Improving Infrastructure Services of City Public Health using GIS: Descriptive Method Development

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Abstract
The nutrition matter is public health problem could not be overame only by medical approach and health caring themselves. Monitoring information system of malnutrition child under five and analysis of potential region of nutrient disturbed in Nanggroe Aceh Darussalam had developed to simplify data input and data analyzing process to information. Resulting Information included reporting table of child under five weighing, reporting of nutrient status monitoring. The status monitoring of kids nutrition with the aid of Geographic Information System (GIS) application designed to facilitate the data input and analysis and to come up with the quality of information. The output of this system is very useful information in forms of monthly table for each primary health care and monthly for each region. Obtained information supposed to be relevance, fast, precise and accurate and benefit for the nutrition program in district, and the last the nutrition program policy got the right objectives.

1. Introduction

Under nutrition and food insecurity are critical problems among under-five children in many developing countries (Moshy et al., 2013). In the developing countries nutrition matter is found in forms as lack of various types of nutrient. The community do not give sufficient attention to the malnutrition at early stage, but just being aware after it becomes seriously worse. The experience indicates that many malnutrition cases are not found among children, unfortunatenaly it is not realized by the community that it has developed as a serious problem (Kendal and Kendal, 2003). Malnutrition which is poor nutritional status, can lead to disability, illness and death and jeopardize future economic growth by reducing the intellectual and physical potential of the entire population. Globally malnutrition is estimated to contribute to over 50% of child deaths and 40 million are affected by vitamin A deficiency. It is estimated that 190 million under-five year old children in developing countries are chronically malnourished. (Nungo et al., 2012). In Aceh province itself, the malnutrition case upto August 2006 has been recorded totally 1,336 cases, out of which 29 cases have died. Meanwhite 1,030 cases, their condition have improved and 177 cases have needed more treatments until recovery. The result of health and nutrition survey which had been conducted on November 2005, stated that condition status of community's nutrition, prevalence of lack nutrient amounting to 44,2% while malnutrition totally 9,8% (profile of NAD province 2006). The result of monitoring activities to the growth of children under five is found from the weighing data obtainable from Integrated Health Station (Posyandu). Health Department's analysis shows for the program for periods from January to December 2006 namely between 84% to 90%. Weighing coatinuity from January to December 2006 stated between 55% to 93%. The weighing result from January to December 2006 is between 63% to 76%, participating community from January to December 2006 amounting between 49% upto 80% and the result of achievement program from January to December 2006 totally between 36% upto 44% (Nutrition Profile of Central Aceh Province 2006). Central Aceh Regency is one of the regencies, where its geographic condition is less favourable for health services as consequence of the difficulties in accessing the health service providers, socio economic including the low level education and the less supporting information system, and afraid this situations will cause that malnutrition will keep existing in this area. Observing the result of the recording and reporting, the malnutrition cases in Health Department of Central Aceh, the data processing is limited only to the submission of the report without further in-dept analysis. Use of Geographic Information Systems (GIS) and

personal computers can reduce the time and money invested while increasing the accuracy of results from the classification and rating process. (Ted et al., 1997). The monitor the areas geographically where the malnutrition cases are found, covering the spread and risks, factors, and information system is needed such as good geographic information system (SIG) to handle the malnutrition problem of the Children Under Five in Nanggroe Aceh Darussalam (NAD) province. Health information system is a system where by transforming the data into information, will produce a health information for the decision makers, wherefrom they can decide various formlines action for health development the information obtainable for health development will also cover for service needs, education and health investigation (Siregar, 1993). Child malnutrion prevalence and trend estimates available for public health planning are mostly available only at the level of global regions and/or at country level. To support carefully targeted intervention to reduce child malnutrion public health planners and policy-makers require access to more refined prevalence data and trend analyses than are presently available. (Amugsi et al., 2013)

2. The Aim of Research

The information system is composed from "database" on the basis of geographical aspect to monitor malnutrition of Children Under Five, which can assist in taking decision and preparing action plan for malnutrition cases in Central Aceh Regency, NAD.

