



Beyond BMI in Community Health Promotion: An Integrated Anthropometric, Physiological, and Functional Screening Approach among Urban Women in East Jakarta, Indonesia

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Abstract

Background: Community-based preventive screening is important for reducing non-communicable disease risk among adult women, particularly those who influence household health practices. However, screening activities frequently emphasize Body Mass Index (BMI), although BMI alone may not adequately describe central adiposity, elevated blood pressure, and functional health indicators. This community service article aimed to describe the implementation of health education and integrated screening involving anthropometric, physiological, and functional measurements among female guardians at Yayasan Tarbiyatul Yatim, East Jakarta, Indonesia.

Aims: This study aimed to (1) implement a community-based health education and screening program for adult female participants, (2) assess anthropometric, physiological, and functional health indicators including blood pressure, BMI, waist circumference, and hand grip strength, and (3) identify the prevalence of potential cardiometabolic and functional risk markers beyond BMI.

Methods: This activity was implemented on January 8, 2026 using a preventive-promotive community service framework with descriptive program evaluation. Thirty-two adult female participants joined health education, screening, and individual consultation. The community service dataset included blood pressure, pulse, oxygen saturation, body temperature, body weight, height, BMI, waist circumference, hand grip strength, health history, lifestyle profile, and current complaints. Data were analyzed descriptively using frequency, percentage, mean, median, standard deviation, and range.

Result: The participants had a mean age of 49.8 years. Mean systolic and diastolic blood pressure were 129.2 mmHg and 78.8 mmHg, respectively. Mean BMI was 24.9 kg/m²; 16/32 participants (50.0%) were categorized as normal, 9/32 (28.1%) overweight, 4/32 (12.5%) obese, and 3/32 (9.4%) underweight. Mean waist circumference was 97.7 cm, and 29/32 participants (90.6%) had waist circumference >80 cm. Mean hand grip strength was 16.5 kg, and 21/32 participants (65.6%) had values <18 kg.

Conclusion: Integrated screening beyond BMI is feasible in community service settings and can help identify potential cardiometabolic and functional risk indicators that require counseling or referral. Future activities should include documented repeat measurements for abnormal findings, structured pretest-posttest educational evaluation, biochemical testing, and referral follow-up.

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INTRODUCTION

Non-communicable diseases (NCDs) remain a major public health problem because cardiovascular disease, type 2 diabetes mellitus, hypertension, and obesity are strongly associated with modifiable lifestyle factors such as diet, physical inactivity, and behavioral patterns (Rusyda, 2025; Ahmed & Mohammed, 2025). These conditions often develop gradually and remain undetected until complications arise, which makes early identification through screening particularly important (Budreviciute et al., 2020). Community-based health promotion and early screening are therefore essential preventive strategies, especially in urban populations where sedentary lifestyles, dietary transitions, and limited access to routine health monitoring may increase risk (Solanke et al., 2026; Wei et al., 2024). Strengthening community-level interventions is thus critical to support early detection and risk reduction before clinical disease develops (Maharani, 2022; Sujarwoto et al., 2020; World Health Organization, 2024).

Women and mothers are a strategic target group for community service because they often influence household food choices, caregiving practices, health service use, and daily physical activity patterns (Colozza, 2021; Yamada et al., 2020). For this reason, providing accessible health education and individualized interpretation of screening results to female guardians may support broader family-level preventive behavior, although this activity did not measure knowledge or behavioral change using a formal instrument (Lailan et al., 2026).

Yayasan Tarbiyatul Yatim in Cililitan, East Jakarta, was selected as the community partner because it provides a structured social-educational setting with direct access to female guardians of students. During preliminary coordination, the partner expressed the need for practical health information and accessible screening activities for guardians. No previous record of comprehensive screening that combined BMI, waist circumference, and hand grip strength was available from the partner. The PKM dataset later showed that the target group had relevant preventive health needs: 17 participants (53.1%) reported at least one prior disease history, 13 participants (40.6%) consumed sweet drinks daily, 11 participants (34.4%) consumed high-sugar, high-fat, or fried foods daily, 8 participants (25.0%) did not routinely exercise, and 15 participants (46.9%) lived in rented housing. These circumstances supported the need for accessible education, screening, and individualized interpretation of results in this community setting.

