

Manuscript received April 23, 2026; revised Mei 06, 2026; accepted June 12, 2026; date of publication March 30, 2026.

Digital Object Identifier (DOI): <https://doi.org/10.35882/ficse.v5i1.118>

Copyright © 2026 by the authors. This work is an open-access article and licensed under a Creative Commons Attribution-ShareAlike 4.0 International License ([CC BY-SA 4.0](https://creativecommons.org/licenses/by-sa/4.0/))

How to cite: Juliana Christyaningsih¹, Lully Hani Endarini¹, Suliati¹, Museyaro¹, Musholli Himmatun Nabilah¹, Sri Sulami Endah Astuti¹, Ayu Puspitasari¹, Yuni Ginarsih², Ira Puspita Sari², Ira Rahayu Tiyyar Sari², Mujayanto³, Nuning Marina Pengge³, Nurul Hindaryani³
Frontiers in Community Service and Empowerment, vol. 5, no. 1, pp. 33-44, March 2026.

Community Service for Improving Health Services and Early Detection of Hypertension Complications in the Elderly in Bulak Village, Surabaya

Juliana Christyaningsih¹, Lully Hani Endarini¹, Suliati¹, Museyaro¹, Musholli Himmatun Nabilah¹, Sri Sulami Endah Astuti¹, Ayu Puspitasari¹, Yuni Ginarsih², Ira Puspita Sari², Ira Rahayu Tiyyar Sari², Mujayanto³, Nuning Marina Pengge³, Nurul Hindaryani³

¹Department of Medical Laboratory Technology, Poltekkes Kemenkes Surabaya, Surabaya, Indonesia

²Department of Midwifery, Poltekkes Kemenkes Surabaya, Surabaya, Indonesia

³Department of Nutrition, Poltekkes Kemenkes Surabaya, Surabaya, Indonesia

Corresponding author: Museyaro (museyaro21@gmail.com)

ABSTRACT Hypertension and anemia remain important health concerns among older adults, particularly in community settings where routine screening and health education may be limited. In Bulak Village, Surabaya, inadequate early detection and limited awareness of hypertension and anemia may increase the risk of complications and reduce the quality of life of elderly individuals. This community service activity aimed to improve health awareness and support the early detection of hypertension and anemia among older adults through health education and routine screening of blood pressure, hemoglobin, and hematocrit levels. The activity was conducted among 49 elderly participants aged ≥ 60 years and health cadres in the Bulak Village area of Surabaya. The intervention consisted of educational sessions on hypertension, anemia, and disease prevention, followed by blood pressure measurement and hemoglobin and hematocrit examinations. Participants' knowledge was evaluated using pre-test and post-test questionnaires. The results demonstrated an improvement in knowledge following the educational intervention. The mean score for understanding hypertension and its prevention increased from 65 to 75, while the mean score for understanding anemia and its prevention increased from 65 to 76. Health screening identified 18 participants (36.7%) with grade 1 hypertension, 6 (12.2%) with grade 2 hypertension, and 4 (8.2%) with grade 3 hypertension. Furthermore, 25 participants (51.0%) had low hemoglobin levels, while 33 (67.3%) had low hematocrit levels. These findings indicate that hypertension and hematological abnormalities remain substantial health concerns among the elderly in Bulak Village. Continuous health education, regular screening, and stronger involvement of families, community health cadres, and primary healthcare services are therefore recommended to promote early detection, appropriate management, and healthier lifestyles among older adults.

INDEX TERMS Elderly, Hypertension, Anemia, Hemoglobin, Hematocrit

I. INTRODUCTION

Population ageing is accompanied by an increasing burden of chronic and hematological disorders that require accessible and continuous community-based health services. Older adults are particularly vulnerable to hypertension and anemia because physiological ageing, nutritional deficiencies, chronic diseases, and reduced access to routine health examinations can adversely affect their health status [1]–[4]. Hypertension is a major modifiable risk factor for cardiovascular, cerebrovascular, and renal complications, while anemia can impair oxygen delivery and contribute to fatigue, functional decline, and reduced quality of life [5]–[7]. The problem is particularly relevant in Indonesia, where hypertension remains

common among older adults and self-management can be constrained by inadequate knowledge, limited family support, and difficulties accessing healthcare services [8]. In Bulak Village, Surabaya, these challenges are reflected in the need to strengthen early detection and routine monitoring through community-based elderly health services [9].

Current approaches to hypertension prevention and control emphasize early detection, lifestyle modification, health education, regular blood-pressure monitoring, and appropriate referral within primary healthcare systems [10], [11]. Community health workers and elderly health cadres can facilitate these interventions by providing health education, monitoring, and links to healthcare facilities

[12], [13]. Recent studies have also demonstrated that health-literacy interventions can improve disease understanding, self-management, treatment adherence, and blood-pressure-related outcomes among older adults with hypertension [14]–[16]. In addition, educational approaches using accessible communication media have demonstrated potential for increasing elderly knowledge regarding hypertension [17]. For hematological conditions, hemoglobin and hematocrit measurements provide practical screening indicators that can help identify individuals requiring further clinical assessment [18]–[20]. Therefore, integrating health education with simple screening procedures represents a feasible community-based strategy for identifying health risks among older adults.

However, an important gap remains in the implementation of integrated community-based interventions that simultaneously address health literacy and the early detection of hypertension and hematological abnormalities among elderly populations. Existing studies have frequently examined hypertension education, health literacy, community health-worker interventions, or anemia separately [12], [14]–[16], [21]. Evidence describing the practical implementation of a combined educational and screening activity involving blood pressure, hemoglobin, and hematocrit measurements in an Indonesian elderly community setting remains comparatively limited. Furthermore, community health services require locally appropriate approaches that can be implemented using available resources while involving elderly health cadres, families, and healthcare personnel.

Accordingly, this community service activity aimed to improve health awareness and facilitate early detection of hypertension and anemia among older adults in Bulak Village, Surabaya, through health education and screening of blood pressure, hemoglobin, and hematocrit levels. The activity was designed to address the identified local health-service gap and provide baseline information regarding the health conditions of participating elderly individuals [9].

