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RESEARCH ARTICLE

Community Health Cadres' Readiness to Support Precision Care for Chronic Disease Management: A Qualitative Study

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Abstract. Background: Chronic diseases require long-term monitoring and individualized care that considers patients' clinical conditions, risk profiles, behaviors, and social contexts. Community health cadres may support monitoring, education, and referral, but their readiness to contribute to precision care requires assessment across practical, conceptual, digital, and operational dimensions. Objective: This study explored the readiness of Great Surabaya Cadres to support precision care for chronic disease management at the community level. Methods: A descriptive qualitative design was used. Thirteen cadres with experience assisting patients with chronic diseases were recruited through purposive sampling and participated in semi-structured in-depth interviews. Data were analyzed thematically. Results: Seven themes emerged: knowledge and conceptual readiness for precision care, operational readiness, community-based risk identification and patient monitoring, digital and data readiness, interprofessional and community collaboration, implementation barriers, and sustainability. Cadres demonstrated strong practical readiness based on field experience, including blood pressure measurement, blood glucose checks, home visits, patient education, and referral support. However, their readiness was constrained by limited conceptual understanding of precision care, variable digital literacy, inadequate equipment, insufficient standardized operational guidance, and limited ongoing supervision and mentoring. Conclusion: Great Surabaya Cadres have potential to support community-based precision care for chronic disease management because of their practical experience and direct involvement in patient monitoring. Effective implementation, however, requires strengthened conceptual understanding, improved digital literacy, standardized and feasible operational guidelines, adequate resources, and continuous professional supervision and mentoring to ensure safe, consistent, and sustainable community-based care. Integration with existing primary health services is also essential for coordinated patient follow-up.

Keywords: community health cadres; non-communicable diseases; primary health care; qualitative studies; precision care

INTRODUCTION

Chronic non-communicable diseases (NCDs), including hypertension, diabetes mellitus, stroke, cardiovascular disease, and chronic kidney disease, remain a major public health challenge because they require long-term monitoring, ongoing self-management, and sustained support from health workers and community-based care systems (World Health Organization, 2025). The 2023 Indonesia Health Survey showed that, among people aged 15 years and older, the prevalence of hypertension based on blood pressure measurements was 29.2% nationally and 32.8% in East Java, while only 8.0% nationally reported having received a doctor's diagnosis. In the same population, the prevalence of diabetes was 11.7% based on blood glucose testing but only 2.2% based on self-reported doctor's diagnosis (Badan Kebijakan Pembangunan Kesehatan [BKPK], 2024). These differences underscore the need for strengthening early detection at the community level, ongoing monitoring, and linkage to appropriate health services. The development and progression of these conditions are influenced by interacting factors, including lifestyle behaviors, medication adherence, family support, health literacy, access to care, and social circumstances. Therefore, chronic disease management cannot rely solely on standard interventions; it requires care strategies that respond to the specific needs and changing risks of individual patients (Siddiqui et al., 2024).

Precision care has emerged as an approach to chronic disease management that tailors care to an individual's health condition, risk profile, behavioral factors, and social environment (Wu et al., 2022). In this study, precision care refers to the systematic use of individual-level information–including clinical indicators, symptoms, medication adherence, health behaviors, family support, and social circumstances–to classify risk and adjust the content, intensity, timing, and referral pathways of care as patient needs change. While related, precision care is not synonymous with patient-centered care. Patient-centered care primarily emphasizes respect for patient preferences, needs, values, goals, and participation in decision-making, while precision care also applies structured, individual-level information to determine which interventions are most

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appropriate for whom, at what intensity, and when. Routine community-based chronic care describes settings and platforms where screening, education, monitoring, and referrals are provided, but do not necessarily involve explicit risk stratification or iterative adjustments. Thus, these approaches complement each other: patient-centeredness guides how decisions are made, community-based care determines where and by whom services are delivered, and precision care provides a systematic basis for differentiated support. This framing is consistent with the concept of precision public health, in which population- and individual-level information is used to deliver the appropriate intervention to the appropriate group at the appropriate time (Khoury et al., 2016). In a community setting, precision care can include identifying individuals at high risk, monitoring blood pressure and blood glucose, recognizing symptoms and warning signs, supporting medication adherence, providing individualized education, and initiating referrals to health professionals when needed (Susanto et al., 2022). However, blood pressure measurements, education, or home visits alone do not constitute precision care. These activities become precision-oriented when their frequency, content, and escalation pathways are systematically tailored to the patient's evolving clinical, behavioral, and social risk profile. In this context, precision care does not mean that community health workers perform genomic testing, make clinical diagnoses, or replace health professionals. Rather, community health workers can provide individual-level information and provide risk-responsive, protocol-guided monitoring, education, and referral support under the supervision of primary health care professionals (Haregu et al., 2024). In Surabaya, the Surabaya Heroes Cadres are involved in various community-based health activities, including health promotion, basic monitoring, home visits, patient education, and referral support (Wibisono et al., 2025).

The successful implementation of precision care depends not only on clinical systems but also on the readiness of community health workers and the systems within which they operate. Readiness should not be equated solely with willingness or previous field experience. Conceptually, readiness can be understood in light of Organizational Readiness for Change theory, which emphasizes commitment to implementing change and confidence in the collective capability to do so, and the $R=MC^2$ implementation heuristic, which defines readiness through the interaction of motivation, general capacity, and innovation-specific capacity (Scaccia et al., 2015; Weiner, 2009). Applied to community-based precision care, innovation-specific capacity includes conceptual knowledge, patient-monitoring skills, digital literacy, and confidence in working within defined role boundaries. Motivation includes perceived relevance, willingness, and commitment to undertake the role. General capacity includes available time, equipment, digital infrastructure, and human resources. System support encompasses clear operational guidelines, competency-based training, referral pathways, interprofessional coordination, leadership, and supportive supervision (World Health Organization, 2018). Because chronic disease management must be maintained over time, readiness also includes the capacity for program sustainability through institutional integration, stable resources, partnerships, monitoring and evaluation, and program adaptation (Schell et al., 2013). Readiness is therefore regarded as a multidimensional and dynamic condition involving both individual cadres and the surrounding implementation system.

