

# KNOWLEDGE AND PERCEPTION OF HEALTHCARE PROVIDERS TOWARDS PHC-HEALTH MANAGEMENT INFORMATION SYSTEMS IN EDO STATE, SOUTHERN NIGERIA

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## Abstract

**Aim:** This study aims to assess knowledge and perception of healthcare providers towards primary health care-health management information systems (PHC-HMIS) in Edo State, Southern Nigeria with a view to enhancing performance in NHMIS service delivery and utilization.

**Methodology:** Descriptive, cross sectional analytical study design was utilized. Quantitative and qualitative assessments of knowledge and perception of health care providers towards HMIS was conducted among health providers handling data at selected PHCs in Edo State. Pre-tested, quantitative and qualitative questionnaires were used for data collection. Data analysis was by IBM SPSS version 20, associations were determined using Chi square, Fisher's exact test and odds ratio with level of significance set at  $p < 0.050$  and 95% Confidence interval.

**Results:** A total of 390 health providers were studied from 35 PHCs for the quantitative survey while 42 participated in the qualitative survey. Over half 200(51.3%) of the studied health personnel had poor knowledge of the NHMIS, 160(41.0%) had fair knowledge and 30(7.7%) had good knowledge. Most of the health personnel 358(91.8%) had positive attitude. Training was identified as a significant predictor of good knowledge of NHMIS (OR= 0.082; CI = 0.010 – 0.665;  $p = 0.019$ )

**Conclusion:** The study identified gap in knowledge and attitude of the health providers towards NHMIS. There is the need to intensify and maintain trainings and step-down training in relation to NHMIS to improve knowledge and bridge this gap.

**Keywords:** Attitude, Data, Edo State, Health providers, Health system, Information, Knowledge, Primary Health Care centers.

## Introduction

The concept of health care management information system is probably as old as medicine, although initially utilized in rudimentary format.<sup>1,2</sup> The formats for collection of patients' records and the way in which this information is used and subsequently stored for future references has continued to evolve from regular paper note taking to electronic taped records and present-day hospital information technologies.<sup>2</sup>

Information literacy that affects medical practice is the ability to identify the need for information they seek, evaluate and use these information in well-presented formats to achieve set objective. Information technology infusion aids appropriate integration of organizational activities to achieve health system objectives and remain current in our fast growing and dynamic global health scenario.<sup>3</sup>

Western nations are at the forefront of implementation of electronic health management information systems (HMIS), while African countries are still at the rudimentary stages of implementation processes. The critical reasons attributed to this disparity are lack of political will and leadership responsibility in setting the right health care priorities, lack of supportive

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infrastructure and poverty.<sup>4</sup> Other problems specific to the HMIS faced by developing countries include, weak organizational support for data collection systems; lack of standardization including data duplications and poor data synergy/coherence in attempts to improve the HMIS; untimely collection of data; inadequate use of information for decision-making; inadequate data collection, analysis and communication skills among health personnel; and overambitious computerization of the HMIS that countries are unable to maintain. The aforementioned give rise to unreliable data from healthcare providers at the PHC health facilities and other levels of care to help plan health interventions to address the poor health issues and strengthen our weak health system.<sup>5,6</sup>

The National Health Management Information System (NHMIS) is structured in line with the World Health Organization (WHO)'s core components of a health management information system. It comprises components structured into three categories with the most important being the 'input' which is the HIS resources e.g. physical and structural prerequisites, coordinators of the HMIS, laws and policy guiding HMIS, finance, HMIS skill, office space, HMIS manuals, forms and HMIS registers, infrastructure and network/internet connectivity. The others are, the 'process', which consist mainly data management and the 'output' consisting data becoming information.<sup>6-8</sup>

Concerns abound on the knowledge level and perceptions towards HMIS; this could affect the utilization of the HMIS by health care providers in the PHC system. These have been identified to be the weakest link in the HMIS network. Despite global spread of the internet and other forms of information technology to help achieve universal access to healthcare information, the level of access remains very challenging to health care providers in developing countries.<sup>9-11</sup> This study was conducted to assess knowledge and perception of healthcare providers towards PHC-Health Management Information Systems in Edo State, Southern Nigeria with a view to enhancing

performance in NHMIS service delivery and utilization.