The contributions of this activity are threefold. First, it integrates health education and multi-parameter screening within a community-based elderly health service. Second, it provides local evidence regarding hypertension, hemoglobin, and hematocrit abnormalities among elderly residents, which can support subsequent preventive and referral strategies. Third, it demonstrates a collaborative model involving healthcare professionals, students, elderly health cadres, and the community to strengthen early detection and health awareness. Such an approach is consistent with current recommendations emphasizing primary healthcare, community participation, and improved detection and control of hypertension [10], [11], [22].

The remainder of this article is organized as follows. Section II describes the methods and implementation stages of the community service activity. Section III presents the results of health education, blood-pressure assessment, and hemoglobin and hematocrit screening, followed by interpretation of the findings. Section IV concludes the article by summarizing the principal findings and providing recommendations for strengthening

continuous health education, routine screening, and community-based elderly health services.

II. METHODS

A. STUDY DESIGN AND SETTING

This study was conducted as a community-based health service activity using a non-randomized, one-group pre–post evaluation design for the educational component, combined with descriptive health screening. The activity was implemented on July 28, 2025, in the Bulak Village area of Surabaya, Indonesia. The intervention was designed to provide health education and facilitate early identification of hypertension and hematological abnormalities among older adults. The methodological structure followed the principles of transparent reporting for observational and community-based health activities, with the study procedures, target population, intervention, measurements, and evaluation clearly specified [23], [24]. The activity was prospective in implementation because participant education and health screening were performed directly during the scheduled community service event. No retrospective medical-record review was conducted, and no random allocation of participants was performed.

B. PARTICIPANTS AND TARGET POPULATION

The target population comprised older adults aged ≥ 60 years and health cadres residing or working within the Bulak Village community-health service area. A total of 49 elderly participants were included in the reported community service activity. The elderly participants constituted the primary population for health education and screening, while health cadres were involved as community-level partners in the implementation of the activity. The available report does not specify a formal probability-sampling procedure; therefore, the participants are described as the elderly individuals who participated in the community service activity rather than as a statistically representative sample of all older adults in Bulak Village. This distinction is important when interpreting the findings and limiting their generalizability.

C. INTERVENTION AND ACTIVITY PROCEDURES

The activity consisted of three sequential stages: preparation, implementation, and evaluation. During the preparation stage, the community service team developed educational materials addressing hypertension, its potential effects on older adults, anemia, and disease prevention. The team also prepared the equipment and materials required for blood-pressure, hemoglobin, and hematocrit examinations. During the implementation stage, participants received health education concerning hypertension and anemia, including risk awareness and preventive measures. The educational component was delivered before the health screening to provide participants with information relevant to the conditions being assessed. This approach is consistent with primary healthcare models that emphasize health education, early detection, monitoring, and community participation in chronic disease prevention [25], [26].

The screening component consisted of blood-pressure measurement and hemoglobin and hematocrit

examinations. Blood-pressure measurement was used to identify participants with elevated blood pressure and to classify hypertension severity according to the classification applied in the original activity. Accurate blood-pressure measurement is essential for appropriate hypertension detection because measurement errors can lead to incorrect classification and inappropriate clinical decisions [27]. For hematological screening, hemoglobin concentration was assessed to identify participants with potentially low hemoglobin levels, while hematocrit was assessed to estimate the proportion of blood volume occupied by red blood cells. The interpretation of hemoglobin results should follow appropriate age- and sex-specific criteria, consistent with current World Health Organization recommendations for defining anemia [28]. Current WHO guidance also emphasizes standardized procedures for hemoglobin measurement because pre-analytical and analytical factors can influence population-level anemia estimates [29].

The community service activity consisted of three sequential stages: preparation, implementation, and evaluation. The preparation stage involved the development of educational materials and preparation of equipment for health screening. The implementation stage included health education and screening of blood pressure, hemoglobin, and hematocrit. The evaluation stage involved assessment of participants' knowledge and monitoring of the activity outcomes. The overall implementation process is summarized in [TABLE 1](#).

TABLE 1
Community Service Implementation Process

Preparation Stage	Implementation Stage	Evaluation Stage
Preparation of educational materials related to hypertension and its impact on the elderly.	Presentation of material related to hypertension by the community service team.	Monitoring and evaluation of activities.
Preparation of tools and materials for health checks on the elderly in Bulak subdistrict, Surabaya	Hemoglobin test Hematocrit test Hypertension test	

During the preparation stage, the community service team developed educational materials related to hypertension and its potential effects on older adults and prepared the equipment required for health screening. During the implementation stage, participants received education on hypertension and anemia prevention, followed by blood-pressure, hemoglobin, and hematocrit examinations. The evaluation stage consisted of assessing changes in participants' knowledge through pre-test and post-test questionnaires and monitoring the implementation of the activity.

D. DATA COLLECTION PROCEDURES AND EVALUATION

Data were collected directly during the community service activity. Participant characteristics and screening findings were recorded as part of the health examination process. For the educational component, participants completed questionnaires before and after the health education session. The pre-test was administered to establish the participants' baseline knowledge, whereas the post-test was administered following the educational intervention to assess changes in knowledge. Two knowledge domains were evaluated: understanding of hypertension and its prevention, and understanding of anemia and its prevention. The reported outcomes were expressed as average pre-test and post-test scores. The evaluation therefore focused on descriptive changes in knowledge rather than on testing a causal effect against a control group.

The health screening data were summarized descriptively according to the categories reported in the activity. Blood-pressure findings were classified into hypertension grades, while hemoglobin and hematocrit findings were categorized according to the reference criteria used during the activity. Because the study did not include randomization, a control group, or inferential statistical modeling, the findings were interpreted as descriptive evidence from the participating elderly population rather than as evidence of treatment efficacy or population-level prevalence. This reporting approach is consistent with the principle that observational and community-based studies should clearly distinguish descriptive findings from causal inference [23], [24].

E. ETHICAL AND COMMUNITY CONSIDERATIONS

The activity was implemented as a community health service involving healthcare professionals, educational staff, students, and community health cadres. Participants were informed about the educational and screening activities before participation. The procedures were conducted in the context of community health promotion and early detection. Individual screening findings were intended to provide information that could support awareness and subsequent healthcare consultation when abnormalities were identified. The available manuscript does not report a formal institutional ethics approval number or a specific informed-consent procedure; therefore, no additional ethics approval details are inferred in this study description.

