OCCUPATIONAL HEALTH & SAFETY INFORMATION MANAGEMENT SYSTEM USING DISTRICT HEALTH INFORMATION SOFTWARE

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Abstract – Generally, there are insufficient studies on occupational health and safety in Africa. This study examines how District Health Information Software (DHIS) can be used as a health information systems infrastructure tool for occupational health and safety. Health Information System data is vital, yet most developing countries' health data collection, collation, compilation, analysis, and reporting is inadequate, inaccurate, and untimely, making it unusable for decision-making. The goal is to examine how various user perceptions affect work-related security and health behavior. The objective is to conduct a baseline study to examine New Partnership for Africa's Development (NEPAD's) challenges in sharing occupational health and safety data with regional partners. This report investigates DHIS as an information infrastructure. The study also identifies factors that affect Occupational Health Information System Management acceptability and utilization using the Unified Theory of Acceptability and utilization of Technology (UTAUT) Model. The researcher used a descriptive research approach in which questionnaires were distributed to a randomly selected group. The acquired data was analyzed using descriptive and correlation analysis in the social package for statistical sciences software (SPSS). It used the descriptive analysis, to find a relationship between individuals' intention to use Occupational Health Information Management System and their belief that the system would improve their performance and efficiency in carrying out their tasks. The study will conclude the hypotheses stated, Effort Expectancy, Performance Expectancy and Social Influence significantly influence behavioral Intentions for users to use occupation health information management system.

Keywords: Health Information Systems, occupational health and safety, Occupational Health Information Management System, District Health Information System, dhis.

I. INTRODUCTION

There is a lack of studies on workplace safety generally in Africa. The present study is designed to explore how District Health Information Software 2 (DHIS2) can be used as an information systems infrastructure tool in relation to occupational health. The aim is to analyse how different risk perceptions can influence the behaviour of security and health related to work. In this paper we will look at (DHIS2) District Health Information System as an information infrastructure with a closer look at Zambia. The World Health Organization (WHO) defines Health Information System (HIS) as a system that integrates data collection, processing, reporting and use of the information necessary for improving health service effectiveness and efficiency through better management at all levels of health services [1][2].

II. LITERATURE REVIEW

Information gathered from Health Information Systems (HIS) is essential. Yet the collection, collation, compilation, analysis, and reporting of health data in most developing countries is incomplete, inaccurate, and untimely which is not very useful for decision-making [2]. Table 1 shows a summary of some literature reviewed and the gaps identified [2][3][4][5][6][7].

Table 1

No.	Author	Paper	Gap
1	Josephine Karuri, Peter Waiganjo, Daniel Orwa, Ayub Manya	DHIS2: The Tool to Improve Health Data Demand and Use in Kenya "journal Vol. 8 No. 1 (2014) https://jhidc.org/index.php/jhidc/article/view/113	Manual methods and poor record keeping render health data inappropriate for decision-making.
2	Adaletey DL, Poppe O, Braa J	Cloud computing for development – improving the health information system in Ghana. In: 2013 IST-Africa conference and exhibition, IST-Africa, Nairobi, Kenya, 2013.	Lack of proper information makes emerging nations' health care systems expensive and slow.
3	Braa J, Monteiro E, Sahay S.	Networks of action: sustainability health information systems across developing countries. MIS Quarterly. 2004;28(3):337–62.	Manual data collection and analysis in developing nations yields incomplete health data unsuitable for decision-making.
4	Josephine Karuri, Peter Waiganjo, Daniel Orwa, Ayub Manya, DHIS2	DHIS2: The Tool to Improve Health Data Demand and Use in Kenya, Journal of Health Informatics in Developing Countries: Vol. 8 No. 1 (2014)	Paper-based routine Health Information Systems are used in underdeveloped countries
5	Jean Panda Lukongo Kitronza, Jacques Lofandjola Masumbuko, Philippe Mairiaux	Workers' Perceptions of Occupational Safety and Health in a Textile Industry in the Democratic Republic of Cong	There is Lack of awareness on Health Information System in developing Countries
6	Braa J, Hanseth O, Heywood A, Mohammed W, V S	Developing Health Information Systems in Developing Countries: The flexible standards strategy. MIS Quarterly. 2007; 31:381–402	The Lack of Health Information Systems in developing Countries

District Health Information System (DHIS) is a free, open-source platform for health program data reporting and analysis. The University of Oslo's Health Information System Program (HISP) launched DHIS to construct Health Information Systems (HIS) in disadvantaged nations.

DHIS is free worldwide as a public good. NORAD, PEPFAR, The Global Fund to Fight AIDS, Tuberculosis, and Malaria, UNICEF, and the University of Oslo fund the DHIS platform's core development operations through the Department of Informatics. [8][9].

