



Antasan Screening Based on Community Health Nursing to Enhance Awareness and Early Detection of Stroke Risk Factors in Antasan Senor Ilir Village

Antasan Screening Berbasis Community Health Nursing dalam Meningkatkan Kesadaran dan Deteksi Dini Faktor Risiko Stroke di Desa Antasan Senor Ilir

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Abstrak

Stroke merupakan salah satu masalah kesehatan masyarakat yang utama, terutama di komunitas pedesaan dengan keterbatasan literasi kesehatan dan akses terhadap layanan preventif. Program ini bertujuan meningkatkan kesadaran masyarakat dan memfasilitasi deteksi dini faktor risiko stroke melalui Antasan Screening berbasis *Community Health Nursing* (CHN). Intervensi berbasis partisipasi masyarakat dilaksanakan pada 100 warga dewasa di Desa Antasan Senor Ilir, Kalimantan Selatan, pada Juni–Juli 2026. Program meliputi edukasi kesehatan, pemeriksaan tekanan darah, indeks massa tubuh, gula darah, kolesterol, dan asam urat, penilaian gaya hidup, konseling individual, rujukan, serta pemberdayaan kader melalui kolaborasi dengan pemerintah desa dan fasilitas pelayanan kesehatan primer. Kesadaran masyarakat diukur menggunakan kuesioner sebelum dan sesudah edukasi, sedangkan faktor risiko dianalisis secara deskriptif. Hasil menunjukkan peningkatan skor kesadaran yang bermakna dari $56,4 \pm 11,8$ menjadi $86,9 \pm 8,2$ ($p < 0,001$). Skrining mengidentifikasi hipertensi pada 42% peserta, obesitas 36%, hiperkolesterolemia 38%, hiperglikemia 21%, hiperurisemia 29%, kurang aktivitas fisik 44%, dan merokok 26%. Sebanyak 61 peserta memerlukan konseling modifikasi gaya hidup dan 28 peserta dirujuk untuk pemeriksaan lebih lanjut. Intervensi juga memperkuat kapasitas lima kader Posbindu PTM untuk melakukan pemantauan berkelanjutan. Antasan Screening berbasis CHN terbukti meningkatkan kesadaran dan mendukung deteksi dini faktor risiko stroke serta berpotensi menjadi model pencegahan stroke berbasis komunitas yang berkelanjutan di wilayah pedesaan.

Kata kunci: antasan *screening*; *community health nursing*; deteksi dini, faktor risiko stroke, kesadaran stroke

Abstract

Stroke is a major public health problem, particularly in rural communities with limited health literacy and access to preventive services. This program aimed to improve community awareness and facilitate the early detection of stroke risk factors through the Antasan Screening program based on the Community Health Nursing (CHN) approach. A community-based participatory intervention was conducted among 100 adult residents of Antasan Senor Ilir Village, South Kalimantan, from June to July 2026. The program included health education, assessment of blood pressure, body mass index, blood glucose, cholesterol, and uric acid, lifestyle assessment, individualized counseling, referral, and community empowerment through collaboration with village authorities and primary healthcare providers. Community awareness was assessed using questionnaires before and after education, while stroke risk factors were analyzed descriptively. The results demonstrated a significant increase in awareness scores from 56.4 ± 11.8 to 86.9 ± 8.2 ($p < 0.001$). Screening

identified hypertension in 42% of participants, obesity in 36%, hypercholesterolemia in 38%, hyperglycemia in 21%, hyperuricemia in 29%, physical inactivity in 44%, and smoking in 26%. Sixty-one participants required lifestyle modification counseling, while 28 were referred for further examination. The intervention also strengthened the capacity of five Posbindu PTM volunteers to conduct continuous monitoring. The CHN-based Antasan Screening program effectively improved community awareness and supported the early detection of stroke risk factors. This integrated approach demonstrated potential as a sustainable community-based strategy for stroke prevention in rural settings.

