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Assessing the Knowledge and Practice of E-Tracker Among Nurses in the Ho Municipality

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Background and Purpose: Electronic health is an integration of technology in healthcare delivery to facilitate its service delivery. It ranges from the use of desktops to handheld devices to facilitate care, data capture, and data transmission. Due to the wide ranges of technology usage in varieties of services, the healthcare industry is not left behind. It improves upon quality of data generations to facilitate proper decision making. The current study aimed at evaluating the knowledge and practice of e-tracker among nurses in the Ho Municipality of the Volta region of Ghana.
Methods: A descriptive cross-sectional approach was used. Simple Random Sampling technique was used to recruit the participants and a semi-structured questionnaire was used to capture the desired data. Data collected was entered using EpiData 3.0 and further exported into Stata 16 IC for analysis. Results were presented using tables and graphs.
Results: 129 (69.3%) of the nurses had high knowledge of e-tracker while 42 (22.6%) had high e-tracker usability. 66 (35.5%) of nurses synchronized data immediately after entry while 114 (61.3%) do not ask clients whether if they had been enrolled onto the e-tracker for their first visit. Nurses who consulted District (HI) were 4.9 [COR=4.9; CI(95%)=2.45 – 9.63; p-value=0.000] and 6.8 [AOR=6.8; CI(95%)=2.78 – 16.53; p-value=0.000] times to have high knowledge than their counterparts that did consult their in-charges for assistance.
Conclusions: Though there was a high knowledge level of e-tracker among nurses in the Ho municipality there was a very low usability of e-tracker among nurses.

Keywords: E-health, M-health, Health technology.

1. Introduction

Electronic health (e-health) is an application of technology in healthcare practice which aimed at improving upon the health service delivery to enhance quality of care [1], and above all quality of data generation during and after care [2].

Mobile health is a form of e-health [3] which most appropriately uses handheld technological devices in providing healthcare [4]. It is becoming more acceptable in healthcare delivery globally [5], and its application to monitoring health conditions has enormously improved upon the quality of data generation [2]. As technology assists in the generation of data easily [6], it will eventually take over entirely the health sector to properly manage health generated data [7] as a result of the Internet of Things (IoT). [8] [9], Though healthcare providers believed that e-health enhances their work as compared to traditional methods [10], the longer in years a Nurse manager works the less the computer skills [11].

It was also evidenced that, 43.0% of nurses were able to use mobile health (m-health) for reminders appointment [5]. And 28.1% and 40.4% of medical students and practitioners had good knowledge and attitude of m-health respectively [12].

In late 2018, the Ghana Health Service in collaboration with United States Agency for International Development (USAID) (evaluates for health) and Good Neighbors Ghana (Korea) implemented and deployed the e-tracker system in all government facilities that do report into the District Health Information

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Management System 2 (DHIMS 2) to assist service providers to enter data directly using mobile handheld devices especially in Child Welfare Clinics (CWCs) in the Volta Region of Ghana.

Data is an important tool in healthcare service delivery [13], and using handheld devices to capture and transmit health data is something that improves upon the quality of health data generation [14] to support good decision making [15]. That is, decisions in themselves are meaningless unless are formulated based on the availability of quality data.

The quality of any captured data depends on the data source [16], and thus, if the people at the front desk of offering services do not have the knowledge of the application they use [17], it becomes so difficult for them to manage the system well enough and thus rather creates a lot of data inconsistencies in the generation process [18] and any health decision or policy that may be implemented will not be the desired health need of the population involved since good decision depends on good data [19] [20].

As a result, there is the need to understand a system (e-tracker) and practice it well enough to avoid repetition of service at different centres. For instance, if immunizations records are not uploaded and the same child visits another facility, it is likely that the same vaccines will be given to the child which will lead to more complications.

The current study however aimed to 1) determine the knowledge of caregivers on e-tracker 2) determine the e-tracker usability of caregivers and 3) identify the factors affecting the practice of e-tracker among nurses in the Ho Municipality of the Volta region of Ghana.

