National and subnational coverage and other service statistics for reproductive, maternal, newborn and child health from health facility data and surveys

SIERRA LEONE

Brief synthesis of the analyses

Countdown to 2030 / GFF / UNICEF / WHO workshop,

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Background

This synthesis describes the data, methods, and results of an analysis of the health facility data for selected indicators of reproductive, maternal, newborn and child health, supported by survey analyses and health system data where available. It focuses on national and subnational (regions and districts) administrative units in countries. In addition, it provides comparative analysis among the four Mano River Union countries – Cote d'Ivoire, Guinea, Liberia, and Sierra Leone. The set of indicators is limited but can easily be expanded using similar methods into for instance family planning, adolescent health, and nutrition.

The aim of the analyses is to inform national and global reviews of progress and performance of the national plan and strategy for RMNCH. From the health facility data (kept in DHIS2 software which is the national health data repository in Sierra Leone) a clean data set is created for the endline review. This is done through a systematic approach, with ample attention for facility data quality assessment and adjustment, denominator selection, joint assessment of surveys and facility results and consideration of possible other biases.

This report has the following sections:

1. Description of the data sets
2. Data quality assessment and adjustment
3. Denominators or target populations
4. Facility data derived coverage trends and inequalities
5. Survey coverage trends and equity
6. Private sector bias

1. Description of the data sets

Sierra Leone is located on the West Coast of Africa, between latitude 8 30^0 north and longitude 11 – 30^0 west and is bounded on the North and East by Guinea, on the South-East by Liberia, and on the South-West by the Atlantic Ocean. Sierra Leone covers a total area of 71,740 km^2 (27,699 sq. ml) with a coastline of 402 km and has a 2022 projected population of 8,494,260 with 59% rural dwellers.

Sierra Leone has five regions (Northern, North-west, Western, Eastern and Southern) and 16 districts (Bo, Bombali, Bonthe, Falaba, Kailahun, Kambia , Karene, Kenema, Koinadugu, Kono, Moyamba, Port Loko, Pujehun, Tonkolili, Western Area Rural and Western Area Urban) (Figure 1). Sierra Leone has 1,414 health facilities identified in the DHIS2 database.

Figure 1: Map of Sierra Leone showing 16 districts

The team extracted health facility data from the DHIS2 by districts and by month from January 2017 to December 2021 on 26 May 2022 prior to arrival to the countdown workshop. We analyzed 16 RMNCH indicators from the extracted health facility data (Table 1) using pre-written STATA codes. In addition, we used three most recent population-based health surveys namely Multi-Indicator Cluster Survey (MICS) 2017, Demographic Health Survey (DHS) 2019, and Malaria Indicator Survey (MIS) 2021 to assess data quality of the denominators for health facility-derived coverages and to compare coverages from health facility-derived and surveys (Table 2). However, there was no data on health professionals and hospital beds at the time of data analysis.

Table 1: Health facility data summary

Indicator	
Administrative organization	
Number of regions	5
Number of districts	16
Health facilities	
Number of health facilities in country	1414
Data on core health professionals	No
Data on hospital beds	No
Facility data analysis period	
First month and year with health facility data	January 2017
Last month and year with health facility data	December 2021
Indicators with facility data for the analysis	**Has data**
Antenatal care first visit	Yes
Antenatal care 4th visit	Yes
IPT 2nd dose (malaria)	Yes
Institutional delivery or skilled birth attendant	Yes
Caesarean Section	Yes
Postnatal care	Yes
Family planning new and revisits	Yes
BCG vaccination	Yes
Pentavalent / DPT first dose	Yes
Pentavalent / DPT third dose	Yes
Measles vaccination	Yes
Stillbirths (fresh / macerated)	Yes
Maternal deaths in health facilities	Yes
OPD visits children under 5 years	Yes
IPD admissions children under 5 years	Yes
Under 5 deaths in health facilities	Yes

Population-based surveys (3 most recent health surveys)

Name of survey	Year
Multi-Indicator Cluster Survey (MICS)	2017
Demographic Health Survey (DHS)	2019
Malaria Indicator Survey (MIS)	2021

Population projection data in DHIS2

Indicator	Year
Total population for every year	Yes
Live births for every year	Yes
Population under 1 year for every year	Yes

2. Data quality assessment and adjustments

From the analysis for data quality assessment, the completeness of monthly facility reporting remained at 100% from 2017 to 2021 for the six indicators - Family Planning (FP), Antenatal care (ANC), Delivery, Vaccination and OPD visits except for IPD admissions which is 94% (figure 2), the percentage of expected monthly facility report (national mean) was 100% from 2017 to 2021 which is above the reporting threshold of 90%.

Due to high reporting rate, the factor k for adjustment was 1 as all facilities that provided services reported. With regards to extreme outliners, table 2 showed the national mean for extreme outliners was above the target 95% throughout the years. However, percentage of districts with no extreme outliners in 2020 and 2021 were 92% and 82% respectively which is below the 95% target.

Furthermore, using ANC1 indicator, the annual consistency of data reporting revealed that significant outliers were identified in Kailahun district, and to a lesser extent in Bonthe district. The consistency for other districts were within the normal range (Figure 3). After adjustments, the graphs in Figure 4 showed corrected ANC1 consistency for Kailahun and Bonthe districts.

There was a strong correlation in the adjusted numbers for ANC1, Penta 1 and Penta3 which maybe suggestive of good data consistency as shown in figure 5. The correlation was strongest between Penta 1 and Penta 3. However, the analysis reported a declining overall annual data quality score (mean indicator) with a score of 93% in 2017, 95% in 2018 which reduced to 57% in 2021 (Table 2).

