Web-Based Design of Maternal and Child Health Management Information System Application for Midwives at Temanggung Regency, Indonesia

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Abstract

Healthcare information systems play an increasingly critical role in providing maternal and child health care. However, Indonesia's maternal child health data recording and reporting system, especially at the Temanggung Regency, does not work well. This problem is due to the data management being done manually. Therefore, the study aims to create a web-based mother and child health (MCH) information system appropriate to the MCH program based on user requirements.

This study has gathered the information by using focus group discussion (FGD). The FGD was run at the District Health Office of Temanggung. There were 17 village midwives (including the midwives coordinator). The informant was selected based on inclusive criteria such as midwives who give antenatal care service, work more than one year, and have experience filling out the maternal and child recording and reporting.

The result showed that most of the midwives feel exhausted to elaborate the manual recording and reporting of mother and child health due to too much data to fill in. According to the problems that village midwives faced, the application was developed by a web-based approach. The system recorded all the data listed in the maternal-child handbook, maternal cohort, maternal card, baby cohort, immunisation cohort, and recorded the health condition infant and child nutrition growth that midwives must do. This information system can handle the inputting process and automatically give the report as needed for patient care and reporting to Public Health Center (Puskesmas) and District Health Office (DHO). The system is user-friendly and can be accessed directly in the field the online or offline. This information system can generate the official reporting for MCH, Nutrition, Immunization and Family Planning programme, which have been a duty for village midwives.

The web-based maternal health management system has been developed according to the demand of the duties of village midwives. This system recorded and reported for the programmes that midwives must handle, either for operational or managerial levels.

Keywords: *Health Information System; Web-Based; Maternal Child Health; Midwife; Health Care; Data Management*

Abbreviations

ANC: Ante Natal Care; DHO: District Health Office; FGD: Focus Group Discussion; LAM MCH: Local Area Monitoring Maternal Child Health; MCH: Maternal Child Health; SDLC: System Development Life Cycle; UCI: Universal Child Immunisation

Introduction

Information systems are now playing a significant role in health management, including maternal and child health [1]. Various efforts have been made to increase the role of health information systems in health management, including Maternal and Child Health (MCH) [2]. In the Indonesian context, the urgency of developing an MCH information system is to provide helpful information for managing Maternal and Child Health programs at a health care service level (Puskesmas).

Web-Based Design of Maternal and Child Health Management Information System Application for Midwives at Temanggung Regency, Indonesia

48

The MCH information system was developed from the MCH recording and reporting system managed by a health care service (Puskesmas) Coordinator and assistance in filling out the utilisation data. The records were sourced from the MCH Handbook, Mother's Card and Child's Card. So far, data entry is still done manually, so there is still a lot of data that needs to be filled in [3]. Manual data management will cause many problems, such as data errors, missing data, etc. MCH recording and reporting still encounters many obstacles, such as overlapping forms, so data recording is redundant. There is a lot of recording reporting, so reporting can not often be on time [4].

Several scholars articulated that the MCH the data recording and reporting system in Indonesia did not work well. A study in Pekalongan Regency reported that only 40% of the samples were reported completely in the Pregnancy, Delivery, and Infant Register [5]. This condition is the same as the study at the Temanggung Regency that revealed the average completeness of the MCH Handbook is only 45.29% [6]. The MCH Handbook data is the LAM MCH database; thus, as the basis of the MCH Information System [7].

The development of Information Systems with computer technology can integrate data into one integrated database system to overcome health data management problems and improve health services [8]. The development of information systems based on computer and network technology is a requirement that must be met to support health management [9].

Aim of the Study

The study aims to create a computer-based MCH information system appropriate to the MCH program based on user requirements.

Materials and Methods

The study applied focus group discussion (FGD) to collect data. The FGD was run around 2 hours at the District Health Office of Temanggung (DHO). This FGD included 12 village 5 DHO's staff related to MCH Program, and one Information Technology (IT) Staff. The FGD was led by the author and was assisted by the research assistant to record the data. The informant was selected based on inclusive criteria such as midwives who gave antenatal care service, have worked more than one year, and have experience filling out the maternal and child recording reporting, job-related with MCH programme, and data recording reporting. The collected data then was used to design the web-based MCH information system. The system information development method used the System Development Life Cycle (SDLC) is a general methodology used to develop information systems. SDLC consists of several phases: planning, analysis, design, and implementation to system maintenance phases [10].

