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CORRELATION OF MORBIDITY WITH SMOKING STATUS AND POSBINDU PTM TO PREPARE AGING SOCIETY HEALTH MANIFESTATION IN INDONESIA

Rizma Dwi Nastiti[1], *Arief Hargono[1], Kurnia Dwi Artanti[1], Santi Martini[1], Chung-Yi Li[2], Adinda Rahma Triyaniarta[1]

[1]Faculty of Public Health, Universitas Airlangga, 60115 Surabaya, East Java, Indonesia
[2]Department of Public Health, National Cheng Kung University, Tainan City 701, Taiwan
***Corresponding author:** Arief Hargono **; Email:** arief.hargono@fkm.unair.ac.id

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ABSTRACT

Aging increases vulnerability to diseases, necessitating comprehensive strategies promoting healthy lifestyles. Posbindu PTM (Integrated Guidance Post for NCDs) is Indonesia's community-based program which was aimed to mitigate the impact of NCDs through monitoring risk factors and empowering individuals for early intervention and lifestyle changes. This study examined the correlations between smoking status, and implementation of *Posbindu PTM* among Indonesia's elderly population with morbidity rates. Data from 34 provinces were analyzed using Spearman's correlation test (α=5%) to examine relationships between morbidity rates (dependent variable) from the 2022 Elderly Population Statistics data, smoking status (active smokers, ex-smokers, non-smokers), and the percentage of *Posbindu PTM* implementation (independent variables) from the data of the 2021 Indonesia Health Profile. Active smokers (p=0.007, r=0.455) and ex-smokers (p=0.003, r=0.497) showed positive correlations with morbidity, while non-smokers (p=0.002, r=-0.506) exhibited a negative correlation. *Posbindu PTM* implementation (66.4% average in 2021) was not significantly correlated with morbidity (p=0.367). High smoking rates among Indonesia's elderly affect morbidity levels. *Posbindu PTM*, as an early detention and health promotion program, has not been well-implemented nationwide. Efforts and government commitment to prioritize health promotion and prevention at the grassroots level are essential for achieving a prosperous and effective aging society.

Keywords:
Elder,
Smoking,
Morbidity,
Non-Communicable Disease,
Integrated Guidance Post

ABSTRAK

Penuaan meningkatkan kerentanan terhadap penyakit, sehingga memerlukan strategi komprehensif yang mempromosikan gaya hidup sehat. Posbindu PTM (Pos Pembinaan Terpadu Penyakit Tidak Menular) adalah program berbasis masyarakat di Indonesia yang bertujuan untuk mengurangi dampak PTM melalui pemantauan faktor risiko dan memberdayakan individu untuk intervensi dini dan perubahan gaya hidup. Studi ini meneliti korelasi antara status merokok, dan implementasi Posbindu PTM di kalangan populasi lanjut usia Indonesia dengan tingkat morbiditas. Data dari 34 provinsi dianalisis menggunakan uji korelasi Spearman (α=5%) untuk memeriksa hubungan antara tingkat morbiditas (variabel dependen) yang berasal dari data Statistik Penduduk Usia Lanjut 2022, status merokok (perokok aktif, mantan perokok, bukan perokok), dan persentase implementasi Posbindu PTM (variabel independen) yang berasal dari data Profil Kesehatan Indonesia 2021. Perokok aktif (p=0.007, r=0.455) dan mantan perokok (p=0.003, r=0.497) menunjukkan korelasi positif dengan morbiditas, sementara bukan perokok (p=0.002, r=-0.506) menunjukkan korelasi negatif. Implementasi Posbindu PTM (rata-rata 66.4% pada tahun 2021) tidak secara signifikan berkorelasi dengan morbiditas (p=0.367). Tingkat merokok yang tinggi di kalangan lanjut usia Indonesia memengaruhi tingkat morbiditas. Posbindu PTM, sebagai program deteksi dini dan promosi kesehatan, belum terimplementasi dengan baik secara nasional. Upaya dan komitmen pemerintah untuk memprioritaskan promosi kesehatan dan pencegahan di tingkat akar rumput sangat penting untuk mencapai masyarakat lanjut usia yang makmur dan efektif.

