

Exploring the barriers to improving Health Management Information System reporting in the Sidama Zone, Southern Ethiopia: Focus on Maternal Health Reporting. A qualitative study.

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Background

Over the past two decades, Ethiopia's healthcare system experienced a radical overhaul, with much focus on primary health care¹. A major component of Ethiopia's healthcare strategy is the Health Management Information System (HMIS²), in place since 2008³. This system collects and communicates health data at every node of Ethiopia's health care system, from *kebele* (village) level to the national government, allowing for improved monitoring, evaluation, and decision-making in health policy. This is particularly important as the Ethiopian Federal Ministry of Health (FMOH) launches its next strategy: The Health Sector Transformation Plan (HSTP)⁴.

Indeed, health information systems (HIS) are considered a "national asset" by the World Health Organisation⁵. While HIS' are one of six building blocks of health systems, (the others being service delivery; health workforce; medical products, vaccines and technologies; financing; and leadership and governance), HIS' are indispensable as it provides the data necessary for decision-making in the other five blocks.

While this study considers issues affecting the HMIS overall, specific focus was paid to maternal health indicators for several reasons. Maternal health is a major objective within SDG 3: *Ensure healthy lives and promote well-being for all at all ages*⁶. Correspondingly, the HSTP aims to reduce maternal mortality to 267 per 100,000 by 2020⁷. However, the HSTP report acknowledges large variations in Ethiopia's maternal mortality estimates, ranging from 353⁸ to 676⁹ deaths per 100,000. Depending on the estimate, this gives Ethiopia around the 35th highest maternal mortality ratio globally¹⁰. Accordingly, the HSTP calls for more "robust and locally generated information" to understand the situation, which requires HMIS monitoring¹¹. Furthermore, the FMOH aims to improve maternal health by implementing "high-impact" interventions, like antenatal care (ANC) and postnatal care (PNC). Yet discrepancies have been identified about the reach of these services¹². By exploring these issues, a better understanding of these inconsistencies could be identified.

¹ Mullan, Z. "Transforming Health Care in Ethiopia." *The Lancet*, 4. No. 1 (2016), e1

² See Annex 3 for a full list of terms and acronyms used in this paper.

³ Federal Democratic Republic of Ethiopia Ministry of Health (FMOH) *HSTP: Health Sector Transformation Plan*. Addis Ababa, 2015, 44

⁴ Mullan, "Transforming Health Care", e1

⁵ WHO "Health Systems Framework." 2017.

http://www.wpro.who.int/health_services/health_systems_framework/en/

⁶ United Nations. *Transforming Our World: The 2030 Agenda for Sustainable Development*. New York. 2015

⁷ FMOH, *HSTP*, 25

⁸ World Bank "Maternal mortality ratio (modeled estimate, per 100,000 live births)." 2015.

<http://data.worldbank.org/indicator/SH.STA.MMRT>

⁹ FMOH, *HSTP*, 24

¹⁰ World Bank "Maternal Mortality ratio"

¹¹ FMOH, *HSTP*, 24

¹² *ibid*: 25

The Sidama Zone, Southern Nations, Nationalities and People's Region (SNNPR) was chosen as the research case for several reasons. Firstly, previous HMIS studies have uncovered gaps in data accuracy, timeliness and quality of information in the SNNPR¹³ and specifically in the Sidama Zone¹⁴. Secondly, in the past seven years the SNNPR experienced a HMIS scale-up, making it ripe for further research¹⁵. Thirdly the Sidama Zone is an interesting case to examine maternal health, as it has one of the lowest coverage for institutional delivery and PNC in the SNNPR¹⁶, but paradoxically has relatively high ANC coverage, raising questions about maternal health service utilization and effective health reporting¹⁷. Thus, it is a worthwhile project to explore what barriers to improvement may currently exist for effective HMIS documentation and reporting on maternal health in the Sidama Zone.

Objectives

This study aims to investigate the quality of HMIS reporting on maternal health indicators at the community level. This includes understanding the barriers that impede the functioning and improvement of HMIS reporting, understanding what problems arise from these barriers, and identifying possible solutions at the village, town, district and zonal level in the Sidama Zone. Therefore, the primary research question is:

What are the barriers to improving Health Management Information System reporting in the Sidama Zone?

With further questions including:

- What are the barriers for improving HMIS reporting for maternal health?
- What is the current quality of HMIS reporting for maternal health?
- What problems arise from these barriers?
- What improvements can come from different health staff cadres?

Literature Review

This research contains several aspects of healthcare that must be considered, including the HMIS and health data; maternal health; primary healthcare; and health systems. This review explores how these topics interact and inform this project.

