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The Efficacy of the Integrated Health Service Post Cadres Training in Noncommunicable Disease Prevention Among Older People in Southwest Papua

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A B S T R A C T

Noncommunicable diseases (NCDs) are the leading causes of morbidity and mortality globally, with a significant impact on older people, particularly in regions with limited healthcare access, such as Southwest Papua. Community-based approaches, such as the Integrated Health Service Post program, potentially enhance the early detection and prevention of NCDs. However, the implementation still faces several challenges. This study evaluates the efficacy of the Integrated Health Service Post cadres training in improving the early detection and prevention of NCDs and healthy lifestyle changes among older people in Southwest Papua. It used a quasi-experimental design with a prospective approach involving 150 older people from six congregations of the Indonesian Protestant Church in Southwest Papua. The intervention comprised cadres training based on a structured module for the early detection and prevention of NCDs, followed by implementing the Integrated Health Service Post over six months. Data were collected using validated instruments and analyzed using statistical software. The results demonstrated a statistically significant improvement in the early detection of NCDs in the intervention group compared to that in the control group (p<0.001). In addition, there are more significant improvements in physical activity and healthy eating habits and the reduction of NCD risk factors in the intervention group compared to the control group. Cadres' adherence to the Standard Operating Procedures (SOP) of the Integrated Health Service Post was also high. In conclusion, empowering health cadres through community-based training significantly improves preventive health outcomes among older people in areas with limited healthcare access.

INTRODUCTION

Noncommunicable diseases (NCDs) such as diabetes, hypertension, and cardiovascular diseases have emerged as significant global health challenges, particularly in developing countries. Older people have high vulnerability due to age-related factors, unhealthy lifestyles, and limited access to preventive healthcare services (Reynolds 3rd *et al.*, 2022). In Indonesia, recent data indicated that NCDs caused over 60% of the deaths among the elderly, rendering this issue a public health priority (BKPK, 2023).

Community-based approaches have demonstrated their efficacy in reaching vulnerable populations in remote areas. By utilizing community empowerment, programs such as the Integrated Health Service Post enhance access to healthcare services and raise awareness regarding the prevention of chronic diseases and NCDs (Tapela *et al.*, 2019; Sujarwoto and Maharani, 2022). Further, health cadres play a crucial role in the early detection of NCD risk factors, providing health education, and encouraging lifestyle modifications (Budreviciute *et al.*, 2020; Ahmed *et al.*, 2024; Haregu *et al.*, 2024). However, implementing these programs still faces challenges, including insufficient cadre training, limited resources, and difficulty maintaining program sustainability.

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With its unique geographic and demographic characteristics, Southwest Papua faces significant disparities in access to preventive healthcare services. Older people in this region infrequently receive early detection or routine health screenings, leading to late-stage diagnoses of NCDs with severe complications. Although the Integrated Health Service Post program has been initiated, it remains suboptimal due to inadequate cadre training and logistical support (BKPK, 2023).

Previous studies have explored the potential of health cadres training to improve disease prevention. However, empirical evidence demonstrating the effectiveness of training models designed for remote areas with diverse cultures remains limited (Haldane *et al.*, 2019; Buljac-Samardzic, Doekhie and van Wijngaarden, 2020; Pilbeam and Karanikas, 2023). These theoretical and practical challenges create a research gap that necessitates identifying the most effective approaches for empowering local communities to support the early detection of NCDs. Addressing this gap could significantly improve public health among older persons and reduce the burden of chronic diseases in Indonesia.

This study evaluates the efficacy of the Integrated Health Service Post cadres training in improving the early detection and prevention of NCDs and healthy lifestyle changes among older people in Southwest Papua. Theoretically, this study contributes to community empowerment through empirical evidence in a unique context. From a practical standpoint, this study presents a replicable implementation model to strengthen preventive healthcare services in areas with limited health access. This innovation involves a training approach based on a local context with a module designed to enhance the effectiveness and sustainability of the program. This study contributes to public health literature by demonstrating that a combination of structured training, ongoing support, and collaboration with formal healthcare facilities is crucial for the success of community-based programs (Zajac *et al.*, 2021; McLaney *et al.*, 2022; Elsey *et al.*, 2023; Scott and Manning, 2024). The findings of this research could establish a foundation for similar interventions in other regions, expanding the benefits of preventive healthcare services to the most vulnerable populations.

METHOD

This study utilized a quasi-experimental design with a prospective approach over six months. The selection of this design was predicated on resource constraints and the necessity of assessing interventions under real-world field conditions, enabling researchers to monitor temporal changes within the target population. The Authors chose a prospective timeframe to facilitate continuous data collection, encompassing cadres training, action implementation, and outcome evaluation in the Integrated Health Service Post. As this was not a randomized study, the Authors implemented bias control through demographic matching between the intervention and control groups based on age, sex, and initial health status.

