RWANDA

Analysis of reproductive, maternal, newborn, child and adolescent health indicators

2019-2023

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General Introduction

This Chartbook summarizes the results for key indicators of reproductive, maternal, newborn, child and adolescent health (RMNCAH) that were produced by the country team at a Countdown analysis workshop in Kigali, April 22-26, 2024. The analysis is based on routine district health facility data for 2019-2023, recent national surveys, health system data and global estimates, much attention is paid to data quality.

This Chartbook describes and interprets the results, which should be a critical input for the monitoring of country RMNCAH and health sector plans .

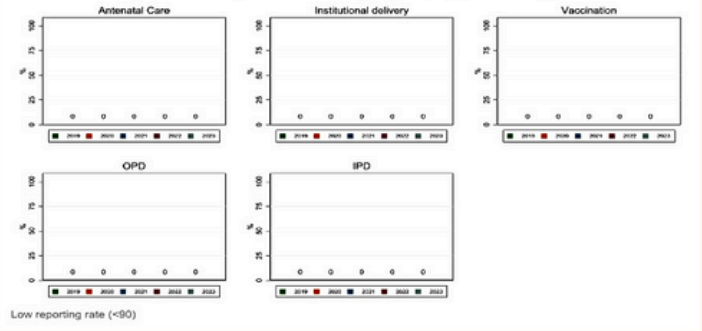
For each of the sections there are selected graphs and tables on key indicators with interpretations made by the country team during the workshop.

1 Facility data quality assessment: numerators 1

Table 1: Summary of reported health facility data quality, DHIS2, 2019-2023

	Data quality metrics	2019	2020	2021	2022	2023
1	**Completeness of monthly facility reporting (mean of ANC, delivery, immunization, OPD)**					
1a	% of expected monthly facility reports (national)	100	100	100	100	100
1b	% of districts with completeness of facility reporting >= 90%	100	100	100	100	100
1c	% of districts with no missing values for the 4 forms	87	93	93	93	93
2	**Extreme outliers (mean of ANC, delivery, immunization, OPD)**					
2a	% of monthly values that are not extreme outliers (national)	98	99	99	99	99
2b	% of districts with no extreme outliers in the year	92	97	97	96	95
3	**Consistency of annual reporting**					
3a	ANC1 to penta1 ratio in the reported data (national)	1.06	1.12	1.15	1.09	1.08
3b	Penta1 to penta3 ratio in the reported data (national)	1.02	1.00	1.02	1.03	0.99
3c	% of districts with ANC1-penta1 ratio in expected range	87	97	97	87	83
3d	% of districts with penta1-penta3 ratio in expected range	80	53	93	93	33
4	**Annual data quality score (mean 1a, 1b, 2a,2b, 3c,3d)**	93	91	98	96	85

Figure 1a - Percentage of districts with low reporting rate (<90) by service and by year



BACKGROUND: Routinely reported health facility data are an important data source for health indicators. The data are reported by health facilities on events such as immunizations given, or live births attended. As with any data, quality is an issue. Data are checked to consider completeness of reporting by health facilities, identify extreme outliers and internal consistency.

Interpretations

- Between 2019 and 2023, **all (100%)** anticipated **monthly reports from health facilities** regarding ANC, deliveries, immunizations, and OPD **were consistently submitted** at the national level implying it is going in the right direction (see figure 1a).
- There was also **complete health facility reporting at the district level (100%),** although there were slight disparities of no missing values for the 4 forms; 2019 was lowest at 87.4% while all the remaining years were 92.9%. Though this is on the right track more effort is required to reduce missing values using the four forms.
- More than **98% of national monthly values showed no significant outliers** across the timeframe (2019 to 2023). The proportion of districts with no outliers was highest in 2020 and 2021 at 96.6% and lowest in 2019 (91.7%).
- We compared the consistency of ANC 1 to Penta 1 in health facility data, given that these services are closely linked. The ANC1 and Penta 1 ratio at national level fell within the expected range of 1.06 to 1.15. A similarly steady ratio was observed for Penta1 to Penta3 at national level, ranging from 0.99 to 1.03. **This indicators good consistency of annual reporting at national level.**
- Regarding the consistency of annual reporting at district level, the percentage of districts with ANC1 to Penta1 ratio was relatively high across the timeframe (at 97% in 2020 and 2021 and down to 83% in 2023). The percentage of districts with a penta1-penta3 ratio was notably low in 2023 (33%) and 2020 (53%), but much higher in 2021 and 2022, reaching 93%. The discrepancy in the penta1-penta3 ratio could be **attributed to a shift from paper-based to electronic reporting.**

1 Facility data quality assessment: numerators 2

Figure 1b: Ratio of number of facility reported ANC1 to penta1, and penta1 to penta3, compared to expected ratios

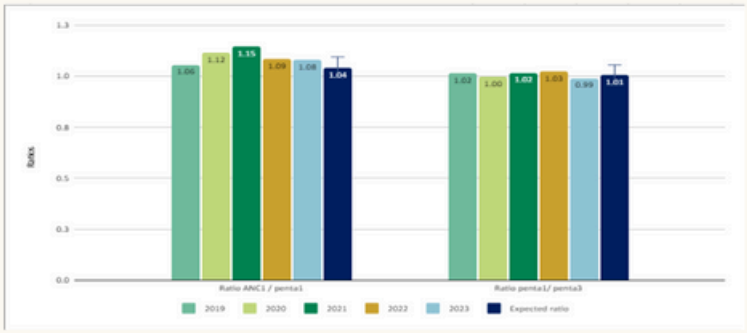
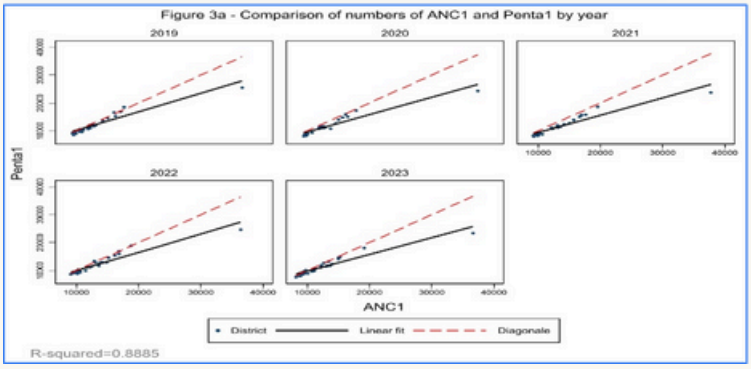


Figure 1c: Comparison of numbers of ANC1 and penta1 reported by health facility, by year



BACKGROUND: Routinely reported health facility data are an important data source for health indicators. The data are reported by health facilities on events such as immunizations given, or live births attended. As with any data, quality is an issue. Data are checked to consider completeness of reporting by health facilities, identify extreme outliers and internal consistency.

Interpretations

- Figure 1b further illustrates the consistency of annual reports at the national level. A substantial portion of the ANC1 to Penta1 ratio remained consistently within the range of 1.06 to 1.15, **indicating a high level of stability with expected ratio of 1.04.** Similarly, a **nearly constant ratio was observed for Penta1 to Penta3**, ranging from 0.99 to 1.03 (expected ratio of 1.01), suggesting **consistent trends over time at national level.**
- Figure 1c depicts a strong correlation (R-squared of 0.8885) between the number of ANC1 and Penta1 across the years, with almost all districts on or above the linear fit line. There is one district below the fit line, however, which affects the overall quality of data. This needs further investigation to identify the district.

