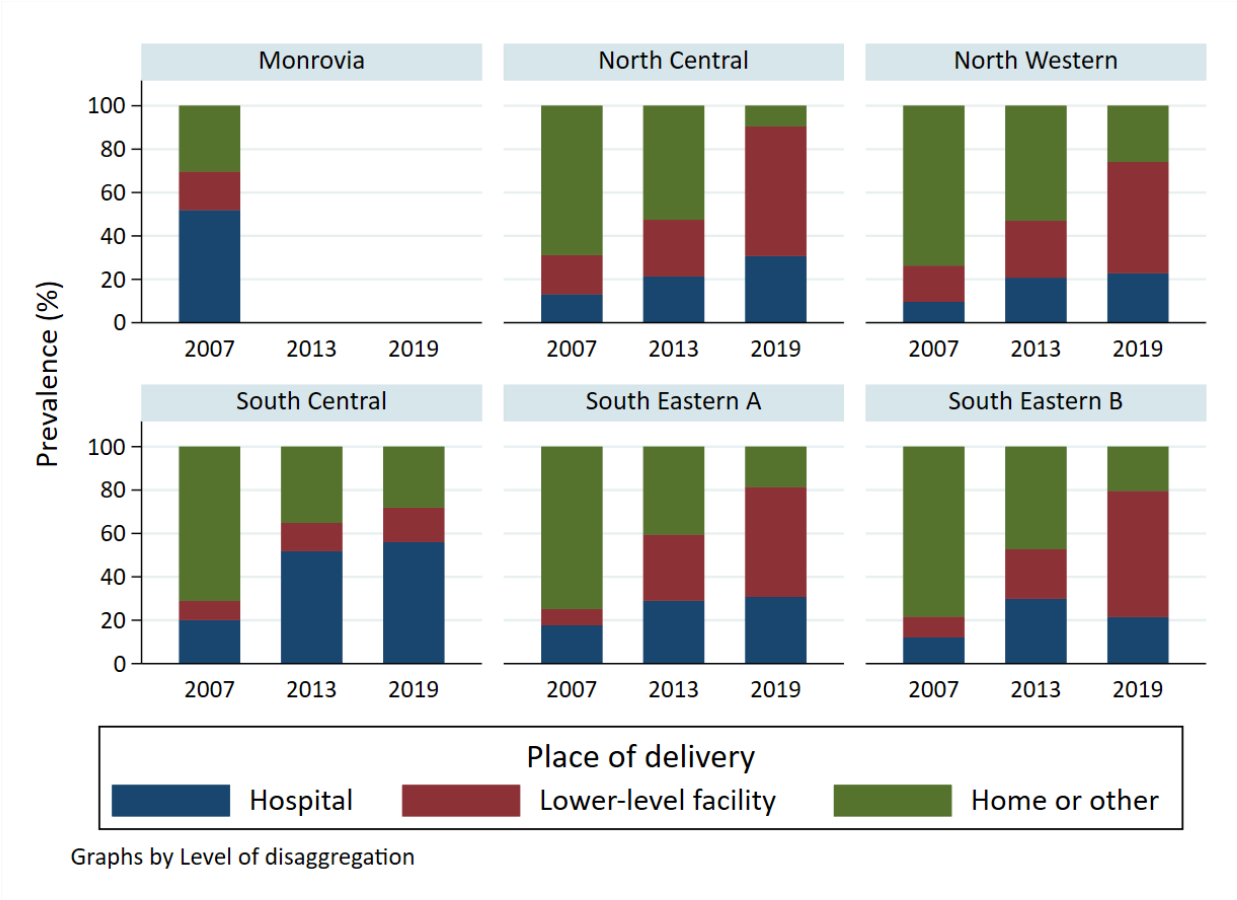


Source: DHS

The trend shows that home births including those assisted by trained personals, declined since 2013 and continued into 2019, with over 80% reduction for the period under discussion. The declined in home birth tracker increase deliveries in lower-level facilities from 2013-2019. Similarly, there was slight increment in hospital deliveries from 2013- 2019.

