Original Article

LIMITATIONS OF DISTRICT HEALTH INFORMATION SOFTWARE 2 (DHIS2) AS A DECISION SUPPORT TOOL FOR UPAZILA (SUB-DISTRICT) HEALTH SERVICE MANAGEMENT IN BANGLADESH

Md. Nazmul Hassan Refat[1], Baizid Khoorshid Riaz[2], ANM Shamsul Islam[3], Taufique Joarder[4], Mahmuda Khandaker[5], Md. Mainul Hassan[6]

ABSTRACT

Background: District Health Information Software 2 (DHIS2) is an open source, web-based health management information system (HMIS) recognized as the world's largest HMIS platform, customized for the health information system of Bangladesh for decentralized data entry since 2011. Healthcare managers and employees should be well informed about the health information system for accurate, appropriate, precise, timely, valid information and also the interpretation of information, which are the basis for policy planning and decision-making at various levels of the organization. The study aimed at exploring the limitations of DHIS2 in decision-making process for health service management among the Upazila (Sub-district) level health managers of Bangladesh.

Methods: The cross-sectional study was conducted among the Upazila Health and Family Planning Officers (UH&FPOs) of Bangladesh from January to December 2018. All (482) UH&FPOs of Bangladesh posted as regular, current charge, or in-charge were included in the study. Data were collected using a pre-tested semi-structured email-based questionnaire.

Results: The response rate was 88.8% (428 out of 482). The mean age of the respondents was 47.08 (±6.33 SD). The mean duration of job experiences as UH&FPO was 1.9 years (±1.635 SD). Regarding limitations, the study revealed that 76.2% (of 424) UH&FPOs think that lack of realizing the 'Importance of DHIS2 by Doctors, Nurses and other Staffs' is the most important "Facility Centered Barriers" to using DHIS2 as a decision support tool for Upazila health service management. Besides, 71.2% of UH&FPOs think that the lack of effective training of the staff concerned with DHIS2 operation is the second most important barrier. The study also revealed that 59.7% (of 402) UH&FPOs think that the absence of the option for automatically displaying the summary reports of various datasets in the respective Upazila dashboard is the most important "Software Centered Barriers" to using DHIS2 as a decision support tool of Upazila health service management. Besides, 58.5% of UH&FPOs faced difficulties in identifying the management-related data elements from various data sets of DHIS2.

Conclusion: This study recommends scaling up DHIS2 by redesigning training programs with more focus on the ways of its application in the decision-making process, creating awareness among all categories of health staff, customizing its contents, and conducting more research on this ground. These initiatives will explore several innovative approaches to monitor health indicators by DHIS2, measure and plan health interventions to ensure quality health service, and lead towards achieving Sustainable Development Goal 3 (SDG-3).

JOPSOM 2023; 42(2): 43-50
https://doi.org/10.3329/jopsom.v42i2.77163

Key words: District Health Information Software 2 (DHIS2), Upazila Health and Family Planning Officer (UH&FPO)**,** Health Management Information System (HMIS)

---

1. *Assistant Professor, Department of Public Health and Hospital Administration, National Institute of Preventive and Social Medicine (NIPSOM), Mohakhali, Dhaka.*
2. *Additional Director General (Admin), DGME, Mohakhali, Dhaka*
3. *Associate Professor, Department of Public Health and Hospital Administration, National Institute of Preventive and Social Medicine (NIPSOM), Mohakhali, Dhaka.*
4. *Associate Professor, SingHealth Duke-NUS Global Health Institute, Singapore.*
5. *Associate Professor, Department of Microbiology, Shaheed Monsur Ali Medical College, Uttara, Dhaka.*
6. *Clinical Staff, Department of Orthopaedics, Square Hospital, Panthopath, Dhaka.*

Correspondence: *Md. Nazmul Hassan Refat, Assistant Professor, Department of Public Health and Hospital Administration, National Institute of Preventive and Social Medicine (NIPSOM), Mohakhali, Dhaka. Contact: +880-1711-305535, nazmulhassanrefat@gmail.com*

INTRODUCTION

District Health Information Software 2 (DHIS2) is an open-source, web-based platform for collecting, validating, analyzing, and presenting aggregate and transactional data, focusing on integrated health information management. Quality data is the basis for improving the health system; however, health programs often fail to use data to inform decisions efficiently. Decision support tools have been found to support evidence-based decision- making by improving data quality and availability, and providing tools for analyzing and interpreting data on the need for national, district, or local information (1,2).