In Indonesia, community health workers or cadres play an essential role in connecting formal health services with patients, families, and communities (Haregu et al., 2024). Through routine community health posts, household visits, and communication with primary health care staff, cadres can help identify patient-specific needs and support long-term disease monitoring (Susanto et al., 2022). Their proximity to residents allows them to observe changes in health status, recognize barriers to treatment adherence, provide basic health education, encourage self-management, and facilitate access to professional care. These functions provide an important foundation for community-based precision care, provided that cadres receive appropriate training, operational guidance, equipment, and supervision. In Surabaya, the Surabaya Heroes Cadres (Kader Surabaya Hebat; KSH) constitute a municipally recognized network of community-based service cadres rather than members of the formal clinical workforce. Municipal regulations organize KSH through coordinators and members operating within the subdistrict, urban-village, community-unit, and neighborhood-unit structures, with cadres assigned to defined household areas ("Peraturan Wali Kota Surabaya Nomor 14 Tahun 2022 tentang Pemberian Biaya Jasa Pelayanan/Honorarium bagi Warga Pelayan Masyarakat di Kota Surabaya," 2022). Their mandate extends beyond health to other community and municipal services. Within the health sector, their duties include supporting integrated community health posts, initial screening, home visits, health education, community monitoring, data recording, and communicable and non-communicable disease programs. They are also involved in health promotion, basic patient monitoring, education, and referral support (Wibisono et al., 2025). KSH record household-level information through the Sayang Warga application and coordinate operationally with kelurahan authorities, community health centers (Puskesmas), auxiliary community health centers, and other relevant municipal agencies. Thus, their position is best understood as a community-facing link between residents and formal primary health care services rather than as an extension of the clinical workforce. Their close and sustained relationships with residents place them in a strategic position to identify individual needs, support long-term patient monitoring, and facilitate timely referral (Wibisono et al., 2025).

Despite this potential role, the readiness of community health cadres to support precision care remains underexplored (Haregu et al., 2024). Three specific gaps can be identified. First, there is a conceptual gap, because the existing literature has not clearly operationalized readiness for precision care among community cadres or distinguished such readiness from competence in performing routine community health activities. Second, there is a contextual gap, as evidence regarding community health worker-supported precision care remains limited in urban Indonesian settings, particularly within the distinctive administrative and service structure of the Surabaya Heroes Cadres. Third, there is an implementation gap, because it remains unclear whether cadres' practical field experience can be translated into systematic risk stratification and individualized monitoring supported by adequate training, digital systems, equipment, standardized operational guidelines, referral pathways, supervision, and sustainable program resources. Addressing these gaps is necessary before developing a community-based precision care model that is feasible, acceptable, and sustainable within the local primary health care system (Fritz et al., 2024).

Accordingly, this qualitative study aimed to explore the readiness of Surabaya Heroes Cadres to support the implementation of precision care for chronic disease management in community settings, including the individual- and system-level conditions required for its sustained implementation.

METHODS

Study Design

This study used a qualitative descriptive design (Sandelowski, 2000) to explore the readiness of Surabaya Heroes Cadres to support the implementation of precision care for people living with chronic diseases. This design was selected to obtain detailed accounts of cadres' knowledge, experiences, perceived roles, current practices, barriers, and support needs in community-based chronic disease management. The study focused on participants' experiences and practical perspectives rather than measuring readiness using a psychometric instrument. The study is reported in accordance with the Consolidated Criteria for Reporting Qualitative Research (COREQ) (Tong et al., 2007).

Study Setting and Period

The study was conducted between September 2025 in one of the Public Health Centre, Surabaya, Indonesia. Surabaya Heroes Cadres undertake community-based activities such as health education, basic health monitoring, home visits, community mobilization, and referral support. They work in coordination with community health posts, integrated non-communicable disease posts, and primary healthcare services and have regular contact with people living with chronic conditions, including hypertension, diabetes mellitus, stroke, cardiovascular disease, and chronic kidney disease. The interviews were conducted face-to-face and online. Face-to-face interviews took place in the public health center in a private room where the conversation could not be overheard. Online interviews were conducted using video call in WhatsApp, with participants joining from a private location. Of the 13 interviews, ten were conducted face-to-face and three were conducted online.

Participants

Participants were purposively selected because of their experience in community-based chronic disease care. Cadres were eligible if they were registered as Surabaya Heroes Cadres, were actively involved in community health activities, had experience assisting or monitoring people with chronic diseases, and were willing to participate in an in-depth interview. Cadres who were inactive during the study period or did not provide informed consent were excluded. Potential participants were identified by researcher using source of the participant list from public health center. Initial contact was made by researcher through WhatsApp and in-person contact. Potential participants received a written information sheet and verbal explanation describing the study and were given time to decide whether to participate. Participation or refusal did not affect the cadres' duties, evaluations, or access to health services. A total of fifteen cadres were invited. Of these, thirteen agreed to participate, one declined, and one did not respond or withdrew before the interview. Reasons for declining were they are not in Surabaya during data collection and did not willing to conduct the interview online. Thirteen cadres ultimately completed an interview. During data collection, first and second author reviewed interview summaries, field notes, transcripts after all interviews were finished. Recruitment ended after 13 interviews when later interviews repeated established patterns, did not add substantively new dimensions relevant to the research question, and provided sufficiently detailed accounts across the interview domains. The decision that the dataset contained adequate information was made by researchers and documented in field notes and voice recorder for face to face and meeting records for online.

Interviewer Characteristics and Relationship With Participants

All interviews were conducted by all authors, a nurse with community health quallification with experience in qualitative interviewing and community health research. Before data collection, the interviewer had no prior relationship with the participants. The interviewer was not involved in supervising, evaluating, or delivering services to the cadres. Participants were informed about the interviewer's professional background, role in the study, and reasons for conducting the research.

Data Collection and Interview Procedure

Data were collected through semi-structured, in-depth interviews conducted in Bahasa Indonesia. Each interview lasted approximately 30–60 minutes. No repeat interviews were conducted because all participants were finished the interview. The interview guide was developed by all researchers based on the study objectives. It covered participants' roles and experiences as cadres; their understanding of chronic disease care and precision care; identification of individual patient needs and risks; monitoring of blood pressure, blood glucose, and symptoms; recording and use of patient information; use of digital tools; collaboration with health professionals and families; perceived barriers; and training and resource needs. The guide was reviewed by professor in nursing that expert in community health nursing and was revised by researcher based on expert suggestion. Representative interview questions included:

"Please tell me about your role as a Surabaya Heroes Cadre and a recent experience of assisting a person with a chronic disease."

"How do you identify differences in patients' health risks and care needs?"

"What does precision care mean to you, and which parts of this approach could you currently support in the community?"

"What patient information do you record, and how do you use that information when deciding what action to take?"

"How do you use mobile phones or other digital tools when monitoring patients or communicating with health workers?"

"How do you collaborate with health professionals and family members when a patient's condition changes?"