F. METHODOLOGY FRAMEWORK

Overall, the methodology combined health education with direct screening to address two major health concerns among older adults: hypertension and hematological abnormalities. The integrated approach enabled the activity to assess changes in participants' knowledge while simultaneously identifying individuals with abnormal blood-pressure, hemoglobin, or hematocrit findings. The use of community-based screening is consistent with international recommendations emphasizing accessible primary healthcare, accurate blood-pressure assessment, and systematic detection of anemia [25], [27]–[29]. The

resulting data were subsequently used to describe the health conditions identified during the activity and to formulate recommendations concerning continued health education, routine screening, family involvement, and strengthening of community-based elderly health services.

III. RESULTS

The number of respondents in this community service activity is 49 elderly individuals over 60 years of age, as well as health cadres in the working area of Bulak Village, Surabaya. The activities carried out include health education related to non-communicable diseases, particularly hypertension, blood pressure checks, hemoglobin, and hematocrit at elderly posyandu events.

A. EDUCATION ABOUT HYPERTENTION

The community service team conducted counselling and education on hypertension and anemia, as well as the prevention of these diseases. Afterward, the service providers distributed questionnaires to assess the participants' knowledge level. The results of the questionnaire are presented in TABLE 2.

TABLE 2

Results of the Questionnaire on Respondents' Knowledge of Hypertension and Anemia

Activities	Average Pre-Test	Average Post-Test	Conclusion
Understanding about hypertension and prevention	65	75	Increase in knowledge
Understanding about anemia and prevention	65	76	Increase in knowledge

Based on the results shown in TABLE 2, there is an observed increase in the average score between the pre-test and post-test results for both activities conducted. In the aspect of understanding hypertension and its prevention, the average score of the participants increased from 65 on the pre-test to 75 on the post-test. This indicates an increase of 10 points, which can be interpreted as the health education or intervention provided successfully increasing the participants' knowledge about hypertension and how to prevent it.



FIGURE 1. Health education

The health education session was conducted as an initial intervention to improve participants' understanding

of hypertension and anemia and their respective preventive measures. As shown in FIGURE 1, the participants attended an educational session delivered by the community service team in a group setting. The session provided information concerning the potential health risks associated with hypertension and anemia, preventive behaviors, and the importance of regular health monitoring among older adults. The educational activity was intended to strengthen participants' awareness and encourage the adoption of appropriate health practices following the screening process.



FIGURE 2. Health education

FIGURE 2 further illustrates the implementation of the health education activity involving elderly participants and the community service team. The group-based delivery of the intervention provided an opportunity for participants to receive information directly and interact with the facilitators regarding hypertension and anemia prevention. This approach was particularly relevant for community-based elderly health promotion because it allowed health information to be delivered collectively and provided an opportunity to reinforce participants' awareness of the importance of regular health assessment and healthy lifestyle practices.

B. HYPERTENTION EXAMINATION



FIGURE 3. Examination process

Following the health education session, health screening was conducted to identify potential health abnormalities among the elderly participants. FIGURE 3 illustrates the examination process in which participants underwent health assessment with assistance from the community

service team and health personnel. The screening activities included blood-pressure measurement and hematological examinations, particularly hemoglobin and hematocrit assessment. This procedure allowed the educational activity to be complemented by direct health screening, thereby providing participants with information regarding their current health status and identifying individuals who may require further monitoring or healthcare consultation.

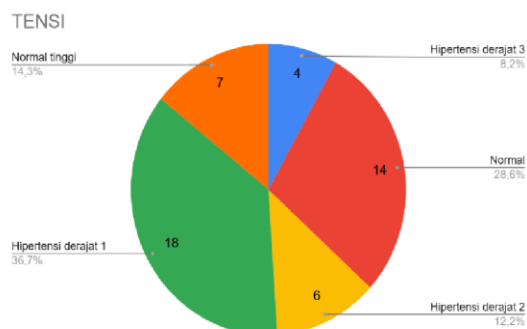


FIGURE 4. Blood Pressure Examination Results for the Elderly

Based on FIGURE 4, the results of blood pressure examinations in the elderly in the Bulak sub-district area of Surabaya city show that 18 respondents (36.7%) have grade 1 hypertension, 6 respondents (12.2%) have grade 2 hypertension, and 4 respondents (8.2%) have grade 3 hypertension. Based on the Minister of Health Regulation number hk.01.07/menkes/4634/2021, blood pressure can be classified as optimal, normal, prehypertension, or hypertension grade 1-3, with the following categories.

TABLE 3
Hypertension Grade

Classification	Systolic Blood Pressure (mmHg)	Diastolic Blood Pressure (mmHg)
Optimal	< 120	and < 80
Normal	120-129	And/or 80-84
Normal high	130-139	And/or 85-89
Hypertension Grade 1	140-159	And/or 90-99
Hypertension Grade 2	160-179	And/or 100-109
Hypertension Grade 3	≥ 180	And/or ≥ 110
Solated systolic hypertension	≥ 140	And/or

Based on the examination results presented in figure 4 and the hypertension classification shown in TABLE 3, the majority of elderly individuals fall into the category of Grade 1 hypertension, indicating a mild to moderate increase in blood pressure. This condition needs attention because if left uncontrolled, it can develop into more severe hypertension (grade 2 or 3), which carries a risk of serious complications such as coronary heart disease, stroke, and kidney failure. The high proportion of hypertension among the elderly in this region can be attributed to various factors, such as a diet high in salt and fat, lack of physical

activity, stress, a family history of hypertension, and the aging process, which reduces blood vessel elasticity [13]. Comprehensive efforts to prevent and control hypertension in the elderly need to be implemented, including routine blood pressure checks, education on healthy lifestyles, increased fruit and vegetable consumption, and limiting salt intake. Additionally, the role of elderly health posts and healthcare workers is crucial in monitoring health conditions and providing early intervention for high-risk elderly individuals [14][15].