Standard community screening often emphasizes body weight or BMI. BMI is useful for broad classification, but it does not directly reflect abdominal fat accumulation, fat distribution, blood pressure status, or muscle function (Chakaroun et al., 2026; Sweatt et al., 2024). This limitation is relevant because adults with normal or near-normal BMI may still have elevated waist circumference, high blood pressure, or low muscle strength. For Indonesian women, waist circumference greater than 80 cm is commonly used as a central obesity indicator (Alberti et al., 2009; Ministry of Health Republic of Indonesia, 2024). Evidence from Indonesian and international studies also supports the use of waist circumference as a practical complementary indicator to BMI (Ross et al., 2020; Sartika et al., 2025; Sigit et al., 2024).

Hand grip strength was added because it is a simple, low-cost, and non-invasive indicator of muscle function. Although this activity was not designed to diagnose sarcopenia, low hand grip strength may identify participants who need counseling on physical activity, functional health maintenance, and adequate nutrition. Thresholds around <18 kg for women are commonly discussed in sarcopenia screening literature (Chen et al., 2020; Won, 2023; Soares et al., 2023).

The contribution of this activity is not the creation of a completely new screening model, but the practical adaptation and integration of existing screening approaches into one feasible community service workflow. The activity combined health education, basic physiological screening, anthropometric assessment beyond BMI, hand grip strength measurement, individual consultation, and referral advice when abnormal findings were identified. This article aims to describe the implementation, findings, and practical implications of this integrated community screening activity among female guardians in East Jakarta.

METHOD

This study was a preventive-promotive community service activity with a descriptive program evaluation design. The purpose was to describe the implementation of a community-based health education and integrated screening program, including participant characteristics, screening results, consultation process, and immediate service outputs. The activity was not designed as a clinical diagnostic study, intervention trial, or analytical observational research. As no validated instruments for knowledge or behavior change were applied, the study does not assess changes in awareness, knowledge, or behavior.

The activity was conducted on January 8, 2026, at Yayasan Tarbiyatul Yatim, East Jakarta, Indonesia. Participants were female guardians of students aged 18 years and older who were willing to participate and able to follow the full program. A total of 32 participants were enrolled after informed consent. Exclusion criteria applied only to hand grip strength measurement in cases of upper-limb injury, pain, or conditions affecting measurement validity or safety.

The implementing team consisted of academic staff and health professionals from Universitas Pembangunan Nasional "Veteran" Jakarta and Universitas Pamulang, with interdisciplinary expertise in medicine, biomedical sciences, physical education, and health promotion.

Data collection included demographic information, vital signs, anthropometric measures, and functional assessment. Blood pressure, oxygen saturation, and body temperature were measured using standard digital devices, while body weight, height, BMI, and waist circumference were assessed using standardized anthropometric procedures. BMI was categorized based on WHO adult cut-offs, and waist circumference >80 cm was used as a risk indicator for central obesity in women. Hand grip strength was measured using a dynamometer in a standardized seated position, with three trials recorded and the highest value used for analysis. A value <18 kg was used as a practical indicator of low muscle strength, acknowledging that this was not intended for clinical diagnosis.

The activity was conducted in three phases: preparation, implementation, and post-activity processing. Preparation involved coordination with the partner institution and development of educational materials on non-communicable disease prevention, nutrition, physical activity, and lifestyle modification. The implementation phase included health education, followed by sequential screening and individual consultation, where participants received immediate feedback and lifestyle recommendations. The post-activity phase involved data compilation, descriptive analysis, and reporting of program outputs.

