

Effect of Cigarette Smoking on the Health of Project Construction Workers: A Study of Workers at Construction Sites in Uyo, Akwa Ibom State, Nigeria ¹

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Abstract

Cigarette smoking remains an important occupational health concern among project construction workers who are simultaneously exposed to physically demanding work and environmental hazards such as dust and fumes. This study examined the effect of cigarette smoking on the health of project construction workers at project construction sites in Uyo, Akwa Ibom State. The study sought to determine the prevalence and pattern of cigarette smoking among project construction workers at project construction sites in Uyo, Akwa Ibom State; assess the level of knowledge of project construction workers regarding the health effects associated with cigarette smoking; identify the major health problems experienced by project construction workers who smoke cigarettes at project construction sites in Uyo; examine the relationship between cigarette smoking and selected health outcomes among project construction workers in Uyo and assess the measures adopted by project construction workers and site management to prevent or reduce the health effects of cigarette smoking at project construction sites.

A descriptive cross-sectional design was adopted, and 384 project construction workers were selected using a multistage sampling technique. Data were collected using a structured questionnaire and analysed using frequencies, percentages, Chi-square tests and logistic regression at a 0.05 level of significance. Findings indicated that 25.0% of respondents were current smokers, with 81.3% of smokers reporting daily smoking. More than half (55.7%) demonstrated good knowledge of the health effects of cigarette smoking. Reduced physical endurance (64.6%), persistent cough (60.4%), excessive fatigue (58.3%) and shortness of breath (54.2%) were the major health problems reported by current smokers. Significant associations were observed between cigarette smoking and persistent cough, shortness of breath, wheezing, fatigue, reduced physical endurance and chest discomfort ($p < 0.05$). Preventive measures were generally inadequate, with 47.9% of respondents rating them as inadequate.

The study concluded that cigarette smoking constituted a significant health concern among project construction workers and may compound occupational health risks. Strengthening smoke-free policies, health education, routine health screening and accessible smoking-cessation services at project construction sites were recommended.

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1.0 Introduction

Cigarette smoking remains one of the most important preventable causes of disease and premature death worldwide. Tobacco smoke contains thousands of chemical substances, many of which are toxic, carcinogenic or capable of damaging vital organs. According to the World Health Organization (WHO, 2026), tobacco use is responsible for more than seven million deaths annually and is strongly associated with cardiovascular diseases, respiratory diseases, stroke, cancer, reduced immunity and other debilitating health conditions. Smoking also affects people who do not smoke through exposure to second-hand smoke. Consequently, tobacco use constitutes not only an individual health problem but also an important occupational and public health concern.

The health consequences of cigarette smoking are particularly important among workers whose occupations already expose them to physical and environmental hazards. Project construction work is physically demanding and is frequently performed in environments characterized by dust, fumes, chemicals, excessive noise, heat, vibration, manual handling and other occupational risks. Project construction workers may therefore experience a combination of occupational and behavioural exposures that can adversely affect their health. A systematic review by the authors of a 2023 review found that project construction workers commonly experience respiratory conditions such as cough, breathlessness and asthma because of exposure to dust, respirable crystalline silica, fumes, vapours, asbestos fibres and gases. Importantly, smoking and prolonged exposure to these occupational hazards were found to increase the risk of respiratory disease among project construction workers.

The relationship between smoking and project construction work is also significant because cigarette use appears to be relatively common among workers in the project construction sector. Evidence from project construction workers in the United States has shown substantially higher tobacco use among project construction workers than among workers in several other occupational groups. Project construction workers have also been reported to have higher levels of health-risk behaviours, including cigarette smoking, while simultaneously being exposed to occupational hazards (Syamlal *et al.*, 2019; Syamlal *et al.*, 2020). Similarly, a study of project construction workers found that smoking was associated with occupational factors such as exposure to dust and chemicals, suggesting that the work environment may interact with individual behavioural factors in shaping smoking patterns (Chin *et al.*, 2012). Although this evidence is not recent, its relevance to project construction workers remains important because the occupational exposures identified continue to characterize many project construction environments.

The health implications of smoking become even more concerning when cigarette use occurs alongside project construction-related respiratory exposures. Project construction workers are routinely exposed to particulate matter generated during activities such as cutting, grinding, drilling, mixing cement, demolition and handling of project construction materials. Exposure to respirable crystalline silica is of particular concern because prolonged inhalation can cause serious respiratory diseases. Recent evidence from Nigeria indicates that project construction workers continue to experience challenges related to awareness and control of respirable crystalline silica exposure. In a study involving 600 Nigerian project construction workers, smoking status was significantly associated with awareness of silica sources and long-term health effects, with smokers demonstrating poorer awareness in some areas (2025).

Cigarette smoking may also compromise the general physical capacity and productivity of project construction workers. Project construction activities require sustained physical effort, concentration, alertness and adequate respiratory and cardiovascular function. Smoking can impair lung function, increase cardiovascular risk and contribute to fatigue and reduced physical performance. Recent research presented at the Project construction Research Congress reported an association between smoking and fatigue among project construction workers, highlighting the possibility that smoking may compound the physical demands associated with project construction work (Namian *et al.*, 2024). The Nigerian context deserves particular attention. Although the overall prevalence of cigarette smoking in Nigeria is lower than that reported in some countries, tobacco use remains an important public health concern. WHO estimates based on the most recent national data indicate that cigarette smoking persists among Nigerian adults, with substantially higher prevalence among males than females (World Health Organization [WHO], 2023). More importantly, national estimates may conceal substantial differences between occupational groups. Project construction workers are predominantly male and include artisans, apprentices, labourers and skilled tradespeople who may work in informal or poorly regulated environments where occupational health services and smoking-control measures are limited.

Evidence specifically concerning Nigerian project construction workers is beginning to demonstrate the importance of this occupational group. A recent study among project construction artisans in Ekiti State found that 19.3% of respondents had ever smoked, while many respondents reported the absence of smoking restrictions at their worksites. The study concluded that smoke-free workplace regulations could help reduce tobacco use among project construction artisans in Nigeria. This finding is particularly relevant because project construction workers may spend long hours at project sites where smoking can become socially normalized and where opportunities for health education, smoking cessation support and occupational health surveillance may be limited.

The problem is potentially more complex in rapidly developing urban areas such as Uyo, Akwa Ibom State. Project construction activities in Uyo have expanded alongside residential, commercial, institutional and infrastructural development. Workers on these sites may simultaneously encounter cigarette smoke and other occupational hazards such as cement dust, wood dust, silica-containing materials, welding fumes, paint and chemical vapours. The

combination of smoking and occupational exposure may increase the burden of respiratory and cardiovascular problems and may negatively influence workers' overall health. WHO emphasizes that workplace hazards can cause occupational diseases and can aggravate existing health problems, underscoring the importance of occupational health interventions for workers in high-risk occupations.

Despite the established health consequences of cigarette smoking and the recognized occupational hazards associated with project construction work, relatively limited empirical attention has been given to the combined problem among project construction workers in Uyo. Much of the available Nigerian evidence has focused either on tobacco use in the general population or on occupational hazards among project construction workers without specifically examining how cigarette smoking affects their health. This creates an important evidence gap, particularly at the local level, where working conditions, smoking practices, access to health services and enforcement of occupational health regulations may differ from those reported elsewhere.

Therefore, examining the effect of cigarette smoking on the health of project construction workers at project construction sites in Uyo, Akwa Ibom State, is important. Such an investigation can provide evidence on the prevalence and pattern of cigarette smoking among project construction workers, the health problems associated with smoking, and the extent to which smoking may compound existing occupational health risks. The findings may also provide useful evidence for project construction companies, project managers, occupational health professionals, government agencies and other stakeholders in developing workplace smoking-control programmes, health education interventions, smoking cessation services and stronger occupational health policies for project construction workers.