Hypertension is a condition where systolic blood pressure rises above 140 mmHg and/or diastolic blood pressure rises above 90 mmHg. The elderly (60 years and older) are the group most at risk due to physiological changes in the cardiovascular system, decreased blood vessel elasticity, and a high prevalence of comorbidities [14]. High blood pressure in the elderly significantly contributes to the incidence of heart disease, stroke, and kidney failure. Based on the 2013 Basic Health Research (Basic Health Research), hypertension rates increase with age, with a prevalence in the elderly exceeding 60%. Most elderly individuals are unaware that they have hypertension because the disease often does not cause symptoms (a silent disease). Many elderly individuals discontinue therapy due to side effects, financial constraints, or a lack of understanding [16].

C. HEMATOCRIT EXAMINATION IN THE ELDERLY



FIGURE 5. Hematocrit Examination

Hematological screening was subsequently performed to identify potential abnormalities in red blood cell-related parameters among the elderly participants. Figure 5 shows the hematocrit examination process conducted during the community service activity. The examination was performed as part of the integrated screening procedure following health education and blood-pressure assessment. Hematocrit measurement provided an additional screening parameter for identifying participants with potentially reduced red blood cell volume, which may warrant further clinical evaluation when interpreted together with other hematological parameters.

The examination results in FIGURE 6 show that 33 respondents (67.3%) have low hematocrit levels. This finding indicates a fairly high tendency toward anemia or a decrease in red blood cell count among the examined respondent group. Hematocrit is one of the important parameters in the medical world used to measure the

percentage of red blood cell volume relative to a person's total blood volume [16].

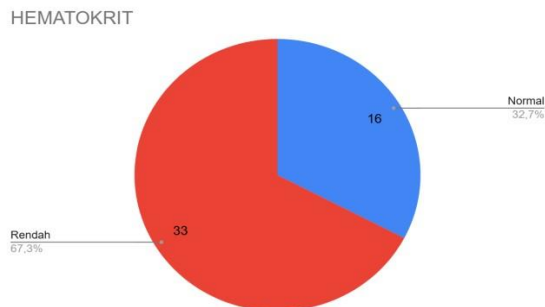


FIGURE 6. Hematocrit Examination Results

The main components of blood are red blood cells (erythrocytes), white blood cells (leukocytes), and platelets (thrombocytes). Among the three, red blood cells play a vital role in transporting oxygen and nutrients throughout the body, making normal hematocrit levels essential for proper physiological function. Abnormal hematocrit levels, whether too high or too low, can indicate certain health disorders. A low hematocrit level usually indicates anemia, blood loss, iron deficiency, or a bone marrow disorder that inhibits red blood cell production. Conversely, a high hematocrit level can indicate conditions such as dehydration, polycythemia vera, or disorders of the respiratory and cardiovascular systems that lead to increased oxygen demand in the body [17]. Therefore examination, the findings indicating that the majority of respondents have low hematocrit levels require further attention. Additional tests such as a Complete Blood Count (CBC) can help determine the specific cause of the decreased hematocrit levels, allowing for appropriate medical interventions or lifestyle changes to normalize these levels.

In the human body, there are three components of blood cells: red blood cells, white blood cells, and platelets. Hematocrit is the ratio of the number of red blood cells to the total blood volume in a person's body [18]. Red blood cells play a role in carrying oxygen and nutrients throughout the body, so their levels must be within the normal range for various bodily functions to operate normally. Abnormal hematocrit levels can cause various problems in the body, so it is necessary to determine whether a person has normal hematocrit levels through a complete blood count (CBC) [19]. For example, if the hematocrit level is 46%, it means there are. Based on age and gender, normal hematocrit levels are newborns: 55–66%; 1-week-old infants: 47–65%; 1month-old infants: 37–49%; 3-month-old infants: 30–36%; 1-year-old children: 29–41%; 10-year-old children: 36–40%; adult males: 42–54%; adult females: 38–46%. Each individual has a different normal hematocrit range. A high hematocrit level exceeding the normal range, such as 60% in adult men, indicates a medical condition that needs attention. High hematocrit levels can be caused by the following conditions:

1. Dehydration:

When the body loses excessive fluids, for example through sweat, vomiting, or diarrhea, this can lead to increased

hematocrit levels. Dehydration occurs because the composition of blood plasma is reduced, leading to an increased concentration of red blood cells. A similar condition can occur in hypovolemia, which is when body fluid volume decreases due to dehydration or bleeding [16].

2. Polycythemia vera:

This is a blood disorder or disease characterized by excessive production of red blood cells from the bone marrow. Polycythemia vera can lead to blood thickening, increasing the risk of blood clots and other complications [16].

3. Dengue fever:

In dengue fever, plasma components leak into body organs, leading to an increased concentration of red blood cells and a rise in hematocrit [16].

4. Lung or heart disease:

Certain lung or heart conditions, such as heart failure and the formation of scar tissue or thickening of the lungs, can affect the blood's ability to carry oxygen, causing the body to react by producing more red blood cells.

5. A low hematocrit level is commonly experienced by patients with anemia [16].

Red blood cells are responsible for transporting oxygen and nutrients to various locations in the body. To keep the body healthy, our body needs a sufficient proportion of red blood cells as a normal value standard [20]. If the hematocrit level is known to be too high or too low, it means there is a health problem occurring. A low hematocrit level can indicate bone marrow disease, chronic inflammatory disease, nutritional deficiencies such as iron, folate, or vitamin B-12, bleeding in internal organs, hemolytic anemia, kidney failure, leukemia, lymphoma, or sickle cell anemia [21]. Meanwhile, a high hematocrit level can indicate congenital heart disease, kidney tumors, dehydration, lung disease, polycythemia vera, dengue fever due to plasma leakage, and pregnancy, which can lower blood urea nitrogen levels due to increased body fluids, resulting in a lower hematocrit level [22]. If people live in high-altitude areas, their hematocrit levels tend to be higher because of the lower oxygen levels, causing the body to produce more red blood cells [23].

D. HEMOGLOBIN EXAMINATION IN THE ELDERLY



FIGURE 7. Hemoglobin Examination

Following the hematocrit examination, hemoglobin screening was performed as another component of the hematological assessment. FIGURE 7 presents the hemoglobin examination process carried out among the

elderly participants during the community service activity. Hemoglobin measurement was included to identify participants with potentially reduced hemoglobin concentrations and to support the early identification of possible anemia. The screening results were subsequently used to identify participants requiring greater attention to nutritional status, health monitoring, and potential follow-up assessment.

