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The Healthy Living Community Movement Program on Smoking and Health Checkups in Kutalimbaru Village, Indonesia

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Abstract

The prevalence of non-communicable diseases (NCDs) has significantly escalated in Indonesia, contributing to 75% of all deaths in 2023. The Healthy Living Community Movement Program, initiated by the Ministry of Health in 2016, aims to mitigate lifestyle risk factors through health promotion strategies. This study focuses on the impact of this program on smoking cessation and health checkup behaviors in Kutalimbaru Village. Utilizing an action research design based on Kurt Lewin's problem-solving model, this study involved 400 families from Kutalimbaru Village. Surveys, focus group discussions and community interventions were employed to identify key health issues and implement targeted strategies. The interventions included health education campaigns, fitness workshops and mobilization of Posbindu NCD, conducted over four months with the support of health workers. Pre- and post-intervention data were collected using structured surveys, with statistical analysis performed to assess behavioral changes. The findings revealed a significant reduction in daily smoking prevalence from 61% to 51% ($p = 0.044$) and an increase in regular health checkup participation from 24% to 37% ($p = 0.005$). The Healthy Living Community Movement Program initiative demonstrates that integrating health education with accessible services can effectively promote preventive health behaviors in underserved communities. These findings underscore the importance of community engagement and interventions in addressing public health challenges.

Keywords: Community Health, Health Checkups, Non-Communicable Diseases, Rural Health Interventions, Smoking Cessation.

Introduction

Health development discussions in Indonesia are centered on non-communicable diseases (NCDs) and their risk factors. In 2023, NCDs were identified as the leading cause of mortality in Indonesia, accounting for 75% of total deaths, where cardiovascular disease (37%), cancer (13%), chronic respiratory disease (8%) and diabetes (7%) are the main causes. Notably, premature deaths attributed to NCDs exceeded 22% (1). The four main lifestyle risks that contribute to NCDs are poor eating habits, alcohol consumption, tobacco use and physical inactivity (2). Cardiovascular diseases, diabetes and hypertension are all significantly linked to these factors (3, 4).

Tobacco use, one of the major risk factors for NCDs, is highly prevalent in Indonesia. According to the 2018 Indonesia Basic Health Research, 33.8% of Indonesians aged ≥15 years were active smokers. North Sumatra province reflects slightly lower rates at 25.26%, yet our community assessment in Kutalimbaru Village revealed alarmingly higher prevalence, with 59% of surveyed inhabitants being active smokers (5). Of particular concern is the finding that all of the household heads in Kutalimbaru were tobacco users, exhibiting varying usage patterns from daily to occasional smoking. Smoking is culturally entrenched and commonly observed in domestic environments, agricultural fields and social gatherings.

To combat NCDs, the Ministry of Health in Indonesia has launched the Healthy Living Community Movement (HLCM) as a national initiative since 2016 to promote a culture of healthy living, so that there is a change in healthier lifestyle towards quality public health (6).

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The program's primary objective is to negate lifestyle risk factors through the promotion of smoking cessation, regular health checkups, increasing physical activity, promoting balanced nutrition, hygiene and avoidance of alcohol (7). The HLCM concept is considered sound, focusing on promotive and preventive activities and supporting Goal 3 of the Sustainable Development Goals (SDGs), namely Good Health and Well-being. However, HLCM implementation still faces various challenges, including low public awareness, a lack of sustainable policy support and limited coordination between stakeholders.

One of the core initiatives under HLCM is the Integrated Non-Communicable Diseases Development Post (Posbindu NCD), which offers regular monitoring and control of NCD risk factors for those aged 15 years and above, covering healthy populations, those at risk and those already with NCDs (8). This activity uses a five-table system: registration, interview, physical examination, simple lab tests (blood pressure, blood sugar, cholesterol and uric acid) and counseling. This activity is conducted once a month for early detection of NCDs. Beyond screening activities, Posbindu NCD also serves as a platform for health education and behavioral counseling. Through regular monitoring, risk factor identification and counseling sessions, community members receive personalized feedback regarding their health status. These interactions aim to increase risk awareness, promote regular health check-ups and motivate individuals to adopt healthier lifestyles.