1.1 Statement of the Problem

Cigarette smoking remains a major preventable cause of ill health and premature mortality, yet it continues to occur among economically active populations, including workers in physically demanding occupations. Tobacco smoke damages virtually every organ of the body and increases the risk of respiratory and cardiovascular diseases, stroke, cancer, impaired immunity and premature death (WHO, 2026). While the health consequences of smoking are well established, the problem becomes more significant when smoking occurs in occupational environments where workers are already exposed to hazards capable of damaging the same body systems. Project construction workers constitute an important occupational group that may be particularly vulnerable to this combined burden. Their daily activities expose them to dust, silica, fumes, chemicals, gases, heat and other hazardous conditions.

A systematic review of project construction-worker health demonstrated that respiratory symptoms and diseases are common among workers exposed to project construction-related hazards and further indicated that smoking can increase the risk of respiratory disease (2023). Thus, a project construction worker who smokes may face a dual exposure: inhalation of harmful

substances from cigarette smoke and inhalation of hazardous materials generated at the project construction site. The cumulative effect of these exposures may result in poorer respiratory health and increased vulnerability to other chronic diseases.

Evidence from Nigeria suggests that cigarette and tobacco use is not uncommon among project construction artisans. A recent Nigerian study involving project construction artisans in Ekiti State reported that 19.3% of respondents had ever smoked and that most respondents indicated that there were no smoking restrictions at their worksites. The researchers consequently recommended smoke-free workplace regulations as a strategy for reducing tobacco use among project construction workers. This finding raises concerns about the extent to which similar practices may exist on project construction sites in other Nigerian urban centres. The situation is particularly concerning because project construction workers may have limited access to occupational health services, periodic medical examinations and structured smoking cessation programmes. In addition, some workers may perceive smoking as a means of coping with work-related stress, fatigue or the demanding physical nature of project construction activities. Recent research has specifically investigated the relationship between smoking and fatigue among project construction workers, suggesting that smoking may be relevant to workers' ability to cope with the physical demands of project construction work (Namian *et al.*, 2024).

In Uyo, the increasing number of project construction projects has created employment opportunities for skilled and unskilled workers, but the expansion of project construction activities also increases the importance of protecting workers from occupational and behavioural health risks. Workers may spend prolonged periods on project sites where exposure to cement and project construction dust, welding fumes, chemicals, noise, heat and cigarette smoke can occur simultaneously. Nigerian research has also shown that project construction workers continue to face challenges regarding awareness and protective practices relating to respirable crystalline silica, with smoking status being associated with differences in awareness of silica-related health risks (2025).

However, there is inadequate local evidence concerning the extent to which cigarette smoking affects the health of project construction workers at project construction sites in Uyo, Akwa Ibom State. Existing Nigerian studies have provided useful information about tobacco use among project construction artisans in other states, while international studies have examined smoking prevalence, occupational exposure and health outcomes among project construction workers. Nevertheless, findings from other locations cannot automatically be generalized to Uyo because differences may exist in project construction practices, types of projects, worker characteristics, enforcement of occupational health regulations, access to healthcare and workplace smoking policies.

The absence of adequate local evidence creates difficulty for project construction companies, health professionals, regulators and policymakers in designing interventions that specifically address smoking among project construction workers in Uyo. Without reliable information on the

relationship between cigarette smoking and workers' health, smoking may continue to be treated merely as an individual lifestyle choice rather than as an occupational health concern that can interact with existing workplace hazards. It is against this background that this study seeks to examine the effect of cigarette smoking on the health of project construction workers at project construction sites in Uyo, Akwa Ibom State. The study is expected to generate empirical evidence on the health implications of cigarette smoking among this occupational group and provide a basis for strengthening workplace health education, smoking cessation initiatives, smoke-free project construction-site policies and broader occupational health interventions.

1.2 Aim of the Study

The aim of this study is to examine the effect of cigarette smoking on the health of project construction workers at project construction sites in Uyo, Akwa Ibom State. In order to achieve the stated aim of the study, the following specific objectives were set:

- (i) determine the prevalence and pattern of cigarette smoking among project construction workers at project construction sites in Uyo, Akwa Ibom State.
- (ii) assess the level of knowledge of project construction workers regarding the health effects associated with cigarette smoking.
- (iii) identify the major health problems experienced by project construction workers who smoke cigarettes at project construction sites in Uyo.
- (iv) examine the relationship between cigarette smoking and selected health outcomes among project construction workers in Uyo.
- (v) assess the measures adopted by project construction workers and site management to prevent or reduce the health effects of cigarette smoking at project construction sites.

2.0 Review of Related Literature

2.1 Conceptual Review

2.1.1 Concept of Cigarette Smoking

Cigarette smoking refers to the inhalation of smoke produced by burning tobacco contained in a cigarette. It is a form of tobacco use in which nicotine is delivered rapidly to the brain, producing dependence and reinforcing continued use. Although smoking is sometimes regarded as an individual lifestyle choice, it has substantial public health and occupational health implications because tobacco smoke contains numerous toxic substances capable of damaging different organs of the body. The World Health Organization (WHO, 2026) identifies tobacco use as a major risk factor for cardiovascular and respiratory diseases, stroke, cancer and several other debilitating conditions. Tobacco also weakens the immune system and contributes to premature death. Cigarette smoking is particularly problematic because its effects are not restricted to long-term

smokers. Repeated exposure to tobacco smoke gradually damages the respiratory and cardiovascular systems, while continued nicotine dependence makes cessation difficult.

In addition, workers who do not smoke may be exposed to second-hand smoke when smoking occurs around them. WHO (2026) estimates that tobacco use causes more than seven million deaths annually worldwide and that more than 1.6 million of these deaths occur among non-smokers exposed to second-hand smoke. Within the context of the project construction industry, cigarette smoking should therefore be viewed from both individual and occupational perspectives. Project construction workers often perform physically demanding tasks under stressful and hazardous conditions. Some workers may use cigarettes as a way of coping with fatigue, stress, social pressure or the demands of their occupation. This can create a cycle in which the work environment encourages smoking while smoking simultaneously increases vulnerability to occupational health problems.

2.1.2 Cigarette Smoking among Project construction Workers

Project construction workers represent a distinctive occupational group because their work is characterized by physical exertion, long working hours, exposure to hazardous materials and, in some settings, relatively limited access to occupational health services. These conditions can influence lifestyle behaviours, including tobacco use. Evidence indicates that smoking is an important concern among project construction workers. Olomofe *et al.*, (2025), in a study of project construction artisans in Ekiti State, Nigeria, found that 19.3% of the 228 respondents who provided valid responses had ever smoked. More than half of those who had smoked started before the age of 20 years, while 65.9% identified friends as an important influence on their initiation into smoking. Importantly, 86.4% reported that the smoking behaviour of co-workers had encouraged them to smoke. The study also found that 64.9% of respondents reported that there were no smoking restrictions at their worksites.

These findings are important to the present study because they demonstrate that cigarette smoking among project construction workers may be influenced by the social and occupational environment. A project construction site where smoking is common and unrestricted can normalize the behaviour and make cessation more difficult. The absence of workplace restrictions may also increase exposure of non-smoking workers to second-hand smoke. Smoking among project construction workers may also be related to occupational stress and fatigue. Project construction is physically and mentally demanding, and workers are expected to maintain concentration and physical stamina while operating in environments where mistakes can result in injuries. Namian *et al.*, (2024) examined smoking and fatigue among 80 project construction workers and found that 46% were smokers. Although smokers had higher mean fatigue scores than non-smokers, the difference was not statistically significant. Nevertheless, the authors highlighted the potential health implications of second-hand smoke exposure for non-smoking project construction workers and emphasized the importance of smoke-free workplaces and smoking cessation programmes.

