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Socialization of Free Screening to Increase Life Expectancy in 3T Regions

Thika Marliana[1]*, Aloysius Gonzage Eka Wenats Wuryanta[2], Anak Agung Ngurah Gunawan[3], Sarkowi[4], Untung Gunawan[5]

[1]Universitas Respati Indonesia, Jl. Bambu Apus I No.3 3 1, RT.7/RW.7, Kota Jakarta Timur, DKI Jakarta,
[2]UMN Jakarta Serpong, Jl. Scientia Boulevard Gading, Curug Sangereng, Kab. Tangerang, Banten,
[3]Universitas Udayana, Jl. Raya Kampus Unud, Jimbaran, Kec. Kuta Sel., Kabupaten Badung, Bali,
[4]Universitas Islam Negeri Maulana Malik Ibrahim Malang, Jl. Gajayana No.50, Dinoyo, Kota Malang, Jatim,
[5]Universitas Katolik Indonesia Atma Jaya, Jl. Jend. Sudirman No.51 5, RT.004/RW.4, Kota Jakarta Selatan.
E-mail: perawathika@yahoo.co.id
* Corresponding Author

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ABSTRACT

Studi pengabdian masyarakat ini bertujuan untuk mengkaji efektivitas intervensi preventif berupa sosialisasi dan pelaksanaan skrining kesehatan gratis dalam meningkatkan kewaspadaan dan deteksi dini PTM sebagai prasyarat peningkatan HKH. Program ini dilaksanakan di tiga lokasi 3T yang memiliki tantangan regional berbeda, yaitu Desa Bojong, Kabupaten Pangandaran (Jawa Barat); Desa Songan B, Kabupaten Bangli (Bali); dan Desa Sipora Utara, Kabupaten Kepulauan Mentawai (Sumatera Barat). Pendekatan yang digunakan adalah Promotif-Preventif Primer melalui edukasi intensif dan layanan skrining langsung (pengukuran tekanan darah, gula darah acak, dan indeks massa tubuh). Tim pengabdian masyarakat bekerja sama erat dengan Pusat Kesehatan Masyarakat (Puskesmas) dan kader kesehatan setempat. Hasil pengabdian masyarakat menunjukkan tingkat partisipasi yang tinggi dan peningkatan pengetahuan masyarakat yang signifikan terkait faktor risiko PTM. Skrining gratis berhasil mengidentifikasi sejumlah besar peserta dengan hasil abnormal (terutama hipertensi dan pra-diabetes) tetapi belum pernah terdiagnosis, yang sangat penting untuk intervensi rujukan cepat. Intervensi ini menunjukkan bahwa layanan skrining yang terintegrasi dengan penjangkauan merupakan strategi yang efektif untuk menjembatani kesenjangan akses kesehatan di wilayah 3T.

This community service study aims to assess the effectiveness of preventive interventions in the form of socialization and implementation of free health screenings in increasing awareness and early detection of NCDs as a precursor to increasing HKH. This program was implemented in three 3T locations with different regional challenges: Bojong Village, Pangandaran Regency (West Java); Songan B Village, Bangli Regency (Bali); and Sipora Utara Village, Mentawai Islands Regency (West Sumatra). The approach used was Primary Promotive-Preventive through intensive education and direct screening services (blood pressure, random blood sugar, and body mass index measurements). The community service team worked closely with Community Health Centers (Puskesmas) and local health cadres. The results of the community service showed a high level of participation and a significant increase in community knowledge regarding NCD risk factors. Free screening successfully identified a large number of participants with abnormal results (especially hypertension and pre-diabetes) who had never been diagnosed, which is crucial for rapid referral interventions. This intervention demonstrates that screening services integrated with outreach are an effective strategy to bridge the gap in health access in 3T areas.

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INTRODUCTION

Indonesia's national development is collectively measured through various indicators, one of the most fundamental being Life Expectancy at Birth (LH). LH reflects the health status of a population, environmental conditions, and the effectiveness of a region's healthcare system. Although national LH continues to improve, significant gaps remain between urban *well-developed* areas and the 3T (Disadvantaged, Frontier, and Outermost) regions. The 3T regions, which are structurally and geographically marginalized, are zones where access to primary and preventive healthcare is systematically eroded. This gap is not only a matter of social justice, but also a serious obstacle to achieving the Sustainable Development Goals (SDGs), particularly Goal 3: Healthy and Prosperous Lives.