Findings of the current study could serve as a basis for other researches and also help in the exploration of the knowledge and usability of E-tracker among nurses in the Ho Municipality.

2. Materials and methods

The current study adopted a descriptive cross-sectional approach which is one of the observational study designs that measure both the exposure and outcome of interest at a point in time within a specified population [21]. The study was carried out in the Ho Municipality which lies between latitudes 6 º 20” N and 6 º 55” N and longitudes 0 º 12’’ E and 0 º 53’’ E. The municipality is divided into five sub-municipalities. The study comprised healthcare providers who were responsible for providing care with the use of a handheld device deployed. Any of the nurses who is responsible for the use of the e-tracker and consented to the study was interviewed. Staff that were sick, at the late period of pregnancy, national service personnel, and NABCO personnel were not interviewed. Sample size of 194 was computed. Simple random sampling technique was used to select the desired participants. Semi-structured questionnaire was used to collect the data. Respondents were called on phone (phone interview) and the link of the questionnaire (google forms) was sent to their WhatsApp lines (for those who preferred that). Those who followed the link sent to them wrote their initials of name to illustrate their consent. Verbal (oral) consent was then used for those who preferred to and answered the questionnaires through phone calls. Phone interviews were entered using EpiData version 3.0. Google forms interviews were downloaded in Excel format. Both were cleaned using Stata 16 IC (College Station, Texas 77845 USA).

Knowledge of E-tracker assessment was generated from seven questions (generated by the author) which was pre-tested among ten nurses ahead of the data collection. Responses were coded into zero (wrong answer) and one (correct answer). These were summed up and grouped into two category scores of high knowledge (above the mean value) and low knowledge (below the mean value) knowledges with a mean score of 3.5. E-tracker usability was computed by using the System Usability Scale (SUS), a ten-question which was computed. For questions 1, 3, 5, 7, and 9, their score (Likert scale) which is 0 to 4 was computed by scale value minus 1. For questions 2, 4, 6, 8 and 10, score was subtracted from 5. The corresponding values were summed and further multiplied by 2.5 to estimate above and below average score with an average score of 68 and a score of more than 68 as above average and score of less than 68 as below average [22]. There were questions to determine factors affecting the practice. Chi-square was run to identify the significant associations between the knowledge level and the demographic characteristics, and knowledge level and factors affecting practice of e-tracker. At a confidence level of 95%, a p-value less than 0.05 was considered statistically significant. Logistic regression was then carried out to determine the odds of exposures to the outcome. Results were however presented using tables and graphs.

Ethical clearance was sought from the Ghana Health Service Ethics Review Committee (GHS-ERC) with ethical number GHS-ERC 012/04/20.

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3. Results

186 respondents responded to the questionnaire in all. 102 (54.8%) of the respondents were in the age group of 30 to 34 years, 162 (87.1%) being females, 138 (74.2%) were married, 156 (83.9%) were holding Certificate, and 144 (77.4%) were CHN's. 126 (67.7%) practiced for more than five years, 162 (87.1%) have spent not more than five years at their current facility, and 102 (54.8%) have been using smartphone for more than five years (Table 1).

Table 1: Demographic characteristics of respondents

Variable	Frequency N = 186	Percent
Age: Mean (SD)	31.9 (±4.4)	
Age group		
<30 years	42	22.6
30 - 34 years	102	54.8
>=35 years	42	22.6
Sex		
Male	24	12.9
Female	162	87.1
Marital Status		
Single	48	25.8
Married	138	74.2
Qualification		
Certificate	156	83.9
Diploma/Bachelor	30	16.1
Cadre		
CHN	144	77.4
Midwife	18	9.7
Others	24	12.9
Length of practice		
<=5 years	60	32.3
>5 years	126	67.7
Length at current facility		
<=5 years	162	87.1
>5 years	24	12.9
Smartphone use		
<=5 years	84	45.2
>5 years	102	54.8

Figure 1 below showed that 129 (69.3%) of the respondents had high knowledge and 57 (30.7%) had low knowledge of e-tracker. Detailed knowledge is illustrated in Table 2.

