
Integrated Community-Based Education and Screening for Cardiometabolic Risk Prevention among Women's Community Group

Melinda Yuslian^{1*}, Fariza², Azizah³, Rizka Himawan⁴

Universitas Muhammadiyah Kudus, Indonesia^{1,2,3,4}

*Corresponding author's email: melindayuslian@gmail.com

Abstract

Keywords:

Cardiometabolic
risk; community
– based
education; health
screening; non –
communicable
diseases

The growing prevalence of noncommunicable diseases (NCDs), particularly hypertension and diabetes mellitus, is closely associated with modifiable cardiometabolic risk factors, including obesity, unhealthy dietary behaviors, and physical inactivity. Early detection and improved health literacy are essential to reducing the burden of these conditions. This community service program evaluated the effectiveness of an integrated health education and screening intervention in improving health knowledge and identifying cardiometabolic risk factors among community participants. A one-group pretest–posttest design was implemented with 40 participants. The intervention combined educational sessions on hypertension, diabetes, obesity, healthy nutrition, and physical activity with health screening, including blood pressure, random blood glucose, body weight, height, and body mass index assessments. Program effectiveness was assessed by comparing pre- and post-intervention knowledge scores. Participants' mean knowledge score increased significantly from 68.95 ± 14.73 to 77.50 ± 14.68 ($p < 0.001$), indicating improved health literacy following the intervention. Health screening further identified a considerable proportion of participants with overweight or obesity, hypertension, and elevated blood glucose levels, highlighting the need for early preventive measures. These findings demonstrate that integrating community-based health education with routine cardiometabolic screening is an effective strategy for enhancing health literacy while facilitating the early

detection of NCD risk factors. The intervention provides a practical and scalable model for strengthening community-based NCD prevention and promoting long-term public health outcomes.

Introduction

Noncommunicable diseases (NCDs) remain the leading cause of death worldwide and account for approximately 71% of all global deaths each year (World Health Organization, 2021). Hypertension, diabetes mellitus, stroke, and heart disease are groups of NCDs closely linked to changes in the lifestyles of modern societies, such as unhealthy diets, lack of physical activity, smoking, alcohol consumption, stress, and the rising prevalence of obesity (Budreviciute et al., 2020; Fatihaturahmi et al., 2023). A diet high in sugar, saturated fat, and sodium but low in fiber is known to increase the risk of metabolic disorders and cardiovascular disease (Fatihaturahmi et al., 2023). In addition, various factors such as hypertriglyceridemia, being overweight, obesity, low fruit and vegetable intake, and insufficient physical activity also contribute to an increased risk of cardiometabolic diseases (Azam et al., 2023; Censin et al., 2019; Teng et al., 2025; Zhang et al., 2021).

In Indonesia, the prevalence of NCDs has also continued to rise year after year. According to the 2023 Indonesian Health Survey, the prevalence of hypertension among adults remains above 30%, while the number of people with diabetes mellitus continues to increase (Kementrian kesehatan RI, 2023). The high prevalence of NCDs is influenced by low levels of physical activity, changes in dietary patterns, and a lack of awareness regarding the importance of adopting healthy lifestyle behaviors and undergoing routine health checkups (Arifin et al., 2022). Low health literacy often leads people to recognize risk factors too late or fail to undergo early detection, resulting in diseases being diagnosed only after complications have arisen (Chang et al., 2022; Wijayanti et al., 2024).

Community-based health education is one effective strategy for improving the public's knowledge, attitudes, and behaviors regarding the prevention of NCDs (Adiatman & Nursasi, 2020; Ozoemena et al., 2019). The participatory learning approach allows the community to actively engage in the learning process, making health information easier to understand and apply in daily life (Khasanah et al., 2019). Various studies have also shown that community-based interventions can increase physical activity, improve dietary habits, enhance medication adherence, and help control blood pressure through education and

regular health checkups (Azami-Aghdash et al., 2025; Gamage et al., 2020; Kolawole et al., 2023; Vidhiastutik et al., 2025) . In addition to education, health screenings including checks of blood pressure, blood glucose, nutritional status, and body mass index play a crucial role in the early detection of risk factors for cardiometabolic diseases, enabling the community to take preventive measures promptly (Fridalni et al., 2019; Jeet et al., 2017; Wahyuni et al., 2025).

Improving public health literacy also requires the active involvement of women, as women play a crucial role in determining dietary patterns, healthy lifestyle behaviors, and health-related decision-making at the family level (Fauzah et al., 2023; Idris et al., 2023). In Indonesia, the Women members of the Family Welfare Empowerment is a community-based women's organization that plays a role in improving family well-being through various empowerment activities, health promotion, nutrition improvement, and community education. Through its network extending down to the village level, the Family Welfare Empowerment serves as a strategic platform for disseminating health information and promoting behavioral changes toward a healthy lifestyle. Community-based women's empowerment programs have been shown to increase knowledge, skills, community participation, and community autonomy in maintaining health sustainably (Saugi & Sumarno, 2015; Sharma et al., 2020).