Regular health check-ups are crucial for NCD prevention, allowing for early identification and treatment of potential health problems (9). Yet, statistics from the 2023 Indonesia Health Survey show that merely 22.7% of Indonesians engage in routine health check-ups (1). This results in an increase in non-communicable diseases (NCDs) rather than a reduction. A past study found that HLCM reduces healthcare costs. The cost of catastrophic diseases, including NCDs, reached IDR 24.1 trillion in 2022, a 34.3% increase from the previous year (10). Another study found that HLCM implementation is associated with age, occupation and attitudes (11).

In Kutalimbaru, Posbindu NCD is confronted with accessibility issues because it has limited hours of operation and report low uptake rates, driven largely by a lack of awareness about the importance of preventive care. Furthermore, the community underutilizes the NCD Posbindu because most people work in the fields as livestock breeders (cattle, poultry, sheep) and as farmers producing rice, cassava, corn, horticultural crops and perennial crops such as oil palm, coffee, cocoa and rubber. Therefore, they spend more time each day farming or raising livestock. They argue that their work is good for their bodies because of the movement associated with farming. Farmers feel healthier because they move around the fields every day and are free to breathe fresh air among the surrounding plants. Other health services available in the village are utilized if people are sick and cannot work in the fields.

Different from previous studies, this study aims to assess the influence of the HLCM Program on smoking cessation behavior and health checks in Kutalimbaru Village. The village is a fostered village of the USU Faculty of Public Health, where various HLCM activities have frequently been carried out. Employing an action research design, the findings are hoped to provide valuable insights for developing more effective health promotion strategies in rural Indonesia and contribute to the overall reduction of the NCD burden and enhancing policies that support the United Nations' 2030 Sustainable Development Goals (SDGs), particularly in promoting good health and well-being for all.

Methodology

Study Design

This study employed an action research design, based on Kurt Lewin's model of problem-solving that focuses on a cycle of diagnosing, planning, action and evaluating. This helped in enabling researchers and community practitioners to work together (12, 13). It offered a systematic framework for recognizing health problems, developing tailored interventions, implementing them and evaluating their effects in Kutalimbaru Village.

Study Population and Sampling

The study population comprised 3,637 residents (907 families) of Kutalimbaru Village, a rural community in North Sumatra primarily inhabited by the Batak Karo tribe, characterized by homogeneous cultural traits. The homogeneous Karo Batak society preserves cultural norms through intensive kinship-based communication

(Rakut Sitelu), the use of the Karo language and the tradition of ertutur (greeting based on traditional position). Cultural messages are disseminated through rituals, traditional gatherings and family education to maintain values such as cabur bulung (marriage) and social solidarity.

Cluster sampling was applied to select five hamlets that densely populated. Proportional sampling was subsequently used to determine the sample, The sample size was calculated using the Lemeshow formula with a Type I error rate of 0.05, a margin of error (d) of 0.05 and an estimated prevalence (p) of 0.413 based on previous studies on smoking prevalence in similar populations (14). Because this is action research or a social experiment, the sample calculation did not consider the rigorous design of quantitative experimental research. The minimum sample size was 372 subjects, so it was rounded up to 400 subjects. The number of subjects, 400 people, was the sample for the survey before the action/intervention was carried out, then 200 subjects were taken who were involved and willing to participate in the intervention.

Data Collection

Data collection involved a combination of structured surveys and focus group discussions (FGDs) to identify prevalent health issues in Kutalimbaru Village (3°26'21.96"N, 98°32'44.02"E).

Problem Identification and Prioritization (Action Diagnosis)

Problem identification was carried out systematically using structured household surveys with validated questionnaires aimed at collecting data on socio-economic status, health behavior and sanitation practices. The decision criteria for questionnaire items are considered valid if the calculated r value is greater than the table r value. The table r value with a sample size (n) of 30 is 0.361. An instrument is considered reliable if the Cronbach Alpha value is greater than 0.60. At the same time, FGDs with various community stakeholders, such as local leaders, health workers and community members, were conducted to obtain qualitative data on perceived health issues and contextual factors. The Pan American Health Organization (PAHO) technique, selected due to its systematic nature of assessing problems on the basis of magnitude, severity, vulnerability, cost-effectiveness and community acceptance, helped ensure that intervention efforts would be focused on the most pressing and actionable health problems with community agreement.