2 Health facility data denominator assessment

Figure 2a: Annual population, DHIS2 and UN

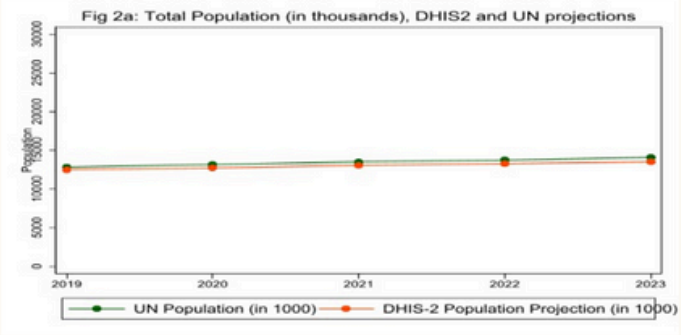
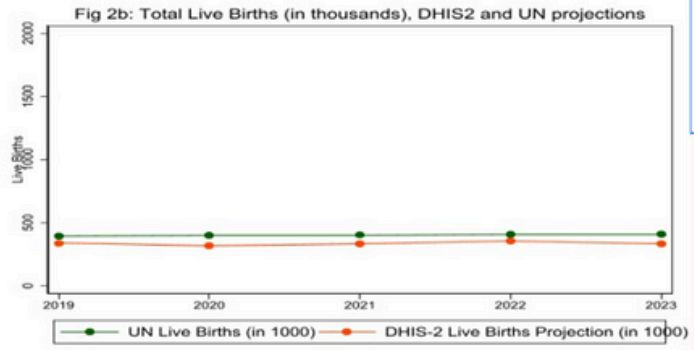


Figure 2b: Live births, DHIS2 and UN

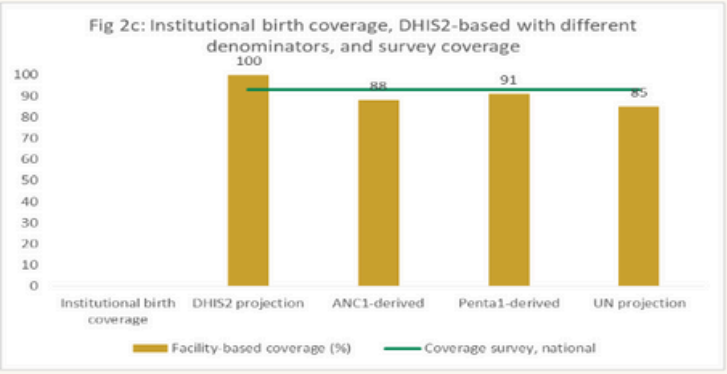


BACKGROUND: Service coverage is defined as the population who received the service divided by the population who need the services: the denominator. The quality of the population projections in DHIS2 is assessed through consistency over time and comparison with the UN projections.

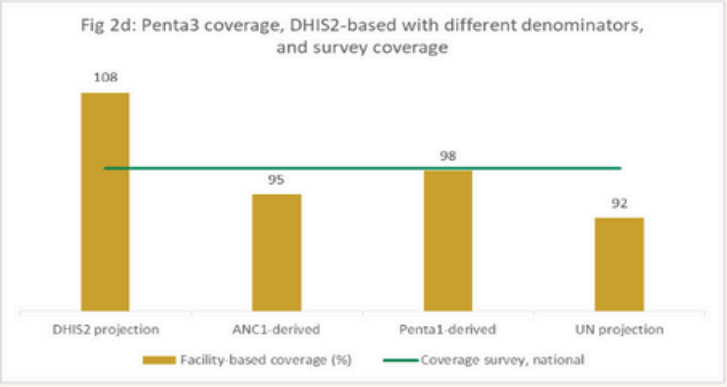
Interpretations

- The **DHIS2 total population projection is consistent over time** with regular population growth and was close with the UN population estimate.
- However, the **trend for DHIS2 total live birth projection was not consistent** across the years and there was substantial discrepancy with the UN live births projections. The differences were more significant during 2020 and 2023.
- Overall, **there was poor quality data in the years of 2020 and 2023 with regard to DHIS2 projection for live births.**

2 Health facility data denominator selection



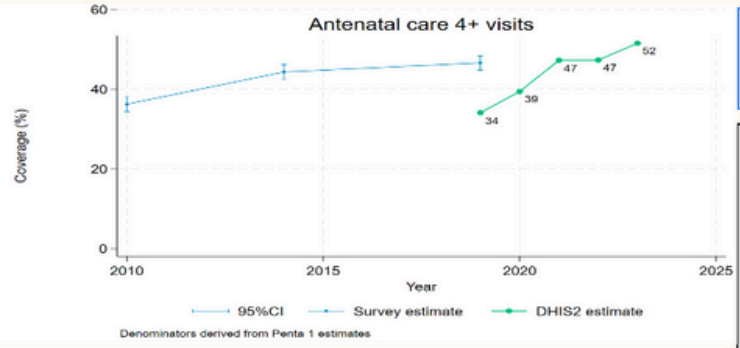
BACKGROUND: The best performing denominator for coverage analysis with facility data is selected by comparing how close the different denominator methods are to survey coverage for a nearby year. This is done at the national and subnational levels (using the median difference with the survey).

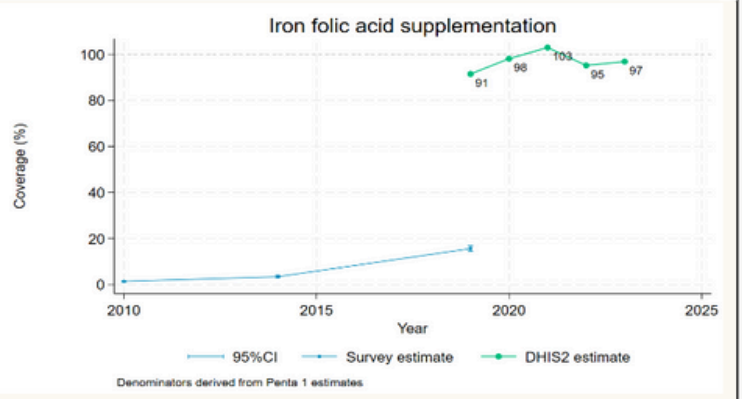


Interpretations

- Penta1 derived (as a Denominator option) performs best at the national level for the two indicators (institutional birth and Penta3 coverage) as it is found to be closer to the national coverage from the survey. Thus, **it could be used as the most reliable denominator option in coverage analysis.**
- Penta1 performed best as the denominator at the subnational level for the two indicators.

