
| RESEARCH ARTICLE

Promoting Health and Safety among Construction Workers in Pasay City: Towards an Enhanced Security and Safety Labor Policies

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| ABSTRACT

This research investigates the health and safety obstacles encountered by experienced construction professionals in Metro Manila. By addressing these challenges, the study aims to enhance worker well-being, safety practices, and policy formulation, potentially yielding economic benefits through cost reduction for construction firms and improved safety standards. Emphasizing social responsibility, the research advocates for promoting worker health and safety to bolster public trust and company reputation. Evidence-based recommendations provided can aid policymakers and regulatory bodies in updating regulations tailored to construction workers' needs, ensuring compliance and addressing sector-specific challenges. Valuable insights for the construction industry include strategies to retain and support experienced workers, anticipating reduced turnover rates and increased productivity. A safer construction environment not only benefits workers but also the broader community by reducing accidents and fostering societal harmony. The study prioritizes enhancing construction workers' quality of life by addressing physical hazards and safety protocol gaps, offering practical guidelines for employers to cultivate a culture of worker well-being and satisfaction. Furthermore, the research contributes to the academic discourse on occupational health and safety in physically demanding industries like construction, advancing understanding and facilitating future discussions on challenges and solutions in this field.

| KEYWORDS

Construction Workers Safety, Occupational Health Challenges, Metro Manila Construction Sector, Workers' Well-Being Policies, Safety Standards Development

| ARTICLE INFORMATION

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1. Introduction

1.1 Research Background

As the construction industry continues to thrive and evolve, it is increasingly important to address the unique challenges faced by construction workers. The invaluable experience and expertise that workers bring to construction sites are undeniable, but their health and safety become paramount concerns as they age. The accidents in the construction industry can be attributed to various factors such as unsafe working methods, improper work plans, human errors, inadequate job site conditions, unsafe equipment, and ineffective management practices (Kim et al, 2022). The goal of a safety program is to create awareness among all organization members about the company's dedication to safety and health, emphasizing individual responsibilities. It aims to foster a safe and healthy work environment for all construction activities by promoting appropriate work practices and conditions (Preya et al 2021). In an era where construction projects grow in complexity and scale, safeguarding the health and safety of the workforce is not just a moral obligation; it's a strategic imperative for the industry's future. This introductory exploration delves into the challenges faced by this demographic, presents potential solutions, and sheds light on policy insights aimed at ensuring the well-being of these essential industry professionals.

The construction industry's continued growth and evolution have made it increasingly crucial to address the unique concerns of its workforce. As of March 2023, 35 percent of the national government's infrastructure projects in the Philippines, comprising 68 projects, are in progress, while nine projects are awaiting government approval. The Philippines employs more than 4 million construction workers Statistica (2023). According to a survey released by PSA (2023) one of the top 5 sub sectors in terms of annual increase in the number of employed persons in August 2023 in the Construction Industry which has 534 thousand. Common causes of fatal accidents in the construction industry include falls from heights, accidents involving construction equipment, electrocution, and incidents where workers are struck by object (Toyado,2021). The prevalence of these types of accidents underscores the critical need for stringent safety measures and comprehensive training programs in the construction industry. Furthermore, addressing these common causes of accidents requires a multifaceted approach that involves not only implementing safety protocols but also regularly inspecting equipment, ensuring proper training and supervision, and fostering a culture of safety among all workers on construction sites. As indicated in the study of (Hashiguchi,2022). Older workers experienced reduced intrinsic motivation and perceived work performance when faced with increased health risks, impacting their extrinsic motivation as well. Conversely, younger workers did not show these effects. In both age groups, a combination of intrinsic and extrinsic motivations positively influenced perceived work productivity among construction workers. Considering the demographic within the construction workforce, the industry in the Philippines encounters various challenges, including safety concerns and infrastructure demands. Specifically focusing on the well-being of older construction workers becomes crucial. Addressing these multifaceted challenges is essential for the industry's sustainable growth and the health and safety of its workforce.

With the imperative need to address the multifaceted challenges confronting the construction industry, particularly the well-being of its workforce, our focus now shifts to the dynamic urban hub of Metro Manila, Philippines. Metro Manila stands as a microcosm of the nation's construction landscape, showcasing both the opportunities and unique challenges faced by industry. As the heart of the country's economic and infrastructural development, it plays a pivotal role in the growth and evolution of the construction sector. Within the bustling streets of Metro Manila, the construction workforce confronts not only the industry's demanding physical rigors but also the increased health risks that come with age. As highlighted in the research study of (Kaur et al,2023). While young and inexperienced workers are at a higher risk of injury, older workers may face more severe injuries and longer recovery times due to the higher proportion of lost-time claims and increased per claim costs. Despite potential disadvantages in performing certain tasks, older workers bring valuable experience and skills to the workforce, exhibit lower injury rates, and can serve as mentors for younger workers, promoting safe work practices. In this complex urban environment, the intersection of experienced older workers and the challenge of a workforce presents a unique opportunity to explore tailored solutions and policies that can safeguard the health, well-being, and productivity of construction professionals in Metro Manila, ultimately benefiting the broader construction industry.

While the studies referenced provide crucial insights into the challenges and potential solutions related to construction workers in Metro Manila, a significant research gap persists. These works have primarily elucidated the issues and offered potential strategies, yet there remains a notable dearth of empirical research that rigorously evaluates the effectiveness and practical implementation of these strategies within the unique urban context of Metro Manila. Consequently, this research, titled 'Promoting Health and Safety among Construction Workers in Pasay City: A Proposed Labor Policy', aims to address these gaps by conducting an in-depth investigation into the real-world application and impact of strategies tailored to enhance the well-being and productivity of construction workers in Metro Manila.

The research gap lies in the lack of empirical evidence regarding the effectiveness and practical implementation of strategies aimed at enhancing the health, safety, and productivity of construction workers within the unique urban context of Metro Manila, particularly in areas like Pasay City. While existing literature has identified the challenges faced by construction workers and proposed potential solutions, there is a notable dearth of research that evaluates how these strategies perform in real-world settings characterized by rapid urbanization, diverse demographics, and varying regulatory environments. Addressing this gap is crucial for developing evidence-based policies and interventions tailored to the specific needs of construction workers in urban settings, ultimately promoting their well-being and contributing to the sustainable growth of the construction industry in Metro Manila.

1.2 Problem Statement and Objectives

This research study aimed to provide a comprehensive understanding of the health and safety of construction workers in the unique urban environment of Metro Manila, Philippines. By addressing this complex issue, the study sought to bridge the existing research gap and offer evidence-based insights that could inform policies and practices in the construction industry. Specifically, this research study answered the following sub-questions:

1. What is the demographic profile of the respondents in terms of:

- 1.1 Age;
- 1.2 Types of Construction Work/Job Role;
- 1.3 Educational Attainment; and
- 1.4 Years of Working Experience?
2. What is the level of experience in health challenges of respondents in the construction industry as to:
 - 2.1 Physical Well-being;
 - 2.2 Mental Well-being;
 - 2.3 Emotional Well-being;
 - 2.4 Workplace Well-being; and
 - 2.5 Societal Well-being?
3. What is the level of experience in safety challenges of respondents in the construction industry as to:
 - 3.1 Environmental safety;
 - 3.2 Safety Trainings; and
 - 3.3 Workplace hazards?
4. What is the significant difference between the level of experienced health challenges and demographic of respondents?
5. What is the significant difference between the level of experiences safety challenges and demographic of respondents?
6. What is the significant relationship between safety challenges and health challenges?
7. Based on the results of the study, what proposed security and safety labor policies can be proposed?

1.3 Hypotheses

H01 There is no significant relationship between the level of experienced health challenges and demographic variables among construction workers.

H02 There is no significant relationship between the level of experienced safety challenges and demographic variables among construction workers.

1.4 Scope and Limitation

This study investigated the health and safety challenges confronted by the construction workforce in Pasay, Metro Manila, Philippines. The examination delved into specific aspects such as physical health, mental well-being, and workplace safety challenges encountered by construction workers in the course of their duties.

Nevertheless, it was imperative to recognize certain inherent limitations in this research initiative. The primary focus on the construction workforce within Pasay, Metro Manila, may have potentially constrained the generalizability of findings to other geographic regions with distinct contexts and challenges. Challenges associated with the availability and size of the sample population may have impacted the representativeness of the research outcomes. Time and resource constraints could have affected the depth and breadth of data collection and analysis, potentially influencing the overall comprehensiveness of the study.

Furthermore, while the study acknowledged the variability in policies and regulations related to construction worker well-being across different regions and countries, it primarily addressed the Philippine context. The data collected through surveys or interviews may have been susceptible to self-reporting bias, affecting the accuracy of responses, especially concerning health and safety issues. Additionally, resource constraints, encompassing financial and logistical limitations, may have impacted the scope of data collection and analysis in this research, particularly regarding the health and safety challenges faced by construction workers.

