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Effectiveness of Management Quality and Information on the Environmental Health Program Monitoring Application (TEMU-KL) at The Baebunta Health Center, North Luwu Regency

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Abstract **Introduction:** A Health Information System (HIS) is a system that collects data from the health sector and other related sectors in public health, analyzes the data and ensures its overall quality, relevance and timeliness. The aim of this research is to analyze the effectiveness of implementing the Environmental Health Program Monitoring Information System on management, system quality and information quality in implementing Environmental Health program monitoring (TEMU-KL) at Community Health Centers at the Baebunta Community Health Center, North Luwu Regency. **Methods:** The type of research used is RnD (Research and Development) and Quasy Experiment research. The population and sample in this study were Health Workers and Environmental Health cadres in villages throughout the Baebunta Community Health Center working area. The data analysis used is univariate and bivariate analysis. **Results:** Respondents in the intervention group after being treated with the TEMU KL information system were effective in monitoring the environmental health monitoring program with a p value of 0.000. Meanwhile, respondents in the control group after being treated with the E-Monev information system were not effective in monitoring the environmental health monitoring program with a p value of 0.810. **Conclusion:** The Environmental Health Program Monitoring Information System (TEMU-KL) is suitable as an effort to monitor the quality of the Environmental Health Program at the Baebunta Community Health Center based on the assessment of expert validators. The Environmental Health Program Monitoring Information System (TEMU-KL) is effective in monitoring program quality and the quality of environmental health program management.

Keywords Environmental Health, Health Information System, Program Quality

1. Introduction

A Health Information System (HIS) is a system that collects data from the health sector and other related

sectors in public health; analyzes the data and ensures its overall quality, relevance and timeliness. Generally, such information systems are needed in the planning and implementation of health service interventions to improve health systems and achieve better health [1]. The degree of public health in a country is influenced by the existence of health service facilities [2]. WHO estimates the burden of disease attributable to unsafe WASH for key health outcomes and reported SDGs indicators [3].

Environmental Health is one of the health efforts to achieve the highest level of health. Environmental health in community health centers has a vital role in the level of public health in the work areas of community health centers [4]. Puskesmas is a health service unit that provides curative and preventive services in an integrated, comprehensive and easily accessible manner, within the working area of a sub-district or part of a sub-district or district [5].

The Environmental Health Program at the Community Health Center is an activity or series of activities aimed at realizing environmental quality. The scope of environmental health program activities at Community Health Centers includes various efforts, including providing clean water and sanitation in the context of preventing or controlling diarrhea, worms, skin diseases, and house sanitation in the context of preventing ISPA/pulmonary TB disease, sanitation of residential environments in the context of preventing fever, bleeding dengue/malaria/filariasis.

The objectives of environmental health include, among others, making corrections, and minimizing/modifying the occurrence of environmental hazards on human health and welfare [6]. By implementing Environmental Health program activities at the Community Health Center, it is hoped that it can improve the level of public health through preventive, promotive and curative efforts.

The main objective of an environmental monitoring system is to collect information about environmental changes in various environmental components [7]. An information system is needed to facilitate recording, monitoring and reporting of activities carried out so that it becomes the main communication medium between the community, health workers and policy makers to control the death rate and morbidity rate of a disease [8].

Several developments in health information systems in recording, monitoring and reporting were carried out by Faridah [8] who created a mobile-based electronic health system called the e-tracer system to manage maternal and child health (KIA) data and the results showed that the system was conducive to increasing MCH data management capacity. Other research conducted by Gozali [9] through the development of the Continuum of Care Services (CCS) m-health platform comparing paper-based and mobile-based monitoring and evaluation (m-health) shows that the mobile-based system significantly increases the accuracy of data transfer compared to the paper-based system.

The assessment was aimed at assessing factors which were healthcare practitioner readiness, technological infrastructure ownership readiness, policy readiness, core readiness and financial readiness. The findings presented indicate that healthcare practitioners and patients are ready to exist and function as part of an interoperable HIS, although some enabling factors were identified in terms of policies needed to support its existence and functionality [9].