3 National coverage trends: Antenatal Care



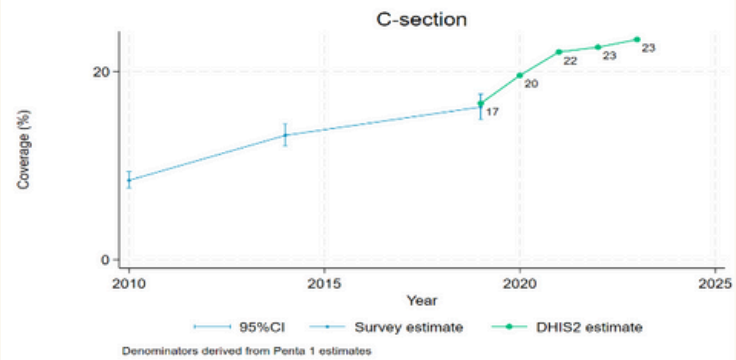


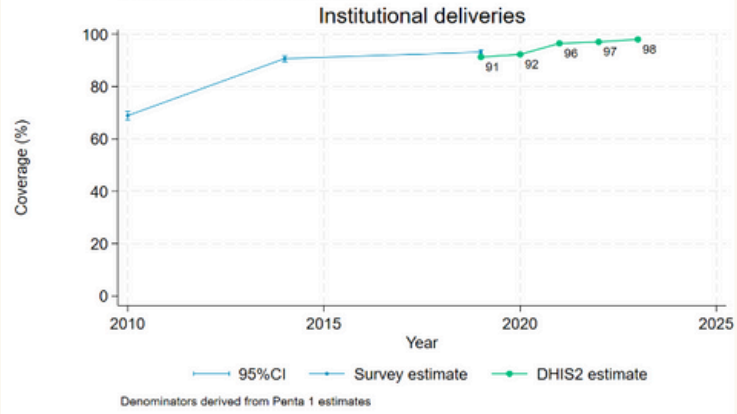
BACKGROUND: Monitoring the coverage of interventions is a critical and direct output of health systems. It is most useful if the national plan has meaningful targets. Both health facility and survey data need to be used.

Interpretations

- The DHS survey indicates that the percentage of women receiving **4 or more ANC visits (ANC4+)** was consistently below 50% (2010-2019). According to facility data, however, there was an increasing trend in this indicator, rising from 34.1% in 2019 to 52% in 2023.
- There was a difference between survey and facility data; for instance, the DHS 2019 reported ANC 4+ at 46.6% while facility data reported 34% in the same year. This **indicates a lack of consistency between the two data.**
- According to facility data, **Iron and Folic Acid supplementation** was reported at high levels, surpassing 100%, particularly in 2021, which suggests **poor data quality or potential over-reporting.**
- Additionally, there was a significant disparity between the DHS data and facility data, with coverage of 15.6% in DHS versus 91.4% in DHIS2 estimates in 2019.

3 National coverage trends: delivery care



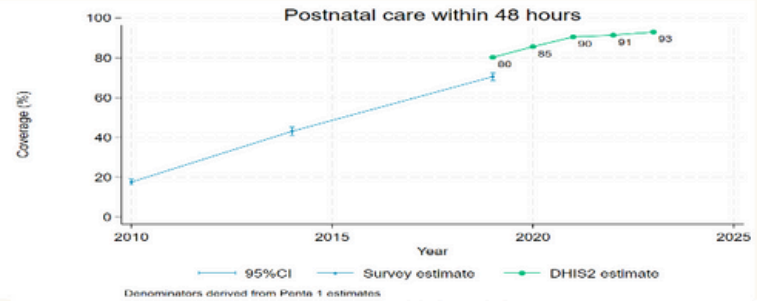


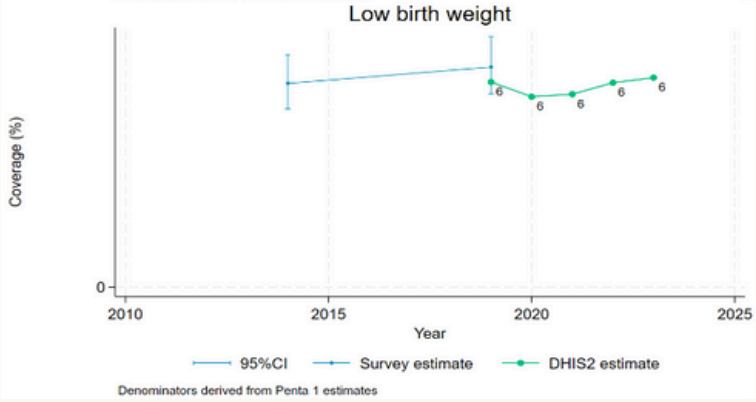
BACKGROUND: Monitoring the coverage of interventions is a critical and direct output of health systems. It is most useful if the national plan has meaningful targets. Both health facility and survey data need to be used.

Interpretations

- Both survey and facility data show a consistent increase in C-section rate with time. The **consistency between the survey and facility data regarding the rate of cesarean sections is significantly high.**
- In 2019, both sources reported similar percentages, with 16.2% from the survey and 16.6% from facility data. This **consistency suggests reliable and good-quality reporting for cesarean section rates.**
- Overall, the trend in c-section coverage increased over time, peaking at 23.4% in 2023, according to the facility data.
- Both survey and facility data showed consistently high prevalence of institutional deliveries (more than 90%). This suggests a high access to maternity facilities with a high coverage of health facilities deliveries.

3 National coverage trends: postnatal care and low birth weight



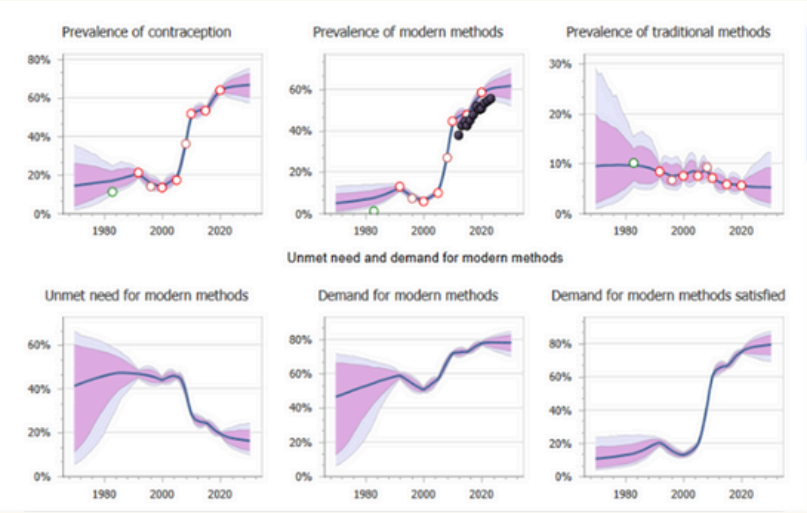


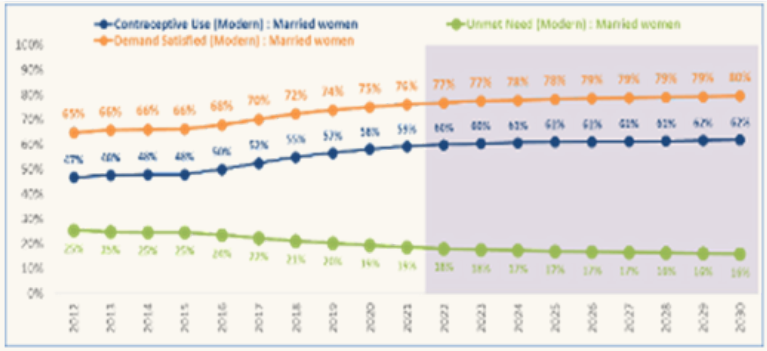
BACKGROUND: Monitoring the coverage of interventions is a critical and direct output of health systems. It is most useful if the national plan has meaningful targets. Both health facility and survey data need to be used.

Interpretations

- There was relatively **good consistency between the facility and survey data in PNC within 48 hours**. Overall, the trend increased consistently across the years.
- Similarly, the **levels and trends of low birth weight have shown good consistency** between the facility and survey data, remaining stable at around 6%.