Table 1: Calculation Results for Determining Problem Priority

Problem	Score					Total	Ranking
	M	S	V	C	A		
Smoking	10	10	7	2	2	2.800	1
Sanitation	7	4	2	3	5	840	3
National Health Insurance	4	7	9	2	5	2.520	2

Note: M: magnitude, S: severity, V: vulnerability, C: cost-effectiveness, A: community acceptance

The following are the stages for applying the PAHO approach to determine problem priorities: present a list of the issues derived from the situation analysis, assign a score to each criterion (for instance, a score of 1–10 based on five criteria) and have discussion participants assign grades or scores to each issue using the PAHO criteria. Then, scores for each criterion were multiplied (M×S×V×C×A) to determine priority values, with higher scores indicating greater urgency. The PAHO problem prioritization method was used to prioritize these issues and guide intervention efforts, as shown in Table 1.

Intervention Planning and Design (Action Planning)

A strategic and participatory approach was developed to employ the Healthy Living Community Movement Program. The planning process included joint workshops with community members where the findings from the surveys and FGDs were shared. The participatory process not only guided the intervention efforts but also created ownership among the community members. The main activities included health education sessions, fitness workshops and mobilization of Posbindu NCD, all tailored to address the specific barriers identified during the diagnosis phase. The health education interventions were implemented over two research cycles: three months in Cycle 1 (provided counseling three times per month) and three months in Cycle 2 (through health checks, fitness exercises and counseling). The presentation of HLCM-related materials lasted for one hour, followed by a one-hour discussion. In the second

cycle, fitness sessions were held in the morning for 45 minutes, followed by health checks and counseling. Field workers were students from the Faculty of Public Health at various levels (bachelor's, master's and doctoral) along with Posbindu cadres.

Action Planning

The action research process followed by the project for some activities is presented in Figure 1.

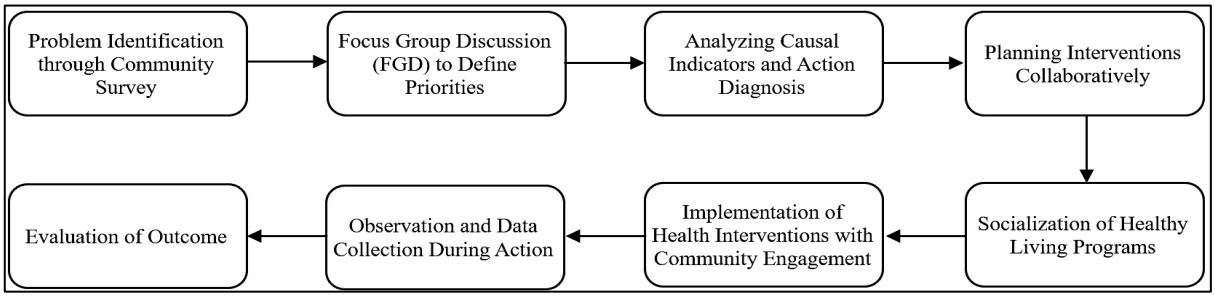

Figure 1: Action Planning

Intervention Implementation

The interventions were carried out within four months, supported by local health workers who helped ensure community involvement and provided continuous education. Health education sessions focused on the risks associated with smoking as well as the need for frequent health check-ups, while fitness workshops promoted physical activity as a way of ensuring general health. Posbindu NCDs were held to offer mobile health services so that the participants could undergo screening and consultation by health workers.

Data Analysis

In order to have a representative sample for post-intervention assessment, a stratified sampling method was adopted. The method was chosen to represent the diversity of the population within the constraints of resources. Of the 400 families that were given the intervention, 200 were selected randomly to ensure a representative sample that would capture the general demographic characteristics of the study population. The pre-intervention sample consisted of 400 subjects, with all demographic data measured, as age, income, occupation and ethnic/tribe. When the intervention was implemented, only 200 people were involved and participated.