When organizational information is made available, it is expected that the decision-makers (e.g., in this study, health managers) use it objectively, making rational decisions. This can be achieved by how the information is organized, integrated, and presented, probably through technology (3).

Using DHIS2, the Ministry of Health and Family Welfare (MoHFW) of Bangladesh developed an electronic central repository for national health data, called the National Data Warehouse, with the aim of bridging the gap between the fragmented systems and also providing rich data-mining functions to generate reliable and accurate data that decision-makers need for planning and monitoring health interventions across all levels of the health system (4). In 2008, based on a recommendation from Annual Program Review of Sector Wide Approach (SWAP), the German development agency, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) agreed to assist the MoHFW in developing a well-functioning health information system (HIS), which incorporates data across all the different levels of the health system. So, in 2009, an innovative and integrated approach towards HIS strengthening was started. As a part of this initiative, GIZ advocated DHIS2- customization for interested MIS. DGHS showed interest, and DHIS2 was first customized for them for decentralized data entry (2011) (5).

The electronic–Health Information System (e-HIS) revolution of Bangladesh started quietly in 2009 and was fully in line with the then Prime Minister's election manifesto, 'Digital Bangladesh'. Directorate General of Health Services (DGHS) under MoH&FW started this initiative with the introduction of 'District Health Information System 2 (DHIS2)', with a whole new approach to building cost-effective and sustainable national HIS. Gradually, it incorporated almost every system and sub-systems of the pluralistic health system of Bangladesh. These initiatives gave the Health Mangers a new approach to monitor, measure, and plan health interventions as a part of the routine activity to achieve health-related SDGs.

Data sets of DHIS2 are customized for Bangladesh to be entered from the Upazila level and its lower health care facilities such as the Union Sub-Centers and Community Clinics. Every dataset contains lists of data elements relevant to respective healthcare service levels. Some datasets are updated daily, most monthly, and a few yearly. Upazila-level health managers have an obligation to ensure timely reporting of all the datasets generated from their Upazila Health Complex and its lower tiers. Based on these reports, a score is automatically generated and subsequently added to the Health System Sending (HSS) scoring system to evaluate the performance of individual Upazila. This score is subsequently verified by an on-site monitoring tool and also done in-person, for ranking all the Upazila Health Complexes of Bangladesh.

In the 4th Health, Population and Nutrition Program (6), the DGHS approved the operational plan on HIS for the years 2017 to 2022 with a significant budget. A substantial amount of resources is allocated to collect, analyze, and disseminate health information on DHIS2. Therefore, it is important to evaluate the use of DHIS2 data in policy and advocacy, program design and improvement, program operations, and management. Considering DHIS2 as the core component of the HIS of Bangladesh, and Upazila & below levels being the major data contributors, it is highly justified to explore the limitations of DHIS2 in the decision-making process by the Upazila-level healthcare managers or UH&FPOs.

METHODS

The cross-sectional study was conducted among the UH&FPOs of Bangladesh from January to December 2018. All (482) UH&FPOs (N = 482) posted as regular, current charge, or in-charge were included in the study.

Data were collected using a pre-tested semi-structured questionnaire. The content validity was established based on a literature review and expert opinions from hospital administrators and healthcare managers. An email-based questionnaire was sent to the group email of UH&FPOs (alluhfpo@uhfpo.dghs.gov.bd). Also, UH&FPOs were requested to return the filled-up questionnaire by post if the scanner or other related logistics remained unavailable in their working station. Personal contact information of UH&FPOs was collected from the MIS of DGHS. Assistant chief statistical officers, designated for eight administrative divisions of Bangladesh, were assigned for data monitoring at MIS, and were involved in the process of data collection.

Before analysis, data checking, editing, coding, categorizing, cleaning, and data entry into computer software were done to ensure data quality. Data were

collected, compiled and tabulated according to key variables and functional assessment scoring. The univariate and bivariate analysis of different variables were done according to standard statistical analysis by using SPSS statistical software version 23.

