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Evaluation of the District Health Information System in District Nowshera, Khyber Pakhtunkhwa Pakistan

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ABSTRACT
Background : Health Information System (HIS) in Nowshera, Khyber Pakhtunkhwa can improve health care quality and safety. Technologically, organizationally, and in regard to human resource, the integration and management of HISs remain today to be optimised for decision making and the improvement of healthcare.
Objective: To identify and examine the performance determinant factors in the implementation of Health Information System (HIS) in province of Khyber Pakhtunkhwa in particular district Nowshera of Pakistan.
Study design: A interventional study
Place and duration of study. from June 2015 to May 2016 to collect data from all the health facility from Nowshera
Methodology: The present interventional study was carried out from June 2015 to May 2016 to collect data from all the health facility from Nowshera and used modified structured questionnaire. In the intervention, these two reporting systems EPI and LHW were incorporated with the currently functional District Health Information System (DHIS). The study was segmented into three phases: A once only baseline assessment within the first three months of the study, an appropriately timed implementation of the intervention within the subsequent six months and a second assessment at the end of the study within the last three months.
Results: The feasibility of linking EPI and LHW data to the HIS was also supported in the baseline assessments. The analysis of the post intervention aimed at achieving higher level of EHR utilization indicated the meaningful improvements in data integration however, the application of integrated data for decision making, health and resource planning, and management remained less evident. Further, the study established that there were gaps within the regulatory and feedback feedback HIS.
Conclusion: The studied revealed such crucial issues as low level of participation in HIS processes, weak understanding of HIS importance for the organisation, absence of adequate competencies, as well as negative hog behavior of the administrative top-brass.

Keywords: Health Information System, Khyber Pakhtunkhwa, quality of health care

INTRODUCTION

Health Information Systems (HIS) are core elements in improving healthcare outcomes and safety within different facilities[1]. A good HIS not only improves the quality of the delivered care, but also increases the peoples' life expectancy through evidence informed decision making and improved management of healthcare delivery[2]. Again while there is evidence of the HIS infrastructure in Nowshera, Khyber Pakhtunkhwa there are significant difficulties in putting it to good use[3]. The main idea of this study is to explore the complex antecedents of HIS performance in Nowshera to narrow the gap regarding the usage, data quality, and organizational/behavioral aspects of the healthcare system[4]. Thus, understanding how and where similar organisations have found pragmatic solutions to the operational implementing challenges, and how HIS has been successfully integrated and rolled out, may have broad insights beyond individual organisation's local contexts, to contribute to global health initiatives and policy discussions on accelerating uptake of and progress toward UHC[5]. Therefore, by discovering these dimensions, the study is relevant to the global health advancements concerning the modern technology improvement and health system management improvement[6-8].

MATERIALS AND METHODS

This Study was done in Nowshera district of Khyber Pakhtunkhwa province it took one year to complete July 2015 to June 2016. The site was selected based on their areal and population similarities to the rest of the district. The work involved all the BHUs and health workers involved in the district HIS. Of the 33 health facilities, three did not participate because of operational and staffing problems. The Study was divided into three sequential phases: predesigned and included preliminary data evaluation, enhanced staff education and training, and post-interventional assessment. Permission of the Study was

granted from the Ethical Review Board of Pak International Medical College, meaning that all the ethics that are protective of the Study participants were followed throughout the study.

Data Collection

a structured questionnaire was used to collect the data from all the active health facilities in Nowshera. The questionnaire was developed to allow the Studyers to gather detailed details on how HIS has been implemented and how effective it is across the operation dimensions.

Statistical Analysis

All data collected were analyzed using Statistical Package for the Social Sciences (SPSS) software version 24.0. Chi-square was used for categorical data while t-tests were used on continuous data to compare HIS performance before and after the intervention making the evaluation stronger and more valid of the system on operations in the health sector.

RESULTS

Data from Thirty Health Care Facilities was collected either from technicians or by looking at the records. In the District Health Office, information from DHIS coordinator was obtained. Baseline information was collected from relevant health staff and records of previous three months. After giving training to the related health staff, information was again collected for observing the difference. For Comparison of Use of Information and Comparison of Quality of Data, chi-square test was performed.