"What would make it easier or more difficult for cadres to support precision care?"

"What additional training, resources, or organizational support would cadres need?"

Before each interview, the interviewer explained the study purpose, procedures, confidentiality protections, voluntary nature of participation, and participants' right to decline any question or withdraw without consequences. Interviews began with broad questions about participants' roles and experiences and then moved to more specific topics. Follow-up probes, such as "Can you give me a specific example?", "What happened next?", "How did you respond?", and "Why was that difficult or helpful?", were used to clarify responses and elicit detailed accounts. Participants were asked to describe concrete examples from their work rather than provide only general opinions. At the end of each interview, they were invited to discuss any relevant matter that had not already been addressed. With participants' permission, the interviews were audio-recorded. Field notes were taken during and immediately after each interview to document contextual information, observable non-verbal communication, and the interviewer's initial reflections. The field notes were reviewed before subsequent interviews to identify topics requiring further exploration. The use of open-ended questions, requests for concrete examples, follow-up probing, and contemporaneous field notes was intended to promote data depth.

Data Management and Thematic Analysis

Audio recordings were transcribed verbatim in Bahasa Indonesia. All authors checked each transcript against its corresponding recording and corrected omissions or transcription errors. Identifying details, including names, addresses, and specific community identifiers, were removed. Participants were assigned codes P1–P13. Analysis was conducted in Bahasa Indonesia.

The data were analyzed using thematic analysis (Braun & Clarke, 2006) following participant statement of the interviews. The analysis used a combination of deductive and inductive coding. Broad domains derived from the research question and interview guide provided an initial organizing structure, while codes within and beyond these domains were developed from participants' accounts. This approach allowed the researchers to examine issues relevant to the study objectives while remaining open to unexpected findings.

The first and second authors served as the primary analysts. They repeatedly read all transcripts and field notes to become familiar with the dataset and recorded their initial analytic observations. Meaningful segments of text were then assigned initial codes. The coding record included the code name, operational definition, inclusion and exclusion criteria, and illustrative excerpts from the transcripts.

The first and second authors independently coded all 13 transcripts. They subsequently compared their coding, discussed differences in the interpretation and application of codes, and revised the code definitions where necessary. The first author consolidated the coding across the dataset, and the second author reviewed the consolidated coding against the original transcripts. Authors 3–6 reviewed the revised codebook, categories, and candidate themes and provided alternative interpretations when appropriate. Disagreements were resolved through discussion and re-examination of the relevant transcript excerpts until consensus was reached among the authors. New or revised codes were then applied consistently to previously coded transcripts.

Related codes were compared across participants and grouped into categories and candidate themes. The analysts examined convergent, divergent, and contradictory accounts rather than selecting only evidence supporting the dominant interpretation. Candidate themes were reviewed against both the coded excerpts and the complete transcripts. Their names, boundaries, and definitions were refined until the research team agreed that they represented the range and patterns of participants' accounts.

Disagreements concerning code meaning, code application, or theme structure were resolved through discussion and re-examination of the relevant transcripts. The final themes were reviewed and agreed upon by all research team members.

Trustworthiness

The trustworthiness of the study was strengthened through credibility, dependability, confirmability, and transferability (Korstjens & Moser, 2018). Credibility was supported by using in-depth interviews, open-ended questions, and probing techniques that allowed participants to explain their experiences in detail. The researchers also compared responses across participants to identify consistent patterns and variations in perspectives. Dependability was maintained by documenting each stage of the research process, including participant recruitment, interview procedures, transcription, coding, category development, and theme construction. Confirmability was supported through reflexive discussion among the research team. Transferability was enhanced by providing a clear description of the study setting, participants, cadre roles, and community-based chronic disease management context.

Ethical Considerations

This study was conducted in accordance with ethical principles for research involving human participants. The study protocol was reviewed and approved by the Health Research Ethics Committee of the Faculty of Health Sciences, Universitas Muhammadiyah Surabaya Indonesia, under approval number 002/KEPK/F/1/2025, issued in January 2025. Before data collection, participants received information about the study objectives, interview procedures, potential risks and benefits, confidentiality, and voluntary participation. They were informed that they could refuse to answer any question or withdraw from the study at any time without consequences. Informed consent was obtained from all participants before the interviews. Participant anonymity was protected by using identification codes rather than real names. All data were stored securely and used only for research purposes.

RESULTS OF STUDY

A total of 13 Surabaya Heroes Cadres participated in this qualitative study. The participants were predominantly female (92.3%), with only one male participant (7.7%). Most participants were aged 46–55 years (38.5%), followed by those aged 36–45 years (30.8%), indicating that the sample largely represented middle-aged community health cadres. In terms of educational background, more than half of the participants had completed senior high school education (53.8%), while 5 participants (38.5%) had completed diploma or bachelor's degree-level education (Table 1).

Regarding cadre-related experience, the largest proportion of participants had served as Surabaya Heroes Cadres for 4–6 years (38.5%), followed by those with more than 6 years of experience (23.1%). All participants reported prior experience in assisting patients with chronic diseases (100.0%). The most frequently encountered chronic

conditions were hypertension (92.3%) and diabetes mellitus (76.9%), followed by history of stroke (30.8%), heart disease (23.1%), and chronic kidney disease (15.4%). Most participants had received previous training related to chronic disease care (69.2%), and more than half reported experience using digital health tools (61.5%). Overall, readiness to support precision care implementation was most commonly reported at a moderate level (53.8%), followed by high readiness (38.5%) and low readiness (7.7%) (Table 1).

Thematic analysis of the in-depth interviews identified seven main themes reflecting the readiness of Surabaya Heroes Cadres to support the implementation of precision care in chronic disease management. These themes included: knowledge and conceptual readiness for precision care, operational readiness of community health cadres, community-based risk identification and patient monitoring, digital and data readiness, interprofessional and community collaboration, implementation barriers, and sustainability of precision care implementation.

First Theme: Knowledge and Conceptual Readiness for Precision Care

The first theme describes cadres' understanding of precision care as an individualized approach to chronic disease management. Although most participants were not familiar with the term "precision care," they understood the importance of tailoring care according to each patient's condition, risk factors, and long-term monitoring needs. This theme consisted of two sub-themes: (a) understanding individualized chronic disease care and (b) familiarity with precision care concepts.

(a) Understanding individualized chronic disease care

Participants emphasized that patients with chronic diseases have different needs and should not be managed using the same approach.