3 National Coverage Trends-Family Planning



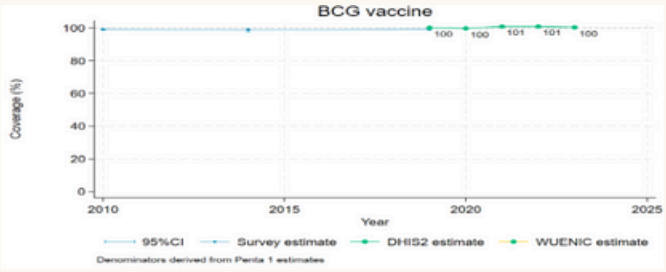


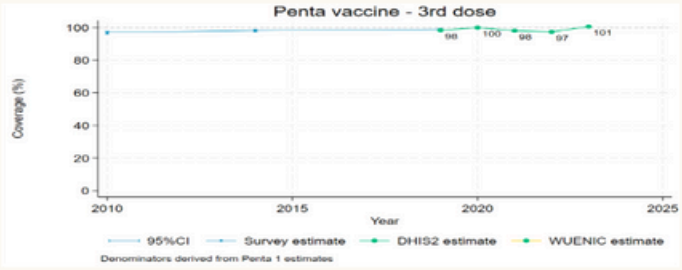
BACKGROUND: Monitoring the coverage of interventions is a critical and direct output of health systems. It is most useful if the national plan has meaningful targets. Both health facility and survey data need to be used.

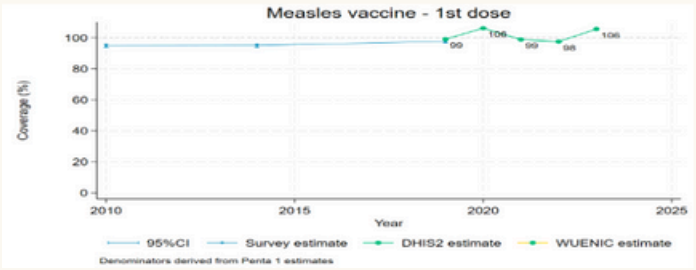
Interpretations

- The **prevalence of modern contraceptive use** has **increased significantly** over the years while the traditional methods remained constant at about 10%.
- The **proportion of unmet need for modern contraceptive has declined substantially** from approximately 40% in 2000 to approximately 20% in 2020. In parallel, the demand and satisfaction for modern contraceptives has steadily increased over the years.

3 National coverage trends: immunization





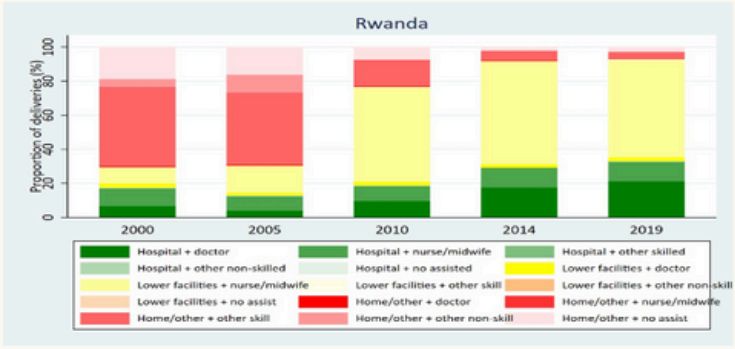


BACKGROUND: Monitoring the coverage of interventions is a critical and direct output of health systems. It is most useful if the national plan has meaningful targets. Both health facility and survey data need to be used.

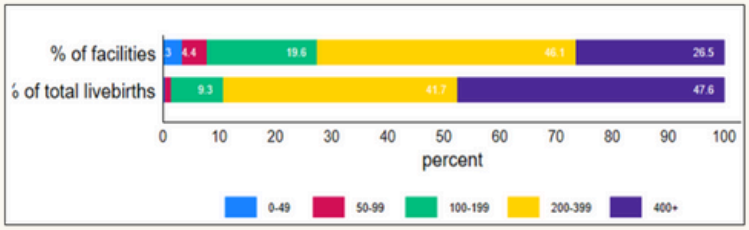
Interpretations

- The levels and trends for **BCG vaccine revealed good consistency observed between facility and survey data** all over the years.
- However, for some years, facility data indicates percentages above 100%, which raises **questions about the data quality and reliability.**
- There was **consistency in** the trends and levels observed for **Penta 3 and measles vaccines.**
- Across both survey and health facility data, immunization trends increased.

3 National coverage trends: delivery care by place and volume



Trends in place and assistant of delivery, Rwanda, 2000-2019



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), 2022

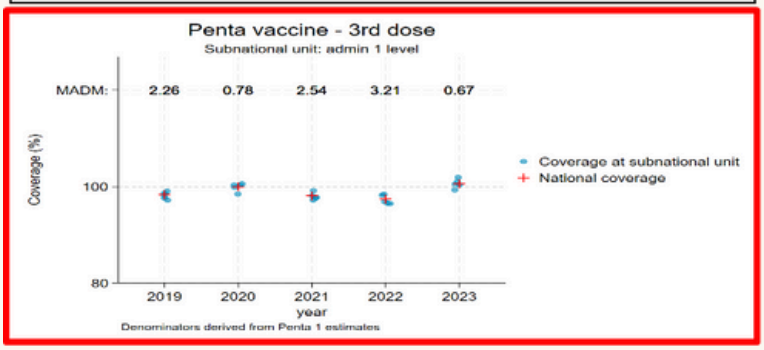
BACKGROUND: Monitoring the coverage of interventions is a critical and direct output of health systems. It is most useful if the national plan has meaningful targets. Both health facility and survey data need to be used. Data on whether deliveries increased more at hospitals or lower-level facilities and in the public or private sector can be used to inform MNH service delivery strategies in the context of the SDG 2030 targets for maternal mortality, stillbirth and neonatal mortality.

Interpretations

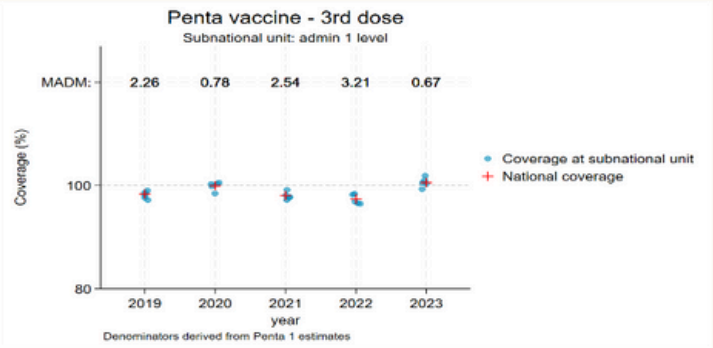
- Over time, Rwanda has decentralized the availability of services to lower levels of the health system in order to increase access.
- The **proportion of deliveries at lower facilities assisted by nurses/midwives and at hospital by a doctor increased** with time (from around 35% in 2000 to more than 80% in 2019, and around 5% in 2000 to around 20% in 2019, respectively).
- The **proportion of home deliveries consistently decreased** during the same period.
- Most health facilities (>71%) were high volume facilities (200+ live births in 2022) and accounted for 89% of live births in Rwanda. Low volume facilities (<100 live births in 2022) constituted less than 8% of facilities and accounted for 2% of all live births.

4 Equity: subnational coverage trends: delivery care and penta3 coverage by admin1 (region), 2019-2023

Trend in Institutional deliveries by Province



Trend in Penta3 coverage by Province



BACKGROUND: Monitoring the coverage of interventions is a critical and direct output of health systems. It is most useful if the national plan has meaningful targets. Both health facility and survey data need to be used.