Both pre- and post-intervention data were gathered through structured surveys and statistical analysis was done to determine changes in behavior. Data analysis was carried out using the chi-square test. Non-parametric analysis was used because assumptions of parametric tests were violated, as normality tests showed a non-normal distribution ($p < 0.05$) and homogeneity tests showed significant variance differences between groups ($p < 0.05$).

Ethical Consideration

This study was carried out with due consideration to ethical principles and was approved by the ethics review committee. It obtained informed consent from all the participants with an assurance of voluntary participation and confidentiality of response. The study protocol was approved by the Institutional Review Board, reference number 022/KEPK/UNPRI/X/2022.

Results

Sociodemographic Characteristic of the Community

The majority of participants were of productive age (85%), predominantly Karo ethnicity (87.25%) and engaged in farming activities (63.75%). Income levels were generally low, with 63.25% earning less than Rp. 1,500,000 per month. The sociodemographic characteristics of study participants shown in Table 2.

Table 2: Demographics of the Communities Involved in the Study

Demographics	Groups			
	Before (n=400)		After (n=200)	
	n	%	n	%
Age				
Productive age (15-64 years)	340	85.0	168	84.0

Demographics	Groups			
	Before (n=400)		After (n=200)	
	n	%	n	%
Elderly age (>64 years)	60	15.0	32	16.0
Total	400	100.0	200	100.0
Income				
≥ Rp. 1.500.000 (median value)	147	36.75	82	41.0
< Rp. 1.500.000	253	63.25	118	59.0
Total	400	100.0	200	100.0
Occupation				
Farmer	255	63.75	143	71.5
Entrepreneur	59	14.75	19	9.5
Construction worker	34	8.5	10	5.0
Driver	32	8.0	9	4.5
Others/uncertain	20	5.0	4	2.0
Total	400	100.0	200	100.0
Ethnic/tribe				
Karo	349	87.25	180	90.0
Java	33	8.25	13	6.5
Batak	12	3.0	5	2.5
Mandailing	3	0.75	2	1.0
Nias	2	0.5	0	0
Minangkabau	1	0.25	0	0
Total	400	100.0	200	100.0

Smoking Status

Most individuals who smoke daily belong to the productive age group, accounting for 61.2% of the total. A statistically significant difference in smoking status by age was observed ($p < 0.001$). Furthermore, the prevalence of smoking is notably higher among individuals with a monthly income of less than Rp. 1,500,000, reaching 65.2% ($p < 0.001$). Occupational status also influences smoking behavior, with 60.4% of farmers identified as daily smokers, compared to 48.3% of non-farmers ($p = 0.019$). The smoking status of study participants shown in Table 3.

Table 3: Smoking Status by Age, Income, Occupation and Ethnicity

Variable		Smoking Status				Total (n=400)		p-value
		Daily smokers (n=224)		Occasional smokers (n=176)				
		n	%	n	%	n	%	
Age	Productive (15-64 years)	208	61.2	132	38.8	340	100.0	0.001
	Elderly (>64 years)	16	26.7	44	73.3	60	100.0	
Income	≥ Rp. 1.500.000 (median value)	59	40.1	88	59.9	147	100.0	0.001
	< Rp. 1.500.000	165	65.2	88	34.8	253	100.0	
Occupation	Farmer	154	60.4	101	39.6	255	100.0	0.019
	Non farmer	70	48.3	75	51.7	145	100.0	
Ethnicity	Karo	195	55.9	154	44.1	349	100.0	0.894
	Other	29	56.9	22	43.1	51	100.0	

*p-value calculated using chi-square test

Table 4: Health Checkup Behavior by Age, Income, Occupation and Ethnicity

Variable		Health Checkups				Total (n=400)		p-value
		Regular (n=122)		No (n=278)				
		n	%	n	%	n	%	
Age	Productive (15-64 years)	96	28.2	244	71.8	340	100.0	0.0019
	Elderly (>64 years)	26	43.3	34	56.7	60	100.0	
Income	≥ Rp. 1.500.000 (median value)	46	31.3	101	68.7	147	100.0	0.793
	< Rp. 1.500.000	76	30.0	177	70.0	253	100.0	
Occupation	Farmer	83	32.5	172	67.5	255	100.0	0.238
	Non farmer	39	26.9	106	73.1	145	100.0	
Ethnicity	Karo	110	31.5	239	68.5	349	100.0	0.247
	Other	12	23.5	39	76.5	51	100.0	