Kata Kunci:
Lansia,
Merokok,
Morbiditas,
Penyakit Tidak Menular (PTM),
Pos Pembinaan Terpadu

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INTRODUCTION

The rapid increase in the average age of the global population, particularly among those aged 60 and over, is a prominent demographic trend. This age group's population doubled from 1980 to 2017, totaling 962 million, and estimates show that it will double again by 2050, reaching around 2.1 billion. (1). This shift is significant, with expectations that the number of older persons aged 60 or over will surpass the combined population of adolescents and youth aged 10–24 by 2050 (1). Furthermore, those aged 80 and over are anticipated to increase more than threefold globally from 137 million in 2017 to 425 million in 2050. It's noteworthy that two-thirds of the older population reside in developing regions, where their numbers are growing more rapidly than in developed regions (2). The increase in the elderly population shows that the life expectancy (LE) of the elderly is also increasing. In Indonesia, the overall LE in 2023 based on the LE data by Central Bureau of Statistics is recorded at 72.18 years, suggesting that infants born in the country that year have the potential to live up to this age. This LE figure represents an increase compared to previous years (71.88 years in 2022), indicative of enhancements in the overall health and nutritional status of the population nationwide (3). This can be a sign of successful national growth, particularly in the health sector, but it can also lead to issues if elderly people do not receive adequate social services (4).

Indonesia is entering a demographic bonus era, with the productive-age population set to peak around 2030, leading to potential economic growth. However, this shift also brings challenges, as the aging population will strain resources, with the proportion of elderly expected to double by 2035 and reach 77 million by 2050 (5). The increasing elderly population holds potential positive impacts if they remain healthy, active, and productive. However, aging also poses challenges concerning maintaining the quality of life for the elderly and the rising need for long-term care. Additionally, aging populations are accompanied by an increase in degenerative diseases and disabilities, leading to greater demand for assistance and long-term care for the elderly (6). Among elderly, osteoarthritis, stroke, and hypertension are the most common degenerative disorders that may need long-term care. Therefore, it may be said that chronic, degenerative, and non-communicable diseases—of which cardiovascular disorders are the most common—affect the aged population (7). Based on the 2018 Riskesdas data in Indonesia, the prevalence of health problems commonly suffered by the elderly includes hypertension at 69.5%, stroke at 50.2%, diabetes mellitus at 6%, chronic kidney disease at 8.23%, heart disease at 4.6%, and cancer at 3.84% (8). These diseases will cause problems if they are not treated or prevented, because they will become chronic and multi-pathological diseases. The attention of all countries to this elderly problem must continue to be anticipated, because there will be a very large dependency on costs (6).

People will face a number of obstacles to their health and quality of life as they live longer (9)(10). The lowered physiological resistance associated with aging will make people more susceptible to illness (11). Health problems often occur in the elderly are usually noncommunicable and chronic diseases (12). According to WHO estimates, noncommunicable diseases (NCDs) account for 74% of all deaths worldwide in 2018 and kill 41 million people annually. Cardiovascular disease, cancer, respiratory disease, and diabetes account for more than 86% of NCD-related premature deaths (13). Elderly populations aged 85 and above are vulnerable to various age-related changes, including sensory impairments like hearing and vision loss, as well as declining vestibular function. Common chronic diseases in this age group include cardiovascular diseases, hypertension, cancer, osteoarthritis, diabetes, and osteoporosis (14). These diseases are also associated with disability, dependency, and the need for long-term care (15). Thus, it's essential to have comprehensive strategies in place to address the healthcare needs of the elderly. One of the efforts made is through increasing the healthy lifestyle of the elderly and avoiding or eliminating risk factors that can reduce health status.

Smoking is widely acknowledged as a significant risk factor for various noncommunicable diseases (NCDs), which are health conditions not caused by infectious agents and are typically chronic in nature (16).

Smoking is linked to a wide range of health problems, including cardiovascular diseases, respiratory diseases, various cancers, and more (17). These health issues contribute significantly to morbidity, which refers to the prevalence of diseases and illnesses within a population. The deleterious effects of smoking on health are exacerbated in older individuals due to decreased physiological resilience and increased vulnerability to diseases (18). The harmful consequences of smoking on health become more severe in older individuals due to a combination of factors, primarily stemming from age-related changes in the body. People become increasingly vulnerable to the negative effects of tobacco smoking as they age, because their physiological resilience tends to decline (19). Studies have shown that older people who smoke, live 10 years less and have poorer health than non-smokers, and the disparity becomes even more noticeable after the age of 80 (20). Additionally, in old age, smoking increases the risk of osteoporosis, particularly in the elderly aged 55-64 years, with 37.5% of them being smokers, averaging a consumption of 13 cigarettes per day (21).