HIS' formulate a vital component of health systems, as they are the source of data that sustains and drives the goals of the other blocks¹⁸. In the context of universal Primary Health Care, as set out by the Alma Ata declaration, health systems should promote health universality and equity, and a bottom-up approach to healthcare by enabling close-to-community care¹⁹. As the trajectory for Alma Ata progressed, HIS' became as a central part of its strategy. According to Braa et al., this was due to their potential to improve the "allocation of resources and setting of priorities"²⁰. However, the authors admit that achieving successful HIS' in developing countries and low-resource settings is difficult, due to sustainability and scalability complications. Sustainability involves supporting a HIS through cultivating

¹³ Belay, H., et al. "Assessment of Health Management Information System (HMIS) Performance in SNNPR, Ethiopia." *Measure Evaluation*. (2013).

¹⁴ Dusabe-Richards, J. N., et al. "Women health extension workers: Capacities, opportunities and challenges to use eHealth to strengthen equitable systems in Southern Ethiopia." *Canadian Journal of Public Health*, 107 no. 4-5 (2016)

¹⁵ Belay et al. "Assessment of HMIS"

¹⁶ Zerihun, A. et al. "Report on the Context Analysis of Close-To-Community Providers in Ethiopia." *ReachOut Consortium*. (2014): 16.

¹⁷ *ibid*

¹⁸ Ledikwe, J. H., et al. 'Improving the quality of health information: a qualitative assessment of data management and reporting systems in Botswana' *Health Research Policy and System*, 12 no. 7 (2014), 2

¹⁹ WHO. *Everybody's Business: Strengthening Health Systems To Improve Health Outcomes Who's Framework For Action*. Geneva, 2007

²⁰ Braa, J. et al.. "Networks of Action: Sustainable Health Information Systems across Developing Counties." *MIS Quarterly*, 28 no. 3 (2004), 338

adaptation, local learning and institutionalisation to a specific health setting, even after external funding finishes²¹, and tailoring allocations to the needs of the users to build local capacity²². Scalability necessitates adopting technical solutions and educational processes by other sites²³.

Sustainability and scalability highlight the challenges many decentralised health facilities face in reporting their data. These issues are not solely technical, but also centred around factors like education and institutionalisation. To conceptualise this, the researcher utilised a framework that surpassed design factors to also incorporate social and management practices: the PRISM Framework (Performance of Routine Health Information System Management). Developed by Aqil et al²⁴, PRISM divides the HMIS into technical, organisational and behavioural components. Discussed in greater detail in the theoretical framework section, PRISM illustrates that high-functioning HMIS' should transcend beyond technical design to incorporate strong organisational strategies – like supervision and training – and behavioural strategies– such as user motivation and competence.

Within the HMIS, organisational obstacles can occur due to a lack of training and support from higher levels, as was found in Kenya²⁵ and the Jimma Zone, Ethiopia²⁶. Similarly, many studies cited a lack of human resource capacity as a major problem^{27,28}, or a lack of workers whose primary role was to manage HMIS data²⁹. This illustrates that an effective human resource management strategy is necessary for a sustainable and scalable HMIS in developing countries. Indeed, Ledikwe et al.'s study in Botswana³⁰ found that investing in organisational benefits, like decentralising health worker training, data quality support and better human resource structures, created lower-cost but effective initiatives for HMIS improvement. Considering these factors, the qualitative interview guides specifically target these issues.

For behavioural factors, effective promotion of the HMIS is integral to motivating employees and improving system usage, as the knowledge and attitudes of health workers are linked to the technology uptake in the workplace³¹. Relatedly, it has been hypothesised that data quality and data usage are interrelated, meaning that poor data quality results in poor data usage and vice versa³². While previous studies tested users' knowledge for behavioural factors using mock-exams³³, the qualitative component of this research primarily wanted to understand how

²¹ ibid

²² Kimaro, H. C. and Nhampossa, J. L. "The challenges of sustainability of health information systems in developing countries: comparative case studies of Mozambique and Tanzania." *Health Information in Developing Countries*, 1 no. 1 (2007), 2

²³ Braa et al. 'Networks of Action', 338

²⁴ Aqil, A. et al. "PRISM framework: a paradigm shift for designing, strengthening and evaluating routine health information systems." *Health Policy and Planning*. No. 24 (2009)

²⁵ Kihuba, E., et al. "Assessing the ability of health information systems in hospitals to support evidence-informed decisions in Kenya." *Global Health Action*, 7 no. 1 (2014)

²⁶ Sultan, A., et al W. "Utilization of Health Information System at district level in Jimma Zone Oromia Regional State, South West Ethiopia." *Ethiopian Journal Health Science*, no. 21 (2011)

²⁷ Kimaro and Nhampossa "Challenges of Sustainability"

²⁸ Kihuba et al. "Assessing the availability"

²⁹ Kintu, P., et al., "Development of HMIS in Poor Countries: Uganda as a Case Study." *Health Policy and Development*, 3 no. 1 (2005)

³⁰ Ledikwe et al "Improving the Quality", 8

³¹ Sukums, F., et al.. "Health workers' knowledge of and attitudes towards computer applications in rural African health facilities." *Global Health Action*. 7 no. 1 (2014), 9

³² Braa, J. et al. "Improving quality and use of data through data-use workshops: Zanzibar, United Republic of Tanzania." *Bull World Health Organ*. No. 90 (2012)

³³ Belay et al. "Assessment of HMIS"

the individual health officials conceptualised the importance of data and their motivation to use the HMIS. This is in consideration of the findings by Asangansi and Braa³⁴ and Braa et al.³⁵.