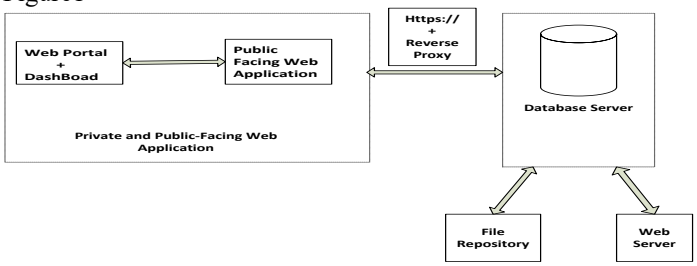
The demand for and use of a Health Information System by its target audience for informed decision making determines its success. There is growing evidence that DHIS is more likely to succeed when local health authorities and all key stakeholders are involved. [10] [11]

Several research studies have used numerous technological acceptance models and theories to different phenomena and cultural settings, giving different results. Performance expectancy, effort expectancy, facilitating conditions, and behavior intention all affect Health Information System adoption. Venkatesh et al. combined eight technology acceptance models to create the UTAUT model [12][13][14]. Compared to the eight models that were used to construct it, the UTAUT model can explain 70% of usage intention diversity. Health Information Systems for data collecting and decision making have not been extensively studied. The UTAUT model's use in Zambia's District Health Information System rollout has not been studied. This study aims to fill that gap.

III. SYSTEMS REQUIREMENTS

Figure 1 shows the block diagram for the systems requirements.

Figure1



FUNCTIONAL REQUIREMENTS

Table 2 below shows a summary of the functional requirements.

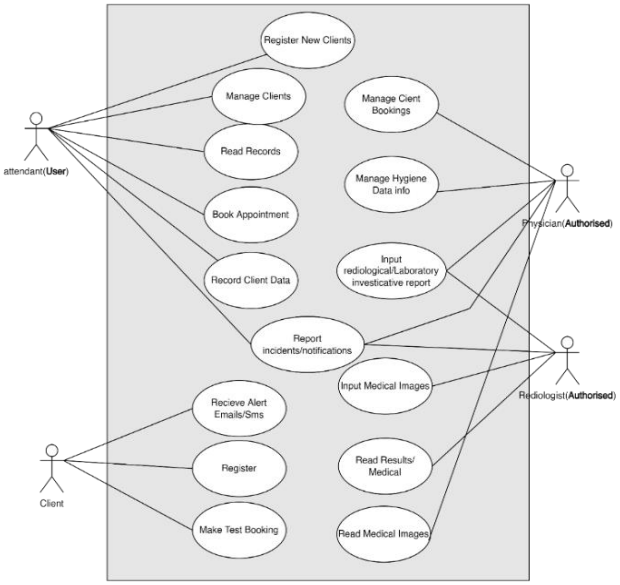
Table 2

l	Description	System Domain/Module
Register client and retrieve the record	A user should be able to register new clients and retrieve records of existing clients	Client Registration
Book Appointment	The user should be able to book appointment for medical consultation and/or examination	Appointment Booking
Client Record	1. The system should allow user to record medical, family, socio-economic and work-related history about clients.	Nursing Services
	2. The system should allow user to record anthropometric measurements.	
	3. The system should allow for entry of vital signs and vision records.	
	4. The system should allow user to record HIV Counseling and Testing Processes and results for Clients	
Clinical Examination	1. The system should allow users with adequate rights for the recording of clinical examination results by the clinician.	Client Screening
	2. System should have Computerized Physician Order Entry (CPoE) allowing the Physician to order labs and other investigations for a client	
	3. The system should allow authorized Physician/Radiologist to input radiological report i.e. interpretation of radiological images s	
	4. The System should allow authorized user to retrieve medical images from archive to be read by a physician for medical decision making.	
Lab Investigation	1. The system should be able to allow authorized user to log lab collected lab samples using bar code	Laboratory Investigation
	2. The system should be able to allow authorized user to input Laboratory investigation reports (i.e. laboratory, hygiene and other investigation results)	
Radiological	The system should allow authorized radiologist to import medical images	Radiological Investigation
Hygiene Data info	1. The system should be able to allow authorized user to perform risk assessment inspection scoring including identification of hazard and associated risks according to standards.	Occupational Hygiene
	2. The system should have a decision support function that will be able to recommend risk mitigation actions based on identified risks.	
	3. The System should allow compliance inspections and monitoring during site visit 4. The System should allow authorize user from the ministries of mines and labor to input update and print hygiene data	
Client Booking and Tracking	1. The System should be able to allow clients to register, making test bookings, and track results through its public-facing portal.	Client Portal Registration, Booking, Tracking and Reporting
	2. The system should allow the individual client to view medical certificate	
Alerts	1. The system should be able to send email alerts to inform them that the result is ready	Alerts
Incident Reporting and Investigation	3. The system should be able to allow authorized user to perform incident reporting and notification	