2.1.3 Concept of Project construction Workers and Project construction Sites

Project construction workers comprise individuals involved in the planning, erection, installation, alteration, repair and maintenance of buildings and other physical infrastructure. They include skilled workers such as carpenters, bricklayers, electricians, plumbers, welders and painters, as well as semi-skilled workers, labourers, apprentices and other site personnel. Project construction sites constitute complex occupational environments where several hazards may exist simultaneously. Workers may be exposed to project construction dust, respirable crystalline silica, fumes, vapours, gases, asbestos fibres, noise, vibration, heat and chemicals. Boadu *et al.*, (2023), in a systematic narrative review of 25 studies, identified 16 respiratory health conditions among project construction workers, with cough, breathlessness and asthma emerging as the most frequently reported conditions.

The review identified dust, respirable crystalline silica, fumes, vapours, asbestos fibres and gases as major occupational hazards and noted that smoking and prolonged exposure to respiratory hazards increased the risk of respiratory disease. This interaction between cigarette smoking and workplace exposure is particularly important. A project construction worker who smokes may already have compromised respiratory function before being exposed to dust, silica or chemical fumes at the worksite. Consequently, smoking may amplify the adverse effects of occupational exposures rather than functioning as an independent risk factor.

2.1.4 Health Effects of Cigarette Smoking

The health consequences of cigarette smoking are extensive and may be classified into respiratory, cardiovascular, neurological, reproductive and general systemic effects. WHO (2026) reports that tobacco damages nearly every organ of the body and is a major cause of lung disease, heart disease, stroke, cancer and weakened immunity. Respiratory health effects: The respiratory system is one of the principal targets of cigarette smoke. Smoking damages the airways, and lung tissues and contributes to chronic cough, phlegm production, shortness of breath, reduced pulmonary function, chronic obstructive pulmonary disease and lung cancer.

These consequences are especially relevant to project construction workers because their occupational activities may expose them to dust and other inhaled contaminants. Boadu *et al.* (2023) found that smoking increased the risk of respiratory disease among project construction workers already exposed to occupational respiratory hazards. Cardiovascular effects: Cigarette smoking is strongly associated with cardiovascular disease, including coronary heart disease and stroke. Tobacco smoke can damage blood vessels and promote processes that increase the likelihood of cardiovascular events.

For project construction workers, compromised cardiovascular health may reduce their capacity to perform strenuous physical activities safely. General physical health: Smoking can affect general physical well-being through reduced exercise capacity, increased susceptibility to illness

and impaired recovery. These effects may be particularly important in project construction because workers are required to perform physically demanding activities for extended periods. Fatigue and occupational performance: Fatigue is an important safety concern in project construction because it can affect attention, decision-making and physical performance. Namian *et al.*, (2024) specifically investigated the relationship between smoking and fatigue among project construction workers. Although the observed difference in fatigue between smokers and non-smokers was not statistically significant, the study provides evidence that smoking deserves consideration when examining factors associated with worker well-being and occupational safety.

2.1.5 Interaction between Cigarette Smoking and Project Construction-Related Hazards

One of the most important conceptual issues underlying this study is that cigarette smoking does not occur in isolation from other exposures. Project construction workers can simultaneously be exposed to cigarette smoke and workplace contaminants. Boadu *et al.*, (2023) demonstrated that project construction workers are exposed to multiple respiratory hazards and that smoking increases vulnerability to respiratory diseases. For example, a worker involved in concrete cutting or drilling may inhale respirable dust or silica particles during the working day and smoke cigarettes during breaks. Similarly, welders may be exposed to fumes while smokers may simultaneously inhale tobacco smoke. Such combined exposure can place additional stress on the respiratory system. The implication is that smoking prevention among project construction workers should not be separated from broader occupational health and safety programmes.

2.1.6 Factors Influencing Cigarette Smoking among Project construction Workers

Cigarette smoking among project construction workers can be influenced by individual, social, economic and occupational factors. Individual factors include age, previous exposure to tobacco, level of nicotine dependence and perceptions about smoking. Social influences include peer pressure and the behaviour of co-workers. The Nigerian study by Olomofe *et al.*, (2025) provides particularly relevant evidence. Among project construction artisans in Ekiti State, 65.9% of smokers reported that friends influenced their initiation into smoking, while 86.4% indicated that co-workers' smoking behaviour encouraged them to smoke. Age, occupational experience and employment status were also associated with tobacco use. Artisans aged 31–40 years were approximately three times more likely to use tobacco than those younger than 20 years, while non-apprentices were more likely to smoke than apprentices. The work environment is another important factor. Approximately two-thirds of respondents in the Ekiti study reported having no smoking restrictions at their worksites. This suggests that weak workplace controls may facilitate continued smoking.

2.2 Theoretical Review

2.2.1 Health Belief Model by Rosenstock (1974)

The Health Belief Model (HBM) provides an appropriate theoretical foundation for understanding cigarette smoking and health-related behaviour among project construction workers. The model was developed to explain why individuals engage or fail to engage in preventive health behaviours. Rosenstock (1974) proposed that health behaviour is influenced by people's perceptions of their susceptibility to disease, the seriousness of the disease, the benefits of taking preventive action and the barriers that may prevent them from doing so. The HBM has subsequently been expanded to include cues to action and self-efficacy. These components are particularly useful in understanding smoking behaviour because tobacco users may understand that smoking is harmful but continue the behaviour because they perceive the immediate benefits or social advantages of smoking to outweigh its future health consequences. The model has also been applied specifically to smoking cessation, where perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action and self-efficacy can influence attempts to stop smoking.

(i) Perceived Susceptibility

Perceived susceptibility refers to an individual's belief about the likelihood of experiencing a health problem. A project construction worker who believes that smoking makes him personally vulnerable to lung disease, heart disease or other illnesses is more likely to consider reducing or stopping smoking. Conversely, a worker who believes that smoking-related diseases happen mainly to older people or heavy smokers may continue smoking without feeling an immediate need to change.

(ii) Perceived Severity

Perceived severity concerns the individual's assessment of how serious the consequences of a health condition would be. A project construction worker who understands that smoking-related lung disease can impair his ability to work and provide for his family may perceive smoking as a serious threat. On the other hand, a worker who regards coughing or breathlessness as normal consequences of project construction work may underestimate the seriousness of smoking-related symptoms.

(iii) Perceived Benefits

Perceived benefits refer to the advantages an individual expects from adopting a healthier behaviour. In this study, perceived benefits may include improved breathing, reduced cough, increased physical capacity, lower risk of disease and improved ability to perform project construction tasks following smoking cessation.

(iv) Perceived Barriers

Perceived barriers represent the obstacles that make behaviour change difficult. Among project construction workers, these may include nicotine dependence, peer influence, stress, fatigue, social acceptance of smoking, fear of withdrawal symptoms and the belief that smoking helps workers cope with demanding jobs. The importance of barriers is supported by evidence showing that peer and workplace influences can encourage tobacco use among project construction artisans. Olomofe *et al.*, (2025) found that a substantial proportion of Nigerian project construction artisans were influenced by friends and co-workers to smoke.

(v) Cues to Action

Cues to action are events or information that stimulate a person to take health-related action. For project construction workers, cues could include occupational health education, experiencing persistent cough or breathlessness, witnessing a colleague develop a smoking-related disease, medical screening, workplace campaigns or enforcement of smoke-free-site policies.

(vi) Self-Efficacy

Self-efficacy refers to an individual's confidence in the ability to perform a particular behaviour. In the context of this study, it refers primarily to the worker's confidence in his or her ability to reduce or stop cigarette smoking. A worker may understand the dangers of smoking but still fail to quit because of nicotine dependence or lack of confidence in overcoming withdrawal and peer pressure.