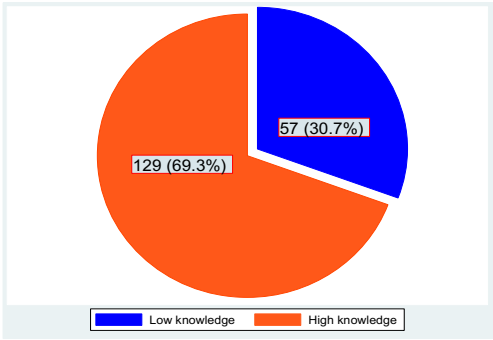

Figure 1: Knowledge level of respondents

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Age group (X^2=10.748; p-value=0.005), Sex (X^2=4.8568; p-value=0.028), Qualification (X^2=6.3045; p-value=0.012), Cadre (X^2=31.5839; p-value=0.000), and Length of practice in years (X^2=15.6111; p-value=0.000) were significantly associated with the knowledge level of respondents (Table 2).

Table 2: Detailed Knowledge level of respondents

Knowledge Level of e-tracker					
	Low	**High**	**X^2 (p-value)**	**COR (95% CI) p value**	**AOR (95% CI) p value**
	N = 57	**N = 129**			
	n (%)	**n (%)**			
Age group					
<30 years	18 (31.6)	24 (18.6)		**Reference**	**Reference**
30 - 34 years	21 (36.8)	81 (62.8)		2.9 (1.33, 6.29) **0.007**	1.1 (0.32, 3.99) 0.853
>=35 years	18 (31.6)	24 (18.6)	10.748 (**0.005**)	1.0 (0.42, 2.37) 1.000	0.2 (0.04, 1.05) 0.057
Sex					
Male	12 (21.1)	12 (9.3)		**Reference**	**Reference**
Female	45 (78.9)	117 (90.7)	4.8568 (**0.028**)	2.6 (1.09, 6.21) **0.032**	3.7 (1.17, 11.84) **0.026**
Marital Status					
Single	19 (33.3)	29 (22.5)		**Reference**	
Married	38 (66.7)	100 (77.5)	2.4318 (0.119)	1.7 (0.87, 3.43) 0.121	
Qualification					
Certificate	42 (73.7)	114 (88.4)		**Reference**	**Reference**
Diploma/Bachelor	15 (26.3)	15 (11.6)	6.3045 (**0.012**)	0.4 (0.17, 0.82) **0.014**	1.5 (0.37, 5.92) 0.579
Cadre					
CHN	30 (52.6)	114 (88.4)		**Reference**	**Reference**
Midwife	14 (24.6)	4 (3.1)		0.1 (0.02, 0.25) **0.000**	0.1 (0.01, 0.19) **0.000**
Others	13 (22.8)	11 (8.5)	31.5839 (**0.000**)	0.2 (0.09, 0.55) **0.001**	0.2 (0.05, 0.56) **0.003**
Length of practice					
<=5 years	30 (52.6)	30 (23.3)		**Reference**	**Reference**
>5 years	27 (47.4)	99 (76.7)	15.6111 (**0.000**)	3.7 (1.89, 7.10) **0.000**	7.4 (2.40, 22.80) **0.001**
Smartphone use					
<=5 years	24 (42.1)	60 (46.5)		**Reference**	
>5 years	33 (57.9)	69 (53.5)	0.3099 (0.578)	0.8 (0.45, 1.57) 0.578	

Figure 2 below showed that 42 (22.6%) of the respondents scored above average and 144 (77.7%) scored below average of the e-tracker usability scale. Detailed e-tracker usability is illustrated in Table 3.