Figure 2: Percentage of districts with low reporting rate by service and by year, Sierra Leone

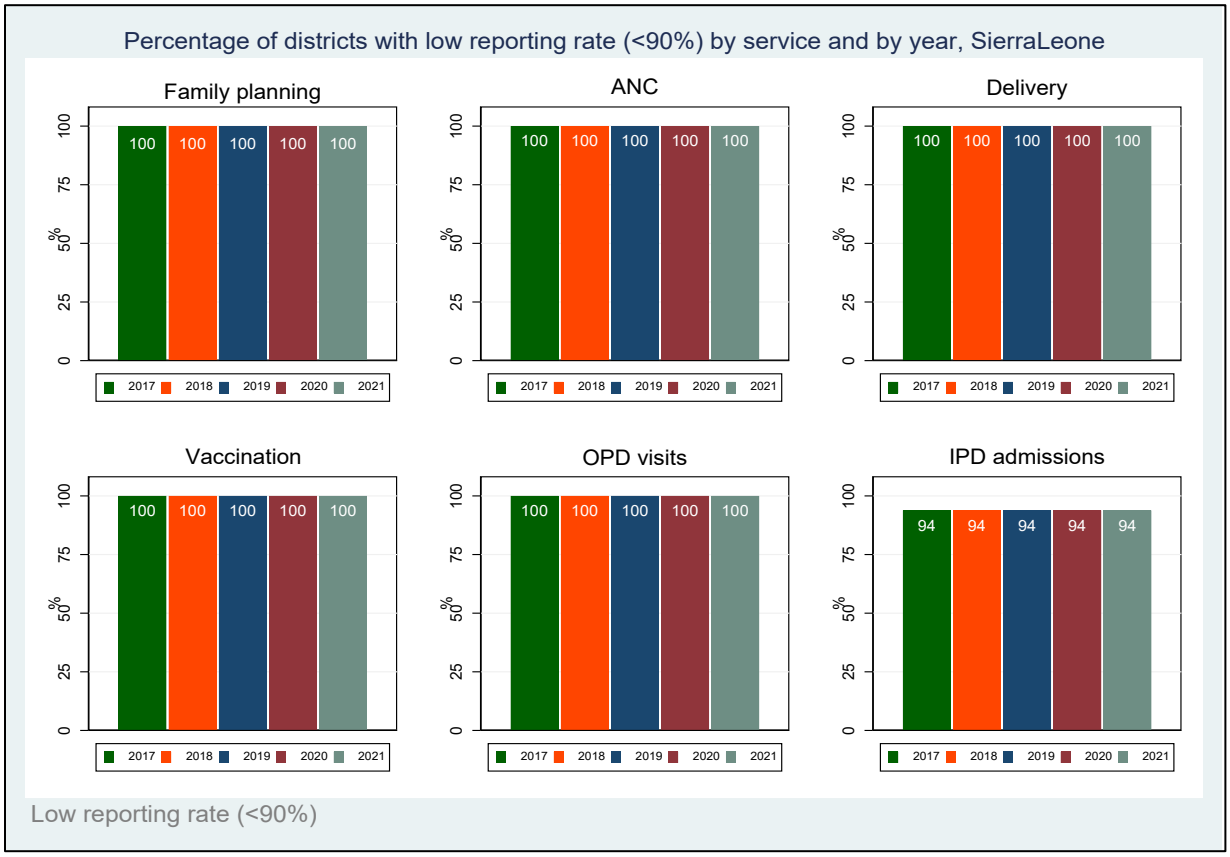
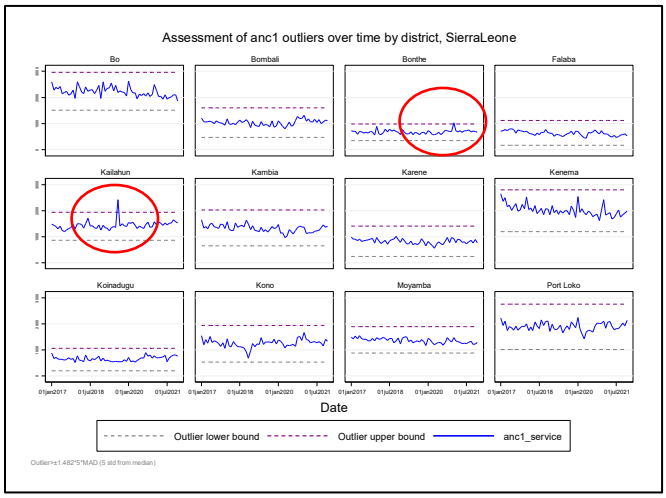


Table 2: Data quality score card for national and subnational levels, 2017-2021

	2017	2018	2019	2020	2021
Completeness of monthly facility reporting (green>90%)					
% of expected monthly facility reports (mean, national)	100	100	100	100	100
% of districts with completeness of facility reporting >=90%					0
% of facilities with no missing monthly values in the year	100	100	100	100	100
Extreme outliners (green>95%)					
% of monthly values that are not extreme outliners (mean, national)	100	100	100	99	95
% of districts with no extreme outliners in the year	98	99	97	92	81
Consistency of annual reporting (green>85%)					
Ratio ANC1 - penta1 numbers (national)	1.06	1.08	1.00	1.01	0.98
% of districts with ANC1 - penta1 ratio between 1.0 and 1.5	69	75	56	56	44
Ratio penta1 - penta3 numbers (national)	1.06	1.04	1.00	1.02	1.02
% of districts with penta1 - penta3 ratio between 1.0 and 1.5	100	100	56	75	75
Annual data quality score (mean indicator 1a to 3b)	93	95	82	84	57

