

STRENGTHENING LITERACY AND HEALTH RESILIENCE OF THE INDONESIAN DIASPORA IN NONTHABURI, THAILAND IN THE PREVENTION AND EARLY DETECTION OF DIABETES MELLITUS COMPLICATIONS BASED ON COMMUNITY FIRST RESPONDERS

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ABSTRACT The Indonesian diaspora in Nonthaburi, Thailand faces significant health vulnerabilities, particularly related to type 2 diabetes mellitus (T2DM), exacerbated by limited access to formal healthcare services and low health literacy. This community empowerment program aims to strengthen health literacy and community resilience in the prevention and early detection of diabetes mellitus complications through a Community First Responder (CFR)-based approach. The program is implemented over eight months involving 30 participants from the Indonesian diaspora community, coordinated by the Indonesian Embassy in Bangkok. Interventions include health education, blood sugar screening, CFR training, and the establishment of community health volunteers. Blood glucose screening results showed that 33.3% of participants had glucose levels above normal: 36.7% in the pre-diabetes category and 30% indicated diabetes. Knowledge evaluation using the validated Diabetes Knowledge Questionnaire (DKQ-24) showed a significant increase in the average score from 46.9 (pre-test) to 93.9 (post-test), representing an increase of 100.21%, with all participants (100%) showing score improvement. Community health volunteers were successfully formed as sustainable agents for ongoing health promotion within the diaspora network. These findings indicate that participatory CFR-based interventions are effective in improving knowledge about diabetes and enable early detection among the Indonesian diaspora in Thailand. This program can serve as a replicable model for community health empowerment of the Indonesian diaspora in other countries with similar characteristics.

KEYWORDS: *Community First Responder; Diabetes Mellitus; Diaspora; Health Literacy; Nonthaburi.*

1. INTRODUCTION

The Indonesian diaspora in Thailand is a transnational community that continues to grow along with increasing cross-border mobility for educational, work, and family purposes. According to data from the Embassy of the Republic of Indonesia (KBRI) in Bangkok, there are approximately 2,150–2,379 Indonesian citizens residing in Thailand, with the largest concentration in the Bangkok area and its surrounding metropolitan regions, including Nonthaburi Province (KBRI Bangkok, 2024). Nonthaburi is a buffer province of the capital city Bangkok that has experienced rapid urbanization, covering an area of about 622.3 km², characterized by high population density, dynamic trade activities, and the presence of migrant workers from various countries (Thai Websites, 2024). Within this metropolitan area, the Indonesian diaspora is spread across various employment sectors including education, services, trade, tourism, and the informal sector, forming a heterogeneous community with diverse socio-economic profiles (Muhammad et al., 2023).

Despite diverse backgrounds, the Indonesian diaspora in Thailand possesses strong social capital manifested through community organizations, religious activities, and cultural activities facilitated by the Indonesian Embassy and diaspora associations (Diah et al., 2023; Muhammad et al., 2023). This social network has great potential as a platform for community-based health promotion and empowerment programs. Nevertheless, empirical evidence shows that this community faces considerable health vulnerabilities, particularly related to non-communicable diseases (NCDs) such as type 2 diabetes mellitus (T2DM). Data from a community health screening study on Indonesian migrant workers in Thailand revealed that 42.1% of respondents had elevated random blood glucose levels (140–199 mg/dL) indicating prediabetes, while 5.3% had already met the diagnostic threshold for diabetes (≥ 200 mg/dL). In addition, 44.8% of respondents were classified as overweight or obese, a major risk factor for the occurrence of type 2 diabetes (Nurrahma et al., 2024).

The burden of T2DM on the Indonesian population is a pressing public health issue on a national level. Indonesia is currently ranked fifth in the world in terms of the number of diabetes patients, with more than 19 million people living with the disease in 2021, and projections indicate that this figure will increase to 40.7 million by 2045 (Rahmawati et al., 2024). Worsening the situation, national health surveys report that 73.2% of diabetic individuals in Indonesia were undiagnosed at the time the survey was conducted, a proportion much higher than in neighboring countries such as Thailand (Rahmawati et al., 2024). Urban lifestyle factors such as high-calorie diets, low physical activity, and work-related stress are well-documented main drivers of diabetes risk (Kurniawan et al., 2024). A cross-sectional study of 1,499 workers with an OHSPIW cohort design (2023) found that the prevalence of type 2 diabetes among shift workers (6.56%) was significantly higher compared to day workers (4.21%), with OR = 1.60 (95% CI: 1.01–2.53). This research

confirms that shift work disrupts the body's circadian rhythm and increases the risk of T2DM through physiological, behavioral, and psychosocial pathways, in line with the context of the Indonesian diaspora working in rotating work environments in Thailand (Wang et al., 2023).