Educational evaluation was based on process indicators such as participation, completion of screening and consultation, and counseling needs identified from participant history and responses. No pretest-posttest analysis was conducted due to incomplete data. Data were analyzed descriptively using frequencies, percentages, means, and standard deviations. No inferential statistical testing was performed because the study focused on program description rather than hypothesis testing. The study was limited to a single site with a small sample size and lacked biochemical assessments, repeated measurements, calibration documentation, and follow-up data. Therefore, findings should be interpreted as community-based risk screening indicators rather than clinical diagnoses.

RESULTS AND DISCUSSION

Results

Participant Characteristics

The activity was attended by 32 participants, all of whom were female guardians of students at Yayasan Tarbiyatul Yatim. The mean age was 49.8 years (median 46.0; SD 12.0; range 29–75 years). Most participants were housewives (30/32; 93.8%), had an education level of senior high school or lower (31/32; 96.9%), were married (19/32; 59.4%) or widowed (13/32; 40.6%), and nearly half lived in rented housing (15/32; 46.9%) (Table 1).

Table 1. Demographic Characteristics of Participants

Parameter	Result
Total participants	32 participants
Female participants	32 participants (100.0%)

Parameter	Result
Male participants	0 participants (0.0%)
Age	Mean 49.8 years; median 46.0; SD 12.0; range 29-75 years
Main occupation	Housewife: 30/32 (93.8%)
Education profile	Senior high school or lower: 31/32 (96.9%)
Marital status	Married: 19/32 (59.4%); widowed: 13/32 (40.6%)
Housing	Rented housing: 15/32 (46.9%)

Health Screening Results

The screening results showed variation in physiological, anthropometric, and functional indicators. Mean systolic blood pressure was 129.2 mmHg (median 129.0 mmHg; SD 22.7; range 99–201 mmHg), while mean diastolic blood pressure was 78.8 mmHg (median 78.5 mmHg; SD 10.2; range 59–102 mmHg). Mean oxygen saturation was 96.7% (median 97.0%; SD 2.8; range 86–99%), and mean body temperature was 36.5°C (median 36.6°C; SD 0.4; range 35.6–37.1°C). Mean body weight was 58.4 kg (median 57.5 kg; SD 11.0; range 35.5–81.3 kg), mean body mass index (BMI) was 24.9 kg/m² (median 23.8 kg/m²; SD 5.0; range 15.3–41.5 kg/m²), mean waist circumference was 97.7 cm (median 97.5 cm; SD 10.3; range 77–124 cm), and mean hand grip strength was 16.5 kg (median 16.9 kg; SD 6.3; range 5.2–28.9 kg).

One participant had a systolic blood pressure of 201/97 mmHg and reported a history of hypertension with irregular antihypertensive medication use. Another participant had a blood pressure of 166/102 mmHg and reported hypertension accompanied by dizziness. The lowest recorded oxygen saturation was 86% in one participant who had no documented acute complaints and a body temperature of 36.6°C.

Table 2. Health Screening Results of Participants

Health Parameter	Mean	Median	SD	Range	Key Finding
Systolic blood pressure	129.2 mmHg	129.0	22.7	99–201	Highest recorded value: 201 mmHg
Diastolic blood pressure	78.8 mmHg	78.5	10.2	59–102	Highest recorded value: 102 mmHg
Oxygen saturation	96.7%	97.0	2.8	86–99	Lowest recorded value: 86%
Body temperature	36.5°C	36.6	0.4	35.6–37.1	No value ≥38°C
Body weight	58.4 kg	57.5	11.0	35.5–81.3	—
BMI	24.9 kg/m ²	23.8	5.0	15.3–41.5	16 participants classified as normal
Waist circumference	97.7 cm	97.5	10.3	77–124	29 participants >80 cm
Hand grip strength	16.5 kg	16.9	6.3	5.2–28.9	21 participants <18 kg

BMI Distribution

BMI classification showed that 16 participants (50.0%) were classified as normal, 9 participants (28.1%) as overweight, 4 participants (12.5%) as obese, and 3 participants (9.4%) as underweight (Table 3). The corresponding waist circumference measurements showed that 29 participants (90.6%) had values >80 cm.