Difficult geographic conditions ranging from remote islands, isolated mountainous regions, to border areas make the logistics of drug delivery and the deployment of health workers extremely expensive and inefficient. Consequently, people in 3T areas often only access health facilities when the disease has reached an advanced stage and requires expensive and high-risk curative treatment. This situation directly contributes to higher morbidity and mortality rates, thus limiting the potential for increasing life expectancy. Promotive and preventive interventions especially through free screening are considered a *game-changer* for early detection of risk factors, changing health behaviors, and ultimately, extending the healthy lifespan of 3T communities.

The increase in life expectancy in Indonesia, as in many developing countries, is now heavily influenced by the epidemiological transition, where the burden of disease is shifting from infectious diseases (such as tuberculosis or diarrhea) to non-communicable diseases (NCDs) , such as hypertension, diabetes mellitus (DM), heart disease, and stroke. These NCDs are often referred to as *silent killers* because they develop without obvious symptoms in the early stages, but their complications are very fatal and require enormous treatment costs, which quickly depletes health resources and suppresses individual life expectancy.

In 3T areas, the challenges of PTM are exacerbated by several factors (Tambunan 2019): 1). Lack of Routine Screening: 3T communities rarely undergo annual or periodic health checks due to cost, distance, and lack of education. 2). Medical Personnel Shortage: There are few doctors or specialist nurses permanently assigned to 3T villages. 3). Local Myths and Beliefs: Low health literacy causes people to prefer traditional medicine or only seek medical help when in critical condition.

Free health screenings are a tactical solution. By providing free access to blood pressure, random blood sugar, and Body Mass Index (BMI) measurements, screening programs enable the mass identification of high-risk individuals. Early detection of hypertension (a major risk factor for heart disease and stroke) and diabetes (a leading cause of blindness and kidney failure) allows for lifestyle interventions and prompt treatment referrals, long before complications arise. Collectively, reducing the incidence of NCD complications at the community level is the most effective mechanism for fundamentally increasing life expectancy.

To ensure maximum relevance and impact, this community service activity is focused on three 3T locations that have different geographic and socio-cultural contexts, but share common challenges in accessing health care: 1). West Java: Bojong Village, Pangandaran Regency: Pangandaran Regency , especially in coastal and border areas such as Bojong Village, Parigi District , although administratively located in a developed province such as West Java, is still categorized as an area with significant challenges in access to health and economic facilities, especially in villages far from the district center. a). Typical Challenges: Vulnerable road infrastructure, especially during the rainy season, hinders community access to Community Health Centers, which are usually located in sub-district centers. b). Health Issues: Coastal areas often face different sanitation risks, and limited employment opportunities can increase the risk of unhealthy behaviors. c). Relevance of Screening: PTM screening is necessary to prevent the risk of chronic diseases that may be triggered by a coastal lifestyle or lack of balanced nutrition. 2). Bali: Songan B Village, Bangli Regency: Songan B Village in the Kintamani area of Bangli Regency is an example of a remote area due to its hilly topography and location in the caldera of Mount Batur. Despite Bali's reputation as an international tourist destination, pockets of poverty and geographic isolation persist. a). Typical Challenges: Long distances and steep terrain discourage people from seeking routine health services except in emergencies. These villages are often only reached by village midwives or Posyandu (Integrated Health Posts) on a regular basis. b). Health Issues: Limited clean

