

Analysis Of The Diabetes Mellitus Disease Surveillance System At The X Community Health Center, Simalungun Regency, North Sumatra

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ABSTRACT

This study analyzes the diabetes mellitus surveillance system at Puskesmas X, focusing on the aspects of input, process, and output. The study found that facilities and staff capabilities need to be improved, with particular emphasis on slow internet connections and high workloads caused by staff working on multiple programs. The process of information collection and routine reporting has been implemented, but obstacles have arisen, such as delays in data entry and the quality of reports being affected by limited resources and infrastructure. The reporting system is implemented manually and digitally, with assessments conducted through monthly workshops to improve effectiveness. The data obtained is used for decision making, rapid response to at-risk patients, and public education. Strengthening human resources and infrastructure is needed to support better diabetes management in the region.

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1. INTRODUCTION

Is a chronic, non-communicable condition and is one of the world's biggest health problems, which has become a burden on society (1). Diabetes mellitus (DM) is classified as a metabolic disease characterized by hyperglycemia, which occurs due to abnormalities in insulin secretion, insulin production, or both (2). Diabetes mellitus is a chronic disease that occurs due to the pancreas' inability to produce adequate amounts of the hormone insulin or because the body cannot utilize insulin properly. According to Sapra (2026), diabetes is a metabolic condition characterized by high blood glucose levels. There are two main types of diabetes, distinguished by their causes: type 1 diabetes (insulin-dependent diabetes), which usually appears at a young age, and type 2 diabetes, which is more common in adults, especially those who are obese. Genetic factors also have a significant influence on the risk of diabetes, as explained by the (4), which shows a strong link between family history and the onset of this condition.

The World Health Organization (WHO) defines diabetes as a serious chronic disease that occurs when the pancreas does not produce enough insulin (a hormone that regulates blood sugar, or glucose) or when the body cannot efficiently use insulin. Diabetes is a crucial public health

issue, and non-communicable diseases are one of the four non-communicable diseases that are the focus of world leaders (5). Diabetes mellitus is a metabolic condition characterized by blood sugar levels higher than normal, commonly referred to as hyperglycemia, with symptoms such as increased frequency of urination, excessive hunger, and increased thirst. This is caused by a disruption in insulin secretion, insulin function, or both (6). According to a 2021 report from the International Diabetes Federation (IDF), diabetes is one of the fastest-growing global health emergencies of the 21st century. The number of diabetes mellitus cases worldwide continues to increase every year. (7)

Diabetes mellitus has significant health consequences. According to the (7), individuals with diabetes are 2 to 3 times more likely to experience a stroke or heart attack. In addition, diabetes can also cause other serious complications, such as blindness caused by damage to the blood vessels in the retina, and is one of the leading causes of kidney failure. Globally, the number of people with diabetes continues to grow. Data from the International Diabetes Federation (IDF) shows that in 2019, there were 463 million people with diabetes mellitus, and this number is predicted to increase to 700 million by 2045. Most of them, about 81%, live in low- to middle-income countries. In Indonesia, according to 2018 Riskesdas data, the prevalence of diabetes mellitus among people over the age of 15 reached 2%, with an increase in cases occurring in almost all provinces compared to the 2013 Riskesdas results. In 2021, the IDF reported that Indonesia had 19.47 million people with diabetes, making it the country with the fifth-highest number of diabetes patients in the world. (7)

Diabetes mellitus (DM) in Indonesia is a long-term condition that arises when the body is unable to produce adequate amounts of insulin or cannot utilize insulin properly, resulting in high blood sugar levels. This situation continues to increase in Indonesia and is influenced by diets high in sugar and fat, obesity, lack of physical activity, as well as age and genetic factors. National statistics show that the prevalence of DM is increasing and has become a serious public health issue due to complications that can affect the heart, kidneys, nerves, and eyes. (8)

Based on the information obtained, diabetes mellitus at Community Health Center X ranks 8th among the 10 most common diseases. In addition, according to data from a preliminary survey, the number of diabetes mellitus patients at Community Health Center X has increased every year. Based on the survey conducted, the number of diabetes mellitus patients at Puskesmas X in 2017 was recorded at 248 people, in 2018 it increased to 252 people, in 2019 the number reached 262 people, and in 2020 it became 264 people. The lack of understanding among the elderly about diets for diabetes mellitus prompted the author to conduct research on this disease with the title "The Elderly's Knowledge of Diabetic Diets."

