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Optimizing the empowerment of rural agricultural communities in creating healthy agricultural villages based on agronursing

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ABSTRACT

Heart disease is a leading cause of death globally, including in Indonesia, with an increasing prevalence in rural farming communities. Risk factors such as pesticide use, unhealthy diets, and poor lifestyles contribute to the high incidence of this disease. Communities in Bondowoso, East Java, especially farmers, need educational and training interventions to improve their knowledge and skills in preventing and treating heart disease. This program aims to improve the knowledge and skills of rural farming communities in the prevention, treatment, and early management of heart disease, including Cardiopulmonary Resuscitation (CPR) skills. The program is carried out through education on hypertension, heart disease, and heart diet, followed by practical training on CPR using audiovisual media and live demonstrations. The evaluation was carried out with a pretest and posttest to measure the increase in knowledge, as well as an assessment of practical skills. The results obtained were a significant increase in community knowledge measured from the results of the pretest and posttest, indicating the effectiveness of the education method. Community CPR skills also increased significantly after training and practical assessment. This program has succeeded in improving the knowledge and skills of rural farming communities in the prevention and treatment of heart disease, as well as CPR skills, which contribute to the long-term health of the community.

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1. INTRODUCTION

Globally, the death rate from heart disease reaches 18.6 million people every year. The death rate is expected to continue to increase to 20.5 million people in 2020 and 24.2 million people in 2030. The main cause of the low survival rate of cardiac arrest victims is late reporting and administration of cardiopulmonary resuscitation (CPR) (Berger, 2015; Cheng et al., 2018; Panchal et al., 2018). The number of heart disease sufferers increases every year in Indonesia and East Java ranks second highest (Badan Penelitian dan Pengembangan Kesehatan, 2018). Heart disease sufferers are dominated by those aged 25 to 65 years, with farming being the type of job with the second highest number of sufferers in

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East Java (Kementrian Kesehatan Republik Indonesia, 2018). Bondowoso and Jember districts show a phenomenon of increasing prevalence of heart disease every year. This is evidenced by the number of visits by heart patients at the Heart Polyclinic of the General Hospital which has increased and was recorded at 982 visits in December 2023 (Nurwahyudi, 2024).

The number of farmers with cardiovascular disorders, including hypertension, hypercholesterolemia in Bondowoso Regency is 57 out of 100, where the factors of using unsafe pesticides, consuming foods high in sodium and cholesterol, and an unhealthy lifestyle (smoking and drinking coffee) are the most important points in this incident (Astuti, 2017; Suharta & Anggrianti, 2021; Susilo, 2015). Kembang and Antirogo villages show a similar phenomenon. Farmers with cardiovascular disorders who access the Health Center are found to range from 5 to 10 patients per month and this tends to increase every year. Based on these data, farmers in the service area have a fairly high risk of experiencing heart disease and heart attacks.

The profile of the village in the service area is one of the Universitas Jember-fostered villages. The potential of the village in the service area to become a healthy village is very large. The target village has an active farmer group and is open to health information. However, the empowerment of active farmer groups to overcome health problems has never been optimized. The results of observations and interviews by the team with village officials, obtained information that the health capacity strengthening program is still not optimal and touches priority groups such as farmer groups with a fairly high number of sufferers. This causes the level of understanding and skills of farmer groups in knowledge about heart disease, care, and treatment to be relatively low. The Farmers Group Association (Gapoktan) of Kembang Village is an organization of farmers' groups established by Kembang Village based on the Village Head's Decree.

Community service programs for farming groups need to be carried out as a form of education and training, so that farmer groups have an important role in reducing the number of cases of illness and death due to heart disease and heart attacks in farmers (Panchal et al., 2018). Everyone in the community can be a cardiac volunteer who can perform CPR. CPR performed immediately will increase the victim's survival rate by two to three times (Cheng et al., 2018; Goodarzi et al., 2015; Nuraeni et al., 2019). Rural agricultural communities have the desire to be empowered in dealing with heart disease problems starting from prevention, treatment, and initial handling when cardiac arrest occurs. The purpose of implementing this community service is: (1) To increase minimal knowledge about heart disease (definition, causes, and prevention), treatment and management of cardiac arrest events; (2) To empower rural agricultural community groups in providing initial treatment for cardiac arrest victims.