Smokers in Indonesia have an increased chance of developing NCDs, which can lead to higher rates of morbidity in a country with historically high smoking rates (22). The natural aging process among elderly people is making the long-term impacts of smoking more noticeable as Indonesia's population ages. This concerning scenario is compounded by the fact that cigarettes are not only popular among teenagers and adults in Indonesia but also among the elderly. Astonishingly, as many as 22.10% of the elderly population find themselves becoming smokers every day, indicating a significant prevalence of this habit within this demographic. Furthermore, the intensity of smoking among the elderly has increased to 23.5%, painting a worrisome picture of the widespread and escalating nature of smoking habits among older individuals (23). Older smokers are at a heightened risk of developing NCDs, which can lead to a higher burden of morbidity within the aging society (24). Addressing the interplay between smoking status and morbidity in the aging population is imperative for devising effective health interventions that promote healthier aging and reduce the burden of NCDs.

However, Indonesia has to prepare for an aging society because of the increasing proportion of elderly individuals in the population. This demographic shift poses various challenges related to healthcare, social services, and economic considerations that require strategic planning and resource allocation. The rising number of older adults often corresponds to higher healthcare needs and an increased demand for social services. Additionally, as the dependency rate rises, there is a greater reliance on support systems (25), impacting economic considerations and necessitating strategic planning and resource allocation to address these complex issues effectively.

Furthermore, Indonesia, which also has a demographic bonus until 2035 due to a large productive age population, must prepare to face a surge in the number of elderly individuals in the coming decades as that bonus turns into a liability. This dual challenge of high smoking rates among the current-productive age generations and an imminent aging population with associated healthcare needs poses a formidable public health concern for Indonesia in both the short and long term. This underscores the importance of thorough mitigation and planning in addressing the aging society. Addressing the complex dynamics of smoking across different age groups is essential to mitigate the associated risks of NCDs, to reduce morbidity rates, and to promote healthier aging for the nation. These efforts include providing adequate healthcare services, expanding social infrastructure, and developing the economy while considering the unique needs and challenges of the elderly population.

Integrated Guidance Post for NCDs or *Pos Binaan Terpadu Penyakit Tidak Menular* (*Posbindu PTM*), is a community-based program which represents Indonesia's proactive approach to mitigate the impact of NCDs. The Ministry of Health initiated community involvement in 2011 with a per-area approach, through one Posbindu in each village (26). Through early detection, education, and lifestyle guidance, *Posbindu PTM* aims to empower individuals, particularly the elderly, to take charge of their health and adopt healthier behaviors (27). The program provides five services, including patient/people visiting enrollment, interview of some NCDs risk factor, behavior-related health,

anthropometric measurement, basic medical check-up (glucose level, blood tension, cholesterol level), counseling, reporting, and referrals to higher health care facilities (28). *Posbindu PTM* can be used as a powerful tool for preventive healthcare in the aging population as Indonesia's population ages and the problems associated with smoking-related morbidity grow more prominent (29)(30). Respiratory peak flow assessments are performed in the *Posbindu PTM* every three months for participants who are at risk of smoking and exhibiting symptoms of a cough. It also includes health education from the health workers regarding the smoking cessation program so that the participant can be facilitated if they want to stop smoking (28). Evaluating the relationship between the presence of *Posbindu PTM* centers and the health outcomes of the aging population is instrumental in assessing the program's effectiveness in improving the health manifestation of the elderly.

This study seeks to investigate the intricate correlations between morbidity, smoking status, and the existence of *Posbindu PTM* in Indonesia's aging society. Through a comprehensive analysis of existing data and pertinent research, we aim to provide insights into the role of smoking cessation interventions and community-based health programs which is *Posbindu PTM* in shaping the health trajectory of the elderly population. The findings of this study hold the potential to inform targeted policies and strategies that promote healthier aging and enhance the overall well-being of Indonesia's elderly citizens to prepare an aging society in the future.