The subject of this study included all construction workers aged 18 to 60 years old currently working in Pasay, Metro Manila, and the data collection spanned the designated date range encompassing all construction workers operating in this area.

1.5 Significance of the Study

With a workforce facing unique challenges, this research endeavored to shed light on the health and safety of experienced construction professionals as they navigated the multifaceted demands within the construction sector. This study sought to

contribute significantly to the well-being of these workers and offered substantial benefits to the construction industry, policy development, and the broader urban context. The significance lay in its potential to enhance worker well-being, elevate safety practices, inform policy development, sustain industry productivity, foster intergenerational knowledge sharing, and provide tailored insights that could shape the construction landscape of Metro Manila and serve as a model for other urban areas facing similar challenges.

Economic Impact. The findings of the current study may not only contribute to creating a safer work environment but also to the development of policies related to improved health and safety standards. A safer work environment can also lead to lesser economic costs on the part of the construction company.

Social Responsibility and Public Trust. Since it is a social responsibility to promote health and safety among construction workers, creating a safer work environment can lead to greater public trust, higher legal compliance, and better company reputation.

Government and Regulatory Bodies. Policymakers and regulatory authorities play a crucial role in ensuring the safety and well-being of workers. The research equips them with evidence-based recommendations to formulate and update regulations tailored to the unique needs of construction workers. This not only ensures compliance with safety standards but also reflects a commitment to addressing the evolving challenges within the construction sector. Ultimately, these regulations contribute to creating a safer working environment for construction workers across Metro Manila.

Construction Industry. The findings of the study have broader implications for the construction industry. With insights into effective strategies for retaining and supporting experienced workers, the industry can anticipate a reduction in turnover rates. This, in turn, contributes to enhanced productivity and a safer work environment. A stable and experienced workforce is crucial for the success and sustainability of construction projects, and the study aims to provide valuable guidance in achieving this.

Community and Society. The study's ultimate impact extends beyond the construction industry to the wider community and society. A safer construction industry, as advocated by the research, reduces the occurrence of accidents and incidents that could have far-reaching consequences. By enhancing safety standards, the study contributes to the overall well-being of both workers and the communities in which construction projects are carried out, fostering a safer and more harmonious societal environment.

Construction Workers. The primary focus of the study is on the construction workers themselves. By delving into the specific challenges they face, ranging from physical hazards to potential gaps in safety protocols, the research seeks to improve the health, safety, and overall well-being of this demographic. The goal is to create a working environment where construction workers can thrive, reducing the risks associated with their profession and enhancing their overall quality of life.

Employers and Managers. Construction companies and site managers are on the front lines of implementing safety measures. The study provides practical guidelines for creating a workplace culture that prioritizes the health and safety of workers. This includes not only adherence to regulations but also fostering a positive corporate culture that values the well-being of employees. The implementation of these guidelines can contribute to sustainable operations, employee satisfaction, and a positive reputation within the industry.

Researchers and Academics. The study adds valuable insights to the academic discourse on occupational health and safety, particularly in physically demanding industries like construction. Researchers and academics can use this foundational knowledge to inform future studies and discussions. By contributing to the body of research in this field, the study plays a role in advancing our understanding of the challenges and solutions related to the health and safety of construction workers.

1.6 Definition of Terms

This research study provided operational and contextual definitions for the following terms:

Construction Workers. This refers to individuals engaged in physical labor within the construction industry in Metro Manila, including but not limited to carpenters, masons, electricians, and laborers.

Demographic Profile. This refers to the specific characteristics and information collected from construction workers, including age, types of construction work/job roles, educational attainment, and years of working. Age refers to the chronological age of the

worker, job roles encompass specific responsibilities within the construction industry, educational attainment pertains to the highest level of education completed, and years of working signify the total duration of employment in the construction sector.

Emotional Health Well-being. This refers to the ability of individuals in operational roles to manage and express their emotions effectively. In an operational context, this involves creating a supportive and empathetic work environment that acknowledges and addresses emotional challenges that individuals may encounter.

Environmental Safety. It relates to measures and protocols in place to protect the natural surroundings from harm or degradation. This includes the prevention of pollution, conservation of resources, and sustainable practices to ensure the well-being of the environment.

Environmental Safety Challenges. It specifically pertains to obstacles in ensuring the safety and sustainability of the natural environment within the operational context. This may involve challenges related to waste management, resource conservation, and minimizing the ecological impact of operational activities. **Health challenges:** This refers to obstacles or issues that impact the physical, mental, emotional, or overall well-being of individuals within a particular setting. These challenges could include factors such as exposure to workplace hazards, stress, inadequate health and safety protocols, or other conditions that may compromise the health of individuals engaged in operational activities.

Mental Health Well-being. It pertains to the psychological and emotional resilience of individuals in operational settings. It involves factors such as stress management, coping mechanisms, and the provision of supportive environments to address mental health challenges that may arise during work-related activities.

Physical Health and Well-being. It is the overall state of an individual's body and its ability to meet the physical demands of their work. It involves factors such as fitness, nutrition, ergonomics, and the management of physical health challenges within the operational environment.

Safety Challenges. This encompasses obstacles or difficulties in maintaining a safe working environment. This could involve issues such as compliance with safety regulations, addressing emerging risks, and adapting safety protocols to evolving operational conditions.

Safety Training. It involves educational programs designed to equip individuals with the knowledge and skills needed to navigate operational environments safely. This includes training in the identification and mitigation of hazards, proper use of safety equipment, and emergency response protocols.

Safety Training Challenge. This pertains to difficulties or barriers in effectively imparting essential safety knowledge and skills to individuals within operational settings. This could include issues related to training accessibility, comprehension, and the adaptation of training programs to address specific operational risks.

Societal Well-being. This extends beyond the workplace to the broader community. It involves considering the social impact of operational activities, such as community engagement, ethical practices, and contributions to societal welfare.

Workplace Hazards. This refers to potential sources of harm or danger within an operational setting. These can include physical hazards (e.g., machinery), chemical hazards, biological hazards, ergonomic risks, and psychosocial factors that may compromise the safety and health of individuals at work.

Workplace Hazards Challenges. It refers to difficulties or complexities in identifying, mitigating, and managing various hazards present in the operational environment. This includes challenges in implementing effective hazard controls, providing adequate protective measures, and addressing emerging hazards in a timely manner.

Workplace Well-being Challenges. It refers to the holistic health and satisfaction of individuals within their work environment. This includes physical safety, mental and emotional well-being, job satisfaction, and a supportive workplace culture that fosters overall health and productivity.

1.7 Related Literature

In an era marked by a workforce in the construction industry, the promotion of health and safety for construction workers has emerged as a pressing concern. As the demographic composition of construction laborers undergoes a significant transformation, with a growing proportion of older individuals entering or remaining in the industry, there is a critical need to address the unique challenges they face in maintaining their well-being and safety on the job. This literature review delves into the multifaceted landscape of health and safety concerns specific to construction workers, explores innovative solutions designed to mitigate these challenges, and examines the role of policy interventions in shaping the future of this vital sector. Through a comprehensive analysis of existing research and expert insights, this study seeks to shed light on the complexities surrounding the health and safety of construction workers and to offer valuable guidance for policymakers, industry stakeholders, and researchers alike.

1.7.1 Demographic Profile Exploration

The demographic within the construction industry in Metro Manila presents a multifaceted set of challenges and opportunities that hold significant implications for the realms of safety, productivity, and sustainability on construction projects. As the construction workers grow older it directly affects not only their safety but also the overall productivity of construction projects and the industry's long-term sustainability. Addressing these implications requires a thoughtful reevaluation and adaptation of industry practices to better accommodate and support this workforce, with an emphasis on enhancing safety measures, optimizing productivity, and fostering sustainability in the construction sector. Older construction workers encounter challenges related to maintaining concentration and attention (Liang, 2022). Also, for aged construction workers understanding and promoting effective coping strategies may be crucial to improving safety outcomes. However, in a study of (Hansen,2022) while aged workers who have physically demanding tasks posed clear factor, the speed at which the factor was performed did not appear to have significant impact on the likelihood of accidents. Agreed by the study of (Peng, 2020) construction workers in Hong Kong concludes that this demographic is experiencing challenges linked to declining health conditions and an increased occurrence of occupational accidents. The patterns of occupational accidents are characterized by factors such as job demands, job resources, health conditions, and physical work capacity. The findings highlight the critical impact of physical work capacity, as well as physical and mental health, on the occupational safety of older construction workers. Importantly, the study suggests that mitigating the relatively high occupational safety risks for this demographic requires the proper design of job demands and job resources, tailored to individual health-related factors. Employers occasionally perceive the efforts and costs imposed on organizations by aging workers with reduced work capacity to exceed the benefits of retaining them (Halivni ,2022).