Figure 3: Assessment of ANC1 outliners over time by districts, Sierra Leone



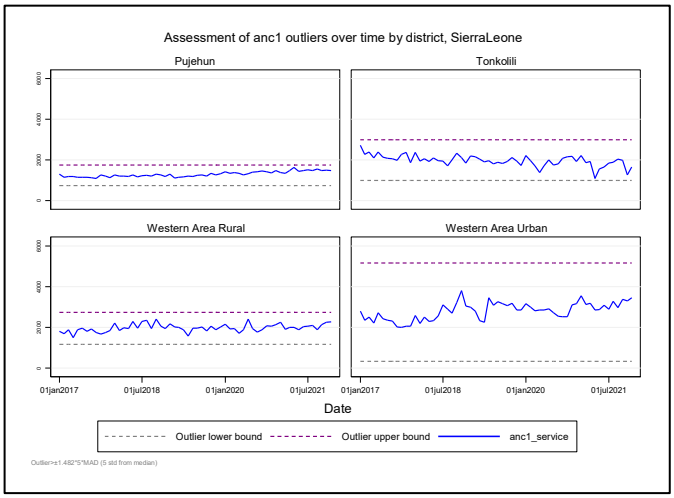
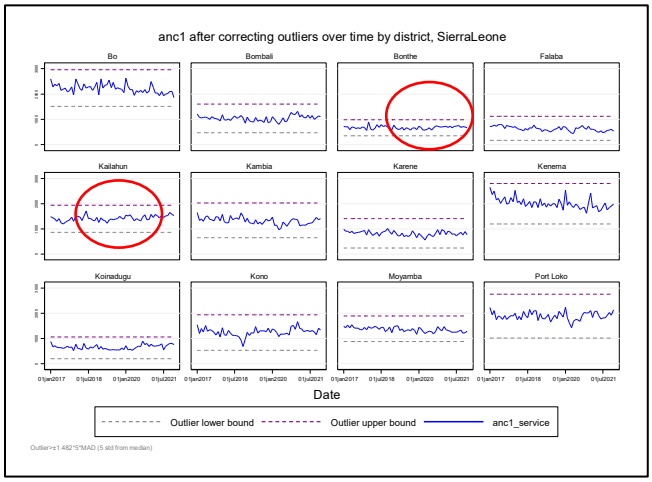


Figure 4: ANC1 after correcting outliners over time by districts, Sierra Leone



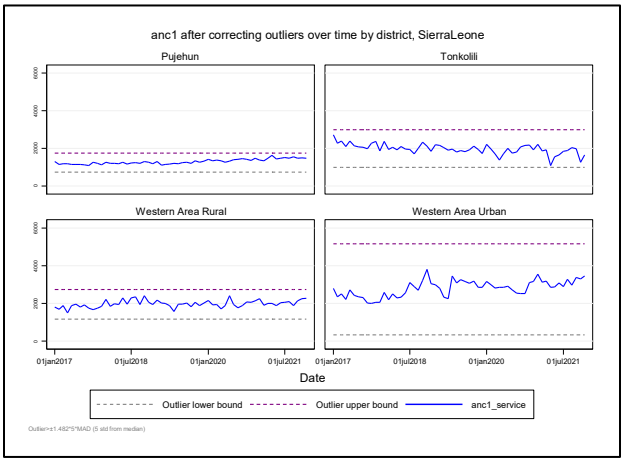
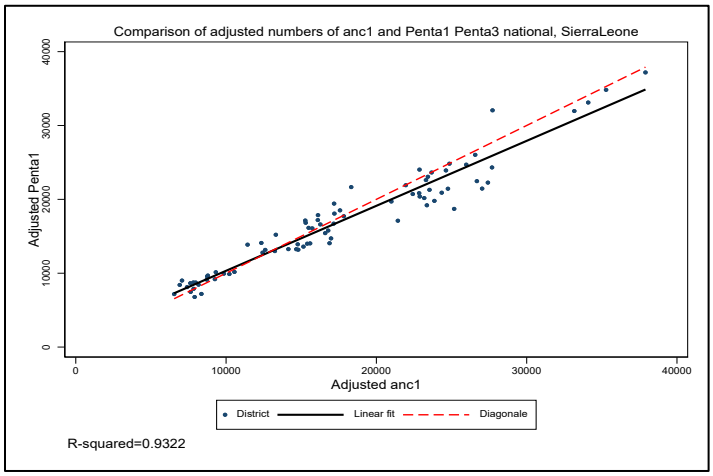
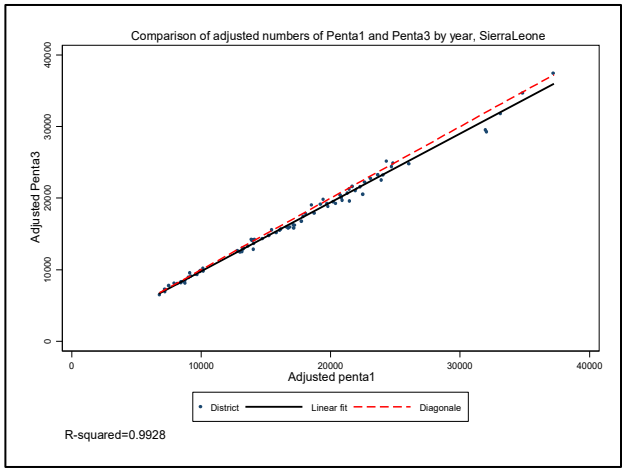


Figure 5: Comparison of adjustment for ANC1 vs Penta 1 and Penta 1 vs Penta3 by year, Sierra Leone





3. Denominators or target populations

To calculate the coverages of various interventions, we assessed the denominators by comparing the population projections in the DHIS2 to the UN estimates for total populations and population sub-groups. The total population in both DHIS2 and UN estimates are strongly correlated (Figure 6). However, the population projections for under one year and under 5 were higher in DHIS2 than those of the UN estimates. Conversely, in DHIS2, the population for live births and women 15 – 49 years were lower than those in UN estimates.

Population of live births is important denominator in the analysis of RMNCH interventions. The ratio of DHIS2 to UN estimates was 83.2% in 2017 and remained 83% in 2022. This value buttressed the lower population for live births in DHIS2 (Figure 7). Similar population ratio trends between DHIS2 and UN estimates across the regions were observed in Figure 7.