HEMOGLOBIN

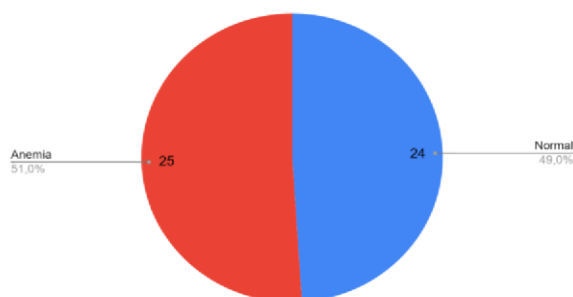


FIGURE 8. Hemoglobin Examination Results

Based on FIGURE 8, regarding the results of hemoglobin examination in the elderly in Bulak sub-district Surabaya, the results obtained are that 25 respondents (51.0%) of the elderly have low hemoglobin levels (anemia). Hemoglobin is a protein in red blood cells that gives blood its red color. Hemoglobin has a structure consisting of four polypeptide chains, each containing heme, an organic compound containing iron. The formation of hemoglobin requires iron and globin compounds (proteins) [22]. In healthy conditions, normal hemoglobin levels are approximately 12-15 grams/dL for adult women and 13-17 grams/dL for adult men. If hemoglobin levels in the body are abnormal (too high or too low), this can indicate an imbalance in the production and breakdown of red blood cells.

Anemia in the elderly often leads to a decline in quality of life, increases the risk of falls and mortality, and is frequently undiagnosed due to subtle symptoms. The main causes of anemia are malnutrition (lack of iron, vitamin B12, and folate) and chronic diseases, as well as decreased physiological function of the body and low rates of routine laboratory testing in the community due to limited equipment and cost [21]. Abnormal hemoglobin levels, whether too low or too high, can be affected by changes in diet, activity, medication use, or the menstrual cycle in women [23]. Anemia occurs due to low hemoglobin levels in red blood cells, making it impossible for red blood cells to meet the body's oxygen needs [22]. This condition usually triggers symptoms such as fatigue, weakness, and paleness. Health problems characterized by low hemoglobin levels can be overcome by consuming iron-rich foods, such as green vegetables, grains, apricots, red meat, liver, and raisins. High hemoglobin levels can be caused by several factors, ranging from lifestyle and medication side effects to various health issues, such as dehydration, congenital heart disease, lung diseases like pulmonary fibrosis and chronic obstructive pulmonary disease (COPD), and polycythemia vera (a condition where the bone marrow produces too many red blood cells) [24].

IV. DISCUSSION

A. HEALTH EDUCATION AND KNOWLEDGE IMPROVEMENT

The present community-based activity demonstrated a positive change in participants' knowledge following health education on hypertension and anemia. The mean knowledge score regarding hypertension and its prevention increased from 65 in the pre-test to 75 in the post-test, representing a 10-point improvement. Similarly, the mean score for understanding anemia and its prevention increased from 65 to 76, corresponding to an 11-point improvement. These findings indicate that the educational component was associated with improved immediate knowledge among the participating older adults. However, because the activity used a non-randomized one-group pre-post approach without a control group, the observed improvement should be interpreted as an immediate educational outcome rather than definitive evidence of a causal intervention effect.

The improvement in knowledge is consistent with recent evidence emphasizing the importance of health literacy interventions among older adults with hypertension. A 2024 scoping review identified face-to-face group education, individual education, written materials, electronic education, counseling, exercise, and personal health diaries as commonly used strategies for improving health literacy in older adults with hypertension [30]. The review also highlighted that educational interventions can facilitate disease understanding and support self-management, particularly when information is delivered through multiple complementary strategies. Similarly, a systematic review of interventions for improving health literacy among older adults reported that educational interventions can strengthen individuals' capacity to access, understand, and apply health information, although intervention characteristics and outcomes vary considerably across studies [31].

The findings are therefore relevant to the community setting in Bulak Village because older adults may require repeated and accessible health information to translate knowledge into appropriate health behavior. The original activity combined health education with direct screening, allowing participants not only to receive information but also to relate the educational material to their own health measurements. This integrated approach may be particularly useful for elderly populations because health literacy is influenced by age, educational background, social support, socioeconomic conditions, chronic disease burden, and cognitive or functional limitations [32].

Nevertheless, several limitations should be considered. The knowledge assessment was based on average pre-test and post-test scores, and the available data do not report the number of questionnaire items, psychometric properties, individual score distributions, or statistical significance of the change. Consequently, the magnitude of the improvement cannot be interpreted in terms of effect size or statistical certainty. In addition, post-test assessment was conducted immediately after education, so the findings cannot establish whether the knowledge improvement was retained over time or translated into sustained behavioral changes. Future programs should incorporate validated

knowledge instruments, repeated follow-up assessments, and behavioral indicators such as medication adherence, dietary modification, physical activity, and routine blood-pressure monitoring.

The practical implication is that community-based elderly health programs should not rely exclusively on one-time information delivery. Repeated education supported by health cadres, family members, written materials, and periodic screening may provide a more sustainable strategy. Evidence concerning community health workers also indicates that community-based interventions can support hypertension management through education, behavior change, linkage to care, and treatment adherence [33], [34]. Therefore, the educational component of the present activity can serve as an entry point for continuing health promotion rather than being considered a standalone intervention.

B. HYPERTENSION SCREENING FINDINGS

Blood-pressure screening identified 18 participants (36.7%) with grade 1 hypertension, 6 participants (12.2%) with grade 2 hypertension, and 4 participants (8.2%) with grade 3 hypertension. The presence of hypertension across three severity categories indicates that elevated blood pressure was an important health concern within the screened group. The finding is particularly relevant because older adults are vulnerable to hypertension as a consequence of age-related vascular changes and the accumulation of cardiovascular risk factors.

The distribution observed in this activity is compatible with evidence showing that community-based interventions are important for improving hypertension detection and management, particularly in low- and middle-income countries. Mbuthia et al. reported that community health worker interventions in LMICs were associated with improvements in blood-pressure control, linkage to care, treatment adherence, and cardiovascular risk reduction [33]. More recent evidence from a systematic review and meta-analysis similarly found that community-based strategies significantly improved blood-pressure control among people living with hypertension in LMICs [34]. These findings support the relevance of conducting screening activities at community health posts because such settings can provide an accessible point for identifying individuals who may require further assessment.

