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Health Screening: Blood Glucose, Blood Pressure, and Body Composition Examination in RT 005 RW IV, Kelurahan Gondoriyo, Ngaliyan, Semarang

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ABSTRACT

Non-communicable diseases (NCDs) such as diabetes mellitus, hypertension, and obesity remain a major public health burden in Indonesia. National data (Riskesdas, 2018) reported a hypertension prevalence of 34.1% among Indonesian adults and a diabetes mellitus prevalence of 10.9% among the population aged 15 years and above, with many cases undetected because these conditions are often asymptomatic in their early stages. This community health screening was carried out on Sunday, 14 June 2026, at Beringin Forest Park, Kelurahan Gondoriyo, Kecamatan Ngaliyan, Semarang, as part of the community service program of the Department of Physics, Universitas Islam Negeri Walisongo Semarang. The activity provided free examination of blood glucose (capillary method), blood pressure (digital tensimeter), and body composition (bioelectrical impedance analysis), together with education on the procedures and individual consultation for participants with abnormal findings. Of 16 participants screened for blood glucose, 81.3% (13 participants) fell within the normal range, while one participant (6.3%) recorded a value in the diabetes range requiring immediate medical evaluation. Of 17 participants screened for blood pressure, only 23.5% (4 participants) had normal blood pressure, whereas 70.6% (12 participants) fell into the Hypertension Stage 1 or Stage 2 category. Mean body fat percentage exceeded normal reference ranges for both female (34.3%, n = 11) and male (24.3%, n = 4) participants. These findings indicate a considerable burden of undetected cardiometabolic risk factors within this community and demonstrate the value of low-cost, university–community screening partnerships for early detection and referral. Given the limitations of single-visit measurement, confirmatory examination by authorized medical personnel is recommended for participants with abnormal results.

Keywords:

Community Health Screening; Blood Glucose; Blood Pressure; Body Composition; Non-Communicable Disease

Introduction

Non-communicable diseases (NCDs), including diabetes mellitus, hypertension, and obesity, represent one of the most significant public health challenges in Indonesia. According to Riskesdas (2018), the prevalence of hypertension among Indonesian adults reached 34.1%, while diabetes mellitus affected 10.9% of the population aged 15 years and older. A substantial proportion of individuals living with these conditions remain undiagnosed, largely because NCDs tend to progress silently, with symptoms often appearing only after complications have developed.

Community-based health screening offers an accessible and low-cost strategy for early detection of NCD risk factors. Through simple examinations of blood glucose, blood pressure, and body composition, individuals at risk can be identified before serious complications occur, allowing timely referral for medical confirmation and lifestyle intervention. Universities, through their community service (pengabdian kepada masyarakat) programs, are well positioned to support this effort by combining scientific instrumentation with direct community outreach.

In this context, the Department of Physics of Universitas Islam Negeri (UIN) Walisongo Semarang, through its Applied Physics research group, conducted a community health screening

activity in RT 005 RW IV, Kelurahan Gondoriyo, Kecamatan Ngaliyan, Semarang, on Sunday, 14 June 2026. The activity offered free examination of blood glucose, blood pressure, and body composition to local residents, accompanied by education on how to interpret the results and individual consultation for participants whose findings indicated possible health risk.

This activity aimed to document and analyze the blood glucose, blood pressure, and body composition examination results of participants; to identify participants at risk of, or suspected of having, diabetes mellitus, hypertension, or body composition abnormalities; and to formulate data-based recommendations for medical follow-up and lifestyle modification.

Methods

This community health screening activity was implemented through three stages: preparation, implementation, and data analysis.

Stage I: Preparation

Prior to implementation, the organizing team coordinated with the management of RT 005 RW IV, Kelurahan Gondoriyo, to arrange the schedule, venue, and participant mobilization. Screening instruments were prepared, comprising a capillary blood glucose test kit, a digital blood pressure monitor (tensimeter), and a bioelectrical impedance body composition analyzer. Resource persons and practitioners were assigned specific roles: resource persons were responsible for delivering education on the examination procedures, while practitioners were responsible for conducting the screening and providing consultation. Consumption for participants and resource persons was funded by the Department of Physics, UIN Walisongo Semarang; the venue and supporting facilities were provided by the management of RT 005 RW IV; and equipment and technical costs were borne by the implementing team.

Stage II: Implementation

The activity was held on Sunday, 14 June 2026, from 07.00 WIB until completion, at Beringin Forest Park, Gondoriyo, Ngaliyan, Semarang. Participants comprised residents of RT 005 RW IV, Kelurahan Gondoriyo; lecturers of the Department of Physics, UIN Walisongo Semarang; and Physics students of UIN Walisongo Semarang. The program followed the schedule summarized in Table 1.

Table 1. Community Health Screening Activity Schedule

Activity	Time (WIB)	Person in Charge
Opening	07.00 – 07.10	Moderator
Remarks from the Chair of RT 005 RW IV	07.10 – 07.20	Chair of RT 005 RW IV
Core session: introduction to blood glucose, blood pressure, and body composition examination	07.20 – 08.00	Irman Said Prastyo, M.Sc.; Heni Sumarti, M.Si.
Free health screening and consultation	08.00 – finish	Qisthi Fariyani, M.Pd.; Sheilla Rully Anggita, M.Sc.