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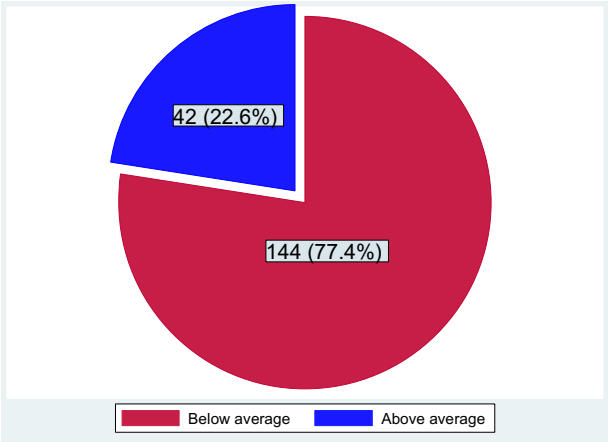

Figure 2: System (e-tracker) usability scale

Age group (X^2=12.9508; p-value=0.002) and length of practice in years (X^2=8.0189; p-value=0.005) were significantly associated with system (e-tracker) usability of respondents (Table 3).

Table 3: Detailed System (e-tracker) usability scale

Average usability scale of e-tracker	**Below average N = 144 n (%)**	**Above average N = 42 n (%)**	**X^2 (p-value)**	**COR (95% CI) p value**	**AOR (95% CI) p value**
Age group					
<30 years	36 (25.0)	6 (14.2)		**Reference**	**Reference**
30 - 34 years	84 (58.3)	18 (42.9)		1.3 (0.47, 3.51) 0.623	0.6 (0.17, 2.23) 0.458
>=35 years	24 (16.7)	18 (42.9)	12.9508 (**0.002**)	4.5 (1.56, 12.97) **0.005**	1.8 (0.42, 7.30) 0.440
Sex					
Male	18 (12.5)	6 (14.3)		**Reference**	
Female	126 (87.5)	36 (85.7)	0.0923 (0.761)	0.9 (0.32, 2.32) 0.761	
Marital Status					
Single	42 (29.2)	6 (14.3)		**Reference**	
Married	102 (70.8)	36 (85.7)	3.7607 (0.052)	2.5 (0.97, 6.30) 0.058	
Qualification					
Certificate	120 (83.3)	36 (85.7)		**Reference**	
Diploma/Bachelor	24 (16.7)	6 (14.3)	0.1363 (0.712)	0.8 (0.32, 2.20) 0.712	
Length of practice					
<=5 years	54 (37.5)	6 (14.3)		**Reference**	**Reference**
>5 years	90 (62.5)	36 (85.7)	8.0189 (**0.005**)	3.6 (1.42, 9.10) **0.007**	3.2 (0.92, 11.44) 0.068

Receiving any coaching (X2=15.2018; p-value=0.000), e-tracker seen as a double work (X2=12.7312; p-value=0.002), the person immediately consulted if encountering a difficulty (X2=22.2155; p-value=0.000), and e-tracker helps in writing reports (X2=35.6652; p-value=0.000) were all statistically significance with knowledge level of respondents Table 4.

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Table 2: Factors affecting e-tracker practice