Banget Village, Kaliwungu Subdistrict, Kudus Regency, was selected as the site for this initiative because it faces various health issues related to the risk of cardiometabolic diseases. According to 2024 data from the Sidorekso Community Health Center, there were 320 cases of hypertension and 115 cases of diabetes mellitus in Banget Village. In addition, preliminary observations indicate that the community still maintains a diet high in simple carbohydrates, fats, and sodium, coupled with low levels of physical activity and limited knowledge regarding the prevention of degenerative diseases. Promotive and preventive health services, including the Elderly Health Post (Posyandu Lansia), have not been operating optimally due to a shortage of health workers, low community participation, and limited supporting facilities. These conditions highlight the need for community-based health interventions that not only improve community knowledge but also strengthen efforts to detect risk factors for cardiometabolic diseases early. Given these conditions, women members of the Family Welfare Empowerment was selected as the target audience for the activities because they play a strategic role in influencing family dietary patterns, healthy lifestyle behaviors, and the dissemination of health information within the community.

Based on this background, this community service activity was carried out through a community-based health education and health screening approach targeting the women members of the Family Welfare Empowerment in Banget Village. The activity aimed to increase community knowledge about the prevention of cardiometabolic diseases while identifying risk factors at an early stage as part of promotive and preventive efforts to control noncommunicable diseases in the community.

Methods

This community service activity employs a community-based intervention approach with a pre-experimental design using the one-group pretest-posttest method. This approach was chosen because it directly involves the community's active participation in the process of health education and early detection of risk factors for noncommunicable diseases. Community-based approaches are known to be effective in improving community knowledge, promoting healthy lifestyles, and controlling risk factors for cardiometabolic diseases (Azami-Aghdash et al., 2025). The program was conducted in December 2025 at the Banget Village Hall, Kaliwungu Subdistrict, Kudus Regency, targeting a group of women from the women members of the Family Welfare Empowerment. A total of 40 participants voluntarily took part in the entire series of activities. The women members of the Family Welfare Empowerment was selected as the target because women play a crucial role in decision-making regarding family dietary patterns, healthy lifestyle behaviors, and the health maintenance of family members (Fauzah et al., 2023; Idris et al., 2023). The implementation of the program adopted a participatory learning and community empowerment approach that emphasized active community involvement in the educational process and health screenings (Khasanah et al., 2019; Saugi & Sumarno, 2015). In addition, a community-based participatory intervention approach was applied to increase community participation in health promotion and prevention activities (Sharma et al., 2020). The implementation of the activities consisted of four stages: planning, action, observation, and reflection (Fridalni et al., 2019).

Planning

The planning phase began with coordination among village officials, the Family Welfare Empowerment leaders, and local health workers to determine the timing, location, and technical details of the activities. During this phase, the team also identified public health issues related to hypertension, diabetes mellitus,

obesity, low levels of physical activity, and the community's limited awareness of the importance of early detection of noncommunicable diseases.

Next, the implementation team developed educational materials, including presentation slides and leaflets, containing information on hypertension, diabetes mellitus, risk factors for cardiometabolic diseases, healthy eating habits, physical activity, sample daily meal plans, and strategies for preventing noncommunicable diseases. The materials were written in simple language and tailored to the characteristics of the participants who were predominantly adult women to ensure they were easily understood (Chang et al., 2022).

The evaluation instrument, in the form of a knowledge questionnaire, was developed by the implementation team based on the literature on hypertension, diabetes mellitus, healthy eating habits, physical activity, and the prevention of cardiometabolic diseases. The initial questionnaire consisted of 15 items with true or false answer options. Each correct answer was scored as 1, while each incorrect answer was scored as 0. Before use, the instrument's validity was tested using Pearson's product-moment correlation analysis on 40 respondents. The test results showed that 10 items were deemed valid (calculated $r > \text{table } r = 0.312$; $p < 0.05$), while five items were eliminated because they did not meet the validity criteria. Subsequently, the ten valid items were tested for reliability using Cronbach's Alpha and yielded a value of $\alpha = 0.707$, indicating that the instrument has acceptable reliability.

Action

The event began with participant registration and random blood glucose (RBG) testing as part of the initial health screening. Participants then attended an opening session, educational presentations, interactive discussions, and an evaluation via a posttest.

The educational materials covered the definitions of hypertension and diabetes mellitus, risk factors for cardiometabolic diseases, the importance of a healthy diet, examples of daily meal plans, physical activity, and the importance of regular health checkups. The education was delivered using interactive lectures and discussions so that participants could actively participate in the learning process. Community-based educational approaches are known to be effective in improving the public's knowledge and preventive behaviors regarding noncommunicable diseases (Kolawole et al., 2023; Ozoemena et al., 2019).