### Materials and Method

The study was carried out in selected primary health care (PHC) facilities in Edo State, Nigeria. Edo State is in the South-South geo-political zone of Nigeria.<sup>12</sup> Eighteen Local Government Areas (LGAs) and three senatorial districts make up Edo State. There are 255 PHC facilities with 1,455 PHC health personnel handling data within the 18 LGAs of Edo State. Seventeen are PHC Coordinators, 16 Medical Officers, 521 Nursing Officers, 69 Community Health Officers (CHOs), 719 Community Health Extension Workers (CHEWs), 44 Pharmacy Technicians, 25 Laboratory Technicians and 44 Medical Records Officers.<sup>10,12</sup>

A descriptive, cross sectional, analytical study design was utilized. A minimum sample size of 387 was calculated using the Cochran formula for sample size determination for single proportion.<sup>13</sup> Multistage sampling technique was used to select the health care providers that participated in the quantitative survey. It involved three stages. Stage 1 involved selecting 2 LGAs from each of the three senatorial areas by simple random sampling to make six LGAs for this study. Stage 2 involved selection of PHC facilities from each of the 6 selected PHCs; by proportional allocation, the number of PHCs to select from each LGA was determined and the actual PHCs for the survey selected by simple random sampling from each LGA. Stage 3 involved a 4-step selection of the various cadres of health providers handling health data in the PHCs by proportional allocation from each cadre and final selection by simple random sampling technique. The participants for the qualitative surveys were purposively selected.

Pre-tested, structured interviewer administered semi-structured quantitative questionnaire adapted from two African studies,<sup>14, 15</sup> and qualitative questionnaires guides were used for data collection. Quantitative and qualitative assessments of knowledge and perception of health care providers towards NHMIS was conducted among health care providers handling

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data/records at selected PHCs and who had been employed under the Edo State Local Government Service Commission for at least 6 months prior to this study. This allowed for adequate exposure to the existing HMIS in the selected PHC facilities. Focus group discussion (FGD) sessions were held for the healthcare providers, key informant (KII) and in depth interviews (IDIs) were carried out on an Assistant Director with the HMIS Unit of the department of Health Planning Research and Statistics and the Medical Officers of Health respectively.

The questionnaire was used to collect data on socio-demographic characteristics such as age, sex, designation of health worker, responsibility at health facility, working experience, type of community and exposure to training on NHMIS; these constituted the independent variables in the analysis while the knowledge of and perception towards NHMIS by healthcare providers were the outcome measure (dependent variable) for the logistic regression. The data obtained from the study were screened for completeness and entered into the IBM-SPSS statistics 20.0 software for analysis. Seven questions assessed knowledge. For each question, a score of '5' was given for each correct answer; '0' for incorrect answer, with total marks of '35'. The total score was converted to percentage and classified thus: Poor knowledge is a score of 0 to 39.9%, fair knowledge is a score of 40.0 to 59.9% and good knowledge is a score of 60.0% to 100%. Some components of the knowledge question like knowledge of the 13 core national minimum data sets were further analyzed in proportions of number of correct options mentioned out of the total thirteen core data sets by the respondents. The questions addressing knowledge were internally consistent and reliable with Cronbach's alpha of 0.758. Questions on attitude of health workers was assessed using a 5 item Likert scale of strongly agree, agree, undecided, disagree and strongly disagree. There were ten questions assessing attitude. The most positive response to a question was given a score of '5' while the most negative response to a question, a score of '1'. The maximum score was 50 and the total score

was converted to percentage and classified thus: Negative attitude is a score of less than 50.0% and positive attitude is a score of greater than and equal to 50.0%. The questions addressing attitude were internally consistent and reliable with Cronbach's alpha of 0.755.

