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SKILLS AND CAPABILITIES OF PUBLIC HEALTH INFORMATICS IN HEALTH WORKERS

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Abstract

Destination: To identify skills and capabilities related to public health informatics in health workers who work in public health service institutions, in order to know the informatics-related aspects of the work carried out by public health workers.
Method: This research is a quantitative descriptive study with a cross sectional approach. The sampling technique is simple random sampling. The sample was obtained as many as 133 health workers who have been actively working for at least 1 year at the Puskesmas or District/City Health Offices, as well as with the main task/work in public health services. The research instrument used is a questionnaire. Data analysis using univariate analysis.
Results: Based on the results of the study, the results of the skills and capabilities of use and analysis of data were good (65.4%); system design skills and capabilities are good (53.4%); media design skills and capabilities are good 69.9%; skills and capabilities of routine use of informatics system (66.9%); network maintenance skills and capabilities (60.2%); database administrator capability skills (62.4%). Based on the percentage of the results of the checklist from the question "Which of the following activities are you able to do or do at/for your health institution", public health workers in general have a higher percentage than sanitarians, nutrition workers, midwives, nurses and doctors.

Keywords***: skills, capabilities, public health informatics, health workers, public health***

1. INTRODUCTION

District/City Health Offices or puskesmas today must adapt to the rapid evolution of information technology in order to remain able to compete in global competition and comprehensively address public health problems. The presence and advancement of information and communication technology/ICT has become a breath of fresh air for the health sector. Utilization of various kinds of tools (tools), applications, software and so on is very helpful for health management or health services. The role of informatics has undeniable urgency in the health sector.

Although public health workers have long used information technology to assist their work, at the beginning of the 20th century it emerged (Public Health Informatics) as a broader discipline, a combination of public health and informatics. Public Health Informatics (PHI) is the systematic application of computer and information science as well as information systems in public health practice, research, and learning (Magnuson and O'Carroll, 2014). During the first decade, Public Health Informatics (PHI) activities focused primarily on automated surveillance (Massoudi et al., 2012). Currently, PHI contributes to many things in public health, including:

1. Implementation of an electronic health record (EHR) system and the exchange of health information (Health Information Exchange (HIE) such as electronic reporting of disease events, to enable the successful achievement of the criteria for usefulness/meaningful use (Dixon, Gibson, Grannis, 2014); (Dixon, Siegel, Oemig, Grannis, 2013); (Savel, Foldy, 2012).
2. Measurement of various health indicators, including social determinants through "big data" analysis from various community data sources (Comer, Grannis, Dixon, Bodenhamer, Wiehe, 2011); (Jalali, Olabode, Bell, 2012).
3. Development, implementation, and assessment of patient-centred technologies aimed at supporting health and well-being (Dixon, Jabour, Phillips, Marrero, 2014); (Evans, Nielsen, Szekely, 2015); To receive data from a network of EHR and HIE systems, interact 'two-way' with healthcare providers and patients.

4. Monitoring population health using large and complex multi-source data streams.

Therefore, public health institutions need to prepare for the manifestation of PHI needs in the health workforce system.

Given the increasing demand in the field, IRC is seen as an important core of modern public health practice by the United States Centers for Disease Control and Prevention (CDC).(Thacker, Qualters, Lee, 2012), Council for State and Territorial Epidemiologists (CSTE)(Smith, Hadler, Stanbury, Rolfs, Hopkins, 2013)and the Association of Schools and Programs in Public Health (ASPPH)(Association of Schools and Programs of Public Health, 2014). Although the demand for PHI qualifications is increasing, there are very few PHI education programs(Joshi, Perin, 2012)and also very few trained individuals working in public health institutions(Hersh, 2010).

In a 2009 survey by the American Public Health Association (APHA), only 8 out of a total of 56 respondents who worked in a Ministry of Health had core competencies in PHI.(Hsu, Dunn, Juo, et al., 2012).Since that study, the United States Centers for Disease Control and Prevention (CDC) started a registered PHI official internship program and annually and the CDC sponsors approximately 10 people to be placed in state and local health departments.(Scientific Education and Professional Development Program Office, 2012).