*p-value calculated using chi-square test

Health Check-up Behavior

Most of the productive age group doesn't undergo regular health checkups, compared to the elderly group (p = 0.0019). Health check-up participation is higher among individuals with an income above ≥ Rp. 1.500.000 and most farmers (32.5%) participating in health checkups, the difference was not statistically significant. Table 4 displays health checkups data of the study participants.

Intervention of Healthy Living Community Movement

The interventions had a significant impact on smoking habits (p = 0.044) and participation in health checkups (p = 0.005), reflecting a significant difference between the pre- and post-intervention groups. Daily smokers reduced from 61% to 51% and participation in health checkups increased from 24% to 37% after the intervention. Table 5 presents the results of the intervention among the study participants.

Table 5: Distribution of Smoking Status and Health Checkup Samples by Group

Variable	Group Before (n=200)		Group After (n=200)		Total	
	n	%	n	%	n	%
Smoking Status						
Daily smokers	122	61.0	102	51.0	224	56.0
Occasional/Non-smokers	78	39.0	98	49.0	176	44.0
Total	200	100.0	200	100.0	400	100.0
P-value			0.044			
Health Checkup						
Continiu	48	24.0	74	37.0	122	30.5
No	152	76.0	126	63.0	278	69.5
Total	200	100.0	200	100.0	400	100.0
P-value			0.005			

*p-value calculated using the chi-square test

Discussion

The sociodemographic background of Kutalimbaru Village, which is dominated by productive-aged populations (85%), mostly Karo ethnicity (87.25%) and a high percentage working as farmers (63.75%) with mostly low-income levels (63.25%) with an income level of less than Rp. 1,500,000 per month, is the necessary background against which the impacts of the program are interpreted. Baseline data indicated distinct patterns in health behaviors across these demographic strata.

Daily smoking prevalence was notably higher among productive-aged individuals (61.2%) and those in lower income brackets (65.2%), aligns with a substantial body of literature demonstrating a consistent inverse relationship between socioeconomic status and smoking prevalence globally (15, 16). A systematic review also highlighted that lower education and income are strong predictors of higher smoking prevalence and lower quit attempts in low- and middle-income countries (17). In addition, the greater percentage of daily smokers among farmers (60.4%) than non-farmers imply occupational influences on tobacco use, which people in manual and service occupations have higher smoking prevalence than those in professional or managerial (18).

In terms of health check-up attendance, the productive age group showed weaker participation than the elderly, despite the high NCD risk in aging populations. This observation is consistent with research showing that perceived health status and unawareness about preventive care may discourage young and apparently healthy individuals from attending routine check-ups (19). In contrast, increased income was linked with increased health check-up participation, a pattern widely seen in health services studies where financial ability commonly enables access to preventive interventions (20, 21). The lower participation rate among farmers (32.5%) also highlights potential accessibility barriers or time constraints inherent to agricultural livelihoods, a challenge frequently cited in rural health service delivery (22).

The observed reduction in daily smoking prevalence from 61% to 51% (p = 0.044) following the intervention suggests that the program's strategies contributed to a positive shift in tobacco use patterns within the community. This outcome is particularly noteworthy given the deeply

ingrained cultural acceptance of smoking in Kutalimbaru Village. The targeted public health campaigns and community education on the adverse health consequences of smoking, including secondhand smoke exposure, appears to have been instrumental in challenging existing perceptions. This approach is supported by recent evidence; for instance, a study affirmed the efficacy of behavioral interventions incorporating educational components in promoting smoking cessation (23).

The educational materials tailored to the local culture and the provision of alternative healthy social activities through fitness workshops, likely supported individuals in modifying their smoking habits. This is consistent with social cognitive theory precepts that indicate behavior change is influenced by environmental as well as social support determinants (24). Studies in similar environments have demonstrated that community-based health education programs, where tailored to local cultural sensibilities, are able to enhance health literacy and foster healthier lifestyles (25, 26).