In addition to education, health screenings were conducted, including blood pressure measurements using a digital sphygmomanometer, random blood

glucose (RBG) tests using a glucometer, weight measurements using digital scales, height measurements using a microtoise, and body mass index (BMI) calculations. These examinations aim to detect risk factors for cardiometabolic diseases in the community at an early stage (Fridalni et al., 2019; Wahyuni et al., 2025). Direct community involvement in the screening process is also part of a community-based promotive and preventive approach (Jeet et al., 2017).

Table 1. Community-Based Health Education Curriculum

Stage	Learning Objectives	Educational Materials	Teaching Method	Duration
Registration and Initial Health Screening	To identify participants' baseline health status	Random Blood Glucose (RBG) screening	Registration and health screening	30 minutes
Opening Session	To introduce the objectives and agenda of the program	Opening remarks and program introduction	Lecture	40 minutes
Health Education Session	To improve participants' knowledge regarding cardiometabolic diseases and healthy lifestyles	Hypertension, diabetes mellitus, cardiometabolic risk factors, healthy diet, sample daily menu, physical activity, and prevention of noncommunicable diseases	Interactive lecture and discussion	20 minutes
Discussion Session	To provide opportunities for participants to ask questions and clarify the educational materials	Question and answer session	Group discussion	10 minutes
Evaluation	To assess participants' knowledge after the	Posttest questionnaire	Questionnaire	10–15 minutes

Stage	Learning Objectives	Educational Materials	Teaching Method	Duration
	educational intervention			
Closing Session	To conclude the community service activity	Door prize distribution and closing remarks	Discussion	10 minutes

Observation

The observation phase involved collecting pretest and posttest data to assess changes in participants' knowledge levels after participating in the health education program. The assessment was conducted using 10 questions that had passed validity and reliability tests. In addition, all health screening results including blood pressure, random blood glucose (RBG), body weight, height, and body mass index were recorded to identify risk factors for cardiometabolic diseases among participants. The screening data were analyzed descriptively using frequency distributions, percentages, means, and standard deviations.

Reflection

The reflection phase was conducted through a joint evaluation of the activity's implementation and the results obtained. Participants were given the opportunity to share their experiences, challenges, and insights gained after participating in the health education and screening. A reflective approach in community-based activities has been shown to increase community participation and awareness of the importance of adopting healthy lifestyle behaviors on a sustainable basis (Saugi & Sumarno, 2015).

Pretest and posttest data were analyzed using the Wilcoxon Signed-Rank Test with a significance level of $p < 0.05$ to determine differences in participants' knowledge levels before and after the intervention. All data analysis was performed using the Statistical Package for the Social Sciences (SPSS). All participants took part in the activities voluntarily and provided informed consent before the activities began, while participant data confidentiality was strictly maintained.

Results and Discussion

Community-Based Health Education Activities

The community service program was conducted among 40 members of the women members of the Family Welfare Empowerment in Banget Village. All participants completed the entire series of activities, including registration, random blood glucose (RBG) screening, blood pressure measurement, anthropometric assessment, health education on hypertension and diabetes mellitus, interactive group discussions, and knowledge assessment using pre-test and post-test questionnaires.



Figure 1. Community-based health education session for women members of the Family Welfare Empowerment in Banget Village.

The educational session was delivered through interactive lectures and group discussions tailored to the characteristics of the participants, who were predominantly adult and pre-elderly women. The educational materials covered the definition of hypertension and diabetes mellitus, risk factors, signs and symptoms, potential complications, preventive strategies, healthy dietary practices, physical activity, and examples of balanced daily meal plans. Participants were also encouraged to share their experiences and ask questions regarding their own health conditions, making the learning process more contextual and participant-centered.

A community-based educational approach encourages active participation throughout the learning process, allowing participants to better understand and apply health information in their daily lives. The combination of interactive education, group discussion, and direct interpretation of participants' screening results enabled the educational messages to become more relevant to the participants' personal health conditions. Consequently, participants became more

aware of their own cardiometabolic risk factors and the importance of adopting healthier lifestyle behaviors. Previous studies have demonstrated that community-based educational interventions effectively improve health literacy, encourage healthy behavioral changes, and strengthen community participation in noncommunicable disease prevention (Gamage et al., 2020; Kolawole et al., 2023; Ozoemena et al., 2019).

The involvement of women members of the Family Welfare Empowerment is particularly important because they serves as a community-based organization that actively promotes family health and healthy lifestyle practices at the household level. Improving health literacy among members is expected to have a broader impact, as participants can disseminate health information to their families and surrounding communities through routine Family Welfare Empowerment activities. Therefore, community-based education targeting women members of the Family Welfare Empowerment has the potential to contribute to sustainable health promotion beyond the duration of the intervention (Idris et al., 2023; Sharma et al., 2020).