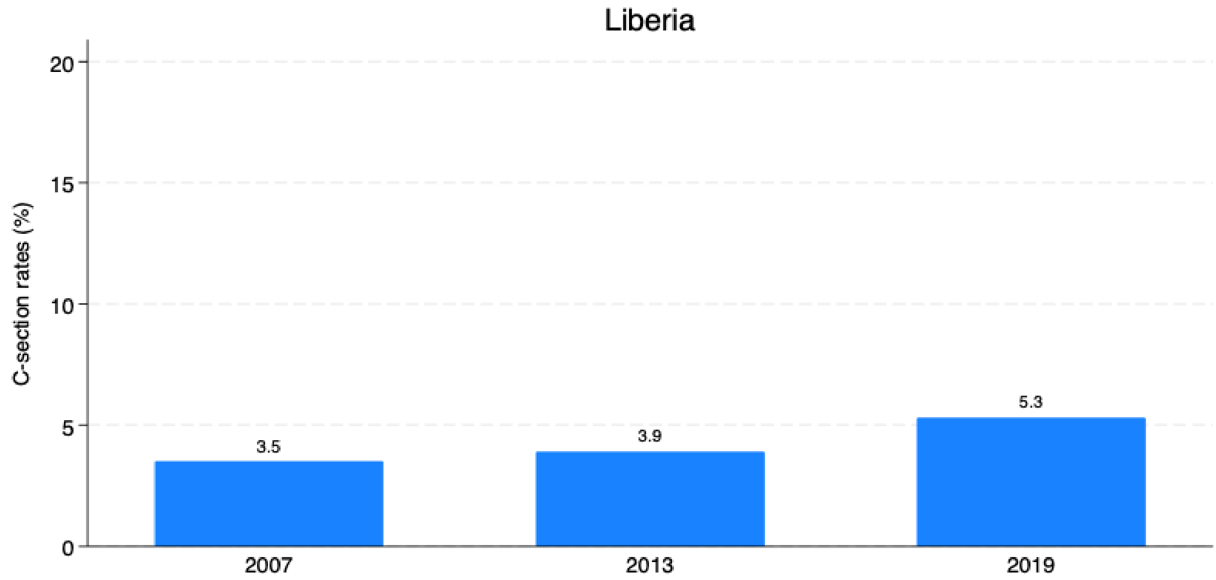
Institutional deliveries by subnational region, wealth and residence groups:

Graph Showing place of delivery and birth attendant by rural-urban residence, wealth quintile and/or region (province, county etc.).