Result

The FGD broadly explores the human resources for managing MCH data records, reporting methods, quality priorities for completeness of reports, and information system model design.

The results of the FGD analysis can be summarised in 5 parts, namely aspects of patients (pregnant women), midwives, tools/equipment, technical filling, and management.

Each of these aspects is described as follows.

Pregnant women aspects

From the aspect of pregnant women, the information still lacking from pregnant women is a factor in the incomplete filling of the MCH Handbook. The incompleteness of MCH Handbook such as in the preparation of birth section, the information about blood donors and village ambulances data. Due to many pregnant women being examined and the examination length, pregnant women do not want their data recorded in the MCH Handbook because they think it will prolong the examination time. This condition showed the low awareness of pregnant women about the importance of data in the MCH Handbook and their health records.

Midwife aspect

Midwives had no difficulty filling out the MCH book or MCH reporting, but sometimes they didn't have enough time to fill it out. This problem is due to a large number of patients while the personnel are limited. The midwife's awareness of the importance of data is quite

Web-Based Design of Maternal and Child Health Management Information System Application for Midwives at Temanggung Regency, Indonesia

49

good. They understand that the data must be filled in correctly and completely because it will also be helpful for services to pregnant women. Midwives faced the problem is data repeated recording and reporting to the Coordinator of the Health Center midwife. The midwife must do filling the same data in many forms.

Tool/equipment aspect

Equipment or facilities that support pregnant women's health examinations also contribute to filling out the complete MCH Handbook data. The absence of this equipment means that data cannot be filled in as soon as after the examinations. The manual method to make MCH reports is also contributed to the completeness of MCH reporting. There are several kinds of books/forms that must be done related to the maternal examination, such as the MCH Handbook, ANC Registration, Medical Records of Pregnant Women, Cohort of Pregnant Women, and Mother Card. The village midwife must recap the mother's examination and report it to the midwife coordinator of the health care service. In the next step, the midwife coordinator reports it to the DHO. This reporting job is routine and must be reported every month. Besides, the midwife worked in the pregnant woman examination monitoring, and they also must work on its reporting. These facts also have an impact on completing the data recorded in MCH data recording and reporting. Thus, a lot of data entry is done repeatedly (redundant). Data repetition is also carried out to prepare reports on the Nutrition and Immunization program that midwives must hold. Therefore, a system is needed that can make Nutrition and Immunisation reports based on data support for MCH activities

Technical aspects of midwife administration

There are many data recordings that the Village Midwife must carry out. Besides the MCH Handbook's data recording, the other data recapitulation also must be done, such as ANC Recapitulation, Mother Cohort Recapitulation, and Pregnant Women Examination Recapitulation. Due to so many the official reporting format that the Village Midwife must do with the different designs, many midwives make the unofficial data capturing called "Help Book" to help in data filling in the recapitulation and reporting data. This book is the assistance book as the intermediate data processing before data inputting in the official reporting form. Due to many reporting forms, the midwife also has many 'Help Book", although these books recorded the redundant data. The midwives' duties are related to Maternal and Child Health, Nutrition, Immunisation and Family Planning; thus, all of the reporting related to these jobs also must be done. This issue is what makes recording and reporting seem like a lot of work. Therefore, data capturing and reporting by computer-based is critical. This technology will assist complex data capturing and reporting.

Management aspect

Management plays a vital role in managing resources, such as laboratory facilities and equipment related to data recording. Reward and Punishment schemes related to data recording have also not been implemented properly. This problem was due to the supervision of data entry in the MCH Handbook had not yet been implemented. Only midwives remind each other in case of delays. The feedback scheme for supervision results is also not optimal. Many reports and redundant data recording schemes are also caused by the need for administrative reports related to management aspects. Many programs require data to be reported to the Puskesmas, both for national and district programs. The number of reports and forms will be difficult to overcome without computer technology that can be made concise and can automatically generate activity report formats.