Mobile applications are a technology that can be used to collect, store and process community population data. Ease of use of applications on mobile devices is the main goal of this information application which can be used and developed via mobile devices because it is more practical, just by using a smartphone and an internet connection [10].

Researchers discovered that the prior environmental health monitoring software system needed regular maintenance and had numerous applications for each parameter based on their observations. Consequently, in order to facilitate the monitoring and reporting of conducted activities, researchers were innovated by developing a program for the TEMU KL environmental health monitoring system that incorporates all indicators.

The TEMU-KL application of the health information system can support the management of data information and health indicators to achieve health development goals. The TEMU-KL monitoring information system will describe standards for Environmental Health activities, success/failure factors for Environmental Health Activities, evaluation of activities as well as a menu on how to deal with Environmental Health Program Activities not running well and ways to optimize Environmental Health activities at Community Health Centers.

Realizing all these benefits requires implementing easy technology to improve environmental health program monitoring systems in urban health centers. The TEMU-KL monitoring information system outlines environmental health standards, environmental health success/failure factors, evaluation and selection of work with incomplete environmental health activities and methods to optimize environmental protection health activities at the Community Health Center level

2. Method

2.1. Type of Research

The type of research used is RnD (Research and Development) and Quasi-Experimental research. RnD is a division that is responsible for conducting research and development to bridge the aspirations of members as well as carrying out performance assessment functions for human resources in the association. Quasi-experimental is a research design that aims to determine the impact/influence after providing certain treatment by

placing research subjects non-randomly into experimental and control groups [11].

2.2. Information Systems Development

a. Basic Needs Identification Stage

The basic requirements referred to are the input and output of information needed to develop an information system for monitoring Environmental Health programs, ensuring identification of information systems that are currently running, identification of problems and challenges and identification of opportunities for information system development [12].

b. Prototype Development Stage

Making a Prototyping that is carried out includes: [13]

1) The model design stage, namely the process of developing an information system design strategy, consists of preparing an information system flow chart.
2) The basic architectural design stage creates a technical architectural design and the application components that are built and will later be used as a reference for creating the final application.
3) The stage of developing a design plan between users, namely the display and interaction between the input and output of the application system being created.
4) Create a prototype Environmental Health program monitoring system (TEMU-KL) that suits user needs.

2.3. Trial Phase

Ensuring that the components in the system are functioning properly is carried out by all entities directly involved to ensure that all system components are running as desired and proving whether the system can process input or produce output that meets expectations, namely appearance, ease of use and usefulness in answering user needs according to the results of basic needs analysis identification [14].

2.4. Revision and Improvement Stage

This is done if the user has input for improving the information system and further development is carried out according to user input and needs

3. Results

3.1. Data Collection

Results from interviews and systematic book reviews show that the TEMU KL activity reporting system monitors and assesses TEMU KL directly to achieve goals. This is considered important as an indicator of program success because it can be seen whether it is in accordance with the planned process and in accordance with the objectives, providing guarantees for the process and objectives through control mechanisms that work together in the system.

Based on the data in table 1, it shows that the largest age range is 30-39 years old, with 8 people in the intervention group and 9 people in the control group. The majority of education was at the high school level with 8 people each for the intervention and control groups. And the characteristics of the computer: able to turn on and turn off the computer, able to store and manage data, and able to operate software programs, were 8 people for the intervention group and 6 people for the control group.

Table 1. Respondent Characteristic Data

Characteristic	Intervention (n=15)		Control (n=15)	
	n	%	n	%
Age				
a. 20-29 Year	0	0	1	6.7
b. 30-39 Year	8	53.3	9	60.0
c. 40-50 Year	6	40.3	5	33.3
d. >50 Year	1	6.7	0	0
Education				
a. Primary School	1	6.3	-	-
b. Elementary School	2	12.5	2	13.3
c. Junior High School	8	50.0	8	53.3
d. Diploma III	3	18.8	4	26.7
e. Bachelor 1	1	6.3	1	6.7
Computer				
a. Able to turn on and turn off the computer	1	6.7	0	0
b. Able to turn on and turn off the computer, and able to store and manage data	6	40.0	9	60.0
c. Able to turn on and turn off the computer, Able to store and manage data, and Able to operate software programs	8	53.3	6	40.0

3.2. Design

The data obtained from this data collection is used to create a Monitoring Information System (TEMU KL), which is designed to meet the need to monitor activities carried out by environmental health. After the information is collected, a system design is carried out. This stage is known as the System Development Life Cycle (SDLC). The theory developed by DeLone and McLean is used to measure the success of updated information systems.

