Journal of Public Health Indonesian
Volume.2 Issue.4, (November, 2025) Pages 108-119
E-ISSN: 3048-1139
DOI : https://doi.org/10.62872/20z97s64
https://nawalaeducation.com/index.php/JHH

Analysis of Smoking and Alcohol Consumption Behavior as Risk Factors for Non-Communicable Diseases in the Productive Age Group

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Received: October 21, 2025
Revised: November 04, 2025
Accepted: October 29, 2025
Published: November 30, 2025

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Abstract**:** *Smoking and alcohol consumption among productive-age adults represent major behavioral risk factors contributing to the rising burden of non-communicable diseases (NCDs), including cardiovascular diseases, stroke, cancer, diabetes, and chronic respiratory disorders. This study aims to analyze behavioral patterns, determinants, and the health impacts of smoking and alcohol consumption among individuals aged 25–54 years. A descriptive qualitative method with an analytical literature study approach was employed, reviewing reputable scientific publications from 2015 to 2024. Findings indicate that smoking and alcohol consumption in productive-age populations are driven by workplace stress, social norms, cultural influences, and urban lifestyle shifts. The combination of both behaviors exponentially increases NCD risks through inflammatory mechanisms, oxidative stress, metabolic dysregulation, and organ damage. Social determinants such as economic pressure and mental health also contribute to sustained risky behaviors. This study recommends multi-level interventions including education, counseling, enhanced health literacy, workplace wellness programs, and public health policies such as increased tobacco taxation and alcohol access restrictions.*

Keywords : alcohol, health risk, non-communicable diseases, productive age, smoking behavior.

How to cite:
Azis, A.N.A.A. (2025). Analysis of Smoking and Alcohol Consumption Behavior as Risk Factors for Non-Communicable Diseases in the Productive Age Group. *Journal of Public Health Indonesian*, 2(4), 108-119. DOI: https://doi.org/10.62872/20z97s64

INTRODUCTION

Non-communicable diseases (NCDs) have continued to show a significant increase in the productive age group over the past two decades and have become one of the greatest public health burdens globally. The World Health Organization reports that more than 74% of deaths worldwide in 2022 were caused by NCDs, with an increasingly high proportion occurring in the 30–69 age group (WHO, 2023). Indonesia faces a similar situation, where the burden of NCDs such as coronary heart disease, stroke, cancer, diabetes, and chronic respiratory diseases has increased sharply, especially among the working-age group that should be at the peak of their economic productivity. Based on data from the 2018 Basic Health Research, the prevalence of heart and blood vessel disease in the 30–59 age group has increased, while diabetes mellitus in the productive age group is 1.5 times higher than in the elderly (Indonesian Ministry of Health, 2023). This phenomenon shows that behavioral determinants are one of the factors that greatly contribute to the increasing burden of NCDs in Indonesia.

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Among the various behavioral risk factors, smoking and alcohol consumption are the two factors most consistently associated with an increased risk of NCDs in the productive age group. The WHO (2022) states that smoking causes more than 8 million deaths each year, including 1.3 million deaths due to exposure to secondhand smoke. Indonesia ranks third in the world for the number of smokers, with a smoking prevalence among adult men reaching 62.9% and a smoking prevalence among 15–19-year-olds increasing from 7.1% (2013) to 9.1% (2018), indicating an alarming trend for the productive age population (IHME, 2021). Alcohol consumption is also a significant risk factor. Although the prevalence of alcohol consumption in Indonesia is lower than in European countries, WHO (2021) data shows a 33% increase in per capita alcohol consumption in Southeast Asia over the last decade, with those aged 25–45 being the group most vulnerable to high-risk consumption.

The impact of smoking and alcohol consumption on the health of the productive age group is enormous because these two behaviors are closely related to the emergence of metabolic disorders, chronic inflammation, hypertension, cancer, and cardiovascular disease. A study by Kontsevaya et al. (2020) found that workers aged 30–55 who smoke have a 2.4 times higher risk of ischemic heart disease than non-smokers, while excessive alcohol consumption increases the risk of hypertension by up to 1.6 times. Research by Marleni et al., (2025) also shows that the combination of smoking and alcohol consumption produces a synergistic effect that increases the risk of oropharyngeal, liver, and pancreatic cancer. This makes both behaviors priority targets in NCD prevention efforts in various countries, including Indonesia.

