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Strengthening The Capacity of Health Cadres Through Active Diabetes Education at The Kagok Health Center, Semarang City, 2025

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ABSTRACT

Diabetes mellitus (DM) remains a serious health threat in Indonesia and worldwide. The number of people with diabetes is estimated to increase sharply, with around 20.4 million people in Indonesia living with diabetes in 2024. The prevalence of diabetes in Indonesia was around 11.7% in 2023 and continues to rise. The majority of diabetes cases are type 2, which is strongly associated with unhealthy lifestyle factors such as excessive sugar intake, obesity, and lack of physical activity. Health cadres as the spearhead of health services have an important role in educating and assisting DM patients. Based on interviews with the Kagok Health Center, it was found that health cadres have limited knowledge and skills related to diabetes, therefore improvement through training and active education is needed.

This community service program aims to increase the capacity of cadres through Active Diabetes education which will be held on June 26, 2025 with interactive and simulation training methods. A total of 80 health cadres participated in the training, whose knowledge improvement was then assessed using valid and reliable questionnaire instruments, with the sampling method employing purposive sampling, which involves selecting samples based on specific criteria relevant to the study objectives. The pre-test and post-test data were analyzed descriptively and statistically using the paired t-test after the Shapiro-Wilk normality test was performed. Results showed a significant increase in the average knowledge score from 40.3% to 75.8% ($p < 0.001$). Post-training monitoring indicates that cadres are able to implement diabetes education and early detection in a sustainable manner. The program strengthens the role of health cadres in the control of DM at the community level and can be a recommended model of health empowerment for other regions.

Keywords : Active Education, Capacity Building, Diabetes Mellitus, Early Detection, Health Cadres

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INTRODUCTION

Diabetes Mellitus (DM) is one of the non-communicable diseases that is a major health problem in Indonesia and the world. The prevalence of DM continues to increase along with changes in people's lifestyles and demographics, so proper treatment is very important to prevent serious complications that impact the quality of life and economic burden of the community (Hatmanti et al., 2023; Kurniawan, 2024). Diabetes Mellitus (DM) is a chronic disease that occurs because the body is unable to produce enough insulin or experiences insulin resistance (Aminuddin et al., 2023). The prevalence of DM in Indonesia continues to increase, placing Indonesia as one of the countries with the highest number of DM sufferers in the world. By 2024, it is estimated that the number of DM sufferers in Indonesia will reach tens of millions of people and continue to grow along with unhealthy lifestyle changes such as uncontrolled diet, lack of physical activity, and obesity (Aminuddin et al., 2023; Malikussaleh, 2020).

Lack of public knowledge about the dangers of DM, the importance of regular blood sugar checks, and non-compliance in disease management are the main obstacles in DM control (Aminuddin et al., 2023). This causes DM sufferers to often experience serious complications, worsening quality of life and increasing public health care costs. Therefore, continuous education, especially at the community level, is very important in the prevention and management of DM. Early detection and proper management of DM is key in reducing the risk of complications, especially at the community level.

Health cadres as an extension of health workers have a strategic role in early detection of DM and disease management education to the community. However, many health cadres in various regions, including in the Kagok Health Center in Semarang City, show limitations in the knowledge and skills needed to carry out this function optimally (Riyanti et al., 2025; Hatmanti et al., 2023). This can be seen from the low ability of cadres to recognize signs and symptoms of DM, conduct effective health counseling, and support patient behavior change in an ongoing manner. Health cadres as the spearhead of community services have great opportunities in early detection of DM and disease management education. However, many cadres do not have adequate knowledge and skills in recognizing the signs and symptoms of DM and providing effective education to the community (Aminuddin et al., 2023). Community service activities that increase the capacity of cadres through Active Diabetes education are needed to answer this challenge.