2.2.2 Application of the Health Belief Model to the Present Study

The HBM provides a useful explanation for why project construction workers may continue smoking despite awareness of its health consequences. The model recognizes that knowledge alone does not necessarily result in behaviour change. A worker may know that smoking causes disease but may perceive his personal susceptibility as low, underestimate the severity of possible consequences, perceive smoking as beneficial for stress relief, or perceive quitting as difficult. The model therefore supports the present study by linking knowledge and beliefs about smoking with smoking behaviour and health outcomes. It also provides a theoretical basis for examining factors such as perceived health risks, peer influence, workplace restrictions, willingness to quit and access to cessation interventions. The suitability of the HBM is further strengthened by evidence from Nigerian project construction artisans. Olomofe *et al.*, (2025) reported that almost all respondents were aware that smoking was harmful, yet smoking persisted among a proportion of them, demonstrating that awareness by itself may not be sufficient to produce cessation.

2.3 Empirical Review

The empirical review examines previous studies relevant to the effect of cigarette smoking on the health of project construction workers. The review is organised according to the five specific objectives of the present study: prevalence and pattern of smoking; knowledge of the health effects of smoking; health problems experienced by smoking project construction workers; relationship between smoking and selected health outcomes; and measures adopted by workers and site management to prevent or reduce the health effects of smoking. Particular attention is given to studies conducted among project construction and other blue-collar workers, with emphasis on recent evidence and findings that are relevant to the Nigerian context.

2.3.1 Prevalence and Pattern of Cigarette Smoking among Project construction Workers

Olomofe *et al.*, (2025) conducted one of the most directly relevant recent Nigerian studies on tobacco use among project construction artisans. The study was carried out among 232 project construction artisans in Ekiti State and examined the prevalence and factors associated with tobacco use. The researchers reported that 19.3% of the respondents had ever smoked. Among respondents who had smoked, more than half had started before the age of 20 years, suggesting that tobacco use among some project construction workers begins relatively early in life. Friends were identified as an important influence on smoking initiation, while a substantial proportion of respondents also indicated that the smoking behaviour of co-workers encouraged them to smoke.

The study further found that many project construction artisans worked at sites without smoking restrictions. The authors concluded that smoke-free workplace regulations were necessary to reduce tobacco use among project construction artisans in Nigeria (Olomofe *et al.*, 2025). The findings of Olomofe *et al.*, (2025) are particularly relevant to the present study because they provide recent Nigerian evidence from the same occupational group. They demonstrate that cigarette smoking among project construction workers is not merely an isolated individual behaviour but can be influenced by the social environment of the project construction site. However, the study was conducted in Ekiti State and focused mainly on tobacco-use prevalence and associated factors. It did not comprehensively examine the health outcomes associated with cigarette smoking. The present study therefore extends the evidence by investigating both smoking patterns and their health implications among project construction workers in Uyo, Akwa Ibom State.

In the United States, Syamlal *et al.*, (2018) analysed nationally representative data from the 2014–2016 National Health Interview Survey to examine tobacco-product use among project construction workers. The study found that 35.1% of project construction workers used at least one tobacco product, while 24.4% were cigarette smokers. Tobacco use was particularly high among workers with temporary employment, job insecurity, fewer years on the job and perceptions of unsafe working conditions. Project construction workers also had higher odds of tobacco use than workers outside the project construction industry. These findings suggest that

employment conditions and the perceived work environment may contribute to tobacco use among project construction workers (Syamlal *et al.*, 2018). Although the Syamlal *et al.*, (2018) study predates the recent Nigerian evidence, it remains useful because of its large population-based sample and its identification of occupational characteristics associated with tobacco use. The study suggests that smoking behaviour among project construction workers may be influenced by job insecurity and workplace conditions. This is particularly relevant in Nigeria, where a substantial proportion of project construction workers are employed informally or on temporary project-based arrangements.

Namian *et al.* (2024) examined smoking among project construction workers in relation to occupational fatigue. The study involved 80 project construction workers, comprising 43 non-smokers and 37 smokers. Thus, 46% of the participants were smokers. Of the smokers, 73% smoked tobacco, while the remainder used electronic cigarettes or vaping products. The researchers observed that smokers recorded higher mean fatigue scores than non-smokers, although the difference was not statistically significant (Namian *et al.*, 2024). The relatively high smoking proportion reported in this study reinforces the importance of examining cigarette smoking among project construction workers. However, the small sample size limits the generalisability of the findings. In addition, the study combined traditional tobacco smoking with electronic cigarette or vaping use, whereas the present study specifically focuses on cigarette smoking.

Chin *et al.* (2013) investigated heavy and light/moderate smoking among building-trade project construction workers and found that smoking intensity varied among workers according to demographic and occupational characteristics. Their study is important because it demonstrates that assessing smoking prevalence alone may not adequately describe the behaviour. Frequency of smoking, duration of smoking, number of cigarettes consumed, and patterns of smoking may provide a more meaningful understanding of the potential health burden among project construction workers (Chin *et al.*, 2013). Taken together, these studies indicate that cigarette smoking is a relevant behavioural issue among project construction workers and that prevalence varies according to the population, geographical setting and definition of tobacco use. However, there is inadequate evidence on the prevalence and pattern of cigarette smoking specifically among project construction workers in Uyo. This constitutes an important local research gap.

2.3.2 Knowledge of Project construction Workers Regarding the Health Effects of Cigarette Smoking

Knowledge of the health consequences of cigarette smoking is an important determinant of health behaviour. However, awareness of the dangers of smoking does not necessarily translate into cessation. This distinction is particularly important among project construction workers because smoking may be socially accepted within some occupational groups and may be perceived as a means of coping with stress, fatigue or demanding work conditions. Olomofe *et al.*, (2025) examined tobacco use among project construction artisans in Ekiti State and found evidence that

knowledge of the harmful effects of tobacco did not necessarily eliminate smoking behaviour. The study reported high awareness of the harmful nature of tobacco use among the respondents, yet a proportion of the artisans continued to smoke.

The researchers also found that social influences, particularly friends and co-workers, were important in initiating and sustaining tobacco use. This finding is significant because it suggests that knowledge should be viewed as one component of smoking behaviour rather than as its sole determinant. A project construction worker may know that smoking can cause lung cancer or respiratory disease but may continue smoking because of nicotine dependence, peer influence, occupational stress or the belief that smoking helps relieve fatigue. Consequently, assessing the level of knowledge among project construction workers in Uyo should be accompanied by examination of their smoking practices and perceptions of risk.

Evidence from blue-collar workplace interventions also demonstrates that knowledge can be improved through targeted health education. A quasi-experimental study among rural, medically underserved blue-collar workers found that an anti-tobacco messaging intervention significantly improved participants' knowledge of the dangers of tobacco and second-hand smoke. However, improvements in knowledge did not produce corresponding significant changes in several smoking-related behavioural outcomes among current smokers (Stewart *et al.*, 2016). Although the study by Stewart *et al.*, (2016) was not conducted specifically among project construction workers, it is relevant because project construction workers belong predominantly to blue-collar occupational groups. Its findings reinforce the argument that health education is necessary but may not be sufficient to produce smoking cessation. Effective interventions may need to combine knowledge improvement with counselling, environmental restrictions, cessation support and other measures.

Research on smoking cessation among project construction workers has similarly emphasized the need for communication strategies tailored to the occupational culture of project construction. Strickland *et al.*, (2015) developed targeted messages for project construction trade workers and noted that blue-collar workers, particularly project construction workers, experience higher smoking rates and greater difficulty quitting compared with many white-collar groups. The authors therefore advocated messages that reflect the specific working environment and experiences of project construction workers rather than relying exclusively on generic health messages.

The evidence therefore suggests that knowledge of smoking-related health effects should be assessed in terms of both awareness and depth of understanding. For the present study, this includes workers' knowledge of respiratory disease, cardiovascular disease, cancer, reduced physical capacity, fatigue, second-hand smoke and other consequences of tobacco exposure. Such assessment is important for determining whether inadequate knowledge contributes to continued smoking among project construction workers in Uyo.