The results also suggest that hypertension screening should be integrated with continuous education and referral rather than performed as an isolated measurement. The presence of grade 2 and grade 3 hypertension indicates that some participants may require clinical assessment beyond community-level health promotion. However, a single blood-pressure measurement should not be interpreted as sufficient to establish a definitive diagnosis of hypertension. Blood pressure can vary according to measurement conditions, recent physical activity, emotional state, medication use, and other factors. Therefore, participants with elevated readings should undergo repeated standardized measurements and appropriate clinical evaluation before a definitive diagnosis or treatment decision is made.

An important limitation of the present findings is the absence of a control group and longitudinal follow-up. The activity provides a snapshot of blood-pressure status among 49 participating older adults rather than a population-representative estimate of hypertension prevalence in Bulak Village. In addition, the available data do not provide detailed information regarding sex, body mass index, medication adherence, dietary sodium intake, physical activity, smoking status, family history, or comorbidities. Therefore, the potential determinants of the observed hypertension distribution cannot be established from this activity.

Despite these limitations, the findings have important practical implications. Community health posts can function as an initial screening point where older adults receive blood-pressure assessment, health education, and information regarding the need for follow-up. The involvement of health cadres is also relevant because community health workers can extend preventive services and facilitate connections between community members and formal healthcare systems [33], [35]. A sustained program should therefore emphasize periodic blood-pressure measurement, individualized counseling, referral of participants with persistently elevated measurements, and family involvement in supporting treatment adherence and healthy lifestyle practices.

C. HEMATOLOGICAL SCREENING FINDINGS: HEMATOCRIT AND HEMOGLOBIN

The hematological screening identified a substantial proportion of participants with low hematocrit and hemoglobin levels. Specifically, 33 participants (67.3%) had low hematocrit levels, while 25 participants (51.0%) had low hemoglobin levels. These findings indicate that hematological abnormalities were common among the screened participants and reinforce the importance of incorporating basic hematological screening into community-based elderly health activities.

The proportion of participants with low hemoglobin in the present activity appears higher than the pooled prevalence reported in a 2024 systematic review and meta-analysis, which estimated anemia prevalence among older adults at approximately 24.6% across 44 studies involving 127,978 participants [36]. However, the two findings should not be directly interpreted as equivalent prevalence estimates. The present activity involved only 49 community participants and was not based on population probability sampling, whereas the systematic review synthesized evidence from substantially larger and heterogeneous populations. The higher proportion observed in Bulak may therefore reflect characteristics of the participating group, local health conditions, selection of individuals attending the health post, or differences in screening criteria rather than a higher population prevalence.

The findings are nevertheless clinically relevant because anemia in older adults should not automatically be regarded as a normal consequence of ageing. Katsumi et al. reported that anemia in older adults is associated with adverse outcomes including falls, frailty, and mortality and may arise from nutritional deficiencies, inflammation,

clonal hematopoiesis, or unexplained mechanisms [37]. Guralnik et al. similarly emphasized that anemia increases with age and is associated with poorer functional capacity, reduced quality of life, hospitalization, and mortality [38]. Consequently, the finding that more than half of the participants had low hemoglobin warrants further attention rather than being dismissed as an expected feature of ageing.

The 67.3% proportion with low hematocrit should also be interpreted cautiously. Hematocrit represents the proportion of blood volume occupied by red blood cells, and a reduced value can occur in anemia but may also be associated with blood loss, nutritional deficiencies, chronic disease, or other hematological conditions. Therefore, low hematocrit alone cannot establish the etiology of anemia. The high proportion of low hematocrit in the present activity, together with the 51.0% proportion with low hemoglobin, strengthens the rationale for further clinical assessment but does not by itself establish a specific cause. The 2024 WHO guideline emphasizes the importance of appropriate hemoglobin measurement and population-specific criteria when defining anemia [39].

A major limitation is that the screening did not appear to include a complete blood count or additional diagnostic parameters such as mean corpuscular volume, serum ferritin, transferrin saturation, vitamin B12, folate, renal function, or inflammatory markers. Consequently, the activity could identify participants who may require further evaluation but could not determine whether abnormalities resulted from iron deficiency, chronic inflammation, renal disease, nutritional deficiency, blood loss, or other conditions. This distinction is important because anemia in older adults is etiologically heterogeneous [37], [38].

The findings therefore have a direct implication for community-based elderly health services. Screening should be used as an early detection mechanism rather than a definitive diagnostic procedure. Participants with abnormal hemoglobin or hematocrit results should be encouraged to seek follow-up assessment through appropriate healthcare facilities. Repeated screening, nutritional counseling, assessment of possible chronic disease, and referral pathways should be incorporated into future community programs. Integrating hematological screening with hypertension monitoring may also provide a more comprehensive picture of elderly health because multiple chronic and hematological conditions can coexist.

Overall, the present activity demonstrates the value of combining health education with community-based screening. The improvement in knowledge scores suggests an immediate educational benefit, while the screening findings reveal a substantial burden of elevated blood pressure and hematological abnormalities among the participating older adults. However, the absence of randomization, control participants, long-term follow-up, detailed participant characteristics, and confirmatory laboratory testing limits causal inference and generalizability. Future community programs should therefore adopt repeated follow-up, standardized measurement procedures, validated educational instruments, more comprehensive clinical assessment, and systematic referral mechanisms. Such improvements

would strengthen the role of community health posts as accessible platforms for prevention, early detection, health education, and continuity of care for older adults.

