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Original Research Article

Factors affecting data quality of health management information system at township level, Bago region, Myanmar

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ABSTRACT

Background: Health information from Health management information system (HMIS) is the core essential operator for strengthening the health system. The effectiveness of the Myanmar health system is challenged by the poor-quality assurance of healthcare data.
Methods: The aim of the quantitative study was to evaluate the township HMIS to assess the factors affecting the data quality assurance through three main aspects; organizational, technical, and behavioral. In this cross-sectional study, eight townships from four districts in Bago Region were randomly picked. Under these townships, from a random sample of 117 public health facilities altogether, 273 public health professionals (PHPs) were culled and 291 HMIS registers and 1270 HMIS monthly reports were reviewed. The researchers applied the PRISM tools developed for assessing district and facility HMIS. SPSS assisted the researchers in computing the frequencies and percentages, practicing cross-tabulation, and analyzing bivariate statistics using the Cox proportional hazards model.
Results: Out of 281 PHPs invited, 273 were likely to participate in this study. The overall prevalence of the HMIS data quality was 30.4%. Poor data quality assurance was associated with the burden of workload (95%CI-1.16-2.91), poor management ability of the supervisors (95%CI-1.22-2.54), weak handover practice of the HMIS document (95%CI-1.65-2.22), and unavailability of HMIS resources (95%CI-1.12-2.45). The statistically significant relationships were found between low-quality data and some technical factors such as inexpertness for data analysis (95%CI-1.14-2.19), over-workload of paper-based HMIS (95%CI-1.21-2.44), differences between information systems (95%CI-1.22-2.81), and multiple reporting (95%CI-1.64-2.36). There were significant associations between the unacceptable data quality and the human factors such as lower scores of perceived confidences (95%CI-1.18-2.29), competence (95%CI-1.17-2.77), and promotion of the culture of information (95%CI-1.09-2.33).
Conclusions: Current township HMIS data quality is unacceptable. It is necessary to strengthen several factors relating to organization, technology and behaviors of HMIS and to develop the effective township-level strategic plan for improving data quality.

Keywords: HMIS data quality, Determinant factors, Township level

INTRODUCTION

HMIS is a system that provides health information to health-related departments and organizations. It is responsible for completing the common cardinal processes such as data collection, compilation, submission, processing, and analysis, interpretation, dissemination, and manipulation, in which the collected healthcare data is transformed into manageable health information to make the evidence-based decision.[1] Such steady health information of HMIS is the central important operator for programming, planning, monitoring, and evaluating the healthcare services and the core essential messenger for strengthening the health system.[2] For a health system, the more the HMIS is strengthened, the better decisions the healthcare authorities can make, as well the better healthcare outcomes can be produced over time.[3] A review

of Thein-Hlaing and Thant-Zin discussed that when the HMIS data are poor in quality, the health risks are unpredictable promptly, and healthcare-related management activities are not able to be organized effectively.[4]

Looking at the Myanmar health system, all core components are mainly managed by health information of the HMIS. However, the Myanmar health system is less effective because the poor-quality assurance of the HMIS data is found in almost all states and regions especially at their township operational levels. In Myanmar HMIS between 1978 and 2019, the programmers could integrate the separated health information systems, review and revise the data dictionary, standardize the reporting formats, upgrade the records and registers, and widely adopt the DHIS-2 software at the township level. Although these improvements are visible, the better quality of the HMIS data has not been found yet.[5] For example, in 2011, the HMIS indicators generated from 34% of the health facilities under the State and Regional health departments were not representative of the real health situations.[6] Furthermore, in 2016, when some indicators reported in the Myanmar HMIS were counterchecked with other valid references (MDHS and WSD), these indicators had significant discrepancies.[7] In 2015 and 2016, two Myanmar studies of May-Lynn-Htun and Win-Naing concluded that the HMIS data were insufficiently qualified.[8,9]

Until 2017, the Myanmar HMIS has been facing organizational, technical, and human-related problems. The HMIS programmers have not assigned the HMIS focal person at every operational level. Their assigned staff is insufficient, less skillful, and unpowered. Most of the HMIS implementers exercise the HMIS without a strategic plan, policy, and goal. Further, the Myanmar HMIS programmers rely on external donors and agencies heavily for information technology.[7] At the township levels, the HMIS has not provided comprehensive and reliable data and still requires meeting the actual population health needs. Frequently, the HMIS data of the township health facilities come to be questioned for their completeness, representativeness, accuracy, and consistency.[7] Here, there may be many reasons why the quality of the township HMIS data is in poor. The aim of the quantitative study was to evaluate the township HMIS to examine the organization, technology, and human-related factors affecting the data quality.

