



Community Integrative Ethnomedicine for Diabetes Prevention: A Holistic Community Empowerment Approach

Isnaini Chantika Yuliandari¹, Dhia Jinan Naura Nidaulhaq¹, Wulan Riandini¹, Fatihah Halimatul Azizah¹, Shabina Nurizzati¹, Devita Fitri Azzahra¹, Oktavia Ramadhani Eka Fitri¹, Dwi Setiani Sumardiko¹, Rini Hamsidi¹

¹Traditional Medicine Study Program, Faculty of Vocational Studies, Universitas Airlangga, Surabaya, Indonesia

E-mail: isnaini.chantika.yuliandari-2023@vokasi.unair.ac.id

ABSTRACT

Introduction: Diabetes mellitus (DM) remains a major global public health challenge, particularly in low- and middle-income countries where delayed diagnosis and inadequate preventive behaviors contribute to increasing disease burden. Conventional community education often improves knowledge but rarely integrates culturally relevant traditional medicine into a structured prevention strategy. This study evaluated the effectiveness of a holistic community empowerment program combining diabetes education, self-acupressure training, preventive herbal medicine education, and opportunistic blood glucose screening, while introducing an integrated conceptual direction for community-based diabetes prevention.

Methods: A one-group pretest–posttest pre-experimental study, reported according to the TREND Statement, was conducted among 30 women aged 40–60 years participating in the Family Welfare Movement (PKK) Indonesia. Diabetes knowledge was assessed using the 24-item Diabetes Knowledge Questionnaire before and immediately after the intervention. Random blood glucose screening was voluntarily performed using a calibrated glucometer as part of early metabolic risk detection. Data were analyzed descriptively using frequencies and percentages.

Results: Twenty participants completed both knowledge assessments, while 16 underwent blood glucose screening. Participants demonstrating poor diabetes knowledge decreased from 70.0% at baseline to 0% after the intervention, whereas good knowledge increased from 0% to 100%. Blood glucose screening identified 14 participants (87.5%) within the normal range and two participants (12.5%) with random blood glucose levels exceeding 200 mg/dL, prompting immediate referral for further clinical evaluation.

Conclusion: Integrating health education, self-acupressure, preventive herbal medicine, and opportunistic screening within existing community organizations is a feasible and culturally responsive strategy for strengthening diabetes prevention. These findings provide preliminary support for the proposed Community Integrative Ethnomedicine Prevention (CIEP) Model, which conceptually integrates health literacy, evidence-informed traditional medicine, community empowerment, and early metabolic surveillance as an emerging framework for sustainable diabetes prevention.

KEYWORDS

Diabetes Mellitus; Health Education; Community Participation; Complementary Therapies; Medicinal Plants; Blood Glucose; Early Diagnosis.





Received: 13 May 2026

Revised: 23 June 2026

Accepted: 9 July 2026

How to cite: Yuliandari, Isnaini Chantika, et al. (2026).

Community Integrative Ethnomedicine for Diabetes Prevention:

A Holistic Community Empowerment Approach. Inov Lokal

Keberdayaan Masy dalam Pembang Berkelanjutan. 4(1): 64-73.



INTRODUCTION

Diabetes mellitus (DM) remains one of the fastest-growing non-communicable diseases worldwide, imposing substantial clinical, economic, and social burdens on healthcare systems. The International Diabetes Federation estimates that more than 589 million adults were living with diabetes in 2025, with the greatest increase occurring in low- and middle-income countries where preventive healthcare resources remain limited. Indonesia is among the countries experiencing the most rapid growth in diabetes prevalence, driven by population ageing, urbanization, sedentary lifestyles, and unhealthy dietary patterns (Walker *et al.*, 2023; Power *et al.*, 2024). Despite advances in pharmacological therapy, nearly half of diabetes cases remain undiagnosed until complications develop, underscoring the need to strengthen community-based prevention and early detection strategies before irreversible metabolic dysfunction occurs.