RESULTS

Among 482 UH&FPOs, 428 responded. The response rate was 88.8%. Table1 shows the number and percentage of respondents according to administrative divisions. The highest number of respondents (96.6%) are from the Khulna Division and the highest number of non-respondents (22.5%) are from the Barishal Division.

Table-1: Distribution of Respondents According to Division

Name of the Division	Category of Response		Total
	Respondent	Non-Respondent	
Dhaka	79 (89.8%)	9 (10.2%)	88
Chattogram	86 (86.9%)	13 (13.1%)	99
Rajshahi	59 (89.4%)	7 (10.6%)	66
Khulna	57 (96.6%)	2 (3.4%)	59
Barishal	31 (77.5%)	9 (22.5%)	40
Sylhet	33 (86.8%)	5 (13.2%)	38
Rangpur	53 (91.4%)	5 (8.6%)	58
Mymensingh	30 (88.2%)	4 (11.8%)	34
Total	**428 (88.8%)**	**54 (11.2%)**	**482**

Age was calculated by software from date of birth until 30 September 2018. The minimum age of the UH&FPO was 27.9 years and the maximum age was 59.0 Years. The mean age of the respondents was 47.08 (±6.33 Standard Deviation). Age was divided into six subgroups. Table 2 shows that the maximum number of UH&FPOs, 125 (29.2%) out of 428 belong to 41-45 years age group and 53 (12.4%) UH&FPOs belong to 56 years and older.

Table 2: Distribution of UH&FPOs According to Age Groups (n=428)

Age of UH&FPO (Years)	Frequency	Percentage (%)
Under 35	11	2.6
36-40	52	12.1
41-45	125	29.2
46-50	106	24.8
51-55	81	18.9
56 and Older	53	12.4
Total	**428**	**100.0**

Table 3 shows out of 428 respondents 402 (93.9%) are male and 26 (6.1%) are female.

Table 3: Distribution of UH&FPOs According to Sex (n=428)

Name of the Division	Gender of the Respondents		Total
	Male	Female	
Dhaka	75 (94.9%)	4 (5.1%)	79 (100%)

Chattogram	79 (91.9%)	7 (8.1%)	86 (100%)
Rajshahi	54 (91.5%)	5 (8.5%)	59 (100%)
Khulna	52 (91.2%)	5 (8.8%)	57 (100%)
Barissal	30 (96.8%)	1 (3.2%)	31 (100%)
Sylhet	32 (97.0%)	1 (3.0%)	33 (100%)
Rangpur	52 (98.1%)	1 (1.9%)	53 (100%)
Mymensingh	28 (93.3%)	2 (6.7%)	30 (100%)
Total	**402 (93.9%)**	**26 (6.1%)**	**428 (100%)**

The duration of job experiences as UH&FPOs was calculated from the date of posting up to 31 October 2018. The minimum duration was one day and the maximum duration 20.3 years. The mean duration was 1.9 years with a standard deviation of 1.635 years. The duration of job experiences as UH&FPO was divided into six sub-groups. The pie diagram shows that the maximum 39% (167 out of 426) of UH&FPOs belong to "1.01-2 years group" (Figure 2).

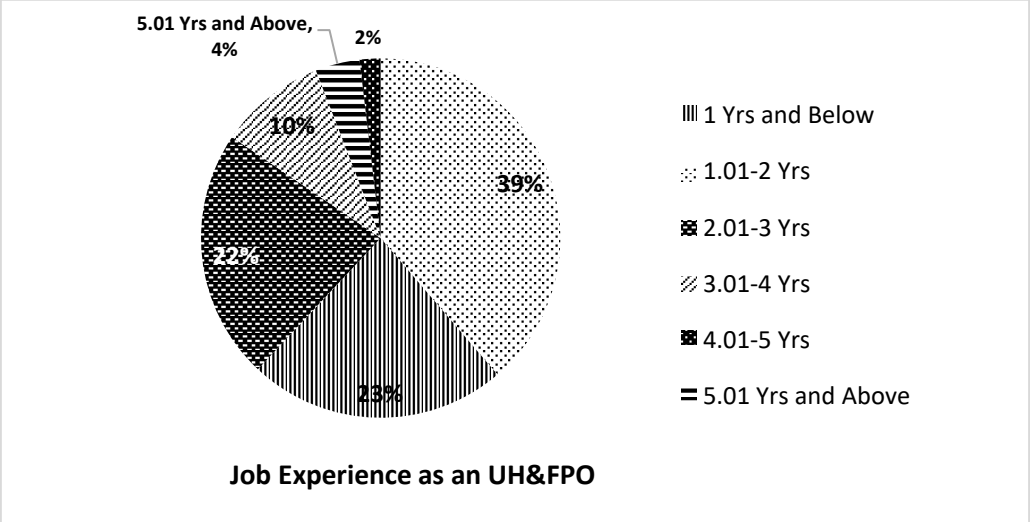

Figure 2: Distribution of UH&FPOs According to Experience (n=426)