"Every patient is different. Some can take their medication regularly, but others need to be reminded often by their family." (P1)

"For example, patients with hypertension cannot all be approached in the same way. Some have problems with their diet, some are affected by stress, and others rarely come for check-ups." (P6)

Participants also explained that risk-based care was important, especially for patients with uncontrolled blood pressure, uncontrolled blood glucose, or a history of complications.

"We usually look at who is at higher risk, for example those whose blood pressure is often high or whose blood sugar is uncontrolled." (P2)

"In my opinion, patients who have had a stroke or often experience dizziness need more attention because their risk is higher than those whose condition is stable." (P9)

Long-term monitoring was also considered necessary because chronic disease conditions may change over time.

"Chronic disease cannot be monitored only once. It has to be checked continuously because this month the condition may be good, but next month it may increase again." (P3)

"If patients are only checked during community activities, sometimes we cannot really see the changes. Cadres need to know the patient's progress over time." (P11)

Table 1. Characteristics of Participants (n = 13)

Characteristics	Category	n	%
Age	26–35 years	2	15.4
	36–45 years	4	30.8
	46–55 years	5	38.5
	>55 years	2	15.4
Gender	Female	12	92.3
	Male	1	7.7
Educational Level	Junior high school	1	7.7
	Senior high school	7	53.8
	University degree	5	38.5
Occupation	Housewife	7	53.8
	Private employee	3	23.1
	Entrepreneur	2	15.4
	Retired	1	7.7
Duration as a Surabaya Heroes Cadre	<1 year	1	7.7
	1–3 years	4	30.8
	4–6 years	5	38.5
	>6 years	3	23.1
Experience in Assisting Patients with Chronic Diseases	Yes	13	100.0
	No	0	0.0
Types of Chronic Diseases Commonly Encountered	Hypertension	12	92.3
	Diabetes mellitus	10	76.9
	History of stroke	4	30.8
	Heart disease	3	23.1
	Chronic kidney disease	2	15.4
Previous Training Related to Chronic Disease Care	Yes	9	69.2
	No	4	30.8
Experience Using Digital Health Tools	Yes	8	61.5
	No	5	38.5
Readiness to Support Precision Care Implementation	High	5	38.5
	Moderate	7	53.8
	Low	1	7.7

Table 2. Themes, Sub-themes, and Categories from In-depth Interviews

Main Theme	Sub-theme	Category
1. Knowledge and Conceptual Readiness for Precision Care	1.1 Understanding individualized chronic disease care	Patient-specific needs; risk-based care; long-term monitoring
	1.2 Familiarity with precision care concepts	Limited knowledge of terminology; practice-based understanding; need for conceptual clarification
2. Operational Readiness of Community Health Cadres	2.1 Role confidence and motivation	Volunteer commitment; prior field experience; perceived responsibility
	2.2 Capacity-building needs	Training needs; clinical guidance; simplified care protocols
3. Community-Based Risk Identification and Patient Monitoring	3.1 Identification of chronic disease risks	Hypertension risk; diabetes risk; lifestyle risk factors; poor adherence
	3.2 Patient monitoring practices	Blood pressure monitoring; blood glucose checks; symptom observation; home visits
4. Digital and Data Readiness	4.1 Health data documentation	Manual records; patient monitoring forms; reporting to health workers
	4.2 Use of digital tools	WhatsApp communication; mobile-based reporting; willingness to use applications
	4.3 Digital barriers	Limited digital literacy; internet limitations; inconsistent data entry
5. Interprofessional and Community Collaboration	5.1 Coordination with health professionals	Referral pathways; feedback from nurses; supervision from primary health care staff
	5.2 Family and social support	Family involvement; peer support; community leader engagement
6. Implementation Barriers	6.1 Patient-level barriers	Low awareness; non-adherence; resistance to lifestyle change
	6.2 Cadre-level barriers	Limited knowledge; limited time; lack of confidence
	6.3 System-level barriers	Lack of equipment; lack of standardized guidelines; limited training access
7. Sustainability of Precision Care Implementation	7.1 Required program support	Continuous mentoring; monitoring tools; educational materials
	7.2 Program integration	Integration with community health posts; regular evaluation; recognition for cadres

(b) Familiarity with precision care concepts

Although participants demonstrated practical understanding of individualized care, the terminology of precision care was still unfamiliar.

"I have just heard the term precision care. But if it means care according to the patient's condition, I understand it a little." (P4)

"The term is still unfamiliar to us. Maybe if it is explained using case examples, cadres will understand it more easily." (P8)

Several participants stated that their understanding came mainly from practical field experience rather than formal theoretical knowledge.

"We do not know the theory, but in the field, we usually adjust the way we communicate according to the residents' condition." (P5)

"So far, we have learned from experience. If the patient is elderly, the approach is different from someone who is still actively working." (P12)

Participants also highlighted the need for clearer explanations of the concept and scope of precision care.

"The meaning and boundaries of precision care need to be explained first, so cadres do not misunderstand their role." (P7)

"If we are only given the term, we may be confused. It would be better to have a simple explanation, for example what should be recorded and what should be reported." (P13)

Second Theme: Operational Readiness of Community Health Cadres

The second theme reflects cadres' motivation, role confidence, and perceived readiness to support the implementation of precision care. Participants expressed willingness to be involved in chronic disease programs, but they also emphasized the need for additional training, clinical guidance, and simplified protocols. This theme consisted of two sub-themes: (a) role confidence and motivation and (b) capacity-building needs.

(a) Role confidence and motivation

Most participants described strong commitment as community volunteers and perceived themselves as part of the community health support system.

"We are used to helping residents, so if this program is for community health, I am ready to participate." (P1)

"As cadres, we are not medical personnel, but we have a responsibility to help monitor residents in our community." (P10)

Their previous field experience helped them feel more confident in supporting patients with chronic diseases.

"I have been involved in community health post and integrated non-communicable disease post activities for several years, so I have often met patients with hypertension and diabetes." (P2)

"Field experience helps us recognize which residents are usually compliant and which ones need to be visited more often." (P6)

Participants also viewed their role as a bridge between residents and health professionals.

"If a resident has high blood pressure, we feel the need to remind them to go to the primary health care center." (P3)

"I feel that cadres are a bridge between residents and health workers. So, if there is a problem, we need to help communicate it." (P9)

(b) Capacity-building needs

Participants stated that additional training was needed, especially in reading simple health examination results and providing chronic disease education.

"We need more training, especially on how to read simple examination results." (P4)

"If there is special training on chronic diseases, cadres can be more confident when giving education to residents." (P11)

Clinical guidance from health professionals was considered essential because cadres recognized the limits of their role.