USE CASE DIAGRAM

Figure 2 below shows the use case diagram

Figure 2



IV. METHODOLGY

The research adopted the descriptive research design to help analyze the impact of having an Occupational Health Information Management System for collection of occupational Health and Safety information for mine employees on the Copperbelt in Zambia. The study population size was 210 of individuals who work with occupational health and safety information from Workers' compensation, Occupational Safety and Health Services Department (OSHD), Occupational Health and Safety Institute (OHSI) and Mine Safety Department (MSD). Due to the nature of the study, purposive sampling technique was employed. The sample size was determined using the Taro Yamane (1967) formula with a 95% confidence level. The formula is as shown:

$$n=N/ (1+N (0.05)^2) \quad (1)$$

where, n = the required sample size, N = the total population and e = the allowable error (%). Substituting numbers in the formula gives us:

$$n=210 / (1 + 210(0.05)^2) \quad (2)$$

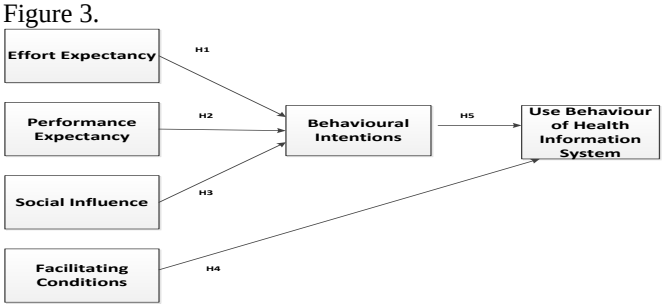
A total of 140 questionnaires were distributed of which a positive response of 130 was received for analysis. The researcher considered this as a success since it represented 93% of the sample size that was selected for the study. Data analysis was undertaken using the Statistical Package for Social Scientists (SPSS) software where the hypotheses of the study was tested. Correlation and descriptive analysis were used to test the impact of having a Health Information System for collecting occupational health data.

V.RESEARCH HYPOTHESIS

The researcher used the following research hypotheses shown in figure3.

The proposed research model is based on the UTAUT model by Venkatesh et al. (2003).

Figure 3.



- H1: Effort expectancy improves Occupational Health Information Management System behavior.
- H2: Performance expectancy increases Occupational Health Information Management System utilization.
- H3: Social influence favorably influences Occupational Health Information Management System utilization.
- H4: Facilitating conditions directly impact Occupational Health Information Management System usage.
- H5: Behavior intentions directly affect Occupational Health Information Management System use.

VI. RESULTS

The approach employed in this research was a mixture of qualitative and quantitative techniques to obtain the desired result. The respondents' characteristics include gender, age, education, and profession. Thereafter the chapter will present research findings and analysis.

Figure 4 shows the Gender for the respondents.

Figure 4

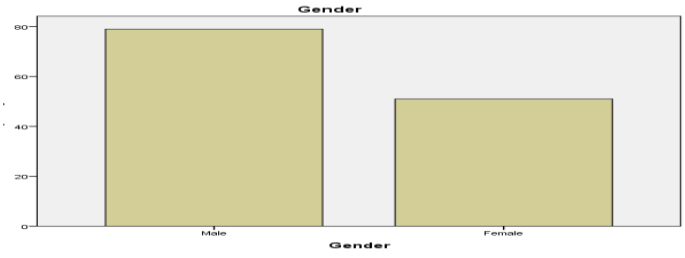


Table 3 shows the Gender for the Respondents by percentage

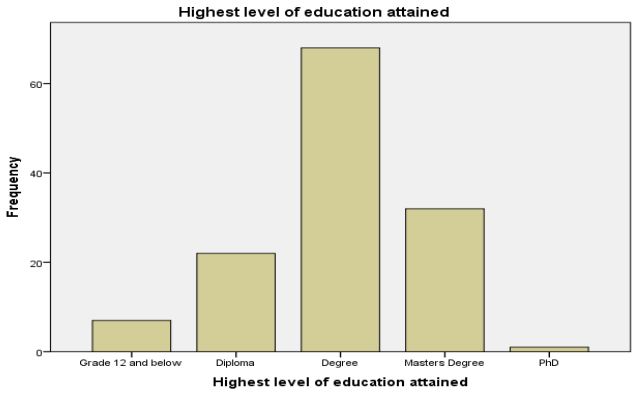
Table 3 Gender

		Frequency	Percent	Cumulative Percent
Valid	Male	79	60.8	60.8
	Female	51	39.2	100.0
	Total	130	100.0	

The findings have revealed that most of the respondents were males as shown in Figure 4 and table 3. Specifically, out

of the total number of respondents 79 representing 60.8 percent were males while 51 representing 39.2 were females.