The UH&FPOs were divided into seven sub-groups according to their level of education. The pie diagram shows that the maximum 89% (380 out of 428) of UH&FPOs are "MBBS" degree-holders and only 22 (5%) UH&FPOs have the "Masters of Public Health (MPH)" degree in addition to "MBBS" degree.

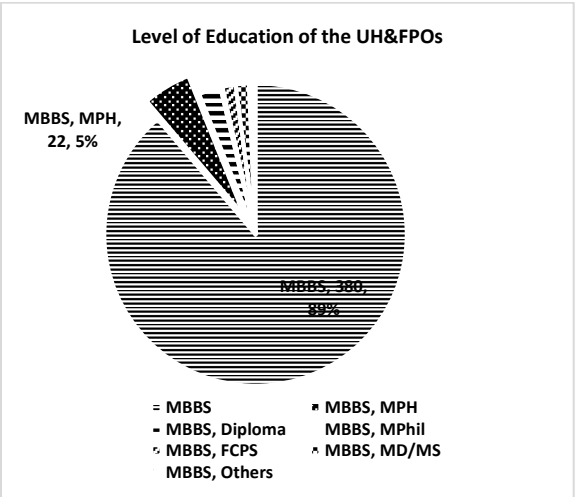

Figure 3: Distribution of UH&FPOs According to Level of Education (n=428)

The bar diagram (Figure1) shows that 76.2% (of 424) UH&FPOs think that "Not Realizing the Importance of DHIS2 by Doctors, Nurses and other Staffs" is the most important "Facility Centered Barriers" for using DHIS2 as a decision support tool for Upazila health service management. Additionally, 71.2% UH&FPOs think "Lack of Effective Training of the Staffs Concerned with DHIS2 Operation" is the most important "Facility Centered Barriers".