3. Research Method

The research, which will be done in this matter, is classified as a qualitative study and directed to prapare application for an information system, also to observe the current exicting information system and to study for the after information needs for the benefit of the development for further information system. System approach which stresses on elements identifies that a system is a a group of interrelated and integrated elements to reach a certain goal. Such a definition can be used as a fundament to easily study a system for the purpose of analysis and planning of a system (Jogiyanto, 1999). According to Scott (1996), a system consists of input, processing and output. There are four main characteristics in a system, namely a system is operating in a ring, consists of elements, characterized with interrelationship and have a function or main goal (Al Fata, 2007). A good information system is derived from a system

development with standardized method one of which is *System Development Life Cycle* (SDLC). The steps taken in SDLC consists of analysis, design, evaluation and maintenance. These steps should be done in orderly manner, which are prohibited to pass through or change the queu. There are some disadvantages in SDLC which among others high cost and time consumption, and has inflexible method, since all the steps must be done in proper order (Al Fata, 2007). The variables in this research covers among others input variable, namely Demographic Data of the districts, Weighing Data of Children Under Five. Monitoring Data of the Nutrition status of Children Under Five, KLB data of Malnutrition. Meanwhile the output variables consists of report of the nutrition status for children under five, the total coverage of SKDN for the districtsand the regency, and also thematic chart. Whereas analysing process is started as from Data Collection, Data Processing. Evaluation Data, prepare the structure of Data Base, planning of Application system, and Planning of Geographic Information system. For further clarification regarding the direction of the system development, an illustration is needed covering the entities involved the entities taken in the framework of this development of the information system are as follows (Figure 1).

4. Result and Discussion

The World Health Organization reported that inappropriate feeding in children is responsible for one-third of the cases of malnutrion. (Hong et al., 2012). The nutrient condition of the Children Under Five in the Central Aceh Regency, based on the Result of Monitoring Survey for Nurtrition status are as the following : year 2007 : from 14,368 total Children Under Five weighted 265 (1,84%) malnutrition 1,052 (7,32%) under nourished, 12,391 (86,24%) have good nutrition, while 644 (4,48%) have over nutrition. From the data of Health Department of Nanggroe Aceh Darusallam (NAD) province, year 2007, outfrom 16,512 Children Under Five in Central Aceh Regency, total Children Under Five (below dotted line) 213 Children while total Children Under Five (below red line) 251 childrens. From the analysis to the current running system at the monitoring activities for nutrient defficiency of children under five, the monitoring has been conducted at weighing activities for children under five at every integrated health station (Posyandu). In addition the monitoring is also done for Nutrition status of children under five every year. This monitoring is performed on August or

September. The monitoring activities for nutrient defficiency of children under five at Central Aceh Regency, the results are reported as from villages or integrated health station (Posyandu) to regency and province. This report is regularly submitted every month. Community Health Center (Puskesmas) receive the weighing report from the midwife.

5. Analysis of the Nutrition Disturbunses Area

The malnutrition is the distribunses to several aspects of a person's welfare and or community which are caused by inability to provide sufficient nutrient obtainable from the food to cover their needs. There are many factors which influence the condition of a persons's nutrition out of which are condition of socio economic and health service. The following illustrations will clarify several factors which have impact to somebody who suffers nutrient defficiency, to enable to analyze the area of malnutrition in Central Aceh Regency, poor people, percentage of baby born with less weight (BBLW), percentage of health personals, percentage of baby and children under five under red line, percentage of health facilities. Using maps to visualise data can enable quicker interpretation of complex geographical phenomena (Elliot, 2004), identify patterns, and aid in planning, resource allocations for policy and decision making (Cromley, 1996). Spatial analysis (figure 2) : To describe the area of malnutrition, in Central Aceh Regency and found several area which are potentially suffer from malnutrition i.e Kute Panang district and Kebayakan district with colour in the map "Red". Whereas the districts with less potential of malnutrition is coloured in the map "Green" located in districts Laut Tawar, Bebesen, Silih Nara, Celala and Pegasing, meanwhile the areas with potential nutrition disturbunces are coloured "Yellow" located in districts Bintang, Linge and Ketol.
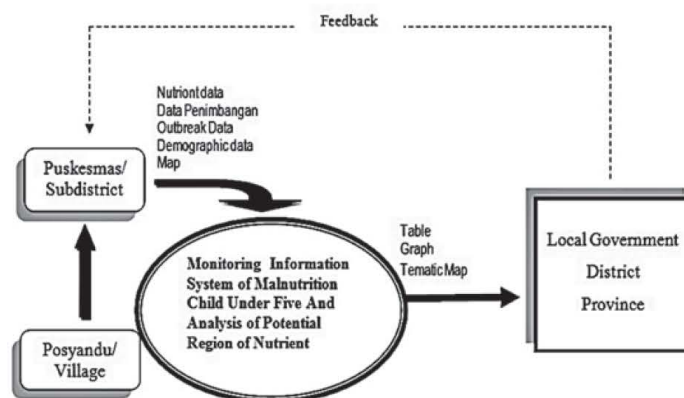