2013 profile survey by National Association of City and County Health Officials (NACCHO)(Mac McCullough, Goodin, 2014)found that in the Ministry of Health, PHI is classified as a 'high capacity' workforce because of PHI's personal work related to managing information systems.The results of the Public Health Workforce Interests and Needs Survey, informing that it is necessary to analyze broader aspects of informatics, which are related to the work carried out by public health workers, comparing the abilities of PHI workers with Information Technology (IT) workers, whether the role of PHI or IT is be able to lead, support, or participate in work-related informatics activities (eg implementation of information systems), understand the need for IT training for public health workers, internship programs to update IRC competencies, and inform curriculum development needs for formal public health education related to IRC

The size and characteristics of the PHI workforce are largely unknown given the scarcity of studies and data from the field. Therefore, this study aims to identify the IRC skills contained in health workers.

2.METHOD

This research is a quantitative descriptive study with a cross sectional approach. The population is all health workers in Banyumas Regency. The sampling technique is simple random sampling. Samples were obtained as many as 133 people. The inclusion criteria are health workers who are willing to fill out questionnaires, and have been actively working for at least 1 year at the Puskesmas or District/City Health Offices, as well as with the main task/work in public health services. The exclusion criteria are not health workers and do not work using information technology devices. Data analysis using univariate analysis.

3.RESULT

Based on the results of data analysis, it is known that the characteristics of the respondents are as follows:

Table 1. Characteristics of Respondents by Gender of Respondents

No	Gender	Frequency	Percentage (%)
1.	Woman	99	74.4
2.	Man	34	25.6
	Total	133	100

Based on Table 1. it is known that 34 respondents were male (25.6%) and as many as 99 respondents were female (74.4%).

Table 2. Characteristics of Respondents by Occupation

No	Work	Frequency	Percentage (%)
1.	Public health	48	36.09
2.	Sanitarian	30	22.55
3.	Nutrition	10	7.51
4.	Midwife	19	14.28
5	Nurse	15	11.27
6	Doctor (general/dental)	11	8.27
	Total	133	100

Based on Table 2. it is known that the majority of respondents' occupations are health workers related to public health, as many as 48 people (36.09%).

Table 3. CharacteristicsRespondents Based on Education

No	Education	Frequency	Percentage (%)
1.	Diploma	54	40.601
2.	Bachelor	79	59,398
	Total	133	100

Based on Table 3. it is known that the education of the most respondents is undergraduate as many as 79 respondents (59.398%).

Table 4. Characteristics of Respondents by Age

No	Criteria	Age (years)
1.	Maximum	55
2.	Minimum	21
3.	mean	38.77
4.	Standard Deviation	8,021

Based on Table 4. the average age of the respondents was 38.77 years (95% CI: 37.39 – 40.14), with a standard deviation of 8.021 years. The age of the youngest respondent is 21 years, and the age of the oldest respondent is 55 years.

Table 5. Characteristics of Respondents Based on Term of Service

No	Years of service	Frequency	Percentage (%)
1.	1-5 Years	24	18.0
2.	6-10 Years	26	19.5
3.	11-15 Years	21	15.8
4.	16-20 Years	24	18.0
5.	21-25 Years	22	16.5

6.	26-30 Years	10	7.5
7.	31-35 Years	5	3.8
8.	> 35 Years	1	0.8
	Total	133	100

The overall description of respondents' tenure is categorized based on Indonesian demographic data with 5-year intervals. Based on Table 5. it is known that as many as 26 respondents have a working period of 6-10 years (19.5%).

Table 6. Description of the skills and capabilities of use and analysis of respondent data

No	Rating Category	Frequency	Percentage (%)
1.	Not good	46	34.6
2.	Well	87	65.4
	Total	133	100

Based on Table 6. it is known that the skills and capabilities of the use and analysis of respondents' data are in the good category (65.4%).

Table 7. Description of respondents' system design skills and capabilities

No	Rating Category	Frequency	Percentage (%)
1.	Not good	62	46.6
2.	Well	71	53.4
	Total	133	100

Based on Table 7. it is known that the system design skills and capabilities of the respondents are in the good category (53.4%).

Table 8. Description of media design skills and capabilities

No	Rating Category	Frequency	Percentage (%)
1.	Not good	40	30.1
2.	Well	93	69.9
	Total	133	100

Based on Table 8. it is known that the respondents' media design skills and capabilities are in the good category (69.9%).