The migrant population, including the Indonesian diaspora, faces layered health challenges that go beyond individual behavioral factors alone. Barriers to accessing healthcare services for migrant workers in Thailand include language barriers, financial limitations, low understanding of the health system, and administrative obstacles (Kunpeuk et al., 2022). These structural conditions often result in delayed diagnosis and low utilization of early detection services for chronic diseases such as T2DM, thereby greatly limiting opportunities for early intervention. Health literacy, defined as the ability of individuals to obtain, process, and understand basic health information to make appropriate health decisions, has been identified as a critical mediating factor in the prevention of non-communicable diseases. Consistent evidence shows that low health literacy is associated with poor health behaviors, low use of preventive services, and high rates of chronic disease complications (Nutbeam and Lloyd, 2021; Jaspers et al., 2023). In the population of migrant workers in Thailand specifically, research has confirmed that health literacy levels vary substantially among migrant groups and are closely related to education levels and exposure to health programs (Sitthiphath and Thato, 2024).

Several previous initiatives have attempted to address health disparities in migrant populations in Southeast Asia. The Thai Ministry of Health, in collaboration with non-governmental organizations, has implemented the Migrant Health Worker (MHW) and Migrant Health Volunteer (MHV) programs, which recruit trained migrants as health intermediaries within their communities (Napierala et al., 2022). These programs have been shown to significantly improve health literacy scores among migrant populations through a peer-based education approach. In parallel, community-based co-design interventions guided by the OPTimising HEalth LIteracy and Access (Ophelia) framework have proven effective in generating context-responsive NCD prevention strategies in migrant communities across various global settings (Dias et al., 2021). In the field of diabetes management, the community health worker (CHW) model, particularly those integrating blood glucose screening with structured health education, has shown its effectiveness in improving early detection of diabetes risk factors as well as facilitating behavior change in underserved communities (Gudlavalleti et al., 2024; World Health Organization, 2022). These models affirm the feasibility of a task-shifting approach, where trained community members play a role in supporting health promotion functions and disease surveillance within their social networks.

Despite the growing evidence supporting community-based health interventions for migrant populations, there remains a significant gap in programs specifically designed to address NCD

prevention, particularly T2DM, in the Indonesian diaspora community in Thailand. Although diaspora social networks provide a strong foundation for community engagement, there is currently no structured empowerment model targeting diabetes literacy and early detection that has been formally implemented or evaluated in this population. This programmatic gap becomes particularly critical given the documented prevalence of metabolic risk factors in this community, as well as structural barriers that limit their access to formal preventive health services.

Community participation is embedded throughout all phases of program design and implementation. Representatives of the Indonesian diaspora in Nonthaburi and the Bangkok Metropolitan Region have been involved from the beginning in identifying priority health needs through focus group discussions and initial consultations coordinated with the Indonesian Embassy in Bangkok. Community members subsequently participated as health education and CFR training participants, as active participants in blood sugar screening activities, and as sustainability agents through the formation of community health cadres responsible for continuing health promotion activities after the program. This participatory and empowerment-oriented approach reflects a broader conceptual framework of community engagement, where the community is positioned not merely as beneficiaries of external interventions, but as co-producers of health knowledge and practices (Dias et al., 2021; Engle et al., 2023). By utilizing the existing social capital of the diaspora and the organizational infrastructure of community associations, this program aims to develop endogenous health promotion capacity that can sustain itself independently without relying on institutional support (Diah et al., 2023). Based on this background, this community service activity is carried out with the aim of improving health literacy and strengthening the health resilience of the Indonesian diaspora community in Nonthaburi, Thailand, in efforts to prevent and early detect complications of diabetes mellitus through a community empowerment approach based on CFR.

2. METHOD

This community service activity was carried out for 8 months in the Nonthaburi area, Thailand, involving the Indonesian diaspora community under the coordination of the Indonesian Embassy in Bangkok. The activity design used a participatory community empowerment approach, where target partners were actively involved in every stage of implementation. A total of 30 participants took part in this activity. Before the program was implemented, the community's condition was characterized by low health literacy related to diabetes mellitus, limited early detection capabilities, and the absence of community health cadres within the diaspora environment. This program was designed to change these conditions through a series of structured interventions.