METHODS

To cull an enough and random sample, this cross-sectional study applied two-stage sampling. In the first stage, Bago region was partitioned into four clusters according to its districts (Bago, Taungoo, Pyay, and Tharyarwaddy) and two townships were randomly picked from each cluster. The stand-alone health units such as TPHDs and MCHCs were totally culled from every selected township of each cluster. In the second stage, the researchers randomly sampled 25%-33% of public health facilities per each selected township.

Accordingly, a random sample of altogether 117 public health facilities and 273 public health professionals (PHPs) from these health facilities within eight selected townships (Shwedaung, Paungde, Zikone, Minhla, Thanatpin, Kyauktada, Phyu, and Taungoo) were in total. The respondents were different in positions and Table 1 shows their samples according to districts and townships.

Table 1: Study sample and population.

District	Township	Health facilities	Healthcare staff							
			TMO	HA-1	TPHN	HA	LHV	PHS-1	PHS-2	MW
Bago	Thanatpin	13	1			3	1		9	13
	Kyauktada	24	1			4	3	3	16	25
Taungoo	Taungoo	16	1	1	1	2	2		6	16
	Phyu	16	1			2	1		10	18
Pyay	Shwedaung	13	1	1	1	4	2	2	13	17
	Paungde	13	1	1	1	2	3	1	12	15
Tharyarwaddy	Zikone	8	1		1	1	2	1	12	9
	Minhla	14	1			1	4	1	9	13
Total		117	8	3	4	19	18	8	87	126

Note: TMO- Township medical officer, HA-1- Health assistant-1, TPHN- Township public health nurse, HA- Health assistant, LHV- Lady health visitor, PHS-1- Public health supervisor-1, PHS-2- Public health supervisor-2, MW- Midwife.

Data sources and collection tool

For identifying the HMIS organizational, technical, and behavioral issues, the primary data were collected by interviewing the participants responsible for the HMIS performance, by observing the HMIS documentations, and by checking the availability of the HMIS infrastructure with checklists. Data quality judgment was conducted on the selected indicators of the HMIS records, registers, and reports during June and July 2019. Among the data items of HMIS records and registers, the new attendances from the out-patient department, the number of attendances from the field registers, the number of birth and death from the vital event registers, the number of children immunized for penta-3 from EPI registers, the number of new antenatal attendances from maternal records were selected

as the core interventional data items for assessing the data accuracy. The cells to be completed and submission dates on the HMIS reports were examined for report completeness and timeliness in the same months of 2019.

In this study, the HMIS data quality was defined by three dimensions; completeness of reported indicators, reporting timeliness, and accuracy. Here, the completeness of reported indicators was judged by the percentage of observed data elements out of those to be inserted into the individual report (form-1A), and combined report (form-1B).

To verify the reporting timeliness, the coverage of monthly reports received within the reference deadline was computed. The HMIS reports were considered to be completed and in time when the resulting percentages of both completeness and timeliness were 90% and above. In justifying the HMIS data accuracy, the researchers compared the selected indicator inserted into the reports and the based-line notes from the five selected HMIS registers at facility levels and observed the differences of the declared indicators between the combined reports (form-1B) and DHIS-2-files at the township levels. The HMIS data were determined as the accurate data when the differences were equal and less than 5%. The overall quality of the HMIS data recorded and reported by the individual sample was judged as good when all three dimensions were consistent with acceptable levels.

Out of the PRISM toolset (2018 version), four PRISM tools were applied and their internal consistency was in a range of 0.72 and 0.89.[10,11] The HMIS performance diagnosis tool developed for district and facility levels was used to determine the HMIS data quality and to identify the determinants relating to the HMIS technology. The facility and office checklist also determined more technical determinants and assessed the availability of the HMIS resources. For determining the organization and human factors, OBAT was applied. More information that can assess the participants' workload and perceptions towards the current paper-based HMIS was added to the management assessment tool. PRISM tools user guide helped the researchers how to evaluate and conclude the determinants that affect the HMIS data quality.