The problems that midwives faced a need to be solved with the information system. The information system design is made that can make records not only for the needs of the MCH program but also programs for Nutrition, Immunisation and Family Planning. These system requirements are needed for fast reporting records, summarising various forms by minimising redundant and repetitive data, and facilitating the preparation of reports required by management. According to the SDLC method used, this is the basis for the study for the planning and system analysis stages.

A web-based system design was made to overcome the problems that midwives faced. Data entry could be done online and integrate mother, infant and toddler data into MCH, Nutrition, Immunisation and Family Planning program reports in a system called the SISKIAZI. The midwives and healthcare services can monitor the maternal, child and nutrition health surveillance that is more conveniently accessed from the desktop if they get the internet connection to the data server.

Web-Based Design of Maternal and Child Health Management Information System Application for Midwives at Temanggung Regency, Indonesia

50

The implementation of the SISKIAZI can be accessed offline and online, with an overview of the menu, is as follows:

   a.   Home/main data dashboard summarises the MCH, nutrition and family planning program indicators, as shown in figure 1.
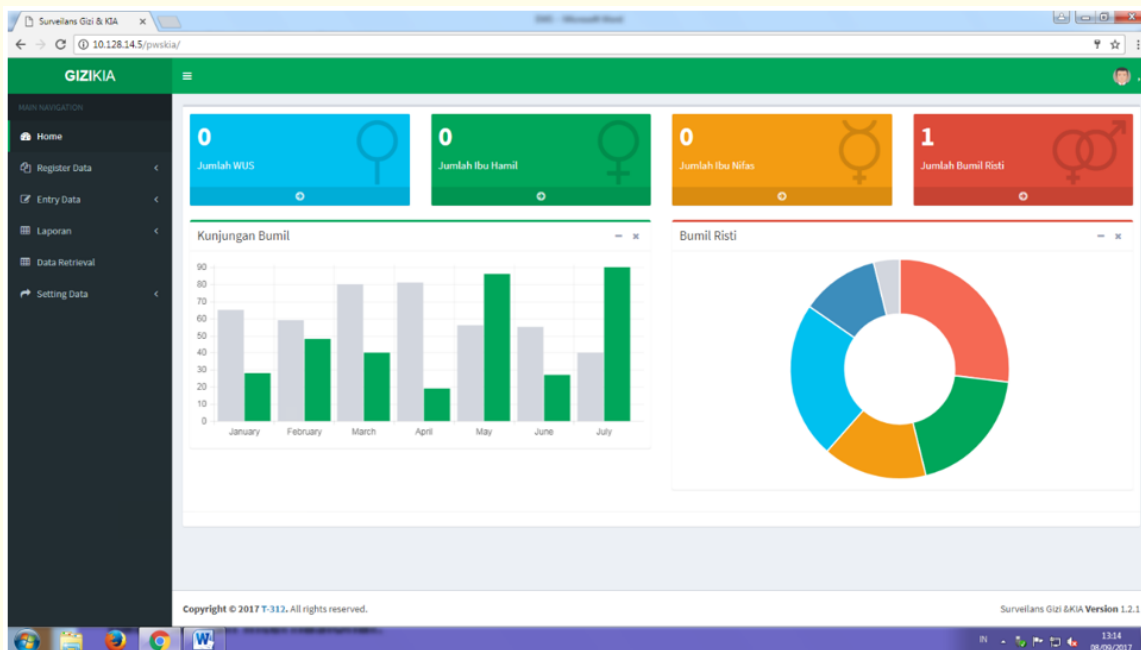

Figure 1: Home/main data dashboard.

   b.   Register for women of childbearing age, pregnant women and infants/toddlers to input primary data for women of childbearing age, pregnant women, and infants/toddlers, as shown in figure 2.

Figure 2: Register for women of childbearing age, pregnant women and infants/toddlers.