2. METHOD

This research is categorized as qualitative research using structured interview techniques based on questionnaires. Interviews were conducted directly at the health center and via voice calls to obtain the necessary information related to the implementation of the diabetes mellitus surveillance system at health center X. This activity was carried out on December 12, 2025. In this study, the author conducted in-depth interviews with 3 informants who represented the respective competencies and was considered suitable as a representative of the issue being studied.

3. RESULTS AND DISCUSSION

3.1. Results

3.1.1. Input

Input in this study included workforce, facilities, and techniques. Below is a summary of the interviews based on these categories.

The findings of the interview regarding labor show that the informants revealed that the number of officers for DM surveillance is still inadequate, because one officer manages various programs. The following is an excerpt from the interview results:

"Honestly, it's insufficient. The thing is, one person is in charge of many programs. So sometimes they are overwhelmed, especially when there are many posbindu activities or DM diet counseling. But they still do their best." (Informant Mrs. J)

Regarding the suitability of officers to their field of work and their understanding of their duties, the informant stated:

"Personally, I was assigned to the surveillance section from the beginning. Eee... even though I handle several programs, I am the one in charge of DM. So, it is in line with my assignment." (Informant Mrs. J)

"Yes, I understand. The tasks include collecting DM data, preparing reports, conducting simple analyses, and assisting with dietary counseling." (Informant Mrs. J)

Regarding training on surveillance, the informant stated:

"I have, but it was a long time ago. There hasn't been any new training lately. So I've been learning mostly on my own." (Informant Mrs. J)

The facilities and infrastructure needed to implement the diabetes mellitus diet counseling program are available, according to the informant. However, they have to share them. Regarding internet connection, the informant stated that internet access is available, but the speed is quite slow. The following is an excerpt from the interview:

"There is a laptop in the room. But if someone else is using it, we take turns." (Informant Mrs. J)

"The internet is available, but sometimes it is slow. So sometimes we have to wait for the network to improve before submitting DM reports." (Informant Mrs. J)

Based on the interview results, the approach applied involves recording at the health center both manually and digitally. The informant stated that initial recording is usually done manually because it is more efficient, more practical when there are many patients, and the register book is always ready for use. The following is an excerpt from the interview results:

"We usually record it manually in the DM register book first. Because when it's busy at the clinic, it's faster to record it in the book. Then we tidy it up later." (Informant Mrs. J)

"If there is a diet counseling session, we also record the blood sugar test results in that book first. We can't just open a laptop if the activity is outside the health center." (Informant Mrs. J)

"We only enter it into Excel when we have time. Sometimes on the same day, sometimes the next day. It depends on the situation." (Informant Mrs. J)

3.1.2 Proses

The process of monitoring diabetes mellitus at the health center in this study includes the stages of planning, organizing, mobilizing, and monitoring and evaluation. Detailed explanations based on the results of interviews with informants are presented as follows.

From the interview results regarding planning, it is known that the DM monitoring program is carried out by analyzing the patterns of diabetes mellitus cases from weekly and monthly data obtained from outpatient services. This information is then used to determine priority areas and targets for educational activities on the DM diet. In addition, the diet counseling program is developed based on monitoring of patients' sugar levels and areas with high case numbers. The following are excerpts from the interview results:

"DM data is collected weekly from the outpatient clinic. From there, we determine which areas have many cases to target for dietary counseling." (Informant Mrs. J)

"When there is dietary counseling, the results of blood sugar checks and eating habits are also recorded." (Informant Mrs. J)

