Policy Brief

Better Data, Better Decisions:
Optimizing Health Information Systems for Improved Health Outcomes

Executive summary

Effective decision-making in the health sector relies heavily on data availability and quality. A robust health management information system (HMIS) enhances data quality through improved measurement and standardization, making it a reliable source of evidence for decision-making, ultimately resulting in improved health outcomes. The HMIS data quality in the Amhara region was assessed for completeness, outlier identification, and internal consistency checking. Furthermore, the reliability of health statistics generated from HMIS data is compromised due to inaccuracies in estimating denominators, mainly due to outdated or imprecise population projections. These inaccuracies may lead to flawed health statistics, which can misinform policy and program decisions. This policy brief presents urgent and actionable policy and strategic recommendations to improve the quality of HMIS data in the Amhara region.

Data was extracted from the district health information software 2 (DHIS2) platform and evaluated using the regional Routine Data Quality Assessment (RDQA) to assess the accuracy of the HMIS data. The findings show that the region's HMIS data quality is sub-optimal and demands urgent attention. Reporting completeness varied significantly by facility type: hospitals had the highest data completeness (97%) in 2023 and 2019, while private clinics had the lowest at 33% in 2023. Health posts showed lower data accuracy compared to health centers and hospitals.

The region's HMIS data did not exhibit significant outlier issues. However, the lowest internal consistency was noted between the ANC1 and Penta1 indicators, with only 57% of zones achieving a consistent ANC1 to Penta1 ratio between 1 and 1.5 in 2019.

Key actions include implementing an automated data quality monitoring system, establishing continuous capacity-building, and enforcing regular monitoring and evaluation with a standardized manual across all health system levels. Strengthening analytics and visualization platforms, enforcing reporting requirements and policies for private health facilities, and integrating data management practices into performance appraisal is crucial. If implemented urgently, this holistic approach will establish robust data quality and foster a culture of data use in decision-making for sustainable health improvements.

Background

Effective decision-making in the health sector relies heavily on data availability and quality. Data quality is crucial in health information systems to enhance the health of individuals and communities. High-quality health data, as collected by HMIS, is an essential building block of national health systems. HMIS enhances data measurement and standardization, leading to improved data quality. This, in turn, enables better decision-making and improves health outcomes.

Every country has routine health information systems that offer comprehensive records covering all levels of health service delivery. Nevertheless, these valuable data sources are often ignored when evaluating the causal effects of health programs due to concerns about their quality, mainly characterized by reporting completeness, consistency, and accuracy. District Health Information System 2 (DHIS2) software is an innovation in data management and monitoring, enhancing HMIS, and has been widely adopted in low and middle-income countries over the past decade. However, analysts and decision-makers encounter significant challenges in fully leveraging these data to achieve subnational, national, and global health goals. Evidence shows that data quality is poor and is not utilized for program and policy decisions in Ethiopia, especially at the subnational level, and it remains a significant challenge.

Approaches

To evaluate the quality of HMIS data, selected routine reproductive, maternal, neonatal, and child health (RMNCH) data were retrieved from the DHIS2 tool in the Amhara region. The extracted data were assessed for completeness, extreme outliers, and consistency. A Countdown to 2030 method was adapted to determine quality, benchmark performance, and develop a quality scorecard that provides a clear and objective assessment of the quality of data within the health system. Additionally, RDQA findings were used to assess the accuracy of the routine health data. The RDQA was calculated by dividing the recount by the reported data. The internal consistency assessment was conducted by analyzing the ratios between related indicators, specifically between the ANC 1st visit and Penta 1 vaccination, as well as between consecutive vaccinations (such as Penta1 to Penta3, Rota1 to Rota 2, and Pneumococcal 1 to Pneumococcal 3) .

We also explored advanced demographic techniques for denominator estimation by utilizing population projection estimates available in DHIS2 and service utilization data alternative denominators.

We triangulated these with population-level surveys to explore deviations between results for selected indicators. This is particularly important because the population projection is based on the 2007 census, making it outdated and over 12 years old by the 2019 estimation. This likely introduces inaccuracies in the traditional method that relies on these figures, potentially leading to misestimating health coverage statistics. Regional program managers and experts in data management, analysis, and utilization were consulted throughout the entire process from conception to analysis and development of this policy brief. Their input was crucial in determining and contextualizing priority issues and interpreting the findings. These regional experts reviewed, validated, and approved the final version of the policy brief.

Key findings

Completeness

The completeness of HMIS data in the Amhara region varied by facility type. Hospitals achieved the highest data completeness, while private clinics faced low data completeness, followed by health posts. Health centers maintained a moderate level of data completeness.