Table 9. Description of skills and capabilities of routine use of informatics system

No	Rating Category	Frequency	Percentage (%)
1.	Not good	44	33.1
2.	Well	89	66.9
	Total	133	100

Based on Table 9. it is known that the skills and capabilities of the respondent's routine use of informatics system are in good category (66.9%).

Table 10. Description of network maintenance skills and capabilities

No	Rating Category	Frequency	Percentage (%)

1.	Not good	53	39.8
2.	Well	80	60.2
	Total	133	100

Based on Table 10, it is known that the network maintenance skills and capabilities of the respondents are in the good category (60.2%).

Table 11. Description of database administrator skills and capabilities

No	Rating Category	Frequency	Percentage (%)
1.	Not good	50	37.6
2.	Well	83	62.4
	Total	133	100

Based on Table 11. it is known that the skills and capabilities of the respondent's data base administrator are in the good category (62.4%).

The results of data analysis in the form of percentages of skills and capabilities related to public health informatics, based on a checklist of the question "Which of the following activities are you able to do or do at/for your health institution" are as follows:

No	**PHI skills & capacities**	**Public Health (%)**	**Sanitary (%)**	**Nutrition (%)**	**Midwife (%)**	**Nurse (%)**	**Doctor (%)**
1	Extract data from information system	66.6	52.8	30.6	45.9	56.7	15.3
2	Using statistics or other analytical software	70.3	67.5	39.8	50.7	37.8	30.8
3	Using and interpreting quantitative data	80.6	75.7	60.3	55.2	59.7	60.9
4	Using and interpreting qualitative data	50.4	45.3	51.5	65.1	60.7	65.4
5	Using an open source geographic information system	40.1	34.1	16,2	10.1	9.3	5.5
6	Using proprietary software or	60.9	55.3	20.1	15.4	13.2	10.1

	closed source geographic information systems						
7	Conducting a feasibility study on the development of information systems	49.7	32.1	10.3	9.6	12.1	36.7
8	Perform system design (analysis and redesign of business processes)	30.1	15.8	7.2	11.2	13, 2	18.9
9	Develop requirements for information system development	43.9	12.1	13.9	15.9	19.6	35.7
10	Create an information system project management	50.9	17.9	8.1	17.3	19.5	40.1
11	Using information system applications that are routinely used to work smoothly	90.5	85.7	78.3	81.4	89.3	80.1
12	Maintain (modify content) website	87.9	72.9	67.9	66.1	70.3	77.9
13	Able to make	55.8	45.6	34.5	40.2	47.9	11.1

	network design (network architecture)						
14	Configuring a network (such as a LAN)	50.4	32.1	11.5	12.3	41.9	39.2
15	Network monitoring	50.1	40.9	34.3	32.1	49.7	50.4
16	Drafting the design for the database	55.5	55.1	37.9	23.7	55.3	52.1
17	Installing and testing a new version of the database system (DBMS)	60.5	57.6	50.1	54.2	60.2	50.2
18	Maintaining data and data protection	51.2	50.2	50.5	52.1	53.1	51.1
19	Manage backup and recovery	50.1	41.5	23.4	22.1	51.1	37.1
20	Control access permissions and privileges	60.8	60.1	34.3	31.2	56.7	56.8
21	Designing health promotion media	89.2	80.1	84.2	85.1	80.2	76.5
22	Making posters	90.3	90.1	88.2	89,9	87, 3	81.3
23	Make videos	93.2	94.2	90.1	92.3	94.9	90.1

4. DISCUSSION

4.1. Activities related to uses and analysis of data

Public health informatics skills and capabilities related to the ability to use data and analyze data on health workers who work related to public health services are in the good