Supporting construction workers requires a multifaceted approach that addresses their physical health, mental well-being, and skill development. Firstly, implementing workplace adjustments such as ergonomic tools and equipment can significantly reduce physical strain. Providing regular health check-ups and access to healthcare services can address age-related health issues proactively. Additionally, offering flexible work schedules and job rotations can help manage fatigue and prevent overexertion. Investing in training programs that focus on updated construction techniques and technologies ensures that older workers can adapt to changing industry demands, enhancing their job security. Moreover, fostering a supportive work environment that values their experience and expertise can boost morale and job satisfaction. Social support initiatives, like peer mentoring and counseling services, can address the mental health challenges often faced by workers, promoting a positive work-life balance. Lastly, advocating for policies that promote age diversity, equal opportunities, and anti-discrimination measures in the workplace can create an inclusive atmosphere where construction workers feel valued and supported, ensuring their continued contribution to the industry.

1.7.2 Health Challenges Assessment

Investigating the intricate interplay between physical health, mental well-being, experience, and skills is essential to understanding how these factors collectively influence the overall well-being and performance of construction workers in the dynamic context of Metro Manila. Highlighted in the study of (Zhang et al,2023) the link between mental fatigue and workers' risk propensity, influencing choices with higher risk and lower pay in states of dual fatigue. While the research focuses on unsafe behavior, it indirectly underscores the importance of monitoring and managing workers' mental and physical fatigue related to their well-being. Evidence linking certain physical factors such as working in awkward postures, performing manual material handling tasks, and prolonged work(Answer et al,2021), also agreed with the study of (Yu et al. 2021). Postures can indicate the quality of work being performed, distinguishing between "effective work" and "contributory work". Physical factors such as repetitive strain, prolonged exposure to manual labor, and inadequate ergonomic support significantly impacts the process of construction workers, influencing their overall health and work performance.

The mental health of aged construction workers is a pressing concern shaped by various factors. Physically demanding work, coupled with challenging environmental conditions, can lead to heightened stress and mental health issues as bodies struggle to cope. Additionally, job insecurity, often fueled by perceptions of reduced productivity in older age, contributes to persistent anxiety and stress among these workers. Social isolation further compounds the issue, as older workers may feel disconnected from younger colleagues, lacking the camaraderie and support they once enjoyed. Moreover, the increased risk of work-related injuries and chronic pain adds another layer of mental distress, emphasizing the urgent need for targeted support and interventions to safeguard the mental well-being of this vulnerable workforce.

There is growing urgency of addressing mental health issues in construction industry that emphasizing the risk factor contributing to mental health. Older construction workers bring a wealth of experience and a versatile skillset to the industry. With many years spent in the field, they have acquired extensive knowledge of construction processes, techniques, and problem-solving strategies (Chan et al, 2021). However, in the study conducted he states that older construction workers reported the highest satisfaction with the functional aspects of their work environment, indicating contentment with their tasks and tools. They also expressed moderate satisfaction with the auxiliary environment, which includes support services and amenities (Torku, 2019). However, satisfaction levels were lower for policies and practices, the physical environment, and the organizational-psychological environment, reflecting potential areas for improvement to better cater to the needs of older workers in the industry. This breadth of skills makes them valuable assets to construction teams, as they can seamlessly adapt to different tasks and projects.

Furthermore, their experience often translates into effective leadership on job sites, where they can mentor younger workers and contribute to a safer and more productive work environment.

1.7.3 Safety Challenges Examination

To ensure the well-being and productivity of construction workers in the dynamic urban landscape of Metro Manila, it is imperative to evaluate the effectiveness of existing policies and strategies designed to address their unique needs. As the construction industry continues to evolve and adapt to changing demographics, a critical examination of policy effectiveness becomes essential. Understanding the various risk behavior factors is crucial for improving safety measures on construction sites and ensuring the well-being of construction workers. In a study conducted by (Man et al, 2021) he states that personal factors like outcome expectancy, attitude toward risk-taking, and specific risk perceptions significantly influenced construction workers' risk-taking behavior. Additionally, safety training directly and indirectly influenced risk-taking behavior through its impact on attitudes and risk perceptions. Safety promotion policies also indirectly influenced risk-taking behavior through their effect on outcome expectancy. Ensuring the safety of construction workers is of paramount importance, as it not only protects their lives and well-being but also contributes to the overall success and integrity of construction projects. However, barriers in improving safety programs as what listed like unfavorable work environment characterized by insufficient safety resources, weak safety commitment, and poor accountability (Buniya et al, 2021). Additionally, there is a lack of safety awareness and training, especially among higher management, along with a deficiency in safety governance programs. The significance of both efficient safety supervision and the cultivation of positive safety attitudes among employees in electrical construction projects, aiming to enhance workplace safety (Basahel,2021).

Understanding the effectiveness of such policies is vital for ensuring the sustained productivity, safety, and job satisfaction of this workforce segment. The importance of safety management practices such as Standard Operating Procedures and using Personal Protective Equipment are important factors in determining the construction workers' behavior (Wong 2021). Adding the research study of (Meng et al, 2021), concluded that in a workforce issue, authorities and managers should consider implementing programs that assist older workers in seeking help and providing leadership training. The study, based on empirical research with 375 construction workers, unveils significant negative associations between construction noise and safety compliance as well as safety citizenship behavior. Surprisingly, there is no direct impact of construction noise on workers' negative emotion, irrespective of regulatory focus, challenging concept previous assumptions. Notably, the positive effects of construction noise on negative emotion are moderated positively by prevention focus and negatively by promotion focus.

These findings shed light on the complex dynamics between construction noise, regulatory focus, and safety behavior within the construction industry (Yang, 2023). By continuously assessing and adapting safety measures, construction industry managers can promote a work environment that ensures not only the sustained productivity, safety, and job satisfaction of their workforce but also fosters a culture of continuous improvement and well-being among all employees.

1.7.4 Demographic Impact on Health Challenges

The investigation into the demographic impact on health challenges examines the complex interrelationships between various demographic factors and individuals' experiences with health difficulties. Demographics encompass a spectrum of characteristics,

including age, gender, socio-economic status, educational background, and geographical location, each potentially playing a pivotal role in shaping health outcomes. A study of (Estudillo,2023) states that organizational factors, notably management commitment and safety communication, in shaping workers' job satisfaction and, consequently, influencing their overall health, effective organizational management with attention to work-life balance, is key to achieving positive outcomes for workers' mental and physical health. By scrutinizing how these factors intersect with health challenges, researchers aim to discern patterns that can shed light on disparities in health outcomes across diverse population groups.

A research study of (Ghafoori et al,2023), revealed that implementation of flexible work- rest schedules, a measure aimed at mitigating the adverse health effects stemming from sustained high physical demand on cardiovascular health. This recommendation is particularly crucial in the context of construction projects, where workers often face intensive tasks, emphasizing the importance of prioritizing worker health and well-being. This study has been affirmed by (Hu, 2023) and in research study made by flexible work-rest schedules in construction projects acknowledges the importance of mitigating the negative health effects of sustained high physical demand on cardiovascular health. This recommendation aligns with the broader understanding that safeguarding the health of construction workers goes beyond immediate safety concerns; it involves creating a work environment that fosters long-term well-being.

As highlighted in the research study of (Mikellidou et al,2019) The concept of active emphasizes that for individuals to extend their working lives, they should maintain good physical and mental health, have access to flexible work options, healthy work environments, continuous learning opportunities, and well- structured retirement plans. Also, in research conducted by (Fan et al, 2023) The study reveals that as workers age, their susceptibility to safety risks escalates, with the most prominent risk factors being falls from heights, machine and equipment injuries, occupational disease injuries, and fire incidents. Agreed by the research conducted by (Babalola et al,2023) there are different hazards such as working at elevated heights, handling heavy loads, electrical risks, and getting caught between objects, aiming to prevent injuries and fatalities. Moreover, (Amoadu, 2023) stresses that Occupational heat stresses poses a significant threat to the health and productivity of workers, particularly those engaged in physically demanding outdoor jobs. This condition hampers working capacity and overall productivity, with precarious working conditions exacerbating the risk of heat stress. And lastly research of (Okumus et al,2023) states that there is a substantial influence of both short- and long-term fatigue on productivity, occupational health and safety. Understanding the unique health challenges encountered by construction workers in Metro Manila, Philippines, is paramount for devising effective strategies to improve their well-being and ensure their continued contributions to the construction sector in this dynamic urban landscape. Addressing these challenges not only safeguard the well-being of construction workers but also fosters a healthier and more productive workforce in Metro Manila's construction industry.