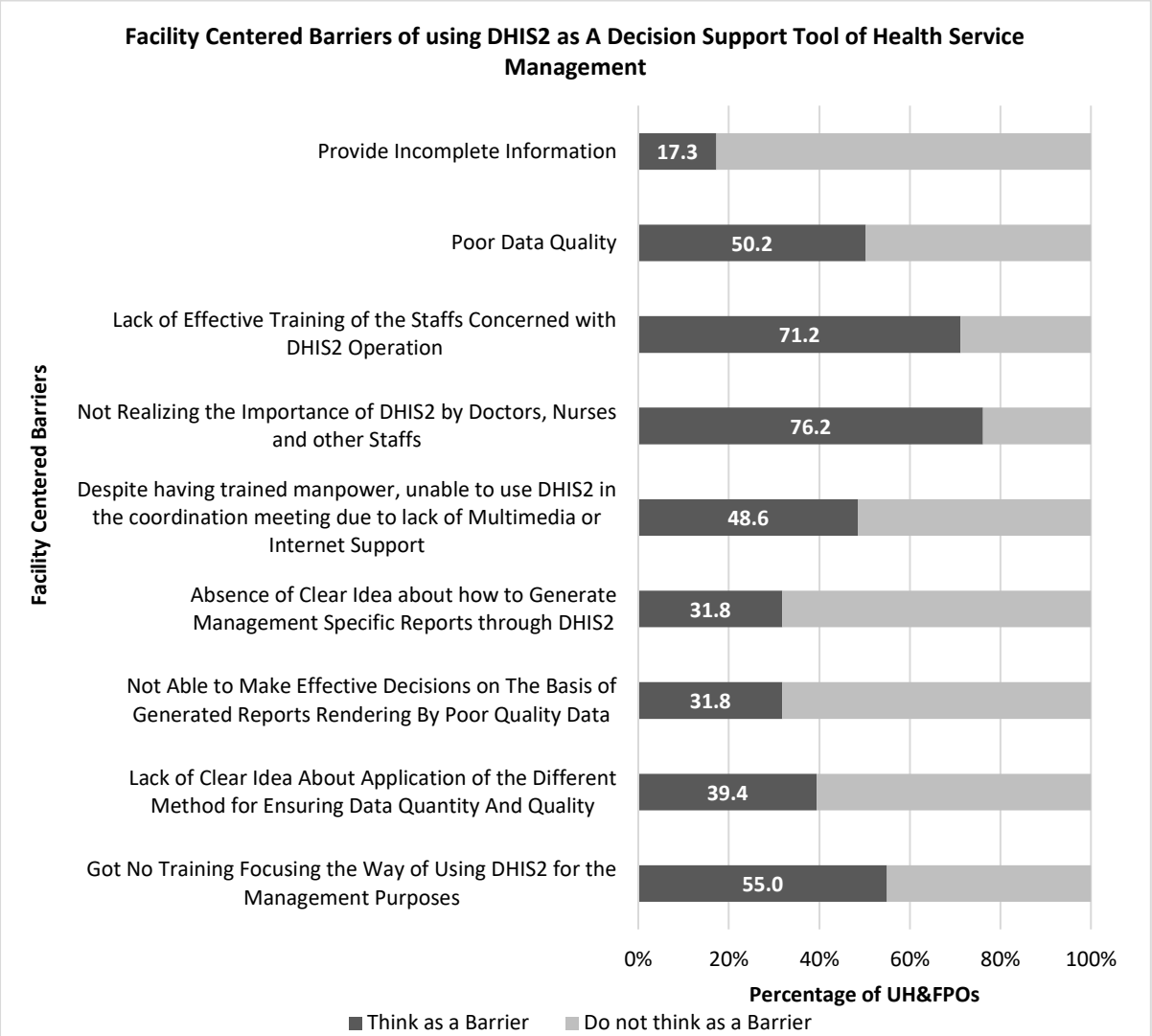

Figure 1: Distribution of UH&FPOs' opinion regarding "Facility Centered Barriers" for using DHIS2 as a decision support tool of Upazila health service management (n=424)

The bar diagram in Figure 2 shows that 59.7% (of 402) UH&FPOs think that "Absence of the option for Automatically Displaying the Summary Reports of Various Datasets in the Respective Upazila Dashboard" is the most important "Software Centered Barriers" for using DHIS2 as a decision support tool of Upazila health service management. Additionally, 58.5% UH&FPOs think "Difficulties in identifying the management-related data elements from various datasets of DHIS2" is the most important "Software Centered Barriers". More than half (50.5%) think "Dissimilarities of Different Record Registers of UHC & CC with the Reporting Formats of DHIS2" is the most important barrier.