Current diabetes prevention programs primarily emphasize health education focusing on diet, physical activity, and routine screening. Although these interventions improve knowledge, their long-term sustainability is often limited because educational messages are rarely integrated with culturally familiar health practices that encourage continuous community engagement (Choudhry *et al.*, 2018; Kirmayer and Jarvis, 2019; Foyet and Child, 2024). Traditional medicine—including herbal remedies and self-acupressure—has increasingly been recognized as a complementary approach for promoting metabolic health, yet these modalities are frequently implemented as isolated interventions rather than as components of a structured prevention framework. Consequently, the potential synergy between evidence-informed traditional medicine, behavioral education, and early metabolic surveillance remains insufficiently explored within community-based health promotion programs (Agudelo-Hernandez, Plata-Casas and Gonzalez-Abril, 2025).

In Indonesia, community organizations such as the Family Welfare Movement (PKK) provide an established platform for implementing preventive health programs because of their strong social networks and regular community activities. A community served by the Malang City Health Center, an area with a relatively high burden of diabetes mellitus. Preliminary observations indicated limited public awareness regarding diabetes risk factors and inadequate access to practical non-pharmacological prevention strategies despite high community interest in participatory health activities. These circumstances provide an opportunity to redesign diabetes prevention by combining structured education with practical complementary interventions and opportunistic blood glucose screening delivered through existing community organizations (Kurtz *et al.*, 2018; Rong and Yuan, 2025).

Recognizing these challenges, this study implemented a holistic community empowerment program integrating diabetes education, self-acupressure training, preventive herbal medicine education, and random blood glucose screening. Rather than viewing these components as separate interventions, this study introduces the concept of an integrated community prevention pathway in which health literacy, culturally responsive traditional medicine, behavioral self-management, and early metabolic detection function as interconnected elements of diabetes prevention. This conceptual direction, further elaborated in the Discussion as the Community Integrative Ethnomedicine Prevention (CIEP) Model, is intended





to provide a foundation for future development of sustainable, community-driven diabetes prevention strategies that integrate evidence-informed traditional medicine with primary healthcare and emerging digital health innovations.

MATERIALS AND METHODS

Study Design

This community empowerment program employed a one-group pretest–posttest pre-experimental design to evaluate changes in diabetes-related knowledge following a holistic non-pharmacological intervention. The study was conducted and reported in accordance with the Transparent Reporting of Evaluations with Nonrandomized Designs (TREND) Statement. The intervention was implemented on Indonesia.

Setting and Participants

The program was conducted in collaboration with the RT 06 Family Welfare Movement (PKK), a community-based women's organization that routinely conducts health promotion activities. Participants were recruited using convenience sampling during the monthly PKK meeting. Eligible participants were women aged 40–60 years who resided in RT 06, attended the educational session, agreed to participate voluntarily, and completed informed consent before enrollment. Participants who were unable to complete the educational activities or declined knowledge assessment were excluded from the final analysis. A total of 30 women participated in the community empowerment activities. Among them, 20 participants completed both the pre-test and post-test knowledge assessments, while 16 participants voluntarily underwent random blood glucose screening.

Intervention

The intervention consisted of a structured holistic non-pharmacological diabetes prevention program integrating four complementary components:

1. Health education, covering diabetes mellitus risk factors, signs and symptoms, prevention strategies, healthy dietary patterns, physical activity, and early detection.
2. Self-acupressure training, including demonstration and supervised practice of acupressure points commonly used to support metabolic health according to traditional medicine practice.
3. Introduction to preventive herbal medicine, emphasizing evidence-informed medicinal plants commonly available in Indonesia and their appropriate use as complementary approaches for diabetes prevention.
4. Random blood glucose screening, performed to facilitate early identification of individuals with suspected hyperglycemia and to encourage timely referral for further clinical evaluation.

The educational session was delivered interactively through lectures, group discussions, demonstrations, and question-and-answer sessions by lecturers and students from the Traditional Medicine Study Program, Faculty of Vocational Studies, Universitas Airlangga. The entire intervention was conducted during a single three-hour community session.





Outcome Measures

The primary outcome was the change in diabetes-related knowledge before and after the intervention. Knowledge was assessed using the 24-item Diabetes Knowledge Questionnaire (DKQ) administered immediately before and after the educational session. Participants' knowledge was categorized into poor, moderate, and good according to the predetermined scoring criteria. The secondary outcome was random blood glucose level obtained during community screening. Blood glucose was measured using a portable calibrated glucometer following standard infection prevention procedures. Results were classified as:

1. <70 mg/dL: hypoglycemia,
2. 70–200 mg/dL: normal random blood glucose,
3. >200 mg/dL: suspected hyperglycemia requiring referral for further clinical assessment.