The implementation of activities consists of five main stages. First, the socialization stage is

carried out through community meetings and group discussions to identify community needs and agree on priority issues. Second, the health education stage is conducted using interactive lectures, discussions, and demonstrations about risk factors, prevention, and signs of diabetes mellitus complications (hypoglycemia and hyperglycemia). Third, the health examination stage involves random blood glucose screening (RBG) using a portable digital glucometer (electrochemical biosensor, examination time $\pm 5-10$ seconds, memory ± 200 results). Fourth, Community First Responder (CFR) training is provided to increase the capacity of community members to give an initial response to emergency conditions related to diabetes. Fifth, the mentoring and evaluation stage is carried out through monitoring health cadres, health consultations, and the formation of community networks using digital platforms.

The program evaluation was carried out using pre-test and post-test methods with a validated diabetes knowledge questionnaire instrument (Diabetes Knowledge Questionnaire, DKQ-24), consisting of 24 questions about general diabetes knowledge, complications, and self-care. The DKQ-24 questionnaire was measured by summing the score of correct answers $\times 4$ with result categories: <55 = poor knowledge, $56-75$ = sufficient knowledge, $76-100$ = good knowledge. GDS examination data were categorized based on American Diabetes Association standards: normal (<140 mg/dL), prediabetes ($140-199$ mg/dL), and diabetes indication (≥ 200 mg/dL). Data analysis was performed descriptively to describe the distribution of examination results and the improvement of participants' knowledge.

3. RESULT AND DISCUSSION

3.1 Participant Characteristics

This community service activity involved 30 participants from the Indonesian diaspora community in Nonthaburi, Thailand. The participants' age range was 33–57 years. Most of the participants (60%, $n=18$) had a history of previous illnesses, including hypertension, diabetes, heart disease, and anemia. This condition indicates that the diaspora community targeted by the activity is a group with a fairly significant burden of comorbidities. The diversity of participants' backgrounds reflects the heterogeneity of the Indonesian diaspora community in the Nonthaburi area, which consists of professional workers, students, as well as workers in the service and trade sectors. The strong social capital in this community, manifested through community networks based on religion and culture, is a supporting factor for the successful mobilization of participants in the screening and training activities (Diah et al., 2023).

3.2 Random Blood Sugar (RBS) Screening Results

Random blood sugar (RBS) screening was conducted on 30 participants from the Indonesian diaspora community in Nonthaburi. The screening results are presented in Table 1 and show a distribution of varying blood sugar level categories.

Table 1. Distribution of Random Blood Glucose (RBG) Screening Results of Participants

GDS Category	Number (n)	Percentage (%)
Normal (<140 mg/dL)	10	33,3
Prediabetes (140–199 mg/dL)	11	36,7
Indicated Diabetes (\geq 200 mg/dL)	9	30,0
Total	30	100,0

GDS Category Source: American Diabetes Association

The screening results showed that ten participants (33.3%) had blood sugar levels above normal, with 36.7% in the prediabetes category and 30% in the diabetes-indicated category. This condition is in line with previous research findings by Nurrahma et al. (2024), which reported a high prevalence of prediabetes and metabolic risk factors in the Indonesian migrant community in Thailand. The high rate of prediabetes in this group indicates the need for comprehensive early intervention, considering that prediabetes is a reversible stage before developing into type 2 diabetes if not addressed with appropriate lifestyle modifications (International Diabetes Federation, 2021).

Participants identified in the category suspected of having diabetes mostly have a known history of diabetes (such as Sengsuda, GDS 287 mg/dL; Hannipa Suandee, GDS 312 mg/dL; Naiyana Thongkom, GDS 268 mg/dL). This indicates that regular screening at the community level is highly necessary to monitor the health conditions of community members who have already been diagnosed and to ensure optimal disease management.



Figure 1. Random blood sugar screening activities in the Indonesian diaspora community in Nonthaburi, Thailand

3.3 Increasing Knowledge about Diabetes Mellitus

Participants' knowledge evaluation was conducted through a pre-test before the educational activities and a post-test after the educational activities and CFR training. The comparison results of pre-test and post-test scores are presented in Table 2.

Table 2. Comparison of Pre-test and Post-test Scores of Diabetes Mellitus Knowledge of Participants (n=30)

Parameter	Pre-test	Post-test
Average score	46,9	93,9
Minimum score	20	80
Maximum score	72	96
Average increase (%)	-	+100,21%

The evaluation results showed a significant increase in participants' knowledge about diabetes mellitus. The average pre-test score of 46.9 increased to 93.9 in the post-test, indicating an average increase of 100.21%. All participants (100%) experienced an increase in knowledge scores after attending the education and training activities. The minimum post-test score reached 80, which means that even the participant with the lowest score had mastered more than 83.33% of the diabetes knowledge material after the intervention. This achievement exceeds the target indicator set, which is that participants experience an increase in scores from pre-test to post-test.