Web-Based Design of Maternal and Child Health Management Information System Application for Midwives at Temanggung Regency, Indonesia

51

c. Data entry for pregnancy examinations, infant nutrition and information systems for detection of infant growth and development, childbirth, postpartum, immunisation status, neonatal, integrated management of sick toddlers, maternal mortality, infant mortality, social demographic surveys, and family planning acceptors to record transaction data on health services provided to mother and baby/toddler, as in figure 3.
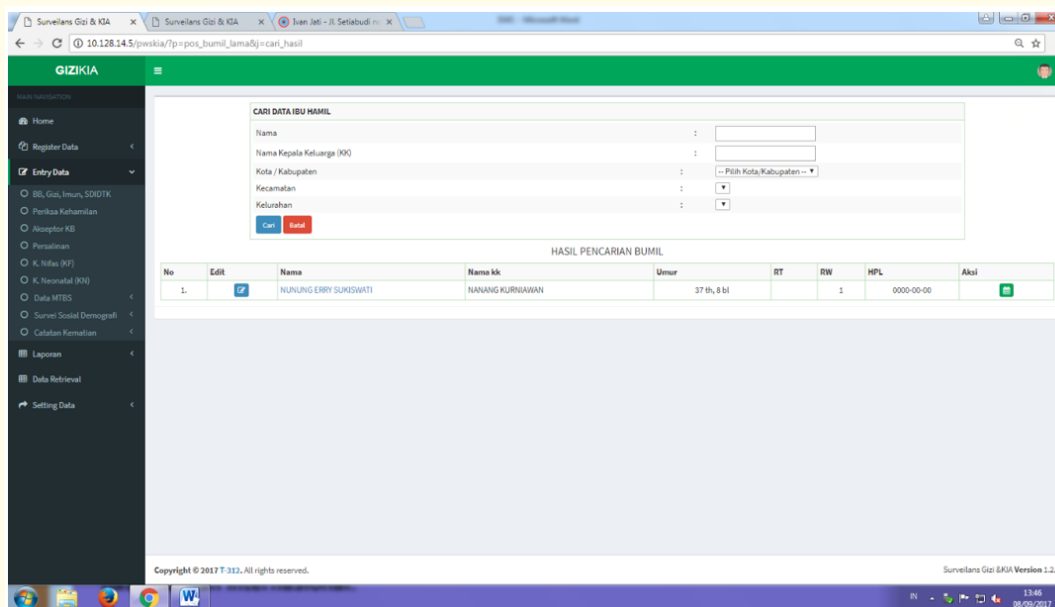

Figure 3: Data entry.

d. Toddler development report, information system for detecting infant growth and development, early warning system immunisations, Immunisation Coverage/UCI, Infant Cohort and Maternal Cohort included in LAM MCH, as output information generated by the system. This information will be used to make decisions regarding the MCH program, nutrition, immunisation and examination of pregnant women, as shown in figure 4.
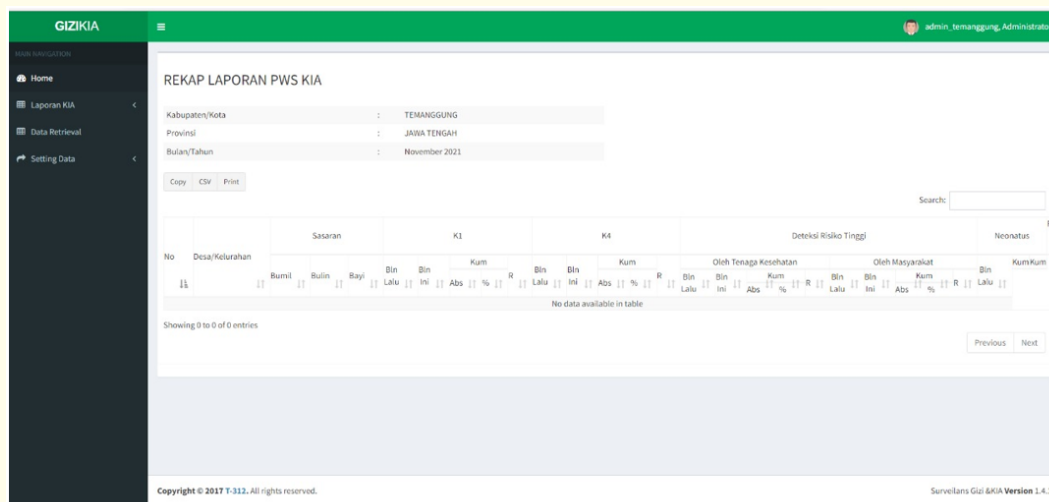

Figure 4: Reporting.