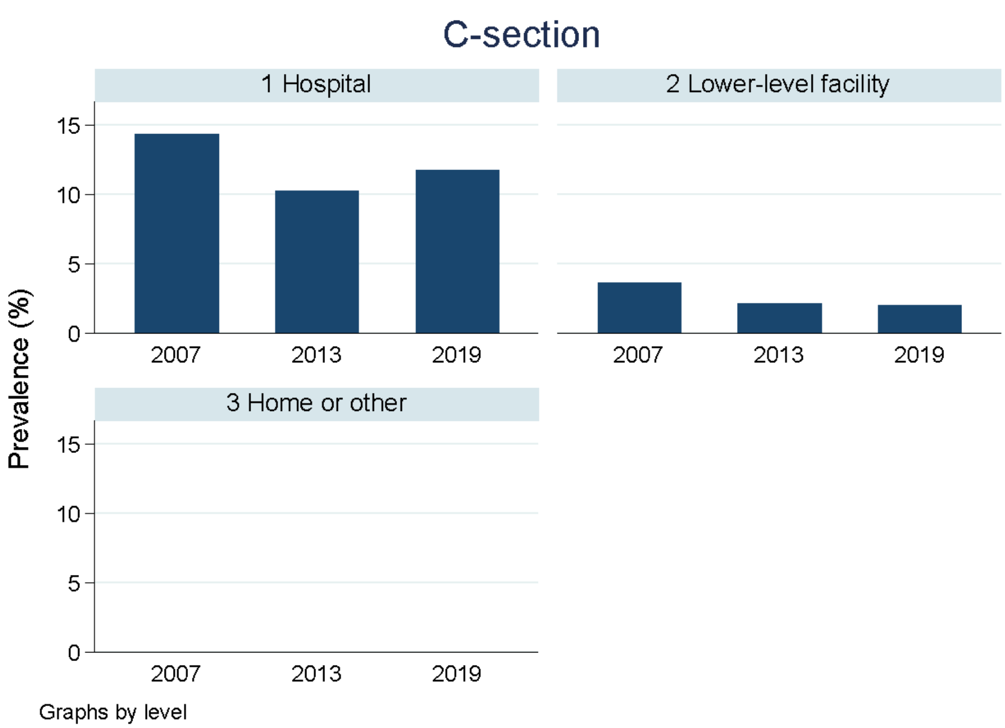
Distribution showed that home births decline consistently from 2007 to 2019, with North Central receiving the highest decline. The second lowest decline was fund in South East A and South East B. In terms of facility used in delivery, hospital delivery declined from 2007 to 2019, with North Central Receiving the highest decline in hospital delivery. The second highest decline in hospital delivery was observed in South East A and South East with south Central and North Western Region receiving the high percentage of hospital delivery from 2007-2019. The highest increase in home delivery was observed in North Central Region followed by South East A and South East B with South Central Receiving the Lowest Home Birth decline followed by the Monrovia Region. Meanwhile the Monrovia region did not receive report the period of 2013 and 2019.

- Trends in C-section rates nationally



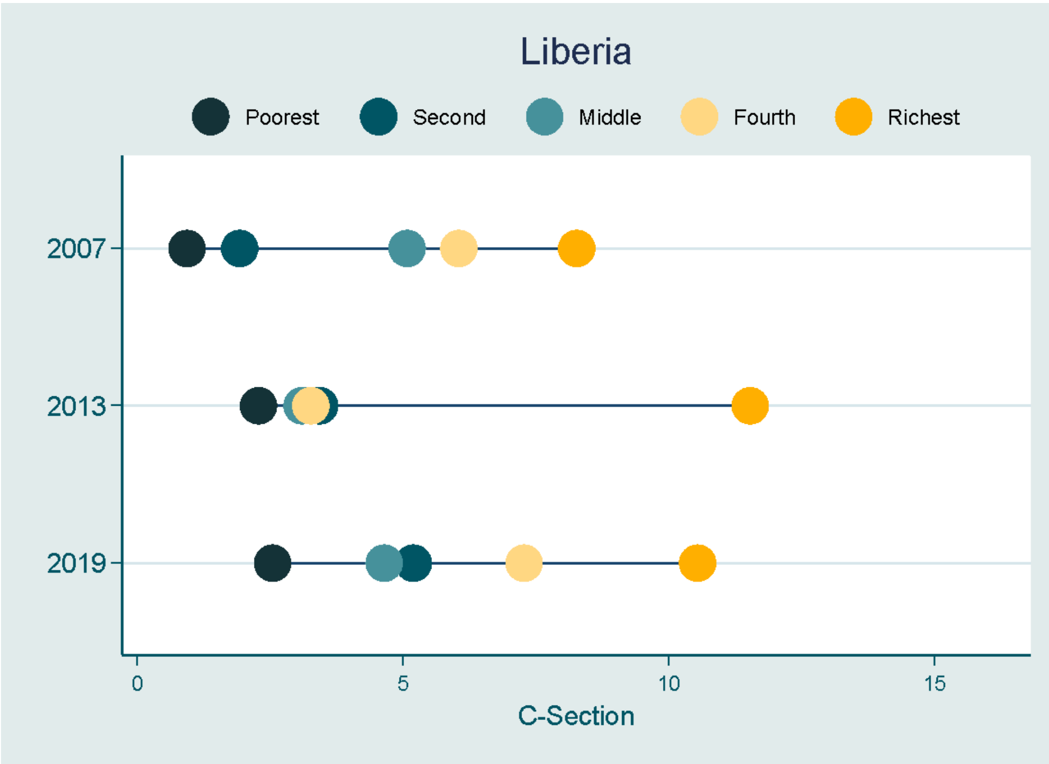
- Trends in C-section rates nationally by facility level/type:

Figure: Shows graphs on C-section rates by delivery place.



The overall performance in C-Section show a decline at the hospital level from 2007 to 2013 and later increased in 2019 by nearly 3%. At the lower-level facility, C-Section showed a decline from 2007 to 2013 and show a plateau up to 2019. All home birth from 2007 to 2019, never experience C-Section.

- C-section rates (per 100 births) by wealth quintile equiplot:
  - Add graph (equiplot) with C-sections rates by wealth.

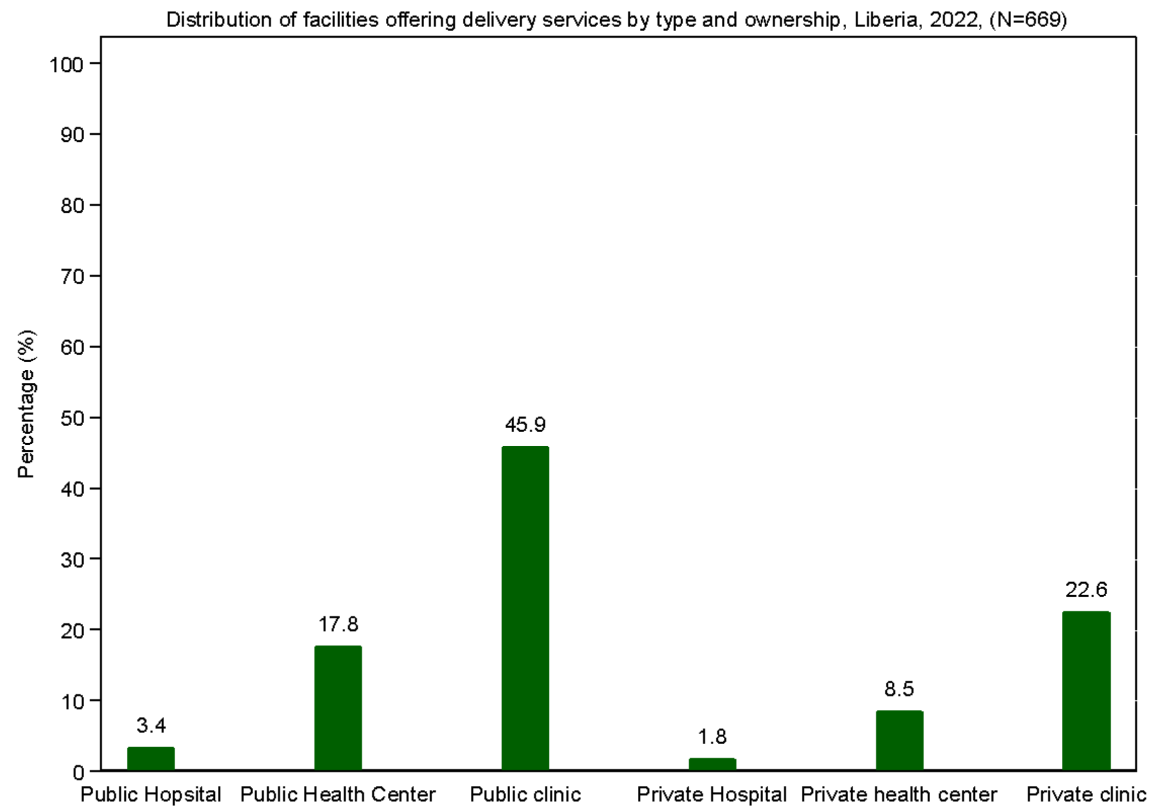


During the period 2007 to 2019, C-Section was dominated by the richest women followed by the second richest women, while the poorest women experience the lowest level of C-section for the same period under review. For the richest women, C-section increased from 8% in 2007 to 12% in 2013 and later declined to 11% in 2019. There was a shape decline in C-Section in the class of second richest women from 7% to 4% in 2013 and later increased to 8% in 2019.