Data management and analysis

After checking the collected data, these data were coded according to the PRISM tools user guide. IBM SPSS Statistics assisted the researchers in developing a reproducible data set and for analyzing the complex data. The average, standard deviation, percentages and mean percentiles were computed and presented according to the types of variables in the descriptive statistics. For the component of the analytic statistics, the Cox proportional hazards model was used to examine the specific influencing factors. The Wald test was used to evaluate whether the variables have statistically significant coefficients. The presence of a significant contribution was determined when the P values were less than 0.05 and a 95% Confidence interval (95%CI) for Hazard ratios (HR) did not include the null hypothesis of 1.

All research works took 20 months (January 2020 to October 2021) to be completed due to the Covid-19 pandemic.

RESULTS

Description of the study sample

Despite inviting 281 PHPs from a total of 117 health facilities, 273 were likely to participate in this study, thus the information was missed from 2.8% of the respondents. For making the judgment of HMIS data quality, 291 HMIS monthly reports, 1270 HMIS registers, and 8 township files-DHIS2 were tracked from health facilities of the respondents. This study sample was composed of 31.87% PHS-2, 46.15% mid-wives, 6.96% HA, and 6.59% LHV and included 73% women. The average age of study participants and their average age of civil service experience were 38.3±8.3 years and 16.13±5.53 years, and their vast majority (96%) had a bachelor's degree. During the last 12 months, 92.3% of study participants have been trained in the HMIS in a form of special training, refresher training, and CME.

Associated factors of HMIS data quality

Overall, the HMIS data of 190 out of 273 samples (69.6%) were poor in quality and 30.4% were deemed well in their data quality. In the particular criteria, the HMIS monthly reports of all samples (100%) were acceptable for the timeliness criteria, but only 83 (30.4%) and 87 (31.9%) were acceptable for the data accuracy and the reporting completeness respectively.

Regarding the organizational issues, of all PHPs evaluated, only 63 (23.1%) had the management structure and mission statement, the defined focal staff, and schedule of planned training for HMIS, 180 (65.9%) practiced the HMIS document handover informally. Regarding data quality auditing and supervision, there were 69.9% who have no experience with data quality audits, and they were also supervised irregularly. In this study, the abilities of HMIS supervisors were examined through four categories as use of supervisory checklists, checking data quality, discussion about data quality, and helping decision-making processes of the HMIS implementers (Table 2).

186 (68.1%) revealed that the supervisory skills of their supervisors need to be improved. In the capacity building on HMIS, only 40.3% were trained in the forms of the training program that covered the important skills for data collection, processing, interpreting, and display. This study assessed the workload through five dimensions such as the number of reports to be submitted, duplication of reports, number of registers to be completed, the average number of working days, and types of feedback (Table 2). As a

result, 194 (71.1%) received feedback relating to the error entry and inconsistency of the HMIS data and 222 (81.3%) were high in workload. In this study, resource availability was measured by the accessibility to HMIS office, cabinets/shelves, computer, computer desk, calculator, A-4 paper supply, power supply, Wi-Fi, HMIS registers, focal staff, operational cost, and memory stick cards (Table 2). The individual who had access to 7 out of these HMIS resources was defined as good availability. Of the total evaluated, 176 (64.5%) had limited resource availability.

Regarding the technical issues, according to the statement of PHPs evaluated, current paper-based HMIS needs extensive record management (78%), is more laborious (70.7%), and are less connected to each other (50.9%). In this current system, its data collection and reporting instruments are fragmented (73.6%), complex (54.9%), large in number (65.9%), overly large number of cells (38.8%), its report formats are too long (40.7%), its reporting is frequently duplicated (67%), and its registers take a long time for complement (79.9%). Further, of this total, 162 (59.3%) had poorly utilized the HMIS records and registers, 98 (35.9%) were less understandable the meanings of the contents of the HMIS manual, and 211 (77.3%) had not received any support for technical advanced skills and operational costs. In this evaluation, the complexity level of current HMIS was 59.7%±19.8 on average.

Regarding human factors, only about one-quarter of PHPs evaluated were aware of the HMIS concepts and rationale, and more than two-thirds had less opportunity to learn about HMIS due to over workloads. In examining the computing, plotting, and interpreting skills through four case studies, about a half could convert numbers to percentages, and percentages to numbers in the correct manner. Two-thirds could not develop a right graph with coverage percentages by years and the majority could not interpret the data of the case study in the questionnaire comprehensively. The perceived confidence and competence levels were examined through six contributes such as the ability to understand the HMIS background, ability to check data quality, ability to calculate, plot, interpret and use the HMIS data (Table 3). In this study, the overall mean percentile scores of perceived confidence and observed competence for the HMIS tasks were 65.3±9.2% and 58.3±10.9%.