Technical factors, like design and complexity, have been described as the “backbone” of the system³⁶. The technical components facilitate a HMIS’ organisational and behavioural factors as it is how health workers input, see and use data. Thus, it is unsurprising that simplifying HMIS formats has improved its usage in several studies^{37,38}. However, a lack of technical support and complex design can hamper the HMIS^{39,40}. A growing solution to this is eHealth (electronic health) and mHealth (mobile health), as it allows workers to log data more efficiently^{41,42}. However, this technology also carries challenges, including unclear benefits, variable results, dealing with power outages and difficulties in monitoring^{43,44}. Thus, the interviews inquired about the convenience of the HMIS’ design and format.

In these contexts, an effective HMIS must incorporate communities and use data from the bottom-up, informing local decision-making before being passed upwards⁴⁵. This was highlighted by the HSTP for maternal health, emphasising “locally generated information”⁴⁶. Indeed, a review of Nigeria’s HMIS, which did not extend past large facilities, was deemed disadvantaged as it excluded the “last mile” of community health data and captured merely “the tip of the iceberg”⁴⁷. Furthermore, when top-down structures exist, those on the lower rungs do not have the same claim to “ownership” of the technologies they are expected to use⁴⁸. Instead control remains with higher officials, excluding lower level health workers from decision-making processes and stifling the institutionalisation of such technologies, necessary for its success⁴⁹.

In Ethiopia, the HMIS is collected from health posts (village/kebele level), health centres (town level) and districts/woredas. Data is then submitted to the zonal and regional level for preliminary analysis and transferred to the FMoH, where deeper analysis informs national health strategy⁵⁰. It is argued that the Health Extension Workers (HEWs – Ethiopia’s Community Health Workers (CHWs)) are at the core of the HMIS, but their activities within the system are damaged by poor infrastructure, communication and human resources⁵¹. Indeed, CHWs are frequently lauded for bridging communities and health systems, as well as

³⁴ Asangansi, I. and Braa, K. “The Emergence of Mobile-Supported National Health Information Systems in Developing Countries.” *Studies in Health Technology and Informatics*. (2010)

³⁵ Braa et al. “Improving quality and use”

³⁶ Kintu et al. “Development of HMIS”, 45

³⁷ Braa et al. “Improving quality and use”, 380

³⁸ Mutale et al. “Improving health information systems for decision making across five sub-Saharan African countries: Implementation strategies from the African Health Initiative” *BMC Health Services Research*, 13, No. 59 (2013)

³⁹ Sultan et al. “Utilization of Health Information Systems”

⁴⁰ Kimaro and Nhampossa “Challenges of Sustainability”

⁴¹ Agarwal, S. et al. “Evidence on feasibility and effective use of mHealth strategies by frontline health workers in developing countries: systematic review” *Tropical Medicine and International Health*, 20, No. 8 (2015)

⁴² Asangansi, I., et al. “Improving the Routine HMIS in Nigeria through Mobile Technology for Community Data Collection.” *Journal of Health Informatics in Developing Countries*, 7 no. 1 (2013)

⁴³ Aranda-Jan et al. “Systematic review on what works, what does not work and why of implementation of mobile health (mHealth) projects in Africa.” *BMC Public Health*, 14, no. 188 (2014): 1-15

⁴⁴ Dusabe-Richards et al. “Women Health Extension Workers”

⁴⁵ Braa et al. ‘Networks of Action’, 340

⁴⁶ FMoH, *HSTP*, 24

⁴⁷ Asangansi et al. “Improving the Routine HMIS” 77

⁴⁸ Kimaro and Nhampossa, “Challenges of Sustainability” 1

⁴⁹ *ibid.*

⁵⁰ Dusabe-Richards et al. “Women Health Extension Workers” 355

⁵¹ *ibid.*, 356

HMIS⁵²⁵³⁵⁴. Accordingly, it is important that problem-identification and improvement within the HMIS occurs at the community level, in addition to other tiers of the health system, to ascertain existing issues and potential remedies. These factors are why different cadres of health officials were interviewed, particularly HEWs.

These issues are of acute importance for maternal health reporting in Ethiopia, where HEWs do much work on the issue⁵⁵. In their study of community maternal health performance in the Sidama Zone, Kok et al.⁵⁶ found that accountability and support concerns affected HEWs' performance. They further argue that health systems are inherently social institutions, which can only be improved through targeted human resource management of actors in the system⁵⁷. While not specifically focused on the HMIS, these issues are nevertheless of relevance.