The interview results show that the management of DM surveillance at the Puskesmas has been carried out well. The division of responsibilities has been clearly defined, whereby surveillance officers are responsible for collecting data, compiling reports, and recording the results of dietary counseling. Cooperation is carried out with PTM nurses and the head of the Puskesmas if there are matters that need to be discussed. The following is an excerpt from the interview results:

"I prepare and submit the DM reports myself. If anything is unclear, I coordinate with the PTM nurse or the head of the Puskesmas." (Informant Mrs. J)

"The tasks are to collect DM data, prepare reports, conduct simple analyses, and assist with dietary counseling." (Informant Mrs. J)

The interview results revealed that the implementation of the surveillance program included periodic data collection from the clinic, recording the results of patient examinations during dietary counseling activities, and providing dietary education to patients with high blood sugar levels. These efforts were carried out continuously despite several challenges, such as delays in data collection and internet connection problems. The following is an excerpt from the interview results:

"DM data is collected weekly from the clinic. Then every month it is summarized for reporting." (Informant Mrs. J)

"Usually on time, but sometimes a little late if the data is incomplete or the network is slow." (Informant Mrs. J)

"If a patient's sugar levels continue to rise, immediate action is taken, such as diet counseling or home visits." (Informant Mrs. J)

Observations and assessments are conducted through monthly Mini Workshops (Lokmin), where surveillance findings, DM reports, changes in patients' blood sugar levels, and the results of dietary counseling are discussed together. The informants also stated that the health office responds to the reports that have been sent, although the feedback is brief. The following are excerpts from the interview results:

"There is a monthly Lokmin. We discuss DM, counseling results, and who has high blood sugar. From there, follow-up actions are determined." (Informant Mrs. J)

"There is feedback from the department, though brief. Usually, they just say if there is missing data or something that needs to be corrected." (Informant Mrs. J)

3.1.3 Output

The output of the Diabetes Mellitus monitoring program at the Puskesmas can be seen from the existence of periodic reports, the delivery of dietary education to DM patients, and the follow-up provided to patients with high blood sugar levels. These results were obtained through the processing of weekly and monthly data and educational activities carried out by officers.

The results of the interviews indicate that the main outputs produced are monthly and annual reports submitted to the health department. The following is a quote from the interview results:

"The output is the monthly and annual reports. DM data is compiled from the clinic and then sent to the department." (Informant Mrs. J)

"The reports are complete according to the format. They are usually on time, except when there are network or data issues." (Informant Mrs. J)

Findings from the survey are recorded in both printed and digital formats. Below is a quote from the interview results:

"Yes, they are stored in hardcopy and softcopy. This makes them easy to find again." (Informant Mrs. J)

The monitoring results are used to make choices or further actions regarding health programs at the health center, namely the availability of DM information that has been analyzed in a simple way to understand patterns of increase or decrease in case numbers. This data is used in the decision-making process to determine the targets of counseling on diet or home visits for patients who need further monitoring. The following is an excerpt from the interview results:

"The DM data is also analyzed. We look at whether it is increasing or decreasing. From there, we know which patients or areas need to be monitored." (Informant Mrs. J)

The results of DM monitoring are used for rapid action on patients at risk and communicated to the community through health posts, village counseling, and health cadres by providing education and information to the community. The following is an excerpt from the interview results:

"If a patient's sugar levels continue to rise, we follow up immediately. This could be through diet counseling or home visits." (Informant Mrs. J)

"Yes, through health posts, village activities, and health workers." (Informant Mrs. J)

3.2. Discussion

3.2.1. Input

The results of the study show that input elements in the Diabetes Mellitus monitoring program at community health centers still face several obstacles, particularly in terms of limited manpower, facilities, and recording methods. The limited number of monitoring officers, who are also assigned to various other programs, results in a high workload, thereby affecting the timeliness of recording and reporting. This situation is in line with the findings of Stein, et al. (2020) who stated that a lack of human resources is the main obstacle to the implementation of non-communicable disease monitoring at the health center level.