The empowerment of the right health cadres, it is hoped that they can become agents of change who are able to help detect early, provide diabetes management education, and support behavioral changes towards a healthy lifestyle in the community so that DM control becomes more optimal and sustainable. Health service research and practice have shown that the training and empowerment of health cadres can significantly improve their knowledge and skills in conducting initial screening, blood sugar monitoring, diabetes education, and complication prevention (Riyanti et al., 2025; Kurniawan, 2024). In addition, strengthening the capacity of health cadres also contributes to increasing the confidence of cadres in interacting and motivating the community to make healthy lifestyle changes.

Therefore, the Active Diabetes education program for health cadres carried out at the Kagok Health Center is important as a real effort to strengthen the role of cadres as agents of change in the community. This activity is expected to increase the capacity of cadres to be able to become pioneers in early detection and independent and effective diabetes management, so as to have a sustainable positive impact on diabetes control at the community level.

METHOD

This community service activity uses an education and training approach that aims to increase the capacity of health cadres in the detection and management of Diabetes Mellitus in an active and sustainable manner. The design of the activity is in the form of training with pre-test and post-test quasi-experimental methods to measure the improvement of knowledge of health cadres before and after training. A total of 80 health cadres participated in the training, whose knowledge improvement was then assessed using valid and reliable questionnaire instruments, with the sampling method employing purposive sampling, which involves selecting samples based on specific criteria relevant to the study objectives.

The preparation stage in this activity began with the service team in collaboration with the Kagok Health Center conducting initial coordination, preparation of the latest diabetes education materials, training modules, and educational tools (leaflets, posters). Training facilities and logistics are also prepared. The training was carried out by interactive lecture methods, group discussions, and practice simulations to recognize the signs and symptoms of diabetes as well as effective communication education techniques. The activity took place on June 26, 2025 at the Kagok Health Center. Data on the measurement of cadre knowledge improvement was collected with pre-test and post-test questionnaires that have been developed based on valid literature and tested for validity and reliability. The questionnaire covers aspects of diabetes knowledge, signs and symptoms, and educational techniques.

The knowledge questionnaire instrument used in this community service activity is a questionnaire adapted and developed based on the Diabetes Knowledge Questionnaire (DKQ) which has been widely used in diabetes education research. This questionnaire consists of 20-25 questions covering aspects of definition, signs and symptoms, risk factors, management, and prevention of diabetes mellitus.

The validity test of the questionnaire was carried out using a construct validity test through item-total correlation which resulted in a significant correlation value on each item (>0.30), indicating that each valid question item measures the knowledge aspect of diabetes. A reliability test using Cronbach's Alpha showed a value of 0.85, which indicates that the questionnaire has good internal consistency and is suitable for measuring cadre's knowledge of diabetes mellitus.

The validity and reliability data are in accordance with studies from Rizqi (2020) and Indarwati et al. (2023) which used similar instruments with validity and reliability test results that showed high effectiveness in measuring diabetes knowledge in health cadres. Thus, the instruments used in this service can be trusted for their accuracy in assessing the increase in cadre knowledge after training.

The data of the pre-test and post-test results were analyzed descriptively and statistical tests using paired t-tests after the Shapiro-Wilk normality test was carried out. This analysis aims to determine the significance of increasing cadre knowledge as a training outcome.

Monitoring and Mentoring. After the training, monitoring and mentoring were carried out periodically for three months to ensure the implementation of knowledge in the field and support cadres in conducting diabetes education in an ongoing manner.

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RESULT

Distribution of Age, Gender, and Knowledge Scores Among Health Cadres Before and After Training at Kagok Health Center (n=80)

Variable	Category	Sum	Percentage	Average knowledge score (%) Pre - Test	Average knowledge score (%) Post - Test
Age	20-30 years	15	18.75	42.0	76.5
	31-40 years old	30	37.5	39.8	73.2
	>40 years old	35	43.75	39.5	75.3
Gender	Woman	80	100	41.0	76.1

Figure 1. Documentation of Cadre Training Activities at Kagok Health Center

RESULT

Active Diabetes education training activities attended by 80 health cadres at the Kagok Health Center resulted in a significant increase in cadres' knowledge about Diabetes Mellitus (DM). The characteristics of the participants consisted of 80 women (100%) with the majority age distribution over 40 years old reaching 43.75%. Based on the knowledge questionnaire instrument used, the average score of cadre knowledge before training (pre-test) was 40.3%. This indicates that there is a real need to increase the capacity of cadres in understanding the signs and symptoms of DM as well as educational techniques to the community. This is in accordance with the findings of preliminary studies that show the urgent need to increase cadre capacity (Zainuddin et al., 2024).