1.7.5 Demographic Impact on Safety Challenges

Demographics, including age, gender, education, and experience, play a significant role in shaping individuals' perceptions, behaviors, and responses to safety concerns within a given workplace. Management barriers were the most prevalent, with issues such as a lack of safety training Olanrewaju (2021). and insufficient safety budgets standing out Maliha (2021), Insufficient facilitation and Preparation and Weak Coordination and Working Relationship (Othman et al, 2021). The highly dynamic operations among workers and equipment on construction sites, coupled with elevated accident and fatality rates, underscore the imperative for more effective safety monitoring measures. Vision-based monitoring methods, leveraging visual surveillance technologies, emerge as a potential solution to address safety challenges in these dynamic environments (Cheng,2023). One key aspect is the influence of age on safety, as older workers may bring invaluable experience but might face different physical and cognitive challenges that impact their safety. In a study of (Okumus,2023) short-term and prolonged fatigue has a notable influence on productivity, occupational health, and safety. The state of fatigue can compromise an individual's alertness, decision-making abilities, and overall cognitive functions. In safety-critical industries, such as construction, where precision and quick responses are paramount, the effects of fatigue can lead to an increased risk of incidents and injuries. Additionally, gender differences in safety perceptions and risk-taking behaviors contribute to the complexity of addressing safety challenges. Understanding the demographic dynamics at play is crucial for developing targeted safety interventions that account for the diverse needs and characteristics of the workforce.

Safety practices encompass a variety of strategies and measures that involve employees at different levels within the construction organization. Adhering strictly to these safety practices is believed to be capable of preventing up to 98% of accidents on construction sites (Ahamed ,2023). Safety practices in the construction industry include a wide range of strategies and protocols that are implemented by employees at various hierarchical levels within an organization. This emphasizes the critical importance of implementing and maintaining robust safety protocols to safeguard the well-being of construction workers and reduce the occurrence of workplace accidents.

Moreover, the educational background and experience levels of workers contribute to safety challenges. Varied educational levels may impact individuals' comprehension of safety protocols, while experienced workers may develop a heightened awareness of potential hazards. However, balancing the safety needs of both novice and seasoned workers is crucial for fostering a comprehensive safety culture within an organization. Training and skill enhancement (Pham,2023). Designing OHS training programs that address the specific beliefs and needs of both managerial/professional and non-managerial/manual workers can facilitate better training transfer programs tailored to older workers can help improve their adaptability to new technologies and work processes. In essence, understanding the demographic impact on safety challenges enables organizations to craft nuanced, inclusive safety strategies that account for the diverse composition of their workforce.

1.8 Synthesis

In the future, research literature on the promotion of health and safety among construction workers is expected to continue emphasizing the critical need for addressing the unique challenges faced by an evolving demographic within the construction industry. Authors such as Liang (2022), Hansen (2022), and Peng (2020) collectively underscore the significance of adapting industry practices to accommodate the aging workforce. Liang emphasizes the challenges related to maintaining concentration and attention for older construction workers, while Hansen highlights the importance of considering physically demanding tasks. Additionally, Peng stresses the impact of declining health conditions on occupational safety, emphasizing the need for tailored job demands and resources.

In a similar vein, Halivni (2022) points out that employers may perceive costs associated with aging workers as outweighing the benefits, highlighting the need for a multifaceted approach. This aligns with the proposals of providing ergonomic tools, healthcare access, and flexible work arrangements as advocated by various authors, including Answer et al. (2021) and Wong (2021). These proposals are geared towards mitigating physical strain, addressing age-related health issues, and managing fatigue. Mental health emerges as a significant concern for aging construction workers, as emphasized by Chan et al (2021). The heightened stress and anxiety related to physically demanding work, coupled with challenging environmental conditions, necessitate targeted support and interventions. Torku et al (2019) and Fan et al (2023) both acknowledge the wealth of experience and versatile skillset older workers bring to the industry, but Torku suggests potential areas for improvement in policies and practices to better cater to their needs.

Moving on to safety challenges, Man et al (2021) and Buniya et al (2021) delve into risk-taking behavior and the effectiveness of safety programs. Man et al (2021) highlight the influence of personal factors and safety training on risk-taking behavior, while Buniya et al list barriers such as an unfavorable work environment and insufficient safety resources. Meng et al (2021) and Yang (2023) further explore the impact of construction noise on safety behavior, suggesting the need for programs assisting older workers and positive safety attitudes. Demographic impact studies by Ghafoori et al (2023) and Okumus et al (2023) emphasize the role of age in shaping health challenges. The former suggests flexible work-rest schedules to mitigate cardiovascular health effects, while the latter stresses the influence of short- and long-term fatigue on productivity and safety. In terms of safety challenges Influenced by demographics, Olanrewaju (2021) and Maliha (2021) highlight management barriers, including a lack of safety training and insufficient safety budgets. Cheng (2023) introduces vision-based monitoring methods as a potential solution. Okumus (2023) further underlines the influence of fatigue on safety, emphasizing the need for precision and quick responses in safety-critical industries. While the literature generally converges on the need for tailored approaches to accommodate the aging workforce, there are differing perspectives on the specific strategies and interventions. The proposed labor policy should consider these nuances, balancing the need for workplace adjustments, healthcare access, and mental health support with the potential concerns of employers regarding costs and efficiency.

However, a notable research gap exists in the lack of comprehensive studies that simultaneously consider physical and mental health, age-related safety challenges, and the effectiveness of proposed interventions. Future research should aim to integrate these elements to provide a holistic understanding of the complex dynamics surrounding the health and safety of construction workers in the context of an aging workforce. This comprehensive approach could contribute valuable insights to the development of a more nuanced and effective labor policy for the construction industry.

1.9 Theoretical Framework

1.9.1 Accident Causation Theory

Accident causation theories have evolved over time, and multiple researchers and theorists have contributed to the development of these theories. One notable figure associated with accident causation theory is Heinrich Herbert William. Heinrich's work laid the

foundation for the domino theory of accidents, which he presented in his book titled "Industrial Accident Prevention: A Scientific Approach" published in 1931. Over the past century, the evolution of accident causation theories is evident from a focus on human factors before 1975, a shift to understanding energy dynamics in the following 30 years, and a recent emphasis on a comprehensive system-based approach encompassing human, management, educational, and energy-related factors. Notably, the development trajectory illustrates a transition from single factor analyses to systematic multifactor considerations. Linear accident causation models, particularly popular in the last 30 years, are widely recognized for providing a clear framework to depict various stages of accident development and have found broad acceptance, notably in China Gui et al (2020).

The Accident Causation Theory highlights the critical role of barrier models and detailed risk registers in addressing accident patterns, particularly emphasizing the impact of human factors on barrier failures, such as unpredictable work patterns, workload, fatigue, and stress Iqbal, (2021). This theory can significantly contribute to understanding and mitigating potential risks in the construction industry. Incident Causation Theory provides a structured framework for analyzing the root causes of accidents or incidents, allowing you to identify key factors contributing to health and safety issues among construction workers. By applying this theory, you can delve into the various elements, including human factors, organizational aspects, and environmental conditions, that may lead to accidents on construction sites.

This theory provides a structured framework for analyzing the root causes of accidents or incidents, allowing for the identification of key factors contributing to health and safety issues among construction workers. In the context of the current study, Accident Causation Theory serves as a foundational framework for understanding the factors contributing to health and safety issues among construction workers in Pasay City. By applying this theory, the study aims to identify and analyze the various elements, including human factors, organizational aspects, and environmental conditions, that may lead to accidents on construction sites in the area. This theoretical approach will enable the development of proactive strategies aimed at mitigating risks and fostering a safer working environment for construction workers in Pasay City.

1.9.2 Social Cognitive Theory

The Social Cognitive Career Theory (SCCT) examines career development and decision-making processes by considering a range of factors, including emotions, motivation, experiences, and expectations. According to this theory, individuals' career-related behaviors are influenced by their beliefs in self-efficacy, outcome expectations, personal goals, and environmental factors such as social support and learning opportunities. SCCT emphasizes the pivotal role of emotions, motivation, and experiences in shaping individuals' self-efficacy and outcome expectations, thereby influencing their career choices and behaviors within the complex interplay of individual attributes and environmental influences Chiu (2023). the interconnected relationship between "personal variables," "environmental factors," and "behavioral" functions plays a crucial role in understanding human behavior. However, much of the research applying SCT has predominantly focused on "personal aspects" neglecting the comprehensive examination of both "personal" and "environmental" elements that collectively influence behavior Bassiouny(2023).

SCCT emphasizes the pivotal role of emotions, motivation, and experiences in shaping individuals' self-efficacy and outcome expectations, thereby influencing their career choices and behaviors. In the context of the current study, SCCT offers a comprehensive lens to unravel the complex interplay between individual attributes, environmental factors, and health and safety behaviors among construction workers in Pasay City. By delving into individual motivations and self-efficacy, the study will explore construction workers' confidence in adopting and implementing health and safety practices. Furthermore, SCCT's emphasis on outcome expectations and personal goals will allow the study to examine how construction workers perceive the outcomes of adhering to safety protocols and how these perceptions impact their decisions and behaviors.