In light of the previous literature, it is important to distinguish the contribution of this project. The justification of the research topic and setting earlier in this report have specified that researching HMIS issues on maternal health is relevant due to the targets set out by the FMOH in the HSTP report⁵⁸. The Sidama Zone is a beneficial case given past identification of maternal health and reporting issues in its region⁵⁹⁶⁰. Furthermore, no studies have been found that specifically explores HMIS issues relating to maternal health in Ethiopia or elsewhere. This offers the opportunity to give in-depth insight into HMIS reporting for a specific health factor, indeed, one identified as an important policy area⁶¹, allowing this paper to provide targeted policy guidance to the zonal and regional levels.

Theoretical Framework

In line with similar research⁶² this project utilised the PRISM framework (Performance of Routine Health Information System Management) as a guiding structure. PRISM was developed by Aqil et al.⁶³ to design, evaluate and identify areas for improvement within routine health information systems. Routine health information is defined as "information that is derived at regular intervals of a year or less through mechanisms designed to meet predictable information needs"⁶⁴.

As briefly discussed, the PRISM framework is useful for this study because it presents a three-point holistic approach to improving HMIS performance. Rather than solely focusing on the technical determinants, the framework also incorporates organisational components (such as training, supervision, a culture of information) and behavioural determinants (such as data quality and the motivation, confidence and competence of data users). By linking these three

⁵² Theobald, S. et. al. "Close-to-community providers of health care: increasing evidence of how to bridge community and health systems." *Human Resources for Health*, 14 no. 32 (2016)

⁵³ Kok, M. C, et al.. "A qualitative assessment of health extension workers' relationships with the community and health sector in Ethiopia: opportunities for enhancing maternal health performance." *Human Resources for Health*, 13, no. 80 (2015)

⁵⁴ Braun, R., Catalani C., Wimbush, J. and Israelski, D. "Community Health Workers and Mobile Technology: A Systematic Review of the Literature." *PLoS ONE*, 8 no. 6 (2013)

⁵⁵ UNICEF. *The Health Extension Programme: Briefing Note*. 2014. Available online: https://www.unicef.org/ethiopia/2014-12-15-Red_HEALth-hep.pdf

⁵⁶ Kok et al. "A qualitative assessment of HEWs", 4

⁵⁷ *ibid.*

⁵⁸ FMOH *HSTP*, 24

⁵⁹ Dusabe-Richards et al. "Women Health Extension Workers"

⁶⁰ Zerihun et al. "Close to Community Providers in Ethiopia"

⁶¹ FMOH *HSTP*

⁶² Belay et al. "Assessment of HMIS"

⁶³ Aqil et al "PRISM Framework"

⁶⁴ La Fond, A. and Fields, R. "The Prism: Introducing an Analytical Framework for Understanding Performance of Routine Health Information Systems in Developing Countries (A Work in Progress)." (A paper presented at A Workshop on Enhancing the Quality and Use of Health Information at the District Level Eastern Cape Province, South Africa September 29 – October 4, 2003), 2

factors, there is an understanding that an effective HIS requires both technical facilitation and a comprehensive human resource strategy⁶⁵. This is important when considering health systems as a whole and their various 'blocks'⁶⁶.

The tools for this research project were designed with the three components of the PRISM framework as the overarching guide. This study differs from others, however, in that it focuses heavily on qualitative methods. Therefore, the interview and focus group discussion guides were devised with specific questions and probes relating to the three PRISM determinants. This included questions targeting workers' thoughts of the design and framework of the HMIS (technical); previous experience on using the HMIS and its resources (organisational); and user motivation and confidence (behavioural). A quantitative document review complimented these processes by examining the quality of HMIS data and allowing the researcher to see first-hand its processes and design. Following common practice on data quality reviews, the methodology examined data accuracy, completeness and timeliness⁶⁷.

Methodology

Setting and Sampling

The research took place in the Sidama Zone, SNNPR, which has a population of over 3.5 million in 19 districts, 2 town administrations and more than 100 health facilities⁶⁸. The project focused on 3 *woredas*/districts, choosing one health centre and two associated health posts from each *woreda*. Thus 3 health centres and 6 health posts were used.

Purposive sampling—sampling with the objectives of the research questions in consideration— was employed to select participants and locations, to represent diversity in geography, health cadre and performance, and to mitigate organisational challenges in the Sidama Zone⁶⁹. The research followed a grounded theory approach, whereby data was collected and reviewed in an iterative process until theoretical saturation was achieved⁷⁰.

Data Collection

Primary qualitative and secondary quantitative data was collected and examined. As both Amharic and the local language Sidamigna are spoken in the Sidama Zone, a research assistant fluent in both languages was employed. A pilot study was completed in a nearby *woreda* to test the research tools, which were then reviewed and adjusted.

Primary Qualitative Data: 17 semi-structured key informant interviews (KIIs) and 3 focus group discussions (FGDs) were conducted (see Table 1, Annex 2 for a breakdown). Only formally employed health workers were included in the study, with HEWs required to have at least one year experience to be eligible for participation. KII/FGD guides were devised using the PRISM framework. The KIIs and FGDs were conducted in the local language, transcribed and translated into English. A random sample of the transcripts were cross-checked for accuracy.