3.3. Expert Validation

There are 2 expert validators who carry out tests on the media being developed, namely management experts as experts who test the suitability of the media being developed, and IT experts as development (Information and Technology). The results of the expert validation carried out are as follows:

Table 2. Result Expert Validation

Name	n	mark	f(%)	Average	Category	*p-Value*
IT Expert	**15**	**61**	**87,14**			
Management Expert	**15**	**60**	**85,7**	**8,42%**	**Layak**	**0.007**

*intraclass correlation coefficient

Based on table 2, it is known that the assessment resuled from 2 expert validators produced a score of 86.42% in the feasible category. The p-value result of 0.007 indicates that TEMU-KL is suitable as an information system for improving monitoring of environmental health programs at the Baebunta Community Health Center, North Luwu Regency.

3.4. Test the Product

The TEMU-KL product test was carried out using the Pre-Experiment Design method with a Two group Pre-post Test design. This research was conducted on environmental health cadres at the Baebunta Community Health Center which is in the work area of the North Luwu District Health Service. In this research, researchers collected information from respondents to determine the need for using the system in environmental health monitoring as a reference for application development. After that, the effectiveness and efficiency of TEMU-KL were measured, which were previously provided with interventions using TEMU-KL to respondents in monitoring environmental health.

Table 3 shows that the mean value of planning in the intervention group and control group after receiving TEMU-KL treatment in the intervention group showed a significant increase with the mean delta value being higher compared to the control group, namely 3.20 in the intervention group and 2.40 in the control group with (p =0.02).

Table 4 shows that the mean accuracy value in the intervention group and control group after receiving TEMU-KL treatment in the intervention group showed a significant increase with the mean delta value being higher compared to the control group, namely 4.27 in the intervention group and 3.53 in the control group with (p =0.03).

Table 5 shows that the mean value of response speed in the intervention group and control group after receiving TEMU-KL treatment in the intervention group showed a significant increase with the mean delta value being higher compared to the control group, namely 2.27 in the intervention group and 1.20 in the control group with (p =0.00).

Table 3. Effectiveness of Quality Management of Environmental Health Services Before and After Implementing TEMU-K

Variable		Intervention Group	Control Group	*z*	*P*
		Mean ±SD	Mean ±SD		
Planning	*Pre-test*	7.80 ±0.862	7.60 ±0.737	-.611	0.51
	Post- test	11.00 ±1.000	10.00 ±1.069	-2.491	0.01
	(Δ)Delta	3.20 ±0.941	2.40 ±1.352	-2.214	0.02
Implementation	*Pre-test*	7.53 ±1.060	7.47 ±0.834	-.196	0.84
	Post- test	10.93 ±1.033	9.20 ±1.207	-3.397	0.00
	(Δ)Delta	3.40 ±1.639	1.73 ±1.100	-2.894	0.00
Monitoring	*Pre-test*	11.20 ±1.781	11.20 ±1.781	0.00	1.00
	Post- test	18.87 ±1.761	16.13 ±1.959	-3.154	0.00
	(Δ)Delta	7.67 ±3.109	4.39 ±3.195	-2.417	0.01
Evaluation	*Pre-test*	11.20 ±1.781	11.20 ±1.781	0.00	1.00
	Post- test	18.87 ±1.761	16.13 ±1.959	-3.154	0.00
	(Δ)Delta	7.67 ±3.109	4.93 ±3.195	-2.417	0.01
Management Quality	*Pre-test*	37.73 ±4.371	37.47 ±3.889	-.230	0.81
	Post- test	59.67-3.867	51.47 ±4.719	-3.736	0.00
	(Δ)Delta	24.67 ±5.434	16.00 ±5.385	-3.410	0.00