Respondent Characteristics

The anthropometric characteristics and clinical parameters of the participants are presented in table 2.

Table 2. Anthropometric and Clinical Characteristics of Participants (n = 40)

Variable	Minimum	Maximum	Mean $\pm$ SD
Age (years)	25	65	44,80 $\pm$ 7,73
BMI (kg/m ²)	17,78	38,45	25,46 $\pm$ 4,31
Systolic blood pressure (mmHg)	90	189	132,83 $\pm$ 22,94
Diastolic blood pressure (mmHg)	46	104	80,13 $\pm$ 11,89
Random blood glucose (mg/dL)	82	365	126,93 $\pm$ 51,22

Based on table 2, the mean age of the participants was 44.80 $\pm$ 7.73 years, indicating that most participants were middle-aged adults who are entering a period of increased susceptibility to cardiometabolic diseases. Advancing age is associated with physiological changes, including reduced insulin sensitivity, increased arterial stiffness, and altered lipid metabolism, which contribute to a higher prevalence of hypertension, diabetes mellitus, and cardiovascular disease (Budreviciute et al., 2020). Considering that the majority of participants were adult women, this age profile further supports the importance of implementing preventive health education and routine health screening within the community.

The participants' mean body mass index (BMI) was $25.46 \pm 4.31 \text{ kg/m}^2$, indicating a tendency toward overweight nutritional status. This finding is consistent with the distribution presented in Table 2, where most participants were classified as overweight or obese. Excess body weight is a well-established risk factor for hypertension, diabetes mellitus, and cardiovascular disease because it contributes to insulin resistance, chronic low-grade inflammation, endothelial dysfunction, and lipid metabolism disorders (Azam et al., 2023; Teng et al., 2025).

According to the 2023 Indonesian Health Survey (SKI), central obesity increases the risk of hypertension by approximately 3.4 times and diabetes mellitus by around three times compared with individuals without central obesity. Therefore, the relatively high mean BMI observed in this study indicates that the participants represent a population at considerable cardiometabolic risk requiring early preventive interventions.

The participants' mean systolic blood pressure was $132.83 \pm 22.94 \text{ mmHg}$, exceeding the normal threshold ($<120 \text{ mmHg}$), while the mean diastolic blood pressure was $80.13 \pm 11.89 \text{ mmHg}$. These findings indicate that elevated blood pressure was already present among many participants, suggesting an increased burden of hypertension within this community.

This finding is particularly important because the prevalence of hypertension among the participants was substantially higher than the national prevalence reported in the 2023 Indonesian Health Survey (30.8%). Early identification of elevated blood pressure through community screening provides an opportunity to initiate lifestyle modification before cardiovascular complications occur.

Meanwhile, the participants' mean random blood glucose level was $126.93 \pm 51.22 \text{ mg/dL}$, indicating considerable variation in glycemic status among participants, with several individuals already presenting elevated blood glucose levels. Although the mean value remained below the diagnostic threshold for diabetes mellitus, the wide standard deviation suggests the presence of participants at increased metabolic risk.

According to the IDF Diabetes Atlas 11th Edition, approximately 589 million adults were living with diabetes worldwide in 2024, and this number is projected to increase to 853 million by 2050. Indonesia is among the countries with a high diabetes burden, with an age-standardized prevalence of approximately 11.3%. These data highlight the importance of community-based blood glucose screening as an effective strategy for identifying individuals requiring further

clinical evaluation and lifestyle intervention (International Diabetes Federation, 2024).

Overall, the anthropometric and clinical findings indicate that the participants had multiple cardiometabolic risk factors even before receiving health education. The combination of overweight status, elevated blood pressure, and increased blood glucose levels underscores the importance of integrating routine community-based screening with health education programs to facilitate early detection and timely preventive interventions.

Distribution of Cardiometabolic Disease Risk Factors

The distribution of participants’ nutritional status, blood pressure, and blood glucose levels is presented in table 3.

Table 3. Distribution of Cardiometabolic Risk Factors Among Participants (n = 40)

Body Mass Index Categories		
Category	n	%
Normal	11	27,5
Overweight	14	35,0
Class I Obesity	10	25,0
Class II Obesity	5	12,5
Blood Pressure Categories		
Category	n	%
Normal	14	35,0
Hypertension	26	65,0
Random Blood Glucose Categories		
Category	n	%
Normal	32	80,0
Above normal	8	20,0

Based on table above, 72.5% of participants were classified as overweight or obese, indicating that the majority had one of the major modifiable risk factors for cardiometabolic diseases. Excess body weight has consistently been associated with hypertension, diabetes mellitus, dyslipidemia, and cardiovascular disease through mechanisms involving insulin resistance, chronic low-grade

inflammation, endothelial dysfunction, and impaired lipid metabolism (Azam et al., 2023; Teng et al., 2025). The findings are consistent with the 2023 Indonesian Health Survey (SKI), which reported that central obesity substantially increases the risk of both hypertension and diabetes mellitus among Indonesian adults. Considering that more than two-thirds of the participants were overweight or obese, lifestyle modification through nutrition education and increased physical activity should become a priority in future community health programs.