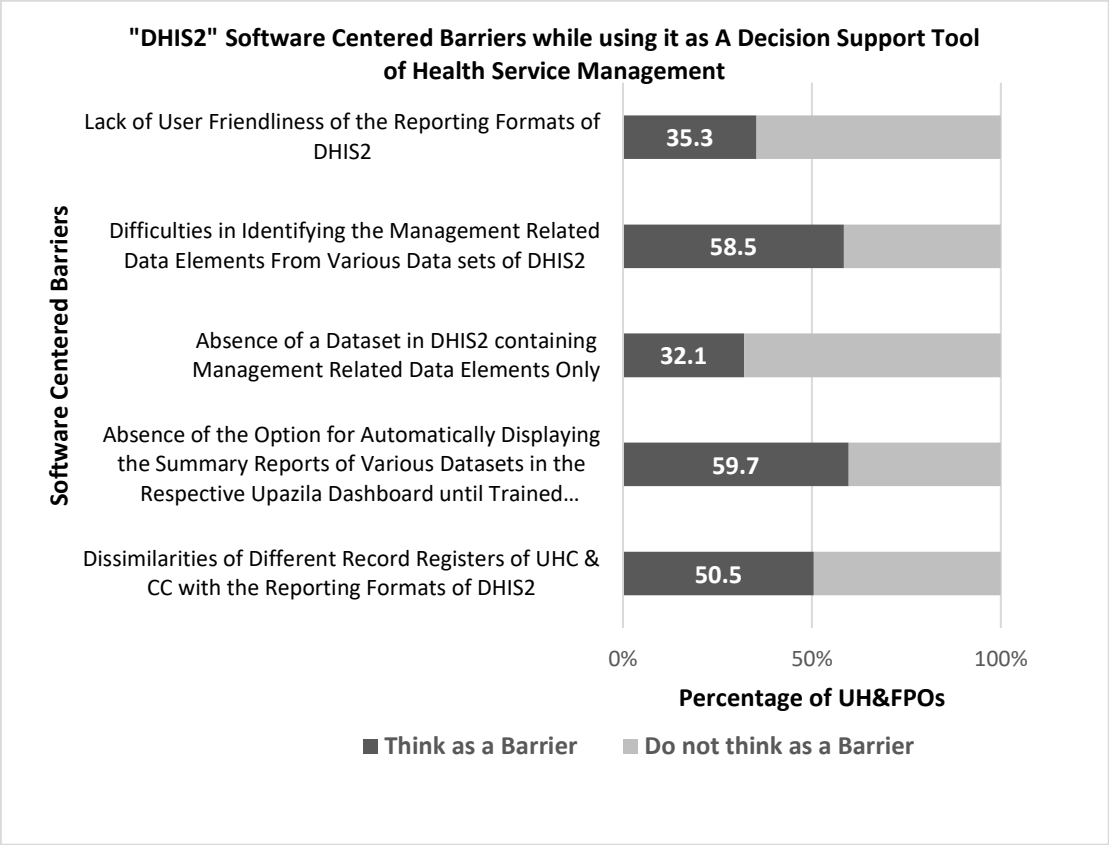

Figure-2: Distribution of UH&FPOs, has given opinion regarding "DHIS2 Software Centered Barriers" for using it as a decision support tool of Upazila health service management (n=402)

DISCUSSION

The findings related to "Facility Centered Barriers" faced by UH&FPOs highlight several key issues impacting the effective use of DHIS2. A significant 76.2% of UH&FPOs agreed that doctors, nurses, and other staff do not fully realize the importance of DHIS2. This could stem from a lack of emphasis on how DHIS2 directly impacts patient care and healthcare outcomes. Many healthcare workers may view it as merely an administrative tool, disconnected from their clinical duties. Moreover, without strong leadership endorsement or encouragement to integrate DHIS2 into daily workflows, its relevance to their work often goes unnoticed.

Additionally, 71.2% pointed to a "Lack of Effective Training of the Staff Concerned with DHIS2 Operation." This suggests that existing training programs are inadequate in equipping staff with the necessary skills and also highlights a gap in the training curriculum, which typically emphasizes operations over strategic decision-making, which is further supported by 55.0% of respondents stating that no training specifically focuses on how to use DHIS2 for management purposes, limiting its integration into routine health management processes. This suggests that current training programs may be insufficient, focusing more on technical aspects rather than demonstrating practical applications in healthcare management.

Another key finding was that 50.2% UH&FPOs identified "Poor Data Quality" as a barrier, likely stemming from inconsistent data entry practices, underdeveloped infrastructure, and a lack of clear protocols for maintaining high data standards, all of which hinder the system's reliability and usefulness in decision-making.

In addition to the opinions expressed by UH&FPOs regarding "DHIS2 software-centered barriers," several challenges hinder the use of DHIS2 as a decision support tool for Upazila health service management. Notably, 59.7% of respondents (out of 402) cited the "absence of an option for automatically displaying summary reports of various datasets in the respective Upazila dashboard" as a significant barrier. This limitation restricts easy access to critical information, making it difficult for health managers to monitor key performance indicators effectively. Furthermore, 58.5% reported "difficulties in identifying management-related data elements from various

datasets in DHIS2," indicating that the software may lack intuitive navigation or clear categorization of data. Additionally, 50.5% noted "disparities between different record registers of UHC and CC and the reporting formats of DHIS2." This inconsistency can create confusion and inefficiencies, as staff may struggle to reconcile information across various sources. Probable explanation can be DHIS2 software is mostly used by UH&FPOs, MO-ICT and statisticians only. The other hospital staffs do not equally provide importance as they might have not been included in orientation program or training regarding DHIS2. The study revealed that user participation in all stages of DHIS design is very important to comply with all users' information needs (7).