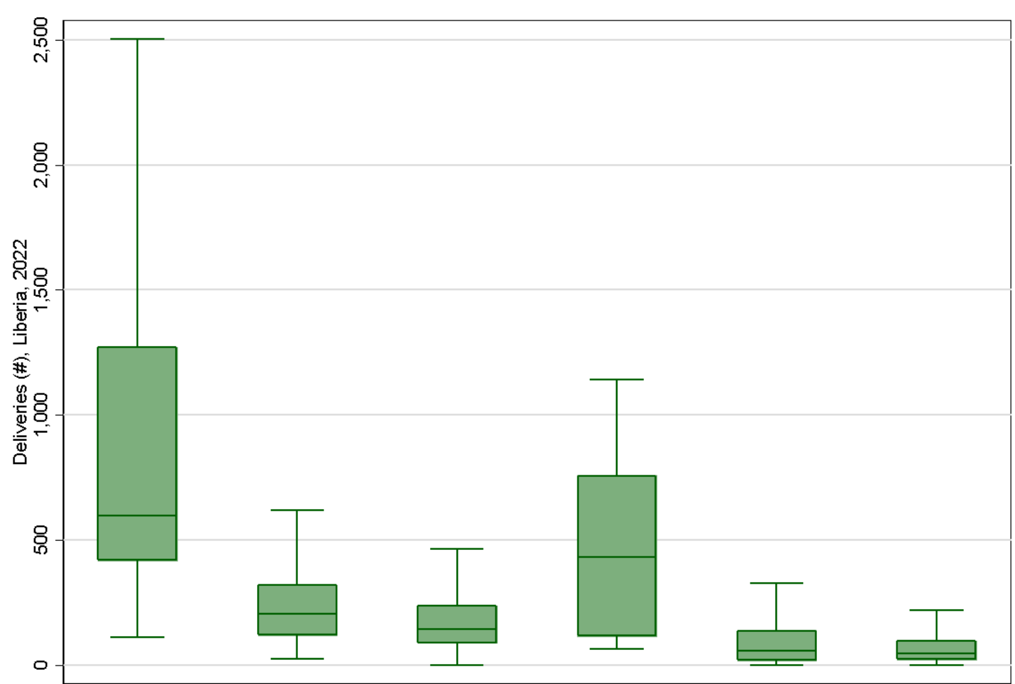
For the poorest women C-Section increased from 2% in 2007 to 4% in 2013 and stagnated up to 2019. The second poorest rose from 2.5% in 2007 to about 4.5% in 2013 and increased to 5.1% in 2019.

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

- Distribution of facilities offering delivery services by type and ownership



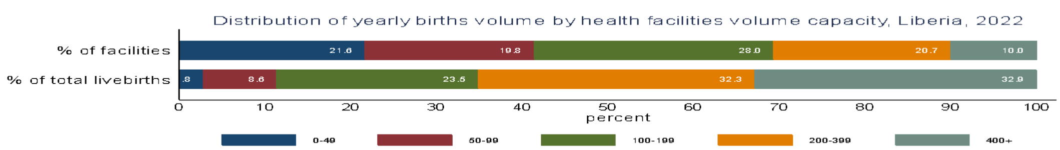
Public services are constituting 67.1% of the total Six Hundred and Sixty-Nine (669) health facilities that are providing child birth services. The most common type of facility that offer child birth is the public centers (45.9%). Hospitals account for 5.2% of total facilities offering child birth (3.4% Public and 1.8% private)



In general hospital do more deliveries than health centers which do more than clinics. Each level of care the public does more deliveries than the private sector. For example, the median number of deliveries in public hospital is higher 580 than the private which is less than 450 deliveries per year. However, many facilities are doing few deliveries per year for example: Half the public hospital are doing between 150-580 deliveries per year.