A total of 65% of participants were classified as having hypertension, which is considerably higher than the national prevalence of 30.8% reported by the 2023 Indonesian Health Survey. This finding indicates that women members of the Family Welfare Empowerment involved in this activity represents a community with a relatively high cardiometabolic risk profile. The high prevalence of hypertension is likely associated with the age distribution of participants, the high proportion of overweight and obesity, occupational stress among cigarette factory workers, limited physical activity, and dietary habits characterized by excessive sodium intake.

These findings emphasize that educational interventions alone may not be sufficient. Continuous blood pressure monitoring, dietary counseling, regular physical activity programs, and collaboration with community health centers are necessary to reduce the long-term burden of hypertension within this community. Community-based cardiovascular risk screening has also been shown to be feasible and effective in identifying individuals at high risk and facilitating timely referral for further management, particularly in underserved populations (Newtonraj et al., 2020).

These findings are comparable to previous community-based screening studies, which have shown that hypertension is frequently detected among middle-aged women during community health screening programs because many individuals remain asymptomatic and therefore do not seek medical examination until complications develop (Fridalni et al., 2019; Heydari et al., 2025).

Random blood glucose screening revealed that 20% of participants had blood glucose levels above the normal range. Although most participants remained within normal limits, this finding indicates that one in every five participants may require further clinical assessment and counseling regarding dietary modification and healthy lifestyle practices. According to the IDF Diabetes Atlas 2025, approximately 43% of people with diabetes worldwide remain undiagnosed, making community-based screening a crucial strategy for early detection before complications arise.

These findings are consistent with community-based screening programs reported by Hill et al. (2018), which demonstrated that community-based screening is effective in identifying individuals with previously unrecognized diabetes risk and elevated blood pressure, thereby facilitating early referral and preventive interventions. Therefore, community-based blood glucose screening represents an important strategy for identifying individuals at increased metabolic risk before complications occur. Early identification followed by lifestyle intervention has been shown to reduce the progression of diabetes and its associated complications.

Overall, the screening results demonstrate that a considerable proportion of participants already presented multiple cardiometabolic risk factors before receiving the educational intervention. The combination of overweight or obesity, elevated blood pressure, and abnormal blood glucose levels highlights the importance of integrating routine health screening with community-based health education. Such an approach enables early identification of individuals at high risk while simultaneously improving community awareness regarding disease prevention and healthy lifestyle modification (Fridalni et al., 2019; Heydari et al., 2025; Wijayanti et al., 2024).

The findings also support the importance of empowering women members of the Family Welfare Empowerment as community health promoters. As women are primarily responsible for food preparation and household health management, improving their knowledge and awareness may contribute not only to individual behavioral changes but also to healthier family dietary practices and community-wide health promotion. Therefore, integrating regular screening with continuous nutrition education through the Family Welfare Empowerment activities has the potential to provide sustainable benefits for cardiometabolic disease prevention (Idris et al., 2023; Sharma et al., 2020).



Figure 2. Community-based health screening activities, including blood pressure measurement, anthropometric assessment, and random blood glucose testing.

Changes in Participants' Knowledge Levels

The results of the pretest and posttest evaluations of participants' knowledge are presented in table 4.

Table 4. Pretest and Posttest Knowledge Scores (n = 40)

Variable	Mean $\pm$ SD	Median	Minimum - Maximum
Pretest	68,95 $\pm$ 14,73	73,00	13-86
Posttest	77,50 $\pm$ 14,68	80,00	26-93

The results presented in table above indicate an increase in the participants' mean knowledge score from 68.95 $\pm$ 14.73 before the intervention to 77.50 $\pm$ 14.68 after the intervention, demonstrating an overall improvement in participants' understanding of hypertension, diabetes mellitus, and cardiometabolic disease prevention following the community-based health education program.

The improvement in participants' knowledge indicates that the educational approach, which combined interactive lectures, group discussions, and practical health screening, successfully enhanced participants' understanding of cardiometabolic disease risk factors, healthy dietary practices, physical activity, and the importance of regular health examinations. Providing education

immediately after participants received their individual screening results made the educational messages more relevant and easier to understand.