Table 3. BMI Classification of Participants

BMI Category	Cut-off	Frequency	Percentage
Underweight	<18.5 kg/m ²	3	9.4%
Normal	18.5–24.9 kg/m ²	16	50.0%
Overweight	25.0–29.9 kg/m ²	9	28.1%
Obese	≥30.0 kg/m ²	4	12.5%

Discussion

Interpretation of Blood Pressure, Oxygen Saturation, and Temperature

Mean blood pressure was 129.2/78.8 mmHg, although 8 of 32 participants (25.0%) had systolic blood pressure ≥140 mmHg and/or diastolic blood pressure ≥90 mmHg. The highest systolic and diastolic readings were 201/97 mmHg and 166/102 mmHg, respectively. These

findings indicate that while the overall blood pressure profile was close to the upper-normal range, a substantial proportion of participants had elevated blood pressure requiring further attention. Although this community service activity was not intended to establish clinical diagnoses, elevated blood pressure is a well-recognized risk factor for cardiovascular disease and is frequently undetected in community settings. Therefore, participants with abnormal readings were advised to receive individualized counseling, repeat blood pressure measurement when feasible, and further evaluation at a healthcare facility, consistent with current recommendations for hypertension screening (Mills et al., 2020; Sujarwoto et al., 2020).

Mean oxygen saturation was 96.7%, with four participants (12.5%) having SpO₂ values below 95% and one participant (3.1%) recording a value below 90%. The lowest oxygen saturation value (86%) was observed in a participant without documented acute complaints or fever, while body temperature ranged from 35.6°C to 37.1°C and no participant had a recorded temperature ≥38°C. These findings suggest that isolated low oxygen saturation values identified during community screening should be interpreted cautiously, particularly in the absence of compatible clinical symptoms, as technical factors such as sensor placement or peripheral perfusion may influence pulse oximetry measurements. Accordingly, future community screening programs should include repeat measurements to confirm abnormal findings before referral decisions are made.

Interpretation of BMI and Waist Circumference

Although 16 of 32 participants (50.0%) were classified as having a normal BMI, waist circumference exceeded 80 cm in 29 participants (90.6%), with a mean waist circumference of 97.7 cm. These findings indicate that BMI alone may underestimate central obesity among adult women in this community setting. While BMI provides a useful measure of overall body mass, it does not distinguish fat distribution, and individuals with a normal BMI may still have excessive abdominal adiposity, which is more strongly associated with cardiometabolic risk than overall body weight (Ross et al., 2020; Sigit et al., 2024).

The discrepancy between BMI classification and waist circumference observed in this study is consistent with previous evidence suggesting that waist circumference provides complementary information beyond BMI for identifying individuals at increased risk of hypertension, type 2 diabetes, and other cardiometabolic disorders, particularly among Asian populations (Sun et al., 2021; Ross et al., 2020; Sartika et al., 2025). Therefore, normal BMI should not automatically be interpreted as the absence of health risk when waist circumference or other screening indicators, such as blood pressure and hand grip strength, are abnormal. From a practical perspective, incorporating waist circumference into routine community-based health screening is highly feasible because the measurement is inexpensive, non-invasive, easy to perform, and provides valuable information for individualized counseling and early risk identification (Zafar et al., 2023; Gomwe et al., 2026).