Interpretations

- There was high consistency in the levels and trends for both institutional deliveries and Penta 3 across the years and provinces according to the national coverage using facility data.
- However, at subnational level, in some provinces the coverage of institutional deliveries and penta 3 exceeded the national coverage and 100% which could be attributed to duplicate reporting.
- Overall, the institutional delivery coverage has demonstrated that inequalities at province level have reduced over time, while disparities in Penta 3 coverage between provinces has fluctuated over time.

4 Equity: subnational coverage trends: delivery care and penta3 coverage by district, 2019-2023

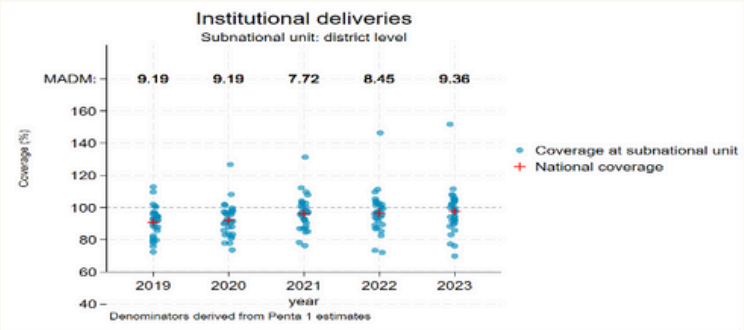
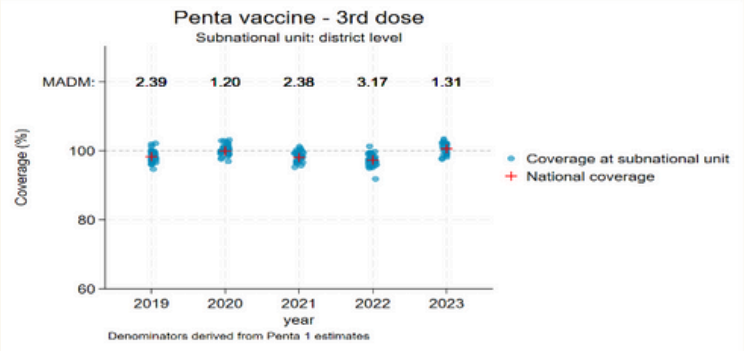


Fig4d: Penta3 coverage by district



BACKGROUND: Monitoring the coverage of interventions is a critical and direct output of health systems. It is most useful if the national plan has meaningful targets. Both health facility and survey data need to be used.

Interpretations

- Using health facility data, subnational trends are district level were also explored. The data showed **consistently high levels of coverage for Penta 3 across the years at district level**. However, the **inequalities** between districts measured by MADM **fluctuated between 2.38 and 1.20** across the years.
- Although most districts had stable institutional deliveries reporting, one district was consistently an extreme outlier, reaching more than 140%. This could be due to over reporting or duplication of reporting live births, and requires further investigation.

4 Equity- subnational coverage: assessment of percent of regions that have reached international targets

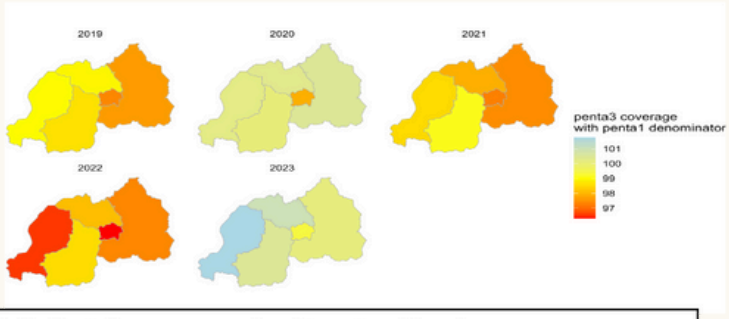


Fig4b: Penta3 coverage, regional targets achieved

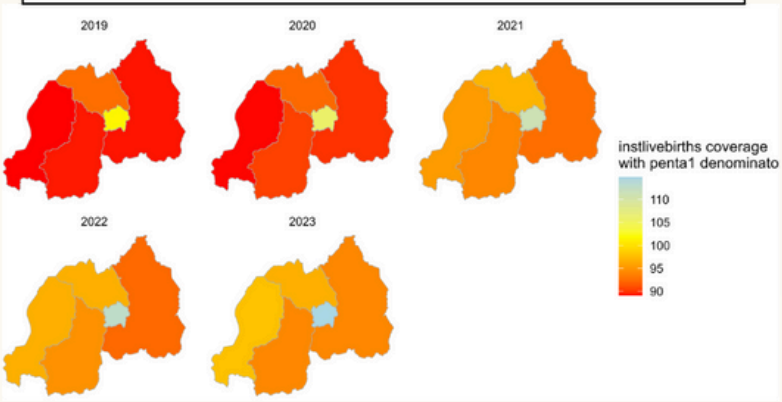


Fig 4c: Institutional deliveries, regional target achieved

BACKGROUND: Monitoring the coverage of interventions is a critical and direct output of health systems. It is most useful if the national plan has meaningful targets. Both health facility and survey data need to be used.

Interpretations

- Analysis indicates that data quality for Penta3 and institutional births for the DHIS2 appears to be good.
- Overall coverage has increased across the regions between 2019 and 2023.
- Instances where Penta3 coverage was above 100% could be explained by the shift from paper-based reporting to the digital E-tracker. This did not coincide with the full transfer/transcription of all the vaccine doses from children who have taken their previous doses during paper-based records keeping era.

4 Equity - wealth quintiles and female education from survey data

Fig 4g: Equiplot of the Composite Coverage Index (CCI) by wealth, recent surveys

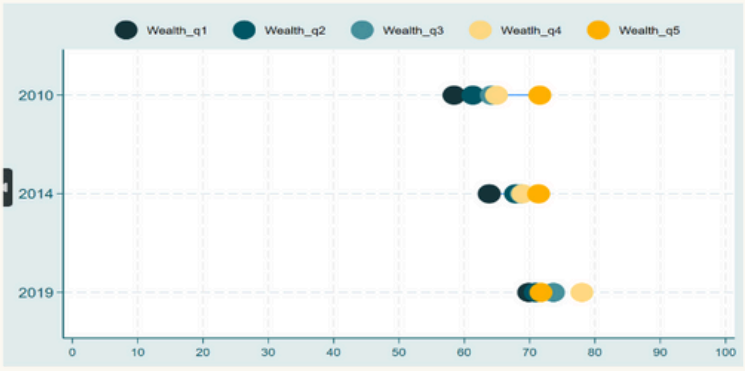
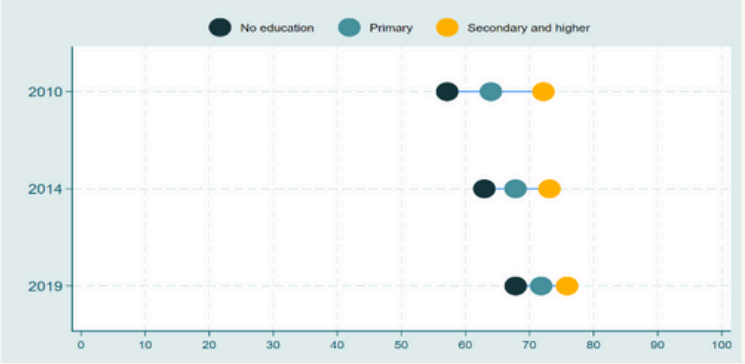


Fig4h: Equiplot of the CCI by level of education of the mother, recent surveys



BACKGROUND: Household surveys provide critical information on inequalities. The focus is on two major dimensions of inequality: household wealth quintile and education of the mother. Equiplots are used to assess whether the country has made progress since 2010 in reducing the poor rich gap or the gap between women with no education or low education and women with higher education.