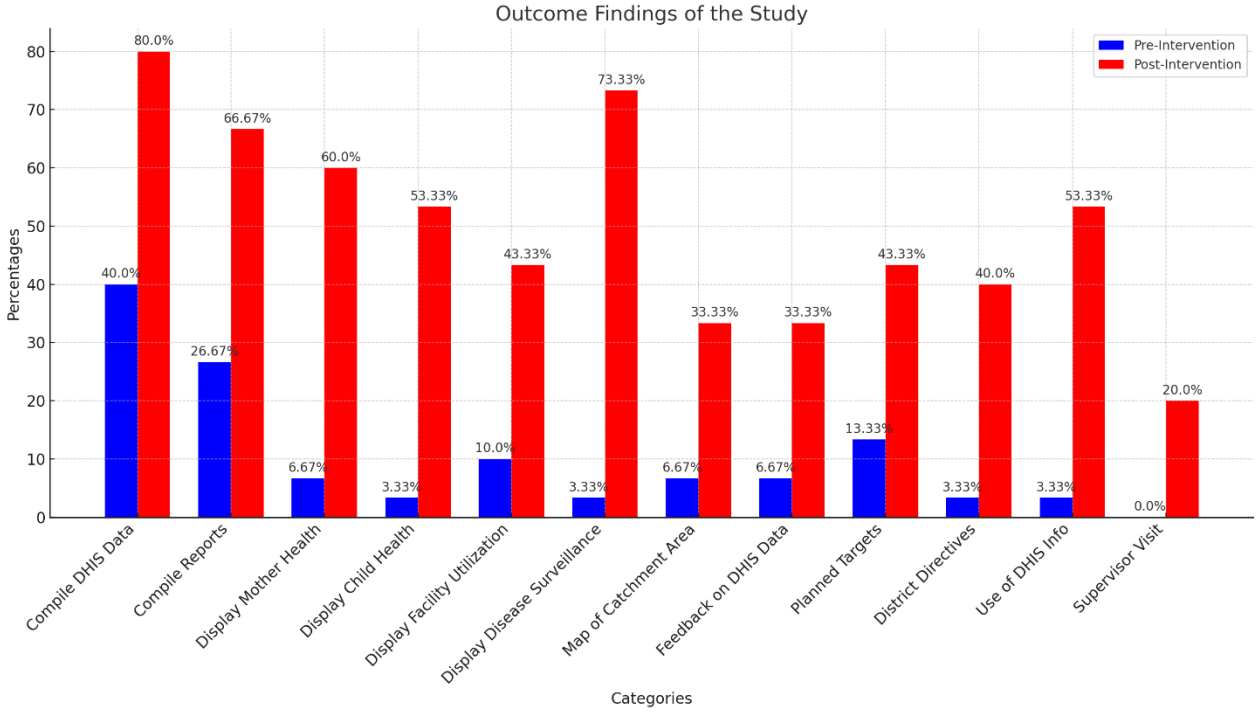

Table 1 Phases and Process of Conducting Interventional Study

District Nowshera			
Phase	**Activity**	**Responsibility**	**Duration (months)**
I	Baseline assessment	Principal Investigator & Health Staff working in DHIS	3
II	Intervention	The Principal Investigator and DHIS Coordinator	6
III	Post intervention Assessment	Principal Investigator & Health Staff working in DHIS	3

Table II: Comparison of Use of Information (Pre vs. Post intervention)

S. No	**Questions & Response**		**Pre-Intervention**		**Post-Intervention**		**p-value**
1	Does the facility compile DHIS Data?	**Yes**	12	40 %	24	80 %	**0.002**
		No	18	60 %	6	20 %	
2	Does the facility compile any report containing DHIS information?	**Yes**	8	26.67%	20	66.67%	**0.002**
		No	22	73.33%	10	33.33%	
3	Does the district office display Mother Health data	**Yes**	2	6.67%	18	60 %	**0.000**
		No	28	93.33%	12	40 %	