Secondary Quantitative Data: The researcher randomly chose two months from the past year as a sample of HMIS reporting for the data collection process. Data from 13 maternal health indicators used in formal FMOH reports was examined by cross checking official reports and registry books for accuracy, completeness and timeliness, in line with similar studies⁷¹.

⁶⁵ Aqil et al "PRISM Framework"

⁶⁶ WHO "Everybody's Business"

⁶⁷ Chen, H. et al. "A Review of Data Quality Assessment Methods for Public Health Information Systems." *International Journal of Environmental Research and Public Health*. No. 11 (2014)

⁶⁸ Dusabe-Richards et al. *Women Health Extension Workers*, 356

⁶⁹ Bryman, A. *Social Research Methods*. 4th Edition. (Oxford: Oxford University Press, 2012), 418

⁷⁰ *ibid*, 420-6

⁷¹ Chen et al. "A Review of Data Quality Assessment Methods"

Data Analysis

Primary Qualitative Data: Nvivo v.11 was used to code and analyse the qualitative data.

Secondary Quantitative Data: Secondary data was collected in hard copy at the health facilities and analysed for data quality using Microsoft Excel:

Accuracy: Indicators from reports and registries were cross-analysed using an adapted FMOH Data Accuracy Check Sheet tailored for maternal health indicators⁷² (Annex 1). When inaccuracies occurred, the figures were checked for under- or over-reporting by calculating the ratio of reported to registered information.

Completeness: The reports were checked for three components: (1) the chosen 13 indicators; (2) the date; (3) an official signature/stamp.

Timeliness: The date was checked to verify if the report was submitted before the official deadline - the 26th of each month.

Constraints and Limitations

Translation was a constraint during the research. As the researcher did not speak the local language, she relied on a research assistant to communicate with participants. This occasionally led to miscommunications or inconsistencies. Furthermore, the research took place over a ten-week period, posing time limits.

Ethics

Ethical approval was granted by Trinity College Dublin and letters of approval for the study were received by the Regional Health Bureau. Written and/or oral consent was gathered by all participants prior to data collection. Participants were told about the purpose of the research and that they could opt out at any time. Data was anonymised, stored on a password-secured computer and will be held for 36 months.

Preliminary Results

Primary Qualitative Data

The qualitative discussions detailed much information about current barriers to improving the HMIS at the kebele, town, woreda and zonal level. The largest issues centred around organisational factors, particularly training and the availability of resources (both human and material). Technical factors, like formatting, were also heavily referenced. Behavioural factors were also of much importance, especially regarding data quality checking, motivation and problem solving. Concerning data quality, accuracy was the most prominent issue.

Organisational Factors

Training was the most frequently mentioned challenge, with almost universal discussion of its necessity for improved performance on the HMIS. This was particularly emphasised at the kebele level, with all HEWs acknowledging the importance of frequent refresher training to maintain their HMIS skills.

The availability of resources was stressed with regards to material resources, such as registry and tally books. Health centres and posts sometimes had to use make-shift registry books or scraps of paper to record health data, as their filled books had not been replaced. This often led to missing and/or unclear data. Human resources were another factor, with all HEWs associating the HMIS with a high work burden. At the health centre, woreda and zonal levels high turnover in staff, and a lack of trained experts working on the HMIS was often noted. In response, continuous supervision and on-the-job training was frequently mentioned as a possible solution to these barriers.

⁷² Federal Democratic Republic of Ethiopia Ministry of Health (FMOH). *HMIS Information Use Guide. Technical Standards Area 4: Version 2*. Addis Ababa, May 2013., 12

Technical Factors

All HEWs believed that their paper-based HMIS tools were convenient, as it made their work “easy and efficient”. However, two HEWs complained that reporting tools were in English instead of Amharic. This created confusion and data inaccuracies, especially when coupled with training deficits. Relatedly, a health centre HMIS Focal Person believed that these language misunderstandings adversely affected maternal health service delivery. One example he shared pertained to mothers receiving ANC without getting a corresponding HIV test, believing that it was due to a misunderstanding with English.

At the health centre and woreda level, the lack of computers and ICT training was cited as a barrier to improved HMIS reporting. Participants complained about the “bulkiness” and work burden associated with the paper-based system. All health centre HMIS Focal Persons requested a computer for their work, claiming it was difficult use the system efficiently otherwise.

Behavioural Factors

There were varying degrees of motivational factors among health staff for using the HMIS. HEWs mostly felt motivated to use the system to display their completed work, as it was visual evidence of their tasks for superiors: *“It acts like a mirror for our job”*.

Conversely, HMIS Focal Persons at zonal and woreda levels, as well as some health centres, agree that the HMIS is necessary for effective decision-making. Several participants used the line that the HMIS is “working on the life of humans”, requiring a corresponding level of care. Others emphasised an “era of information”, that promotes information as an effective resource. This illustrates two distinct motivations for using the system among HEWs and higher cadres of health staff, similar to other findings in the Sidama Zone by Dusabe-Richards et al⁷³.