Interpretations

- Based on equity analysis using the Composite Coverage Index (CCI), inequities between the rich and poor have declined substantially between 2010 and 2019.
- Similar trends were observed for level of education of mothers. The the gap reduced notably between 2010 and 2019.

5 Maternal mortality in health facilities

Figure 5a: Maternal mortality per 100,000 live births in health facilities

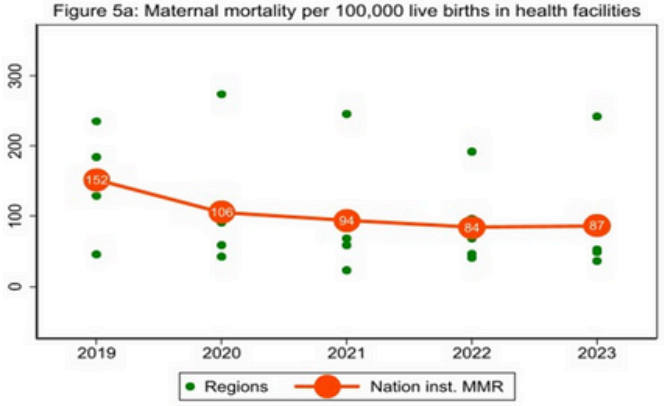
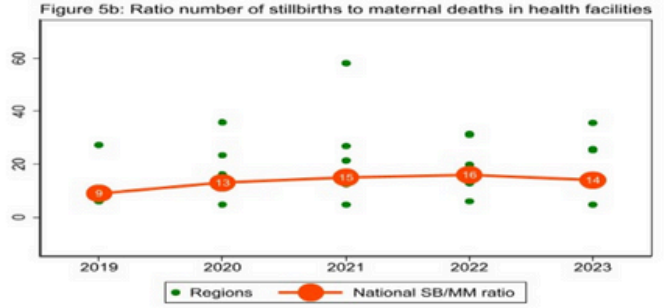


Figure 5b: Ratio number of stillbirths to maternal deaths in health facilities



BACKGROUND: The main challenge with mortality data from health facilities is underreporting of deaths. Deaths may not be recorded in the maternity register, or not reported. Also, maternal deaths in other hospital wards are more likely to be missed, e.g., deaths associated with abortion or sepsis. The main aim is to estimate the level of underreporting in DHIS2 or MPDSR.

INTERPRETATION

Maternal Mortality Ratio (MMR)

- It is expected that reporting of maternal mortality is high in Rwanda, as processes are in place to audit every maternal death. As a result, **MMR using HMIS is considered the most reliable data source.** Both DHS and UN population estimates are higher than the current reality.
- HMIS data indicates that **MMR** has **declined nationally from 152 in 2019 to 87 in 2023.**
- Significant **MMR disparities were observed across provinces.** The rate was highest in Kigali city - above the national estimate (outlier). This is due to referral/tertiary hospitals where 50% of maternal deaths occur within the three referral hospitals in Kigali City.

Stillbirths ration to maternal deaths

- Evidence suggests that **the rate of stillbirth to maternal deaths should be within the range of 5-15. For Rwanda,** between 2019 to 2023, several provinces had rates higher than 15. This requires further analysis to understand why this pattern is observed.

5 Stillbirth rates in health facilities

Figure 5c: Stillbirths per 1,000 births in health facilities

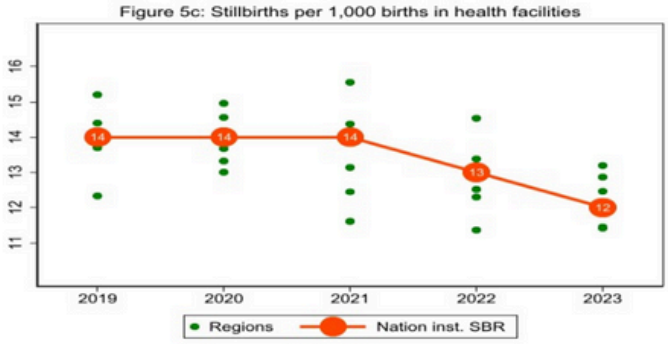
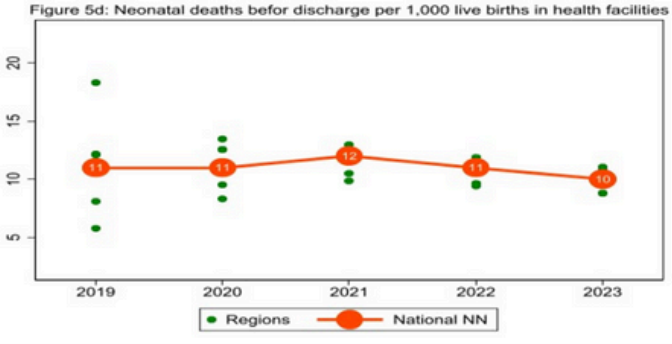


Figure 5d: Neonatal deaths befor discharge per 1,000 live births in health facilities



BACKGROUND: The main challenge with health facility data on stillbirths and neonatal deaths is underreporting. We can estimate the level of underreporting of stillbirths based on different assumptions. For neonatal deaths, DHIS2 reporting systems based on labour and delivery ward are limited to neonatal deaths before discharge in the reporting system. Therefore, they are only an indicator of mortality during the first 24-48 hours.

Interpretations

It is assumed that reporting of stillbirths and neonatal a, following high institutional deliveries rates and supporting community health systems. As a result, **inst.SBR using HMIS is considered the most reliable data source.**

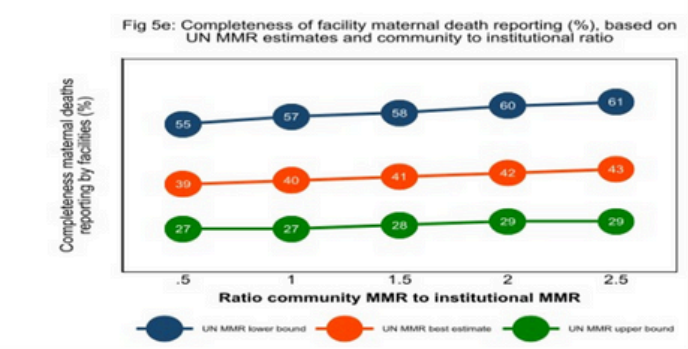
The stillbirth rate using facility data varies across time and regions. Nationally, the **rate has declined from 14 per 1,000 births in 2019 to 12 per 1,000 in 2023.**

There are **marked disparities in stillbirth rate between the four provinces and City of Kigali.**

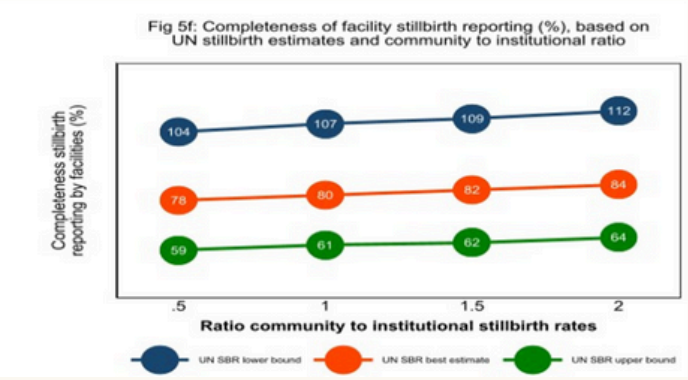
Neonatal deaths have not shown a consistent pattern over time. They increased slightly from 11 deaths per 1,000 live births in 2019 and 2020, to 12 deaths per 1,000 in 2021. Then there has been a gradual decline to 10 deaths per 1,000 in 2023.