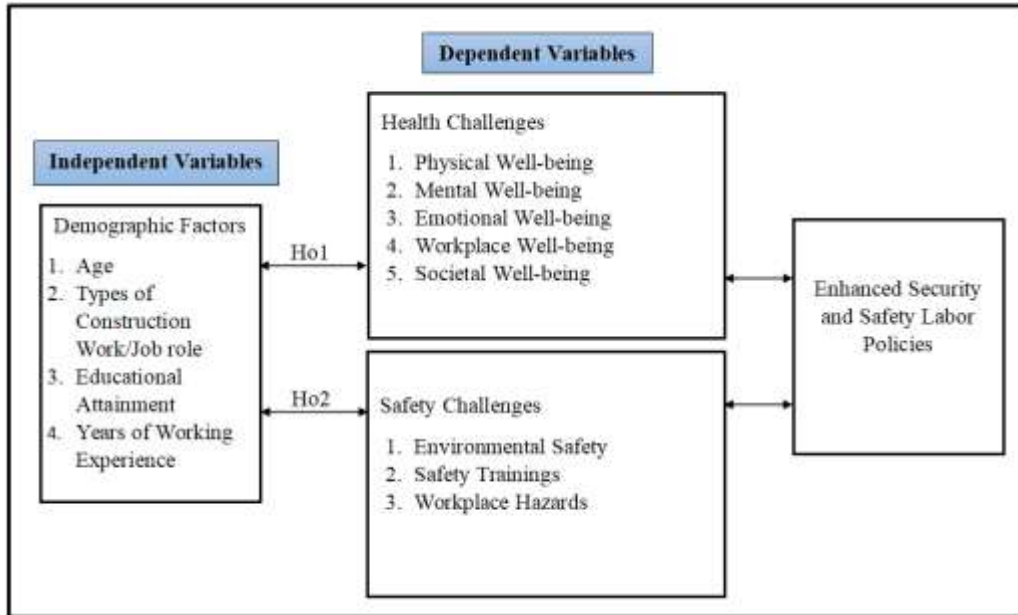
The integration of SCCT principles into the current study enables the tailoring of interventions and strategies that resonate with the motivational and goal-oriented aspects of construction workers' decision-making processes, ultimately fostering a safer and healthier work environment in Pasay City.

1.10 Conceptual Framework

The conceptual framework for this research centers on the dynamic interplay between the construction workforce in Metro Manila and the strategies, factors, and policies that influence their health, safety, and well-being. At its core, the aging workforce in the construction sector serves as the central element, influencing and being influenced by several key factors. This framework acknowledges that workers face unique health and safety challenges and explores how these challenges affect their overall well-being and productivity. It also delves into the effectiveness of existing strategies and policies designed to address the concerns of workers and identifies the gaps and limitations in their implementation. Factors such as physical health, mental health, experience, and skills contribute significantly to the overall well-being and performance of construction workers. The framework also considers

practical barriers and facilitators to implementing strategies aimed at enhancing health, safety, and productivity and how these barriers can be overcome.

Figure 1. Conceptual Framework: Paradigm in the Relationship between Health and Safety Challenges



Where in the study conducted by Morales et.al (2023) the identification of consistent contributing factors, and the call for comprehensive prevention efforts, aligning with broader industry initiatives aimed at enhancing safety in construction and reducing the incidence and severity of falls. Moreover, in a study also conducted by Liao et al (2023) he stresses that to ensure effective Health Safety and Environment (HSE) management for construction workers, construction managers started to make full use of information technology or advanced tools to develop systems or simulation models to supervise workers' conditions and eliminate ergonomic hazards. Ultimately, it recognizes the broader implications of a demographic within the construction industry and how industry practices can be improved to better support this workforce.

The conceptual framework guides the study in understanding the complex relationships within the construction industry and the implications for workers in Metro Manila. It emphasizes the importance of these relationships as workers navigate their careers and face unique challenges. The Framework also positions research questions as integral components, serving as lenses through which to navigate these relationships. By integrating the perspective of construction workers, it seeks to offer evidence-based insights into promoting health and safety. This two-way interaction between the workforce and the strategies, policies, and factors influencing their well-being is central to the study. The framework's visual representation helps structure the study's design, data collection, and analysis, enabling a holistic examination of the multifaceted challenges faced by construction workers and informing policy and practice improvements to support their health, safety, and well-being in the unique urban environment of Pasay, Metro Manila.

In the construction industry, where workforce efficiency directly influences project schedules and costs, monitoring workers on-site is crucial for preventing inefficiencies and resource wastage. By tracking their movements, managers can gather real-time information, enabling informed decision-making and adjustments to strategies for optimized productivity Zhou et al. (2023). In this comprehensive research inquiry, the study delves into the intricate relationships between several independent variables and the well-being and safety outcomes of construction workers. Age, as one pivotal variable, is expected to introduce nuanced influences across diverse dimensions. Older individuals may contend with distinct physical well-being concerns, potentially shaping their perspectives on workplace safety and their responses to hazards. In a study of (Kaur et al,2023) he states that the construction work environment is inherently hazardous, with workers frequently exposed to risks such as proximity to hazardous conditions, manual material handling, operation of heavy equipment, and working on uneven surfaces, all of which can pose significant dangers to their safety. Furthermore, job roles and the nature of construction work emerge as influential determinants. Specific roles may

subject workers to heightened physical demands, impacting both their physical and workplace well-being. Variations in exposure to hazards associated with different job roles could contribute to differing levels of workplace and societal well-being.

Educational attainment stands as a critical facet of this investigation, with higher levels anticipated to correlate with increased awareness and comprehension of safety protocols. This educational influence may extend its impact on workplace well-being and environmental safety within the construction industry. In a study of Umer 2023, he stresses that the critical importance of fatigue monitoring is important among construction workers. Additionally, monthly income is envisioned as a contributing factor to overall well-being. The potential influence of income on mental and emotional well-being may subsequently shape individuals' responses to workplace hazards, presenting a crucial aspect for exploration. Finally, the cumulative effects of years spent working in the construction industry are deemed significant. More experienced workers are likely to exhibit differences in physical well-being, influencing their perceptions of safety training and workplace hazards. Prolonged exposure to the industry is expected to shape not only overall well-being but also societal well-being perceptions among construction workers.

Through a meticulous examination of these interconnected variables, the study aims to provide a nuanced understanding of how demographic and occupational factors collectively contribute to the well-being and safety of construction workers. Such insights hold the potential to inform targeted interventions, ultimately advancing the health and safety practices within the construction industry.

The conceptual framework now includes an "A Proposed Labor Policy" as the output, reflecting the study's objective to translate these insights into actionable policies. This enhanced labor policy aims to address identified gaps and barriers, incorporating best practices and innovative strategies to support the aging workforce, promote comprehensive health and safety measures, and foster a more inclusive and supportive work environment. By doing so, the framework underscores the importance of evidence-based policy-making in improving the overall well-being and productivity of construction workers in Metro Manila.

2. Methods

This chapter serves as a comprehensive guide to the various stages and protocols to be followed throughout the course of this research. It encompasses critical elements such as the research design, how data will be managed, the development of research instruments, the procedures for collecting data, the statistical methodologies that will be applied, and the ethical principles that will govern the study. By delineating these key components, this chapter ensures that the research process is systematic, transparent, and aligned with ethical standards, ultimately contributing to the reliability and validity of the study's findings.

2.1 Research Design

According to Mello (2021), the primary purpose of a research design is to ensure the validity of the answers provided and to facilitate efficient discovery. Descriptive research, as chosen for this study, involves surveys and fact-finding investigations, aiming to explain the existing circumstances without manipulation (Mishra, 2021). This design is particularly suitable for examining the health and safety challenges of construction workers in Metro Manila because it allows for a systematic exploration and description of the current situation. By employing surveys and fact-finding methods, the research aims to gather accurate and comprehensive information essential for understanding the multifaceted challenges faced by construction workers. The descriptive research design provides a structured framework for systematically examining these challenges, contributing to a nuanced understanding of the issues. The choice of a descriptive research design is strategic for establishing the health and safety challenges of construction workers in Metro Manila. It enables the researcher to present an accurate depiction of the prevailing conditions and to explore whether there are significant differences in physical health and safety challenges across various demographic factors. Through this approach, the study aims to provide valuable insights that can inform policy recommendations and potential solutions for enhancing the well-being of construction workers in the specified context.

2.2 Data Management

The quantitative data collection for this study was made through survey questionnaires, making the research primary data. Secondary data was needed because some information to support the study was in documented form. The study was conducted in Metro Manila, particularly in the construction industry. The participants in this research study were construction workers. The survey forms were distributed on the weekend and during break times so as not to hamper the work schedule of the respondents. The study was conducted in the first quarter of the year 2024.