These findings are consistent with previous studies demonstrating that community-based educational interventions effectively improve health literacy, encourage healthy lifestyle behaviors, and strengthen the prevention of noncommunicable diseases (Gamage et al., 2020; Ozoemena et al., 2019). Similarly, Jamiu et al. (2024) reported that educational interventions focusing on hypertension and healthy lifestyle practices significantly improved participants' knowledge and promoted positive behavioral intentions toward disease prevention.

Throughout the educational sessions, participants demonstrated high enthusiasm by actively asking questions regarding dietary management for hypertension and diabetes mellitus, restriction of sugar and salt intake, physical activity, and the importance of regular blood pressure and blood glucose examinations. Many participants acknowledged that they had previously been unaware of the close relationship between obesity, hypertension, diabetes mellitus, and cardiovascular disease. This interactive discussion indicates that community-based education not only improved knowledge but also increased participants' awareness of their own health risks and motivated them to adopt healthier lifestyle behaviors.



Figure 3. Interactive discussion and individual consultation between participants and the community service team following the health education session.

Results of the Wilcoxon Signed-Rank Test

The results of the Wilcoxon Signed-Rank Test are presented in Table 5.

Table 5. Results of the Wilcoxon Signed-Rank Test

Variable	Z	p-value
Posttest – Pretest	-4,675	0,000*

*Note: $p < 0.05$ indicates statistical significance.

The Wilcoxon Signed-Rank Test confirmed that the increase in participants' knowledge following the educational intervention was statistically significant ($Z = -4.675$; $p < 0.001$). These findings indicate that the community-based health education program effectively improved participants' understanding of hypertension, diabetes mellitus, cardiometabolic risk factors, healthy dietary practices, and disease prevention.

The statistically significant improvement observed in this study is consistent with previous evidence demonstrating that community-based educational interventions improve health literacy and promote preventive behaviors related to noncommunicable diseases. Interactive educational strategies encourage participants to actively engage in discussions, improve knowledge retention, and facilitate behavioral change (Kolawole et al., 2023; Ozoemena et al., 2019). Likewise, Azami-Aghdash et al. (2025) reported that community-based interventions integrating health education, lifestyle modification, and routine health screening significantly improve cardiovascular risk management and blood pressure control among adults.

The effectiveness of this program may also be explained by its participatory learning approach. Unlike conventional lectures, participants were encouraged to discuss their personal health conditions, interpret their screening results, and ask questions directly to the community service team. This interactive learning process likely enhanced participants' understanding because the educational content was directly linked to their own health status, making the information more meaningful and easier to remember.

Integrating health education with community-based health screening also enabled participants to immediately recognize their individual cardiometabolic risk factors. Previous studies have shown that combining educational interventions with health screening increases participants' awareness of their own health conditions, encourages early health-seeking behavior, and strengthens community-based prevention programs (Heydari et al., 2025; Jeet et al., 2017).

Furthermore, the involvement of women members of the Family Welfare Empowerment in this program may contribute to the sustainability of health

promotion activities within the community. As women are primarily responsible for household food preparation and family health management, increasing their health literacy has the potential to influence dietary practices and healthy lifestyle behaviors among other family members. Consequently, the benefits of this intervention may extend beyond individual participants and contribute to broader community health improvement (Idris et al., 2023; Sharma et al., 2020).

Despite these encouraging findings, this community service program has several limitations. The evaluation focused only on short-term changes in participants' knowledge and did not assess long-term behavioral changes or improvements in clinical outcomes. Furthermore, the absence of a control group limits the ability to attribute the observed improvements solely to the intervention. Future community-based programs should incorporate longer follow-up periods and repeated health assessments to evaluate the sustainability of behavioral and clinical changes over time. Nevertheless, the significant improvement in participants' knowledge indicates that integrating community-based health education with routine health screening is a promising promotive and preventive strategy for reducing cardiometabolic disease risk in community settings.

Conclusion

Community-based health education integrated with health screening was effective in improving participants' knowledge regarding the prevention and control of noncommunicable diseases, particularly hypertension and diabetes mellitus. The significant improvement in knowledge after the intervention demonstrates that combining interactive education with blood pressure, anthropometric, and random blood glucose screening can strengthen health literacy while increasing participants' awareness of their own cardiometabolic risk. These findings support the use of community-based educational approaches as an effective promotive and preventive strategy for reducing the burden of noncommunicable diseases. The high proportion of participants who were overweight or obese, hypertensive, and had elevated blood glucose levels indicates that community-based screening remains essential for the early identification of cardiometabolic risk factors.

Therefore, regular health education and screening programs should be integrated into routine Family Welfare Empowerment activities through collaboration with community health centers (*Puskesmas*), village governments, and community health volunteers to ensure continuous monitoring, follow-up counseling, and referral when necessary. Strengthening community-based

primary health care through continuous education, routine screening, and early management is essential for improving hypertension prevention and long-term cardiometabolic health outcomes. Because women members of the Family Welfare Empowerment play an important role in influencing family dietary practices and healthy lifestyle behaviors, this community-based model has the potential to be replicated in other communities facing similar cardiometabolic health challenges.