The package was used to generate a simple frequency table of socio-demographic variables. Dependent and independent variables were cross-tabulated and Fisher's exact probability test where applicable was used to test for the associations between them to produce *p* values; these along with odds ratios computed were the point estimates of the associations. Logistic regression was utilized to identify significant predictors of outcome variables of knowledge and perception towards the HMIS by healthcare providers. All the predictors that were initially utilized in the bivariate analysis, irrespective of statistical significance were utilized for the logistic regression and backward logistic regression modeling done to identify those truly significant. Composite knowledge scores were regrouped into poor and good to allow for binary logistic regression. Good knowledge was made up of addition of fair and good scores (i.e. scores 50.0% and above) while poor knowledge was made up of scores 49.9% or less. The reference categories for the odds ratios were assigned the value of 1.00. The 95% confidence intervals (CIs) for the respective odds ratios were the interval estimates of the associations. Statistically significant associations were taken as those with *p* < 0.05. Qualitative survey findings were outlined in themes in line with the study objective addressing healthcare providers in line with their knowledge and perception towards NHMIS.

Ethical clearance to conduct this research was sought and obtained from the University of Benin Teaching Hospital Ethics and Research Committee. Permission was sought and obtained from Director, Department of Health Planning Research and Statistics, SMOH, Edo State and the PHC Coordinators of the various LGAs. Informed written consent was obtained from each respondent before conducting interviews and respondents were

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informed that they had the right to decline participation or to withdraw from the study at any time they wished. Information on the benefits of the HMIS, updates on data entry and basic statistical analysis were given to the respondents at the end of the study.

### Results.

A total of 432 respondents (comprising 390 health personnel who participated in the facility based quantitative survey and 42 FGD participants, 6 Medical Officers of Health and 1 Key informant) were interviewed for this study. In the quantitative survey; 273 (70.0%) of the respondents were in the age group 30 – 39 years, with mean age of 36.7 (4.6) years. The difference in mean age of the male respondents 36.8 (4.7) years (n = 60) and female respondents 35.9 (4.45) years (n = 330) were not statistically significant (p = 0.211).

Two hundred (51.3%) of the respondents had poor knowledge of NHMIS, 160 (41.0%) had fair knowledge of NHMIS while 30 (7.7%) had good knowledge. The composite median knowledge score for the Urban (n = 69) had median (interquartile range) = 20 (15 - 20) and rural (n = 321) health facilities which had median (interquartile range) = 15 (15 - 20) were not statistically significant (independent samples Mann-Whitney U test; p value = 0.339). Fourteen (3.6%) of the respondents had ever received NHMIS training with 4 (28.6%) of trained within the past one year and 10 (71.4%) were trained more than a year preceding study. Training on NHMIS was a significant predictors of good knowledge of the NHMIS (OR = 0.082, CI = 0.010 – 0.665; p=0.019). Location of health facility was also a significant predictor of good knowledge as more respondents in urban health facilities (14.5%) than those residing in rural health facilities (6.3%) had good knowledge of NHMIS (p = 0.005). Furthermore, heads of health care facility (25.0%) than all other health personnel (5.9%) significantly had better knowledge of NHMIS (p < 0.001).

Three hundred and eleven (79.7%), 331 (84.9%), 305 (78.2%) agreed that NHMIS is worth their time and effort, important to continue with NHMIS activities at the facility, and that the current HMIS is difficult and need to be simplified. While 292 (74.9%) disagreed that NHMIS is meant for LGA, SMOH and FMOH health managers. Three hundred and fifty eight (91.8%) of the respondents had positive attitude towards NHMIS, while 32 (8.2%) had negative attitude towards NHMIS.