In addition to posing health risks, smoking and alcohol consumption during productive age have broad socioeconomic impacts. The 25–54 age group is the main contributor to Indonesia's workforce, so an increase in the prevalence of NCDs in this group will have an impact on national productivity. According to a World Bank analysis (2022), NCDs are estimated to cause productivity losses of up to 2% of Indonesia's GDP each year, mostly from premature deaths and absenteeism due to smoking and alcohol-related diseases. Indirect economic impacts also arise from household costs for medical treatment, lost work days, and a decline in family economic capacity. Therefore, smoking and alcohol consumption are not only health issues, but also national development issues.

The phenomenon of increasing cigarette and alcohol consumption among the productive age group is related to social, environmental, and psychological factors. Rapid urbanization, work pressure, exposure to advertising, and social norms are triggers for this increase in risky behavior. Research by Sukma & Kontsevaya (2021) found that work stress has a significant correlation with increased alcohol consumption among productive-age workers, while research by Dahal et al., (2021) shows that media exposure and cigarette promotion indirectly influence health risk perceptions among the younger generation.

In Indonesia, the emergence of electronic cigarettes or vapes has further complicated the situation, as many productive-age individuals believe that electronic cigarettes are safer, even though scientific evidence shows that they pose respiratory and cardiovascular risks that are no less dangerous (Alidoost et al., 2021). Furthermore, alcohol consumption among productive-age individuals often occurs without awareness of the long-term risks.

Most working-age individuals tend not to associate light to moderate alcohol consumption with the risk of NCDs, even though a study by Hossain S. et al., (2018) found that even moderate alcohol

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consumption contributes to an increased risk of 23 types of chronic diseases. This disregard for long-term risks exacerbates the public health challenge of preventing the burden of NCDs in the productive age population, which continues to dominate Indonesia's demographic structure.

In scientific studies, there are several research gaps indicating the need for further research on smoking and alcohol consumption as risk factors for NCDs in the productive age group. First, a study titled "Smoking Behavior and Cardiometabolic Diseases among Young Adults" by Dahal et al. (2021) examined the relationship between smoking and cardiometabolic diseases, but the study focused more on the young population (18–25 years) and did not provide an in-depth exploration of the productive age group of 25–55 years, which has a different risk profile. Second, the study "Alcohol Consumption Patterns and Chronic Disease Burden in Asia-Pacific Countries" by Lim et al. (2020) identified alcohol consumption patterns in Asian countries, but did not conduct a separate analysis based on age categories, so the implications for the productive age group were not specifically described. Third, the study "Combined Effects of Smoking and Alcohol on Non-Communicable Diseases" by Cho et al. (2019) shows a synergistic effect between smoking and alcohol on the risk of NCDs, but the study uses a general population design without a specific focus on the productive age group, which has different consumption dynamics related to work, stress, and social exposure.

Based on these research gaps, this study presents a novelty in the form of an analysis that specifically focuses on the productive age group in Indonesia, which has received little attention in studies combining behavioral risk factors for NCDs. The novelty of this study also lies in its integrative approach, which views smoking and alcohol consumption not only as physical health variables but also as behavioral phenomena influenced by psychosocial factors, work environment, and urban socioeconomic conditions.

In terms of research objectives, this study aims to comprehensively analyze smoking and alcohol consumption as risk factors for non-communicable diseases in the productive age group by evaluating the behavioral patterns, determining factors, and health impacts of these two behaviors. In addition, this study also aims to provide a basic overview for more effective public health interventions in the prevention of NCDs in the working age group, which contributes significantly to national productivity.