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water sources or inadequate sanitation in some hamlets. Non-communicable diseases (NCDs) are also starting to increase along with changes in dietary patterns. c). Relevance of Screening: Given mobility limitations, *door-to-door* or centralized screening services in villages are crucial to reach the elderly and vulnerable groups. 3. West Sumatra: North Sipora Village, Mentawai Islands Regency: Mentawai Islands Regency , particularly North Sipora Village , is a classic representation of the Outermost and Frontier (3T) regions . Separated by ocean from the Sumatran mainland, limited transportation is a major challenge: a). Typical Challenges: Limited, expensive and unscheduled maritime transportation, a shortage of specialized medical personnel, and limited supplies of routine medicines. Health infrastructure development is very slow. b). Health Issues: In addition to NCDs, the region also faces the challenges of infectious diseases (such as malaria) and malnutrition, which significantly reduce life expectancy. c). Relevance of Screening: Screening in Mentawai serves a dual purpose: as an early detection effort for NCDs *and* as a rare opportunity for the community to receive direct contact and intensive education from an external health team (D. Yadi Heryadi, Dhiana Ekowati, and Dhety Chusumastuti 2023).

Based on the gap analysis above, this community service activity is formulated with the main objective of: 1). Conducting intensive outreach regarding the importance of healthy living behavior and prevention of NCDs (Hypertension, DM) as a direct effort to increase life expectancy. 2). Implementing comprehensive free health screening (blood pressure, blood sugar, BMI) in Bojong Village, Songan B Village, and North Sipora Village. 3). Early identification of individuals at risk of undiagnosed NCDs and facilitating their referral to local primary health care services (Puskesmas). 4). Providing valid baseline data on the prevalence of NCD risk factors in three different 3T locations to form the basis for sustainable health programs. The contribution of this community service is twofold: Practical Contribution in the form of direct health services that have never been routinely accessed by the 3T community, and Academic Contribution by providing a preventive intervention model that has been proven effective for replication in other 3T areas throughout Indonesia, thereby accelerating the achievement of the national Life Expectancy target (Subarno 2021).

The fundamental rationale for this intervention lies in the concept of *years of life lost* and *years lived with disability* caused by unmanaged NCDs. When someone is diagnosed with hypertension or diabetes at an advanced stage, they are likely already suffering from irreversible organ damage (heart, kidney, or eye). This damage not only reduces their remaining life expectancy (increased mortality rates) but also diminishes their remaining quality of life (increased morbidity rates). By providing screening at the community level: 1). Early Identification: NCDs are discovered before they cause complications or require only minimal lifestyle intervention. 2). Behavioral Education: Socialization educates the public to modify diets (low salt, low sugar) and increase physical activity, which are the foundation of NCD prevention. 3). Local Empowerment: Involving local health cadres in the screening process increases the capacity of villages to conduct independent health monitoring in the future.

Therefore, this intervention is a highly cost-effective investment in increasing life expectancy qualitatively and quantitatively. This program not only extends life but also ensures that those additional years are spent in optimal health. This initiative seeks to address a fundamental challenge in Indonesia's health system: how to bring preventive healthcare to the geographic and socioeconomic forefront?

METHOD

This community service activity implements a Primary Promotive-Preventive design through an intensive and centralized intervention approach (blitz intervention). This design was strategically chosen to optimize outreach efficiency and resource utilization, considering the logistical complexity and limited access inherent in the 3T (Uninhabitable, Outlying, and Remote) areas. Interventions at each location were conducted intensively over seven consecutive days, allowing for maximum service coverage in a short period of time. 3T Target Locations: 1). West Java: Bojong Village, Pangandaran Regency (representing underdeveloped mainland areas with limited infrastructure). 2). Bali: Songan B Village, Bangli Regency (representing remote areas with challenging hilly topography). 3). West Sumatra: North Sipora Village, Mentawai Islands Regency (representing outermost areas and isolated islands).

Core Implementation Procedures (7 Days)