Figure 6: Comparison of populations in DHIS2 vs UN estimates

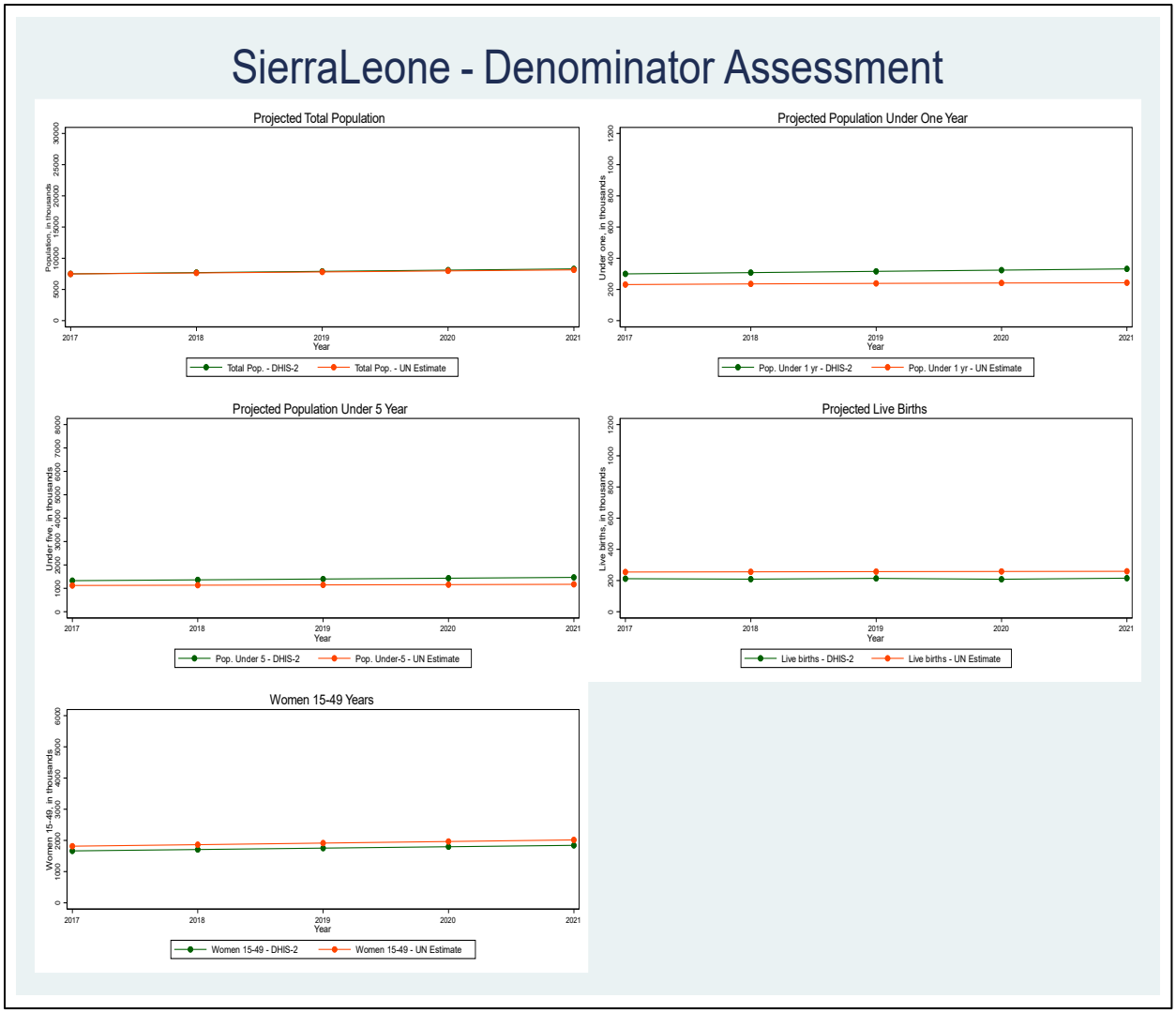
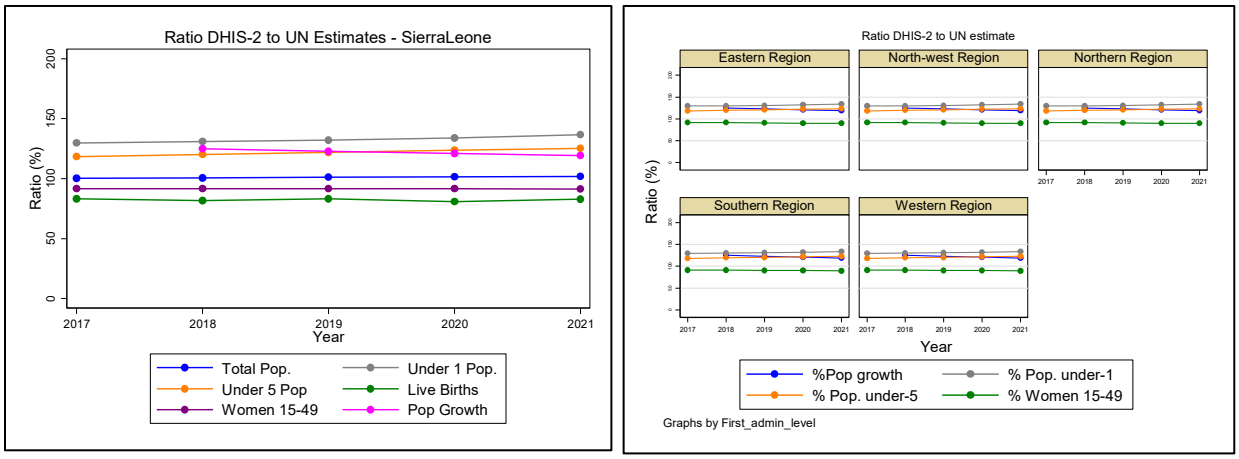


Figure 7: Comparison of ratio for populations in DHIS2 vs UN estimates



4. Facility data derived coverage trends and equity

Using the DHIS2 population projections, the coverages for ANC1, Penta-1 and BCG were above 100% which is not obtainable. Similar more than 100% coverages were reported for ANC1, Penta-1 and BCG across the regions (Figure 8).

However, correcting for the denominators using the ANC-1 derived population from DHS 2019, with exception of penta-1, penta-3 and measles coverages which were above 100% in 2019, 2020 and 2021, the coverages of other RMNCH interventions were within realistic range of below 100% (Figure 9). Therefore, this implies that ANC-1 derived denominator from DHIS2 is high.

Further analysis using the penta-1 denominators from the DHS 2019 revealed that all coverages for ANC-1, BCG, penta-3, measles, institutional deliveries, and IPTp-2 were below 100%. Hence, these coverages were more realistic for RMNCH program monitoring and decision-making. Coverages of most services have increased steadily from 2017. However, a drop in coverages was observed in 2020 which maybe attributed to the impact of the COVID-19 pandemic on RMNCH service utilization.