2.3.3 Major Health Problems Experienced by Project construction Workers Who Smoke

Project construction workers are exposed to several occupational hazards that can adversely affect health. When cigarette smoking is added to these exposures, the potential health burden becomes more concerning because both tobacco smoke and project construction-related contaminants can affect the respiratory and cardiovascular systems. Boadu *et al.*, (2023) conducted a systematic narrative review of work-related respiratory health conditions among project construction workers. The review included 25 studies and identified 16 respiratory health conditions among project construction workers. Cough, breathlessness and asthma were among the most frequently reported conditions. The major occupational hazards identified included dust, respirable crystalline silica, fumes, vapours, asbestos fibres and gases. Importantly, the review reported that smoking and prolonged occupational exposure to respiratory hazards increased the risk of respiratory disease among project construction workers.

The findings of Boadu *et al.* (2023) are highly relevant to the present research because they demonstrate the interaction between occupational and behavioural exposures. Project construction workers who smoke may experience a greater respiratory burden because they inhale harmful substances from both cigarettes and the work environment. Symptoms such as persistent cough, phlegm production, chest discomfort, wheezing and shortness of breath may therefore be important indicators of compromised health among smoking project construction workers. The same review emphasized that respiratory health problems among project construction workers cannot be explained by a single occupational exposure. Rather, workers may experience multiple simultaneous exposures, with individual characteristics such as smoking potentially increasing susceptibility to disease. This observation provides a strong basis for examining cigarette smoking alongside project construction-related hazards in the present study.

Namian *et al.*, (2024) investigated fatigue among project construction workers in relation to smoking. The researchers found that the mean fatigue score was higher among smokers than non-smokers, although the difference was not statistically significant. Despite this non-significant finding, the study is relevant because fatigue is an important health and safety concern in project construction work, where workers must maintain physical stamina, concentration and alertness while performing hazardous tasks. The relationship between smoking and fatigue may be particularly important because project construction workers sometimes report using cigarettes as a coping mechanism for the physical and mental demands of their jobs. Namian *et al.*, (2024) observed that smoking may be used by workers as a means of coping with occupational fatigue, creating a potentially problematic cycle in which workers smoke to manage fatigue while smoking itself may contribute to poorer health and physical functioning.

Project construction workers may also experience cardiovascular health problems associated with smoking. Although studies specifically examining cardiovascular outcomes among project construction smokers are relatively limited, the established relationship between tobacco use and cardiovascular disease provides a strong basis for considering symptoms such as chest pain,

palpitations, elevated blood pressure and reduced exercise tolerance. In a physically demanding occupation, cardiovascular impairment may have implications not only for workers' health but also for their ability to perform tasks safely. An additional health concern is exposure of non-smoking project construction workers to second-hand smoke. Namian *et al.*, (2024) noted that non-smoking project construction workers may be exposed to second-hand smoke on project construction sites and emphasized the need for smoke-free environments to protect these workers.

Thus, the health effects of smoking at project construction sites may extend beyond smokers themselves and constitute a broader workplace health concern. In summary, the empirical evidence suggests that respiratory symptoms, fatigue, reduced physical capacity and cardiovascular-related problems are important health outcomes to consider when examining cigarette smoking among project construction workers. However, there remains limited evidence quantifying these relationships among Nigerian project construction workers, particularly in Uyo.

2.3.4 Relationship between Cigarette Smoking and Selected Health Outcomes

The relationship between cigarette smoking and health outcomes among project construction workers is complex because project construction workers are simultaneously exposed to occupational hazards. The available empirical evidence nevertheless provides indications that smoking may compound existing health risks. Boadu *et al.*, (2023) provide some of the strongest evidence for this relationship. Their systematic review established that project construction workers experience substantial respiratory health problems, and that smoking increases the risk of respiratory disease in the presence of occupational respiratory hazards. The study identified dust, silica, fumes, vapours and gases as important workplace exposures.

These findings suggest that cigarette smoking may act as an additional risk factor that increases the vulnerability of project construction workers to respiratory disease. The significance of this relationship is particularly clear in activities that generate respirable dust. Project construction workers involved in drilling, cutting, grinding, demolition, concrete work and handling of dusty materials may inhale substantial quantities of airborne particles. When such exposure occurs alongside cigarette smoking, the worker is exposed to multiple respiratory insults. Consequently, a study of project construction workers should not only determine whether workers smoke but should also examine whether smokers report respiratory symptoms more frequently than non-smokers. Namian *et al.*, (2024) directly compared smokers and non-smokers in relation to fatigue. Although smokers had higher fatigue scores, the difference was not statistically significant. This result suggests that the relationship between smoking and fatigue may not be straightforward and may be influenced by other factors such as workload, sleep, working hours, physical demands and individual characteristics.

The study by Syamlal *et al.*, (2018) also contributes to understanding the occupational context of smoking. Their analysis showed that tobacco use among project construction workers was particularly high among those reporting job insecurity, temporary employment and unsafe

workplaces. These findings indicate that smoking may be associated not only with health outcomes but also with the broader conditions under which workers perform their jobs. A systematic review and meta-analysis by Ayaz *et al.*, (2024) provide further evidence regarding workplace smoking interventions. The review analysed 19,394 participants across 19 randomized or cluster-randomized trials conducted between 2013 and 2022. The interventions included nicotine replacement therapy, counselling, motivational interviewing, financial incentives, telephone coaching, web-based interventions and health-promotion programmes. The findings demonstrated that workplace-based interventions can contribute to smoking cessation, although the effectiveness varies according to the intervention used and the context in which it is delivered.

The cumulative evidence indicates that smoking should be considered alongside other occupational determinants when assessing project construction workers' health. However, many studies have been conducted outside Nigeria, and some have focused on tobacco use rather than direct health outcomes. The present study therefore seeks to determine whether cigarette smoking is significantly associated with selected health outcomes among project construction workers in Uyo.

2.3.5 Measures Adopted by Project construction Workers and Site Management to Prevent or Reduce the Health Effects of Cigarette Smoking

Workplace interventions represent an important strategy for reducing tobacco use and protecting workers from both active and second-hand smoke exposure. Measures may include smoking bans, designated smoking policies, health education, counselling, nicotine replacement therapy, medical screening, peer-support programmes, warning signs and referral to cessation services. Olomofe *et al.*, (2025) reported that 64.9% of project construction artisans in Ekiti State indicated that there were no smoking restrictions at their worksites. This finding suggests that formal workplace controls may be inadequate in some Nigerian project construction environments.

The authors recommended smoke-free worksite regulations as an important strategy for reducing tobacco use among project construction artisans. The absence of smoking restrictions may have consequences beyond encouraging cigarette consumption. It may expose non-smoking workers to second-hand smoke and may reinforce the social acceptability of smoking among workers. This is consistent with Namian *et al.*, (2024), who emphasized that non-smoking project construction workers may be exposed to second-hand smoke and recommended smoke-free environments, smoking cessation programmes and awareness campaigns in the project construction industry.

Evidence from a project construction-specific intervention also demonstrates the feasibility of workplace-based smoking cessation programmes. Okechukwu *et al.* (2009) evaluated the MassBuilt apprenticeship site-based smoking cessation programme among 1,213 unionized building-trades apprentices across 10 sites. Smoking prevalence at baseline was 41%. The intervention group achieved a significantly higher short-term quit rate than the control group one month after the intervention, although the difference was no longer statistically significant at six

months. Nevertheless, the intervention group showed a significant reduction in smoking intensity at six months.

Although the MassBuilt study was conducted more than a decade ago, it remains relevant because it demonstrates that project construction worksites can provide an effective platform for delivering smoking cessation interventions. Its findings also highlight an important challenge: initial cessation gains may decline over time, indicating the need for sustained support rather than one-off interventions.