METHODOLOGY

This study uses a descriptive qualitative method with an analytical literature study approach to comprehensively examine the relationship between smoking and alcohol consumption as risk factors for non-communicable diseases in the productive age group. This approach was chosen because it is effective in identifying patterns, trends, and empirical findings from various previous studies in the field of behavioral epidemiology. According to Snyder (2019), analytical literature studies allow researchers to integrate empirical and conceptual findings to produce a deep understanding of complex public health phenomena. The data sources came from reputable scientific publications such as Scopus and Web of Science, the WHO Global Status Report on Noncommunicable Diseases, and national reports from the Indonesian Ministry of Health for the period 2015–2024.

The data collection process was carried out in three main stages, namely literature identification, selection, and thematic analysis. In the identification stage, researchers used keywords such as smoking behavior, alcohol consumption, non-communicable diseases, productive age, and behavioral risk factors in the PubMed, Scopus, and ScienceDirect scientific databases. In the selection stage, articles were filtered based on inclusion criteria such as relevance to the topic, year of publication, methodological

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quality, and focus on the productive age population as recommended by Xiao and Watson (2019). Articles that were not directly related to behavioral risk factors or did not study the productive age population were excluded from the analysis. All articles were then analyzed using thematic analysis techniques developed by Braun and Clarke (2021) to identify thematic categories such as behavior patterns, determinants, health risks, and public health policy implications.

This method does not aim to produce statistical generalizations, but rather to provide a conceptual and analytical understanding of the interaction between smoking behavior, alcohol consumption, and the risk of non-communicable diseases in the productive age group. Thus, descriptive qualitative methods based on literature allow for the development of comprehensive and relevant arguments to support evidence-based public health intervention recommendations.

RESULTS AND DISCUSSION

Smoking and Alcohol Consumption Patterns in the Productive Age Group

Smoking patterns in the productive age group show alarming trends both globally and nationally. The 25–54 age group has the highest prevalence of smoking because individuals in this age range are in a stressful work environment, have high social exposure, and have stronger purchasing power than younger or older age groups. According to a WHO report (2023), the global prevalence of smoking among people of productive age reaches more than 38%, making this group a major contributor to the burden of tobacco-related diseases. A study by Upadhyay (2022) confirms that smoking behavior tends to begin in adolescence but peaks between the ages of 30 and 49, when individuals have established stable smoking habits that are often difficult to quit. In Indonesia, a similar pattern was found, with data from the Indonesian Ministry of Health (2023) showing that 62.9% of adult men of productive age are active smokers, representing one of the highest prevalence rates in the world.

The urge to smoke during productive age is often closely related to working conditions. Research by Kontsevaya et al. (2020) reports that work stress, high workloads, and work environments with socially permissive norms towards smoking increase a person's tendency to smoke regularly. This explains why smoking prevalence tends to be higher in sectors with physical and mental stress, such as manufacturing, transportation, and construction. In addition to stress, smoking patterns among working-age adults are also influenced by social variables such as peer groups, exposure to advertising, and masculine culture. A study by Kontsevaya and Zenu et al., (2021) revealed that social perceptions of cigarettes as a symbol of toughness or a tool for coping with stress are one of the dominant determinants of smoking behavior among working-age men. These factors show that smoking is not only an individual behavior but also a social phenomenon influenced by environmental dynamics.

In addition to smoking, alcohol consumption is also a common risk behavior among people of productive age. Although Indonesia has a relatively lower prevalence of alcohol consumption compared to European or American countries, high-risk consumption patterns are increasing, especially among men aged 25–45 years. The WHO (2021) notes that the Southeast Asia region has experienced a 33% increase in alcohol consumption in the last ten years, while IHME (2022) data shows a trend of increasing heavy episodic alcohol consumption among productive-age workers. This phenomenon occurs because alcohol is often associated with social activities, stress relief after work, and a culture of celebration in the workplace and community. Research by Sukma et al. (2019) found that moderate to heavy alcohol consumption is more prevalent among working-age individuals who face financial pressure, long working hours, and low social support.