4	Does the district office display Child Health data	**Yes**	1	3.33%	16	53.33%	**0.000**
		No	29	96.67%	14	46.67%	
5	Does the district office display Facility Utilization data	**Yes**	3	10 %	13	43.33%	**0.004**
		No	27	90 %	17	56.67%	
6	Does the district office display Disease Surveillance data	**Yes**	1	3.33%	22	73.33%	**0.000**
		No	29	96.67%	8	26.67%	
7	Does the office have a map of catchment area?	**Yes**	2	6.67%	10	33.33%	**0.010**
		No	28	93.33%	20	66.67%	
8	Any feedback (quarterly, yearly) report on DHIS data	**Yes**	2	6.67%	10	33.33%	**0.010**
		No	28	93.33%	20	66.67%	
9	Facility received annual/monthly planned targets based on DHIS information?	**Yes**	4	13.33%	13	43.33%	**0.010**
		No	26	86.67%	17	56.67%	
10	Did records of facility of last three months show that district directives?	**Yes**	1	3.33%	12	40 %	**0.001**
		No	29	96.67%	18	60 %	
11	Examples of how the facility uses DHIS information for health system management	**Yes**	1	3.33%	16	53.33%	**0.000**
		No	29	96.67%	14	46.67%	
12	Did the district supervisor visit your facility during the last three	**Yes**	0	0.00 %	6	20 %	**0.010**
		No	30	100 %	24	80 %	

Table III: Comparison of Quality of Data (Pre vs. Post Intervention)

Questions & Response		**Pre-Intervention**		**Post-Intervention**		**p-value**
Keeping Record	**Yes**	7	23.33%	30	100.00%	**0.000**
	No	23	76.67%	0	0.00%	
Sending Monthly Report	**Before deadline**	16	53.33%	24	80.00%	**0.028**
	After deadline	14	46.67%	6	20.00%	
Availability of person for collection of monthly report	**Yes**	14	46.67%	24	80.00%	**0.007**
	No	16	53.33%	6	20.00%	
Is monthly report form complex and difficult to follow	**Yes**	18	60.00%	9	30.00%	**0.020**
	No	12	40.00%	21	70.00%	
Do you find that IT is easy to manage	**Yes**	10	33.33%	19	63.33%	**0.020**
	No	20	66.67%	11	36.67%	

Table IV: Mean Score of Study participants on Organizational and Behavioral Assessment Tool (OBAT)

Item/Question	**Mean Score**
In Health Department, Decisions are based on:	
Personal liking	4.83
Superiors' directives	6.7
Evidence/facts	2.17
Political interference	5.67
Health needs	1.87
Comparing data with strategic health objectives	1.67

In Health Department, superiors:	
Seek feedback from concerned persons	1.57
Emphasize data quality in monthly reports	2.03
Discuss conflicts openly to resolve them	1.97
Use HMIS data for setting targets and monitoring	2.1
Check data quality at the facility and higher level regularly	2
Provide feedback to their staff through regular report based on evidence	2.4
Report on data accuracy regularly	1.93
In Health Department, Staff:	
Are punctual	1.7
Document their activities and keep records	2.37
Feel committed in improving health status of the target population	2.07
Feel guilty for not accomplishing	2.2
Are rewarded for good work	2
Use HMIS data for day to day management of the facility and district	1.77
Display data for monitoring their set target	1.8
Can evaluate whether the targets or outcomes have been achieved	1.93
Are empowered to make decisions	2.6
Are made accountable for poor performance	5.97
Use HMIS data for community education and mobilization	2.3
Admit mistakes for taking corrective actions	2.47
Personal:	
Collecting information which is not used for decision making discourages me	1.93
Collecting information makes me feel bored	5.97
Collecting information is meaningful for me	2.2
Collecting information gives me the feeling that data is needed for monitoring facility performance	2.2
Collecting information give me the Feeling that it is forced on me	1.9
Collecting information is appreciated by Co-workers and superiors	2
Self-efficacy:	
I can calculate percentages/rates correctly	2.33
I can plot data by months or years	1.67
I can compute trend from bar charts SE5	1.67