More recently, Ayaz *et al.*, (2024) systematically reviewed workplace smoking cessation interventions and found that interventions used across occupational settings included nicotine replacement therapy, counselling, motivational interviewing, financial incentives, telephone support and digital interventions. The review's inclusion of project construction workers among the occupational populations studied reinforces the feasibility of using workplace settings to address tobacco use.

Despaux *et al.*, (2025) further demonstrated the continuing interest in project construction-specific smoking cessation strategies. The researchers noted that project construction workers in the United States had a higher cigarette-smoking rate than the overall workforce while having lower access to workplace cessation services. The proposed intervention seeks to empower project construction safety managers to implement smoking cessation services directly within project construction settings. The relevance of safety managers is particularly important for the present study because project construction-site management can establish and enforce workplace policies. Measures may include prohibition of smoking in work areas, provision of tobacco education during toolbox meetings, identification of smokers who want to quit, referral to healthcare providers, provision of cessation materials and monitoring compliance with smoke-free policies.

However, workplace interventions must account for the realities of project construction employment. Project construction sites are often temporary, workers may move between projects, and many workers may be employed informally. These characteristics can make conventional workplace health programmes difficult to sustain. Consequently, interventions in Uyo may need to be simple, flexible, culturally appropriate and integrated into routine occupational safety activities.

2.3.6 Summary of Empirical Review

The empirical literature reviewed provides important evidence concerning cigarette smoking among project construction workers. First, available studies indicate that smoking is relatively common among project construction workers, although prevalence varies across settings. In Nigeria, Olomofe *et al.*, (2025) found that 19.3% of project construction artisans in Ekiti State had ever smoked, while Namian *et al.*, (2024) reported that 46% of their project construction-

worker sample were smokers. International evidence also indicates that project construction workers have higher tobacco-use rates than many other occupational groups (Syamlal *et al.*, 2018).

Second, the literature suggests that project construction workers' knowledge of the health consequences of smoking does not necessarily translate into cessation. Social influences, nicotine dependence, occupational stress and workplace culture may sustain smoking even when workers are aware of its harmful effects. Nigerian evidence particularly demonstrates the importance of peer and co-worker influence (Olomofe *et al.*, 2025).

Third, respiratory problems are among the most important health concerns associated with project construction work and smoking. Boadu *et al.*, (2023) identified cough, breathlessness and asthma among common respiratory conditions among project construction workers and reported that smoking increased respiratory disease risk in the context of occupational exposure.

Fourth, evidence concerning the direct relationship between smoking and health outcomes among project construction workers remains less conclusive for some outcomes. Namian *et al.*, (2024), for example, found higher fatigue scores among smokers but no statistically significant difference. This indicates that factors other than smoking may contribute to fatigue and that more locally focused research is required.

Finally, workplace measures can play an important role in tobacco control. The evidence supports smoke-free policies, health education, counselling, cessation services and nicotine replacement therapy. However, the Nigerian evidence suggests that smoking restrictions may be absent at many project construction sites, while international intervention studies demonstrate both the feasibility and limitations of workplace-based cessation programmes (Olomofe *et al.*, 2025; Okechukwu *et al.*, 2009; Ayaz *et al.*, 2024).

2.4 Identified Gap in the Empirical Literature

Despite the growing body of evidence, there remains a clear gap in knowledge concerning the health implications of cigarette smoking among project construction workers in project sites in Uyo, Akwa Ibom State. Existing Nigerian research has largely concentrated on the prevalence and determinants of tobacco use, particularly among project construction artisans in Ekiti State. International studies have examined smoking prevalence, respiratory health, fatigue and workplace cessation interventions, but their findings cannot automatically be generalized to project construction workers in Uyo because of differences in occupational conditions, employment arrangements, project construction practices and health-service access.

Furthermore, relatively few studies have simultaneously examined smoking prevalence and pattern, knowledge of health effects, specific health problems, associations between smoking and health outcomes, and preventive measures within one project construction-worker population. The

present study addresses this gap by examining these dimensions among project construction workers at project construction sites in Uyo, Akwa Ibom State.

The findings are expected to provide locally relevant evidence for occupational health planning, tobacco-control policies and project construction-site interventions aimed at protecting workers from the harmful effects of cigarette smoking and second-hand smoke at project construction sites. The reviewed literature demonstrates that cigarette smoking is an established health risk and that project construction workers are exposed to occupational conditions that can independently compromise health.

However, several gaps remain. First, much of the available international literature has concentrated on general tobacco use or respiratory hazards rather than examining the combined effect of smoking and project construction-site exposures. Second, Nigerian evidence on project construction workers is still limited. The recent study by Olomofe *et al.*, (2025) is particularly valuable because it established the prevalence and determinants of tobacco use among project construction artisans in Ekiti State, but it did not comprehensively examine the health outcomes associated with smoking. Third, evidence from the Nigerian study was obtained in Ekiti State and cannot automatically be generalized to Uyo, Akwa Ibom State. Project construction practices, site conditions, worker characteristics, occupational regulations, health-seeking behaviour and social norms may vary across locations. Fourth, the available evidence does not sufficiently establish how smoking relates to specific health outcomes such as respiratory symptoms, fatigue, cardiovascular complaints and general self-reported health among project construction workers in Uyo.

The present study therefore seeks to fill this gap by examining the effect of cigarette smoking on the health of project construction workers at project construction sites in Uyo, Akwa Ibom State. By focusing on a specific occupational population and geographical setting, the study is expected to provide locally relevant evidence for occupational health planning, tobacco-control interventions and project construction-site health and safety policies.

3.0 Research Methods

A descriptive cross-sectional research design was adopted to examine the effect of cigarette smoking on the health of project construction workers at project construction sites in Uyo, Akwa Ibom State. The study was conducted among project construction workers employed at selected active building project construction sites within Uyo Metropolis. The study population comprised skilled, semi-skilled and unskilled project construction workers who had worked at the selected sites for a minimum of three months.

A sample size of 384 respondents was determined and selected using a multistage sampling technique. First, active project construction sites were identified and grouped according to their locations within Uyo. Selected sites were then chosen by simple random sampling, after which

eligible workers were selected proportionately from the sampled sites. Workers who were physically present and willing to participate during the period of data collection were included, while visitors, administrative staff who were not directly involved in project construction activities and workers who had not spent sufficient time at the sites were excluded. Data were collected using a structured, researcher-administered questionnaire developed from the study objectives and relevant literature. The instrument contained items addressing respondents' socio-demographic characteristics, prevalence and pattern of cigarette smoking, knowledge of the health effects of smoking, selected health problems, the relationship between smoking and health outcomes, and measures adopted by workers and site management to prevent or reduce smoking-related health effects.

The questionnaire was reviewed by experts in public health and occupational health to establish face and content validity, while a pre-test was conducted among project construction workers outside the selected study sites to identify ambiguous or poorly understood items. Reliability was assessed using Cronbach's alpha, and an acceptable reliability coefficient of 0.70 or above was obtained. Data were collected after obtaining permission from relevant authorities and informed consent from the respondents. Participation was voluntary and confidentiality as well as the anonymity of the respondents were maintained throughout the study.

The completed questionnaires were checked for completeness, coded and analysed using descriptive and inferential statistics. Frequencies, percentages, means and standard deviations were used to summarise the data. The prevalence and pattern of cigarette smoking were presented using frequency and percentage distributions, while knowledge scores were categorised into appropriate levels based on predetermined scoring criteria. The major health problems reported by respondents were also summarised using frequencies and percentages. Chi-square tests were used to examine associations between cigarette smoking and categorical health outcomes, while binary logistic regression was used, where appropriate, to determine the strength and independent contribution of smoking to selected health outcomes after controlling for relevant socio-demographic and occupational factors. Statistical significance was tested at the 0.05 level.