Participant engagement during practical demonstrations was also documented descriptively through direct observation by the implementation team.

Data Collection Procedure

Data collection was performed in three sequential stages. During the pre-intervention stage, participant registration was completed, written informed consent was obtained, and baseline knowledge was measured using the DKQ. During the intervention stage, participants attended the structured educational session, received demonstrations of self-acupressure techniques, were introduced to preventive herbal medicine, and participated in interactive discussions. Random blood glucose screening was offered voluntarily following completion of the educational activities. During the post-intervention stage, participants completed the DKQ immediately after the intervention. Individuals identified with elevated blood glucose levels received individual counseling and were referred to the Dinoyo Primary Health Center for further medical evaluation.

Data Analysis

Participant characteristics, knowledge categories, and blood glucose results were summarized using descriptive statistics, including frequencies and percentages. Changes in knowledge distribution before and after the intervention were presented descriptively to evaluate the educational impact of the community empowerment program. Statistical analyses were performed using IBM SPSS Statistics version 29.0, with statistical significance set at $p < 0.05$ where inferential analyses were applicable.

Ethical Considerations

Participation was entirely voluntary, and written informed consent was obtained from all participants before data collection. Participant confidentiality and anonymity were maintained throughout the study by removing personal identifiers from the dataset. Individuals with random blood glucose levels exceeding 200 mg/dL were advised to seek further diagnostic evaluation and management at the Dinoyo Primary Health Center. The community empowerment activity was conducted with permission from the local community leaders and the Traditional Medicine Study Program, Faculty of Vocational Studies, Universitas Airlangga.





RESULTS AND DISCUSSION

Participant Characteristics

A total of 30 women aged 40–60 years participated in the community empowerment program. Among them, 20 participants (66.7%) completed both the pre-test and post-test Diabetes Knowledge Questionnaire (DKQ), whereas 16 participants (53.3%) voluntarily underwent random blood glucose screening. All participants were active members of the Family Welfare Movement (PKK) in Malang City.

Changes in Diabetes Knowledge

The educational intervention demonstrated a marked improvement in participants' knowledge regarding diabetes mellitus prevention. Prior to the intervention, none of the participants achieved the good knowledge category. Most participants were classified as having poor knowledge (14/20; 70.0%), while the remaining 6 participants (30.0%) demonstrated moderate knowledge.

Following the educational session, all participants who completed the post-test (20/20; 100%) achieved the good knowledge category, with no participants remaining in either the moderate or poor categories (Table 1). The transition from predominantly poor and moderate knowledge to universal good knowledge suggests that the interactive educational strategy effectively enhanced participants' understanding of diabetes risk factors, early detection, healthy lifestyle modification, and complementary prevention approaches.

Table 1. Distribution of Diabetes Knowledge Before and After the Intervention

Knowledge Category	Pre-test n (%)	Post-test n (%)
Good	0 (0.0)	20 (100.0)
Moderate	6 (30.0)	0 (0.0)
Poor	14 (70.0)	0 (0.0)
Total	20 (100.0)	20 (100.0)

Blood Glucose Screening

Random blood glucose screening was completed by 16 participants as part of the community-based early detection strategy. Fourteen participants (87.5%) presented with random blood glucose levels within the normal range (70–200 mg/dL). No participant exhibited hypoglycemia (<70 mg/dL).

Two participants (12.5%) were identified with markedly elevated blood glucose levels exceeding 200 mg/dL, recording values of 249 mg/dL and 419 mg/dL, respectively (Table 2). These findings indicate the presence of individuals at high risk for undiagnosed diabetes mellitus within the community and emphasize the importance of incorporating opportunistic blood glucose screening into community empowerment activities. Both participants received immediate counseling and were referred to the Dinoyo Primary Health Center for confirmatory diagnostic evaluation and appropriate clinical management.