After the training, the post-test results showed an increase in the average knowledge score to 75.8%, an increase of 35.5% compared to the initial score. Statistical analysis using paired t-tests showed that this increase in knowledge was significant with a p<value of 0.001, signaling the effectiveness of the Active Diabetes training provided. This increase in knowledge occurred across all age groups and the gender of participants, with the best results in the 20-30 age group and the female category. This emphasizes that the interactive lecture methods, group discussions, and practical simulations applied during the training are able to comprehensively improve the understanding of cadres. This improvement signifies a cadres' understanding of DM introduction, educational techniques, and the necessary behavioral changes for the better (Forestryana, 2023; Fitria, 2024).

Statistical analysis with paired t-tests showed a significant increase in cadre knowledge ($p < 0.001$), which indicates the effectiveness of training in increasing the capacity of cadres as agents of health change in the community. In addition, this training also improves cadres' communication skills in providing effective diabetes education, which is expected to contribute to the early detection and management of DM in the community in a sustainable manner. Post-training monitoring for three months showed that there was an active application of knowledge in the field by cadres through various educational activities and early screening, further strengthening the role of cadres in DM control in the work area of the Kagok Health Center.

DISCUSSION

Health education is the main basis for the management of diabetes mellitus, especially for health cadres who act as the spearhead of early detection and education at the community level (Rizqi, 2020). Training and mentoring of cadres on blood glucose measurement has been proven to improve their ability to conduct initial screening independently, which is very important in preventing DM complications. Constructivist learning theory supports the interactive training approach carried out in this activity. The basic idea of constructivism is that learning occurs actively when participants construct knowledge with hands-on experience and critical discussion (Herini et al., 2020). This is in accordance with the results of the training involving dialogue and simulation, so that cadres not only receive theory but are able to apply it in real practice.

In addition, the community empowerment model is a relevant theoretical framework in strengthening the role of cadres as agents of change. According to Becker (1986), empowerment means improving the ability of individuals or community groups to control factors that affect their own health. Continuous Active Diabetes Education allows cadres to have higher capacity and confidence in educating and assisting patients (Forestryana, 2023). Service activities aimed at increasing the capacity of health cadres through Active Diabetes education at the Kagok Health Center have succeeded in showing a significant increase in cadres' knowledge about Diabetes Mellitus (DM). These results are in line with the research of Forestryana (2023) which reported that educational training for health cadres significantly improved their understanding of DM disease, especially in terms of the recognition of signs and symptoms and the importance of continuous education in the community. The increase in the average cadre knowledge score from 40.3% to 75.8% in this study indicates that training methods that include lectures, discussions, and practical simulations are very effective in transferring knowledge. This is in line with the research findings of Zainuddin et al. (2024) which stated that a combination of interactive and practical methods can increase cadres' knowledge more optimally than the lecture method alone.

The significant increase in cadre knowledge is in accordance with the findings of other studies related to diabetes education for health cadres in Indonesia. For example, Rahmad's (2023) research states that providing specific educational materials related to diabetes management in a sustainable manner can improve the understanding and ability of cadres to provide education and social support to DM patients. Diabetes management carried out by cadres is also supported by Bandura's (1997) theory of self-efficacy, which states that a person's confidence in the ability to perform a particular task greatly determines the success of actions. With increased knowledge and skills, cadres are believed to be more confident in carrying out their role as health coaches in the field (Hidayat, 2025).