V. CONCLUSIONS

This community-based health service activity aimed to improve health awareness among older adults and facilitate the early detection of hypertension and hematological abnormalities through integrated health education and screening of blood pressure, hemoglobin, and hematocrit levels in Bulak Village, Surabaya. The findings demonstrate that the educational intervention was associated with an improvement in participants' immediate knowledge of hypertension and anemia prevention. The mean knowledge score for hypertension increased from 65 in the pre-test to 75 in the post-test, representing a 10-point increase, while the mean score for anemia-related knowledge increased from 65 to 76, corresponding to an 11-point increase. The screening results also identified a substantial proportion of participants with elevated blood pressure. Among the 49 elderly participants, 18 participants (36.7%) were classified as having grade 1 hypertension, 6 participants (12.2%) as grade 2 hypertension, and 4 participants (8.2%) as grade 3 hypertension, indicating the importance of continued blood-pressure monitoring and appropriate follow-up among older adults. Hematological screening further demonstrated that 33 participants (67.3%) had low hematocrit levels, while 25 participants (51.0%) had low hemoglobin levels, highlighting the need for greater attention to potential hematological abnormalities in the elderly population. These findings support the value of integrating health education with accessible community-based screening because the approach can simultaneously strengthen health knowledge and identify participants who may require further health assessment. Nevertheless, the findings should be interpreted within the limitations of the activity, including the relatively small number of participants, absence of a control group and randomization, lack of long-term follow-up, and limited laboratory parameters for determining the underlying causes of hematological abnormalities. Therefore, future community-based programs should implement periodic screening and follow-up assessments, employ validated knowledge instruments, incorporate more comprehensive hematological examinations, and establish systematic referral mechanisms for participants with abnormal findings. Future studies should also consider larger and more representative samples, controlled or longitudinal designs, and assessment of behavioral outcomes to determine whether improvements in knowledge are sustained and translated into healthier lifestyles, improved blood-pressure control, and better management of anemia-related risk factors among older adults.

ACKNOWLEDGEMENTS

The authors would like to express their sincere gratitude to the elderly participants and health cadres in Bulak Village, Surabaya, for their active participation and cooperation throughout the community service activity. The authors also thank the local community health service team and all

individuals who contributed to the preparation, implementation, health screening, and evaluation of the program. Their support and collaboration were essential to the successful implementation of the health education and screening activities.

FUNDING

The authors declare that this community service activity received no specific external funding.

DATA AVAILABILITY

The data supporting the findings of this community service activity are available from the corresponding author upon reasonable request, subject to appropriate privacy and confidentiality considerations.

AUTHOR CONTRIBUTION

All authors contributed to the development and completion of this community service activity and manuscript. The authors contributed to the conceptualization and design of the activity, development of the methodology, preparation and delivery of health education materials, implementation of blood-pressure, hemoglobin, and hematocrit screening, data collection and analysis, and interpretation of the findings. The authors also contributed to the preparation, critical review, and revision of the manuscript. All authors reviewed and approved the final version of the manuscript and agreed to be accountable for the accuracy and integrity of the work.

DECLARATIONS

ETHICAL APPROVAL

The activity was conducted as a community-based health service program involving elderly participants and health cadres. Participants were informed about the health education and screening activities before participation. The available manuscript does not report a formal institutional ethics approval number; therefore, no specific ethics approval number is stated in this article.

CONSENT FOR PUBLICATION PARTICIPANTS

The authors consent to the publication of the manuscript and its associated non-identifiable activity documentation.

COMPETING INTERESTS

The authors declare that there are no conflicts of interest associated with the publication of this article.

REFERENCES

- [1] World Health Organization, Guideline for the Pharmacological Treatment of Hypertension in Adults. Geneva, Switzerland: World Health Organization, 2021.
- [2] J. G. Umemura et al., "The 2021 Japanese Society of Hypertension guidelines for the management of hypertension," *Hypertension Research*, vol. 44, pp. 1403–1457, 2021.
- [3] World Health Organization, Global Report on Hypertension: The Race Against a Silent Killer. Geneva, Switzerland: World Health Organization, 2023.
- [4] M. Zhou et al., "Worldwide trends in hypertension prevalence and progress in treatment and control from 1990 to 2019: A pooled analysis of 1201 population-representative studies with 104 million participants," *The Lancet*, vol. 398, no. 10304, pp. 957–980, 2021.
- [5] A. Katsumi, A. Abe, S. Tamura, and T. Matsushita, "Anemia in older adults as a geriatric syndrome: A review," *Geriatrics & Gerontology International*, vol. 21, no. 6, pp. 549–554, 2021, doi: 10.1111/ggi.14183.
- [6] J. W. Guralnik et al., "Unexplained anemia of aging: Etiology, health consequences, and diagnostic criteria," *Journal of the American Geriatrics Society*, vol. 70, no. 3, pp. 891–899, 2022, doi: 10.1111/jgs.17565.
- [7] S. S. et al., "Prevalence of anemia in older adults: A systematic and meta-analysis study," *International Journal of Africa Nursing Sciences*, vol. 20, p. 100739, 2024, doi: 10.1016/j.ijans.2024.100739.
- [8] S. Ahmed et al., "Community health workers and health equity in low- and middle-income countries: Systematic review and recommendations for policy and practice," *International Journal for Equity in Health*, vol. 21, no. 49, 2022.
- [9] G. W. Mbuthia, K. Magutah, and J. Pellowski, "Approaches and outcomes of community health worker's interventions for hypertension management and control in low-income and middle-income countries: Systematic review," *BMJ Open*, vol. 12, no. 4, e053455, 2022, doi: 10.1136/bmjopen-2021-053455.
- [10] M. A. Kennedy et al., "Community health worker interventions for older adults with complex health needs: A systematic review," *Journal of the American Geriatrics Society*, vol. 69, no. 6, pp. 1670–1682, 2021, doi: 10.1111/jgs.17078.
- [11] M. S. S. Cardoso et al., "The multidimensionality of low health literacy in older adults: A scoping review of international studies," *Journal of Gerontological Nursing*, vol. 49, no. 2, 2023, doi: 10.1177/10547738221146461.
- [12] A. C. P. Lima et al., "Factors associated with poor health literacy in older adults: A systematic review," *Geriatric Nursing*, vol. 55, pp. 242–254, 2024, doi: 10.1016/j.gerinurse.2023.11.016.
- [13] X. Jiang et al., "The level of electronic health literacy among older adults: A systematic review and meta-analysis," *Archives of Public Health*, vol. 82, no. 204, 2024.
- [14] M. Sardareh et al., "Interventions for improving health literacy among older people: A systematic review," *BMC Geriatrics*, vol. 24, no. 911, 2024, doi: 10.1186/s12877-024-05522-z.
- [15] S. Onprasong, K. Trinnawootipong, and S. Buntra, "Health literacy program among the elderly with hypertension: A systematic review," *Journal of Public Health and Development*, vol. 22, no. 3, 2024, doi: 10.55131/jphd/2024/220325.
- [16] Y. Shao et al., "Health literacy interventions among patients with chronic diseases: A meta-analysis of randomized controlled trials," *Patient Education and Counseling*, vol. 114, p. 107829, 2023, doi: 10.1016/j.pec.2023.107829.
- [17] L. Verweel et al., "The effect of digital interventions on related health literacy and skills for individuals living with chronic diseases: A systematic review and meta-analysis," *International Journal of Medical Informatics*, vol. 177, p. 105114, 2023, doi: 10.1016/j.ijmedinf.2023.105114.
- [18] S. Hyvert et al., "Association between health literacy and medication adherence in chronic diseases: A recent systematic review," *International Journal of Clinical Pharmacy*, vol. 45, no. 1, pp. 38–51, 2023, doi: 10.1007/s11096-022-01470-z.
- [19] V. Widyasari, F. F. Rahman, K.-H. Lin, and J.-Y. Wang, "The effectiveness of health services delivered by community health workers on outcomes related to non-communicable diseases among elderly people in rural areas: A systematic review," *Iranian Journal of Public Health*, vol. 50, no. 6, pp. 1088–1096, 2021, doi: 10.18502/ijph.v50i6.6408.
- [20] R. Thapa et al., "Community health workers for non-communicable diseases: A systematic review and meta-analysis," *International Journal of Epidemiology*, vol. 50, suppl. 1, 2021, doi: 10.1093/ije/dyab168.659.
- [21] D. P. Sahoo, A. Gupta, G. A. War, and S. Deb, "Unmasking anemia in the elderly: A systematic review of prevalence, causes, and consequences," *Journal of Family Medicine and Primary Care*, vol. 14, no. 11, pp. 4466–4475, 2025, doi: 10.4103/jfmpc.jfmpc_829_25.
- [22] A. G. et al., "The effect of community-based health interventions on hypertension management and cardiovascular risk among older adults: A systematic review," *BMC Public Health*, 2024.
- [23] D. A. S. Ranganathan and R. Aggarwal, "Study designs: Part 1—An overview and classification," *Perspectives in Clinical*