In the Indonesian context, the dynamics of alcohol consumption have unique characteristics due to regional variations. Data from the 2018 Riskesdas survey shows that certain regions, such as East Nusa

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Tenggara, North Sulawesi, and Bali, have a higher prevalence of alcohol consumption than other regions due to cultural factors and the availability of local beverages. However, in urban areas, the increase in alcohol consumption is influenced by modern lifestyles and access to nightlife. Hossain M. B. et al., (2022) argue that the productive age group in big cities such as Jakarta and Bandung exhibits a more intense pattern of alcohol consumption, driven by work stress, increased income, and the normalization of an urban entertainment-based lifestyle. This combination of cultural, social, and economic factors results in different patterns of alcohol consumption between regions, but overall shows an increasing trend among the productive age group.

The combination of smoking and alcohol is very common among the productive age group, and this significantly increases the risk of non-communicable diseases. A study by Cho et al. (2019) confirms that individuals aged 30–55 who consume alcohol and smoke simultaneously have a higher risk of heart disease, liver cancer, pancreatic cancer, and metabolic disorders than those who only engage in one of these behaviors. In the workplace, individuals who smoke are more likely to also consume alcohol because these two behaviors reinforce each other psychologically and socially. This is evidenced by a study by Park et al. (2020), which shows that 72% of female and male workers who consume alcohol heavily are also active smokers.

This combination of risky behaviors indicates that the productive age group is the most vulnerable to the cumulative effects of the two main risk factors for NCDs. In addition to environmental and occupational factors, psychological aspects also contribute significantly to smoking and alcohol consumption in the productive age group. Many working-age individuals face life pressures such as family responsibilities, economic demands, and career adjustments, which trigger the need to seek emotional escape.

Research by Upadhyay (2021) shows that chronic stress and mild to moderate depression have a significant relationship with increased alcohol consumption and smoking frequency in productive age. This condition shows that NCD prevention interventions cannot only focus on physical behavior but must consider mental health as an integral part of risk behavior determinants.

Not only in men, smoking and alcohol consumption behaviors have also increased in women of productive age in various countries. A study by Sukma et al. (2019) shows that women aged 25–40 years have experienced an increase in the prevalence of smoking and alcohol consumption due to increased participation in the workforce, changes in social roles, and increased stress levels. Although the prevalence is still lower than that of men, this trend indicates a shift in social norms that makes risky behaviors increasingly universal among the productive age group.

Overall, smoking and alcohol consumption patterns among the productive age group show that these two behaviors are not merely individual habits, but are the result of complex interactions between psychological factors, the work environment, social pressures, and lifestyle changes. The challenging characteristics of productive age make this group a population that is vulnerable to risky behaviors that can increase the burden of non-communicable diseases. A deep understanding of these behavior patterns is an important basis for public health interventions that are more targeted, adaptive, and sensitive to the socioeconomic context of productive age.

Risk of Non-Communicable Diseases Due to Smoking and Alcohol Consumption in Productive Age

Smoking and alcohol consumption in productive age have a significant impact on the development of non-communicable diseases because both behaviors have biological mechanisms that trigger chronic inflammation, oxidative stress, metabolic dysregulation, and damage to vital organ tissues. Smoking is a major cause of ischemic heart disease, stroke, lung cancer, COPD, and various vascular disorders. The

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WHO (2023) reports that 14% of global deaths among people aged 30–69 are directly related to tobacco consumption. Tobacco smoke contains more than 7,000 toxic chemicals, including nicotine, carbon monoxide, and polycyclic aromatic hydrocarbons, which accelerate atherosclerosis and cause damage to blood vessel endothelium. A study by Kontsevaya et al. (2020) shows that smokers aged 25–55 years have twice the risk of developing ischemic heart disease compared to non-smokers, and this risk increases if the duration of smoking has lasted more than ten years.

In addition to its direct effects on the cardiovascular system, smoking also increases the risk of cancer in productive age groups. Data from the International Agency for Research on Cancer (IARC, 2022) states that smoking is responsible for 80–90% of lung cancer cases and contributes significantly to cancer of the throat, pancreas, kidneys, and bladder. Long-term exposure makes the productive age group more susceptible to the risk of early cancer, especially for those who started smoking as teenagers. This is reinforced by research by Upadhyay (2022), which found that individuals aged 30–50 who started smoking before the age of 18 had a higher odds ratio for lung cancer than those who started smoking after adulthood.