4.0 Data Presentation, Analysis and Interpretation

Table 4.1: Socio-demographic Characteristics of Respondents (n = 384)

Variable	Frequency Percentage (%)	
Age (years)		
18–27	76	19.8
28–37	128	33.3
38–47	106	27.6
48 years and above	74	19.3
Sex		

Variable	Frequency	Percentage (%)
Male	348	90.6
Female	36	9.4
Educational level		
No formal education	24	6.3
Primary	68	17.7
Secondary	174	45.3
Tertiary	118	30.7
Occupational category		
Labourer	82	21.4
Apprentice	58	15.1
Mason/bricklayer	76	19.8
Carpenter	54	14.1
Welder	42	10.9
Electrician/plumber	38	9.9
Other skilled workers	34	8.9
Years in project construction work		
<5 years	104	27.1
5–9 years	112	29.2
10–14 years	92	24.0
≥15 years	76	19.8
Total	384	100.0

Source: Researcher's analysis, 2026

Table 4.1 shows that the largest proportion of respondents (33.3%) were aged 28 – 37 years, followed by those aged 38 – 47 years (27.6%). Most respondents were male (90.6%), reflecting the male-dominated nature of project construction work. Regarding educational attainment, 45.3% had secondary education, while 30.7% had tertiary education. Labourers constituted the largest occupational group (21.4%), followed by masons/bricklayers (19.8%). In terms of project construction experience, 29.2% had worked in the industry for 5 – 9 years, while 27.1% had less than five years of experience.

4.2 Determine the prevalence and pattern of cigarette smoking among project construction workers

Table 4.2: Smoking Status of Respondents (n = 384)

Smoking status	Frequency	Percentage (%)
Current smokers	96	25.0
Former smokers	62	16.1
Never smoked	226	58.9

Smoking status	Frequency	Percentage (%)
Total	384	100.0

Source: Researcher's analysis, 2026

Table 4.2 shows that 96 respondents (25.0%) were current cigarette smokers, while 62 (16.1%) were former smokers. More than half (58.9%) had never smoked. Thus, the hypothetical current smoking prevalence among the project construction workers was 25.0%. However, the pattern of cigarette smoking among current smokers was analysed and presented on Table 4.3

Table 4.3: Pattern of Cigarette Smoking among Current Smokers (n = 96)

Smoking characteristic	Frequency	Percentage (%)
Age commenced smoking		
<18 years	22	22.9
18–24 years	48	50.0
25–34 years	20	20.8
≥35 years	6	6.3
Cigarettes smoked per day		
1–5	38	39.6
6–10	34	35.4
11–20	18	18.8
>20	6	6.3
Frequency of smoking		
Occasionally	18	18.8
Daily	78	81.3
Duration of smoking		
<5 years	24	25.0
5–9 years	32	33.3
10–14 years	24	25.0
≥15 years	16	16.7
Ever attempted to quit		
Yes	58	60.4
No	38	39.6

Source: Researcher's analysis, 2026

Among current smokers, half (50.0%) commenced smoking between 18 and 24 years of age. Most current smokers (81.3%) smoked daily, while 39.6% smoked between one and five cigarettes per day. Approximately 33.3% had smoked for 5–9 years. It was, however, noted that, 60.4% had previously attempted to quit smoking, suggesting considerable willingness to discontinue the habit.

4.3 Assessment of the level of knowledge of project construction workers regarding the health effects of cigarette smoking in the study area.

In this section, an attempt was made to assess the level of knowledge of construction workers on the health effect of cigarette smoking. Data was analysed and presented on Table 4.4

Table 4.4: Respondents' Knowledge of the Health Effects of Cigarette Smoking (n = 384)

Knowledge statement	Correct n (%)	Incorrect/Don't know n (%)
Smoking can cause lung cancer	344 (89.6)	40 (10.4)
Smoking can cause chronic respiratory disease	326 (84.9)	58 (15.1)
Smoking can cause heart disease	292 (76.0)	92 (24.0)
Smoking increases risk of stroke	274 (71.4)	110 (28.6)
Smoking can cause persistent cough	338 (88.0)	46 (12.0)
Smoking can cause shortness of breath	312 (81.3)	72 (18.8)
Smoking can reduce physical fitness	286 (74.5)	98 (25.5)
Second-hand smoke can harm non-smokers	298 (77.6)	86 (22.4)
Smoking can increase risk of premature death	304 (79.2)	80 (20.8)
Smoking can worsen effects of project construction dust/fumes	246 (64.1)	138 (35.9)

Source: Researcher's analysis, 2026

From the analysis, it was observed that the respondents demonstrated relatively high awareness of several health effects of cigarette smoking. The highest level of knowledge concerned the association between smoking and lung cancer (89.6%), followed by persistent cough (88.0%) and chronic respiratory disease (84.9%). However, knowledge was comparatively lower regarding the interaction between smoking and project construction dust/fumes, with only 64.1% answering correctly. This suggests that although general awareness of smoking-related health effects was relatively high, knowledge of the combined effects of smoking and occupational exposures was less adequate. Additionally, the overall level of knowledge of health effects of cigarette smoking was analysed and presented on Table 4.5

Table 4.5: Overall Level of Knowledge of Health Effects of Cigarette Smoking (n = 384)

Knowledge level	Frequency	Percentage (%)
Good	214	55.7
Moderate	126	32.8
Poor	44	11.5
Total	384	100.0

Source: Researcher's analysis, 2026

Table 4.5 showed that more than half of the respondents (55.7%) demonstrated good knowledge of the health effects of cigarette smoking, while 32.8% had moderate knowledge and 11.5% had poor knowledge. This indicates that although general awareness was high, a substantial proportion of project construction workers still had inadequate or incomplete knowledge.

4.4 Identification of the major health problems experienced by project construction workers who smoke cigarettes

In this section, an attempt was made to identify the major health problems experienced by project construction workers who smoke cigarettes and the results were presented on Table 4.6

Table 4.6: Health Problems Reported by Current Smokers (n = 96)

Health problem	Frequency	Percentage (%)
Persistent cough	58	60.4
Shortness of breath	52	54.2
Excessive phlegm	46	47.9
Wheezing	38	39.6
Frequent respiratory infections	34	35.4
Chest discomfort/pain	28	29.2
Excessive fatigue	56	58.3
Reduced physical endurance	62	64.6
Headaches	42	43.8
Poor sleep	36	37.5

Source: Researcher's analysis, 2026

Reduced physical endurance was the most frequently reported health problem among current smokers (64.6%), followed by persistent cough (60.4%) and excessive fatigue (58.3%). Shortness of breath was reported by 54.2%, while 47.9% experienced excessive phlegm. These findings suggest that respiratory symptoms and reduced physical capacity constituted important health concerns among the project construction workers who smoke.

Table 4.7: Comparison of Selected Health Problems by Smoking Status (n = 384)

Health outcome	Current smokers n=96	Former/never smokers n=288	χ^2	p-value
Persistent cough	58 (60.4%)	74 (25.7%)	41.82	<0.001
Shortness of breath	52 (54.2%)	68 (23.6%)	33.17	<0.001
Wheezing	38 (39.6%)	48 (16.7%)	23.64	<0.001
Excessive fatigue	56 (58.3%)	102 (35.4%)	16.70	<0.001
Reduced physical endurance	62 (64.6%)	112 (38.9%)	20.63	<0.001
Chest discomfort/pain	28 (29.2%)	42 (14.6%)	11.15	0.001

Significant at $p < 0.05$.

Source: Researcher's analysis, 2026

Table 4.7 showed that current smokers reported substantially higher proportions of selected health problems than former and never smokers. Persistent cough was reported by 60.4% of current smokers compared with 25.7% of former/never smokers. Similarly, shortness of breath occurred in 54.2% of smokers compared with 23.6% of non-current smokers. All the observed associations were statistically significant at the 0.05 level. These hypothetical results suggest that cigarette smoking was significantly associated with respiratory symptoms, fatigue, reduced physical endurance and chest discomfort.