2. METHODS

Design, Time, Location, and Targets

The design offered by the Community Service Team to partners is a community empowerment design consisting of several work procedures. The implementation of this activity is carried out for 3 months in May-September 2024 starting from the preparation stage, initial dissemination, implementation, and final dissemination. The location of this program is in two villages, namely in Kembang Village, Bondowoso and in Antirogo Village, Jember. The targets involved in this program are rural agricultural communities in Kembang Village and Antirogo Village totaling 51 farmers.

Work Procedure

The work procedure of the Program carried out by the team together with partners is carried out over a period of three years (multiyear) to resolve the problem of lack of partner empowerment in handling and providing care for cases of heart disorders in farmers. The following is a diagram of problem solving in the Rural Agricultural Community Empowerment program.

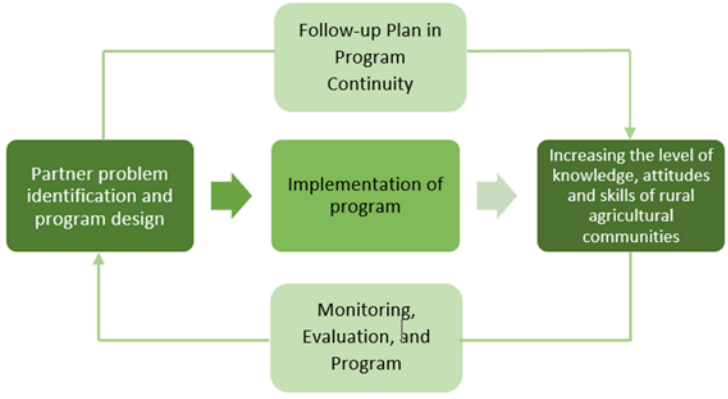

Figure 1. Work procedures for community service activities in rural agriculture

Table 1. IEC (Communication, Information and Education) and empowerment of rural agricultural communities in Kembang Village and Antirogo Village

	Description of the Material
Pre-Test	
Material 1	"The Concept of the Heart and Its Functions" This material contains the concept of the heart organ and its vital functions for the body.
Material 2	"Heart Disease and Its Causes" This material contains various types of heart disease and the causes that may be factors.
Material 3	"Heart Disease Prevention" This material contains preventive steps to prevent heart disease in farmers.
Material 4	"Heart Disease Treatment Efforts with Diet Modifications Based on Local Food Sources" This material contains dietary modification efforts that can be carried out by heart disease sufferers based on local food sources so that their heart condition can be optimal.
Material 5	"Early Detection of Heart Disease" This material contains steps to carry out early detection of heart disease.
Material 6	"Heart Disease Treatment" This material contains various treatment efforts that are carried out to be able to care for someone who is experiencing heart disease.
	Training Description
Training 1	"Early Heart Disease Screening Training" This training focuses on early screening methods to detect potential heart disease at an early stage. Rural farming communities will be provided with knowledge about heart disease risk factors, relevant physical examinations, and the use of certain instruments or tests to detect early symptoms of heart disease.
Training 2	"Heart Diet Modification Training" This training focuses on diet modification as part of a strategy for preventing and treating heart disease. Rural farming communities are taught about the types of foods that support heart health, how to reduce salt, saturated fat, and sugar intake, and how to utilize local village potential to create a balanced diet. In addition, it can involve creative approaches to promote healthy lifestyle changes.
Training 3	"Cardiac Arrest Management Training" This training deals with emergency management, namely cardiac arrest, and proper management to minimize the risk of death. Rural farming communities will be taught cardiopulmonary resuscitation (CPR) skills, use of automated defibrillators (AEDs), and comprehensive management of cardiac arrest. This training may involve case simulations, discussions, and understanding of the applicable action protocols in such emergency situations.