Keyword: antasan screening; community health nursing; early detection; stroke awareness; stroke risk factors

1. Introduction

Stroke remains one of the leading causes of mortality and long-term disability worldwide, creating substantial health, social, and economic burdens. The increasing prevalence of stroke is closely associated with the growing incidence of modifiable risk factors, including hypertension, diabetes mellitus, dyslipidemia, obesity, smoking, and physical inactivity. Global estimates indicate that approximately 12.2 million individuals experience a first-ever stroke each year, while more than 101 million people are living with the consequences of stroke. Nearly 6.5 million deaths annually are attributed to stroke, making it the second leading cause of death and one of the primary contributors to disability-adjusted life years worldwide. More than seventy percent of stroke cases and approximately eighty-seven percent of stroke-related deaths occur in low- and middle-income countries, where access to preventive health services and early detection remains limited [1], [2].

Indonesia continues to experience a considerable increase in stroke prevalence. National health survey data reported that the prevalence of physician-diagnosed stroke reached 10.9 per 1,000 population, with higher rates observed among older adults and individuals with uncontrolled cardiovascular risk factors. Hypertension affects more than one-third of the Indonesian adult population, while diabetes mellitus, obesity, hypercholesterolemia, and unhealthy lifestyles continue to increase across both urban and rural communities. South Kalimantan has consistently been identified as one of the provinces with a high prevalence of hypertension and cardiovascular diseases [3]. Rural communities located in wetland environments face additional barriers related to health literacy, accessibility of preventive healthcare, routine screening participation, and sustainable community-based health promotion. These conditions contribute to delayed identification of stroke risk factors and increase the likelihood of preventable stroke events [4].

Evidence consistently demonstrates that nearly eighty percent of stroke cases are preventable through effective modification of behavioral and metabolic risk factors. Early identification of hypertension, elevated blood glucose, dyslipidemia, obesity, and unhealthy lifestyles enables timely intervention before irreversible cerebrovascular damage occurs [5]. Community-based screening programs have become an important public health strategy because they facilitate early risk identification while simultaneously increasing awareness regarding healthy behaviors and adherence to preventive interventions. Community empowerment further strengthens these programs by encouraging individuals to actively participate in maintaining their health and by promoting collective responsibility for disease prevention [6].

Community Health Nursing provides a comprehensive framework for implementing preventive interventions at the community level. This approach emphasizes health promotion, disease prevention, community participation, interprofessional collaboration, and empowerment of local health volunteers to improve population health outcomes. Previous studies have demonstrated that Community Health Nursing interventions significantly improve health literacy, self-management behaviors, blood pressure control, and utilization of preventive health services among populations at risk for non-communicable diseases. Integration of nursing interventions with community participation also enhances the sustainability of health promotion activities because local stakeholders become actively involved in planning, implementation, monitoring, and follow-up. Community-based screening programs led by nurses have shown positive effects in increasing early detection rates of cardiovascular risk factors while strengthening collaboration among primary healthcare providers, local governments, and community organizations [7].

Although numerous community screening initiatives have been implemented, many programs remain focused primarily on clinical assessment without integrating comprehensive health education, community empowerment, and capacity building for local stakeholders [8]. Limited evidence is available regarding community service programs that combine systematic stroke risk screening with Community Health Nursing principles, particularly within rural wetland communities in Indonesia. Sustainable collaboration involving universities, student organizations, village governments, primary healthcare centers, integrated health posts, and community health volunteers remains relatively underreported in the literature. Practical models that simultaneously strengthen community awareness, improve early detection, and establish local capacity for continuous prevention are therefore needed [9].

The Antasan Screening program was developed to address these challenges through a Community Health Nursing–based community empowerment approach in Antasan Senor Ilir Village, South Kalimantan. The program integrates health education, measurement of blood pressure, body mass index, blood glucose, cholesterol, and uric acid levels, assessment of stroke risk factors, individualized health counseling, referral recommendations, and strengthening of community participation through collaboration among nursing students, village government officials, community health volunteers, and the primary healthcare center. Financial support from the Student Organization Capacity Strengthening Program facilitated the implementation of an interdisciplinary community engagement model that emphasizes preventive healthcare and sustainable community participation. This integrated approach is expected not only to identify individuals with previously undetected stroke risk factors but also to improve public awareness and strengthen local capacity for ongoing prevention.

The present community service study was conducted to evaluate the implementation of the Antasan Screening program based on Community Health Nursing in improving community awareness and facilitating the early detection of stroke risk factors in Antasan Senor Ilir Village. The study seeks to answer the following question: How can a Community Health Nursing–based Antasan Screening program enhance community awareness and improve the early detection of modifiable stroke risk factors among rural populations?