Hospital data completeness ranged from 81% in 2021 to 87% in 2019 and 2023. In contrast, private clinics saw a decline in data completeness from 58% in 2019 to 35% in 2023. Health centers had data completeness levels between 70% in 2021 and 77% in 2020, with 75% in 2022 and 2023. Health posts showed the lowest data completeness at 60% in 2021, with their highest at 74% in 2020. Data completeness across all facility types was particularly low in 2021. Routine immunization and family planning had the highest reporting completeness among the indicators. Routine immunization completeness was high (93%) for health posts in 2020; the lowest was 61% in 2022 for private clinics. For family planning, the highest completeness was 96% for health centers in 2019, while the lowest was 29% for private clinics in 2023.

Facility type	Year				
	2019	2020	2021	2022	2023
Health Post	68	74	60	69	66
Health Center	76	77	70	75	75
Hospital	87	86	81	84	87
Private Clinic	58	50	46	38	35
Average	72	72	64	67	66

Table 1: Average reporting completeness of HMIS data in DHIS2, by facility type, Amhara region, 2019 - 2023 .

Data completeness monthly average, %

<55 **55-63** **64-77** **78-92** >=93

Note: Family planning, ANC, institutional delivery, routine immunization, nutrition, service utilization and institutional mortality indicators were include to prepare this reporting completeness.

Accuracy

Routine data quality assurance (RDQA) is a crucial technique for ensuring data accuracy, and the assessments are conducted annually as part of routine practice. According to the 2022 RDQA survey conducted for data verification among 78 health facilities (including 23 health posts, 45 health centers, and 10 hospitals) within 12 zones, most verification factors did not fall within the acceptable range of 90% to 110%. The result presents a discrepancy across health facility types for the same indicator. Hospital data accuracy is better than that of health centers and health posts.

No	Selected data elements	Verification factor by health facility type		
		Health post	Health centre	Hospital
1	Family planning (new and repeat acceptors)	86%	76%	92%
2	MCV1 (measles) under 1 year age	84%	76%	101%
3	Skill birth attendance	NA	100%	99%
4	ANC4	NA	76%	57%
5	Sepsis	118	125%	118%
6	ART retention rate	NA	94%	94%
7	HEI receiving prophylaxis	NA	103	55%
8	TB case detection	NA	103	98%

Table 2: Amhara Regional Health Bureau RDQA data verification assessment on selectedIndicators and by health facilities type in 2022

<90, > 110 90-110 < 100: over reporting; >100: under reporting; between 90-100: good; <90 or >110: not good.

Consistency

The internal consistency assessment was done by the ratio of related indicators, as shown in Table 3 below. Despite the notably poor consistency between ANC1 and Penta1 during 2019 t-2022, with less than 75% of zones falling between 1.0 and 1.5, the trend suggests it has improved over time. The initial care visit and the subsequent Penta-1 vaccinations Penta1 to Penta3, Rota1 to Rota2, and Pneumococcal to Pneumococcal3 had good consistency.

Data quality scorecard

The data quality scorecard in Table 3 presents the proportion of zones assessed for completeness, outliers, and internal consistency, highlighting insights about HMIS data quality. In addition to the proportion of report completeness at the zone level, it identifies minimal discrepancies, such as extreme values and internal consistency issues that affect data accuracy. These findings highlight the need for targeted interventions to improve data quality and support strategic planning and policy-making.

		2019	2020	2021	2022	2023
1	Completeness of monthly facility reporting (green>90%)					
1a	% of expected monthly facility report (mean)	85	73	50	71	79
1b	% of zones with completeness of facility reporting >=90%	100	100	100	100	100
1c	% of facilities with no missing monthly values in the year	100	100	100	100	100
2	Extreme outliers (green >95%)					
2a	% of monthly values that are not extreme outliers (mean)	96	96	96	95	94
2b	% of zones with no extreme outlier in the year	92	95	92	74	85
3	Consistency of annual reporting (green> 85%)					
3a	% of zones with ANC1-Penta1 ratio between 1.0 and 1.5	52	67	71	62	67
3b	% of zones with Penta1-Penta3 ratio between 1.0 and 1.5	100	100	91	86	91
3c	% of zones with Rota1-Rota2 ratio between 1.0 and 1.5	100	100	100	95.2	100
3d	% of zones with a Pneumo1-Pneumo3 ratio between 1.0 and 1.5	100	100	90.5	85.7	90.5
4	Mean					
4a	Overall data quality score (mean indicator 1a to 3d)	92	92	88	85	90

Table 3: HMIS data quality scorecard in the Amhara region, 2019-2023

Best practice to optimize data quality

Lessons learned from Uttar Pradesh's efforts to optimize HMIS data quality emphasize the critical role of tailored systems to local needs. These lessons ensured that the information collected must be actionable and meaningful for decision-making at all health system levels. Institutionalizing data quality processes, including establishing governance structures such as data quality committees to oversee and enforce data quality measures and implementing automated and manual validation checks, proved essential for maintaining data accuracy and consistency. These measures were identified as vital in establishing a reliable data foundation that supports regular monitoring of health system performance and effective health program management.