METHODS

A total of 34 provinces in Indonesia was included in the analysis. The dependent variable is morbidity rates of the elderly population. The morbidity rate or illness rate among the elderly is calculated based on the elderly population experiencing health complaints and disrupted daily activities. The health condition of the elderly reflects their lifestyle, such as smoking habits. The independent variables are the percentage of smoking status consisting of active smokers, ex-smokers and non-smokers, as well as the percentage of villages implementing *Posbindu PTM* in each province. The unit analysis of the data is 34 provinces in Indonesia. The data were obtained from survey report conducted by the Indonesian government which are the 2022 Indonesian Elderly Population Statistics Report by the Indonesia Central Bureau of Statistics (23) and the 2021 Indonesian Health Profile by the Indonesia Ministry of Health (31). The data sources used in compiling the 2022 Elderly Population Statistics include the results of the March 2022 National Socioeconomic Survey (Susenas), the August 2022 National Labor Force Survey (Sakernas), as well as other relevant data sources (23).

Indonesia Health Profiles 2021 are compiled based on routine data as well as survey data from technical units within the Ministry of Health and other relevant institutions such as the Central Bureau of Statistics (BPS), Social Security Administration (BPJS), Ministry of Home Affairs, Ministry of Education, and the National Population and Family Planning Agency (BKKBN).The data on elderly morbidity are from the year 2022 while the implementation of Posbindu began in 2021 based on the assumption that the effects of Posbindu on elderly health would manifest over time. By collecting data in 2022, it allows for a sufficient period to observe any changes or impacts resulting from the implementation of Posbindu throughout the previous year.

The data were analyzed using the Spearman correlation test (α=5%) to ascertain the presence of correlations among variables, along with the direction and strength of the relationships. No ethical clearance is provided as the data used in this study are secondary and have been obtained from the government reports.

RESULTS

The percentage of morbidity rates in 34 provinces in Indonesia shows varying results, with an average of 20.25%, which means that 1 in 5 elderly people in Indonesia, experiences health problems (Table 1). The province with the highest morbidity rate is Gorontalo(30.97%) and the lowest is The Special Capital Region of JakartaI (DKI Jakarta) (9.48%). The smoking status consists of active smoker, ex-smoker and non-smoker.

Table 1. Percentage of morbidity rates and smoking status in the elderly and villages conducting Posbindu PTM by province

Province	Smoking Status				Villages conducting *Posbindu PTM (%)*
	Morbidity (%)	Ex-Smoker (%)	Non-Smoker (%)	Active Smoker (%)	
DKI Jakarta	9.48	1.17	86.67	12.16	97.8
Papua	13.80	1.13	78.32	20.54	5.3
Kepulauan Riau	15.29	2.60	80.99	16.41	68.0
South Kalimantan	15.82	1.89	82.24	15.87	78.5
South Sumatera	16.46	1.85	73.63	24.52	74.3
Maluku	16.49	1.20	75.66	23.14	23.0
West Papua	16.58	2.08	77.93	19.99	21.8
Central Kalimantan	16.66	1.58	77.31	21.11	57.0
Bali	17.47	1.45	87.46	11.09	77.0
West Kalimantan	17.73	2.08	77.09	20.83	59.1
Riau	17.94	1.44	76.60	21.97	63.6
North Sulawesi	18.00	2.49	77.62	19.88	29.0
Bengkulu	18.13	2.10	71.05	26.85	64.8
Jambi	18.68	1.49	74.95	23.56	60.4
Kep. Bangka Belitung	19.24	1.37	80.64	17.99	88.0
East Kalimantan	19.71	2.46	78.70	18.84	83.4
East Java	19.80	1.57	74.63	23.79	81.9
Central Sulawesi	19.84	2.41	74.06	23.53	70.8
DI Yogyakarta	20.05	2.81	77.87	19.32	93.4
Banten	20.47	0.90	73.68	25.42	67.2
East Nusa Tenggara	20.51	2.44	78.60	18.96	73.6
Central Java	20.56	2.15	73.44	24.41	80.1
Sulawesi Selatan	20.72	1.47	80.52	18.01	89.2
West Sumatera	20.76	2.66	74.12	23.21	82.0
Lampung	21.00	2.62	67.00	30.38	80.9
North Sumatera	21.77	2.15	76.84	21.01	64.7
West Sulawesi	22.42	2.95	76.08	20.97	63.5
North Kalimantan	24.22	1.51	79.35	19.13	21.1
West Java	24.97	2.22	69.13	28.65	71.7
North Maluku	25.81	2.96	72.05	24.99	51.0
Southeast Sulawesi	26.54	3.01	75.97	21.01	40.5
Aceh	29.86	1.97	77.16	20.87	67.5
West Nusa Tenggara	30.94	2.48	67.58	29.94	92.9
Gorontalo	30.97	2.12	70.21	27.67	73.2
INDONESIA	20.71	1.95	74,61	21.24	66.4