Interpretation of Hand Grip Strength

Mean hand grip strength was 16.5 kg (median 16.9 kg; SD 6.3; range 5.2–28.9 kg), and 21 of 32 participants (65.6%) had hand grip strength values below 18 kg. Although this community service activity was not intended to diagnose sarcopenia, the high proportion of participants with low hand grip strength suggests the presence of potential functional limitations that warrant further attention. Hand grip strength is widely recognized as a simple, low-cost, and reliable indicator of muscle function and overall physical performance, making it suitable for community-based health screening (Chen et al., 2020; Won, 2023).

The findings of this activity indicate that functional assessment may complement anthropometric measurements in identifying individuals who could benefit from early lifestyle interventions. While BMI and waist circumference primarily reflect body composition and central adiposity, hand grip strength provides additional information on muscle function that cannot be captured by anthropometric indicators alone. Therefore, participants with low hand grip strength were prioritized for individualized counseling on safe strengthening exercises, regular physical activity, and adequate nutritional intake, with recommendations for further clinical evaluation if functional impairment was suspected. Incorporating hand grip strength into integrated community

screening may enhance the identification of individuals at risk of functional decline and support more comprehensive preventive health promotion (Ahn et al., 2019; Kim et al., 2025).

Educational Process, Participant Response, and Community Reception

The educational component of this community service activity addressed key topics related to healthy lifestyles, including balanced nutrition, regular physical activity, stress management, adequate rest, blood pressure monitoring, obesity prevention, and chronic disease risk factors. Following the education session, each participant received individualized counseling based on their physiological, anthropometric, and functional screening results. This integrated approach enabled participants to relate general health information to their own health profiles, thereby supporting more personalized health education and counseling.

All 32 participants completed both the health screening and individualized consultation sessions, demonstrating the feasibility and acceptability of the integrated screening approach within the community setting. During the consultation process, counseling was tailored to each participant's screening findings and lifestyle profile, including blood pressure control, medication adherence, central obesity despite normal BMI, dietary habits, physical activity, muscle strength, joint pain, fatigue, and sleep-related concerns. However, because no validated pre-test, post-test, or participant satisfaction questionnaire was administered, this activity cannot demonstrate measurable improvements in health knowledge, attitudes, or behavioral outcomes. Consequently, the educational component should be interpreted as a successfully implemented health promotion activity rather than an intervention with quantified educational effectiveness.

The community partner actively supported the implementation of the program by facilitating participant recruitment, venue preparation, and coordination throughout the activity. All registered participants completed the screening and counseling process, indicating good operational participation and program feasibility. Nevertheless, because community satisfaction was not assessed using a standardized evaluation instrument, community reception is reported based on successful implementation and participant engagement rather than on quantitative satisfaction outcomes.

Adapted Integrated Screening Framework

The findings of this community service activity support the use of an adapted integrated screening framework that combines physiological, anthropometric, and functional assessments with individualized health education and counseling (Figure 1). The framework consists of four complementary components: (1) basic physiological screening, (2) anthropometric assessment beyond BMI, (3) functional assessment using hand grip strength, and (4) individualized education and consultation based on each participant's screening profile.