2. Materials and Methods

2.1 Study Design and Setting

This community service program employed a community-based participatory intervention using the Community Health Nursing (CHN) approach to improve public awareness and facilitate the early detection of stroke risk factors among rural communities. The intervention integrated health promotion, disease prevention, community empowerment, and interprofessional collaboration to strengthen sustainable stroke prevention efforts at the community level. The program was implemented in Antasan Senor Ilir Village, Martapura Timur District, Banjar Regency, South Kalimantan, Indonesia, from June to July 2026. Antasan Senor Ilir Village was purposively selected because preliminary community assessments conducted by the Nursing Student Association identified a high prevalence of non-communicable disease risk factors, particularly hypertension, obesity, uncontrolled blood glucose, and unhealthy lifestyles. The village also demonstrated limited participation in routine health screening activities despite the availability of community health services.

The intervention was implemented through collaboration among the Nursing Student Association of the Faculty of Medicine and Health Sciences, Universitas Lambung Mangkurat, Martapura Timur Primary Health Center, Antasan Senor Ilir Village Government, Posbindu PTM volunteers, village health cadres, and the Indonesian National Nurses Association of Banjarbaru Branch. Financial support was provided through the 2026 Student Organization Capacity Strengthening Program (PPK Ormawa) funded by the Directorate of Learning and Student Affairs, Ministry of Higher Education, Science, and Technology of Indonesia. The Community Health Nursing framework guided every stage of the intervention, including community assessment, planning, implementation, evaluation, and follow-up activities. Community participation was emphasized throughout the program to strengthen local ownership and ensure sustainability beyond the intervention period.

2.2 Participants and Sampling Technique

The target population comprised adult residents of Antasan Senor Ilir Village who were considered at risk of developing stroke because of age, lifestyle, or existing cardiovascular risk factors. Participants were recruited using a convenience sampling technique through announcements distributed by village authorities, community health volunteers, neighborhood leaders, Posbindu PTM coordinators, and social media platforms managed by the village administration.

The inclusion criteria were: 1) adults aged 18 years or older; 2) permanent residents of Antasan Senor Ilir Village; 3) willingness to participate throughout the screening activities; 4) ability to communicate effectively; 5) provision of written informed consent. The exclusion criteria included: 1) acute medical emergencies requiring immediate referral; 2) severe cognitive impairment preventing questionnaire completion; 3) pregnancy for anthropometric interpretation purposes; 4) incomplete screening records. A total of 100 participants successfully completed all intervention activities, including registration, pre-intervention assessment, health education, comprehensive health screening, individualized counseling, and post-intervention evaluation.

2.3 Educational Materials and Media

Educational materials were developed by nursing lecturers and nursing students based on recommendations from the World Stroke Organization, the American Heart Association, the World Health Organization, and the Indonesian Ministry of Health concerning stroke prevention and cardiovascular risk reduction. The educational

content consisted of: basic concepts of stroke; ischemic and hemorrhagic stroke; burden of stroke globally and nationally; modifiable and non-modifiable stroke risk factors; hypertension prevention and management; diabetes mellitus prevention; cholesterol management; obesity prevention; smoking cessation; healthy dietary practices; physical activity recommendations; medication adherence; recognition of stroke warning signs using the FAST approach; emergency response during stroke onset; importance of routine health screening.

Various educational media were employed to accommodate different learning preferences, including: PowerPoint presentations; printed educational booklets; leaflets; posters; flipcharts; banners; audiovisual presentations; live demonstrations; group discussions; interactive question-and-answer sessions; individualized counseling. Health education was delivered by nursing lecturers and trained nursing students using participatory learning methods that encouraged active community engagement.

2.4 Intervention Procedures

The intervention was conducted through six consecutive stages.

Phase 1: Community Assessment and Planning

A preliminary community assessment was undertaken through meetings with village officials, healthcare professionals, Posbindu PTM volunteers, and community representatives. Existing health problems, available resources, previous screening activities, and community expectations were identified.

Administrative approval was subsequently obtained from relevant stakeholders. Screening equipment was calibrated, educational materials were finalized, intervention schedules were developed, and facilitators received standardized training concerning participant registration, questionnaire administration, anthropometric measurements, biochemical testing, counseling procedures, infection prevention, and data recording.