Best practices also highlight the importance of strong government leadership and continuous capacity building. Regular training sessions for data handlers ensure proficiency in using tools for data management, analytics, and visualization and understanding the importance of data quality.

Furthermore, the implementation of data dashboards allows for the real-time visualization of data quality metrics, facilitating the prompt identification and resolution of issues, resulting in more accurate, reliable, and actionable insights, ultimately improving health outcomes. These practices improve data quality and foster a culture of data use that drives ongoing improvements in health outcomes. By embedding these lessons into routine practices, the Amhara region can enhance its health information system and achieve better health outcomes.

Alternative denominators

Efforts were made to adapt advanced Countdown to 2030 methods by using health service utilization data to derive alternative denominators, comparing these with population projections, and triangulating statistics generated from both methods with data from population-based surveys (EDHS). Figures 1 and 2 present ANC4+ and institutional delivery statistics from HMIS data, derived using two denominator estimation methods: service utilization and population projections data, triangulated with coverage statistics generated from population-level surveys.

Results indicate that while the statistics generated using the two denominators generally align, the coverage of ANC4+ was higher when using traditional population projections as the denominator. In contrast, this method underestimated institutional delivery coverage compared to the alternative method. These discrepancies underscore the need for regular, rigorous analytics and triangulation to enhance the accuracy and reliability of evidence used to monitor health systems' performance.

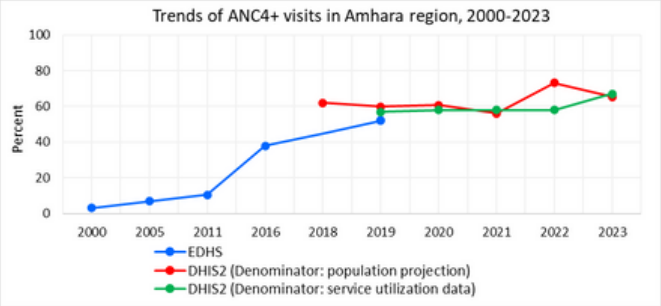

Figure 1. Trends of ANC4+ coverage in the Amhara region from 2000-2023, using data from surveys and HMIS. The HMIS coverage is calculated using two different denominators: traditional population projections and service utilization data.

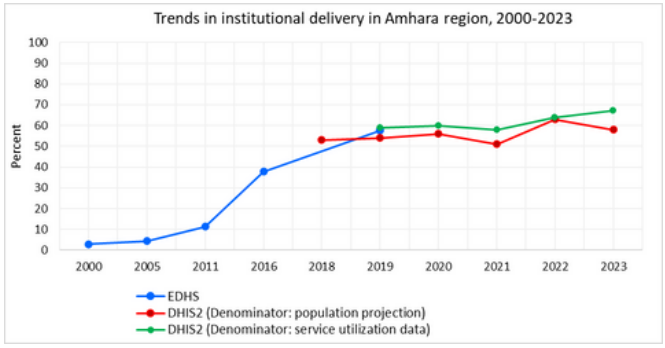

Figure 2.. Trends of institutional delivery in the Amhara region from 2000-2023, using data from surveys and HMIS. The HMIS coverage is calculated using two different denominators: traditional population projections and service utilization data.

Conclusion

The overall quality of HMIS data in the Amhara region remains suboptimal, with significant issues in data reporting completeness, especially at health posts and private clinics. Health centers also struggle among government facilities, while hospitals perform relatively better.

Data accuracy is compromised by over-reporting, particularly at health posts and health centers, though hospitals perform better. Internal consistency is generally good, but discrepancies exist between ANC1 and Penta1 indicators, highlighting specific data accuracy and reliability improvement areas. Furthermore, regular and rigorous analytics, combined with triangulation of data sources, are essential for enhancing the accuracy and reliability of evidence used in health system monitoring and performance tracking.Policymakers should prioritize creating an enabling environment for rigorous analysis and triangulation to ensure that the evidence guiding decision-making is robust and reflects actual conditions.

Policy and strategic recommendations

Enforcing existing regulatory policies at all levels to improve the reporting rate from private health facilities and health posts. This includes regular monitoring and audits to ensure compliance and imposing penalties for non-compliance. Enhancing collaboration with private sector stakeholders to emphasize the importance of data reporting can also drive improvements.

Implementing data management accountability at all levels by integrating data management as a criterion in employee performance evaluation. This approach creates accountability and encourages accurate and timely data reporting. By making data management a key performance indicator, employees can be motivated to prioritize data accuracy and completeness in their daily tasks.