Table 2. Random Blood Glucose Screening Results

Blood Glucose Category	n	%
<70 mg/dL	0	0.0
70–200 mg/dL	14	87.5
>200 mg/dL	2	12.5
Total	16	100.0

Participant Engagement During the Intervention

Participants demonstrated a high level of engagement throughout the community empowerment program. Interactive discussions, question-and-answer sessions, demonstrations of self-acupressure techniques, and the introduction of preventive herbal remedies were well received by participants. During the practical sessions, participants actively practiced the demonstrated techniques under supervision and showed enthusiasm in discussing lifestyle modifications for diabetes prevention. The integration of educational, practical, and screening activities created a participatory learning environment that encouraged active involvement and strengthened community awareness of diabetes prevention.

Overall Program Outcomes

Overall, the holistic non-pharmacological community empowerment program successfully strengthened participants' knowledge regarding diabetes mellitus prevention while simultaneously facilitating early identification of individuals with elevated blood glucose levels. The integration of health education, self-acupressure training, preventive herbal education, and opportunistic blood glucose screening proved feasible within an existing community organization (PKK) and enabled both capacity building and early risk identification. These findings support the potential of community-based empowerment strategies as an accessible and sustainable approach for strengthening diabetes prevention at the primary healthcare level.

Discussion

The present community empowerment program demonstrated substantial improvement in diabetes-related knowledge among PKK members following a holistic educational intervention integrating health education, blood glucose screening, self-acupressure, and preventive herbal medicine. The complete shift from predominantly poor and moderate knowledge at baseline to universally good knowledge after the intervention suggests that combining cognitive learning with experiential activities facilitates greater understanding than didactic education alone. Adult learners tend to retain health information more effectively when educational content is immediately translated into practical skills that can be applied in everyday life. In this program, direct demonstrations of self-acupressure, discussion of locally available medicinal plants, and opportunistic blood glucose screening transformed abstract information into meaningful experiences, thereby strengthening participants' motivation to adopt preventive behaviors (Al-Shami *et al.*, 2024; Sasakamoose *et al.*, 2024; Thorburn and Ansloos, 2026). These findings are consistent with previous studies reporting that participatory community education enhances health literacy, promotes self-management capacity, and improves community engagement in chronic disease prevention (Waddell *et al.*, 2021; Putri *et al.*, 2025; Zhou, 2025).





Beyond improving knowledge, this program highlights the value of integrating traditional medicine into community-based diabetes prevention within a structured health promotion framework. Unlike conventional educational programs that primarily focus on lifestyle modification, this intervention combined evidence-informed herbal education, self-acupressure practice, and early metabolic screening into a single preventive strategy. Such integration reflects a transition from disease-oriented education toward person-centered preventive care that acknowledges cultural health practices while remaining aligned with primary healthcare principles (Rice and Harris, 2021; Liu *et al.*, 2025). Traditional medicine should therefore be viewed not as an alternative to modern medicine but as a complementary resource that may strengthen community participation, improve preventive self-care, and increase the acceptability of health promotion programs, particularly in populations where traditional practices remain culturally embedded (Donovan *et al.*, 2024; Collins, Reid and Kearney, 2026; Stepanova *et al.*, 2026)

Community Integrative Ethnomedicine Prevention (CIEP) Model and Predictive Ethno-Preventive Ecosystem (PEPE)

Building upon these findings, we propose a conceptual framework termed the Community Integrative Ethnomedicine Prevention (CIEP) Model, which positions community empowerment as the central mechanism linking health literacy, evidence-informed traditional medicine, behavioral self-management, and early metabolic surveillance. Within this framework, educational interventions extend beyond knowledge transfer by integrating culturally familiar herbal medicine, structured self-acupressure practice, periodic community screening, and continuous cadre-led mentoring into a unified prevention ecosystem. Looking ahead, this model could evolve into a Predictive Ethno-Preventive Ecosystem (PEPE), where traditional medicine is integrated with digital health technologies, wearable metabolic monitoring, artificial intelligence-assisted risk prediction, and personalized lifestyle recommendations. Such an approach has the potential to transform community diabetes prevention from periodic educational campaigns into a continuous, data-driven, culturally adaptive prevention system capable of identifying individuals at risk before clinical disease develops. Future studies should evaluate the effectiveness and cost-effectiveness of this integrated model through longitudinal, multi-community implementation trials.