Source: Indonesia 2022 Elderly Population Statistics & Indonesia 2021 Health Profile

Table 2. Correlation of morbidity with smoking status and the existence of *Posbindu PTM*

Variable	Spearman Correlation	p value
Active smoker	0.455	0.007
Ex-smoker	0.497	0.003
Non smoker	-0.506	0.002
Posbindu PTM	0.160	0.367

Lampung Province has the highest percentage of active smokers with 30.38%, while Bali province is the lowest with 11.09% active smokers. The average percentage of *Posbindu PTM* implementation in Indonesia was 66.4% in 2021 (Table 1). All villages in DKI Jakarta province have almost implemented *Posbindu PTM* (97.8%). Maluku province is the lowest province to have implemented the *Posbindu PTM* (23%). Thus, not all regions in Indonesia provide *Posbindu PTM* programs in their area.

Table 2's Spearman correlation analysis reveals that currently active smoker ($p = 0.007$; $r = 0.455$; direction = positive), ex-smoker ($p = 0.003$; $r = 0.497$; direction = positive), and non-smoker ($p = 0.002$; $r = -0.506$; direction = negative) had a significant relationship with morbidity in Indonesia's elderly. Furthermore, it has been observed that regions with a high prevalence of smoking among the elderly also tend to have a higher morbidity. This observation suggests a correlation between smoking habits among older individuals and an increased incidence of illnesses or health-related issues in those specific areas, for example, Gorontalo province has 30.96% morbidity and 2.67% of active smoker. On the contrary, regions with a high prevalence of non-smokers tend to have a lower prevalence of morbidity, for example Kepulauan Riau with 2.60% non-smokers resulted in 15.82% of morbidity numbers.

While *Posbindu PTM* has been instrumental in early detection and prevention, the research results indicate that it did not show a significant relationship with morbidity in Indonesia's elderly population ($p = 0.367$). The outcomes of research studies suggest that its presence and activities did not exhibit a substantial correlation with morbidity within this specific demographic group, which is based on the Regency/City as the unit analysis. It comes up as the limitation of the study, since the Posbindu PTM data only refer to the data from villages that implement Posbindu PTM. Another limitation is that Posbindu PTM also covers residents aged 15 years and older, thus is not specific to the elderly age range. The coverage of the UKBM program related to NCDs for the elderly specifically exists in the integration activities between the Elderly Integrated Service Center (*Pos Pelayanan Terpadu/ Posyandu*) and the Integrated Posbindu PTM (32).

DISCUSSION

The average percentage of *Posbindu PTM* implementation in Indonesia stood at 66.4%. Although this figure reflects the significant level of adoption and utilization of the *Posbindu PTM* program across the country, it should be noted that there are still several regions that have not implemented this program. This shows that efforts to increase the coverage of this program must continue, especially in unreached areas. Apart from quantity, program effectiveness is also an important focus. The success of *Posbindu PTM* not only depends on the extent to which this program is implemented, but also on how effective the program is in achieving its goals. A public health program is considered to be effective when it includes performance management, especially through rigorous, real-time monitoring, evaluation, and program improvement (33).

Based on the Regulation of the Minister of Health of the Republic of Indonesia No. 71 of 2015 concerning Management of noncommunicable diseases, article 20 paragraph 3 states that in *Posbindu PTM* activities, early detection, monitoring and early follow-up activities for NCDs risk factors can be carried out independently and continuously under the guidance of Community Health Centers and, to increase the effectiveness and efficiency of implementing NCDs prevention, the Government and the Community Health Centers can conduct research in collaboration with other agencies as an effort to prevent, control and treat noncommunicable diseases in Indonesia (34). Therefore, it is important to continue to measure and evaluate the impact of these programs on public health and identify ways to improve their effectiveness. This effort will

help ensure that *Posbindu PTM* is not only present in various regions, but also provides real benefits for the Indonesian people in dealing with noncommunicable diseases.