Phase 2: Community Mobilization

Community mobilization was conducted one week before program implementation. Information regarding the program was disseminated through village meetings, public announcements, social media, printed banners, invitation letters, and direct communication by community health volunteers. Residents meeting the eligibility criteria were invited to participate voluntarily.

Phase 3: Health Education

Upon registration, participants completed baseline questionnaires assessing demographic characteristics, medical history, family history of stroke, smoking behavior, dietary habits, physical activity, and knowledge regarding stroke prevention. Health education sessions were subsequently delivered for approximately 45–60 minutes using interactive lectures, audiovisual presentations, demonstrations, and group discussions. Educational topics emphasized: stroke epidemiology; stroke warning signs; hypertension control; healthy dietary behaviors; regular physical activity; smoking cessation; blood glucose control; cholesterol management; stress management; medication adherence; importance of regular health examinations. Participants actively discussed their personal health conditions and received opportunities to ask questions throughout the educational session.



Figure 1. Biochemical examination of random blood glucose, total cholesterol, and uric acid using capillary blood samples

Phase 4: Comprehensive Stroke Risk Screening

Following health education, comprehensive health screening was performed by trained nursing students under direct supervision of nursing lecturers and healthcare professionals.

The screening included: 1) Blood pressure measurement; 2) Blood pressure was measured using a validated automatic digital sphygmomanometer after participants rested for at least five minutes in a seated position. Two measurements were obtained, and the average value was recorded; 3) Anthropometric assessment, body weight was measured using a calibrated digital weighing scale, whereas height was measured using a portable stadiometer. Body mass index was subsequently calculated; 4) Biochemical examination, capillary blood samples were collected using aseptic techniques for measurement of: random blood glucose; total cholesterol; uric acid. Point-of-care testing devices were calibrated before use according to manufacturer recommendations; 5) Lifestyle assessment. Participants completed structured questionnaires concerning: smoking history; alcohol consumption; dietary habits; physical activity; previous diagnosis of hypertension; diabetes mellitus; dyslipidemia; medication adherence; family history of stroke.



Figure 2. Blood pressure assessment using a digital sphygmomanometer

Phase 5: Individual Counseling and Referral

Immediately after screening, each participant received individualized counseling based on personal screening results. Participants identified with abnormal findings were informed regarding: identified risk factors; interpretation of examination results; recommended lifestyle modifications; dietary recommendations; physical activity plans; blood pressure monitoring; medication adherence; smoking cessation. Participants requiring further evaluation were referred to Martapura Timur Primary Health Center for comprehensive medical assessment.

Phase 6: Community Empowerment and Follow-up

Village health volunteers and Posbindu PTM cadres received guidance regarding continued monitoring of high-risk residents. Follow-up activities included routine blood pressure monitoring, periodic health education, encouragement of healthy lifestyles, and referral monitoring through collaboration between community health volunteers and primary healthcare professionals.

2.4 Research Instrument

Several standardized instruments were used throughout the intervention. Sociodemographic information was collected using structured questionnaires developed by the research team. Community awareness regarding stroke prevention was measured using a structured questionnaire consisting of items evaluating knowledge of: stroke definition; warning signs; risk factors; healthy lifestyle; emergency response; prevention strategies; routine health screening. Physical examination instruments included; Omron Digital Blood Pressure Monitor; Digital Weight Scale; Portable Stadiometer; EasyTouch Blood Glucose Meter; EasyTouch Cholesterol Meter; EasyTouch Uric Acid Meter All instruments were calibrated before data collection.

2.6 Data Collection Procedure

Data collection followed standardized operating procedures: 1) Participants first completed informed consent before registration; 2) Baseline demographic information and lifestyle characteristics were subsequently recorded; 3) Pre-test questionnaires were administered before health education; 4) Health education sessions

were conducted; 5) Comprehensive health screening was subsequently performed. 6) Post-test questionnaires were administered immediately after counseling. All completed forms were reviewed daily by supervisors to minimize missing data and recording errors.

2.7 Data Analysis

The collected data were tabulated and analyzed quantitatively using descriptive and inferential statistical Data were entered into Microsoft Excel before statistical analysis using IBM SPSS Statistics version 27. Data cleaning included verification of completeness, consistency, duplicate entries, and outlier detection. Descriptive statistics summarized participant characteristics. Continuous variables were expressed as mean $\pm$ standard deviation; median and interquartile range. Categorical variables were presented as: frequency; percentage. Changes in awareness scores before and after health education were analyzed using the paired sample t-test when normally distributed or the Wilcoxon signed-rank test for non-normal data. The prevalence of stroke risk factors, including hypertension, obesity, diabetes mellitus, hypercholesterolemia, hyperuricemia, smoking behavior, and physical inactivity, was calculated descriptively. Statistical significance was established at $p < 0.05$.