Figure 8: Coverages of ANC-1, Penta-1 and BCG using DHIS-2 population projections

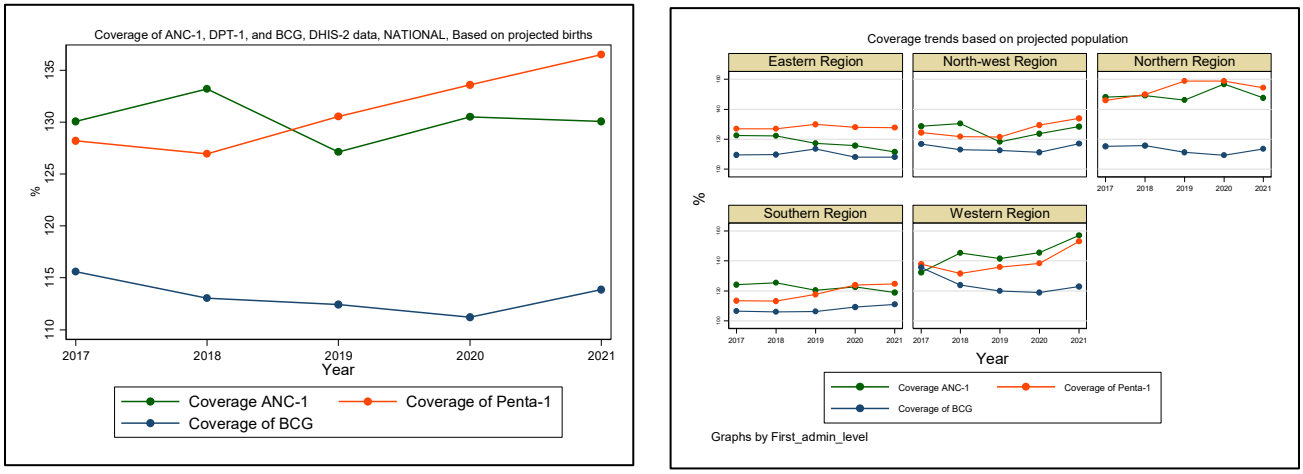


Figure 9: Coverages of BCG, Penta-1, Penta-3, Measles, ANC-4, Institutional Deliveries, and IPTp-2 using ANC-1 derived denominators

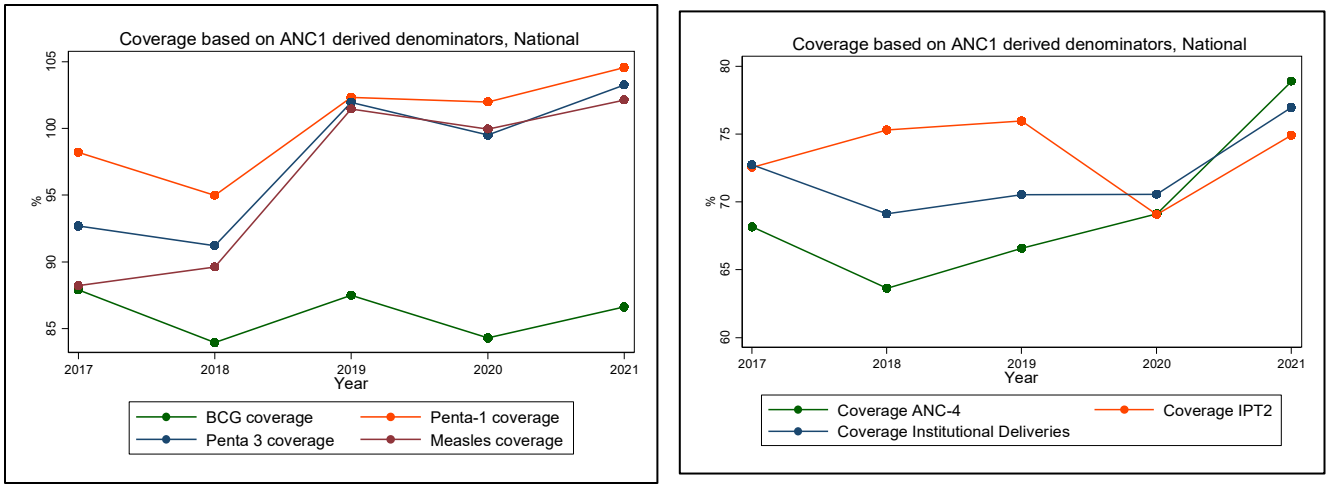
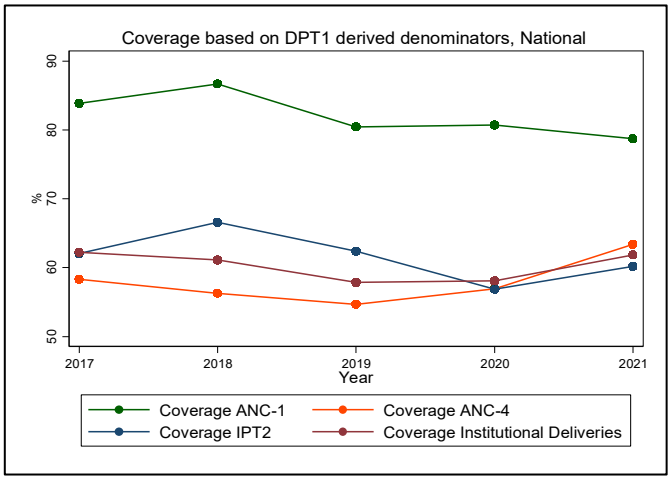
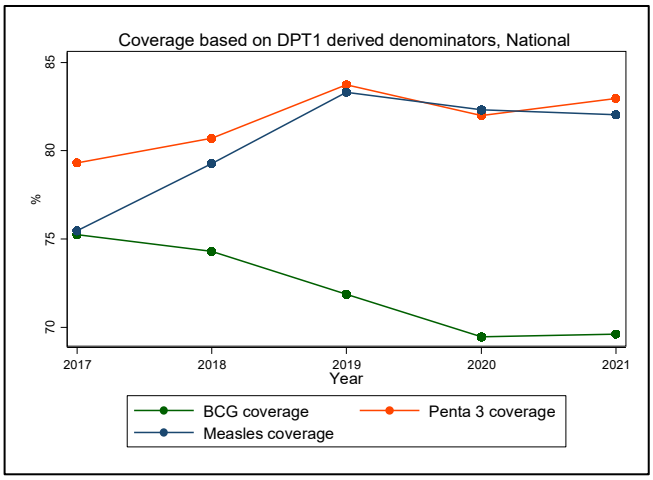