Participants had mixed perspectives about data quality checking and problem solving skills. Several participants praised their superiors and the PRT (Performance Review Teams) for evaluating the reports. However, some complained about persistent false reporting. One HEW admitted that their reports were falsified at higher levels, believing it was a widespread problem. Other health staff, including MCH and HMIS Focal Persons, noted the prevalence of “exaggerated” reports, giving the appearance that more work was completed than reality. In one HMIS Focal Person FGD, a participant stated:

“It is terrible that we know that the information we are reporting is wrong, but we are simply preparing wrong reports”

Data Quality

13 (out of 20) interviews/FGDs cited accuracy discrepancies due to factors like a lack of evaluation and supervision; a high work burden; and false reporting. Timeliness was the next cited factor (12/20), with participants emphasising the necessity of on-time reports, as delays lead to problematic data. However, most acknowledged that timeliness is a challenge due to a high work burden associated with the HMIS. Completeness was cited as an issue only by 6 participants, stating it created problems with data interpretation.

Maternal Health Factors

Health staff frequently cited the importance of maternal health data due its potential to change behaviours and track other health indicators (such as HIV testing and child health). Some stated that the HMIS facilitated the tracking of pregnancies in the community. They argued this allowed for greater encouragement of ANC and institutional birth, reducing maternal deaths and problems during delivery. However, many cited that without adequate attention to

⁷³ Dusabe-Richards et al. “Women Health Extension Workers”

the HMIS, these positive effects were overturned. Often when ANC visits were not tracked effectively, home-deliveries would occur or accompanying HIV and syphilis tests were not administered.

Secondary Quantitative Data

Accuracy

Maternal health indicators across the 9 health facilities were reviewed (see annex 1). Health Centre reports were cross-checked against their registers. Health post reports were cross-checked against the corresponding reports at the health centre. 61% of reporting figures were deemed accurate. Of the remaining 39%, 19% were over-reported, 6% under-reported, and 15% missing/incomplete (see Tables 2 and 3, Annex 2). Health centres achieved 55% accuracy; while health posts were 64% accurate.

The most accurately reported indicators included caesarean section (100%); stillbirths (89%) and maternal deaths in the community (83%). However, it was noted there were zero instances of these events in all reports, meaning there was little room for error. While there was no definitive explanation for these figures, one suggested reason was that problem-cases in pregnancies, which could result in stillbirths, caesarean sections or maternal deaths, are usually referred to the nearest hospital.

The highest inaccuracies occurred for Syphilis testing (33%); ANC 4 (44%); and early PNC (44%). There are several possible reasons for this. Firstly, syphilis testing was not possible at certain health centres due to a shortage of reagent, resulting in interrupted recording. Secondly, as Early PNC consisted of three sub-parts - 0-2 days, 2-3 days and 4-6 days - health staff often failed to correctly track the exact time periods. Finally, ANC 4 is considered as a difficult indicator to follow, as some women only receive their first ANC visit late in the pregnancy.

Timeliness

While no reports examined were explicitly 'late', only 56% (10/18) reports contained the date of reception. The remaining 44% did not contain a date, but it is unclear if the report was late or completed incorrectly. For timeliness, the HSTP has a baseline of 84% and aims to have 90% of reports on time by the 2017/18 period⁷⁴. If the 44% of reports are considered late, this goal requires much work. (See Table 4, Annex 2).

Completeness

The HSTP aims to have 90% completeness of reports by the 2017/18 period, with a baseline of 72%⁷⁵. Only 12/18, or 67% of reports met this criterion. A total of 5/6 Health Centre reports and 7/12 Health Post reports met the criteria, indicating most of the problems are at the health post level (see Table 5, Annex 2).

Discussion

Data quality problems clearly exist within the organisational, technical and behavioural components of the HMIS. The diversity of barriers to improving HMIS reporting, both in general and for maternal health, illustrates that a strategy incorporating all three factors is necessary to target HMIS shortfalls. This is evidenced by the fact that many of the identified issues with HMIS by the different interviewees are interrelated, and must be considered holistically to understand why data quality issues arise. For example, difficulties in understanding the language of the reporting forms is an issue both because of the design of the form (technical) and a lack of training (organisational). At each stage, the responsibilities of HEWs, Health Centre, Woreda and Zonal staff will be discussed.

⁷⁴ FMoH, *HSTP*, 179

⁷⁵ *ibid.*

Current Barriers

Impeded Workforce

Qualitative data uncovered problems with training, high work burden and staff turnover. These three factors were often mentioned in tandem and combined to make HMIS work taxing, echoing existing literature⁷⁶⁷⁷. Work burden and a lack of training were especially felt by HEWs, who faced challenges in balancing their patients' treatment and recording their activities. This is particularly burdensome for HEWs who work solo.