In evaluating the promotion of a culture of the HMIS data, 174 (63.7%) have evaluated and discussed the HMIS data as declared period, 140 (51.3%) used the HMIS data in evaluating the situations of public health activities and developing facility health plan and EPI micro-plan. For the perceived promotion of a culture of information, the mean percentile score of all measurements was 60±7.1%.

Organizational factors

In the organizational factors, workload and work pressure (HR: 1.79; 95%CI-1.16-2.91), the supervisors' low abilities for the HMIS management (HR: 1.53; 95%CI-1.22-2.54), irregular supportive supervision (HR: 1.63; 95%CI-1.02-2.86), and unmethodical handover of the HMIS documents (HR: 1.52; 95%CI-1.65-2.22) were the significant risk factors of unacceptable data quality.

Irregular HMIS data audit was more at risk of unacceptable data quality (HR: 1.69; 95%CI-1.01-2.31) and operating the HMIS tasks without a budget (HR: 1.79; 95%CI-1.08-2.75) and with limited resources (HR: 1.81; 95%CI-1.12-2.45) were more at risk of the unsatisfactory quality level. In this result, the significant differences were not found if there were standard operational procedures, targets, operational setup, authorized person, and training schedule for the HMIS development (95%CI-0.77-2.41) if the positive feedback was provided for the HMIS data quality improvement (95%CI-0.78-1.88), if the roles and responsibilities of the HMIS implementers were clearly defined (95%CI-0.58-1.66), and if the HMIS training was delivered in the past twelve-months period (95%CI-0.51-1.59).

Technical factors

The probabilities of being unacceptable data quality were higher among the unskilled staff for the HMIS techniques and procedures, and data analysis (HR: 1.72; 95%CI-1.14-2.19). Likewise, a higher probability of being unacceptable data quality was found among PHPs who expressed requirement of greater effort for the paper-based HMIS (HR: 1.61; 95%CI-1.21-2.44), detachment of an information system from another (HR: 1.68; 95%CI-1.22-2.81), the multiplicity of submission forms (HR: 1.49; 95%CI-1.64-2.36), the time consumption of the HMIS tools for complement (HR: 1.74; 95%CI-1.31-2.41), and presence of duplication in submitting the HMIS reports (HR: 1.63; 95%CI-1.44-2.47).

However, regarding the design of the current paper-based HMIS, the requirement of extensive record management (95%CI-0.58-1.66), breaking into different registers and reports (95%CI-0.65-1.49), the complicatedness of data collection instruments (95%CI-0.81-2.22), formatting long numbers in the HMIS reports (95%CI-0.55-1.68), large quantities of cells on the HMIS data collection tools (95%CI-0.81-1.84) and less understandability about the operational definitions of the HMIS manual (95%CI-0.66-1.76) were not significantly linked with the probability of being the unacceptable level of data quality.

Human factors

Among components of human factors, unawareness of the HMIS concepts (HR: 1.58; 95%CI-1.26-2.29), less understanding of basic knowledge and skill in calculating the HMIS data (HR: 1.52; 95%CI-1.09-2.33), illustrating the graphs with the computed coverage (HR: 1.84; 95%CI-1.28-2.83), and analyzing and interpreting the HMIS data (HR: 1.66; 95%CI-1.17-2.77) were the major factors of unacceptable data quality. The significant difference was

noted as evaluated in the score of perceived confidence. Indeed, the group who had the lower score for perceived confidence was more at risk of unacceptable data quality than the group who had a better score (HR: 1.51; 95%CI-1.18-2.29).

Also, the comparisons, as evaluated between the better and lower score of competence level in HMIS tasks (HR: 1.66; 95%CI-1.17-2.77), and better and lower promotion of a culture of information (HR: 1.52; 95%CI-1.09-2.33), were statistically different.

Table 2: Measurements of HMIS data quality and some organizational factors by frequencies and percentages.