Figure 10: Coverages of BCG, ANC-1, Penta-3, Measles, ANC-4, Institutional Deliveries, and IPTp-2 using ANC-1 derived denominators





5. Survey coverage trends and equity

To better understand the level of survey coverage trends and equity across the regions in Sierra Leone, the composite coverage indexes (CCI) were calculated from coverages of selected RMNCH indicators using the formula. DHS 2019 household survey was used to compute the CCI by regions. We used Equiplot Creator Tool to visualize the equity pattern. The wide the length, the more the inequity issues for RMNCH interventions.

$$CCI = {}^{1}/_{4}\left(DFPSm + \frac{ANC4 + SBA}{2} + \frac{BCG + 2DPT3 + MSL}{4} + \frac{ORS + CPNM}{2}\right)$$

The composite coverage index (CCI) is highest with a value of 78.7 in the Eastern region and lowest in the north-western (71.1) and western regions (74.5) (Figure 11). Figure 12 showed the CCI equity by regions for selected RMNCH indicators. Based on the findings, this calls for prioritization of RMNCAH interventions in the North-western and Western regions to improve on national CCI index and to address the inequities.

Furthermore, another analysis was done to assess the inequalities in RMNCH interventions across regions by calculating the differences and the ratios between extremes of coverages. Using the survey coverages for selected RMNCH interventions in DHS 2019, the findings revealed that ANC4 has the highest inequality followed by Skilled Birth Attendance. BCG service has the lowest inequality (Figure 13).

Additional analysis was performed to compare the level of inequity for selected RMNCH interventions across the Mano River Union countries (Cote d'Ivoire, Guinea, Liberia, and Sierra Leone) using the most recent population-based surveys. Sierra Leone seems to have the highest CCI coverage among the MRU countries, followed by Liberia. Inequity also seems to be lower in the other two countries (Figure 14). A closer look at the ANC-4 coverage, the coverage and equity pattern for ANC-4 was somewhat like that of CCI. However, Liberia seems to have lower inequity than Sierra Leone. ANC-4 coverage inequities were highest in Guinea and Cote d'Ivoire (Figure 15).

We assessed the inequalities in selected RMNCH interventions using the sum of differences and ratios between the extremes of coverages for the Mano River Union countries. Using the sum of differences, inequalities for CCI were highest in Guinea. Inequalities for ANC-4 were highest in Cote d'Ivoire followed by Guinea. Whilst for pneumonia treatment, inequities were highest in Guinea followed by Sierra Leone (Figure 16). Using the sum of ratios, figure 17 showed that Guinea has the highest inequity for all indicators analyzed.

Figure 11: Assessment of CCI by Regions in Sierra Leone

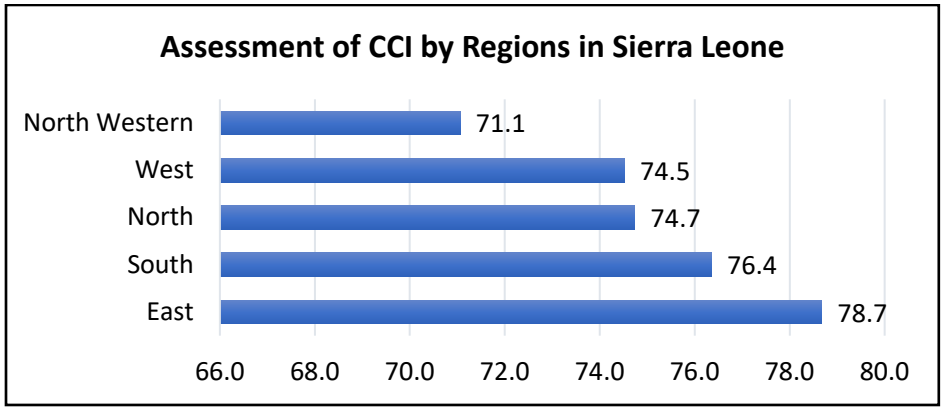


Figure 12: Composite Coverage Index (CCI) equity by regions in Sierra Leone using Equiplot Creator Tool

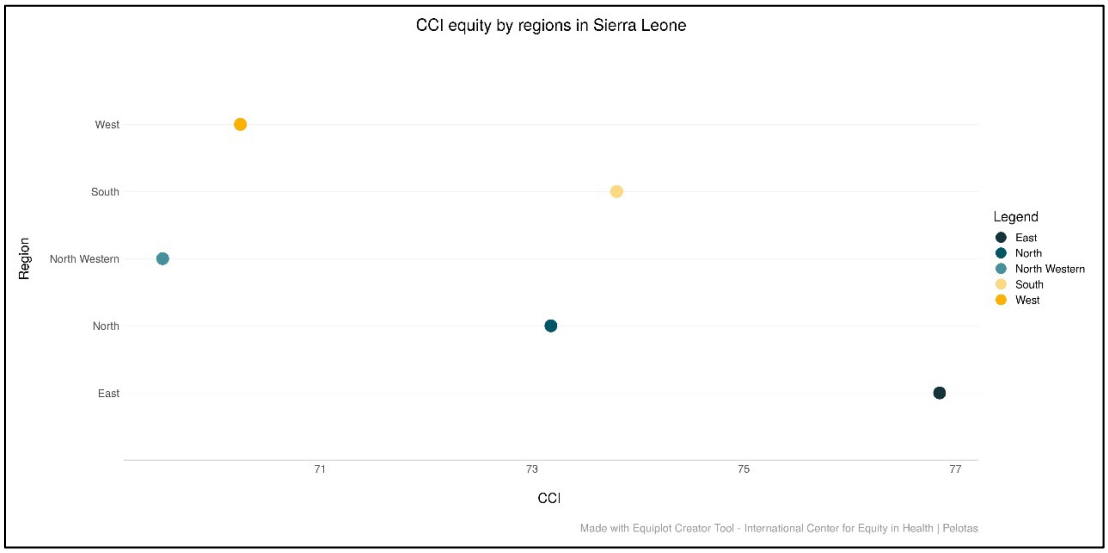


Figure 13: Coverage Inequalities for selected RMNCH interventions in Sierra Leone