The stages of implementing the community service program carried out by the community service team in concrete terms include: (1) Identification of the needs of the rural communities of Kembang Village and Antirogo Village through initial dissemination to formulate joint solutions to overcome heart health problems in rural agricultural communities. We used surveys, focus group discussions, health screenings, and observations of daily habits to identify the health problem. Required facilities include survey tools, medical equipment, meeting spaces, transportation, and health education materials; (2) Designing a joint program based on the results of the identification of community needs discussed, and joint deliberations were carried out on the plan for empowering rural agricultural communities in Kembang Village and Antirogo Village as basic life support (BHD) volunteers to create a heart-friendly agricultural area; (3) For 16 weeks, the community service program was implemented in the Rural Agricultural Communities of Kembang Village and Antirogo Village through a series of education, training, and empowerment processes. This includes one initial identification session, six IEC sessions, three intensive training sessions, four follow-up sessions, and one final dissemination session. Descriptions of IEC and training materials are presented in the Table 1.

Evaluation Design

The instrument used to evaluate the program's success is a questionnaire developed in the form of a checklist with closed-ended questions. We used several questionnaires to measure the participants' knowledge, attitude, and practice in this community service program. The hypertension knowledge, heart disease knowledge, diet knowledge, and CPR action knowledge consisted of 10 questions with a score of 10 for each question, the minimum score is 0 and the maximum score is 100. The CPR action self-efficacy questionnaire consists of 10 questions with a Likert scale of 1-4. The total score obtained is in the range of 10-40. The CPR action skills questionnaire consists of 10 questions with a maximum total score of 40. The analysis used to evaluate the program's success was carried out by tabulating data according to type. Categorical data (gender, history of hypertension, history of heart disease, where to get information about hypertension and heart disease, distance to health services) are presented in the form of frequency distribution and percentage, while numerical data (age) are presented in the form of average and standard deviation. Graphical presentations in the form of pretest and posttest are also displayed in the results section.

Table 2. The hypertension knowledge, heart disease knowledge, diet knowledge, CPR action knowledge, and the CPR action self-efficacy questionnaire

	Questions about Hypertension
1	Hypertension is a disease where blood pressure reaches ≥140/90 mmHg.
2	Hypertension can lead to stroke.
3	Hypertension can be caused by genetics.
4	Blood pressure reaching ≥180/110 mmHg is classified as severe hypertension.
5	Smoking is one of the factors that can cause hypertension.
6	Cigarettes can lead to atherosclerosis or hardening of the blood vessels.
7	Substances contained in cigarettes cause the heart to work harder, increasing blood pressure.
8	Symptoms experienced by hypertension patients include headaches, a heavy feeling in the neck, and irritability.
9	Hypertension can only be treated with medication from a doctor.
10	Hypertension is a temporary increase in blood pressure.

Questions about Heart Disease	
1	Heart disease is a condition that affects the function of the heart and blood vessels.
2	A heart attack occurs when blood flow to the heart muscle is disrupted or stopped.
3	Major risk factors for heart disease include smoking, high blood pressure, and high cholesterol.
4	Excessive stress can increase the risk of heart disease.
5	Chest pain that lasts for more than a few minutes can be a sign of a heart attack.
6	A diet high in saturated fats and cholesterol can increase the risk of heart disease.
7	Lack of physical activity is one of the primary causes of heart disease.
8	Obesity increases the risk of heart disease and other health problems.
9	Heart disease can be prevented by adopting a healthy and regular lifestyle.
10	Diabetes is an important risk factor in the development of heart disease.
Questions about Hypertension Diet	
1	The hypertension diet is one way to manage hypertension without side effects.
2	The goal of the hypertension diet is to lower blood pressure.
3	The goal of the hypertension diet is to lose weight.
4	The goal of the hypertension diet is to lower cholesterol and uric acid levels.
5	Smoking can cause damage to blood vessels.
6	Drinking coffee can raise blood pressure.
7	Foods that are low in fat include fish, milkfish, and skinless chicken.
8	Yogurt is low-fat milk.
9	High-fiber vegetables can facilitate bowel movements and hold some sodium intake.
10	Drinking alcohol can raise blood pressure.
Questions about CPR Actions	
1	The main sign of someone experiencing a heart attack is:
2	Whom should you contact and request medical assistance?
3	Where is the correct location to check the victim's pulse?
4	What action will you take if the victim's pulse is not beating?
5	The location for chest compressions on a cardiac arrest victim is:
6	What is the compression rate for CPR?
7	What is the correct hand position when performing chest compressions on a victim?
8	What is the proper way to provide full recoil after each chest compression given to the victim?
9	The correct combination of chest compressions and ventilation is:
10	What is the maximum delay in performing the combination of compression and ventilation on the victim?
Self-Efficacy Statements	
1	I believe I can perform heart massage when encountering someone experiencing cardiac arrest.
2	I am confident I can understand the material about heart massage.
3	I am confident I can comprehend the difficulties in performing heart massage.
4	I am confident I can learn the basics of heart massage.
5	I am confident I can understand heart massage if taught by a competent person.
6	I am confident I can perform heart massage well.
7	I hope I can do it well when encountering a cardiac arrest victim.
8	Considering the difficulty of heart massage, I will study more about how to do it correctly.
9	I want to do it well because it is very important to save someone's life.
10	I am confident that I can train others to perform heart massage correctly.