2.3 Sampling Design

In this research, the selected method for data collection is quota sampling. Originating from Moser and Stuart in experimental research, quota sampling involves selecting a sample from a population divided into subgroups. Unlike other sampling methods, it employs a more convenient method within each subgroup rather than relying on random selection. The researcher will specifically

use the controlled quota method, applying specific criteria in sample selection after defining the population, to enhance the validity of respondents in quota sampling (Futri, 2022).

The sampling criteria include selecting participants from diverse occupational roles within the construction sector, such as masons, carpenters, rebar workers, surveyors, concrete workers, mechanics, electricians, plumbers, painters, heavy equipment operators, welders, and general laborers. The sampling process will also consider varying years of working experience to ensure a representation of diverse expertise within the industry. Educational attainment will be categorized into elementary and below, high school graduate, and college graduate. Age will also be considered, acknowledging its correlation with different levels of experience, physical capabilities, and risk perception in the construction sector.

2.3.1 Sample Population

The population sample was selected through a quota sampling technique. The quota sampling technique aims to ensure a proportional representation of different segments within the entire population of construction workers residing in Pasay Metro Manila. The unit of analysis in this research is the individual worker, and their responses to the printed survey questionnaire would be collected. To align with the research objectives and adhere to the chosen epistemological paradigm, an objectivist approach is employed. This approach uses empirical evidence to uncover objective truths about the working conditions, safety practices, and job satisfaction among construction workers, maintaining a balanced representation across specified demographic categories with a sample size of 300 respondents.

2.3.2 Research Instrument

The adopted questionnaire, as detailed in the provided Appendix D, has been thoughtfully crafted as a comprehensive tool to investigate and address critical issues surrounding the promotion of health and safety among construction workers in Metro Manila. With a focus on accessibility, the questionnaire is presented in the Tagalog language, ensuring that construction workers can readily understand and engage with the survey. The structured approach of the questionnaire begins with a demographic section capturing essential information such as age, job roles, education, and years of industry experience. This foundational data not only paints a detailed picture of the diverse construction workforce in Metro Manila but also serves as the basis for delving into the intricate realms of health and safety challenges.

The subsequent sections of the questionnaire focus on health and safety challenges, allowing respondents to express their perspectives using a scale from 1 to 5 for agreement levels with various statements. The Health Challenges segment probes into issues like physical strain, exposure to hazardous substances, and mental health impacts, while the Safety Challenges section explores perceptions regarding personal protective equipment use, training effectiveness, fall protection measures, and other safety-related aspects. The questionnaire concludes with an open-ended opportunity for participants to share additional comments or suggestions, providing a qualitative layer to the data collected. By combining quantitative and qualitative insights, the researcher aims to construct a holistic understanding of the health and safety landscape among construction workers in Metro Manila, paving the way for informed interventions and policies tailored to the unique needs of this workforce.

2.3.2.1 Reliability Testing of Instrument

The questionnaire was pilot tested on at least 30 respondents who were not a part of the study. Data Management using SPSS 24 generated a Cronbach alpha coefficient equivalent to .94. This is an indication that the questionnaire is reliable and with high internal consistency.

2.3.2.2 Cronbach's Alpha

Cronbach's Alpha is a measure of internal consistency; that is, how closely related a set of items are as a group. It is considered a measure of scale reliability. A reliability coefficient of 0.94 is higher with "excellent internal consistency" and considered "acceptable". The values near 0.70 are minimally acceptable but not ideal in most social science research situations [J. J. Vaske et al. 2017].

Reliability of the measures

This shows the alphas for the Objectives and comprehensive understanding of the health, safety, and well-being of construction workers in the unique urban environment of Metro Manila were all well above 0.70.

The health challenges and well-being of construction workers obtained Cronbach's alpha of 0.93 which is excellent internal consistency and acceptable while the safe challenges obtained a Cronbach alpha of 0.82 to denote "good internal consistency". However, the overall Cronbach's alpha shows that all the selected questions in the questionnaire carried acceptable reliability to test the selected variables.

2.3.3 Control Procedure

To conduct the survey, the researcher directly approached the construction workers, who were the targeted respondents. The questionnaire was handed out to the participants and subsequently reviewed by the researcher's advisor to assess the accuracy of the questions.

Following necessary revisions, the finalized printed questionnaire was distributed to the respondents during weekends or lunch breaks to avoid disrupting their work schedules.

2.4 Statistical Treatment

For SOP 1, 2, and 3, this research paper used frequency percentage and means. In this research paper, the statistical treatments of frequency and means played pivotal roles in unraveling the intricate layers of the construction workforce's experiences and challenges. The concept of frequency referred to the count or distribution of specific values within the dataset, offering a quantitative lens through which the demographic profiles outlined in SOP1 were explored.

Utilizing the formula

Frequency=Number of occurrences of a specific value or category/Total number of data points×100

The researcher meticulously quantified and analyzed the prevalence of various demographic attributes, such as age, job roles, educational attainment, and years of working. This statistical approach provided a comprehensive understanding of the composition and distribution of respondents within the construction industry, forming a foundational exploration of the workforce. On the other hand, means, represented by the average, served as a measure of central tendency, providing a representative value for the levels of experience in health and safety challenges outlined in SOP 2 and SOP 3. Employing the formula:

Mean=Sum of all values/Number of data points

The researcher derived representative values for the perceived health challenges, including physical, mental, emotional, workplace, and societal well-being (SOP 2). The mean distilled the nuanced responses, offering a consolidated understanding of the construction workers' overall experiences in these dimensions. Similarly, for SOP 3, focusing on safety challenges such as environmental safety, safety trainings, and workplace hazards, the mean synthesized the diverse responses, providing comprehensive insight into the perceived safety landscape within the construction industry. These statistical treatments woven into the fabric of the research, aimed to provide both quantitative rigor and nuanced interpretations, enhancing the overall depth and richness of the study's findings.

For SOP 4 and 5, this research study used ANOVA and for possible significant result post hoc test – Scheffe test will be used to justify on what profile does it contribute significant result. ANOVA was employed to investigate significant differences in the levels of experienced health challenges and safety challenges across different demographic groups, making it an appropriate statistical method. For experienced health challenges, the null hypothesis posited that the mean level remained consistent across all demographic groups, while the alternative hypothesis suggested that at least one group deviated from the others. Similarly, for experienced safety challenges, the null hypothesis assumed uniformity in mean levels across demographics, with the alternative hypothesis indicating potential differences in at least one group.

Before conducting ANOVA, it was crucial to validate its assumptions: data independence, normal distribution of challenge levels within each group, and homogeneity of variances across groups. After ensuring these conditions were met, a one-way ANOVA was performed for each question. The resulting F-statistic and p-value from the ANOVA tests indicated whether the observed differences were statistically significant. If the p-value was below a predetermined significance level (commonly 0.05), it suggested rejecting the null hypothesis in favor of the alternative, indicating significant differences in challenge levels across demographic groups. Subsequent post-hoc tests could further pinpoint which specific demographic groups diverged significantly from one another in their experienced health and safety challenges.

Interpretation:

The experience levels of construction workers can be categorized as follows: Scores of 4.21 to 5.00 indicate Highly Experienced/Proficient workers with extensive skills and knowledge. Scores from 3.41 to 4.20 denote Experienced/Skilled workers with solid competence and expertise. Workers scoring 2.61 to 3.40 are considered Moderately

Experienced/Competent, reflecting adequate understanding and ability. Scores of 1.81 to 2.60 classify workers as Slightly Experienced/Beginner, indicating limited experience and basic skills. Finally, scores from 1.00 to 1.80 represent Not Experienced at All/Untrained workers, showing minimal to no experience.

For SOP 6 Pearson correlation coefficient to determine the relationship between safety challenges and health challenges.

Where r_s is the coefficient and n is the number of points in the data set. For each point the square of the difference in the ranks of the two coordinates for each point (x,y) is represented by d^2 and the expression $\sum d^2$ indicates that we should find the sum of each of these squares.

2.5 Ethical Considerations

As the research endeavor titled "Promoting Health and Safety among Construction Workers in Pasay City: A Proposed Labor Policy" is undertaken, it is imperative to prioritize ethical considerations to ensure the welfare, rights, and confidentiality of all involved stakeholders. The following outlines the ethical framework guiding this study:

2.5.1 Conflict of Interest

Before participating in the research, all construction workers approached for data collection will be fully informed about the study's objectives, procedures, potential risks, and benefits. Voluntary participation will be emphasized, and written consent will be obtained from each participant. Participants will also be assured that their decision to participate or withdraw will not impact their employment or any other aspect of their relationship with their employers.

2.5.2 Privacy and Confidentiality

All collected data, including survey responses and interview transcripts, were treated with the utmost confidentiality. Personal identifiers were removed or anonymized to protect the privacy of the participants. Only aggregate, de-identified data was presented in any disseminated results or publications to prevent the identification of individual respondents.