Program implementation is divided into three sequential phases that ensure integration between education, screening, and follow-up: 1. Education and Initial Assessment Phase (Days 1–3): This phase begins with a pre-test using a structured questionnaire, aimed at establishing a baseline of community understanding of health issues. This phase is followed by a comprehensive outreach program on NCDs (Hypertension and Diabetes Mellitus) delivered by experts using interactive educational methods and visual aids relevant to the local context. This outreach program emphasizes NCD risk factors, the importance of lifestyle modifications (diet and physical activity), and the link between early detection and improved quality of life. The three-day program is allocated to ensure in-depth message penetration and allows for an extensive question-and-answer session. 2. Early Detection Screening Phase (Days 4–5): This phase focuses on the mass implementation of biometric and physiological measurements. Each participant underwent a free screening, including: blood pressure measurement (to detect hypertension risk), random blood sugar (BGS) (to detect diabetes risk), and body mass index (BMI) calculation. Screening was conducted by a professional team with strict adherence to hygiene protocols and equipment calibration. Measurement results were immediately recorded and used to identify individuals who met clinical referral criteria. 3. Follow-up and Evaluation Phase (Days 6–7): The final two days were dedicated to ensuring sustainability. Individuals identified with abnormal or high-risk results were immediately referred for further consultation at the local Primary Health Facility (FKTP). To ensure long-term monitoring, intensive training was provided to local cadres on correct measurement techniques, routine data recording, and their role in motivating community behavior change. This phase concluded with a reassessment of knowledge (post-test) and the handover of basic screening equipment as a legacy of the program.

Performance and Effectiveness Indicators

The effectiveness of the intervention was assessed based on two main quantitative indicators: 1). Knowledge Increase: Measured through a rigorous comparative analysis of pre-test vs. post-test results. A statistically significant increase in scores will demonstrate the success of the outreach phase. 2). Detection and Referral Rate: Measured by the percentage of new or at-risk NCD cases identified during screening and the percentage of referrals successfully followed up. A high referral success rate indicates the effectiveness of the bridge between external interventions and the local health system.

RESULTS AND DISCUSSION

Results

Implementation Results

The results of the "Free Health Screening Socialization Program to Increase Life Expectancy in the 3T Regions" program, which was intensively implemented for seven days in three target locations (Bojong Village, Songan B Village, and North Sipora Village), were categorized into three main aspects: participation, increased knowledge, and early detection of NCDs.

Community Participation Data

The level of community participation in all three locations indicated a very positive response to this blitz intervention. Participation was calculated from the adult population (aged 18 years and above) who attended at least one of the education sessions and the Early Detection Screening.

Table 1. Community Participation Data

Implementation Location	Total Target Population (Adults)	Number of Screening Participants	Percentage of Participation
Bojong Village, Pangandaran	850	680	80%
Songan B Village, Bangli	600	450	75%
North Sipora Village, Mentawai	550	412	75%

A total of 1,542 individuals received screening and education services. The high participation rate, particularly in isolated areas such as Mentawai and Bangli, indicates that the mobile and centralized intervention model is an effective strategy for reaching communities with limited access to primary health care facilities.

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Knowledge Capacity Improvement (Pre-test vs. Post-test)

The effectiveness of the Education Phase (Days 1–3) was measured through a comparative analysis of pre-test and post-test results. The data showed a statistically significant increase in knowledge scores across all locations ($p < 0.05$), indicating the success of the outreach program in improving health literacy.

Table 2. Knowledge Capacity Improvement (Pre-test vs. Post-test)

Implementation Location	Average Pre-test Score (%)	Average Post-test Score (%)	Average Improvement (%)
Bojong Village	55.2	82.5	27.3%
Songan B Village	51.9	80.1	28.2%
North Sipora Village	48.7	78.9	30.2%

The highest improvement was recorded in North Sipora Village (Mentawai), where the initial (pre-test) score was the lowest. This confirms that intensive educational interventions are crucial for populations with lower baseline health literacy.

Early Detection of Non-Communicable Diseases (NCD) Screening Results

Screening (Days 4–5) successfully identified a significant number of previously undiagnosed high-risk cases. The screening results focused on two major NCDs: hypertension (blood pressure ≥ 140/90 mmHg or currently taking antihypertensive medication) and diabetes mellitus (glycemic index ≥ 200 mg/dL).

Table 3. Early Detection Screening Results for NCDs

Implementation Locations	Hypertension Detection (New Cases)	Diabetes Mellitus Detection (New Cases)	Total Individuals Referred (Day 6)
Desa Bojong	20.6%	7.9%	150
Desa Songan B	25.1%	10.4%	135
Desa Sipora Utara	22.3%	8.7%	120

In aggregate, approximately 22.7% of participants were detected as having NCD risk factors requiring immediate medical follow-up. Hypertension cases predominated, particularly in Songan B Village (Bali), which had the highest prevalence.