In the qualitative survey; Focus group discussion (FGD) session revealed the opinion of respondents that training on NHMIS was virtually non-existent, and only few persons had gotten some form of training for years, resulting in poor knowledge and negative perception towards the NHMIS. They saw it as being cumbersome especially combining it with other activities at the health facilities. Some responses include:

*"Most of us have never had any training; only few special ones were trained some time ago and I think they are given some stipends also. So why bother us when someone is collecting money for what we are not trained to do and we manage to combine HMIS with other PHC activities"*

### CHEW, 33 years.

*'The registers are numerous and varied. You don't know which applies to which agency. Various agencies bring their own forms and you end up collecting double data on the same indicator. They should all be unified.'*

### CHO, 41years.

*'The forms are too numerous with various abbreviations that you have to memorize. Various registers can even have their own abbreviations. Imagine all that double hectic work and all they are interested in is if the register is complete and not if commodities to serve the communities are available. Their reason always is that we all need the data to make requisition for commodities.'*

### CHEW. 34 years.

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In-depth Interview Session; Most respondents here emphasized the need for sustained step down training on NHMIS. They opined that the healthcare provider can only give what he/she has. If they are not regularly trained, supervised and encouraged especially as regards getting feedback on the data they collect, the overall negative attitude will remain and worsen; thus unreliable, poor quality data will be the outcome from the healthcare providers.

*“There is high likelihood for interruption of data collection and flow since these persons collecting data only do so for collection sake. It should be all inclusive. They should be encouraged to participate in it and own it. This will give the needed energy to the system that will sustain interest, full participation and success.”*

**Medical officer, 40 years**

*‘To save cost, in-house trainings can be conducted. More emphasis should be on Training-of-trainers sessions, so they can cascade trainings acquired to other health workers. Occasional stipends especially to facilitate data transmission will curb delays as well.’*

**Medical officer, 38 years**

TABLE 1: SOCIO-DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

Variables	Frequency	Percent
<b>Age group (years)*</b>		
20 – 29	22	5.6
30 – 39	273	70.0
40 – 49	94	24.1
≥50	1	0.3
<b>Sex</b>		
Male	60	15.4
Female	330	84.6
<b>Type of Community</b>		
Urban	69	17.7
Sub – urban	321	82.3
<b>Marital Status</b>		
Married	362	92.8
Single	17	4.4
Widowed	6	1.5
Separated	3	0.8
Divorced	2	0.5
<b>Designation</b>		
Community Health Extension Workers	198	50.8
Nursing Officers	142	36.4
Community Health Officers	19	4.8
Monitoring / Evaluation / Records Officers	12	3.1
Pharmacy Technicians	12	3.1
Laboratory Technicians	7	1.8
<b>Responsibility at the Facility Level</b>		
Head of Facility	35	9.2
Other Health Personnel	355	90.8
<b>Working Experience (Years)**</b>		
1 – 5	198	50.8
6 – 10	110	28.2
>10	82	21.0