One HEW mentioned they would frequently forget to record what treatments they provided, as patients would continuously arrive to the health post:

"After we finished treating one person, before we record that work, the other [patient] will come. Due to this we may forget to record the previous work."

Many complaints from health centre and woreda staff focused on a lack of skilled manpower, frequently worsened by high staff turnover. This created an extra burden on other staff in the centre, many of whom had a 'double burden', holding another role in addition to acting as a HMIS Focal Person, reflecting previous findings⁷⁸. At the zonal level, it was acknowledged that when there are no adequately trained HMIS Focal Persons, they resort to using one of their junior assistants for the work.

Resources and Design

A widespread complaint from all health cadres was the shortage of material resources (like registry books) to record HMIS data. An FGD with HMIS Focal Persons explained these shortages result in "uncomfortable working situations or bad environments", with one participant adding that this leads to "no interest to work on the HMIS". These shortages lead to shortfalls in data quality, reiterating Braa et al.'s claim that data quality and data usage are interlinked⁷⁹. Another complaint about the design, as discussed above, was that the reports were in English. While this complaint mainly arose from HEWs, it was also acknowledged by some woreda and zonal officials.

HEWs appear mostly satisfied with the paper-based recording formats. But while this system may be practical at the *kebele* level, those at health centre level and above complained about the paper-system's "bulkiness", in one case saying that it was unsustainable. They have argued that the lack of e-health and computerised resources for data collection and analysis impedes their potential to work more efficiently.

Commitment to Data Quality

It was shown that issues with data accuracy, timeliness and completeness exist, often occurring due to the issues discussed, like high work burden and training and resource deficits. While some respondents were silent on the subject (perhaps due to fear of reproach), others openly expressed their experiences and suspicions of data falsification and "exaggeration", believing that it occurred to give the impression that the health facility was performing better than in reality.

Another aspect of ensuring data quality may rely on why the respondents believe that data quality is important. At the lower levels (all HEWs and some health centre Focal Persons), the motivation for using the HMIS rested upon individual work performance. However, at the higher levels, and with some health centre Focal Persons, the motivation for HMIS was due to better healthcare for patients. This represents a clear divide in the commitment to maintaining data quality.

⁷⁶ Kihuba et al. "Assessing the availability"

⁷⁷ Kimaro and Nhampossa, "Challenges of Sustainability"

⁷⁸ Kintu et al. "Development of HMIS"

⁷⁹ Braa et al "Improving quality and use", 379

Recommendations

There was universal agreement among participants that the HMIS held much importance for their work. Many cited their appreciation for the system and their desire to ensure its success. This was seen in their willingness to suggest possible solutions for their grievances.

Training was frequently cited as the most important aspect for improving HMIS performance, as it has the potential to target several challenges, including staff turnover and knowledge retention. Refresher courses are one possible solution. However for sustainability of the system, a zonal official recommended that training must be ingrained into the HMIS at all levels, allowing for more targeted supervision, feedback and on-the-job training to avoid the problems identified. Such organisational initiatives promise much potential, as it was previously found to promote an effective but low-cost way to improve HMIS performance⁸⁰.

Relatedly, continuously stimulating responsibility of the HMIS among the different health cadres facilitates ownership of the system⁸¹. This can develop user motivation by encouraging better understanding of its benefits at the professional level (for displaying the work done) and within the community (helping to identify health trends to save patients' lives). This type of system can also foster improved communication among the different health cadres, potentially curbing other HMIS shortfalls, like false reporting, a lack of materials and Amharic-English difficulties. By enabling greater interaction among health cadres about the HMIS, widespread problems can be identified and discussed with higher officials.

Technical and organisational challenges, like requests for e-health, more resources and English-Amharic translations, appear to have a simple solution but require a higher financial and resource commitment. E-Health carries many benefits, but, as discussed, also brings external challenges like power outages and resource constraints^{82,83} and is a high-cost solution compared to the human resource initiatives discussed⁸⁴. A potential answer comes with the m-Health projects currently being piloted in certain woredas in the Sidama Zone. If successful, it could be scaled up to health centres that are struggling with a lack of electronic resources. For language struggles in the HMIS, it is worth exploring whether bilingual reports or guides can be created and distributed on request, as the simplification of forms has been found successful for data quality in past studies⁸⁵. Regarding the lack of material resources, one of the largest complaints, steps should be taken to ensure stock outs end and that necessary replacements arrive on time.

These issues have an impact for maintaining proper recording of maternal health indicators, particularly those which are time sensitive (such as post-natal care in the immediate days following delivery). From the data review, it was evident that several important milestones within maternal health (particularly ANC4 and PNC) faced challenges in reporting, with only 44% accuracy for ANC4 and PNC respectively. By tackling the above barriers, it is hoped that the reporting for maternal health indicators will benefit from this.

To conclude, it is evident that the HMIS plays an important role for decision-making. However, by exploring its use at the community, district and zonal level in the Sidama Zone, it is clear that many problems exist at the technical, organisation and behavioural levels. This poses many barriers to improving the functioning of the HMIS and will require a comprehensive strategy to ensure its sustainability and scalability. As the HSTP progresses, the HMIS will be increasingly required to support the ambitions of Ethiopia's health system and must deploy a corresponding strategy in response.