"We still need guidance from nurses or primary health care staff because there are things cadres cannot decide on their own." (P5)

"Sometimes patients ask about medication, but we do not dare to answer too deeply. It would be better to have guidance from health professionals." (P12)

Participants also emphasized the need for simple protocols to guide their actions in the community.

"If there is a simple guideline, for example what the first step is and when to refer, it will help cadres." (P7)

"The form should not be too complicated. If there are too many columns, cadres may have difficulty using it during field activities." (P13)

Third Theme: Community-Based Risk Identification and Patient Monitoring

The third theme describes how cadres identify chronic disease risks and monitor patients in community settings. Participants frequently encountered hypertension, diabetes mellitus, lifestyle-related risks, and poor treatment adherence. This theme included two sub-themes: (a) identification of chronic disease risks and (b) patient monitoring practices.

(a) Identification of chronic disease risks

Hypertension was the most frequently encountered condition, particularly among older adults.

"The condition we most often encounter is high blood pressure, especially among older residents." (P1)

"Many patients feel fine even though their blood pressure is high. That is often a challenge for cadres." (P8)

Participants also described diabetes-related risks, particularly uncontrolled blood glucose and difficulty changing dietary habits.

"For diabetes, we usually find residents whose blood sugar is high but who still find it difficult to reduce sweet foods." (P2)

"Some patients already know they have diabetes, but they do not check regularly because they feel their body is still strong." (P10)

Lifestyle factors and poor adherence were also identified as common problems.

"Diet remains a problem. Many residents find it difficult to reduce salt, fried foods, or sweet foods." (P3)

"Besides food, physical activity is also lacking. Some patients mostly stay at home and rarely move." (P6)

"Some patients only take medication when they feel dizzy. When they feel better, they stop taking the medicine." (P4)

"We often remind them, but the decision remains with the patient. Sometimes they forget or feel tired of having to take medication continuously." (P9)

(b) Patient monitoring practices

Participants described several monitoring activities, including blood pressure measurement, blood glucose checks, symptom observation, and home visits.

"We usually help measure blood pressure during integrated community health post activities." (P5)

"If the blood pressure result is high, we record it and advise the patient to go to the primary health care center." (P11)

Blood glucose monitoring was conducted less frequently and depended on the availability of tools and supplies.

"Blood sugar checks are usually done during certain activities, not every week." (P7)

"If the device and strips are available, cadres can help monitor blood sugar among at-risk residents." (P12)

Participants also observed symptoms and conducted home visits for patients who were less likely to attend community health activities.

"We pay attention to patients' complaints, such as frequent dizziness, weakness, or swelling in the legs." (P8)

"Sometimes patients do not immediately tell us. So cadres need to ask gently about the symptoms they feel." (P13)

"For patients who rarely come to the community health post, we usually try to visit their homes." (P1)

"Home visits help us see the patient's condition directly, including the support from their family." (P10)

Fourth Theme: Digital and Data Readiness

The fourth theme reflects cadres' readiness to document health data and use digital tools. Participants were familiar with manual records and WhatsApp-based communication, but some still faced challenges in using digital reporting systems. This theme consisted of three sub-themes: (a) health data documentation, (b) use of digital tools, and (c) digital barriers.

(a) Health data documentation

Participants explained that health data documentation was still mostly conducted manually.

"So far, most recording is still done using notebooks." (P2)

"Manual records are actually easy, but sometimes it is difficult to find old data if they are not organized properly." (P6)

They considered patient monitoring forms useful as long as the format was simple.

"If there is a patient monitoring form, cadres can be more directed when recording examination results." (P3)

"A simple form will make it easier for us to distinguish between stable patients and those who need more attention." (P11)

Participants also highlighted the importance of reporting abnormal findings to health workers.

"If there is an abnormal result, we usually report it to the primary health care staff." (P4)

"We need a clear reporting pathway so that data from cadres do not just stop in the records." (P9)

(b) Use of digital tools

WhatsApp was the most commonly used digital platform for communication among cadres and health workers.

"The easiest communication is through WhatsApp because almost all cadres use it." (P5)

"Usually, if there is information about activities or patients who need follow-up, we share it through the group." (P12)

Participants were open to mobile-based reporting if the system was easy to use.

"If reporting can be done through a mobile phone, it is actually faster, as long as the application is easy to use." (P7)

"We are willing to try digital reporting, but we need to be taught the steps first." (P13)

"I am willing to learn how to use an application if it can help monitor patients." (P1)

"Using an application is not a problem, as long as there are not too many menus and it is not confusing." (P8)

(c) Digital barriers

Participants identified limited digital literacy, unstable internet connection, and incomplete data entry as barriers to digital implementation.

"Some cadres are used to using mobile phones, but others are still afraid of pressing the wrong button." (P2)

"If the application uses too many technical terms, some cadres may have difficulty." (P10)

"Sometimes the signal is not smooth, especially when activities are carried out in certain places." (P3)

"If it has to be online all the time, that can be a problem. It would be better if the data could be saved first and sent later when there is internet access." (P6)

"Sometimes the data are incomplete because the activities are crowded and cadres have to serve many residents." (P4)

"There are times when we forget to fill in some sections, especially if the format is too long." (P11)

Fifth Theme: Interprofessional and Community Collaboration

The fifth theme highlights the importance of collaboration between cadres, health professionals, families, peers, and community leaders. Participants emphasized that precision care could not be implemented by cadres alone. This theme consisted of two sub-themes: (a) coordination with health professionals and (b) family and social support.

(a) Coordination with health professionals

Participants emphasized the importance of clear referral pathways and follow-up from health professionals.

"If a patient needs further examination, we direct them to the primary health care center." (P5)

"Cadres need to know when patients only need education and when they should be referred immediately to health professionals." (P9)

Feedback from nurses and supervision from primary health care staff were considered important for improving cadres' performance.

"We are happy when, after reporting, there is feedback from nurses, so we know the follow-up." (P7)

"If health workers give input, cadres can learn from the cases found in the field." (P12)

"Support from the primary health care center is important so that cadre activities remain in line with the guidance." (P8)

"We feel more confident working when there is supervision because cadres should not work alone without guidance." (P13)

(b) Family and social support

Participants considered family involvement important for medication adherence, dietary control, and patient motivation.

"Family has a major role, especially in reminding patients to take medication and manage food at home." (P1)

"If the family is supportive, patients are usually more likely to follow the recommendations." (P10)

Peer support and community leader involvement were also perceived as important.