Figure 5: highest level of education attained for the respondents.



Chi-Square Tests

Table 4

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	27.674[a]	16	0.035l
N of Valid Cases	130		

The findings in figure 5 have revealed that most respondents that had degrees also believed that Occupational Health Management System would be useful in carrying out their work.

The findings further revealed that the Chi-square test in table 4 show that there is a statistically significant relationship between the highest level of education attained by an individual and their belief that Occupational Health Management System would be useful in carrying out their tasks. This is evidenced by the asymptotic significant value (p-value) 0.035.

Table 5 shows the respondents that thought that Occupational Health Information Management System would increase their productivity and efficiency.

Table 5

	I think that Occupational Health Management System would be useful in carrying out my tasks					
	Strong Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Strongly Disagree	1	0	0	0	0	1
Neutral	0	1	5	3	3	12
Agree	0	0	3	31	21	55
Strongly Agree	0	0	1	14	47	62
Total	1	1	9	48	71	130

Table 6 shows the Chi-Square Tests

Table 6

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	182.728[a]	12	0.000
N of Valid Cases	130		

The findings in table 5 have revealed that most respondents believed that the Occupation Health Information Management System would increase their productivity and efficiency also believed that it would be useful in carrying out their tasks.

The findings have further revealed as shown in table 6 that the Chi-square test indicates a statistically significant relationship between the respondents' belief that Occupational Health Management System would increase their productivity and efficiency and that it would be useful in carrying out their tasks. This is evidenced by the asymptotic significant value (p-value) 0.000.

IMPELEMENTATION RESULTS

Figure 6 and figure 7 show the implementation results for the login screen and user dashboard respectively.

Figure 6

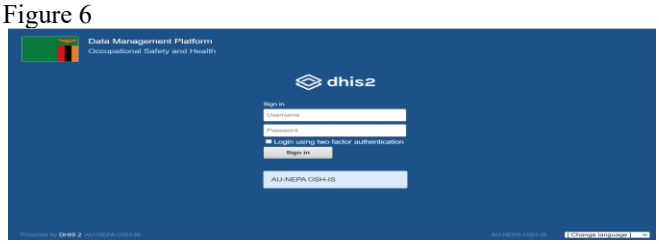
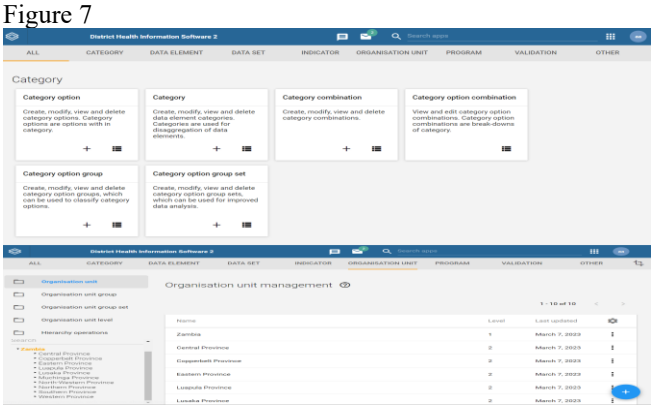


Figure 7



VII. DISCUSSION OF RESEARCH FINDINGS

This study found a statistically significant association between one's degree of education and their perception that an Occupational Health Management System would be effective in carrying out their duties. The study also found a statistically significant association between employees' beliefs that an Occupational Health and Information Management System will boost their productivity and efficiency in carrying out their responsibilities. Similarly, the study found a statistically significant association between people's beliefs that the interface with the Occupational Health Information Management System is clear and easy to grasp, and that the system will be effective in carrying out their jobs. Health Management Information System and their perception that the system will be effective in carrying out their activities. The study also discovered a statistically significant association between possessing the knowledge required to operate an Occupational Health Management Information System and individuals' view that the system would be effective in carrying out their tasks.

VIII. CONCLUSION

This study provides insights into the effects of a Health Information System with regards to occupational health and safety information. Further, it shows the application of the UTAUT model on the use and adoption of occupational health information management system. This is supported by the respondent's response that believe that Occupational Health Management System would increase their productivity and efficiency and their belief that it would be useful in carrying out their tasks. On the application of the UTAUT model by Venkatesh et al. (2003), the study concludes that of the hypotheses stated, Effort Expectancy, Performance Expectancy and Social Influence significantly influence Behavioral Intentions for users to use Occupation Health Information Management System.

IX. ACKNOWLEGEMENTS

The authors wish to acknowledge all those who took part in the study.

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