	Knowledge Level of e-tracker				
	Low	**High**	**X^2 (p-value)**	**COR (95% CI) p value**	**AOR (95% CI) p value**
	N = 57	**N = 129**			
	n (%)	**n (%)**			
Have you ever received any coaching?					
Yes	21 (36.8)	87 (67.4)		**Reference**	**Reference**
No	36 (63.2)	42 (32.6)	15.2018 (**0.000**)	0.3 (0.15, 0.54) **0.000**	1.6 (0.61, 4.15) 0.345
Do you have access to internet all the time?					
Yes	8 (14.0)	28 (22.8)		**Reference**	
No	49 (86.0)	95 (77.2)	1.8549 (0.173)	0.6 (0.23, 1.31) 0.177	
Is the e-tracker seen as a double work?					
Yes	37 (64.9)	107 (82.9)		**Reference**	**Reference**
No	8 (14.0)	16 (12.4)		0.7 (0.27, 1.75) 0.436	1.6 (0.56, 4.63) 0.373
No idea	12 (21.1)	6 (4.7)	12.7312 (**0.002**)	0.2 (0.06, 0.49) **0.001**	0.9 (0.22, 3.75) 0.887
If you have encountered a difficulty with the system, who do you immediately consult?					
In charge	30 (52.6)	24 (18.6)		**Reference**	**Reference**
District HI	27 (47.4)	105 (81.4)	22.2155 (**0.000**)	4.9 (2.45, 9.63) **0.000**	6.8 (2.78, 16.53) **0.000**
Do you take tablet to the field?					
Yes	25 (43.9)	47 (36.4)		**Reference**	
No	32 (56.1)	82 (63.6)	0.9187 (0.338)	1.4 (0.72, 2.57) 0.339	
Do you have good computer skills?					
Yes	21 (36.8)	51 (39.5)		**Reference**	
No	36 (63.2)	78 (60.5)	0.1208 (0.728)	0.9 (0.47, 1.70) 0.728	
Does the e-tracker help in writing your reports?					
Yes	20 (35.1)	52 (40.3)		**Reference**	**Reference**
No	7 (12.3)	59 (45.7)		3.2 (1.27, 8.28) **0.014**	5.0 (1.70, 14.78) **0.004**
No idea	30 (52.6)	18 (14.0)	35.6652 (**0.000**)	0.2 (0.11, 0.50) **0.000**	0.2 (0.07, 0.47) **0.001**

4. Discussion

Generally, there was relatively high knowledge of e-tracker among nurses in the Ho municipality (69.3%). Comparing to similar studies that found that 8.9% of nurses are familiar with m-health in Lagos State [5] and 28.1% of medical students and practitioners having good knowledge of m-health in Iran [12]. The huge difference in the knowledge might be as a result that in Lagos State, the nurses were not trained before the survey was carried out as it was in the Ho municipality. In Iran, the knowledge level was divided in three categories whereby the current study was divided into two categories. Age group was an associated factor that determined the knowledge level of nurses. Female nurses also have higher odds of high knowledge than male nurses (COR = 2.6; AOR = 3.7). Age was agreed as a factor affecting knowledge of computer skills among nurse managers however, disagreed with female nurses having higher odds of having computer skills [11]. CHN's have a better understanding of the e-tracker hence were more knowledgeable of the e-tracker than the other cadres. Midwives were 90% (AOR=0.1, p-value=0.000) less to have high knowledge as those with others which include; Physician Assistants (PAs), Enrolled Nurses (EN's) among others were 80% (AOR=0.2, p-value=0.003) less to have high knowledge. This might be because most of the services that are rendered by the CHN's such as Child Welfare Clinics (CWC's) are imputed into the system and reminders are usually set and used to track those that will be due to services within a particular day. To be able to meet these demands of the service since no child is to be left out in the vaccine-

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preventable diseases vaccines, it increases their exploitation of the system and eventually makes them to better understand the use of the system. Nurse who practiced more than five years had a better understanding of the system than those practicing for five years or less (COR=3.7, p-value=0.000; AOR=7.4, p-value=0.001) whiles the length of smartphone usage does not influence knowledge of e-tracker. The reason may be that the e-tracker was designed based on the manual register that the nurses use to record services they have offered into. Therefore, the longer one practiced, the familiarization with the register. Thus, as the system is just the replicate of the manual register in an electronic form, it does not demand how long a nurse used a smartphone to be able to use the system but rather the familiarization of the manual register helps in the filling of electronic one and also the necessary steps to be taken to avoid mistakes using the system. The current finding however disagrees with Adatara et al., which found that the longer a nurse manager works the less the computer skills [11]. This contradiction might have to do with the outcome of interest. While the current study was looking at e-tracker which is a form of ICT tool, Adatara et al., took into consideration the general computer usage such as MS Word, and HAMS among other applications. Moreover, it sampled only nurse managers at secondary facilities as the current study looked at the CHPS, Health Centers, and the hospitals and sample nurses in general without any category.