References

- Adiatman, & Nursasi, A. Y. (2020). *Efektifitas Edukasi dalam Pencegahan dan Pengendalian Hipertensi Adiatman*. 11(1), 228–232.
- Arifin, H., Chou, K., Ibrahim, K., Ulfah, S., Pradipta, O., Rias, Y. A., Sitorus, N., Wiratama, B. S., Setiawan, A., Setyowati, S., Kuswanto, H., Mediarti, D., Sulistini, R., Pahria, T., Setyowati, S., Kuswanto, H., Mediarti, D., Rosnani, R., Sulistini, R., ... Ulfah, S. (2022). *Analysis of Modifiable, Non-Modifiable, and Indonesian Basic Health Research Diseases in Indonesia: Evidence from the 2018 Indonesian Basic Health Research*. 2390. <https://doi.org/10.2147/JMDH.S382191>
- Azam, M., Sakinah, L. F., Kartasurya, M. I., Fibriana, A. I., Minuljo, T. T., & Aljunid, S. M. (2023). *Prevalence and determinants of obesity among individuals with diabetes in Indonesia [version 4 ; peer review : 2 approved]*. 1–28.
- Azami-Aghdash, S., Joudyian, N., Jafari, S., Karami, S., & Rezapour, R. (2025). Assessing Community-Based interventions effectiveness on hypertension prevention and control: A systematic review and Meta-Analysis. *BMC Public Health*, 25(1). <https://doi.org/10.1186/s12889-025-24283-x>
- Budreviciute, A., Damiani, S., Sabir, D. K., & Onder, K. (2020). *Management and Prevention Strategies for Non-communicable Diseases (NCDs) and Their Risk Factors*. 8(November), 1–11. <https://doi.org/10.3389/fpubh.2020.574111>
- Censin, J. C., Peters, S. A. E., Id, J. B., Ferreira, T., Mahajan, A., Id, M. V. H., Pulit, L., & Ma, R. (2019). *Causal relationships between obesity and the leading causes of death in women and men*. 1–22. <https://doi.org/10.1371/journal.pgen.1008405>
- Chang, S. J., Lee, K., Yang, E., & Ryu, H. (2022). *Evaluating a theory-based intervention for improving eHealth literacy in older adults : a single group , pretest – posttest design*. 1–9.
- Fatihaturahmi, Yuliana, & Yulastri, A. (2023). Literature Riview : Penyakit Degeneratif : Penyebab, Akibat, Pencegahan Dan Penanggulangan. *Jurnal Gizi Dan Kesehatan (JGK)*, 3(1), 63–72.

- Fauzah, N., Fuad, Z., Farma, J., & Umuri, K. (2023). *Peran Perempuan dalam Meningkatkan Kesejahteraan Keluarga : Tinjauan Ekonomi Islam*. 9(2).
- Fridalni, N., Guslinda, Minropa, A., Febriyanti, & Sapardi, V. S. (2019). Pengendalian diri penyakit degeneratif. *Jurnal Abdimas Saintika*, 1(1), 45–50.
- Gamage, D. G., Id, G., Id, M. A. R., Joshi, R., Id, R. T., Chow, C. K., Id, B. O., Id, R. G. E., Id, S. M., Id, K. K., Id, K. K., & Suresh, O. (2020). *Effectiveness of a scalable group-based education and monitoring program , delivered by health workers , to improve control of hypertension in rural India : A cluster randomised controlled trial*.
- Heydari, H., Sadeghi, R., Jamshidi, E., Rahimiforushani, A., Nikbakht, H. A., & Mashhadsari, M. R. A. (2025). Effectiveness of community-based intervention using PATCH on disease perception, empowerment, and self-care in hypertension: a community trial protocol. *Trials*, 26(1). <https://doi.org/10.1186/s13063-025-08743-8>
- Hill, J., Peer, N., Sobngwi, E., & Kengne, A. P. (2018). *Community Screening for Diabetes Risk Reveals A High Prevalence of Higher Than Optimal Blood Pressure Levels*. 2018.
- Idris, I. B., Hamis, A. A., Bukhori, A. B., Chan, D., Hoong, C., Yusop, H., Al, M., Shaharuddin, A., Adline, N., & Fauzi, F. A. (2023). Women ' s autonomy in healthcare decision making : a systematic review. *BMC Women's Health*, 1–10. <https://doi.org/10.1186/s12905-023-02792-4>
- International Diabetes Federation. (2024). *Diabetes around the world - 2024 Diabetes around the world - 2024*.
- Jamiu, M. O., Maiha, B. B., Danjuma, N. M., & Giwa, A. (2024). *Educational intervention on knowledge of hypertension and lifestyle / dietary modification among hypertensive patients attending a tertiary health facility in Nigeria*. 4(1), 1–11.
- Jeet, G., Thakur, J. S., Prinja, S., & Singh, M. (2017). Community health workers for non-communicable diseases prevention and control in developing countries : Evidence and implications. *PLoS ONE*, 12(7), 1–21.
- Kakoma, P. K., Emmanuel Kiyana Muyumba, O. M., Musung, J. M., Banze, J. P. M., Lisasi, G. K., Kayomb, N. K., Bin, G. M. K., Kakoma, J.-B. S. Z., Bugeme, M., Nkulu, D. N., & Born, B.-J. H. van den. (2026). Prevalence and associated factors of primary dysmenorrhea among women in sub-Saharan Africa: a systematic review and meta-analysis. *BMC Women's Health*, 26(1). <https://doi.org/10.1186/s12905-026-04379-1>
- Kementrian kesehatan RI, 2023. (2023). *Prevalensi , Dampak , serta Upaya Pengendalian Hipertensi & Diabetes di Indonesia*.