Meanwhile, alcohol consumption plays a major role in the development of NCDs through inflammatory mechanisms, liver dysfunction, and increased blood pressure. The WHO (2021) states that alcohol is the leading cause of more than 200 types of diseases and injuries, including liver cirrhosis, hypertension, stroke, esophageal cancer, and pancreatic cancer. During productive age, alcohol consumption often takes the form of binge drinking, which is more damaging because exposure to large amounts of ethanol in a short period of time increases the accumulation of acetaldehyde, a toxic compound that causes oxidative stress and organ damage. A study by Marleni et al., (2025) shows that individuals aged 30–49 who consume heavy amounts of alcohol have a 1.6 times higher risk of developing hypertension, and the risk doubles for those who combine alcohol with smoking.

The combination of smoking and alcohol consumption simultaneously has a synergistic effect that is far more destructive and exponentially increases the risk of NCDs. The combination of the two worsens chronic inflammation, accelerates tissue damage, and triggers genetic mutations that lead to cancer. Research by Cho et al. (2019) found that individuals of productive age who smoke and consume alcohol heavily have a 3.5 times higher risk of developing liver and esophageal cancer compared to those who only engage in one of these behaviors. The synergistic toxicity of cigarettes and alcohol also exacerbates damage to blood vessel walls, increasing the risk of stroke at an earlier age. Findings by Park et al. (2020) prove that 65% of stroke cases in people under 55 years of age have a history of both smoking and heavy episodic alcohol consumption.

From a metabolic health perspective, smoking and alcohol play a significant role in the development of insulin resistance, abdominal obesity, and type 2 diabetes mellitus. Individuals of productive age who consume alcohol excessively experience changes in glucose and fat metabolism, which contribute to increased triglycerides and insulin resistance. This is reinforced by research by Schulte et al. (2020), which shows that moderate to heavy alcohol consumption increases the risk of type 2 diabetes by up to 40%, especially in the 30-50 age group. Smoking exacerbates this condition, as nicotine interferes with insulin sensitivity. The combination of these two behaviors increases the risk of metabolic diseases, which are one of the main causes of decreased productivity in the working age group.

The impact of smoking and alcohol consumption on productive age is also evident in the increasing incidence of liver diseases such as alcoholic hepatitis and cirrhosis. Chronic alcohol consumption accelerates liver fibrosis, especially when combined with a sedentary lifestyle and a high-calorie diet. The WHO (2022) estimates that the population aged 25–50 years has seen an 18% increase in the incidence of

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alcoholic liver disease in the last decade. In Indonesia, although alcohol consumption is relatively lower, liver disease remains a significant cause of morbidity in the productive age group, especially in regions with high alcohol prevalence. Findings by Hossain M. B. et al., (2022) indicate that in Eastern Indonesia, traditional beverages with high alcohol content cause high incidence of liver disease in the working age group.

Chronic respiratory diseases are also a major risk for productive-age smokers. Long-term smoking causes damage to the alveoli and reduces lung elasticity, leading to diseases such as COPD. A study by WaUpadhyay (2021) reported that smokers aged 35–55 years have a higher risk of developing early-stage lung disease, which often goes unnoticed until it reaches an advanced stage. This impact is particularly serious because chronic respiratory diseases can reduce physical work capacity and increase absenteeism, thereby directly reducing national productivity.

To provide a structured overview of the risks of NCDs due to smoking and alcohol consumption among people of productive age, the following is a summary table:

Table 1. Non-Communicable Disease Risks Associated with Smoking and Alcohol Consumption in Productive Age

Risk Factor	Health Impact	Evidence Summary
Smoking	Cardiovascular diseases, stroke, COPD, lung cancer	Increases risk of ischemic heart disease 2× in ages 25–55 (Kontsevaya et al., 2020)
Alcohol	Hypertension, liver disease, cancers, metabolic disorders	Heavy drinkers aged 30–49 have 1.6× higher hypertension risk (Rehm et al., 2019)
Combined smoking + alcohol	Esophageal cancer, liver cancer, premature stroke	3.5× higher risk for combined PTM outcomes (Cho et al., 2019)
Long-term exposure	Early-onset PTM, chronic inflammation	Elevates oxidative stress and accelerates organ damage (Upadhyay, 2022)
Behavioral synergy	Lower self-regulation, higher frequency of binge drinking and smoking	65% early-age stroke cases involve combined behaviors (Park et al., 2020)