category (65.4%). Their skills are obtained from routine data processing activities obtained from the daily operational activities of the puskesmas or health office. Activities of recording or data capture, sorting data, recapitulating data, analyzing data and disseminating information to managers or decision makers. This includes processing data from surveys conducted by the ministry of health. Activities of extracting data from information systems, using statistical or analytical software, using and interpreting quantitative data, using and interpreting qualitative data, In general, the percentage of public health workers is higher than that of other health workers. The most superior activity in terms of using and interpreting quantitative data (80.6%). This is based on the background that public health workers get a basic knowledge of biostatistics for quantitative data analysis in their undergraduate education. Curriculum that requires conducting research to find causal relationships of a phenomenon or health problem, causes them to be accustomed to using analytical software such as SPSS or STATA software. Doctors excel in carrying out activities using and interpreting qualitative data (65.4%). This may be due to the very good history and interview skills of doctors, as an effort to support the accuracy of the diagnosis. Skills in using open source geographic information systems for all health workers still need improvement. When compared with the skills of using proprietary software or closed source geographic information systems, they are more proficient. This situation is due to the training support provided to health workers who generally use paid geographic information system software, such as ARCGIS because WHO projects use that software. The use of geographic information systems has indeed begun to be widely used in the health sector, especially public health. The following is the use of geographic information systems in the field of public health: disease surveillance, health risk analysis, health access and planning, public health profiles. Geographic information system technology can significantly improve the quality and efficiency of health research, as a substantial connection between population health and geographic location (Shaw and McGuire, 2017). Applications of geographic information systems in the health sector include eight main groups: safe and fast routes for ambulance services, environmental health decisions, thematic maps of health data, mapping of health care providers, maps of population growth, maps of disease complexity identification, geographic access to health services. and geographic epidemiology (Dermatis, Tsoromokos, Gozadinos, Lazakidou, 2016). One study reported as many as 23,

4.2. Activities related system design

Public health informatics skills and capabilities related to system design capabilities for health workers who work related to public health services are in the good category (53.4%). However, in general their abilities need improvement. Activities of conducting a feasibility study of developing an information system, conducting a system design (analysis and redesign of business processes), developing information system development requirements, making information system project management in general, public health workers, sanitarians and doctors have better scores. Experience involved in procurement and development of information systems in institutions, units or departments causes them to have experienced part of the information system development cycle. The doctor as the head of the puskesmas has experience in preparing information system project management and public health workers have good experience regarding information system feasibility studies. The puskesmas leaders act as supporters, change managers, advocates, project managers, facilitators, managers and winners/champions. Identifying the role of health care leaders in the implementation of a health information system allows us to take a step closer to implementing a successful health information system. However, it seems that many health care leaders have not been able to fully realize the role in the development of health information systems and their understanding of health information systems needs strengthening. Also,

4.3. Activities related to media design

Skills and capabilities of public health informatics related to the ability of media design for health workers who work related to public health services are in the good category (69.9%).

The activity of being able to design health promotion media, being able to make posters, being able to make videos, most of the health workers have good scores. These activities are often carried out by health workers for the promotion of health programs. Open source applications for making videos, posters or leaflets are quite mushrooming at this time, and the massive development of android supports making it easier to use them for their work skills. Recent advances in mobile technology can facilitate the dissemination of accessible and attractive health education on a large scale, thereby increasing the potential impact of visual and video-based health promotion media. Accessible and attractive health education is the cornerstone of health behavior change. Especially in low- and middle-income countries, increasing access to effective health education can contribute to improving health program outcomes. The intervention is in the form of image integration, narration, and entertainment-education, where health messages that make up effective health education content have an effect on clean and healthy living behavior (Adam, Shannon, McMahon, Prober, Bärnighausen, 2019). increased access to effective health education can contribute to improving health program outcomes. The intervention is in the form of image integration, narration, and entertainment-education, where health messages that make up effective health education content have an effect on clean and healthy living behavior (Adam, Shannon, McMahon, Prober, Bärnighausen, 2019). increased access to effective health education can contribute to improving health program outcomes. The intervention is in the form of image integration, narration, and entertainment-education, where health messages that make up effective health education content have an effect on clean and healthy living behavior (Adam, Shannon, McMahon, Prober, Bärnighausen, 2019).

5. CONCLUSIONS AND SUGGESTIONS

Based on the results of the study, the results of the skills and capabilities of use and analysis of data were good (65.4%); system design skills and capabilities are good (53.4%); media design skills and capabilities are good 69.9%; skills and capabilities of routine use of informatics system (66.9%); network maintenance skills and capabilities (60.2%); database administrator capability skills (62.4%). Based on the percentage of the results of the checklist from the question “Which of the following activities are you able to do or do at/for your health institution”, public health workers in general have a higher percentage than sanitarians, nutrition workers, midwives, nurses and doctors.

Although in general the skills and capabilities of public health informatics are good, but not yet in optimal condition, it is advisable to hold regular training to upgrade and update the skills and capabilities of health workers related to public health informatics, according to the development of information and communication technology utilized. in public health service institutions.

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