2.5.3 Informed Consent Process

Prior to disseminating the questionnaire, the researcher carefully assessed whether respondents possessed adequate free time to receive and complete it willingly. Data collection proceeded with the understanding that respondents comprehended the questionnaire's purpose and voluntarily agreed to participate. Furthermore, the researcher clearly stated the survey's objectives at the beginning of the questionnaire to ensure respondent understanding. Participants retained the option to withdraw from the study at any point without incurring any penalties.

All collected data was securely stored in password-protected electronic databases accessible only to the research team. The data was stored for a period of five years following the completion of the study to allow for any necessary follow-up or validation. After this period, all data was permanently deleted to ensure confidentiality and compliance with data protection regulations. If there were concerns about the questionnaire, respondents could contact the researcher via the contact details provided.

2.5.4 Vulnerability and Possible Risk

The respondents for this study were construction workers based in Pasay City, targeted to ensure their active participation in promoting health and safety within their workplaces. They were required to be currently employed in the construction industry within Pasay City, with a minimum age requirement set at 18 years old to ensure legal consent and understanding. Additionally, efforts were made to include workers with diverse backgrounds and experiences, ensuring a comprehensive representation of the construction workforce in the city.

2.5.5 Recruitment

The recruitment process adheres to ethical principles, prioritizing the informed consent of participants. Workers are recruited based on objective criteria, avoiding any biases or conflicts of interest. Additionally, efforts are made to include diverse perspectives, ensuring a comprehensive understanding of the issues at hand. Participants are fully informed of their rights and the purpose of their involvement, and they retain the option to withdraw from the study at any point without penalty. This approach upholds the integrity of the research and honors the well-being and autonomy of the construction workers in Pasay City.

2.5.6 Assent

Prior to their involvement, clear and age-appropriate explanations are provided regarding the purpose and procedures of the study. Assent forms are designed in a comprehensible manner, ensuring that participants understand their role and rights within the research process. Moreover, efforts are made to create a supportive environment where participants feel comfortable expressing any concerns or uncertainties. The assent process serves to empower participants, affirming their voluntary participation and reinforcing their importance in shaping policies that affect their health and safety as construction workers in Pasay City.

2.5.7 Benefits

The study strived to contribute positively to the well-being of construction workers by shedding light on health and safety challenges. The research was conducted with sensitivity to avoid causing harm, both physically and emotionally, to participants. If any participant had expressed distress during the data collection process, appropriate support mechanisms would have been in place, including information on available mental health resources.

2.5.8 Compensation, Incentives or Reimbursements

Participants were offered a packed lunch as a token of appreciation for their involvement in the study. However, this incentive did not influence participants' decisions to participate or compromise their autonomy. Transparency regarding compensation or incentives was maintained throughout the recruitment process, and participants were fully informed of what they could expect in return for their involvement. This approach upheld ethical standards and reinforced the value placed on the contributions of construction workers in Pasay City to the research endeavor.

2.5.9 Community Considerations

Efforts were made to engage with community stakeholders, including residents, businesses, and organizations, to ensure that their perspectives and concerns were heard and integrated into the proposed labor policy. Collaboration with community leaders and organizations could have also facilitated the dissemination of research findings and promoted community involvement in implementing policy recommendations. Additionally, the research team remained sensitive to the cultural and social dynamics of the Pasay City community, ensuring that research activities were conducted in a respectful and inclusive manner. By prioritizing community engagement and collaboration, the study aimed to foster a sense of ownership and empowerment among all stakeholders, ultimately contributing to the promotion of health and safety among construction workers and the broader well-being of the Pasay City community.

3. Results

This chapter deals with the presentation, analysis, and interpretation of data gathered to answer the statement of the problems.

3.1 Respondents' Demographic Profile

Table 1.1 Profile of the Respondents in Terms of Age

Variable	Categories	Frequency	Percentage
Age	18-29 years old	120	40
	30-39 years old	89	30
	40-49 years old	71	24
	50-60years old	20	7
Total		300	100

In terms of age, the table shows the number of respondents (frequency) in each age group and the percentage of respondents represented by each age group. The respondents are categorized into four age groups: 18-29 years old, 30-39 years old, 40-49 years old, and 50-60 years old. The age group with the highest frequency is 18-29 years old, with 120 respondents, constituting 40% of the total sample. This indicates that the survey or study is particularly representative of younger adults. Most respondents fall within the younger age brackets, with 70% of respondents being under 40 years old (18-39 years old). Conversely, only 7% of respondents are in the oldest age group (50-60 years old). As age increases, the frequency of respondents generally decreases. This is evident from the decreasing trend in frequency from younger to older age groups.

This implied that the study likely reflects a youth-centric perspective due to most respondents being in the 18-29 age group. This suggests that future research should aim for a more balanced representation across age groups to ensure findings are inclusive and applicable to a wider demographic.

Table 1.2 Profile of the Respondents in terms of Types of Construction Workers

Types of Construction Work/Job Role	Frequency	Percentage
Mason	61	20
Carpenter	34	11
Rebar Worker	42	14
Surveyor	2	1

Concrete Worker	0	0
Mechanic	0	0
Electrician	16	5
Plumer	25	8
Painter	9	3
Heavy Equipment Operator	9	3
Operator	0	0
Welder	9	3
General Laborer	60	20
Foreman	7	2
Scaffolder	17	6
Others like Engineer, safety offices, document controller, staff, QA & QC and HR	9	3
Total	300	100

In terms of their types of construction work/job roles. The data revealed that the Mason and General Laborer roles have the highest frequency, both showed for 20% of the respondents each. The high number of masons and general laborers indicates their significance in construction projects. They are likely the backbone of on-site work, involved in various tasks from laying bricks to carrying out manual labor.

This suggests that based on the critical role of masons and general laborers, ensuring the availability of skilled workers in these roles is crucial. Investing in training programs to enhance their skills and productivity could yield long-term benefits. Specifically, this could involve developing targeted apprenticeship programs, collaborating with vocational schools to offer specialized courses, and providing continuous on-the-job training to update and refine their skills. Additionally, partnerships with industry organizations to create certification programs can help maintain high standards and ensure a steady supply of proficient masons and general laborers.

However, the lowest in frequency were Concrete Worker, Mechanic, and Operator with none of the respondents representing these roles. This implied that the absence of respondents in these roles might suggest a shortage of workers with these specialized skills or a lack of demand for these roles in the surveyed population.

Based on the data, this suggests that investigating the reasons behind the absence of respondents in these roles is essential. It could be due to factors such as technological advancements reducing the need for certain roles or a lack of awareness about career opportunities in these fields. Addressing these issues could involve promoting these roles in vocational training programs or offering incentives to attract workers with these skills.

For Rebar Workers, Carpenters, and Plumbers also have notable representation, with 14%, 11%, and 8% of the respondents respectively. Roles such as Surveyor, Foreman, and Electrician, while not as prevalent as Masons or General Laborers, still have significant representation in the survey.

The analysis highlights the importance of roles like Masons and General Laborers in the construction industry, while also indicating potential areas for improvement in terms of attracting workers to less represented roles like Concrete Workers and Mechanics. Addressing these gaps could contribute to a more balanced and skilled workforce in the construction sector.

Table 1.3 Profile of the Respondents in terms of Educational Attainment

	Elementary and below	103	34
Educational Attainment	High School Graduate	177	59
	College Graduate	19	6
	Others, please specify	1	0.3
	Total	300	100

Based on their educational attainment, the data revealed the category for Elementary and below comprises of 103 respondents, or 34% of the total sample. It indicates a significant portion of the respondents have completed elementary education or below. This could suggest potential challenges in accessing or completing higher levels of education, which may have implications for their employment prospects and socio-economic status. The largest group among the respondents were high school graduates with 177 individuals constituting 59% of the total sample. This indicates that most of the respondents have completed high school. While this is a positive sign of basic educational attainment, it also highlights the need for further analysis to understand factors influencing educational outcomes beyond represented by 19 respondents or 6% of the total sample, being college graduates, this category represents a smaller proportion of the sample. This suggests potential challenges or barriers in accessing higher education or completing college-level studies. Further investigation is necessary to identify and address these barriers to ensure broader access to higher education and enhance the skill level of the workforce.

While the others, specifically college undergraduates, have the smallest representation, with only 1 respondent or 0.33% of the total sample. This suggests developing and expanding adult education programs to support individuals with lower levels of educational attainment, such as those who have only completed elementary education or below. These programs should offer opportunities for skill development, career advancement, and reintegration into the education system to enhance their employability and socio-economic status.