Smoking status with the morbidity rates of the elderly shows significant association, this urges the condition that smoking influences the health condition of elder, and as proof that there are still many elders who smoke. Active smokers exhibited a statistically significant positive correlation ($p = 0.007$, $r = 0.455$), indicating that as the number of active smokers increased, so did the morbidity numbers. Similarly, ex-smokers also showed a significant positive correlation ($p = 0.003$, $r = 0.497$), suggesting that higher numbers of ex-smokers were associated with increased morbidity. Conversely, non-smokers displayed a statistically significant negative correlation ($p = 0.002$, $r = -0.506$), indicating that as the number of non-smokers increased, morbidity numbers tended to decrease. Cigarette smoking addiction typically takes hold during adolescence, but the majority of its detrimental health effects manifest much later in life (35). The vast array of components in cigarette smoke gets deposited on the respiratory epithelium and lung surface, swallowed into the gastrointestinal tract, absorbed into the bloodstream, distributed throughout the body, metabolized, and eventually excreted (36)(37). Cigarette smoking stands as a primary contributor to cellular damage and disruption of biochemical processes. The organs most frequently impacted include the heart, liver, lungs, and others (38). Throughout this intricate process, these constituents have the potential to inflict harm at both the cellular and organ levels, inducing genetic mutations and ultimately leading to the development of cancer (39). Increased exposure to harmful substances from cigarettes, especially impacting the respiratory tract, results in a quicker decline in lung function compared to non-smokers (40).

The resulting injuries are largely incremental and cumulative, meaning they build up gradually over time. Consequently, these effects are more prevalent in the elderly population due to their extended duration of smoking. While the addiction may start early, the consequences become more apparent and severe in later stages of life, emphasizing the importance of addressing smoking habits and promoting cessation, especially in younger individuals, to mitigate the long-term health risks associated with smoking.

Evidence shows that elderly individuals aged 75 and above were less inclined to express their intention to quit smoking or reach out to a general practitioner for assistance in quitting smoking (41). Moreover, a decline in an older individual's physiological resilience can heighten their susceptibility to various diseases. Some studies show that engaging in smoking and the cumulative exposure to cigarettes were linked to subtle changes in the structure and function of the heart organs due to smoking among the elderly population, even in the absence of evident coronary artery disease or heart failure, and underscores the intricate relationship between prolonged smoking and adverse health outcomes, particularly in females and those over 80 years old (42).

Achieving an aging society, where a significant portion of the population consists of older adults, presents both opportunities and challenges for a nation. To effectively address this demographic shift, a nation should consider various strategies and policies across multiple sectors, including healthcare, social services, the economy, and education (43)(44). The goal is to adapt to the changing demographics in a way that promotes the health, productivity, and happiness of elderly citizens while maintaining overall societal well-being. Addressing the consequences of an aging population requires a comprehensive approach encompassing various strategies and policies. This includes investing in healthcare infrastructure, ensuring affordable access to healthcare, and expanding long-term care services (45)(46).

Regarding this condition, the Indonesia government is urgently required to have a comprehensive strategy to meet the health service needs of the elderly. Efforts need to be made as soon as possible to create a strong and resilient aging society in the future. This includes efforts to prevent NCDs and promote healthy aging through *Posbindu PTM* as the smoking cessation programs, alongside other preventive measures, can significantly contribute to reducing the burden of diseases in the aging population. Indonesia's smoking cessation program (*Upaya Berhenti Merokok*) in Primary Healthcare (*Fasilitas Kesehatan Tingkat Pertama*) in Indonesia was not optimally implemented in terms of

infrastructure and facilities, socialization and motivation of the participant to visit the clinic (47)(48), despite that the efforts were expected by the Ministry of Health to contribute to the achievement of the National Medium-Term Development Plan or *Rencana Pembangunan Jangka Menengah Nasional (RPJMN)* targets for 2020-2024. Therefore, it is essential to broaden and improve smoking cessation programs so that they will be more effective to support individuals in quitting smoking and to contribute the overall improvement of public health.