Implementing an automated system to identify data quality issues and provide feedback for improvement to cover major data quality dimensions such as completeness, inconsistencies, and outliers, ultimately enhancing the accuracy and reliability of HMIS data. This system should facilitate communications and timely feedback between different health system levels, enabling them to correct errors in real time and improve overall data quality.

Enhancing automated data analytics and visualization practices to improve data quality, understanding, and utilization by leadership and program owners. This includes institutionalizing rigorous analysis and visualization processes to ensure that evidence guiding decision-making is robust and reflective of actual conditions, enabling it to highlight true trends, identify gaps, and inform strategic decisions for improved health system performance.

Standardizing capacity-building activities through continuous professional development (CPD) programs and supportive supervision and mentoring guidelines. This ensures that health workers at all levels are consistently trained in the best data management, analysis, and use practices, leading to sustained improvements in data quality and overall public health and clinical practice.

Figure 3 below presents a diagrammatic flow illustrating the connections between the recommended policy and strategic actions for enhancing HMIS data quality. This will thereby improve decision-making and, ultimately, health outcomes at the population level.

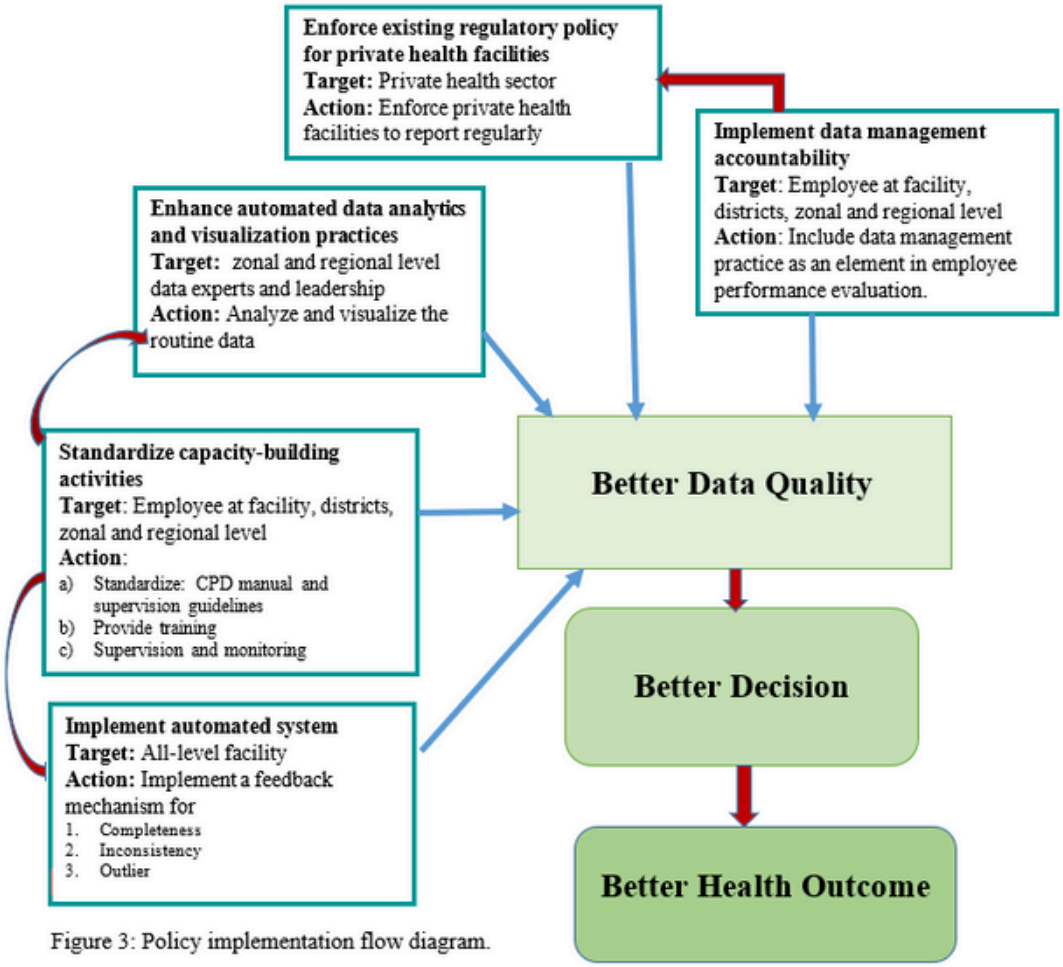

Figure 3: Policy implementation flow diagram.

Better data

Better decisions

Source of funding

This work was financial supported by Bill & Melinda Gates Foundation (INV-033411).

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