The table shows that the risk of NCDs in productive age is greatly influenced by smoking and alcohol consumption patterns, which often reinforce each other. Complex biological and social mechanisms make these two behaviors more destructive when they occur simultaneously. Thus, public health interventions require a multi-level approach that not only targets tobacco and alcohol consumption separately, but also understands their synergy in increasing the risk of NCDs in working age.

Public Health Intervention and Policy Strategies to Reduce the Risk of Smoking and Alcohol Consumption in the Productive Age Group

Efforts to control smoking and alcohol consumption in the productive age group require comprehensive public health strategies, including individual and community interventions, as well as national policies. Given that the productive age group plays an important role in socioeconomic

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development, prevention strategies should be directed not only at reducing the prevalence of risky behaviors, but also at reducing the long-term impact on the burden of noncommunicable diseases. The WHO (2023) emphasizes that population-based interventions targeting access restrictions, promotion control, and price regulation have been proven effective in reducing tobacco and alcohol consumption in many countries. However, the effectiveness of these strategies is highly dependent on the social, cultural, and economic context, so they need to be specifically assessed for the productive age group in Indonesia.

One of the main strategies in tobacco control is the behavioral change approach, which focuses on changing individual behavior through intensive education, counseling, and habit modification. Primary health care-based smoking cessation programs have proven effective, especially when accompanied by pharmacotherapy support such as varenicline or nicotine replacement therapy. A study by Letelay et al., (2021) shows that a combination of intensive counseling and pharmacotherapy increases the chances of quitting smoking by up to three times compared to independent efforts to quit. For the productive age population, behavioral interventions must be tailored to the work context, for example, by providing counseling services in the workplace, corporate health programs, and educational campaigns that emphasize the impact of smoking on productivity and long-term health risks. Research by Kontsevaya et al. (2020) confirms that smoking cessation programs in the workplace are more effective when supported by company policies that restrict smoking areas and provide dedicated time for health counseling.

In the context of alcohol consumption, effective interventions include educational approaches, stress management, and consumption regulation. Public health education on the dangers of moderate to heavy alcohol consumption can raise risk awareness, especially among men aged 25–45, who are the group with the highest prevalence. Marleni et al., (2025) underscored that evidence-based education emphasizing the direct link between alcohol consumption and NCDs including cancer, liver disease, and hypertension successfully reduced alcohol consumption intensity among the working-age group. In addition to education, stress management programs are also necessary, as alcohol consumption is often a coping mechanism for productive-age individuals experiencing work pressure and family burdens.

Community-based interventions play an important role in creating an environment that supports behavioral change. A study by Lim et al. (2020) shows that a community approach that combines public campaigns, the formation of support groups, and the involvement of community leaders is effective in significantly reducing the prevalence of alcohol consumption and smoking. During productive age, the workplace community and residential environment are strategic points for increasing participation in health programs. For example, companies can integrate health programs into human resource policies, provide sports facilities, and restrict access to cigarettes and alcohol in company activities. In addition, local organizations can organize anti-smoking and anti-alcohol campaigns specifically designed to target vulnerable working age groups.

Regulation-based public health policies also have a major impact on controlling tobacco and alcohol consumption. Policies to increase tobacco excise taxes have been shown to significantly reduce smoking rates in many countries. The WHO (2022) reports that a 10% increase in cigarette prices can reduce consumption by 4% in the adult population. In Indonesia, increasing cigarette excise taxes has been shown to reduce consumption, especially among low- to middle-income groups, but the impact on productive-age people with middle to high incomes is relatively smaller because they have higher purchasing power. Therefore, excise policies must be accompanied by restrictions on advertising, promotion, and sponsorship by the cigarette industry, especially in digital media, which is often accessed by productive-age people.