"Patients sometimes become more motivated when they see their neighbors also attending check-ups." (P2)

"Support from fellow residents can help because they feel they are not alone in facing their illness." (P6)

"If the neighborhood leader or community figure is involved, residents are usually easier to invite." (P3)

"Health programs will be stronger if not only cadres are involved, but also the wider community." (P11)

Sixth Theme: Implementation Barriers

The sixth theme describes barriers that may hinder precision care implementation. These barriers emerged at the patient, cadre, and system levels. This theme consisted of three sub-themes: (a) patient-level barriers, (b) cadre-level barriers, and (c) system-level barriers.

(a) Patient-level barriers

Participants reported that some patients had low awareness of chronic disease risks and were reluctant to undergo routine examinations.

"There are still residents who feel healthy, so they do not want to be examined." (P4)

"Some patients only come when they already have symptoms. For chronic diseases, monitoring should be routine." (P9)

Non-adherence and resistance to lifestyle modification were also frequently reported.

"The problem that often appears is that patients do not take medication regularly or do not come for follow-up." (P5)
"We have reminded them, but some patients still follow their own habits." (P12)
"Changing eating habits is difficult, especially when it has been a habit for a long time." (P7)
"Sometimes patients are willing to change after being informed, but a few weeks later they return to their old habits." (P13)

(b) Cadre-level barriers

Cadres acknowledged their limited knowledge, limited time, and lack of confidence in supporting patients with chronic diseases.

"We still need to learn more about chronic diseases and warning signs." (P1)
"Cadres can help monitor, but our knowledge is still limited when explaining more clinical matters." (P8)
"Cadres also have household responsibilities and other activities, so the time to accompany patients is sometimes limited." (P2)
"If there are many patients, not all of them can be visited at the same time." (P10)
"Sometimes I feel unsure when patients ask questions related to medication." (P3)
"We need practice so that we can be more confident, especially when explaining examination results to patients." (P6)

(c) System-level barriers

System-level barriers included limited equipment, lack of standardized guidelines, and limited access to training.

"Blood pressure devices are available, but they are not always sufficient when there are many participants." (P4)
"For blood sugar checks, we still depend on the availability of tools and supplies from primary health care activities." (P11)
"There is no specific guideline yet regarding cadres' steps in precision care." (P5)
"If there is a common standard, all cadres can work in a more uniform way." (P9)
"Not all cadres have the same opportunity to attend training." (P7)
"Training is usually available, but the timing does not always suit all cadres." (P12)

Seventh Theme: Sustainability of Precision Care Implementation

The seventh theme reflects participants' expectations for sustaining precision care in community-based chronic disease management. Participants emphasized the importance of continuous mentoring, monitoring tools, educational materials, integration into existing community health posts, regular evaluation, and recognition for cadres. This theme consisted of two sub-themes: (a) required program support and (b) program integration.

(a) Required program support

Participants stated that one-time training would not be sufficient. Continuous mentoring was considered important to help cadres manage real cases in the community.

"It should not only be one training session; there needs to be mentoring afterward." (P8)
"If there is regular mentoring, cadres can ask about cases they find in the field." (P13)
Monitoring tools and educational materials were also considered necessary.
"Cadres need measuring tools that are available and can be used during community activities." (P1)
"Besides the tools, we also need a clear monitoring format so that patient data are not scattered." (P10)
"Leaflets or simple pictures will help when explaining information to patients." (P2)
"Sometimes patients understand better when they are given visual examples, not only verbal explanations." (P6)

(b) Program integration

Participants suggested that precision care should be integrated into existing community-based health activities, such as community health posts or integrated non-communicable disease posts.

"This program will be easier to implement if it is included in routine community health post activities." (P3)
"If it is made separate, residents may be reluctant to come. But if it is combined with regular activities, it is more feasible." (P11)
Regular evaluation was also viewed as important to improve the quality of documentation and follow-up.
"Evaluation is needed so that cadres know whether the recording and reporting are correct." (P4)
"With regular evaluation, we can know which patients are improving and which ones need more attention." (P9)

Recognition for cadres was considered important to sustain motivation.

"Cadres need to be appreciated, not necessarily with money, but also through certificates or formal acknowledgment." (P5)
"If there is appreciation, we feel that cadre work is noticed, and that makes us more motivated." (P12)

DISCUSSION

This study found that the readiness of Surabaya Heroes Cadres to support community-level precision care was practical but conditional rather than uniformly high. Cadres already performed activities that could support individualized chronic disease care, including basic risk identification, blood pressure and blood glucose monitoring, symptom observation, individualized education, home visits, and referral support. However, their ability to perform these activities consistently was constrained by uneven conceptual knowledge, limited confidence, inconsistent documentation, digital and equipment barriers, time limitations, and variable access to professional guidance. The main contribution of this study is therefore to demonstrate that precision care at the community level need not initially depend on complex technologies or advanced analytics. It can begin with a simple, connected pathway comprising risk monitoring, individualized education, prioritized home visits, longitudinal documentation, and protocol-directed referral. Nevertheless, this pathway cannot operate through cadre motivation alone. It requires standardized protocols,

competency-based training, appropriate equipment, supervision and feedback from health professionals, a secure and sustainable data system, and explicit boundaries around the responsibilities of non-health professionals.

Although many participants were unfamiliar with the term "precision care," they recognized that people with the same chronic disease may differ in risk factors, adherence, lifestyle, family support, symptoms, and access to healthcare. Their conceptual readiness was therefore grounded more strongly in practical and contextual knowledge than in formal terminology. This finding is consistent with an Indonesian study of primary healthcare integration, which found that cadre enthusiasm, commitment, and collaboration coexisted with gaps in human resources, facilities, data synchronization, and digital reporting. Most health posts in that study were classified as moderately ready rather than fully ready (Setiaasih et al., 2025). The present study extends that evidence by specifying how cadres' contextual knowledge could be translated into a low-complexity precision-care approach for chronic disease management. Training should therefore connect cadres' existing experience to clear concepts and practical decisions rather than focusing primarily on technical terminology. At the same time, practice-based familiarity should not be interpreted as sufficient competence for clinical decision-making.

The proposed pathway is also consistent with evidence that structured community health-worker interventions can improve chronic disease screening, education, monitoring, and linkage to care. In Indonesia, participation in integrated non-communicable disease posts has been associated with greater hypertension and diabetes screening and improved knowledge, although improvements in knowledge have translated only partly into healthier behaviour or metabolic outcomes (Fritz et al., 2024). Similarly, participation in community-based non-communicable disease services has been associated with greater hypertension awareness and treatment but not with improved blood pressure control (Sujarwoto & Maharani, 2020). These findings qualify an overly optimistic interpretation of cadre readiness: screening and education are valuable, but they do not automatically produce disease control. The present study extends previous evidence by identifying a mechanism through which community services could move beyond one-time screening–repeated risk monitoring, education adapted to individual barriers, home visits for patients needing closer follow-up, longitudinal recording of changes, and referral using predefined criteria.