Though there was high variability in neonatal death across the regions in 2019, this variability has reduced between 2020 to 2023.

5 Underreporting of maternal deaths and stillbirths



BACKGROUND: The main challenge with health facility data on stillbirths and neonatal deaths is underreporting. We can estimate the level of underreporting of stillbirths based on different assumptions: 1) using population mortality estimates from the UN: lower bound, best estimate and upper bound 2) community to institutional mortality ratio: assumptions ranging from half as low to at least 2 times higher community mortality.

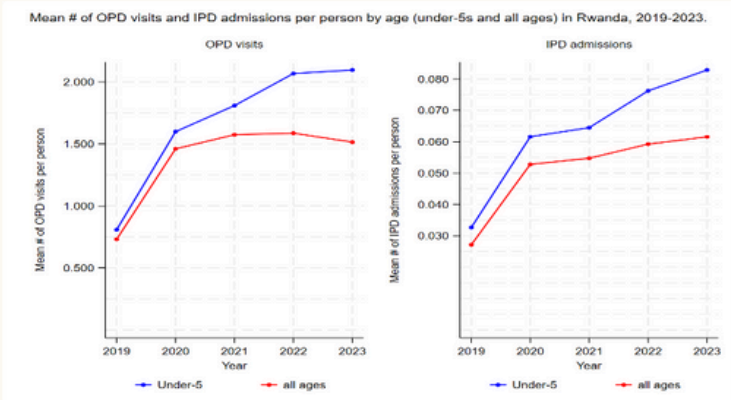


Interpretations

- Overall, the estimated level of completeness of reporting of maternal death and stillbirths were high.

6 Curative Health services : OPD utilization among childrenunder-5

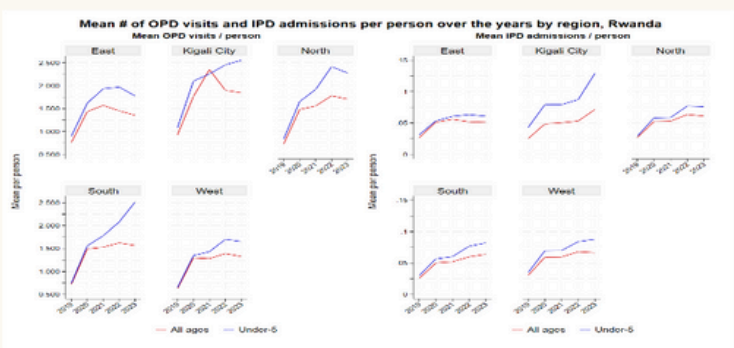
Figure 6a: OPD service use by children and all ages, national, 2019-2023



BACKGROUND

There is a major data gap on curative service utilization by children. Health facility data on outpatient (OPD) visits among under-fives are an indicator of access to curative services.

Figure 6b : map with OPD service use by children, by region, 2023



INTERPRETATIONS

- It seems that there is disparity between the rate of under-five and all ages regarding to the rate of OPD which suggests more sickness and access among under five years. This could be linked with the decentralized health services for children at health posts and health centers and the functionality of CHWs who support in danger signs detections among children under 5 over t
- The number of children visiting for OPD was increasing over times. ***The percentage of OPD visits that are under-5 are within an expected range of 15-40%.***
- The number of OPD visits per child per year during 2019-2023 has shown an increasing trend. There was no lower than 1 visit per year, which is considered indicative of high access.
- ***The OPD visits per child per year by province in 2023 was slightly different where the difference ranges between 17% and 25%.***

6 Curative health services: admission and case fatality rates among children under-5

Figure 6c: Admissions per 100 children and case fatality rates per 100 admissions under-5, national, 2019-2023

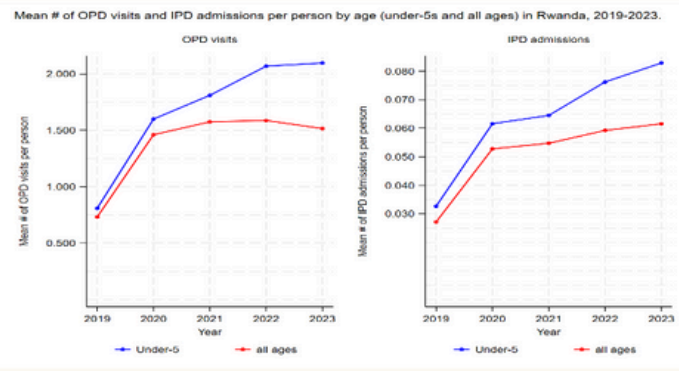
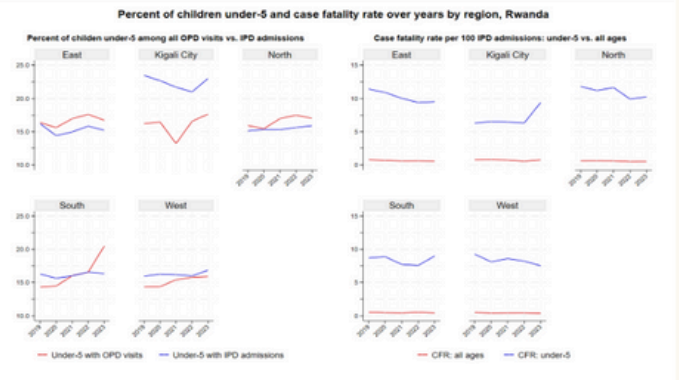


Figure 6d : Admission rates per 100 children under-5, by region, 2023 (map)



BACKGROUND

Data on inpatient admissions among under-fives are indicators of access to curative services. In-patient mortality (case fatality rates) is an indicator of quality of care.

MAIN FINDINGS

- There reported numbers of admissions / admission rates over time was consistently raising. The percent of admissions that are children under-5 was between 6 and 9 which are lower compared to the expected range 15-40%.
- The trend of admissions per 100 children under 5 per year during 2019-2023 was increasing.
- The case fatality rate among admissions under-5 remained almost stable about 9% across the timeframe.
- The admissions per 100 children under-5 per year by province in 2023 was slightly different where the difference ranges between 6% and 12.5%.

7 Health system performance assessment: indicators

Figure 7a: Number of hospital beds per 10,000 population by region, year

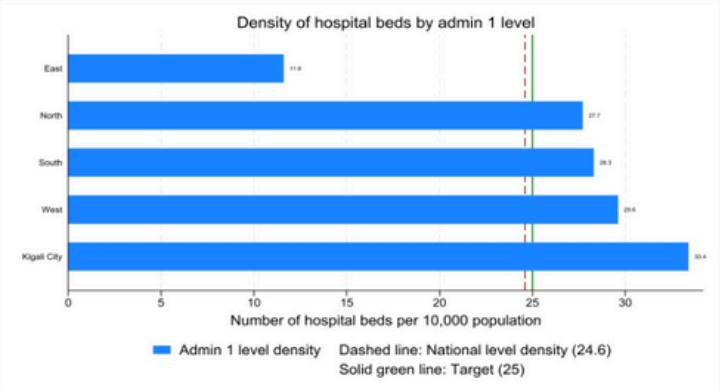
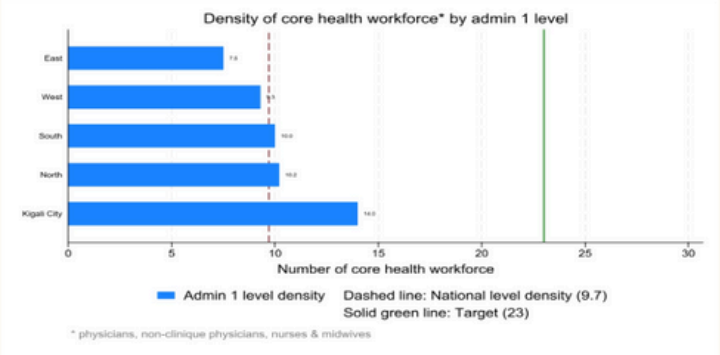


Figure 7b : Number of core health professionals per 10,000 population by year



BACKGROUND

Subnational analyses of health system inputs and service outputs are critical: districts and regions are key units of the health systems and their service delivery. This includes assessment of system inputs (health workforce, infrastructure) and outputs (use, coverage).