⁸⁰ Ledikwe et al. "Improving the Quality", 8

⁸¹ Kimaro and Nhampossa, "Challenges of Sustainability", 7

⁸² Dusabe-Richards et al. "Women Health Extension Workers", 359

⁸³ Aranda-Jan et al. "Systematic Review", 11

⁸⁴ Ledikwe et al. "Improving the Quality", 8

⁸⁵ Braa et al. "Improving quality and use", 380

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Annex

1. Data Accuracy Check Sheet

Month: _____

Indicator Number	Indicator	Source & figures		Is it a match?	
		Report	Register	Yes	No
C1.1.1.1.	Contraceptive acceptance rate				
C1.1.1.2	Antenatal care coverage – First visit				
C1.1.1.3	Antenatal care coverage – Four visits				
C1.1.1.4 *	Percentage of pregnant women attending antenatal care clinics tested for syphilis				
C1.1.1.5 *	Proportion of births attended by skilled health personnel				
C1.1.1.6 ◇	Proportion of births attended by health extension workers at Health Post				
C1.1.1.7	Early postnatal care coverage:				
	0-2 Days				
	2-3 Days				
	4-6 Days				
C1.1.1.8 *	Caesarean section rate				
C1.1.1.9 *	Number of women receiving comprehensive abortion care services				
C1.1.1.10 *	Institutional Maternal deaths				
C1.1.1.11 ◇	Number of maternal deaths in the community				
C1.1.1.12	Stillbirth rate				
C1.1.1.13 ◇	Proportion of kebeles declared 'home delivery free'				
Total:					

* = specific to Health Centres

◇ = specific to Health Posts

2. Tables

Table 1. Research Participants

Zonal Level	District 1	District 2	District 3
Zonal HMIS Focal Person	District HMIS Focal Person	District HMIS Focal Person	District HMIS Focal Person
Zonal MCH Focal Person	HMIS Focal Person – Health Centre	HMIS Focal Person – Health Centre	HMIS Focal Person – Health Centre
	MCH Focal Person – Health Centre	MCH Focal Person – Health Centre	MCH Focal Person – Health Centre
	2 Health Extension Workers	2 Health Extension Workers	2 Health Extension Workers
	Focus Group Discussion with HMIS Focal Persons	Focus Group Discussion with HMIS Focal Persons	Focus Group Discussion with HEWs

Table 2: Total Accuracy

Accurate:	61%
Over reported:	19%
Under reported:	6%
Missing:	15%

Table 3: Accuracy by Indicator

	Indicator	Accuracy	Over Reported	Under Reported	Missing
C1.1.1.1.	Contraceptive acceptance rate	61%	28%	11%	0%
C1.1.1.2	Antenatal care coverage – First visit	50%	33%	11%	6%
C1.1.1.3	Antenatal care coverage – Four visits	44%	39%	11%	6%
C1.1.1.4 *	Percentage of pregnant women attending antenatal care clinics tested for syphilis	33%	67%	0%	0%
C1.1.1.5 *	Proportion of births attended by skilled health personnel	50%	50%	0%	0%
C1.1.1.6 ◇	Proportion of births attended by health extension workers at Health Post	67%	0%	17%	17%
C1.1.1.7	Early postnatal care coverage	44%	28%	11%	17%
C1.1.1.8 *	Caesarean section rate	100%	0%	0%	0%
C1.1.1.9 *	Number of women receiving comprehensive abortion care services	50%	0%	17%	33%
C1.1.1.10 *	Institutional Maternal deaths	67%	0%	0%	33%
C1.1.1.11 ◇	Number of maternal deaths in the community	83%	0%	0%	17%
C1.1.1.12	Stillbirth rate	89%	0%	0%	11%
C1.1.1.13 ◇	Proportion of kebeles declared ‘home delivery free’	50%	0%	0%	50%

* = specific to Health Centres

◇ = specific to Health Posts

Table 4: Timeliness

Total: 18	On time:	10		56%
	Late	0		0%
	No date:	8		44%

Table 5: Does the report meet the 90% completeness criteria?

Yes	No
12	6
67%	33%

3. Terms and Acronyms

ANC – Antenatal Care

CHW - Community Health Worker

DHS – Demographic and Health Survey

FGD – Focus Group Discussion

FMoH – Federal Ministry of Health

HEW – Health Extension Worker

HIS – Health Information System

HIV – Human Immunodeficiency Virus

HMIS – Health Management Information System

HSTP – Health Sector Transformation Plan

Kebele - Village

KII – Key Informant Interviews

PNC – Postnatal Care

PRISM - Performance of Routine Health Information System Management

SDGs – Sustainable Development Goals

SNNPR – Southern Nation, Nationalities and People’s Region

Woreda - District

WHO – World Health Organisation