Indicators	N	%
Frequency of supervision during last three months		
0 time	82	30.1
1-2 times	191	69.9
Use of supervisor's checklist during last three months		
Presence	83	30.4
Absence	190	69.6
Checking data quality by supervisor during supervision		
Check	87	31.9
Not check	186	68.1
Discussion about data quality by supervisor during supervision		
Discuss	87	31.9
Not discuss	186	68.1
Helping for decision-making by supervisor during supervision		
Help	84	30.8
Not help	189	69.2
Presence of supervision notes for last three months		
Observe	82	30.1
Not observe	191	69.9
HMIS resource availability (HMIS office)		
Yes	13	4.8
No	260	95.2
HMIS resource availability (cabinet/shelves)		
Yes	97	35.5
No	176	64.5
HMIS resource availability (computer desk)		
Yes	18	6.6
No	255	93.4
HMIS resource availability (computer)		
Yes	42	15.4
Not	231	84.6
HMIS resource availability (calculator)		
Yes	210	76.9
No	63	23.1
HMIS resource availability (A4-paper supply)		
Yes	41	15.02
No	232	84.98
HMIS resource availability (power supply)		
Yes	269	98.5
No	4	1.5
HMIS resource availability (Wi-Fi)		
Yes	14	5.1
No	259	94.9
HMIS resource availability (registers)		
Yes	100	100
No	0	0
HMIS resource availability (focal)		
Yes	42	15.4

Continued.

Indicators	N	%
No	231	84.6
HMIS resource availability (operational cost)		
Yes	42	15.4
No	231	84.6
HMIS resource availability (memory stick card)		
Yes	89	32.6
No	184	67.4
HMIS training (schedule)		
Presence	63	23.1
Absence	210	76.9
Frequency of training on HMIS last one year		
0 time	28	10.3
1-2 times	245	89.7
Frequency of CME on HMIS last one year		
0 time	21	7.7
1-2 times	252	92.3
Last HMIS training/ CME covered on		
Only data collection	252	92.3
Both data collection and analysis	211	77.3
All of data collection, analysis and display	110	40.3
Workload (number of reports to be submitted by individual health workers) for the last 12 months		
Less than and equal 100	87	31.9
More than 100	186	68.1
Workload (number of duplicated reports to be submitted by individual health workers) for the last 12 months		
Less than and equal 50	55	20.1
More than 100	218	79.9
Workload (number of registers to be completed by individual health workers currently)		
Less than and equal 10	67	24.5
More than 10	206	75.5
Workload [average number of working days noted on OPD and field registers by individual health worker (as of July and August 2020)]		
Less than and equal 20	51	18.7
More than 20	222	81.3
Workload (type of feedback received)		
Constructive feedback received	79	28.9
Unconstructive feedback received	194	71.1

Table 3: Measurements of perceived confidence levels and competence levels for HMIS tasks by mean percentile scores and 95%CI.

Measurements	Perceived confidence levels of PHPs evaluated			Competence levels of PHPs evaluated		
	Mean percentile	95%CI		Mean percentile	95% CI	
		Lower bound	Upper bound		Lower bound	Upper bound
Ability to understand HMIS concepts	60.5	53.8	67.2	49.8	39.6	60
Ability to check data quality	60.5	53.8	67.2	59.6	55.4	63.8
Ability to compute	86.8	77.6	96	72.6	61.5	83.7
Ability to plot	60.1	53.4	66.8	53.2	34.1	72.3
Ability to interpret	50.1	39.8	60.4	47.8	40.2	55.4
Ability to use the HMIS data	73.8	58.2	89.4	66.5	56.4	76.6

Table 4: Factors affecting the HMIS data quality and hazard ratios with their 95%CI.