Table 4. Effectiveness of the Quality of Environmental Health Service Information Before and After Implementing TEMU-KL

Variable		Intervention Group	Control Group	*z*	*p*
		Mean ±SD	Mean ±SD		
Accuracy	*Pre-test*	6.40 ±2.261	6.27 ±2.017	-.274	0.78
	Post- test	10.67 ±2.261	9.80 ±1.082	-1.676	0.04
	(Δ)Delta	4.27 ±1387	3.53 ±1.727	-.908	0.03
Completeness of Information	*Pre-test*	6.40 ±2.261	6.27 ±2.01	-.274	0.78
	Post- test	10.73 ±1.438	9.87 ±1.060	-1.585	0.01
	(Δ)Delta	4.33 ±1.496	3.60 ±1.844	-.860	0.03
Punctuality	*Pre-test*	3.00 ±0.845	3.00 ±0.845	0.00	1.00
	Post- test	7.27 ±0.961	6.33-6.617	-2.673	0.00
	(Δ)Delta	4.27 ±0.884	3.33 ±0.976	-2.446	0.01
Relevance	*Pre-test*	3.07 ±0.799	2.93 ±0.884	-.547	0.58
	Post- test	7.33 ±0.976	6.40 ±0.632	-2.627	0.00
	(Δ)Delta	4.27 ±0.961	3.47 ±1.060	-1.927	0.04
Information Quality	*Pre-test*	18.87 ±4.491	18.47 ±4.486	-.314	0.75
	Post- test	36.00 ±4.053	32.40 ±2.720	-2.409	0.01
	(Δ)Delta	17.13 ±2.386	13.93 ±4.008	-2.332	0.02

Table 5. Effectiveness of the Quality of Environmental Health Services Before and After Implementing TEMU-KL

Variable		Intervention Group	Control Group	*z*	*p*
		Mean ±SD	Mean ±SD		
Response Speed	*Pre-test*	1.40 ±0.507	1.40 ±0.507	0.00	1.00
	Post- test	3.67 ±0617	2.60 ±0.282	-3.231	0.00
	(Δ)Delta	2.27 ±0.799	1.20 ±0.561	-3.602	0.00
Technical Abilities	*Pre-test*	2.47 ±0.743	2.53 ±0.743	-.315	0.75
	Post- test	6.93 ±1.280	6.00 ±0.756	-2.396	0.01
	(Δ)Delta	4.47 ±1.407	3.47 ±0.743	-2.246	0.02
Service Afterward	*Pre-test*	2.47 ±0.843	2.60 ±0.828	-.597	0.55
	Post- test	7.20 ±1.865	6.20 ±0.941	-2.486	0.01
	(Δ)Delta	4.73 ±1.534	3.60 ±0.828	-2.235	0.02
Service Quality	*Pre-test*	6.33 ±1.718	6.53 ±1.598	-.540	0.58
	Post- test	17.80 ±2.305	14.80 ±1.740	-3.560	0.00
	(Δ)Delta	11.47 ±2.774	8.27 ±1.710	-3.329	0.00

3.5. Product Yield

Researchers have innovated an information system for monitoring environmental health programs at community health centers, the use of which is to support the systematic management of the information cycle for environmental sanitation activities in preventing environmental-based diseases in the community and to repurpose program problems faced by activity implementation officers so far using a manual system.

Based on Figure 1, it shows the initial display menu of the KL meeting application which is used for the process of monitoring environmental health program activities. The initial display contains the email and password of the user who was previously registered.