The identification of two participants with markedly elevated blood glucose levels despite the absence of prior diagnosis further demonstrates the importance of incorporating opportunistic screening into community empowerment activities. Educational interventions alone may improve awareness but cannot identify asymptomatic individuals who require immediate clinical attention. Integrating screening with education therefore creates a dual preventive benefit by simultaneously enhancing community health literacy and facilitating early case detection. This combined strategy supports the broader role of community-based organizations, such as PKK groups, as active partners in strengthening primary healthcare services and reducing delays in diabetes diagnosis through community participation.





Limitations

This community service program has several limitations. First, the intervention was conducted in a single community with a relatively small number of participants, limiting the generalizability of the findings. Second, the absence of a comparison group precludes causal inference regarding the observed improvement in diabetes knowledge. Third, knowledge was assessed immediately after the educational session; therefore, long-term retention of knowledge and sustained behavioral changes could not be determined. Finally, although blood glucose screening successfully identified individuals with suspected hyperglycemia, confirmatory laboratory testing and long-term clinical follow-up were beyond the scope of this program. Future studies should incorporate larger multi-site samples, controlled study designs, longitudinal follow-up, and objective behavioral and metabolic outcomes to validate the long-term effectiveness of this integrated community empowerment approach.

CONCLUSION

This community empowerment program demonstrated that integrating diabetes education, self-acupressure training, preventive herbal medicine education, and opportunistic blood glucose screening within an existing PKK community network represents a feasible and culturally responsive strategy for diabetes prevention at the primary healthcare level. Beyond improving diabetes-related knowledge and facilitating early identification of individuals with previously unrecognized hyperglycemia, this study proposes the Community Integrative Ethnomedicine Prevention (CIEP) Model, a conceptual framework that systematically integrates evidence-informed traditional medicine, community empowerment, early metabolic screening, and behavioral self-management into a unified prevention pathway. The CIEP Model provides a foundation for reorienting community-based diabetes prevention from isolated educational activities toward an integrated, person-centered prevention ecosystem. Future research should validate this framework through multicenter implementation studies and expand it into a digitally enabled Predictive Ethno-Preventive Ecosystem (PEPE) that combines community health data, artificial intelligence-assisted risk prediction, and personalized traditional medicine interventions to support precision prevention in diverse populations.

Acknowledgement

The authors also thank the patient and her family for their willingness to participate.

Funding Source

This study received no external funding from government agencies, commercial organizations, or non-profit institutions. All expenses related to the research were self-funded by the authors.

Conflict of Interest

The authors declare no conflict of interest regarding the publication of this article.