Figure 1. Entity of the Monitoring Information system for Nutrient Defficiency to Children Under Five and Analysis for Nutrient Disturbunces Area
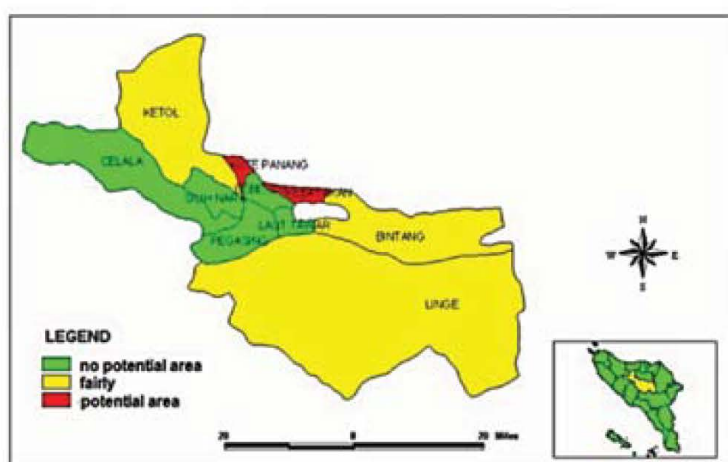

Figure 2: Areas Map of Potential Malnutrition in Central Aceh Regency

5.1 Information System

The development of the information system is an establishment of a new system to replace the old system in totallity or to improve the current existing system. The development of information system can form the new information system or to improve perfectly the existing system. Basically, the reasons in changing the old system are caused by problems arising in the old system, secondly there are still opportunities to insert the additional information which could support the process of management decision, and also if any other instructions such as government regulation (Jogiyanto, 1999). From the aspect of input, there are some problems found in the information system. The number of target for Children Under Five is not consistent every time the weighing activities for Children Under Five were done in the Integrated Health Station (Posyandu). No proper filing was done causing difficulties in tracing the data when needed. Nutrition data is still not perfectly filled out and not complete in each Community Health Center (Puskesmas). Proper and complete data is still less prepared in the district office i.e population and demographic data. The sole alternative solution is necessarily to establish the proper recording and reporting system at Community Health Center (Puskesmas), in addition it is also necessary to form a computerized back up data system, which could easily help to find the filling data of nutrition. Also to find and prepare assisting appliances which enable to more support the activities to improve the nutrition for Children Under Five in every district. From the aspect of process. The resources are limited in their knowledge of technology mainly computer. The process of preparing report is done manually, so that the work becomes slow. Analysing process is also still prepared manually. No data base which is connected to the spatial data and the back up filing system is also not available. The alternative solution is to set up the Education and Computer Training and also provide some softwares. Preparing the automated report can be computerized. Analyzing process will also prepared by computer and automated. The data base can be set up to back up the data in Health Department at the Regency. The map can be arranged using software of mapping. From aspect of output. The report is still very simple. The map is made by manual system to check the areas which meet the nutrition problems with children under five. The alternative solution : to set up the data automated by computer which is presently available for the time being. Also to design the map in connection with monitoring the under nourish of children under five and the area of nutrition disturbunces.