The high response rate of 88.8% in the email-based survey suggests that Upazila-level health managers in Bangladesh are increasingly familiar with ICT and benefit from a well-established communication system, as highlighted in the National Health Bulletin 2017, which notes that Upazilas are equipped with sufficient ICT resources. The email method was preferred because it offers a quick and straightforward way to respond (8).

The study also reveals that only 22 out of 428 UH&FPOs (5%) have completed a Master of Public Health (MPH), indicating a lack of public health specialists in the Upazila health management chain, despite the annual production of numerous public health experts in Bangladesh. This gap may be due to a lack of prioritization by policymakers for placing public health professionals in these roles. The competencies required for healthcare managers span five domains: communication and relationship management, professionalism, leadership, knowledge of the healthcare system, and business skills (8). Many of these competencies are covered by academic programs in Public Health, which are not typically included in the MBBS curriculum.

POLICY IMPLICATIONS AND RECOMMENDATIONS

The findings of this study highlight several critical policy implications and recommendations for enhancing the effectiveness of DHIS2 as a decision support tool at the Upazila level. Firstly, it is essential for policymakers to prioritize comprehensive training programs that not only focus on the technical aspects of DHIS2 but also emphasize its application in decision-making processes and health management. These programs should be tailored to the specific needs of various healthcare staff to ensure a better understanding of the system's benefits. Additionally, there should be an initiative to customize the datasets and reporting formats of DHIS2 to align with local contexts and practices, thereby increasing its usability and relevance. Moreover, fostering a culture of awareness about the importance of DHIS2 among all health workers can significantly improve its implementation. Finally, ongoing support and resources should be allocated to maintain and upgrade the digital infrastructure necessary for effective data management, ensuring that high-quality information is readily available for evidence-based decision-making. By addressing these areas, the potential of DHIS2 as a vital component of the national health information system can be fully realized.

CONCLUSION

This study has evaluated the limitations of DHIS2 as a decision support tool for health service management at the Upazila level. The findings indicate that a significant portion of health managers remain inadequately oriented regarding the application of DHIS2 in the decision-making process, which is essential for ensuring effective healthcare services in their facilities. Additionally, the lack of awareness among various health staff about the importance of DHIS2 hinders its successful implementation. The study also identified that the different datasets and reporting formats within DHIS2 are not adequately customized to fit the local context, further complicating its use. Given that the primary objective of a national health information system is to generate high-quality data for informed decision-making in health system interventions, DHIS2 is crucial as a core component in achieving this goal.

REFERENCES

1. AbouZahr C, Boerma T. Health information systems: the foundations of public health. Bulletin of the World Health Organization. 2005;
2. Nutley T, Reynolds HeidiW. Improving the use of health data for health system strengthening. Global Health Action. 2013 Dec;6(1):20001.
3. Chikumba PA. Management of Health Information in Malawi: Role of Technology. Adv sci technol eng syst j. 2017 Jan;2(1):157–66.
4. Dhaka hosts conference on Data for Decision (D4D) in health [Internet]. [cited 2024 Jul 2]. Available from: https://www.who.int/bangladesh/news/detail/1

2-04-2017-dhaka-hosts-conference-on-data-for-decision-(d4d)-in-health

5. Khan MAH. DHIS2 – a multi stake holder HIS platform for Strengthening RHIS in Bangladesh.
6. ৪র্থ সেক্টর প্রোগ্রাম (HPNSP) [Internet]. [cited 2024 Jul 2]. Available from: https://old.dghs.gov.bd/index.php/bd/4819-HPNSP
7. Chaulagai CN, Moyo CM, Koot J, Moyo HB, Sambakunsi TC, Khunga FM, et al. Design and implementation of a health management information system in Malawi: issues, innovations and results. Health Policy and Planning. 2005 Nov 1;20(6):375–84.
8. Flaherty TB, Honeycutt ED, Powers D. Exploring Text-Based Electronic Mail Surveys as a Means of Primary Data Collection. In: Ford JB, Honeycutt, ED, editors. Proceedings of the 1998 Academy of Marketing Science (AMS) Annual Conference [Internet]. Cham: Springer International Publishing; 2015 [cited 2024 Jul 2]. p. 260–4. (Developments in Marketing Science: Proceedings of the Academy of Marketing Science). Available from: https://link.springer.com/10.1007/978-3-319-13084-2_60