This significant increase in knowledge can be attributed to the interactive educational methods used, which combine lectures, group discussions, and engaging visual media. Participatory educational methods have proven to be more effective compared to one-way lecture methods in improving knowledge retention, especially in adult groups (Gudlavalleti et al., 2024). These findings are also in line with the research by Jaspers et al. (2023) which states that community-based interventions can effectively enhance public health literacy, including among groups with low basic literacy.

Item analysis on the post-test showed that most participants had understood the basic concepts of diabetes mellitus, risk factors, as well as signs of complications such as hypoglycemia and hyperglycemia. Improvement in understanding in these areas is very important considering that early recognition of complication symptoms is a key competence required by CFR cadres to provide appropriate early response at the community level.

3.4 Formation of Health Cadres and Program Sustainability

One of the main outcomes of this program is the formation of community health cadres from the Indonesian diaspora in Nonthaburi. The health cadres are selected from participants who demonstrate high motivation and good communication skills during the CFR training. These cadres are expected to continue health education activities and monitor the health status of community members independently after the service program is completed.

The program's sustainability strategy is designed through several mechanisms, namely: (1) the establishment and strengthening of community health cadres tasked with conducting education and regular screening; (2) the provision of health education media in the form of booklets and posters that can be used independently; (3) the utilization of community digital communication platforms (WhatsApp groups and social media) to disseminate sustainable health information; and (4) the strengthening of collaboration networks between the diaspora community, universities, and healthcare workers.

This community health worker-based approach is in line with the WHO (2018) recommendations regarding the optimization of community health worker programs as a cost-effective strategy for improving public health in developing countries. The strong social capital within the Indonesian diaspora community, in the form of religious and cultural community networks, becomes an important asset that supports the sustainability of this program (Diah et al., 2023; Muhammad et al., 2023).

Active participation of partners in all stages of activities, starting from problem identification, implementation of socialization, training, screening, to the evaluation process, is an indicator of the success of the participatory approach adopted. Community involvement from the beginning ensures that the programs implemented truly align with the needs and specific conditions of the Indonesian diaspora community in Nonthaburi.



Figure 2 Health education activities and CFR training

3.5 Impact and Benefits of the Program

This program provides tangible impacts in terms of health, social, and economic aspects for the Indonesian diaspora community in Nonthaburi. From a health perspective, identifying participants with prediabetes and diabetes offers an opportunity for early intervention that can prevent the progression of the disease to more severe stages. The significant improvement in health literacy also contributes to enhancing the community's ability to make better health decisions.

From a social aspect, this program strengthens the solidarity of the diaspora community through joint activities oriented toward improving welfare. The formation of a network of community health cadres creates a social support system that can intervene in health problems at the community level more responsively. From an economic aspect, increasing early detection and preventing diabetes complications has the potential to reduce treatment costs that could burden migrant workers who generally have limited access to health insurance in the destination country.

4. CONCLUSION

This community service program successfully improved health literacy and the capacity of the Indonesian diaspora community in Nonthaburi, Thailand, in preventing and early detecting diabetes mellitus complications. GDS screening results on 30 participants showed that 33.3% had blood sugar levels above the normal limit (36.7% prediabetes and 30% indicated diabetes), indicating a high metabolic risk burden in this community. Health education interventions and Community First Responder (CFR) training have been proven effective in increasing participants' knowledge, with the average score rising from 46.9 to 93.9 (an increase of 100.21%) and all participants (100%) experiencing an increase in post-test scores compared to pre-test scores. This achievement exceeds the minimum indicator target set.

The formation of diaspora community health cadres and the availability of health education media become important assets for the sustainability of the program. The CFR-based approach has proven suitable to be applied to international diaspora communities that have strong social capital but limited access to formal health services. This program can serve as a model intervention that can be replicated for Indonesian diaspora communities in other countries with similar characteristics. For further development, it is recommended that similar programs be implemented with a larger participant scope, accompanied by standardized clinical trials to measure long-term health behavior changes. Closer collaboration between universities, the Indonesian Embassy, and diaspora organizations also needs to be strengthened to ensure the sustainability of the program and the expansion of its impact.

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CONFLICT OF INTERESTS

The authors declare that there are no conflicts of interest, whether financial, professional, or personal, related to this article. No sponsoring organization was involved in the study design, data collection and analysis, writing of the article, or the decision to publish this work.

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