3. RESULTS AND DISCUSSION

Results

The community service program carried out by the team is an effort to realize heart disease alertness in vulnerable groups of rural farming communities in Kembang Village, Bondowoso, and Antirogo Village, Jember. This program is run in collaboration with the local village government.

Figure 2. Coordination and collaboration of the implementation team with the village government
Figure 3. Coordination and collaboration of the implementation team with the community health cadres

Table 3 shows the characteristics of the respondents in this study. Of the 51 participants, 58.8 percent were from Antirogo Village, and 41.2 percent from Kembang Village. 39.2 percent were male and 60.8 percent female, with a mean age of 46.29 years and a standard deviation of 9.566. The education of the participants varied, with 19.6 percent having elementary school education, 7.8 percent junior high school, and 60.8 percent high school, and 11.8 percent college. A total of 43.1 percent of participants had a history of hypertension, either themselves (29.6 percent) or their parents (13.5 percent), while 56.9 percent did not have a history of hypertension. For a history of heart disease, 17.6 percent of participants admitted to having it, while 82.4 percent did not. Most participants (58.8 percent) obtained information about hypertension from health services, 9.5 percent from the mass media, and 33.3 percent had never received information. Regarding heart disease, 57.1 percent received information from health services, 33.3 percent from other sources, and 7.9 percent never received information. The distance to health services for the majority (62.2 percent) was 1-5 km, with 25.5 percent less than 1 km, and 411.8 percent more than 5 km.

Table 4 shows a significant increase in knowledge, attitudes, and skills of rural farming communities in cardiac emergency response after the training program. Before the training, the average knowledge of participants about hypertension was 61.33 (± 15.765), and increased to 74.86 (± 11.038) after the training. Knowledge about heart disease also increased from 68.6 (± 6.97) to 76.24 (± 6.31). In addition, knowledge about heart diet increased drastically from 78.27 (± 24.2) to 94.34 (± 6.82). Participants' knowledge about Cardiopulmonary Resuscitation (CPR) actions increased from 48.10 (± 14.007) to 73.33 (± 11.547), indicating the effectiveness of the training in increasing awareness and understanding of cardiac emergency actions.

In addition to increasing knowledge, this table also shows a significant increase in participants' self-efficacy and skills in performing CPR. Self-efficacy increased from 24.76 (± 5.735) to 29 (± 4.012), while skills in performing CPR increased from 15.16 (± 2.722) to 35.76 (± 2.235). In addition, participants' willingness to perform CPR also showed a positive change, with the percentage of participants willing to increase from 95.2 percent to 100 percent. These results indicate that the training program not only increases knowledge but also builds participants' confidence and practical skills in handling cardiac emergencies.

Table 3. Respondent characteristics

Participants Characteristics	Frequency (f)	Percentage (%)
Kembang Village	21	41.2
Antirogo Village	30	58.8
Total	51	100
Gender		
Male	20	39.2
Female	31	60.8
Total	51	100
Age (year)	46.29 (Mean)	9.566 (SD)
Education		
Elementary School	10	19.6
Junior High School	4	7.8
Senior High School	31	60.8
College	6	11.8
Others	0	0
Total	51	100
History of Hypertension Disease		
Yes	22	43.1
Themselves	15	29.6
Parents	7	13.5
No	29	56.9
Total	51	100
History of Heart Disease		
Yes	9	17.6
No	42	82.4
Total	51	100
Information about hypertension		
Health services	30	58.8
Mass media	17	33.3
Never	4	7.9
Total	51	100
Information about heart disease		
Health services	30	58.8
Newspapers/magazines	0	
Television/radio	0	
Others	17	33.3
Never	4	7.9
Total	51	100
Distance to health services		
<1km	13	25.5
1-5km	32	62.7
>5km	6	11.8
Total	51	100