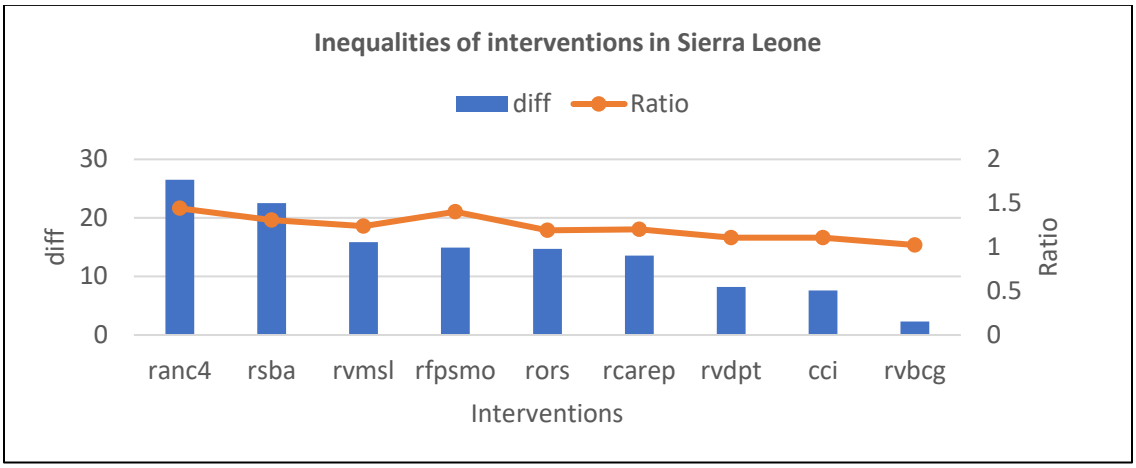


Figure 14: CCI equity by Mano River Union countries using Equiplot Creator Tool

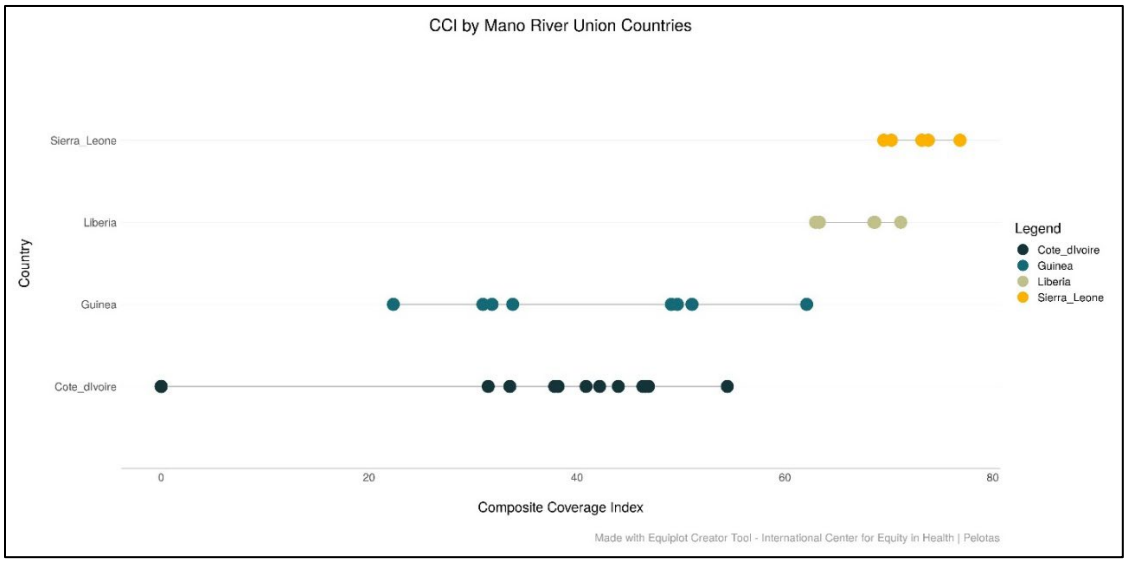


Figure 16: ANC-4 equity by Mano River Union countries using Equiplot Creator Tool

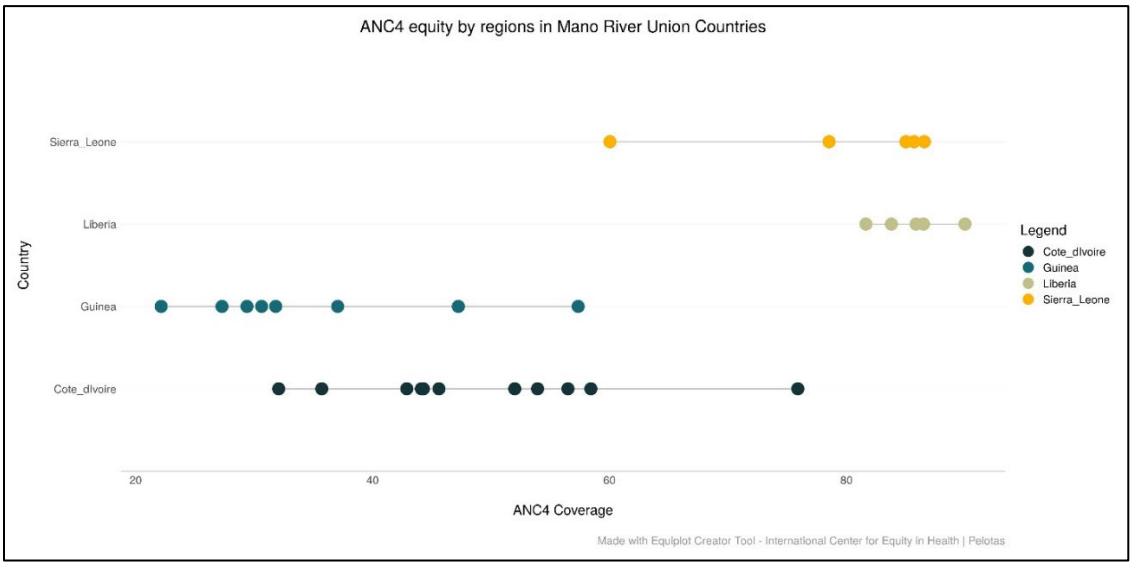


Figure 16: Coverage Inequalities for selected RMNCH interventions among Mano River Union Countries using sum of differences