MAIN FINDINGS

- The data was obtained from MoH through regular monitoring and evaluation so the quality of data is reliable.
- Regarding to the hospital bed per 10,000 population, the national level (24.5) is very close to Is the target (25). Four regions exceeded to the national and recommended target while one region (Eastern province) is quite below the target. The main reason is due to high population and fewer number of hospitals compared to the other regions.
- The number of core health professionals per 10,000 population was lower from the target but close to the national level density. Eastern and Western provinces fell below the national density level.

BACKGROUND

Subnational analyses of health system inputs and service outputs are critical: districts and regions are key units of the health systems and their service delivery. This includes assessment of system inputs (health workforce, infrastructure) and outputs (use, coverage).

Figure 7c: Scatter plot of service utilization by health system inputs for regions, year (e.g. OPD use among under 5 and health workforce density, or admission rates among under-5 and beds density)

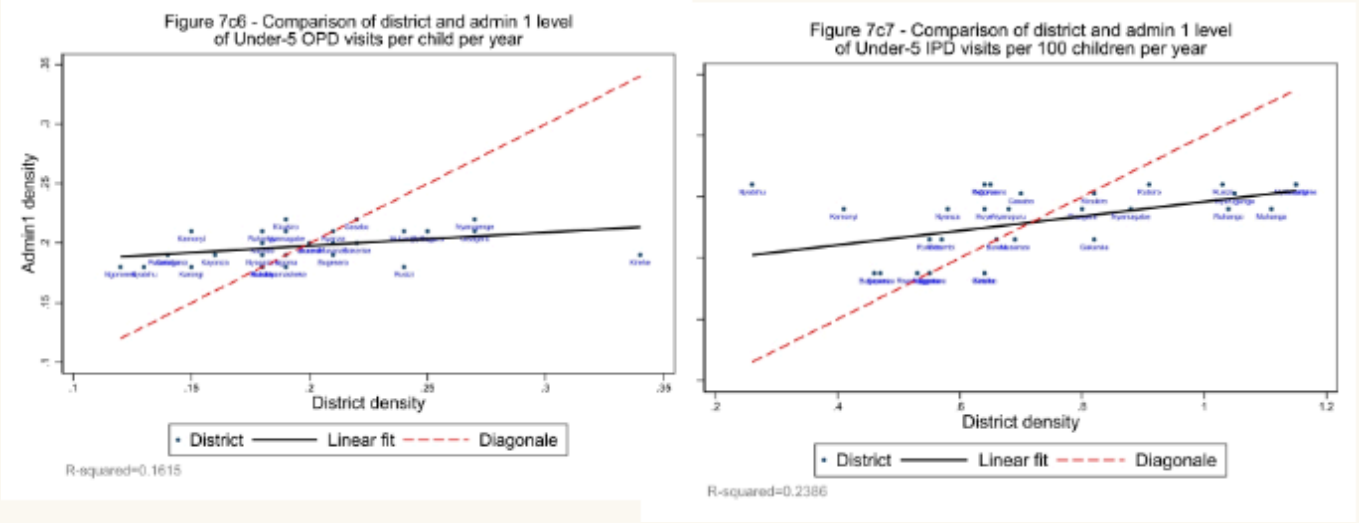
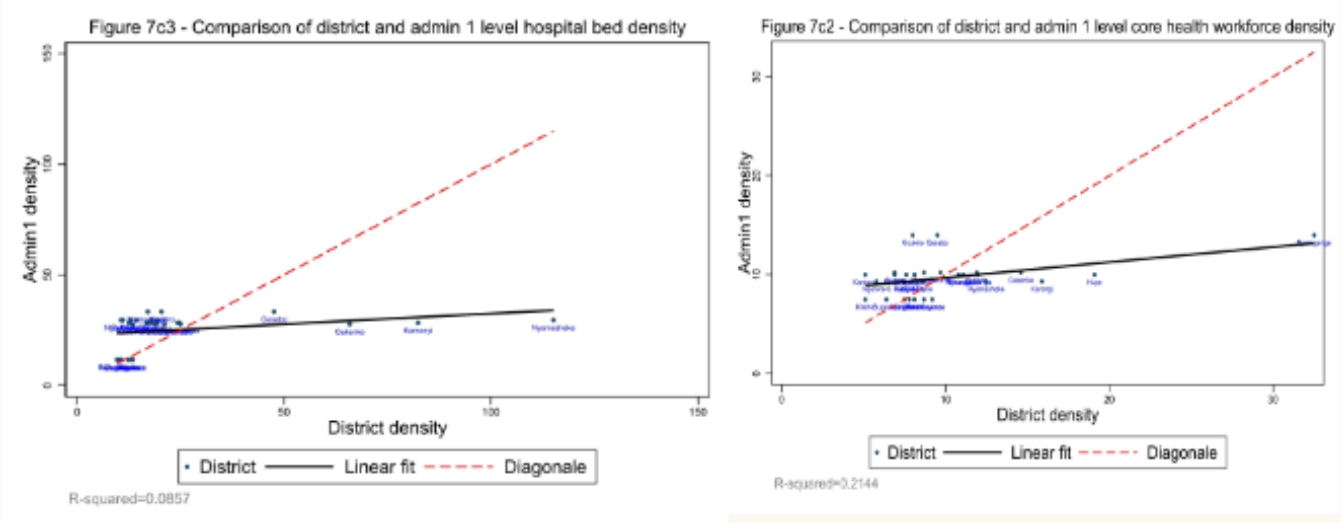


Figure 7d: Scatter plot of service utilization by health system inputs for regions, year (e.g., institutional live birth coverage rate and health workforce density)



MAIN FINDINGS

- The obtained pictures have validity as the data were obtained through reliable HMIS.
- Kirehe district had more OPD under five visits in Eastern province compared to the other districts while Nyamasheke district had more than expected under 5 IPD visits in Western province.
- Nyarugenge district had about three times more healthcare providers in the central region (Kigali city).
- Nyamasheke district had more hospital beds in the region.

Analysis of reproductive, maternal, newborn, child and adolescent health indicators

2019-2023

About Countdown 2030 in Rwanda

The countdown collaboration in Rwanda is led by The School of Public Health/College of Medicine and Health Sciences/University of Rwanda (UR-CMHS-SPH). It will play an important role in supporting the Ministry of Health (MOH) and Rwanda Biomedical Centre (RBC) in building the capacity to conduct analytical work to inform the reviews. The UR-CMHS-SPH will be engaged in the analytical process on a more continuous basis, working closely with the MOH and development partners, and drawing from solid in-depth analytical work, with a focus on evidence generation for regular reviews of progress and performance of the RMNCAH+N program in Rwanda.

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