Figure 3: user key for admin

5.2 Interface Design

Developments in Geographical Information Systems (GIS) have now made the mapping of this information commonplace and are used in a large range of applications. (Evans and Clive, 2012). The interface design is the concept of system development in form of a prototype, which illustrates the whole form fully. From the design it (figure 3) can be viewed how the user perform data entry, select menu, and to obtain output from the process. The output of the interface design for the Children Under-nutrition Information System in the District level. In the main menu, user can select the desired menu; data menu, information, report, management, and exit. There are selections of sub menus in every menu. In the "Find" menu, consists of information to search the data needed, data modification, data edit, and also to add data. (see figure 4). In the "Report" menu, user can view report of child weighing in the sub district, report of nutritional status monitoring according to sub district and malnutrition children in Aceh Tengah District. Besides that, the system which will be developed also contains the "Information" menu, which is useful to view information in form of regional maps and graphs. The visualization of the "Information" menu can be seen through the figure 5. below:

5.3 The Evaluation and Feedback of Information System

The National Health Information System was developed to support the accomplishment of the "Indonesia Sehat 2010" program. The "Indonesia Sehat 2010" program would accomplished nicely if

supported by sufficient and accurate data and information which was delivered rapidly and on-time. The monitoring of Malnutrition Information System has some evaluations to be put notice. First of all, regarding good recording and reporting system in the input section in the puskesmas level. Subsequently, there should be a computerized backup system to simplify the search of nutrition files for supporting secondary data in order to support the improvement of child nutrition performance in every sub district in the service area of the District Health Office. Whereas in the process and output section, there should be computer trainings and courses regarding the software used by the District Health Office. The surplus value of the system in this section is the computerized reporting and data analysis. The availability of a database to backup data of the District Health Office through map production using GIS based software, therefore more attractive and can be modified as desired.
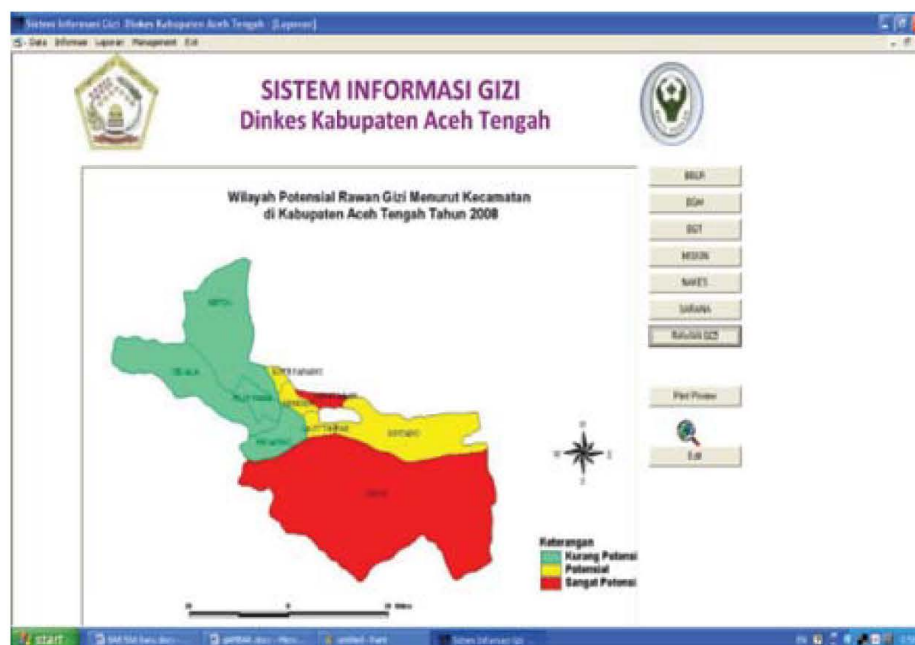

Figure 4: Sub Menu for inputting data

Figure 5: Example of output from the "Information" menu

6. Conclusions

1. By having established the monitoring information system for malnutrition of children under five and mapping the areas potentially suffer malnutrition will easily make the filing and tracking back the data, so that the work process in the health department will become more effective and efficient.
2. The development of the monitoring information system for malnutrition of children under five and analysis for the areas potentially suffer malnutrition in Central Aceh Regency will be much possibly be imporoved in supporting the planning and managing the nutrition program in Central Aceh Regency.
3. The framework of the output in developing the monitoring information system for malnutrition of children under five in Cenral Aceh Regency is the output in the forms of tables (weighing report, monitoring report of nutrition status and malnutrition Report of children under five), such reports are prepared in graphical forms and map.
4. The result of the analysis for the potential malnutrition in Central Aceh Regency covers the districts which suffer services malnutrition namely Kute Panang and Kebayakan district.

Acknowledgements

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