2.8 Ethical Considerations

This community service program adhered to the ethical principles of autonomy, beneficence, non-maleficence, justice, confidentiality, and respect for human dignity. Participation was entirely voluntary. Written informed consent was obtained before participation. Participants were informed regarding the objectives, procedures, potential benefits, possible discomfort during capillary blood collection, confidentiality measures, and their right to withdraw at any time without consequences. Participant identities were anonymized using unique identification codes. Screening results were stored securely and were accessible only to the research team. Participants with abnormal blood pressure, blood glucose, cholesterol, or uric acid levels received immediate counseling and referral to Martapura Timur Primary Health Center for further clinical evaluation and management. The intervention was implemented under the supervision of nursing lecturers and healthcare professionals to ensure participant safety and adherence to ethical standards.

3. Results and Discussion

A total of 100 community members from Antasan Senior Ilir Village participated in all stages of the Community Health Nursing-based Antasan Screening program, including registration, baseline assessment, health education, comprehensive health screening, individualized counseling, and post-intervention evaluation. No participants withdrew during the intervention.

3.1 Participant Characteristics

The majority of participants were female (62.0%), with a mean age of 51.8 ± 13.7 years. Approximately 58% had completed elementary or junior high school, while most participants were farmers, housewives, or informal workers. Nearly half of the participants (47%) reported a previous diagnosis of hypertension, whereas 18% had previously been diagnosed with diabetes mellitus.

Table 1. Sociodemographic Characteristics of Participants (n = 100)

Characteristics	n	%
Female	62	62.0
Male	38	38.0
Elementary/Junior High School	58	58.0
Senior High School	31	31.0
College	11	11.0
Hypertension history	47	47.0
Diabetes history	18	18.0
Current smoker	26	26.0

3.2 Community Awareness Before and After Health Education

Community awareness regarding stroke prevention increased significantly following the educational intervention. The mean awareness score improved from 56.4 ± 11.8 before the intervention to 86.9 ± 8.2 after health education. A paired-sample t-test demonstrated a statistically significant improvement ($p < 0.001$), indicating that the Community Health Nursing-based educational approach effectively enhanced participants' understanding of stroke prevention.

Table 2. Changes in Community Awareness Scores

Variable	Pre-test	Post-test	p-value
Awareness Score	56.4 ± 11.8	86.9 ± 8.2	<0.001

3.3 Distribution of Stroke Risk Factors

Comprehensive health screening identified a considerable burden of modifiable stroke risk factors within the community. Hypertension was identified in 42% of participants, obesity in 36%, elevated cholesterol levels in 38%, hyperglycemia in 21%, hyperuricemia in 29%, physical inactivity in 44%, and current smoking in 26% of participants.

Table 3. Prevalence of Stroke Risk Factors

Risk Factors	n	%
Hypertension	42	42.0
Obesity	36	36.0
Hypercholesterolemia	38	38.0
Hyperglycemia	21	21.0
Hyperuricemia	29	29.0
Physical inactivity	44	44.0
Smoking	26	26.0

3.4 Individual Counseling and Referral

Following screening, 61 participants presented with at least one abnormal clinical finding requiring lifestyle modification counseling. Among them, 28 participants met referral criteria and were advised to undergo further examination at the Martapura Timur Primary Health Center. Village health volunteers subsequently initiated follow-up monitoring through routine blood pressure assessment and health promotion activities coordinated with community health nurses.

3.5 Community Empowerment Outcomes

The intervention successfully strengthened community participation through collaboration among nursing students, village government, health volunteers, and primary healthcare providers. Five Posbindu PTM volunteers completed additional guidance on stroke prevention and were assigned to continue routine monitoring of high-risk individuals. Community members demonstrated active participation during educational sessions, interactive discussions, and individual counseling, indicating high acceptance of the Community Health Nursing approach. Overall, the Antasan Screening program achieved its primary objectives of increasing public awareness and facilitating early detection of modifiable stroke risk factors within the community.