Facilities and infrastructure such as laptops and internet access are available but have not been utilized to their full potential. Slow internet connections and the replacement of devices make the data entry process longer, so officers still have to record manually first. This finding is in line with research showing that the quality of digital infrastructure greatly affects the effectiveness of NCD surveillance and the timeliness of reporting. (10)

In addition, the lack of regular training hinders the improvement of officers' abilities in managing surveillance data. In fact, continuous training has been proven to improve the quality of recording, analytical skills, and the readiness of officers to carry out surveillance. (11,12)

Therefore, in general, the contributing elements indicate that human resources, facilities, and staff capabilities still need to be improved to ensure that the surveillance process and outcomes can be effectively implemented.

3.2.2. Proses

The implementation of DM surveillance in this study included data collection, recapitulation, simple analysis, education, and reporting. The program was planned based on weekly and monthly data obtained from service units, indicating that the health center had used surveillance information to support decision-making. This reflects the fundamental principle of public health surveillance as "information for action" (13). These findings are consistent with (14), who reported that routine health data in primary healthcare settings are used for planning, monitoring and evaluation, identifying service gaps and priority areas, setting targets, and supporting managerial decision-making.

The organization process has begun, including the division of tasks among officers. However, delays in data entry persist because of unstable internet connectivity and high workloads, which may affect the timeliness and completeness of surveillance reporting. Studies have shown that disparities in infrastructure and increased workloads among surveillance officers are associated with reduced reporting quality, while poor internet connectivity, limited workforce capacity, and reliance on paper-based reporting remain important operational barriers to timely and complete surveillance reporting. (15)

Monitoring and evaluation activities are carried out through monthly mini-workshops and feedback from the health office. These activities are an important element in program monitoring. However, feedback that is still general and irregular hinders efforts to improve quality on an ongoing basis. These findings are in line with the research by Pamungkasari, et al (2024) Ismail et al. (2020), which states that organized supervision can improve data quality and the effectiveness of follow-up actions.

3.2.2. Output

The outputs of the monitoring system include periodic reports (monthly and annual), patient education, follow-up activities such as nutritional counseling, and the setting of intervention targets based on data analysis. The research findings show that health centers can produce useful outputs for diabetes mellitus programs, although the quality is still affected by limitations in inputs and obstacles in the process. (17)

The availability of periodic reports indicates that recording has been carried out, although there is still the possibility of delays. This is in line with research conducted by Rahajeng, et al. (2020), which highlights that the output of surveillance is highly dependent on the completeness and timeliness of recording.

The use of surveillance data to determine education targets and Posbindu activities indicates that surveillance outputs have been translated into public health action. Surveillance data are essential not only for describing disease occurrence but also for guiding disease prevention and control through evidence-based planning, implementation, and evaluation of health interventions. (19)

However, maintaining documentation across paper and electronic platforms may result in information duplication, fragmentation, and inconsistencies. Therefore, standardized documentation procedures and regular reviews are needed to maintain data consistency and improve the quality of health information. (16)

Overall, the output of surveillance in this study has functioned well, but it can still be improved by strengthening the input and process so that reports can be delivered more timely, more complete, and more optimally in supporting the diabetes mellitus control program.

4. CONCLUSION

The monitoring system for diabetes mellitus at community health centers is operational but has not yet reached the expected level of effectiveness. Limited staff numbers, inadequate facilities, and lack of training are factors that hinder the accuracy of recording and reporting. Planning and data collection activities have been carried out regularly and based on information, but issues related to workload and internet connectivity have disrupted the timeliness of reporting. The results of the monitoring system, which include periodic reports, diet education, and patient follow-ups, have been produced and are useful in the decision-making process. However, the quality of the reports is still affected by deficiencies in data collection and processing. Overall, this monitoring system needs to be strengthened by improving human resources, upgrading digital infrastructure, and implementing more effective supervision to optimize diabetes management.

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