Previous studies investigated how the combination of smoking cessation initiatives and programs like *Posbindu PTM* could positively impact the health outcomes and quality of life of the aging population. The findings in Brazil suggested that extending the duration of smoking cessation was linked to increased scores in the psychological health domain (49). Quitting smoking demonstrates positive effects on quality of life (QoL) and the need to enhance this among older adults. Other evidence showed that quitting smoking before reaching the age of 40 could prevent over 90% of the additional deaths associated with persistent smoking. Even quitting smoking around the age of 60 has the potential to decrease premature mortality by 40% (50).

Moreover, research emphasizes the positive impact of smoking cessation on both men and women, demonstrating gains in life expectancy. Those who ceased smoking, especially at the age of 65, experienced significant increases in survival rates, men gained 1.4–2.0 years of life, and women gained 2.7–3.7 years (51). Immediate improvements in circulatory function and lung repair within a year of smoking cessation are noted, accompanied by a substantial reduction in the risk of heart disease and stroke (52) . A national study in Singapore showed a decrease in total mortality risk, specifically for lung cancer, within five years of smoking cessation (53). Efforts to address smoking in the context of an aging population should consider the unique health concerns and vulnerabilities of older adults (54). Implementing targeted smoking cessation programs and public health campaigns can play a crucial role in promoting healthier lifestyles among older individuals, ultimately contributing to the prevention and management of non-communicable diseases in this demographic.

Additionally, community-based health can be utilized in efforts to raise awareness among the community (55), especially the elderly, to quit smoking. Cadres from non-governmental organizations working under the supervision of Primary Healthcare (*Pusat Kesehatan Masyarakat*) can serve as a valuable resource for the operation of *Posbindu PTM*.

Moreover, since the programs have been developed by various cross-sectoral health-related programs such as *Posbindu PTM* and *Posyandu Lansia*, they can be unified into an integrated service package (32). It is hoped that services can be provided according to the issues and needs required by each age group (including pre-elderly and elderly targets). In the service for the pre-elderly and elderly age groups, individuals will not feel the need to come twice to receive services that are sometimes the same but conducted by different parties, thus becoming ineffective and inefficient. With integrated activities, it will be more effective and efficient, where elderly individuals will receive a comprehensive service package in one visit.

These cadres can be provided with training and education on various aspects of *Posbindu PTM*, including their roles in its implementation, the fundamental concept of *Posbindu PTM* (covering aspects like understanding, types of noncommunicable diseases, targets, objectives, and risk factors for PTM), and the execution of *Posbindu* activities by cadres (56). *Posbindu PTM* cadres will provide counseling and education regarding health issues encountered by *Posbindu PTM* participants, including implementing a referral system to the Primary Healthcare when necessary, in accordance with the criteria (28). Therefore, this is a potential way to optimize the promotive preventive effort, especially on tobacco control efforts among elderly.

Based on the Technical Guidelines for Posbindu PTM by the Ministry of Health, evaluations conducted for Posbindu PTM include assessments of organization, administrative evaluation including recording and reporting, and assessment of the developmental level of Posbindu PTM according to all established indicators. Morbidity rate is indeed one of the impact indicators that can depict the influence of Posbindu implementation on the community. However, this becomes the initial evaluation

and also the limitation of this research, thus it remains necessary to complement evaluations with other indicators and consider various aspects influencing public health in the future.

CONCLUSIONS AND SUGGESTIONS

Conclusion

High smoking status among elderly in 34 provinces in Indonesia affects the level of morbidity. Regions with a high prevalence of smoking among the elderly also tend to have a higher morbidity and regions with a high prevalence of non-smokers tend to have a lower prevalence of morbidity. *Posbindu PTM* as the early detection and health promotion post hasn't been implemented well in Indonesia, even though this is a highly potential way to maintain the health condition of all adults, moreover the elderly, so that it may result in good well-being.

Suggestion

More efforts and government commitment need to be optimized to prioritize health promotion and prevention from the lowest level, in order to achieve a prosperous and effective aging society. One of them is by optimizing the resources, educate and train cadres, and provide facilitations to implement a smoking cessation program and *Posbindu PTM* in all regions in Indonesia. The implementation of *Posbindu PTM* must be monitored and evaluated regularly so that the programs could effectively prevent and control the risk factors, especially among elderly in all provinces in Indonesia.

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