Web-Based Design of Maternal and Child Health Management Information System Application for Midwives at Temanggung Regency, Indonesia

52

The information system model that has been produced combines all the work of Midwives in one reporting system. All midwives' jobs require reporting; therefore, it takes an approach that only needs to input data once, so reports on MCH, Nutrition, Immunization and even Family Planning can be generated. This system will reduce redundant data and make data recording and reporting easy.

At the end of the SDLC development method, monitoring and maintenance are carried out by observing the system when used. The system is monitored whether it is as desired by the midwives.

Discussion

Midwives face many problems in health data management due to a lot of programs data and reporting forms that were handled manually. This problem is a burden working for midwives. It makes the quality of data and information in health care services managed by midwives are low. The web-based health information called the SISKIAZI is developed to assist the need of data management for midwives. It can record the data and generate the official reporting in all midwives' duties in health care services such as MCH, Nutrition, Immunization, and Family Planning programmes at the village.

Midwives, as the spearhead of village health programs, have many functions. The midwife in the village is alone and functions as a health service in the village [11]. Many programs are charged to midwives, followed by a data recording and reporting scheme. The number of reporting records that midwives have to do with various forms or record books, which often overlap each other, makes the data's quality not good [4].

The same thing also happened with LAM MCH, it was found that much data was not recorded properly. Many LAM MCH reporting data are still incomplete, with information quality achievements ranging from 55% to 75% [12]. Another study in Eastern Java Province showed that the current manual LAM MCH system has several problems: lack of flexibility, low data quality, high acceptability, low sensitivity, low representativeness, uncertain timeliness, and low data stability [13]. The implementation of LAM MCH also still found obstacles, namely the lack of the number of midwives in the village. These problems are due to many midwives' duties, including being asked to help with jobs at the health care service (Puskesmas) (Senewe and Wiryawan). Another obstacle is the geographical factor which is quite difficult, limited personnel both in the Puskesmas and in the village. There are still many health workers who have double duty. These problems caused LAM MCH unable to produce good data (Senewe and Wiryawan). In general, these problems are also faced by midwives in Temanggung Regency.

Therefore, information technology assistance is needed to make it easier for data recording and reporting. By using computer technology, the information system will facilitate the recording and processing of data and facilitate monitoring and decision-making, including decisions for maternal and infant services [16]. The use of Web-based technology is intended to facilitate online recording and retrieval of data. There are many advantages to a web-based information system, such as increasing knowledge [17] and users' awareness [18]. A web-based information system will also facilitate access to information anywhere [19].

Training and policy support from the management are needed to maximise the web-based information system developed. With policies from the leadership of the Health Office and Puskesmas, the midwife will maximise the use of SISKIAZI, as the only medium for recording and reporting all the official reporting from the midwives, including LAM MCH. The leadership should also carry out periodic monitoring to ensure that the existing system is used and possibly improve midwives' performance [20]. The hope is that the SISKIAZI can provide correct, complete, accurate and timely information, including the health conditions of mothers and children, to prevent morbidity and mortality.

Conclusion

The data recording and reporting that midwives must do encounters many obstacles because the recording is still manual, so that there is often overlapping of records and redundant data. It was needed to make data recording more concise, faster, and reports on time. The developed system's design and implementation use a web-based approach to facilitate access to input data and report information to submit reports on time

Web-Based Design of Maternal and Child Health Management Information System Application for Midwives at Temanggung Regency, Indonesia

53

and appropriate with the midwives' needed. This information system application can generate the reporting of MCH, Nutrition, Immunisation and Family Planning program, which midwives must do from once inputting. It is recommended to conduct training and be given management support to implement the system properly.

Acknowledgements

Conflict of Interest

The authors declared that no competing interests exist.

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Web-Based Design of Maternal and Child Health Management Information System Application for Midwives at Temanggung Regency, Indonesia

54

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