Key factors affecting the HMIS data quality	Parameter estimate	P value	Hazard ratio (HR)	95% CI for HR	
				Lower bound	Upper bound
Organizational factors evaluated					
Absence of HMIS management structure and mission statement, focal person and training schedule	210	0.198	1.39	0.77	2.41
Unsystematic HMIS documents handover	180	0.048	1.52	1.65	2.22
Not defining the HMIS implementers' roles and responsibilities	213	0.892	1.13	0.58	1.66
Irregular supportive supervision	191	0.007	1.63	1.02	2.86
Lack of data auditing	191	0.001	1.69	1.01	2.31
Poor management abilities of the HMIS supervisors on the HMIS tasks	186	0.012	1.53	1.22	2.54
Interruptive and incomplete training on HMIS	110	0.68	0.83	0.51	1.59
Workload and work pressure	222	0.001	1.79	1.16	2.91
Lack of positive feedback	194	0.311	1.14	0.78	1.88
No budget for the HMIS performance	231	0.005	1.79	1.08	2.75
Less availability for HMIS resources	176	0.004	1.81	1.12	2.45
Technical factors evaluated					
Lack of skilled technical staff	172	0.042	1.72	1.14	2.19
Extensive record management of the paper-based HMIS	213	0.892	1.13	0.58	1.66
Laboriousness of the paper-based HMIS	193	0.016	1.61	1.21	2.44
Disconnection between information systems	139	0.019	1.68	1.22	2.81
Fragmented recording and reporting	201	0.66	1.08	0.65	1.49
Complexity of data collection instruments	150	0.058	1.39	0.81	2.22
Large number of submission forms	180	0.046	1.49	1.64	2.36
Too long format of the HMIS report	111	0.79	0.91	0.55	1.68
Overly large number of cells on the HMIS data collection tools	106	0.47	1.33	0.81	1.84
Taking a long time for the complement of the HMIS registers	218	0.001	1.74	1.31	2.41
Duplication of the reports	183	0.001	1.63	1.44	2.47
Low ability to understand the operational definitions of the HMIS manual	98	0.353	1.12	0.66	1.76
Lack of technical and financial support	211	0.001	1.78	1.44	2.29
Human Factors Evaluated					
Less awareness of the HMIS concept & rationale	206	0.033	1.58	1.26	2.29
Lack of learning opportunities for HMIS	186	0.333	1.33	0.79	1.77
Poor skill for computing the HMIS data	154	0.041	1.52	1.09	2.33
Poor skill for plotting the HMIS data	183	0.003	1.84	1.28	2.83
Poor skill for analyzing and interpreting	220	0.002	1.66	1.17	2.77
Low perceived confidence for HMIS tasks	218	0.045	1.51	1.18	2.29
Low competence in the HMIS tasks	220	0.002	1.66	1.17	2.77
Lack of evaluation and discussion on the HMIS performance	99	0.791	1.41	0.53	1.39
Lack of use of the HMIS data	133	0.699	1.38	0.51	1.78
Less promotion of culture of information	154	0.041	1.52	1.09	2.33

DISCUSSION

This cross-sectional study was foremost in applying the PRISM framework and its data collection tools and might cover the different issues of the determinants influencing the township HMIS data quality if compared to the previous studies focusing on the HMIS in Myanmar.[6,8,9,12] This study, as a study sample, could draw 25%-33% of public health staff and healthcare settings from each township healthcare system as recommended by WHO.[13] However, this effort could not directly provide the challenges encountered in hospital information systems. In

the judgment of the HMIS data quality, this study could not apply the LQAS technique that is very useful for determining the acceptable or unacceptable quality level systematically.[14,15,16] However, many studies applied a completeness dimension to examine the quality level of HMIS data. A review of Hlaing et al and Zin et al argued that although the data quality can be verified by different aspects, completeness, timeliness, and accuracy are the most frequently used attributes.[4] In this study, the completeness and timeliness rates, and accuracy were applied as the proxies for measuring HMIS data quality.

The aim of the study was to determine the current prevalence of data quality at the township HMIS. As a revelation, the prevalence of acceptable quality was 30.4%. This figure is very low if compared with overall data quality proportions (75.3% and 75%) resulting from Ethiopian studies by Teklegiorgis et al and Ouedraogo et al done on similar healthcare settings.[17,18] The most common reasons happening in this result were filling the reports with over-representatives and registers with under-representatives and submitting the reports with many void cells. This similar situation was also found in recent studies from different countries; Tanzania, Ethiopia, and Rwanda.[18-20] Besides, this study reported 100% timeliness coverage. This figure is consistent with the national report timeliness rate (97%) in Myanmar in 2017, but highly different from the report timeliness rates in a Myanmar study of Saw et al and an Ethiopian study of Ouedraogo et al at 50% and 70% respectively.[7,12,18] This study reported the prevalence of 31.9% for report completeness and 30.4% for data accuracy. For report completeness, a discrepancy might be also found between this study and the previous Myanmar studies due to differences in measurements. For example, Saw's et al study examined the report completeness percentage based on the number of reporting units while this study considered the number of void cells in calculating this percentage.[12] For data accuracy, an assessment of Myanmar HMIS in 2017 supports this study revelation and this assessment reported lower than 33% of data accuracy was found in the State and Regional HMIS[7]. In comparing with another Ethiopian study in 2020, the proportions of report completeness (86%) and data accuracy (46%) evaluated at primary healthcare facilities were higher than these proportions of this study.[21]