- Khasanah, U., Anwar, S., Sofiani, Y., Kurwiyah, N., & Nurhayati. (2019). *Edukasi Masyarakat dalam Peningkatan Pencegahan dan Perawatan Hipertensi dan DM Desa Kaliasin Kecamatan Sukamulya Kabupaten Tangerang*. September 2019.
- Kolawole, T. O., Mustapha, A. Y., Mbata, O., Tomoh, B. O., Forkuo, A. Y., Kelvin-agwu, M. C., & Researcher, I. (2023). *Evaluating the Effectiveness of Community-Based Health Education Programs in Preventing Non-Communicable Diseases*. 7(3), 779–794.
- Newtonraj, A., Selvaraj, K., Purty, A. J., Nanda, S. K., Arokiaraj, M. C., Vincent, A., & Manikandan, M. (2020). *Feasibility and Outcome of Community - based Screening for Cardiovascular Disease Risk Factors in a Remote Rural Area of South India : The Chunampet Rural – Cardiovascular Health Assessment and Management Program*. <https://doi.org/10.4103/ijem.IJEM>
- Ozoemena, E. L., Iweama, C. N., Agbaje, O. S., Umoke, P. C. I., Ene, O. C., Ofili, P. C., Agu, B. N., Orisa, C. U., Agu, M., & Anthony, E. (2019). *Effects of a health education intervention on hypertension-related knowledge , prevention and self-care practices in Nigerian retirees : a quasi-experimental study*. 1–16.
- Saugi, W., & Sumarno, S. (2015). Pemberdayaan perempuan melalui pelatihan pengolahan bahan pangan lokal. *Jurnal Pendidikan Dan Pemberdayaan Masyarakat*, 2(2), 226. <https://doi.org/10.21831/jppm.v2i2.6361>
- Sharma, S., Mehra, D., Akhtar, F., & Mehra, S. (2020). *Evaluation of a community-based intervention for health and economic empowerment of marginalized women in India*. 1–16.
- Teng, T., Liu, J., Wang, M., Chen, Y., Xu, J., Dong, Z., & Jiao, Q. (2025). *Exploring the relationship between residual cholesterol , body mass index , and hypertension risk : a national cohort study*.
- Thapa, R., Zaman, S. Bin, Thrift, A., Mishra, S. R., & Zengim, A. (2024). *Empowering Primary Care : Implementing Effective Hypertension Management Strategies*. 63, 2024.
- Vidhiastutik, Y., Widyowati, A., & Elina, A. D. (2025). *Integrated Education And Assistance to Optimize the Quality of Life the Elderly with Hypertension*. 2(1), 1–8.
- Wahyuni, A., Yenni, Y., Utami, A. S., Bachri, Y., & Oktorina, R. (2025). *Community Health Screening for Cardiometabolic Risk Through Blood Pressure, Glucose, and Lifestyle Assessment*. *Jurnal Pengabdian Masyarakat Dalam Kesehatan*, 7(2), 103–112. <https://doi.org/10.20473/jpmk.v7i2.75122>
- Wijayanti, Y. T., Sumiyati, S., Tira, D. S., & Saputra, M. K. F. (2024). *Edukasi Kesehatan bagi masyarakat dalam Pencegahan Penyakit Hipertensi dan Stroke stroke*.

1, 77–84. <https://doi.org/10.61099/jpmei.v1i>

World Health Organization, 2021. (2021). *Assessing national capacity for the prevention and control of noncommunicable diseases*.

Zhang, Y., Yang, H., Ren, M., Wang, R., Zhao, F., Liu, T., Zhang, Y., & Guo, Z. (2021). *Distribution of risk factors of hypertension patients in different age groups in Tianjin*. 1–10.