International intervention studies further support this interpretation. A randomized trial in Argentina found that a multicomponent intervention incorporating community health-worker home visits, health coaching, blood pressure monitoring, physician involvement, and text messaging improved blood pressure control compared with usual care (He et al., 2017). However, because the intervention combined community and professional components, its effectiveness cannot be attributed to community health-worker motivation or monitoring alone. Likewise, a home-based intervention in Ethiopia substantially improved linkage to hypertension care, but only a small proportion of participants initiated antihypertensive medication (Teshome et al., 2025). This distinction is important for interpreting the present findings. Cadres may identify risk and facilitate referral, but clinical benefit also depends on whether the primary healthcare system responds, completes assessment, initiates appropriate treatment, and communicates the follow-up plan to the cadre and patient.

Training appeared to influence readiness through both role clarity and confidence. Cadres who understood what to observe, measure, record, and report were better positioned to act confidently within their role. In contrast, uncertainty about interpreting measurements, warning signs, medication-related questions, or disease complications reduced confidence. Training alone, however, is unlikely to produce sustainable readiness if cadres lack simplified protocols, functioning equipment, professional supervision, and feedback. World Health Organization guidance similarly emphasizes that community health-worker training should correspond to assigned tasks and should be accompanied by clear responsibilities, supportive supervision, continuing education, adequate supplies, and integration with primary healthcare teams (World Health Organization, 2018). Reviews of community health worker programmes reach a similar conclusion, identifying community embeddedness, supportive supervision, continuing education, and adequate logistical support as recurring determinants of programme performance (Scott et al., 2018).

Clear role boundaries are especially important because Surabaya Heroes Cadres are lay community volunteers rather than qualified healthcare professionals. Within the proposed model, cadres could undertake protocol-based measurement of risk factors, use simple checklists, observe symptoms, reinforce individualized health education, support adherence, conduct prioritized home visits, document approved information, and activate predefined referral pathways. Diagnosis, interpretation of complex clinical findings, medication initiation or adjustment, and management of acute, unstable, or complicated conditions should remain the responsibility of qualified health professionals. Cadres should also not be expected to determine independently whether an abnormal result is clinically insignificant. Protocols should specify the measurements cadres may undertake, equipment and techniques to be used, threshold values or warning signs requiring referral, urgency of escalation, documentation requirements, and procedures for contacting a nurse or other designated professional. The model should therefore be understood as supervised task sharing rather than substitution of cadres for nurses, physicians, or other health professionals.

Cadre motivation and commitment should also not be interpreted as unlimited capacity to assume additional responsibilities. Cadres commonly work as volunteers and may simultaneously have paid employment, household and caregiving responsibilities, and duties in several community programs. An Indonesian evaluation of Posbindu implementation found that cadres frequently worked across multiple programs while facing limited time, complex reporting requirements, inadequate equipment, skills gaps, and difficulties with devices and internet connectivity (Widyaningsih et al., 2022). A broader review relevant to Indonesia similarly found that community health workers often addressed several diseases and numerous activities, and that excessive roles, broad catchment areas, inadequate facilities, limited mentoring, and weak supervision contributed to stress and overload (Nida et al., 2024). Evidence from low- and middle-income countries likewise indicates that community health worker performance is shaped by intervention design factors, including the nature of tasks and time allocation, human resource management, quality assurance, links with the community, integration within the health system, and the availability of resources and logistics (Kok et al., 2015).

Introducing precision-care activities without considering this existing workload could increase incomplete monitoring, duplicate documentation, cadre

attrition, or displacement of other essential responsibilities. Before implementation, primary healthcare centers should assess cadres' current duties, the number and risk profile of patients assigned to each cadre, the expected frequency and duration of contacts, and the time required for documentation and referral. Activities should be integrated into existing community-post and home-visit schedules rather than added as a parallel program. High-risk patients could be prioritized for more intensive follow-up, while stable patients could receive less frequent contact according to protocol. Reporting requirements should be kept concise, and duplicate paper and digital entry should be avoided. Transport reimbursement, internet support, functioning equipment, recognition, and other material or financial support consistent with local policy should be considered when additional responsibilities are assigned. Social recognition may reinforce motivation, but it cannot compensate for excessive workload or inadequate resources.

The findings also show that risk monitoring becomes meaningful only when it is connected to documentation and professional response. Measuring blood pressure, blood glucose, or symptoms does not by itself constitute precision care. The information must be recorded consistently, compared over time, communicated to the appropriate health professional, and followed by a proportionate response. Thus, the themes identified in this study form an interconnected pathway: training and protocols strengthen role clarity and confidence; confidence supports standardized monitoring and individualized education; monitoring generates longitudinal information; documentation makes changes visible; and referral and professional feedback convert those observations into follow-up care. A weakness at any point can interrupt the pathway. This interpretation is consistent with WHO guidance that reliable, longitudinal, case-based data are central to monitoring non-communicable diseases at the primary-care level (World Health Organization, 2022).

Digital documentation could strengthen this pathway by making observations from Posbindu activities and home visits available for follow-up and directed referral. However, participants' familiarity with WhatsApp should not be treated as equivalent to readiness for secure digital documentation. Digital systems may create additional work, especially when interfaces are complex, internet connectivity is unreliable, or the same information must be entered into several systems. Implementation should therefore use simple forms, minimize required data fields, provide offline functionality where feasible, and include practical training and technical assistance.

Digital documentation also introduces risks related to confidentiality, unauthorized access, inaccurate data entry, personal-device use, and unintended disclosure within the community. Indonesia's Personal Data Protection Law classifies health information as specific personal data and requires its processing to be lawful, purpose-specific, limited, secure, and accountable ("Undang-Undang Republik Indonesia Nomor 27 Tahun 2022 tentang Pelindungan Data Pribadi [Law of the Republic of Indonesia Number 27 of 2022 concerning Personal Data Protection]," 2022). Ministry of Health Regulation No. 24 of 2022 further requires electronic medical-record systems to protect confidentiality, integrity, and availability and requires healthcare facilities to define access rights through institutional procedures ("Peraturan Menteri Kesehatan Republik Indonesia Nomor 24 Tahun 2022 tentang Rekam Medis [Regulation of the Minister of Health of the Republic of Indonesia Number 24 of 2022 concerning Medical Records]," 2022). Privacy is particularly important when cadres live in the same communities as patients. Although evidence from other countries and disease contexts cannot be applied directly to Surabaya, research has shown that concerns about community health workers maintaining confidentiality may reduce public trust and willingness to disclose sensitive information (Geldsetzer et al., 2017).