The incorporation of Posbindu NCD services, which provide accessible platforms for health professional interaction and individualized counseling, further aligned with habitual and social aspects of smoking, a process in accordance with the principles of comprehensive tobacco control frameworks (27). Although some literature identifies the persistence of smoking in rural communities as a result of close social bonds (28), the program's participatory nature might have counteracted these effects by promoting group commitment to health.

The increase in regular health check-up participation from 24% to 37% ($p = 0.005$) reflects a positive trend towards improved health-seeking behaviors among the study population. This improvement can be significantly accounted for by the health education program which sought to promote awareness about the need for early detection and NCD prevention. By elucidating the benefits of regular health check-ups, the program attempted to promote a more proactive mode of health management. This finding is consistent with a study, which highlighted the role of health education in improving awareness and uptake of preventive health services (29).

However, it is important to note that elderly participants continued to exhibit lower participation rates despite their elevated NCD risk. This observation suggests that while the program's general strategies were effective, specific barriers pertinent to the elderly population, such as mobility limitations, varying levels of health literacy and a potential perception of preventive measures as less relevant in advanced age might not have been addressed completely (30). This inequality highlights the necessity for more specific strategies to increase health checkups participation among elderly.

Practically, the results indicate that the Healthy Living Community Movement Program is a promising model for NCD prevention in similar rural Indonesian and possibly other developing country settings. The program's use of health education, practical workshops and utilization of existing community health infrastructure, offers a potentially affordable and sustainable solution. Making Posbindu NCD services more accessible, for example, through longer operating hours or the use of mobile health units, would overcome barriers for working and geographically scattered populations, consistent with calls for the strengthening of primary healthcare in rural areas (31). In addition, the observed changes highlight the benefit of participatory models empowering communities to take greater ownership of health programs, often critical to ensuring long-term program sustainability (32).

Conclusion

The results of the study indicate that smoking behaviour is higher among the productive age group, low-income individuals and farmers. Conversely, participation in routine health check-ups is lower among the productive age group and people with low socioeconomic status. Interventions through the Healthy Living Community Movement Programme have shown a statistically significant impact on reducing the proportion of daily smokers and increasing participation in health check-ups. After the intervention, the prevalence of daily smokers decreased and health check-up coverage increased significantly. These findings indicate that a community-based approach has the potential to encourage changes in health behaviour, particularly among vulnerable groups.

Despite the findings, this study is subject to several limitations that warrant acknowledgment. First, the study's focus on a single village in North Sumatra, while allowing for in-depth contextual understanding, may restrict the generalizability of the findings to other regions with distinct cultural, social, or economic characteristics. Second, the relatively short duration of the intervention (four months) limits the ability to assess the long-term sustainability of behavior changes that were seen. Although initial changes were evident, the maintenance of novel behaviors, especially entrenched habits such as smoking, requires extended follow-up. Third, the use of self-report data for both the measurement of smoking status and attendance at health check-ups, standard in community-based studies, introduces the possibility of social desirability bias. Objective measures, such as biochemical confirmation for smoking status, can be included in future research to improve the validity of data.

Abbreviations

FGD: Focus Group Discussions, HLCM: Healthy Living Community Movement, NCDs: non-communicable diseases, PAHO: Pan American Health Organization, SDGs: Sustainable Development Goals.

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Author contributions

All author contributes equally to the research, design the study, analyzed data and approved the final manuscript

Conflict of Interest

The authors declare that they have no conflict of interest.

Ethic Approval

This research has gone through ethical trials from the Universitas Prima Indonesia No. 022/KEPK/UNPRI/X/2022.

Data Availability

The data was available and collected through research activities funded by TALENTA USU under contract number 174/UN5.4.11.K/Kontrak/PPM/2023 and through community service activities of the doctoral study programme as a village under the guidance of the Faculty of Public Health, Universitas Sumatera Utara.

Declaration of Artificial Intelligence (AI) Assistance

The authors declare this manuscript was prepared without the assistance of generative AI. All conceptualization, analysis, interpretation and writing were developed independently by the authors.

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