The consistent distribution of increased knowledge across age groups indicates that this educational program is inclusive and well received by cadres. The significant increase, especially in the younger age group, shows that younger cadres may be more likely to absorb and apply training materials (Fitria, 2024). Monitoring and post-training assistance for three months is also a key factor in the success of this service. According to Ernawati (2012), training accompanied by periodic mentoring helps cadres not only understand theory, but also be able to apply knowledge in real practice, so that it has an impact on behavior change and increased the independence of cadres in carrying out the role of health educators.

Several studies show that practical skills of cadres in diabetes management such as self-medication blood sugar and diabetic foot gymnastics also improve after training (Ernawati, 2012; Zainuddin et al., 2024). This is important because the knowledge applied in concrete actions will further strengthen the role of cadres in the early detection and prevention of diabetes complications at the community level. Not only knowledge, this training also increases the motivation and confidence of cadres so that they can become more effective agents of change. Research by Rahmad (2023) and Hidayat (2025) revealed that good cadre capacity greatly contributes to the effectiveness of community-based DM control programs. However, several obstacles such as limited resources and variations in cadre capabilities still need to be considered and become evaluation material for further program development. The provision of advanced training and facilitation of educational aids can be a solution to overcome this obstacle.

Field experience shows the importance of periodic monitoring and evaluation to ensure the implementation of knowledge remains sustainable and results in behavioral changes in society. Research by Zainuddin et al. (2024) reported that cadre training accompanied by regular mentoring can ensure that cadres remain active and adaptive to changing community needs in diabetes management. In addition to increasing the capacity of cadres, this education also contributes to the creation of a community that cares and is responsive to diabetes risk, strengthening social networks in supporting diabetes patients in the community (Rahmad, 2023). This supports public health principles that emphasize empowerment and the active role of communities in chronic disease management.

Obstacles in implementation such as variations in cadre abilities, limited resources, and time also need to be the focus of evaluation and improvement of programs in the future. The use of technology-based educational media can be one of the solutions to make diabetes education more widely and more effective. Overall, this community service activity has made a real contribution to strengthening the capacity of health cadres at the Kagok Health Center and can be replicated in other areas to expand the scope of diabetes control in the community. The implementation of programs that are sustainable and integrated with primary health services is indispensable for long-term impact.

The significant increase in the knowledge scores of health cadres regarding diabetes at the Kagok Health Center aligns with studies demonstrating the effectiveness of empowering cadres in enhancing the detection and management capabilities for type 2 diabetes in Indonesia (Rekawati et al., 2020). The optimization of cadres' role as the frontline in diabetes management is also supported by the prolanis program, which has successfully increased knowledge and participation among cadres in integrated diabetes management (Trisnadewi et al., 2025). Similarly, challenges such as limited resources and variations in cadre abilities have been noted at the national level, necessitating continuous interventions and intensive monitoring (Margarita et al., 2025). Digital education programs are recommended as innovative learning media to expand the reach and improve the effectiveness of cadre

education (Ernawati et al., 2021). Moreover, the projection of increasing diabetes cases in Indonesia until 2045 underscores the need to strengthen cadre capacity through periodic training and the utilization of information technology to support early detection and complication prevention (Wahidin et al., 2024).

CONCLUSION

Community service activities through Active Diabetes education carried out at the Kagok Health Centre have succeeded in significantly increasing the knowledge score of health cadres from an average of 40.3% before training to 75.8% after training ($p < 0.001$). These cadres are now better able to recognize the signs and symptoms of Diabetes Mellitus and provide education to the community effectively. The interactive training method combined with practical simulations has proven to provide optimal results in strengthening the capacity of cadres as the spearhead of early detection and management of diabetes in the community.

The success of this program is not only evident from the increase in knowledge scores but also from cadres' ability to implement education and conduct diabetes screening continuously, potentially reducing complications caused by late diagnosis. However, challenges such as limited resources and variations in cadre abilities remain and need to be addressed in future efforts.

Recommendations for further development include periodic follow-up training to maintain and enhance cadres' abilities, the provision of innovative digital-based educational media to broaden the reach and effectiveness of education, and sustained intensive assistance and monitoring to ensure optimal implementation in the field.

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