Following the opening and welcoming remarks, the core session introduced participants to the purpose and procedure of each examination, delivered by Irman Said Prastyo, M.Sc. and Heni Sumarti, M.Si. Practitioners Qisthi Fariyani, M.Pd. and Sheilla Rully Anggita, M.Sc. then carried out the free screening, measuring blood glucose, blood pressure, and body composition for participants who registered. Participants whose results indicated possible health risk received individual consultation and were advised on appropriate follow-up action.

Stage III: Data Analysis

Examination results were classified against established clinical reference values, summarized in Table 2. Blood glucose results were classified following the Indonesian Society of Endocrinology guideline (PERKENI, 2021); blood pressure results were classified following the 2017 ACC/AHA guideline (Whelton et al., 2018); and body fat percentage was classified by sex following Gallagher et al. (2000).

Table 2. Clinical Reference Values Used for Classification

Parameter	Classification	Reference Source
Blood glucose – random (mg/dL)	<100 Normal; 100–199 Attention; ≥ 200 Diabetes range	PERKENI (2021); ADA Standards of Care 2023
Blood glucose – fasting (mg/dL)	<100 Normal; 100–125 Prediabetes; ≥ 126 Diabetes	PERKENI (2021)
Blood pressure (mmHg)	Normal <120/<80; Elevated 120–129/<80; Stage 1: 130–139/80–89; Stage 2: $\geq 140/\geq 90$	Whelton et al. (2018), AHA/ACC
Body fat – female (%)	Normal 21–32; High 33–39; Obese ≥ 40	Gallagher et al. (2000)
Body fat – male (%)	Normal 8–20; High 21–25; Obese ≥ 26	Gallagher et al. (2000)
Abdominal fat level	Normal ≤ 9 ; High 10–14; Very high ≥ 15	Device (bioimpedance) reference scale

Two methodological limitations should be noted regarding the analysis. First, the specific type of blood glucose test administered to each participant — random (GDS), fasting (GDP), or 2-hour post-prandial (GD-2PP) — was not recorded during the screening; definitive clinical interpretation of individual glucose values therefore requires confirmation of test type from the screening staff. Second, the cellular age and bone mass values recorded for one participant fell outside physiologically plausible ranges and were excluded from analysis. In addition, consistent with clinical guidance (Whelton et al., 2018), a single measurement is not sufficient to establish a diagnosis of hypertension or diabetes mellitus; at least two to three separate measurements, together with confirmation by authorized medical personnel, are required before a clinical diagnosis can be made.

Results and Discussion

The community health screening activity (Figure 1a) was conducted as planned. A total of 16 participants were screened for blood glucose, 17 for blood pressure, and 15 for body composition; not all participants underwent every examination. Figure 1b show the implementing team with the blood glucose testing equipment used during the screening



Figure 1. (a) Blood pressure measurement during the community health screening activity **(b)** The implementing team with the blood glucose testing equipment used during the screening

Blood Glucose Screening Results

Table 3. Blood Glucose Screening Results (n = 16)

Category	n	%
Normal (<100 mg/dL)	13	81.3
Attention (100–199 mg/dL)	2	12.5
Diabetes range (≥ 200 mg/dL)	1	6.3
Total	16	100.0

Most participants (81.3%) recorded a blood glucose value within the normal range (Table 3). Two participants (12.5%) fell into the attention category, warranting dietary counseling and periodic monitoring. One participant (6.3%) recorded a value in the diabetes range, a finding that requires immediate confirmatory examination by a physician. At the opposite end of the distribution, one participant recorded a markedly low value; if this reading reflected a fasting state, it would warrant caution regarding hypoglycemia and follow-up to confirm the test type and the participant's condition at the time of measurement.

Blood Pressure Screening Results

Table 4. Blood Pressure Screening Results (n = 17)

Category	n	%
Normal (<120/<80 mmHg)	4	23.5
Elevated (120–129/<80 mmHg)	1	5.9
Hypertension Stage 1 (130–139/80–89 mmHg)	10	58.8
Hypertension Stage 2 ($\geq 140/\geq 90$ mmHg)	2	11.8
Total	17	100.0

Blood pressure screening (Table 4) revealed that only 23.5% of participants had normal blood pressure, while the large majority (70.6%) fell into the Hypertension Stage 1 or Stage 2 category, and a further 5.9% were classified as elevated. In total, 76.5% of participants recorded a blood pressure reading above the normal range. Two participants were classified as Hypertension Stage 2 based on their systolic reading; two additional participants were classified as Stage 1 based on systolic pressure but would meet the Stage 2 threshold on the basis of diastolic pressure alone, illustrating the importance of considering both systolic and diastolic components when interpreting results.