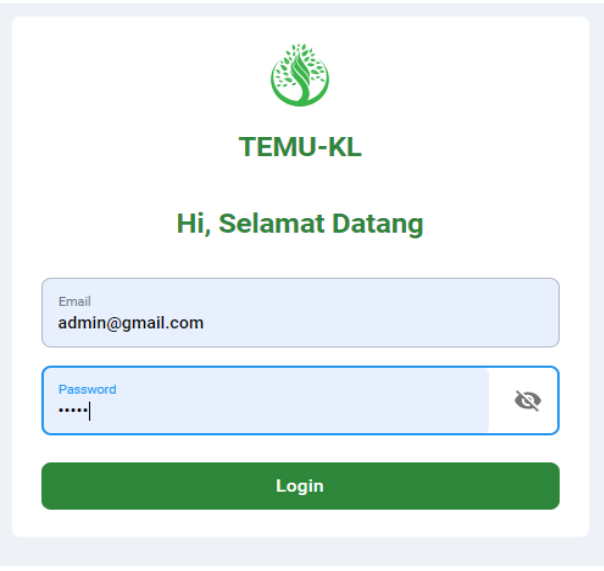

Figure 1. Home Page of the Meet Kl Application

4. Discussion

4.1. Implementation of the Environmental Health Program Monitoring Information System (TEMU-KL)

Digitalization of information has become an important need in society. As technology continues to develop, various information systems are starting to be created and used by organizations. The emergence of this information system is used to assist organizations in supporting appropriate decision making and rapid analysis of various alternatives [15]. Research by lee [16] regards the development of a non-communicable disease information system. Monitoring results from the use of this information system show that recording and analyzing results of early detection of non-communicable diseases can be done in a short time. Through this information system, it is also easier for users to find out the status of their health conditions directly [17].

4.2. Analysis of the Quality of the Environmental Health Program Monitoring Information System (TEMU-KL) Before and After the Environmental Health Program (Temu-KL) was Provided

a. Planning

The success of the program (TEMU KL) requires continuous development, integration and improvement efforts in the process. To allocate resources, priorities are set in the form of planning and determining program output. From Table 3, the p value obtained before and after administering the TEMU KL program application for planning quality is 0.000, which shows that there is a

difference in the effectiveness of planning quality. Meanwhile, the p-value of planning quality in the control group before and after providing the system application from TEMU KL was 0.001 (p<0.05), which means there is a difference in the effectiveness of planning quality in environmental health service management.

With developed resources, information systems make it easier to plan health workers' activities. This is in line with research conducted by Tarmizi [18] to answer the need for services and monitoring activities that can be developed through a collaborative process, including the planning process.

b. Implementation

The implementation is carried out in such a way that services are carried out effectively and efficiently according to predetermined plans. Program implementation (TEMU KL) cannot be separated from community participation and communication activities between stakeholders. From Table 3, the p-value obtained before and after program implementation (TEMU KL), in terms of implementation, is 0.000 (p<0.05), indicating that there is a difference in the quality of implementation before and after program implementation (TEMU KL).

c. Monitoring

A comprehensive data collection system includes up-to-date data information and changes in data over time can be monitored (WHO) [19]. The p-value in table 3 shows that the p-value of monitoring quality is 0.000 (p<0.05) which shows that there is a difference in effectiveness before and after program delivery (TEMU KL) on monitoring quality. This is in line with research by Tritanto [19]. The monitoring process with an information system is aimed at monitoring the planning and development of activities and producing various information needed for consideration of future activities.

d. Evaluation

Evaluation is a management process to determine information regarding the success, obstacles and impact of an activity. Information that is available to assess if more program actions are necessary [20]. Table 3 shows that the quality of the evaluation shows a p-value of 0.000 (p<0.05), which means that there is a difference in effectiveness between the quality of the evaluation before and after program delivery (TEMU KL). This is in line with research by Zunaidi [21]. The evaluation process using an information system can help improve staff services in making decisions in program planning.

e. Accuracy

Accuracy of information systems to support patient services is needed to improve services to patients and other related environments. The more accurate the information available and needed, the more useful it will be for all end-users of the information, especially for decisionmakers [22].