Table 4. Knowledge, attitude, and skills variables of farmer groups in heart emergency response

Indicator	Pre-Test (Mean ± SD)	Post-Test (Mean ± SD)
Knowledge of hypertension	61.33 ± 15.765	74.86 ± 11.038
Knowledge of heart disease	68.6 ± 6.97	76.24 ± 6.31
Knowledge of heart diet	78.27 ± 24.2	94.34 ± 6.82
Knowledge of CPR Actions	48.10 ± 14.007	73.33 ± 11.547
Self-efficacy in performing CPR Actions	24.76 ± 5.735	29 ± 4.012
Skills in performing CPR actions	15.16 ± 2.722	35.76 ± 2.235

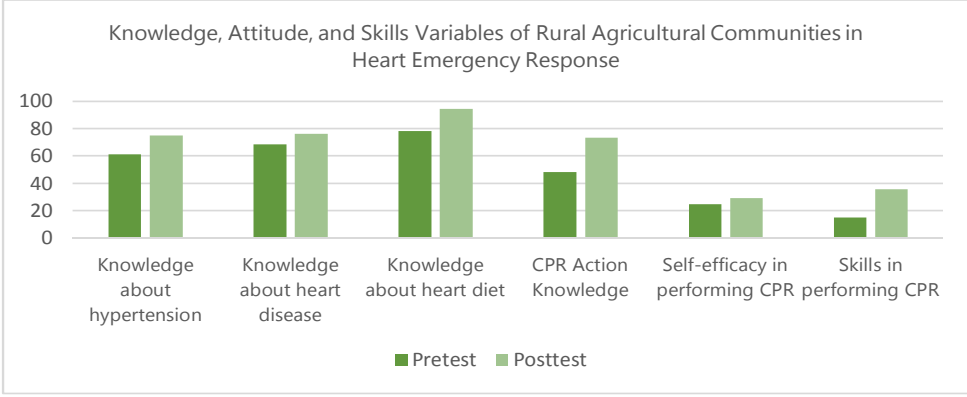

Figure 4. Pre-test and post-test of knowledge, attitude, and skills variables of farmer groups in heart emergency response

Figure 5. Delivery of Material 1: "Heart Disease and Causes"
Figure 6. Delivery of Material 3: "Heart Disease Prevention"
Figure 7. Delivery of Material 6 for improving knowledge of heart disease treatment

Figure 7. Training Season 1: "Early Heart Disease Screening"
Figure 8. Training Season 3: "Simulation CPR"

Discussion

The rural agricultural community empowerment program in realizing a healthy, heart-alert agricultural village based on agronursing through CPR education and training has been implemented well by the team. This community service program has shown that the capacity of rural agricultural communities in the service area has increased in the dimensions of knowledge and skills in carrying out heart health care and management. The community-based approach that has been carried out by the team is key in efforts to overcome heart disease in rural communities (Yunanto et al., 2023). Inclusiveness and active participation of the community allow health programs to be more relevant to local needs, thereby increasing their effectiveness (Susanto et al., 2020). This approach also helps strengthen the community's sense of ownership of the program, which in turn increases the long-term sustainability of the interventions provided (Susanto et al., 2016).

The program we work on provides education and training to farmers on the importance of prevention, treatment, and early management of heart disease. The education provided to rural farming communities in our program includes knowledge about hypertension, heart disease, and heart diet, which are crucial steps in improving community health. After the education was carried out, there was a significant increase in knowledge as measured by pretest and posttest. This change can be explained by several factors. First, structured and comprehensive education provides clear and easy-to-understand information about medical conditions and preventive measures so that participants can better understand and remember the information (Feith et al., 2018; Yang et al., 2016). Second, active learning methods such as discussions, practical demonstrations, and case simulations allow participants to better internalize knowledge and apply it in real situations (Boarder, 2023; Feith et al., 2018; Tasnim et al., 2022). Third, repetition of information and continuous evaluation throughout the program helped reinforce learning and ensure that participants mastered the material (Coman et al., 2020; Yunanto et al., 2023). The measurable increase in knowledge between pretest and posttest suggests that our educational program was effective in changing community understanding and awareness of hypertension, heart disease, and heart diet, which in turn contributed to efforts to prevent and manage heart disease in rural communities.