REFERENCES





- Agudelo-Hernandez, F., Plata-Casas, L.I. and Gonzalez-Abril, K. (2025) “‘The Territory Has Its Ways of Warning Us’: Cultural Practices and Belief Systems of Two Indigenous Peoples in Colombia and Their Role in Public Mental Health,” *Culture, medicine and psychiatry*, 49(4), pp. 1205–1225. Available at: <https://doi.org/10.1007/s11013-025-09936-1>.
- Al-Shami, S.A. *et al.* (2024) “Financial and digital financial literacy through social media use towards financial inclusion among batik small enterprises in Indonesia,” *Heliyon*, 10(15), p. e34902. Available at: <https://doi.org/10.1016/j.heliyon.2024.e34902>.
- Choudhry, F.R. *et al.* (2018) “Mental Health Conceptualization and Resilience Factors in the Kalasha Youth: An Indigenous Ethnic and Religious Minority Community in Pakistan,” *Frontiers in public health*, 6, p. 187. Available at: <https://doi.org/10.3389/fpubh.2018.00187>.
- Collins, L., Reid, H. and Kearney, G.P. (2026) “Engaging the unengaged: lessons from a culturally informed workshop framed around Traveller health,” *Education for primary care: an official publication of the Association of Course Organisers, National Association of GP Tutors, World Organisation of Family Doctors*, pp. 1–6. Available at: <https://doi.org/10.1080/14739879.2026.2690519>.
- Donovan, R.J. *et al.* (2024) “Impact on stakeholders of a cultural adaptation of a social and emotional well-being intervention in an Aboriginal community,” *Health promotion journal of Australia: official journal of Australian Association of Health Promotion Professionals*, 35(1), pp. 134–143. Available at: <https://doi.org/10.1002/hpja.723>.
- Foyet, M. and Child, B. (2024) “COVID-19, social media, algorithms and the rise of indigenous movements in Southern Africa: perspectives from activists, audiences and policymakers,” *Frontiers in sociology*, 9, p. 1433998. Available at: <https://doi.org/10.3389/fsoc.2024.1433998>.
- Kirmayer, L.J. and Jarvis, G.E. (2019) “Culturally Responsive Services as a Path to Equity in Mental Healthcare,” *HealthcarePapers*, 18(2), pp. 11–23. Available at: <https://doi.org/10.12927/hcpap.2019.25925>.
- Kurtz, D.L.M. *et al.* (2018) “Health Sciences cultural safety education in Australia, Canada, New Zealand, and the United States: a literature review,” *International journal of medical education*, 9, pp. 271–285. Available at: <https://doi.org/10.5116/ijme.5bc7.21e2>.
- Liu, M. *et al.* (2025) “Culturally Responsive Community Mental Health: Successes and Lessons from a Community Mental Health Organization,” *Journal of health communication*, pp. 1–10. Available at: <https://doi.org/10.1080/10810730.2025.2592153>.
- Power, T. *et al.* (2024) “Indigenous students’ experiences of being taught indigenous health,” *Nurse education today*, 143, p. 106364. Available at: <https://doi.org/10.1016/j.nedt.2024.106364>.
- Putri, L.D. *et al.* (2025) “Genetic Perception Versus Nutritional Factors: Analyzing the Indigenous Baduy Community’s Understanding of Stunting as a Health Issue,” *International journal of environmental research and public health*, 22(2). Available at: <https://doi.org/10.3390/ijerph22020145>.
- Rice, A.N. and Harris, S.C. (2021) “Issues of cultural competence in mental health care,” *Journal of the American Pharmacists Association: JAPhA*, 61(1), pp. e65–e68. Available at: <https://doi.org/10.1016/j.japh.2020.10.015>.
- Rong, Y. and Yuan, G.F. (2025) “Family-centered mental health care for left-behind children in Chinese ethnic minority concentrated areas: a psychiatric nursing framework for rural education settings,” *Frontiers in public health*, 13, p. 1709606. Available at: <https://doi.org/10.3389/fpubh.2025.1709606>.
- Sasakamoose, J. *et al.* (2024) “From trauma to resilience: advancing cultural responsiveness and equity in the Muskowekwan First Nation’s healing journey,” *Frontiers in public health*, 12, p.



1419250. Available at: <https://doi.org/10.3389/fpubh.2024.1419250>.
- Stepanova, E. *et al.* (2026) "Consensus on Culturally Competent Mental Health Services Recommendations: A Modified Delphi Consensus Study With Ethnic Minorities, Carers, Public Advisors and Health Professionals," *Health expectations : an international journal of public participation in health care and health policy*, 29(1), p. e70567. Available at: <https://doi.org/10.1111/hex.70567>.
- Thorburn, R. and Ansloos, J. (2026) "Community Is Medicine: Understanding Indigenous Youth-Led Peer Support in Mental Health and Suicide Prevention.," *Journal of prevention and health promotion*, 7(2), pp. 290–321. Available at: <https://doi.org/10.1177/26320770251359603>.
- Waddell, C.M. *et al.* (2021) "Healing journeys: Indigenous Men's reflections on resources and barriers to mental wellness.," *Social science & medicine (1982)*, 270, p. 113696. Available at: <https://doi.org/10.1016/j.socscimed.2021.113696>.
- Walker, S. *et al.* (2023) "Evaluation of a longitudinal digital citizen science initiative to understand the impact of culture on Indigenous youth mental health: Findings from a quasi-experimental qualitative study.," *PloS one*, 18(12), p. e0294234. Available at: <https://doi.org/10.1371/journal.pone.0294234>.
- Zhou, Y. (2025) "Ethical practice in the majority world: A framework for psychotherapists trained in the minority world.," *The American psychologist* [Preprint]. Available at: <https://doi.org/10.1037/amp0001511>.