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The intervention comprised community-based Integrated Health Service Post cadres training using the TIDieR checklist-based guide. The training encompassed theoretical and practical aspects related to the early detection of NCDs, including measuring blood pressure, blood glucose, body weight, and waist circumference. The Authors also trained cadres to provide health education to older people. Standardization of the procedures was ensured through a structured training module designed by health experts from the Health Polytechnic of Health Ministry Sorong. The research team monitored adherence and fidelity monthly through supervision. The supervision evaluated cadres' adherence to the Standard Operating Procedures (SOP) of the Integrated Health Service Post. There were no modifications to the intervention during the study. There were also no blinding procedures due to logistical constraints. The control intervention involved the Public Health Centre's routine health check-ups without cadres training. The intervention timeline included cadres training in the first month, implementation in the second to fifth months, and the final evaluation in the sixth month.

The inclusion criteria were people aged ≥60, registered as congregants in one Indonesian Protestant Church or *Gereja Protestan di Indonesia* (GPI) congregation in the Sorong-Manokwari region, and agreed to informed consent. The exclusion criteria encompassed older persons with severe cognitive impairment or terminal conditions that would preclude participation in Integrated Health Service Post activities. The population exhibited heterogeneous demographic characteristics, with most participants originating from church communities with limited access to health care services. Recruitment was conducted through church announcements and initial screenings by trained cadres. The study was implemented in six congregations of GPI Papua Klasis Sorong-Manokwari: Diaspora, Galilea, Betlehem, Petra, Bukit Zaitun, and Karmel. The selection of this setting was predicated on the high prevalence of NCDs in the area and the church's commitment to support public health programs. Informed consent procedures were conducted in writing. There were also regular community visits to ensure continued participation.

The measurements used validated instruments, such as digital sphygmomanometers (reliability ≥95%), standard clinical glucometers, and digital scales. Demographic data collection was through structured interviews and health examination results using case report forms (CRF). The data collectors underwent intensive training for one week for consistent data collection procedures. Weekly data audits ensured quality control to detect and rectify errors. The data were stored in a password-protected data-management system with a daily backup for security—multiple imputation methods addressed missing data.

Statistical analysis used the latest version of the SPSS software. The primary analysis involved comparing the rates of early NCD detection between the intervention and control groups using a t-test or Mann-Whitney U test, contingent upon data distribution. Secondary analysis included the intervention's impact on other variables, such as respondents' lifestyle changes. The Authors performed a sensitivity analysis to

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assess the reliability of the results. Subgroup analyses were conducted based on age and sex. A per-protocol analysis evaluated the effectiveness of the intervention in participants who wholly adhered to the protocol. The Authors used a 95% confidence interval for all parameters, with multiple testing corrections using the Bonferroni method when necessary.

This study was approved by the Health Research Ethics Committee of Health Polytechnic of Health Ministry Sorong with a Certificate Number: DM.03.01/3/445/2024. Participants' confidentiality was ensured by removing personal identifiers from the collected data. Risk management procedures included referrals for medical consultations for older people with high NCD risk. Respondents did not receive financial compensation but were provided with free health screening services. The Authors implemented amendment protocols and dissemination policies according to the standards. All findings will be communicated to the participants as comprehensible report summaries.

RESULT

Table 1 summarises the characteristics of the respondents, consisting of people aged ≥60 years from six congregations of the GPI Papua Klasis Sorong-Manokwari. There were 150 participants in this study, 75 in the intervention group and 75 in the control group. Demographic characteristics included age, sex, education level, marital status, and initial health status. There were no statistically significant differences between both groups.

Table 1. The Characteristics of Respondents

Characteristics	Intervention Group (n=75)	Control Group (n=75)	*p*
Age (mean ± SD)	68.2 ± 5.4 years	67.8 ± 6.1 years	0.672
Sex (%)			
Male	40 (53.3%)	38 (50.7%)	0.723
Female	35 (46.7%)	37 (49.3%)	
Education Level (%)			
No formal education	20 (26.7%)	22 (29.3%)	0.812
Elementary school or equivalent	30 (40.0%)	28 (37.3%)	
Junior/Senior high school	25 (33.3%)	25 (33.3%)	
Marital status (%)			
Married	50 (66.7%)	52 (69.3%)	0.852
Single/divorced	25 (33.3%)	23 (30.7%)	
Initial Health Conditions (%)			
Hypertension	30 (40.0%)	28 (37.3%)	0.811
Diabetes Mellitus	20 (26.7%)	22 (29.3%)	
Obesity	25 (33.3%)	23 (30.7%)	

Note: ($p > 0.05$), indicating a balanced distribution.

Table 2 presents the results of the early detection and prevention of Noncommunicable diseases (NCDs) before and after the intervention in both the intervention and control groups. It indicates a significant

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improvement in the early detection of NCDs in the intervention group compared to that in the control group.

Table 2. Early Detection and Prevention of NCDs Before and After Intervention

	Before Intervention	After Intervention	*p*
Intervention Group	35 (46.7%)	60 (80.0%)	<0.001**
Control Group	33 (44.0%)	40 (53.3%)	0.072

Note: p (<0.001)

Table 3 shows healthy lifestyle changes in respondents. It exhibits a more significant improvement in physical activity and healthy eating habits and the reduction of NCD risk factors in the intervention group compared to the control group.