For alcohol, policies prohibiting sales to certain age groups, restricting operating hours, and regulating points of sale can help reduce excessive consumption. Monitoring the sale of illegal alcohol

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and traditional high-alcohol beverages is also important, especially in Eastern Indonesia, which has a higher prevalence of alcohol consumption. Research by Hossain M. B. et al., (2022) confirms that tightening regulations on local alcohol distribution can reduce the incidence of liver disease among productive age groups.

In addition to direct strategies targeting behavior, it is important to consider interventions that target social determinants of health, such as work stress, long working hours, and economic pressure. Research by Upadhyay (2021) shows that chronic stress is a strong determinant of alcohol consumption and smoking among productive-age adults. Therefore, worker welfare policies such as healthier working hour regulations, access to psychological counseling, and health promotion in the workplace need to be strengthened. Such initiatives not only reduce risky behaviors but also improve mental well-being and workforce productivity.

In the field of public health, multi-level interventions are considered the most effective in reducing the prevalence of risky behaviors among the productive age group. This multi-level approach integrates individual, community, and public policy interventions that reinforce each other. Park et al. (2020) emphasize that interventions that only target individuals tend to be less effective if social, environmental, and structural determinants are not addressed simultaneously. Therefore, strategies to control smoking and alcohol consumption among people of productive age must reflect a systemic approach that considers the entire spectrum of risk factors.

In Indonesia, the implementation of multi-level interventions still faces challenges, such as limited funding, lack of inter-agency coordination, and low public awareness of NCD risks. Nevertheless, several policies such as increased cigarette excise taxes, the development of smoke-free areas, and healthy living campaigns have shown quite positive results. However, there are not yet many specific interventions designed for the productive age population as a segmented group. Given that this population has different risk characteristics from adolescents and the elderly, more adaptive and focused programs are needed, such as corporate health programs, targeted digital media campaigns, and counseling services accessible to workers.

Overall, strategies to control smoking and alcohol consumption among the productive age group require an integrated approach that takes into account psychosocial characteristics, workplace pressures, and social determinants of health. Public health interventions must be designed to support sustainable, evidence-based behavioral change. With policy reinforcement, education, and environmental support, the risk of noncommunicable diseases in the productive age group can be significantly reduced, thereby improving the quality of life and productivity of the community.

CONCLUSIONS

The results of the study show that smoking and alcohol consumption in productive age contribute significantly to the increasing burden of non-communicable diseases, including heart disease, stroke, hypertension, diabetes, cancer, and chronic respiratory disorders. These behavioral patterns are influenced by work factors, psychosocial pressures, social norms, environmental access, and an increasingly permissive urban lifestyle. The combination of smoking and alcohol consumption has been shown to produce a synergistic effect that exponentially increases the risk of NCDs, with the productive age group being the most vulnerable due to long-term exposure and high frequency of consumption. These risky behaviors also have an impact on economic productivity, increasing health costs and reducing the quality of life of the working age group.

This study emphasizes that NCD prevention in the productive age group cannot focus solely on individual education, but requires a holistic approach that includes behavioral interventions, improved

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health literacy, stress management, and community interventions. In addition, public health policies such as increased cigarette taxes, restrictions on alcohol access, and the implementation of smoke-free areas have been shown to have a positive impact when applied consistently. The workplace, as the main environment for the productive age group, also plays an important role, so corporate health programs, smoking cessation counseling, and mental health support need to be expanded. Given that social determinants of health such as workload, economic pressure, and access to information have a strong influence on smoking and alcohol consumption behaviors, intervention strategies must be designed multidimensionally.

Based on these findings, this study recommends the need to strengthen tobacco and alcohol control policies that are more specific to the productive age group, increase the capacity of primary health services to provide smoking cessation programs and alcohol consumption management, and develop sustainable community- and workplace-based interventions. In addition, cross-sector collaboration between the government, companies, health institutions, and the community is needed to create an environment that supports healthy living behaviors. With comprehensive and targeted interventions, the risk of non-communicable diseases in the productive age group can be reduced, thereby improving the overall quality of public health and national productivity.

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