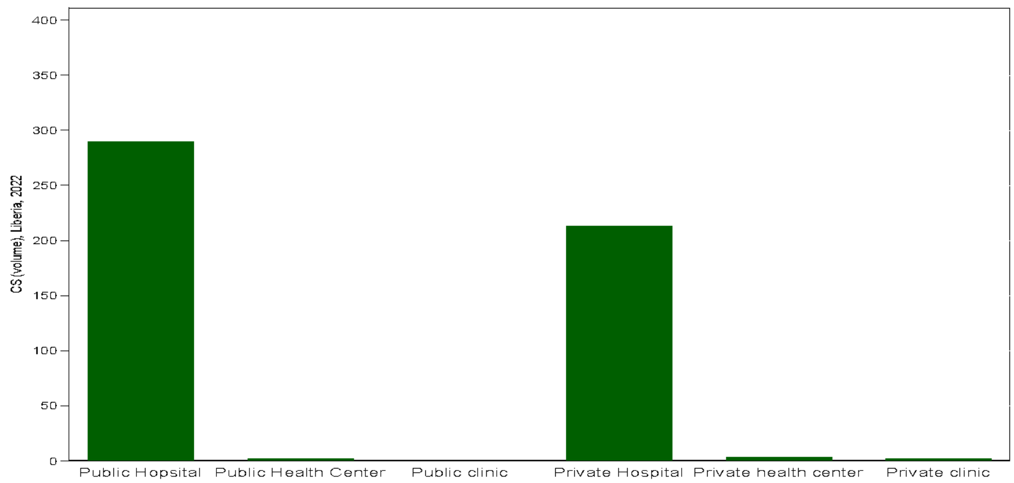
- Distribution of total births by the volume of births handled by the health facilities each year (lower bar), and the percentage of facilities by yearly birth volumes (upper bar) in 2022

Graph showing the distribution of births by volume of births across health facilities:



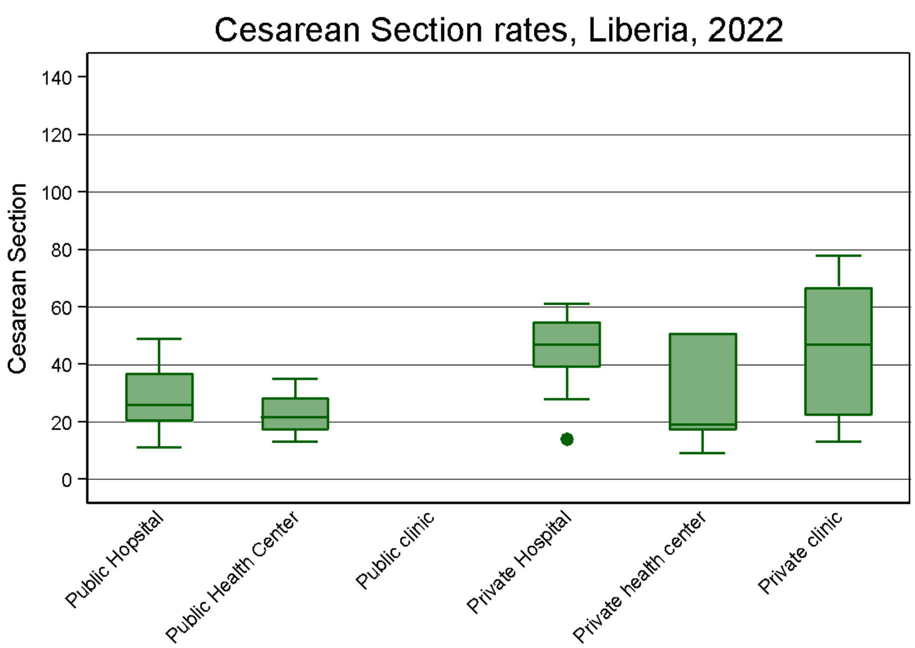
Some low volume facilities are delivering high births than high volume facilities for example 10% of the low volume facilities is catering up to 32.9% of deliveries while 21.6% of high-volume facilities is rendering 2.8% of birth delivery services.