4. Discussion

This community-based intervention demonstrated that the Community Health Nursing approach effectively improved public awareness regarding stroke prevention while simultaneously identifying a substantial proportion of residents with previously undetected modifiable stroke risk factors [10]. The significant increase in awareness scores following health education indicates that participatory educational strategies remain an effective method for improving health literacy among rural populations. Interactive learning methods, individualized counseling, and direct engagement with community members likely contributed to the observed improvement. These findings are consistent with previous studies reporting that community-based nursing interventions enhance knowledge, encourage healthier behaviors, and increase participation in preventive healthcare services. The screening component also revealed that hypertension remained the most prevalent risk factor among participants, followed by hypercholesterolemia, obesity, and physical inactivity. These findings reflect the persistent burden of cardiovascular risk factors commonly reported in low- and middle-income countries, where preventive health services remain underutilized. Early identification of these conditions enables timely referral and lifestyle modification before cerebrovascular complications occur [11].

An important strength of the Antasan Screening program was the integration of health education with immediate clinical screening and individualized counseling. Rather than providing education alone, participants received personalized explanations of their clinical results and practical recommendations for risk reduction. This integrated approach may increase participants' motivation to adopt healthier behaviors because the educational messages were directly related to their own health status [6]. Another notable finding was the active involvement of village health volunteers and local stakeholders throughout program implementation. Community empowerment represents one of the core principles of Community Health Nursing and contributes to program sustainability beyond the intervention period. By strengthening the capacity of Posbindu PTM volunteers to conduct routine monitoring and health promotion activities, the program established an important foundation for continuous community-based stroke prevention [12].

Interprofessional collaboration also played a significant role in the success of the intervention. The partnership among nursing students, academic supervisors, village authorities, community health volunteers, and primary healthcare professionals facilitated efficient implementation of screening activities while improving community trust. Such collaboration has been widely recognized as an essential component of successful community health programs, particularly in rural settings where healthcare resources are limited. Despite these positive findings, several limitations should be acknowledged. First, the intervention was conducted in a single village using convenience sampling, which may limit generalizability to other populations. Second, post-intervention evaluation was performed immediately after health education, preventing assessment of long-term behavioral changes. Third, biochemical measurements were based on point-of-care testing rather than laboratory confirmation, although calibrated devices were used according to standardized procedures [10].

Future community service programs should incorporate longer follow-up periods to evaluate sustained lifestyle modification, blood pressure control, and reductions in stroke incidence. Expanding the Community Health Nursing model to other rural communities and integrating digital monitoring systems may further strengthen the continuity and effectiveness of community-based stroke prevention initiatives. Overall, the findings suggest that the Community Health Nursing-based Antasan Screening program represents a feasible, acceptable, and sustainable strategy for improving community awareness and facilitating early detection of stroke risk factors in rural Indonesian communities. The integration of health education, comprehensive screening, individualized counseling, and community empowerment offers a practical model for strengthening primary prevention of stroke at the community level [13].

4. Conclusion

The effectiveness of the anti-bullying psychoeducation program at MAN 1 Banjarmasin may be attributed to This Community Health Nursing-based Antasan Screening program successfully enhanced community awareness regarding stroke prevention while facilitating the early identification of modifiable stroke risk factors among rural residents in Antasan Senor Ilir Village. Significant improvements were observed in participants' knowledge of stroke warning signs, risk factors, healthy lifestyles, emergency responses, and the importance of routine health screening following the educational intervention. Comprehensive community screening also identified a substantial proportion of participants with hypertension, obesity, hypercholesterolemia, hyperuricemia, unhealthy dietary habits, and physical inactivity, emphasizing the continued need for community-based preventive strategies. The integration of health education, comprehensive risk assessment, individualized counseling, referral mechanisms, and community empowerment within the Community Health Nursing framework demonstrated the feasibility of implementing sustainable stroke prevention initiatives in rural settings.

Furthermore, active collaboration among nursing students, community health volunteers, village authorities, and primary healthcare professionals strengthened local capacity for continuous health promotion and early detection activities. This collaborative model may serve as a practical and replicable approach for strengthening primary prevention of stroke and other non-communicable diseases in similar resource-limited communities. Future programs should incorporate longer follow-up periods to evaluate sustained behavioral changes and long-term clinical outcomes following community-based interventions.

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