The objective of this study was to observe different possible causes of the under-quality of the township HMIS data. As organizational issues, excessive workload, incomplete handover, weak exploration and resolution of HMIS data quality issues, limited resources, and unavailability of finances especially fault-finding supervision were majorly responsible for the unacceptable quality of the HMIS data. Theoretically, bad supervision is closely related to the development of conflicts, work burnout, reduction of job satisfaction, declination of performance, and unfriendly relationship, which in turn lead to poorer data quality.[22] These revelations were consistently conveyed in the outcomes of updated studies conducted by Mboera et al in Tanzania, and Kebede, Adeba et al in Ethiopia.[19,21,23] Besides, these findings cause PRISM's concepts more confirmable. Although in this study the HMIS data quality was not directly linked with other organizational factors (e.g.; HMIS training), these issues might be closely related to the behavioral factors that may have a direct effect on the HMIS data quality.[22]

Concerning technical issues, the quality of the HMIS data was unacceptable due to three major issues relating to technical skill and supports, paper-based HMIS and report formatting. The HMIS implementers at primary levels process the HMIS tasks with poor technical skill and they have no support of operational cost, as well as they feel exhaustive due to over workload of the paper-based HMIS. Besides, the information systems that they are operating are disunited. Further, they have separated report forms to submit, require spending much time working with HMIS tools, and have to submit similar reports to different health sectors repetitively. These HMIS technical issues were agreed with the most recent studies done on similar healthcare settings across the same designs in Tanzania in 2020, and in Ethiopia in 2021.[19,24] Also, another Ethiopian mixed-methods study reported similar technical issues that filling several registry forms, parallel reporting, and difficulties in integrating the HMIS data from disharmonized sources cause the HMIS data poor.[25] In this study, long reporting formats and meanings of the HMIS manual's contents do not affect the HMIS data quality. This happening may be because of the benefits of the third revision of the HMIS data collection tools and data dictionary in 2018 for being more comprehensive form.[5]

In this study, the HMIS data quality was more likely to be unacceptable if less awareness about the importance of HMIS data, poor data management practices, poor confidence and competence levels in HMIS tasks, and less promotion of a culture of information were found among the HMIS implementers. This revelation establishes the important issues of human factors conceptualized in the PRISM framework.[22] This finding is supported by a recent Ethiopian study that was conducted in similar healthcare settings to identify the factors associated with the management of healthcare data among 643 health professionals.

In their conclusion, higher knowledge about the HMIS rationale, better practices in the transformation of health data to the manageable health information, and positive attitude towards all processes and performance of HMIS were not only influencers on the HMIS-related technical and organizational developments but also contributors to the improvement of the HMIS data quality.[26]

CONCLUSION

The current prevalence of acceptable quality of the HMIS data at the primary and township public health settings was reported by this cross-sectional study at 30.4%. This low-quality status of the HMIS data was associated with some

organization-, technology- and human-related factors as conceptualized in the PRISM framework. The factors revealed in this study will be the considerable facts to be improved, useful for the development of the effective township-level strategic plan, and help the HMIS officers how to monitor and tackle the causes of under-qualified data for better performance of HMIS.