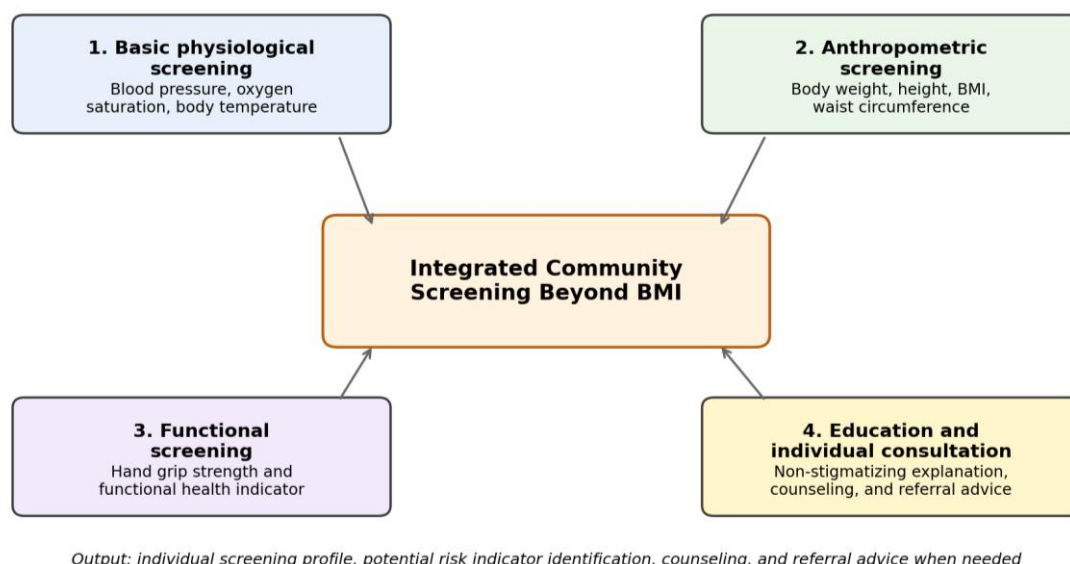


Figure 1. Adapted integrated community screening framework beyond BMI.

The proposed framework emphasizes a more comprehensive approach to community health screening by integrating multiple low-cost and practical assessment methods rather than relying solely on BMI. In this activity, the combined use of blood pressure, waist circumference, and hand grip strength provided additional information that supported individualized counseling and the identification of participants who might otherwise have been overlooked if BMI had been used as the only screening indicator. Although the framework is not intended to replace clinical assessment or establish medical diagnoses, it offers a practical strategy for strengthening early identification of potential health risks and facilitating appropriate referral within community-based health promotion programs.

Implications

The findings of this community service activity have several practical implications for community-based health promotion. First, the results demonstrate that relying solely on BMI may overlook individuals with central obesity and reduced muscle strength who could benefit from early lifestyle intervention. Incorporating waist circumference and hand grip strength into routine community screening provides complementary information that supports more comprehensive assessment of cardiometabolic and functional health risks.

Second, the integrated screening approach was feasible to implement using simple, low-cost equipment and was successfully completed by all participants. This suggests that combining physiological, anthropometric, and functional assessments with individualized counseling can be incorporated into existing community health promotion activities without requiring sophisticated resources ([Delaire et al., 2023](#); [Mehta et al., 2025](#); [Zhang, 2025](#)). Such an approach may strengthen early risk identification, facilitate personalized health education, and support timely referral of individuals with abnormal findings to primary healthcare services.

Research contribution

This article contributes to the community health promotion literature by demonstrating the practical application of an integrated community-based screening approach that extends beyond conventional BMI assessment. Rather than focusing solely on anthropometric measurements, the program combined physiological assessment, waist circumference measurement, functional evaluation using hand grip strength, and individualized health counseling within a single community service activity.

In addition, the adapted integrated screening framework proposed in this study provides a practical reference for designing future community-based health promotion programs. Although the framework is not intended as a diagnostic model, it illustrates how multiple simple screening components can be integrated to support early identification of potential health risks and individualized preventive interventions in resource-limited community settings.

Limitations

Several limitations should be acknowledged when interpreting the findings of this community service activity. First, the program involved only 32 participants from a single community partner; therefore, the findings cannot be generalized to broader populations of women in East Jakarta or Indonesia. Second, biochemical assessments, including fasting blood glucose, lipid profile, HbA1c, kidney function, uric acid, and inflammatory markers, were not performed. Consequently, the screening results should be interpreted as indicators of potential cardiometabolic risk rather than confirmed clinical conditions.

Third, the educational component was not evaluated using validated pre-test, post-test, or participant satisfaction instruments, and no follow-up assessment of behavioral change was conducted. As a result, the effectiveness of the educational intervention in improving health knowledge, attitudes, or lifestyle behaviors could not be quantitatively assessed. Fourth, long-term follow-up and referral outcomes were not monitored, making it impossible to determine whether participants sought further medical evaluation or adopted the recommended lifestyle modifications. Finally, detailed documentation of device specifications, calibration records, and

repeated measurements for abnormal blood pressure or oxygen saturation values was unavailable, which may have affected the consistency and verification of several physiological measurements.