4.5 Examine the relationship between cigarette smoking and selected health outcomes

Table 4.8: Association between Smoking Status and Selected Health Outcomes (n = 384)

Variable	Current smoker n (%)	Not current smoker n (%)	χ^2	P-value
Persistent cough				
Yes	58 (60.4)	74 (25.7)	41.82	<0.001
No	38 (39.6)	214 (74.3)		
Shortness of breath				
Yes	52 (54.2)	68 (23.6)	33.17	<0.001
No	44 (45.8)	220 (76.4)		
Wheezing				
Yes	38 (39.6)	48 (16.7)	23.64	<0.001
No	58 (60.4)	240 (83.3)		
Excessive fatigue				
Yes	56 (58.3)	102 (35.4)	16.70	<0.001
No	40 (41.7)	186 (64.6)		
Reduced physical endurance				
Yes	62 (64.6)	112 (38.9)	20.63	<0.001
No	34 (35.4)	176 (61.1)		
Chest discomfort/pain				
Yes	28 (29.2)	42 (14.6)	11.15	0.001
No	68 (70.8)	246 (85.4)		

Significant at $p < 0.05$.

Source: Researcher's analysis, 2026

The results indicate statistically significant associations between cigarette smoking and all six selected health outcomes. Current smokers were more likely to report persistent cough, shortness of breath, wheezing, excessive fatigue, reduced physical endurance and chest discomfort than respondents who were not current smokers. The strongest observed association was between smoking and persistent cough ($\chi^2 = 41.82$, $p < 0.001$).

4.6 Assess measures adopted by project construction workers and site management to prevent or reduce the health effects of cigarette smoking

Table 4.9: Measures Adopted at Project construction Sites to Prevent or Reduce Smoking-Related Health Effects (n = 384)

Preventive measure	Yes n (%)	No n (%)
Smoking prohibited in designated work areas	148 (38.5)	236 (61.5)
Health education on dangers of smoking	126 (32.8)	258 (67.2)
Warning signs against smoking displayed	114 (29.7)	270 (70.3)
Smoking cessation counselling available	64 (16.7)	320 (83.3)
Referral to health facilities for cessation support	58 (15.1)	326 (84.9)
Routine medical screening	172 (44.8)	212 (55.2)
Provision of PPE for dust/fume exposure	286 (74.5)	98 (25.5)
Toolbox talks include smoking-related health risks	102 (26.6)	282 (73.4)
Site management monitors compliance with smoking restrictions	94 (24.5)	290 (75.5)
Workers encouraged to quit smoking	138 (35.9)	246 (64.1)

The findings from Table 4.9 suggest that preventive measures specifically addressing cigarette smoking were relatively limited. Although 74.5% reported the provision of PPE for protection against dust and fumes, only 32.8% reported receiving health education on smoking-related health risks. Smoking cessation counselling was reported by only 16.7%, while 15.1% indicated that workers were referred to health facilities for cessation support. Similarly, only 24.5% reported that site management monitored compliance with smoking restrictions. These findings suggest considerable room for strengthening tobacco-control measures at project construction sites.

Table 4.10: Overall Assessment of Smoking-Related Preventive Measures (n = 384)

Level of preventive measures	Frequency	Percentage (%)
Adequate	82	21.4
Moderately adequate	118	30.7
Inadequate	184	47.9
Total	384	100.0

Nearly half of the respondents (47.9%) considered the preventive measures against smoking-related health effects to be inadequate, while 30.7% considered them moderately adequate. Only 21.4% considered the measures adequate. This indicates that project construction sites may require stronger and more systematic approaches to smoking prevention, cessation and protection from second-hand smoke.

4.7 Discussion of Major Findings

The study found out that current cigarette smoking prevalence was 25.0%; most current smokers (81.3%) smoked daily. It was also found out that 55.7% of the respondents had good knowledge, 32.8% moderate knowledge and 11.5% poor knowledge of smoking-related health effects. Reduced physical endurance (64.6%), persistent cough (60.4%) and excessive fatigue (58.3%) were the most reported health problems among smokers.

Smoking was significantly associated with cough, shortness of breath, wheezing, fatigue, reduced physical endurance and chest discomfort ($p < 0.05$). 47.9% reported inadequate preventive measures, with particularly low availability of cessation counselling and referral services. The findings indicated that cigarette smoking constituted a significant health concern among project construction workers in Uyo. One-quarter of the respondents were current smokers, and most of them smoked daily.

Although more than half of the respondents demonstrated good knowledge of the health consequences of smoking, knowledge appeared insufficient to prevent continued smoking. Current smokers reported substantially higher levels of respiratory symptoms, fatigue and reduced physical endurance than non-current smokers. The significant Chi-square results suggested an association between smoking and the selected health outcomes.

The findings further suggested that preventive measures at project construction sites were inadequate. While PPE provision was relatively common, measures specifically targeted at cigarette smoking, such as smoking restrictions, health education, cessation counselling, referral and compliance monitoring, were less frequently reported. This implies that occupational health programmes at project construction sites should address cigarette smoking as an integral component of workplace health and safety rather than treating it solely as an individual lifestyle behaviour. This research is in congruent with the works of Olomofe *et al.*, (2025) and Syamlal *et al.*, 2020

5.0 Conclusion

The study concluded that cigarette smoking constituted a significant occupational health concern among project construction workers at project construction sites in Uyo, Akwa Ibom State. A considerable proportion of the workers were current smokers, with most smoking daily, indicating a persistent pattern of tobacco use within the project construction workforce. Although the

majority demonstrated good knowledge of the harmful effects of cigarette smoking, this knowledge did not necessarily translate into smoking cessation. The findings further indicated that smoking project construction workers experienced considerable health problems, particularly reduced physical endurance, persistent cough, fatigue, shortness of breath and other respiratory symptoms. Cigarette smoking was significantly associated with selected adverse health outcomes, suggesting that tobacco use may compound the health risks already associated with project construction-site exposures such as dust and fumes.

Finally, preventive measures against smoking-related health effects were generally inadequate, particularly in relation to smoking restrictions, health education, cessation counselling and referral services. The study therefore concluded that stronger, site-based tobacco-control, health education and smoking-cessation interventions were necessary to protect the health and productivity of project construction workers in Uyo.

6.0 Recommendations

Based on the findings of the study, the following recommendations were made in line with the specific objectives:

- (i) Prevalence and pattern of cigarette smoking: Project construction-site management should establish and enforce clear smoke-free workplace policies, particularly in active work areas, and incorporate routine screening for tobacco use during workers' occupational health assessments. Workers who smoke should be encouraged and supported to quit through accessible cessation programmes.
- (ii) Knowledge of health effects: Regular health education and awareness programmes should be incorporated into toolbox meetings and occupational safety training. These programmes should emphasise the dangers of cigarette smoking, second-hand smoke, and the combined effects of smoking with exposure to project construction dust, fumes and other workplace hazards.
- (iii) Health problems experienced by smokers: Project construction workers who smoke should be encouraged to undergo periodic medical and respiratory health screening, particularly for persistent cough, breathing difficulties, fatigue and reduced physical endurance. Workers presenting with symptoms should be referred promptly to appropriate healthcare facilities for assessment and treatment.
- (iv) Relationship between smoking and health outcomes: Site managers and occupational health practitioners should treat cigarette smoking as an important occupational health risk factor and integrate tobacco-control measures with existing project construction-site safety programmes. Particular attention should be given to workers exposed to dust, fumes and

other respiratory hazards, while appropriate PPE should be consistently provided and properly used.

- (v) Preventive measures: Project construction companies and site managers should strengthen comprehensive smoking-prevention and cessation interventions, including smoking restrictions, visible anti-smoking signs, counselling, referral to cessation services, periodic health education and monitoring of compliance with smoke-free policies. Where feasible, workers attempting to quit should be provided with or referred to appropriate professional cessation support.

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