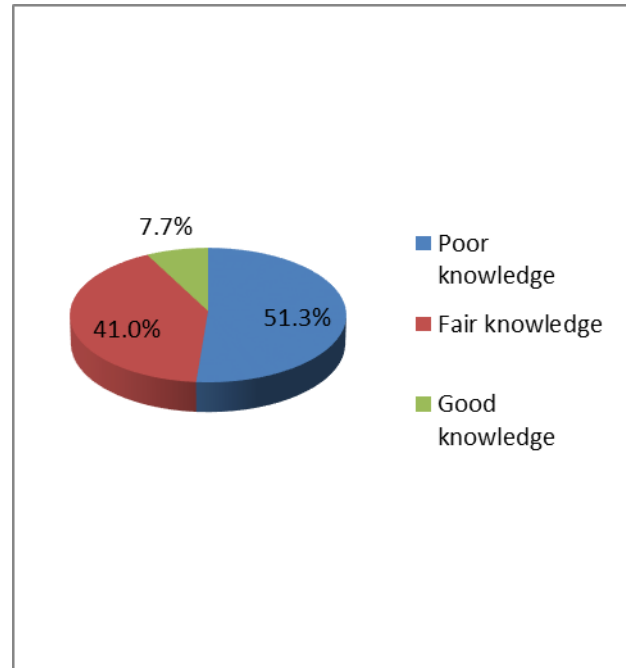


FIGURE 1: COMPOSITE SCORE OF KNOWLEDGE OF NHMIS BY RESPONDENTS

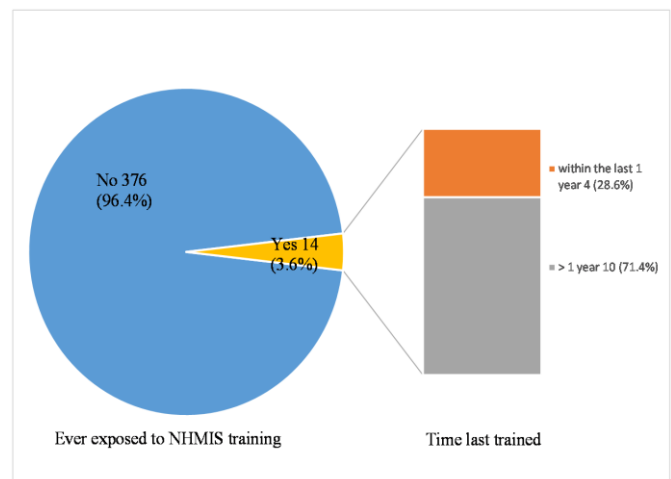


FIGURE 2: RESPONDENTS THAT WERE EVER EXPOSED TO NHMIS TRAINING AND TIME OF LAST TRAINING

### Discussion

Almost nine-tenth of the respondents had poor knowledge of definition of HMIS in this study, this was also observed from the qualitative sessions.



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This is in contrast to findings from a study done in Tanzania in 2010 where two-thirds had good knowledge of definition of HMIS.<sup>14</sup> With poor and virtually non-existent training and almost three-quarters of the respondents had not received training, even among those trained most had their last training over one year ago preceding the current study, it is not surprising that as much nine-tenth could not define and describe the NHMIS.

Also in this study, less than one in twenty of the entire respondents were aware of the core NHMIS data sets and of this proportion only half could mention 1– 4 core NHMIS data set, one-third of these could not mention any of the core data sets. This is similar to findings observed in a study in Enugu State, Nigeria, where only half of the PHC health personnel studied had knowledge of only 5 of the 13 core NHMIS data sets.<sup>15</sup> This was also the case in a 2010 study in Tanzania where more than one third failed to recall even one out of twelve HMIS data sets.<sup>14</sup> The finding from this study was in contrast to findings observed in a 2011 survey in India where out of the six data elements, 86% of the respondents had good knowledge on these six data elements, for three data elements more than 91% had good knowledge.<sup>16</sup> The relatively high knowledge in this India study is probably due to the on-going and regular training on HMIS organized by the Indian health ministry. The observed poor knowledge on the basics of the HMIS in the current study, is not farfetched and may be attributable to insufficient/lack of training, retraining programme and supportive supervision on NHMIS and faulty coordination of the entire process by the relevant Ministries and Agencies of Government. This poor knowledge on NHMIS is worrisome among health care providers with serious implication for reliable and qualitative data for our weak health system.<sup>17, 18</sup>

The overall composite knowledge on the NHMIS was poor in this study. Over half of the respondents had poor knowledge of the NHMIS. Several research findings compare favorably with the above findings as seen in studies done in Pakistan<sup>17</sup> and Malawi<sup>18</sup> where poor knowledge