Graph Showing: C-section volumes by facility ownership (and type):



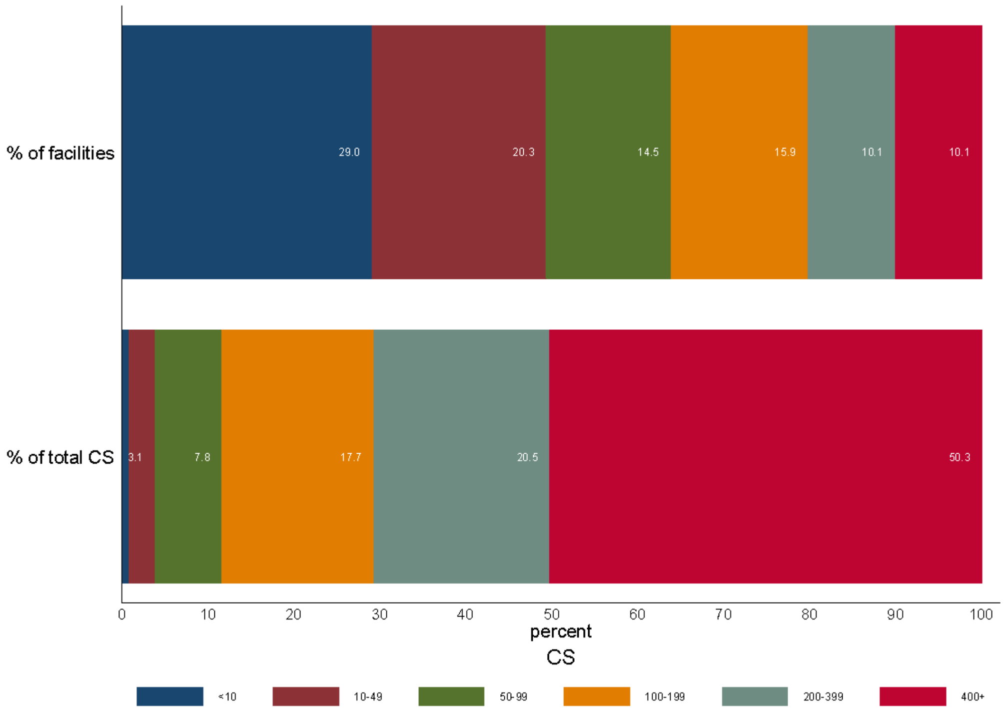
Both private and public hospitals in Liberia accounts for the highest number of C-section conducted for the period under review followed by Health centers and clinic. Public hospital conducted the highest volume C-section (290) followed by private hospitals (250). On the other hand, private health centers and clinics conducted more C-section than public health centers and clinics.

Graph Showing yearly Facility C-section rates (per 100 livebirths) by facility type & ownership (public/private)



In general, private health facilities conduct more C-section than public Health Facilities. For example, private hospitals perform more than 40% of C-section than the public hospitals. While Public health centers provides more C-section than private health centers. Moreover, private clinics perform C-section than public hospital and Health centers combined.

- Distribution of C-sections by 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:



For C-Section low volume facilities are conduction huge volume C-sections while some high-volume facilities are catering small number of C-sections. For Example: 29% of high-volume facilities are conduction Less than 1% C-Sections while 10.1% of low volume facilities catering to 50.3%.