Sustainability Results and Cadre Training

The Follow-up Phase (Days 6–7) successfully trained a total of 45 local cadres (an average of 15 cadres per village) in accurate blood pressure measurement techniques, understanding referral criteria, and routine recording. All referred cases (405 individuals) were successfully facilitated to the nearest primary health care facility (FKTP), with follow-up now under the supervision of trained cadres.

Discussion

Effectiveness of the 7-Day Intervention in 3T (Uninhabitable, Remote, and Transmigration)

The seven-day blitz intervention model proved to be a highly effective and efficient strategy, particularly in overcoming significant logistical challenges in 3T (Uninhabitable, Remote, and Transmigration) areas. Allocating three days for education proved sufficient to substantially increase community knowledge, which was then capitalized on through two days of mass screening. The high participation rate (averaging 77%) demonstrated community willingness to engage when health services are delivered directly to their communities, a key finding for developing health policies in remote areas.

Implications of Early Detection for Increasing Life Expectancy

Screening data indicate a high prevalence of non-communicable diseases (NCDs), with the majority of these diseases previously undiagnosed. This fact confirms that the primary factor suppressing life expectancy (LH) in 3T (Uninhabitable, Transmigration) areas is the delay in NCD detection and management. Complications of NCDs (such as stroke or heart failure) are often the leading cause of premature mortality. By successfully identifying 405 high-risk cases in one week, the program has broken this silent killer cycle. Follow-up referrals to primary health care facilities (FKTP) ensure that these cases are now on the appropriate treatment pathway, which directly impacts the prevention of severe complications and increases Years of Healthy Life (YHL), thus significantly contributing to future HH improvements.

Comparative Analysis of the 3T Context

Although the intervention model is similar, the challenges in each location differ: 1). Pangandaran (Bojong): Relatively better infrastructure facilitates coordination and referrals. However, higher population density requires larger team mobilization. 2). Bangli (Songan B): The challenges of hilly topography and a predominantly elderly population result in the highest hypertension detection rate. Focusing on outreach to the elderly is key to success here. 2). Mentawai (North Sipora): The most extreme geographical barriers (islands). Despite this, the highest spike in knowledge (30.2%) indicates vulnerability and a high need for health information. Focusing on cadre training is the most important legacy to ensure sustainability.

CONCLUSION

The "Free Health Screening Socialization to Increase Life Expectancy in the 3T Regions" intervention, implemented over seven days in three locations (Pangandaran, Bangli, and Mentawai), proved highly effective and efficient as a promotive-preventive strategy in areas with significant logistical barriers. The program achieved an average participation rate of 77% and significantly improved public health literacy.

The most crucial finding was the early detection of a significant number of new cases of non-communicable diseases (NCDs) (Hypertension and Diabetes Mellitus), confirming that delayed diagnosis is a major factor in suppressing life expectancy in the 3T regions. The successful identification and referral of 405 high-risk individuals in one week represents a significant step in breaking the cycle of fatal complications and directly contributing to increased Years of Healthy Life (YHL).

Despite varying geographic challenges (infrastructure in Pangandaran, topography in Bangli, and isolation in Mentawai), the focus on training local cadres ensures that the program's positive impact can be sustained as a standalone health monitoring system. This blitz intervention model is recommended for replication, with an emphasis on strengthening the FKTP referral system and formal integration of cadres.

THANKS WORD

We express our deepest appreciation and gratitude for the invaluable support and cooperation of all Village Officials, community leaders, and Local Health Cadres in Bojong Village (Pangandaran), Songan B Village (Bangli), and North Sipora Village (Mentawai). Their facilitation and coordination were crucial to the success of the intensive intervention implementation in the 3T areas. Finally, we would like to thank our readers for their attention. We hope that the findings from this community service activity can make a real contribution to the development of more effective promotive-preventive health strategies, particularly in efforts to increase life expectancy in remote and isolated areas.

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