TABLE 2: SOCIO-DEMOGRAPHIC CHARACTERISTICS AND KNOWLEDGE OF NHMIS AMONG RESPONDENTS

Variables	Knowledge n (%)	
	Poor	Good
<b>Age group (years)</b>		
20 – 29	9 (40.9)	13 (59.1)
30 – 39	138 (50.5)	135 (49.5)
≥40	53 (55.3)	42 (44.7)
	Chi-square = 1.779	p-value = 0.411
<b>Sex</b>		
Male	28 (46.7)	32 (53.3)
Female	172 (52.1)	158 (47.9)
	Chi-square = 0.605	p-value = 0.437
<b>Type of community</b>		
Urban	32 (46.4)	37 (53.6)
Sub-urban	168 (52.3)	153 (47.7)
	Chi-square = 0.807;	p-value = 0.005
<b>Responsibility at health facility</b>		
Head of facility	16 (44.4)	20 (55.6)
Other health personnel	184 (52.0)	170 (48.0)
	Chi-square = 19.775;	p-value < 0.001
<b>Exposed to any formal training on NHMIS</b>		
Yes	1 (7.1)	13 (92.9)
No	199 (52.9)	177 (47.1)
	Chi-square = 66.805;	p-value = 0.019
<b>Working experience (years)</b>		
1 – 5	106 (53.5)	189 (46.5)
6 – 10	55 (50.0)	55 (50.0)
>10	39 (47.6)	43 (52.4)
	Chi-square = 8.269;	p-value = 0.016

TABLE 3: SOCIO-DEMOGRAPHIC CHARACTERISTICS AND ATTITUDE TOWARDS NHMIS AMONG RESPONDENTS

Variables	Attitude n (%)	
	Positive	Negative
<b>Age group (years)</b>		
20 – 29	21 (95.5)	1 (4.5)
30 – 39	250 (91.6)	23 (8.4)
≥40	87 (91.5)	8 (8.5)
	Chi-square = 0.315;	p-value = 0.813
<b>Sex</b>		
Male	55 (91.7)	5 (8.3)
Female	303 (91.8)	27 (8.2)
	Chi-square = 0.002;	p-value = 0.969
<b>Type of community</b>		
Urban	64 (92.8)	5 (7.2)
Sub-urban	294 (91.6)	27 (8.4)
	Chi-square = 0.102;	p-value = 0.749
<b>Responsibility at health facility</b>		
Head of facility	33 (91.7)	3 (8.3)
Health care provider	325 (91.8)	29 (8.2)
	Chi-square = 0.001;	p-value = 0.977
<b>Exposed to any formal training on NHMIS</b>		
Yes	14 (100.0)	0 (0.0)
No	344 (91.5)	32 (8.5)
	Chi-square = 1.298;	p-value = 0.255
<b>Working experience (years)</b>		
1 – 5	180 (90.9)	18 (9.1)
6 – 10	103 (93.6)	7 (6.4)
>10	75 (91.5)	7 (8.5)
	Chi-square = 0.713;	p-value = 0.700
<b>Knowledge of NHMIS</b>		
Poor	184 (92.0)	16 (8.0)
Good	174 (91.6)	16 (8.4)
	Chi-square = 0.023;	p-value = 0.880

of the HMIS posed significant difficulties in form filling and submissions due faulty understanding of the forms. The lack of training and poor understanding of the HMIS registers were common factors highlighted for poor knowledge in these studies. Health personnel lacking the basic knowledge and understanding of the health information system will inevitably hinder their understanding of the general role of the HMIS in the management of the PHC in totality. In general,

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the design and implementation of the HMIS in most developing countries especially in Africa need to focus on this grey area if significant and useful progress is to be made to aid decision making and strengthen our weak health system.<sup>20</sup> More of the health personnel who had not received any training on NHMIS had poor knowledge of the NHMIS, this association was statistically significant ( $p=0.019$ ). This was corroborated by findings from the FGD and IDI sessions where lack of training and updates on HMIS was identified as the common determinant for the generally poor knowledge and perceived negative attitude expressed by most of the respondents. Expectedly, all the health personnel who were trained on the NHMIS had positive attitude towards it. There are no institutionalized mechanisms for planned training on NHMIS. Training usually occurs on an adhoc needs basis, usually for selected persons (as opined in the FGDs), curtailing opportunities for continuous, all round improvement for all health personnel handling data. Also opined in the FGD sessions was that the cascade trainings had been insufficiently provided at the PHC health facility level. Most of the focal persons at the PHCs, who had received training did not cascade this knowledge to other health personnel in their health facility. The implication of this is that whenever these focal persons are indisposed, either as transfers to other health facilities, on leave of absence or positional upgrades to statuses in which they no longer want to handle data, the PHC-NHMIS may collapse. Capacity building in terms of training and refresher courses could significantly motivate the health personnel to produce quality data with updated and improved knowledge on the PHC-NHMIS generally. Practical based training sessions should be scheduled to occur on rotational and regular basis during which every health worker is given fair opportunity to gain and update their knowledge on the subject matter. This should be organized at facility level so that the health workers can go through the process of recording, aggregation and analysis, graphing and using information. Using information stimulates