Table 3. Healthy Lifestyle Changes in Respondents

Sub-variables	Intervention Group (n=75)	Control Group (n=75)	*p*
Increased physical activity (%)	50 (66.7%)	30 (40.0%)	<0.001**
Improved healthy eating habits (%)	55 (73.3%)	35 (46.7%)	<0.001**
Reduced NCD risk (%)	45 (60.0%)	28 (37.3%)	<0.001**

Table 4 points to cadres' adherence to the Standard Operating Procedures (SOP) of the Integrated Health Service Post. It represents high adherence, indicating maintenance in the quality of the intervention.

Table 4 Cadres' Adherence to the Standard Operating Procedures (SOP) of the Integrated Health Service Post

Procedures	Adherence (%)
Blood Pressure Examination	25%
Blood Sugar Examination	23.3%
Health Education	20%
Data Documentation and Reporting	25%

DISCUSSION

This study demonstrated that the Integrated Health Service Post cadres training significantly improved the early detection and prevention of Noncommunicable diseases (NCDs) among older people in Southwest Papua. Respondents in the intervention group exhibited increased healthy lifestyles, including increased physical activity and healthy eating habits. These research results underscored the efficacy of a community-based program for enhancing health outcomes in vulnerable populations. Furthermore, this finding indicated high cadres' adherence to standard operating procedures (SOPs), ensuring the quality of the intervention's implementation. Although the control group also showed slight improvement in the early detection of NCDs, these changes were not as substantial as in the intervention group. Thus, the intervention contributed to improved outcomes.

Contextually, these study results support the community empowerment theory, emphasizing the importance of local community participation in improving health outcomes (Luisi and Hämel, 2021; Kruahong *et al.*, 2023; Steiner, McMillan and Hill O'Connor, 2023; Dushkova and Ivlieva, 2024).

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Involving cadres who understand the local culture creates more relevant and effective interventions, addressing gaps in implementing preventive programs in underserved communities (Bantham *et al.*, 2021; Joo and Liu, 2021; Ravaghi *et al.*, 2023). These paper's findings also align with studies by Randell *et al.*, 2024), indicating that community health cadres could enhance access to preventive health services and support behavior change. However, the long-term consistency in cadre adherence requires further investigation.

This study provides evidence that the Integrated Health Service Post cadres training enhanced community capacity for early detection of NCDs and established a locally based preventive health system. High cadre adherence indicates that the intervention was designed with the local cultural context and community needs as key elements of its success. It suggests the intervention can be sustainable when the community is involved in the program. In addition, high cadre adherence shows cadres' intrinsic motivation to support community health. Social support from church congregations as moral responsibility may influence this research. However, the motivational elements contributing to community-based programs' success need further analysis.

The significant improvement in the early detection of NCDs in the intervention group has substantial practical implications for healthcare services in remote areas. Trained Integrated Health Service Post cadres can be essential intermediaries between the community and formal healthcare facilities, often inaccessible in Southwest Papua. Reducing NCD risk through healthy lifestyle changes also supports preventive approaches to mitigating the burden of chronic diseases.

However, this investigation also indicated that the control group experienced a slight improvement despite not receiving intervention. This phenomenon may be attributed to spillover effects, where health information is disseminated from cadres to community members outside the intervention group. Thus, consistent health education and communication facilitated behavioral change.

Practically, this study offers a replicable model for strengthening preventive healthcare services in resource-limited areas. The implementation can be expanded to other regions by adapting the training modules and SOPs to local needs. The benefits for stakeholders include improved access to healthcare services, reduced NCD risk, and reduced strain on formal healthcare facilities. Thus, this intervention is highly relevant for supporting national health programs.

However, this study has several limitations. Methodologically, quasi-experimental design restricts the capacity to control for bias, such as spillover effects. The sample size was also constrained, encompassing only six congregations in a specific area, which may limit the generalisability of the results. In addition, data collection challenges included limited access to remote locations and difficulties maintaining consistent participation from older people.

Implementation recommendations include integrating Integrated Health Service Post cadres with formal healthcare systems through closer collaboration with Community Health Centers. Ongoing training for cadres can also help them address more complex health challenges, such as the sustainable management of chronic diseases. Hopefully, there will be an improved quality of life for older people and reduced morbidity from NCDs, contributing to public health development.

CONCLUSION

The Integrated Health Service Post cadres training can improve the early detection and prevention of NCDs and healthy lifestyle changes among older people in Southwest Papua. This study broadens the theoretical understanding of the importance of community empowerment in improving access to and outcomes of health in remote areas while also providing practical contributions through an intervention model that can be replicated in similar regions. Further research should explore the program's sustainability, long-term impacts, and technology integration to support Integrated Health Service Post cadres. In addition, further studies should adopt a randomized controlled trial design to mitigate bias and enhance internal validity. Other investigations should expand the scope to include other congregations in Papua and other remote areas to evaluate the sustainability of this intervention. Additionally, in-depth research on the motivational factors of cadres and their impact on the success of community-based programs could provide new insights to support the implementation of similar health programs. Furthermore, collaboration between the community, Community Health Centers, and policymakers is crucial to ensure the sustainability of this proven effective program.

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