- Research, vol. 15, no. 2, pp. 65–68, 2024.
- [24] A. M. von Elm et al., “The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement: Guidelines for reporting observational studies,” *International Journal of Surgery*, vol. 101, p. 106395, 2022.
- [25] World Health Organization, HEARTS: Technical Package for Cardiovascular Disease Management in Primary Health Care. Geneva, Switzerland: World Health Organization, 2021.
- [26] G. W. Mbuthia, K. Magutah, and J. Pellowski, “Approaches and outcomes of community health worker’s interventions for hypertension management and control in low-income and middle-income countries: Systematic review,” *BMJ Open*, vol. 12, no. 4, e053455, 2022.
- [27] Pan American Health Organization, HEARTS in the Americas: Regulatory Pathway to the Exclusive Use of Validated Blood Pressure Measuring Devices. Washington, DC, USA: PAHO, 2021.
- [28] World Health Organization, Guideline on Haemoglobin Cutoffs to Define Anaemia in Individuals and Populations. Geneva, Switzerland: World Health Organization, 2024.
- [29] World Health Organization and United Nations Children’s Fund, Best Practices for Haemoglobin Measurement in Population-Level Anaemia Surveys. Geneva, Switzerland: World Health Organization, 2024.
- [30] C. F. Simões, L. P. N. Lopes, L. S. Lara, and A. L. Cortês, “Health literacy for elderly patients with high blood pressure: A scoping review,” *Research in Social and Administrative Pharmacy*, vol. 20, no. 9, pp. 846–859, 2024, doi: 10.1016/j.sapharm.2024.06.004.
- [31] M. Sardareh, H. Matlabi, A. R. Shafiee-Kandjani, R. Bahreini, S. Mohammaddokht, and S. Azami-Aghdash, “Interventions for improving health literacy among older people: A systematic review,” *BMC Geriatrics*, vol. 24, no. 1, p. 911, 2024, doi: 10.1186/s12877-024-05522-z.
- [32] A. C. P. Lima, M. A. Maximiano-Barreto, T. C. R. Martins, and B. M. Luchesi, “Factors associated with poor health literacy in older adults: A systematic review,” *Geriatric Nursing*, vol. 55, pp. 242–254, 2024, doi: 10.1016/j.gerinurse.2023.11.016.
- [33] G. W. Mbuthia, K. Magutah, and J. Pellowski, “Approaches and outcomes of community health worker’s interventions for hypertension management and control in low-income and middle-income countries: Systematic review,” *BMJ Open*, vol. 12, no. 4, e053455, 2022, doi: 10.1136/bmjopen-2021-053455.
- [34] “Community-Based Strategies to Improve Health-Related Outcomes in People Living With Hypertension in Low- and Middle-Income Countries: A Systematic Review and Meta-Analysis,” *Global Heart*, 2024.
- [35] S. Ahmed et al., “Community health workers and health equity in low- and middle-income countries: Systematic review and recommendations for policy and practice,” *International Journal for Equity in Health*, vol. 21, no. 1, p. 49, 2022, doi: 10.1186/s12939-021-01615-y.
- [36] M. K. et al., “Prevalence of anemia in older adults: A systematic and meta-analysis study,” *International Journal of Africa Nursing Sciences*, vol. 20, p. 100739, 2024, doi: 10.1016/j.ijans.2024.100739.
- [37] A. Katsumi, A. Abe, S. Tamura, and T. Matsushita, “Anemia in older adults as a geriatric syndrome: A review,” *Geriatrics & Gerontology International*, vol. 21, no. 7, pp. 549–554, 2021, doi: 10.1111/ggi.14183.
- [38] J. Guralnik et al., “Unexplained anemia of aging: Etiology, health consequences, and diagnostic criteria,” *Journal of the American Geriatrics Society*, vol. 70, no. 3, pp. 891–899, 2022, doi: 10.1111/jgs.17565.
- [39] World Health Organization, Guideline on Haemoglobin Cutoffs to Define Anaemia in Individuals and Populations. Geneva, Switzerland: World Health Organization, 2024.