Suggestions

Future community-based health promotion programs should incorporate validated pre-test and post-test assessments to evaluate educational outcomes, together with standardized participant satisfaction questionnaires and long-term follow-up to assess behavioral changes after counseling. Repeat measurements should be performed for abnormal physiological findings to improve measurement reliability, while complete documentation of device specifications and calibration records should be maintained to strengthen data quality.

Where resources permit, integrating biochemical examinations such as fasting blood glucose, HbA1c, or lipid profile would provide a more comprehensive assessment of cardiometabolic risk. In addition, closer collaboration with primary healthcare facilities is recommended to facilitate referral, follow-up, and continuity of care for participants identified as having potential health risks during community screening activities.

CONCLUSION

The community service program 'Peningkatan Kesadaran Pola Hidup Sehat dan Skrining Kesehatan' at Yayasan Tarbiyatul Yatim, East Jakarta, was implemented by the Faculty of Medicine, Universitas Pembangunan Nasional 'Veteran' Jakarta, in collaboration with the Program Studi Pendidikan Jasmani, Universitas Pamulang. The activity delivered interactive health education, integrated screening, and individual consultation for 32 female participants.

The findings show that BMI alone was insufficient for describing the participants' potential health risk indicators. Although mean BMI was 24.9 kg/m² and 16/32 participants (50.0%) were categorized as having normal BMI, mean waist circumference reached 97.7 cm and 29/32 participants (90.6%) had waist circumference >80 cm. Mean hand grip strength was 16.5 kg, and 21/32 participants (65.6%) had hand grip strength <18 kg. The maximum blood pressure values and the minimum oxygen saturation value also highlighted the importance of repeat measurement, counseling, and referral advice in community screening.

This activity supports the feasibility of adapting an integrated screening approach beyond BMI in community service settings. The approach may help identify potential cardiometabolic and functional risk indicators, provide individualized interpretation, and strengthen preventive health promotion. Future activities should include biochemical measurements, pretest-posttest educational evaluation, complete descriptive statistics from raw data, and structured follow-up with primary health care facilities.

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AUTHOR CONTRIBUTION STATEMENT

IB contributed to program coordination, screening preparation, implementation supervision, data interpretation, and manuscript preparation. TFP contributed to health education, clinical interpretation, consultation, and manuscript review. AR contributed to participant coordination, screening implementation, data tabulation, and documentation. AS contributed to health screening, participant assistance, and data organization. BAS contributed to body composition assessment, participant education, and data interpretation. FSR contributed to health education, cardiometabolic risk interpretation, manuscript drafting, and academic refinement. HR contributed

to screening implementation, consultation support, and documentation. MF contributed to clinical consultation, interpretation of screening findings, and recommendation for follow-up. NRG contributed to participant assistance, data recapitulation, and final report preparation. RA contributed to physical activity education, functional screening support, lifestyle counseling, and manuscript review. All authors reviewed and approved the final manuscript.

AI DISCLOSURE STATEMENT

The authors declare that no artificial intelligence (AI)-based tools were used for data collection, data analysis, interpretation of results, or generation of scientific content in this manuscript. All research activities, including study design, implementation of the community service program, data interpretation, and manuscript preparation, were conducted by the authors. If applicable, AI-based language assistance tools were only used for minor language refinement and proofreading purposes. The authors remain fully responsible for the accuracy, originality, integrity, and scientific validity of the manuscript content.

CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest related to the implementation of this community service activity, data collection, analysis, interpretation, or publication of this manuscript. The authors have no financial, institutional, or personal relationships that could have influenced the research process or the presentation of the findings.

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