Another crucial component of the program is training in Cardiopulmonary Resuscitation (CPR), which provides the community with basic skills to handle a cardiac emergency before medical assistance arrives. Community CPR training is highly recommended (Khademian et al., 2020). Community CPR training is highly recommended, especially in the context of the increasing number of out-of-hospital cardiac arrests (Lavonas et al., 2020). The American Heart Association (AHA) recommends that CPR training for the general public be provided, as immediate action by bystanders can greatly increase the chances of survival (Panchal et al., 2018). The AHA recommends that everyone, even those without a medical background, should be trained to recognize the signs of cardiac arrest and perform CPR effectively. This training typically includes proper chest compression technique, the importance of compression rate and depth, and how to use an Automated External Defibrillator (AED) if available (Lavonas et al., 2020). With increased awareness and skills in CPR among the general public, the critical time that is usually wasted before medical professionals arrive at the scene can be filled with life-saving interventions (Pivač et al., 2020). In rural communities, where access to medical services may be limited or delayed, CPR training becomes even more important, as it can be the difference between life and death. Therefore, CPR training should be an integral part of community empowerment programs in the management of heart disease.

The skills of the agricultural community in performing Cardiopulmonary Resuscitation (CPR) have significantly improved thanks to the comprehensive educational approach in our program. This

process involves several stages designed to ensure that participants not only understand the theory but are also able to apply the skills practically. First, the community is introduced to the CPR technique through audiovisual media, which provides a visual and auditory depiction of the procedure. This media includes video tutorials and animations that explain the steps of CPR in detail, allowing participants to see the correct actions in an emergency (Yunanto et al., 2017). Furthermore, live demonstrations by expert instructors provide participants with the opportunity to witness the application of CPR techniques directly. These demonstrations are important because they allow participants to observe and understand the technique in a more in-depth way, as well as answer questions that may arise during the process (Rasman et al., 2022). After viewing the simulation and demonstration, participants are allowed to redelegate the CPR technique individually. Each participant performs CPR actions in front of the instructor, who then provides a direct assessment of their skills. This assessment is important to ensure that participants can perform the techniques correctly and according to standards, as well as to provide constructive feedback for further improvement (Octakana et al., 2023).

This program also emphasizes the development of science and technology innovations for community empowerment, especially for rural farming communities. Case-based and simulation-based learning technologies, along with the use of user-friendly CPR phantoms, play a crucial role in the effectiveness of the training. The use of simulation tools helps participants practice and repeat CPR techniques, thereby increasing their competence. The innovations provided by the team make CPR training more accessible and practical, ensuring that the community can master these essential skills. This approach contributes not only to increasing community knowledge but also to developing their confidence in applying life-saving techniques. The approach taken in this service program enables communities to respond to emergencies more effectively, improving safety and health in rural farming communities. In doing so, the program not only increases knowledge but also strengthens essential practical skills, providing a broad positive impact on public health in the region.

4. CONCLUSION AND RECOMMENDATIONS

This rural agricultural community empowerment program has succeeded in increasing rural agricultural community knowledge about non-communicable diseases and skills in CPR. However, there are several limitations to this program: the number of participants was limited due to budget constraints, retention of the knowledge and skills taught may diminish over time, and follow-up from healthcare providers has not yet been conducted.

To enhance the effectiveness of this initiative, it is recommended to (1) expand the program to more villages and ensure sustainability through regular evaluation and updating of educational materials. Additionally, (2) integrating CPR training into the basic health education curriculum is essential, and (3) leveraging digital technology can help reach a wider audience and improve training effectiveness. Finally, implementing ongoing support and follow-up from healthcare professionals will be crucial for reinforcing the knowledge and skills acquired by participants, thereby ensuring lasting impact on community health.

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