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REFERENCES

1. WHO. Monitoring the building blocks of health systems: A handbook of indicators and their measurement strategies. Introduction and Objectives of the Handbook. Switzerland: WHO Press; 2010: 5-8.
2. Health Systems Global. A new era for the WHO health system building blocks?, 2014. Available at: https://healthsystemsglobal.org/news/a-new-era-for-the-who-health-system-building-blocks/. Accessed on 23 December 2021.
3. Measure Evaluation. Health Management Information System (HMIS) Facilitator's Guide for Training of Trainers. HMIS Reform in Ethiopia. SNNP Regional Health Bureau; 2013: 10-13.
4. Hlaing T, Zin T. Organizational factors in determining data quality produced from health management information systems in low- and middle-income countries: A systematic review. Health Informatics. Int J. 2020;9(4): 1-17.
5. Department of Public Health. Data Dictionary for Health Services Indicators. Myanmar: Ministry of Health and Sports; 2018: 3-6.
6. Department of Medical Research (Lower Myanmar). Report on assessment of routine public health information system by basic health staff at the township level, Myanmar with special reference to data reporting and data quality. Myanmar: Department of Health Planning, MOHS, WHO; 2011: 19-34.
7. Department of Public Health. Public Health Statistics (2014-2016). Myanmar: Ministry of Health and Sports; 2017: 1-10.
8. Htun ML. Assessment on completeness of medical record documentation and quality of disease coding in West Yangon general hospital. Yangon: University of Public Health; 2015: 21-44.
9. Naing W. Assessment of completeness of record documentation and quality of coding of modified trauma register of form in Naypyitaw general hospital. Yangon: University of Public Health; 2016: 23-48.
10. Harikumar S. Evaluation of Health Management Information Systems- A study of HMIS in Kerala. Thiruvananthapuram: Sree Chitra Tirunal Institute for Medical Sciences and Technology; 2012: 20-54.
11. Hotchkiss DR, Aqil A, Lippeveld T, Mukooyo E. Evaluation of the Performance of Routine Information System Management (PRISM) framework: evidence from Uganda. BMC Health Serv Res. 2010;10:188.
12. Saw KK. Assessment on data quality of routine public health management information using District Health Information Software Version 2 in East District. Yangon Region: University of Public Health; 2016: 20-37.
13. Simba DO, Mwangu MA. Factors influencing quality of health management information system (HMIS) data: The case of Kinondoni District in Dar ES Salaam Region, Tanzania. East African J Public Health. 2006;3(1):28-31.
14. 14. Hazerijian J. Measure Evaluation: Facts about Lot Quality Assurance Sampling. In: Lot Quality Assurance Sampling. Chapel Hill: Measure evaluation, Carolina Population Center; 2021: 5-9.
15. Ahanhanzo Y, Ouedraogo LT, Kpozèhouen A, Coppieters Y, Makoutodé M, Dramaix M. Factors associated with data quality in the routine health information system of Benin. Arch Public Health. 2014;72(1):25.
16. Shrestha LB, Bodart C. Data transmission, data processing and data quality. In: Lippeveld T, Sauerborn R, Bodart C, eds. Design and implementation of health systems. Geneva: WHO; 2000: 24-37.
17. Teklegiorgis K, Tadesse K, Mirutse G, Terefe W. Level of data quality from health management information systems in a resource-limited setting and its associated factors, eastern Ethiopia. South African J Inf Manag. 2016;17(1):1-8.
18. Ouedraogo M, Kurji J, Abebe L, Labonté R, Morankar S, Bedru KH, et al. A quality assessment of Health Management Information System (HMIS) data for maternal and child health in Jimma Zone, Ethiopia. PLoS One. 2019;14(3):0213600.
19. Rumisha SF, Lyimo EP, Mremi IR, Tungu PK, Mwingira VS, Mbata D, et al. Data quality of the routine health management information system at the primary healthcare facility and district levels in Tanzania. BMC Med Inform Decis Mak. 2020;20(1):340.
20. Nshimyiryo A, Kirk CM, Sauer SM, Ntawuyirusha E, Muhire A, Sayinzoga F, et al. Health management

information system (HMIS) data verification: A case study in four districts in Rwanda. PLoS One. 2020;15(7):0235823.
21. Kebede M, Adeba E, Chego M. Evaluation of quality and use of health management information system in primary health care units of east Wollega zone, Oromia regional state, Ethiopia. BMC Med Inform Decis Mak. 2020;20(1):107.
22. Aqil A, Lippeveld T, Hozumi D. PRISM framework: a paradigm shift for designing, strengthening and evaluating routine health information systems. Health Policy Plan. 2009;24(3):217-28.
23. Mboera LEG, Rumisha SF, Mbata D, Mremi IR, Lyimo EP, Joachim C. Data utilisation and factors influencing the performance of the health management information system in Tanzania. BMC Health Serv Res. 2021;21(1):498.
24. Seid MA, Bayou NB, Ayele FY, Zerga AA. Utilization of Routine Health Information from Health Management Information System and Associated Factors Among Health Workers at Health Centers in Oromia Special Zone, Ethiopia: A Multilevel Analysis. Risk Manag Healthc Policy. 2021;14:1189-98.
25. Haftu B, Taye G, Ayele W, Habtamu T, Biruk E. A mixed-methods assessment of Routine Health Information System (RHIS) data quality and factors affecting it, Addis Ababa City Administration, Ethiopia, 2020. Ethiop J Health Dev. 2021;35(1):15-24.
26. Ngusie HS, Shiferaw AM, Bogale AD, Ahmed MH. Health Data Management Practice and Associated Factors Among Health Professionals Working at Public Health Facilities in Resource Limited Settings. Adv Med Educ Pract. 2021;12:855-62.

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