Cadre documentation should therefore occur only through a workflow approved and supervised by the responsible Puskesmas or health authority. Cadres should receive individual, role-limited access only to information required for screening, follow-up, and referral. Access and changes should be logged, and identifiable information should be transmitted and stored through authorized systems. Training should cover confidentiality, secure account and device use, appropriate handling of patient identifiers, correction of data-entry errors, and reporting of lost devices or suspected data breaches. Patients should receive clear information about what data will be collected, why they are needed, who may access them, and how they will be used. Identifiable clinical information should not be circulated through ordinary personal or group chats. This does not exclude an officially authorized and integrated WhatsApp-based workflow, but such a system should be clearly distinguished from informal messaging. Cadres' digital responsibilities should be limited to entering approved observations and transmitting referral alerts; validation of clinical information, interpretation of findings, and unrestricted access to medical records should remain under qualified health professionals.

The findings have several practical implications for primary healthcare centers, integrated non-communicable disease posts, and community health programs. At the Puskesmas level, implementation would require a designated nurse or other health-professional focal person responsible for cadre training, supervision, record validation, review of high-risk cases, referral decisions, and timely feedback. Puskesmas should provide simplified protocols, calibrated equipment, necessary consumables, competency assessment, refresher training, and clear escalation pathways. It should also retain responsibility for data governance and periodically review workload, data completeness, referral completion, and possible adverse events.

At integrated non-communicable disease posts, the model could be incorporated through a short standardized risk checklist and a longitudinal patient register. Repeat measurements should follow standardized procedures, and patients with predefined warning signs, missed follow-up, or worsening measurements should be flagged for professional review or prioritized home visits. Referral completion and feedback should be documented so that screening results lead to action rather than ending with data collection. These procedures should be incorporated into existing Posbindu workflows to avoid creating a separate reporting system.

Community health programs could use cadres' knowledge of patients' household circumstances to individualize education, involve family members appropriately, support adherence, and reach patients who have difficulty attending health services. Community leaders may assist with mobilization and program acceptance, but patient confidentiality should be preserved and individual health information should not be disclosed without an appropriate basis. Program schedules and reporting requirements should also be coordinated across health initiatives so that precision-care activities do not duplicate or displace cadres' existing responsibilities.

Sustainability should therefore be understood as a property of the supporting system rather than an outcome

of individual motivation. Motivation encourages participation, but protocols establish consistency, training and supervision maintain competence, equipment makes monitoring possible, secure documentation supports continuity, and professional feedback demonstrates that cadres' work results in action. One-time training is unlikely to be sufficient. Refresher education, supportive supervision, equipment maintenance, data-system maintenance, workload review, and periodic evaluation require recurrent resources. Recognition may support retention, but it cannot compensate for excessive workload, inadequate resources, or unclear accountability.

This study has several limitations. First, it involved 13 Surabaya Heroes Cadres from one community context; the findings may therefore not represent cadres working in other regions or health systems. Second, the findings were based on self-reported experiences and perceived readiness rather than direct observation of performance. Responses may have been influenced by recall or social-desirability bias. Third, the study included cadres only and did not incorporate the perspectives of patients, family members, nurses, Puskesmas managers, or other health professionals. The interview accounts were not corroborated using service records, referral data, or observations of cadre practice. Fourth, the high-, moderate-, and low-readiness profiles were study-specific qualitative interpretations rather than scores from a validated readiness instrument. Finally, the study did not test implementation fidelity, workload effects, patient safety, data quality, privacy practices, clinical outcomes, or the effectiveness and cost of the proposed pathway.

Future research should co-design and pilot the model with cadres, patients, families, Puskesmas staff, and program managers. Evaluation should examine feasibility, cadre workload and retention, competency, documentation completeness, referral completion, professional response time, patient acceptability, privacy and security, costs, and clinical outcomes. Such evaluation is necessary before wider implementation.

CONCLUSION

Surabaya Heroes Cadres demonstrated practical readiness to support chronic disease monitoring, individualized education, home visits, and referral. However, implementing community-level precision care requires stronger conceptual knowledge, clear role boundaries, operational guidelines, competency-based training, professional supervision, appropriate monitoring tools, and a secure reporting system. Primary healthcare centers should develop concise training modules, simple risk and referral algorithms, standardized longitudinal monitoring forms, and mechanisms for providing feedback to cadres. Cadres should undertake protocol-based monitoring, education, documentation, and referral, while clinical decisions remain the responsibility of qualified health professionals. The proposed model should be pilot-tested to assess feasibility, workload, data quality, referral completion, safety, and acceptability before wider implementation.

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DECRALATION

Ethics approval and consent to participate

This study was conducted in accordance with the ethical principles of research involving human participants. The study protocol was reviewed and approved by the Health Research Ethics Committee of the Faculty of Health Sciences, Universitas Muhammadiyah Surabaya Indonesia, under approval number 002/KEPK/F/1/2025, issued in January 2025. All participants were informed about the study objectives, procedures, voluntary participation, confidentiality, and their right to withdraw at any time without consequences. Written informed consent was obtained from all participants before participation.

Consent for publication

Not applicable. This manuscript does not contain any individual person's identifiable data, images, or personal information. If any anonymized quotations are included, participants provided consent for their responses to be used for research and publication purposes.

Availability of data and materials

The datasets generated and/or analyzed during the current study are not publicly available due to confidentiality and privacy considerations, but may be available from the corresponding author upon reasonable request and with permission from the relevant institution or ethics committee.

Conflicts of interest Statement

The authors declare that they have no conflicts of interest related to this study.

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During the preparation of this manuscript, the authors used ChatGPT (OpenAI) and Grammarly for language refinement, grammar checking, and improving the clarity of academic writing. The authors reviewed and edited all AI-assisted outputs and take full responsibility for the accuracy, integrity, and final content of the manuscript. No AI tool was used to generate research data, conduct interviews, perform qualitative analysis, or replace researcher judgment.

Authors' contributions.

Septian Galuh Winata contributed to the study conception, design, data collection, data analysis, and drafting of the manuscript. Diah Priyantini contributed to the study supervision, conceptualization, methodology refinement, critical review, and manuscript revision. Chlara Yunita Prabawati contributed to data analysis, interpretation of findings, and manuscript preparation. Asri

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ADDITIONAL INFORMATION

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