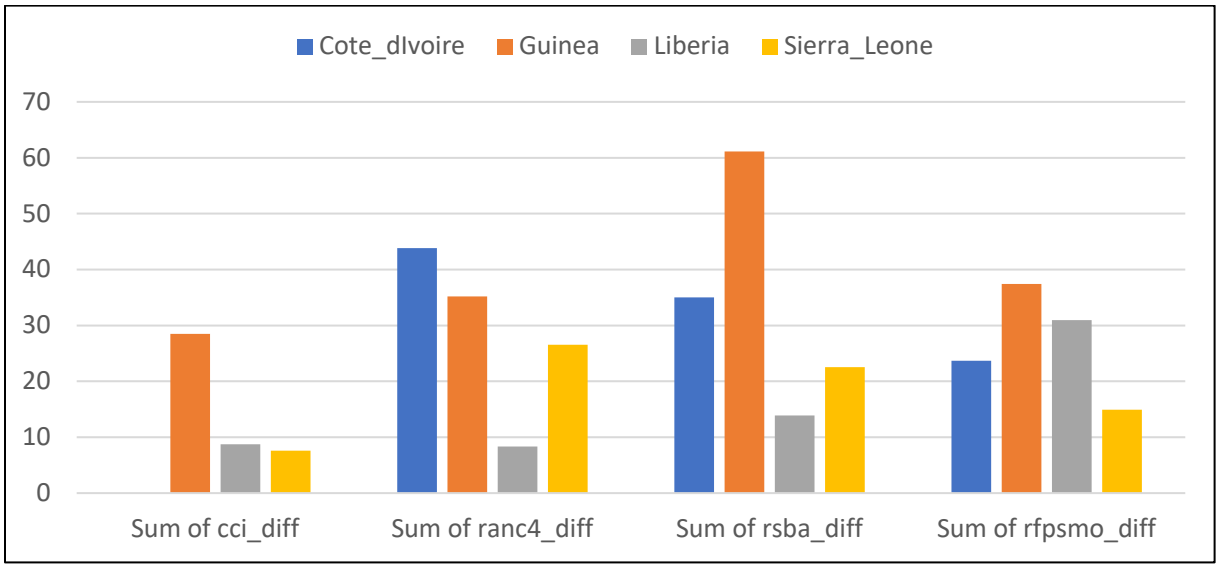
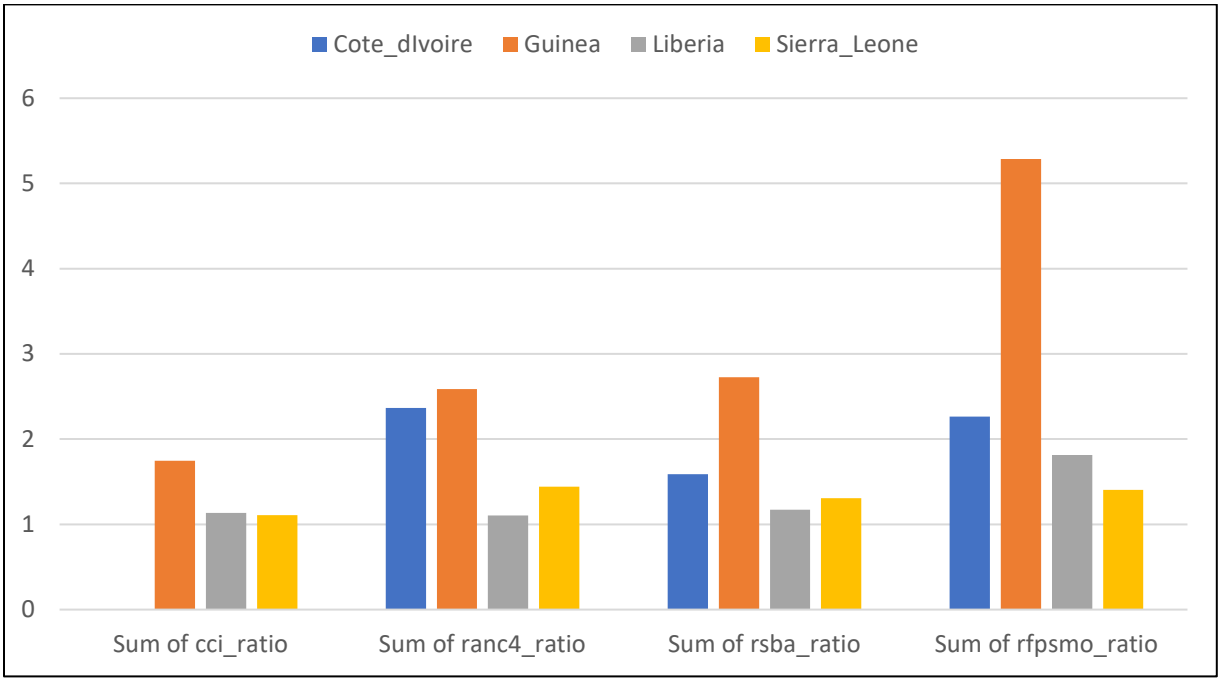


Figure 17: Coverage Inequalities for selected RMNCH interventions among Mano River Union Countries using sum of ratios



6. Private sector bias in health facility reporting

According to national guidelines on health facility reporting, all health facilities should submit the health monthly summary reports before the 5th of every month to the districts and the districts should enter all submitted health monthly summary reports into the DHIS2 before the 15th of every month.

Nation wide, 13% of the Health Facilities in Sierra Leone are private. The proportion of Private health facilities is highest in Western Area Urban (70%). Compliance to national reporting by private health facilities is much higher in the district compared to the Western Area Urban which has the highest proportion of private health facilities (Figure 18). Health facility data extracted for this purpose showed under-reporting for private health facilities.

Figure 18: Distribution of private and public health facilities by districts in Sierra Leone