Body Composition Screening Results

Table 5. Body Fat Percentage Screening Results by Sex

Sex	n	Mean Body Fat (%)	Normal, n (%)	High, n (%)	Obese, n (%)
Female	11	34.3	4 (36%)	7 (64%)	0 (0%)
Male	4	24.3	1 (25%)	1 (25%)	2 (50%)

Body composition screening (Table 5) showed that mean body fat percentage exceeded the normal reference range for both sexes: 34.3% among female participants (normal range 21–32%) and 24.3% among male participants (normal range 8–20%). Among female participants, 64% fell into the high body fat category; among male participants, 50% were classified as obese by body fat percentage. Several participants also showed a device-estimated cellular age higher than their chronological age, consistent with possible accelerated metabolic aging, although this metric was not the primary focus of the screening and was not available for all participants. Figure 3 show body weight and composition measurement during the screening

Priority Follow-Up Findings

Based on the combination of examination results, participants were grouped into three priority tiers for follow-up; individual participants are not identified by name in this report. The highest-priority tier comprised two participants: one recorded a blood glucose value in the diabetes range together with Stage 2 hypertension, indicating a high combined cardiometabolic risk; the other recorded Stage 2 hypertension together with a borderline glucose value and a very high abdominal fat reading. Immediate referral to a physician or community health center (Puskesmas) was recommended for both. A second-priority tier comprised three participants: two with blood pressure readings classified as Stage 1 by systolic pressure but meeting the Stage 2 threshold by diastolic pressure, for whom physician confirmation was recommended, and one with a markedly low blood glucose reading, for whom

confirmation of test type and nutritional counseling were recommended. A third-priority tier comprised participants with Hypertension Stage 1 readings and participants with high body fat percentage, for whom repeat blood pressure measurement, dietary counseling, and increased physical activity were recommended.



Figure 3. Body weight and composition measurement during the screening

Comparison with National Data

The proportion of participants with above-normal blood pressure in this screening (76.5%) considerably exceeds the national hypertension prevalence reported by Riskesdas (2018) of 34.1%. This gap may partly reflect the nature of the sample: participants were community members who voluntarily attended a free screening event rather than a random population sample, and may include a higher proportion of residents already concerned about their health. Nonetheless, the pattern is consistent with the broader public health concern that hypertension and diabetes mellitus remain substantially underdetected in the general population until symptoms or complications arise (Riskesdas, 2018).

Challenges and Limitations

Several methodological limitations should be considered when interpreting these findings. The type of blood glucose test performed was not recorded for each participant, limiting precise clinical interpretation of individual glucose values. Blood pressure and blood glucose were each measured only once per participant; clinical guidelines recommend at least two to three separate measurements before a diagnosis of hypertension or diabetes mellitus can be established (Whelton et al., 2018). One participant's cellular age and bone mass data were physiologically implausible and were excluded from analysis, highlighting the importance of data verification in future screenings. Finally, as a convenience sample of residents who chose to attend, the results may not be representative of the wider RT 005 RW IV or Kelurahan Gondoriyo population.

Implications for Practice

These findings support several practical recommendations. Participants identified in the highest-priority tier should be referred immediately for physician evaluation of possible diabetes mellitus and hypertension, including screening for related complications. All participants with above-normal blood pressure should undergo repeat measurement on a separate occasion before a hypertension diagnosis is established, consistent with clinical guidelines. Future screening activities should include standardized recording of blood glucose test type (fasting, random, or postprandial) to strengthen the clinical interpretability of results. Participants with high body fat percentage should be encouraged to

seek nutritional counseling and to increase physical activity, in line with general recommendations for reducing cardiometabolic risk. More broadly, this activity demonstrates the value of university–community partnerships in extending low-cost NCD screening to neighborhoods with limited routine access to health checks, and such partnerships could be expanded to other RT/RW units in the surrounding area.

Conclusion

This community health screening activity examined blood glucose, blood pressure, and body composition among residents of RT 005 RW IV, Kelurahan Gondoriyo, Kecamatan Ngaliyan, Semarang. Of 16 participants screened for blood glucose, 81.3% fell within the normal range, while one participant recorded a value in the diabetes range requiring immediate medical evaluation. Of 17 participants screened for blood pressure, only 23.5% had normal blood pressure, while 70.6% fell into the Hypertension Stage 1 or Stage 2 category. One participant recorded a combination of diabetes-range blood glucose and Stage 2 hypertension, representing the highest cardiometabolic risk profile identified in this screening. Mean body fat percentage exceeded normal reference ranges for both female (34.3%) and male (24.3%) participants, and several participants showed a device-estimated cellular age higher than their chronological age.

These results indicate a considerable burden of undetected cardiometabolic risk factors within this community and support the continued value of low-cost, university-led health screening as an early detection strategy. Given the limitations of single-visit measurement and the absence of recorded blood glucose test type, confirmatory examination by authorized medical personnel is recommended for all participants with abnormal findings, particularly those identified in the highest-priority tier. Future activities of this kind should incorporate standardized data recording and, where feasible, be extended to other RT/RW units to broaden the reach of community-based non-communicable disease screening.

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Conflicts of Interest

The authors affirm that they have no conflicts of interest.

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