There was relatively low e-tracker usability as only 22.6% of the nurses had above average of the system usability score. This implies that majority of the nurses cannot use the system on their own without consulting others despite the knowledge. A study found the practice and knowledge of health information technology among nurses as 42.0% and 32.2% respectively which showed higher practice against knowledge score [12]. In an eight questions checklist in Burundi, 94.2% of healthcare workers agreed and strongly agreed to communicate to other colleagues using mobile devices with the least adoption of 51.2% that agreed and strongly agreed to monitoring and treating clients using mobile devices [23]. This study however, did not combine the questions as in the case of the current study. However, the current study agreed with Rahimi et al., which also reported that there was challenges with Technology Acceptance Model (TAM) such as telemedicine among health workers which does not guaranteed them to work effectively without an assistance [24]. In the current study, e-tracker usability was highly influenced by age group (X^2=12.9508; p-value=0.002) and length of practice (X^2=8.0189; p-value=0.005). Nurses who were thirty-five years or above were about five times (COR = 4.5) to have above average usability compared to nurses less than thirty years and those who practiced more than five years were about four times (COR = 3.6) to score above the average compared to those who practiced five years or less. This might be as a result that those nurses who were old happened to have spent longer periods in the service and eventually understood the terrain of the work especially the register and thus, their knowledge of expertise helped them to be able to follow the e-tracker and with minimal efforts, they can keep going with the system without much technical support.

Coaching or training has an associated factor with knowledge of e-tracker among nurses. For nurses that received coaching, it increased their level of understanding the e-tracker and hence increases their knowledge level as nurses who were not coached were about 70% less to understand the e-tracker as desired. This is because the lack of nurses engagement in technology training sessions decreases their confident level to cope with the current demand of the application of technology in the health industry [25]. The e-tracker was seen as a double work for the nurses. This is because it is just a replicate of their manual register and the same client's data that will be entered into the e-tracker will again be entered into their hardcopy registers. This hinders some of the nurses from entering especially if they go for outreach services without the tablet. It was more evidenced as 74.5% of physicians having burnout symptoms in Canada reported HER as a key factor contributing to it [26]. The personnel a nurse contacted if he or she has a challenge with the e-tracker affected his or her knowledge level of the e-tracker. Those who sought help from the District (HI) had a higher knowledge to understand the e-tracker than those who got help from theirs in charges (COR = 4.9; AOR = 6.8). This might be that some of the in-charges themselves have challenges to understand the system to talk of guiding someone else with it. And perhaps as the District (HI) was part of the deployment team, they happened to have a better understanding, and since the District doubles as the next reporting organizational level of the Ghana Health Service, the District seemed to have authority over them. Nurses who disagreed that the e-tracker helped in writing their reports were higher to have high knowledge of the e-tracker than nurses who agreed it helped in writing reports. This might be as a result that though they know the e-tracker they do not do the entries on time and thus, the system has no value for them as far as their report writing is concern. This is because if some are still entering back locks,

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then there is no way the system can be of any help to them in writing their current reports. The majority of the nurses do not have internet connectivity all the time and this hinders their usage of the e-tracker. This is because even if a client comes and there is the need to search for the client's details, it becomes very difficult to get the details, and to reduce the increase in waiting time, services are rendered without the search and this increases the chance of duplication. Though access to the internet has no statistical significance.

In conclusion, majority of the nurses in the Ho Municipality has high knowledge of e-tracker whereby there was very poor e-tracker usability. As nurses were coached, their level of understanding the e-tracker were increased. The e-tracker was seen as a double work and thus hinders its performance and this eventually led to the system not providing any benefit as far as report writing is concern. Limitations were that the current study was susceptible to recall bias on the part of the participants since there was no room for practical observations and whether a participant has ever used an e-health system before was not measured. And to the best of our knowledge the current study was the first to assess the e-tracker deployment and thus recommends that; there should be regular in-service training to enhance the nurses' ability to use the system on their own. The government should see to the internet stability for proper synchronization and searching.

5. Acknowledgements

Nurses at the Ho Municipality.

6. Statement on conflicts of interest

There is no conflict of interest as far as the current study is concern.

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