Based on Table 4, it shows that the p-value is 0.000 (p<0.05) before and after providing the new system in the accuracy aspect, which means there is a difference in the quality of information in the accuracy aspect before and after providing TEMU KL. This is in line with research by Maulida [23] which resulted in a significant increase in report accuracy before and after providing the information system.

f. Completeness of Information

Information produced by an information system can be said to be of quality if the information produced is complete. This complete information is really needed by users in making decisions. Table 4 shows the value for the completeness of information aspect showing a p-value of 0.000 (p<0.05) indicating that there is a difference before and after giving SIP-TEMU KL in this aspect. This result is supported by research by Apriyandi [24] which experienced an increase in the value of the information completeness aspect of the information system as perceived by users of the system.

g. Punctuality

Timeliness is the aspect of data that is updated based on time. Timeliness has the dimensions of recency, volatility, and timeliness. In Table 4, the punctuality aspect produces a p-value of 0.000 (p<0.05), which means there is a difference before and after using SIP-TEMU KL in the punctuality aspect. This is in line with research conducted by Putra [25] that the development of a new information system is able to overcome problems related to timeliness.

h. Relevance

The use of the new system produces more accurate data compared to the old system, and the relevance aspect shows a p-value of 0.000 (p<0.05) which means there are differences before and after the use of SIP-TEMU KL explained in Table 4 that there is an influence on the quality of information from the relevance aspect of the information system being intervened [26].

i. Response Speed

Information system response speed is measured as the level of information system capability in responding to system user requests [27]. The results of the service quality assessment analysis shown in table 4 show a p-value of 0.000 (p <0.05) in the aspect of response speed after and before giving SIP-TEMU KL, which shows that there is a difference in the response speed of service quality. The results of this research show that the response speed of information system users is very good as an indicator of service quality and has high value [28].

j. Technical Ability

Personal technical ability in using information can be seen from the user's ease in identifying data, accessing data

and interpreting the data. Good personal technical skills will encourage users to use accounting information systems so that information system performance will be higher [29].

One of the facilities provided to information system developers is technical ability. With a p-value of 0.000 ($p < 0.05$), there are differences before and after using SIP-TEMU KL, according to the technical capability aspect in table 5. In addition, this finding supports research conducted that information system technical capabilities influence information system performance positively [29].

k. After Service

After the developer used the information system to measure the quality of the SIP-TEMU KL service, the service afterward produced a value of 0.000 ($p<0.05$), which shows that there is a difference in service quality before and after providing SIP-TEMU KL. These results support previous research findings which show that the use of information systems has a significant influence [30].

4.3. Limitation

a. In carrying out research, there are several obstacles faced by researchers, namely:
b. The sample coverage used in the research was only one working area of the Baebunta Community Health Center.
c. In this research, the Android-based TEMU KL can only be used in areas that are covered by the internet network.
d. Environmental health cadres are very difficult to gather in the Baebunta Community Health Center working area during activities.

5. Conclusions

1. The application of the Environmental Health Program Monitoring Information System (TEMU-KL) to the quality of management and information quality in monitoring environmental health programs was proven to be significant based on the results of the Wilcoxon test, which obtained a p value of 0.000
2. Effective implementation of the Environmental Health Program Monitoring Information System (TEMU-KL) was on management quality and information quality in monitoring environmental health programs.

6. Suggestion

Suggestions for future studies include adding features to the Environmental Health Program Monitoring Information System (TEMU-KL) so that it can provide a better effect on the comprehensive environmental health activity reporting system. As well as using a larger sample so that the Environmental Health Program Monitoring Information System (TEMU-KL) application can be accessed by environmental health workers and cadres so that the Environmental Health Program Monitoring (TEMU-KL) can reach the wider community.

Ethical Approval

Obtain ethical approval from the Ethics Committee of the Faculty of Public Health, Hasanuddin University with number 5747/UN4.14.1/TP.01.02/2023.

Conflict Interest

The author declares that there is no conflict of interest in this study.

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1. For Regional Governments, to consider using the Environmental Health Program Monitoring Information System (TEMU-KL) application is effective in monitoring the quality of environmental health program management in a larger scope and can be used sustainably.
2. Add features to the Environmental Health Program Monitoring Information System (TEMU-KL) so that it can provide a better effect on the comprehensive environmental health activity reporting system.

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