evidence-based health care and is an incentive in itself. It has been observed that once healthcare providers start using information in management decisions, data quality eventually improves.<sup>19, 20</sup> Urban health care providers than rural had significantly better knowledge of HMIS, The urban respondents tend to have more/better exposure to IT infrastructure for self-development in spite of lack of training. The tendency for them to improve on their knowledge is higher with better availability and access to internet/IT facilities to update knowledge and transmit data to the next level. Morale and thus attitude towards the HMIS could be higher among the urban-based health personnel. This study also revealed that heads of health facility were significantly more knowledgeable compared to other staff on NHMIS. This may be attributed to the possibility of more frequent attendance to meeting and programmes allotted to the health facility they head and ease of approving their own attendance since most of this training has additional incentives attached to it. This is similar to findings were observed in a study in Tanzania.<sup>14</sup>

In addition, heads of facilities having spent considerable length of time in service have been exposed over time continuously to the NHMIS, most of them have learnt on the job and some have received some form of HMIS trainings which they are supposed to cascade to other health workers, but most of the time, the gained knowledge stays with the head as corroborated in the FGD sessions. This significant and relevant experience gained over time explains the higher knowledge level than other health workers. Also, being the PHC manager and head of the team, they are involved in the day-to-day community health activities and the PHC functioning. They require these data to make informed decisions on health outcomes like immunization coverage and missed opportunities for immunization; crude birth rates and consumption/requisitions for family planning commodities etc. Knowledge on the NHMIS is thus inevitable if he or she has to succeed as the manager of the PHC facility. Eight in ten of respondents agreed that NHMIS was worth the time and effort, were interested in

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filling the forms and that the current HMIS was difficult and needed to be simplified. These findings were however contrary to the opinion expressed by some respondents in the FGD sessions where attitude to the HMIS was mostly poor likely because they felt the NHMIS was an opportunity to add to their daily workload most especially when it does not translate to commensurate increase in their monthly take home. The opposing findings could be that even though respondents realize and appreciate the importance and relevance of the NHMIS, in reality they are not motivated to perform it especially with the observed shortcomings of no training, no feedback on data collected and no incentives on effort expended. Some respondents opined that they got the cold treatment whenever they showed interest to learn about the system. The generally positive attitude to the HMIS is an opportunity for focused action by health managers to orientate health personnel handling data, by addressing particular misgivings and negative perceptions that are hindering the desire to improve knowledge on data entry and the HMIS. These existing pockets of negative attitude and perception may overtime become a norm among the health personnel and subsequently erode the current existing advantage of overall positive attitude, which will ultimately worsen implementation of the NHMIS at the various PHCs. These findings were similar to a 2009 study in Taiwan where approximately two thirds of the subjects felt that the reporting system was convenient, almost all of the subjects, agreed that data entry was one of their public health responsibilities and were willing to fill forms if the method was easy and convenient.<sup>21</sup>

The key challenge observed with healthcare providers in PHCs in Edo State was poor knowledge of the HMIS perpetuated by lack or no training at all and this has culminated in a buildup of high negative perception towards HMIS which perpetually fuels lack of interest and really low knowledge and churning out of unreliable poor quality data from the NHMIS. In- expensive in-house trainings organized by focal persons (who should regularly undergo training-of-trainers

sessions on HMIS) should be frequently carried out in addition to regular supportive supervisions and feedback on health data collected by the health workers. This recommendation if considerably implemented will to a large extent strengthen our weak health system by providing reliable and qualitative data that will help policy makers and Government make timely decision in relation to health sector and national development

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