I can explain findings & their implications	1.67
I can use data for identifying gaps and setting targets	1
I can use data for making various types of decisions and providing feedback	1.67

DISCUSSION

Different districts of have reported various impacts when implementing HIS in the district operations, as per previous concept reviews, and our investigations in Nowshera. Our study also supports the notion that when HIS is implemented properly there are benefits in terms of healthcare delivery and usage of data as underscored by other authors who have called HIS as a trigger point for better health delivery[9].As our study has shown, there is increased HIS integration that empowers the healthcare organisations in decision making and resource management, a point also corroborated by Smith et al. (2017)[10]. Their weaknesses however, paralleled those of our study where they indicated that the adoption and utilisation of the systems was faced with organisational resistance and lack of training. This resistance sometimes results from the failure to grasp the aspect in which the system offers utility, a concern that we also identified when implementing HIS in Nowshera: Besides, earlier, the stakeholders showed significant interest in HIS, but the lack of apparent tangible gains demoralized them [11].Furthermore, it has similarity in the findings done by Johnson (2018)[12] that claimed data integration from various health programs into single HIS is still a complex issue which many district face. The EPI and LHW programs were connected to DHIS as part of our intervention which did encounter challenges in regards to data input and issues with the staff.Further, our study also identified regulatory frameworks and feedback mechanism as relevant to the performance of HIS. Lee & Choi, (2019)[13] also concluded that registrations cannot operate effectively in its pure form, without adequate verification and feedback mechanisms in place within an HIS environment. Based on our findings, it appears that Nowshera's HIS is marred by these mismatches and thus, experience less than optimal use of collected data a study conducted by Gupta et al. (2020)[14] supports this since they posit that feedback mechanism is a key determinant of data quality and justification for HIS.About use of data, this study noted that the healthcare workers rarely used the available data for planning or enhancing service delivery, similar to what Patel and Kumar (2021)[15] have revealed when establishing low rates of using data in similar studies. This underutilization calls for improvement in the training to enhance awareness as observed in this study and other regions as described by Zhou et al. (2022)[16].The post-intervention enhancements reported in the current study partly conform with the related developments identified by Harris et al. (2021)[17] where constant training and updates enhance the performance of HIS. However, for these improvements to be maintained, there should be commitment and funding which may prove hard as observed by Thompson (2020)[18].In conclusion we see the tremendous potential of HIS to revolutionize health care and by using evaluation from our study and many of the literature cited we see that transformation of health care through the use of HIS requires overcoming significant behavioral, technical and organizational challenges. For Nowshera, and other like districts, overcoming these barriers through relevant interventions might provide inputs to establishing more effective health information systems that could deal a big blow to the improvement of the system.

Limitations

This study had some limitations: the small number of participants included participants from only one district of the study region, self-report measures may introduce bias, and difficulties engaging stakeholders for the entire period of the intervention plan. Further, on the areas that they practice some of challenges they encountered included technical problems as well as lack of enough training on effective deployment of Health Information System (HIS).

CONCLUSION

Our study highlighted some core issues involving the managerial staff of the DHIS at Nowshera.

After training the staff involved in health information system, performance and achieving the targets were improved.The main issues were lack of understanding the information system activities, lack of enthusiasm about the job, inability to understand the significance of the Health Information System, lack of proper skills to decrypt data or findings, and uncooperative attitude of the authorities. It should be noted that adequate leadership, appreciative attitude, regular training and practice can help make DHIS a more efficient system.

Future Directions

To continue and extend the study, future Study in HIS implementation should endeavour to conduct the study in other districts to include a wider cross section of stakeholders as well as to design sophisticated training program. Also, application of advanced technologies such as machine learning in data analysis and feedback loops will also add value in enhancing the effectiveness of the HIS as well as its contribution towards providing evidence based healthcare decision making at a wider reach.

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Authors Contribution

Rab Nawaz conceived, designed, data collection, entry of data and did statistical analysis and manuscript writing, responsible for integrity of Study.

Tayyaba and Fatima Nasir data collection, entry of data, data analysis and editing of manuscript

Shahzad Ali Khan did review and final approval of the manuscript

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