Table 1.4 Profile of the Respondents in terms of Years of Working

	Below 1 year	29	10
	1 to 3 years	39	13
Years of Working	3 to 10 years	131	44
	10 to 20 years	75	25
	More than 20 years	26	9
	Total	300	100

The distribution of the respondents' years of working experience. The data revealed that 131 or 44% of the respondents fall within the range of 3 to 10 years of working experience, indicating a significant proportion of mid-career professionals. Following this, those with 10 to 20 years of experience constituted 75 or 25% of the respondents, suggesting a substantial presence of experienced professionals.

The lowest frequency is among those with more than 20 years of experience with 26 or 9%, indicating a smaller number of respondents at the later stages of their careers. While 39 or 13% of respondents have less than 3 years of working experience, and 29 or 10% of respondents have worked for below 1 year, indicating a notable presence of early-career professionals.

This implied that the distribution of years of working experience suggests a diverse workforce composition with representatives from various career stages. This diversity can be leveraged for knowledge sharing, mentorship programs, and creating a balanced team with a mix of fresh perspectives and seasoned expertise. While there is a notable presence of experienced professionals with 10 to 20 years of experience, the smaller proportion of respondents with more than 20 years of experience implies a potential gap in succession planning.

This suggests implementing targeted training and development programs that cater to the specific needs and career stages of employees, including mentorship programs, leadership training, and technical skill development initiatives.

The career stage development of employees can be addressed by facilitating knowledge sharing and support professional growth by Pairing of experienced with less experienced. Pair employees with more than 10 years of experience with those who have less than 3 years. This fosters a culture of mentorship and ensures that institutional knowledge is passed down.

Another is to conduct leadership workshops and session planning. Conduct workshops focused on developing leadership skills for those with 3 to 10 years of experience and create a clear path for leadership roles by identifying and training potential leaders

among mid-career employees, especially those with 10 to 20 years of experience. Lastly, offer support for certifications relevant to the industry to encourage continuous professional development.

3.2 Level of experience in health challenges of respondents in the construction industry

Table 2.1 Physical Well-being

Variables	Weighted Mean	Standard Deviation (SD)	Interpretation	Adjectival Interpretation
Physical Well-being				
1.I feel tired because of working extra hours	3.81	1.41	Experienced	Skilled
2.Health problems affect my strength and ability to work physically.	3.33	1.56	Moderate Experienced	Competent
3.Health conditions like high blood pressure and diabetes affect my job				
4.I struggle to focus on construction tasks, which affects my performance. It may be due to tiredness, stress, or distractions	3.21	1.58	Moderate Experienced	Competent
Total	3.41	1.41	Experienced	Skilled

This table analyzes the level of experience in health challenges of respondents in the construction industry reveals a hierarchy of proficiency, ranging from highest to lowest mean.

The respondents demonstrate an experienced or skilled in physical well-being, with a weighted mean of 3.41, the overall weighted mean and standard deviation of 1.41 suggests that the physical well-being of the workers is significantly affected by tiredness, health problems, and difficulties in maintaining focus. While still competent, there's a slightly higher variability in responses compared to emotional well-being, indicating that experiences with physical challenges may vary among respondents. The overall adjectival interpretation of "Skilled" suggests that, despite these challenges, the workers maintain a high level of skill and capability in their tasks.

Table 2.2 Mental Well-being

Variables	Weighted Mean	Standard Deviation (SD)	Interpretation	Adjectival Interpretation
1.I feel the impact of work-related injuries on my mental well-being	3.28	1.74	Moderate Experienced	Competent
2.Work stress directly impacts my mental health as a construction worker.	3.16	1.61	Moderate Experienced	Competent
3. I experience the impact of depression, which directly affects my mental well-being.	3.16	1.67	Moderate Experienced	Competent

4. Supervisors' or leaders' treatment significantly impacts my mental well-being as a construction worker.	3.14	1.61	Moderate Experienced	Competent
5. In my experience, work-related factors contribute to the extent of thoughts of suicide among construction workers, affecting my mental well-being.	3.2	1.76	Moderate Experienced	Competent
Total	3.19	1.6	Moderate Experienced	Competent

Similarly, respondents show a moderate level of experience in mental well-being, with a weighted mean of 3.19, indicating a moderate level of impact on mental well-being among construction workers. The standard deviation of 1.60 suggests there is variability in the responses, indicating differing experiences among individuals.

The highest mean score (3.28) is related to the impact of work-related injuries on mental well-being. This suggests that injuries are a significant factor affecting mental health in this occupation. While both work stress (mean = 3.16) and depression (mean = 3.16) are noted to moderately impact mental well-being. The standard deviations of 1.61 and 1.67 respectively indicates a fair degree of variability, suggesting that while these issues are common, their impact varies among workers.

The treatment by supervisors or leaders also has a moderate impact with mean score = 3.14) on mental well-being. The consistency of this impact is reflected in the relatively low standard deviation of 1.61, implying that this is a commonly shared experience among construction workers. However, work-related factors contributing to thoughts of suicide have a mean score of 3.20 coupled with a higher standard deviation of 1.76, indicates a significant but varied impact on mental well-being, highlighting the severity and variability of these experiences.

All statements are marked as Experienced and Competent, suggesting that the respondents have substantial experience and sufficient competence to evaluate these factors accurately. Consistency across the competency and experience levels implies that the respondents' perceptions are reliable and based on considerable exposure to the construction work environment. This implied that the moderate impact levels indicate a need for mental health support services tailored to address specific issues like work-related injuries, stress, and depression among construction workers.

The data suggests giving the impact in supervisors' treatment, enhancing leadership training to foster a supportive and positive work environment could mitigate some mental well-being issues by implementing preventive measures and support systems for dealing with work-related injuries and stress could potentially lower the mental health burden on construction workers. Another is awareness and intervention, the significant but varied impact of thoughts of suicide underscores the importance of mental health awareness programs and early intervention strategies in the construction industry.

The analysis indicates that construction workers experience moderate impacts on their mental well-being due to various work-related factors. Addressing these issues through targeted mental health interventions, improved leadership practices, and preventive measures could significantly enhance the mental well-being of construction workers.

Table 2.3 Emotional Well-being

Variables	Weighted Mean	Standard Deviation (SD)	Interpretation	Adjectival Interpretation
1. The workplace provides some support for my emotional well-being.	3.73	1	Experienced	Skilled
2. I feel capable in effectively managing and coping with stress related to my job.	3.36	1.36	Moderate Experienced	Competent

3. I can see that there are enough resources and support systems in place to address emotional well-being concerns within my workplace.	3.48	1.29	Experienced	Skilled
4. My organization recognize and address the emotional needs of its employees.	3.73	1.04	Experienced	Skilled
5. My organization offer training or programs to enhance the emotional well-being of construction workers.	3.44	1.31	Experienced	Skilled
Total	3.55	1	Experienced	Skilled

The composite score for emotional well-being is 3.55 with a standard deviation of 1.00. This positions the organization as "Experienced" and "Skilled" in supporting emotional well-being, though variability in responses highlights areas for potential improvement, particularly in stress management and the provision of training programs.

The workplace provides moderate support for employees' emotional well-being, with an average rating of 3.73. This suggests that most employees find the support satisfactory, although there is some room for improvement. The standard deviation of 1.00 indicates a consistent perception among employees. The skill level for this support is rated as "Experienced" and "Skilled". The data also showed that the employees feel moderately capable of managing job-related stress, with an average score of 3.36. This score falls into the "Moderate Experienced" and "Competent" categories, indicating a need for enhanced stress management strategies. The higher standard deviation of 1.36 shows a wider range of experiences and perceptions in this area.

While the availability of resources and support systems obtained an average rating of 3.48, employees perceive that there are adequate resources and support systems to address emotional well-being concerns. The skill level here is also "Experienced" and "Skilled", with a standard deviation of 1.29, pointing to some variability in how employees view these resources.

However, employees feel that their organization does a good job recognizing and addressing their emotional needs, reflected by a rating of 3.73. This is consistent with the support for emotional well-being, and is rated similarly as "Experienced" and "Skilled". The standard deviation of 1.04 suggests relatively uniform agreement among employees.

Lastly, the provision of training or programs aimed at enhancing emotional well-being receives a slightly lower score of 3.44, indicating that while efforts are being made, there is still potential for growth. This aspect is also rated as "Experienced" and "Skilled" with a standard deviation of 1.31, indicating a broad range of experiences and opinions.

Overall, the organization is performing well in terms of supporting emotional well-being but should focus on specific areas such as stress management and training programs to ensure comprehensive support for all employees.

Table 2.4 Workplace Well-being

Variables	Weighted Mean	Standard Deviation (SD)	Interpretation	Adjectival Interpretation
1. I feel that my company provides a safe working environment.	4.41	1.04	Highly Experienced	Proficient
2. I have safety materials provided to be used at workplace.	4.36	1.04	Highly Experienced	Proficient
3. I participate in safety induction, orientation, and refresher courses at my workplace?	4.39	1.04	Highly Experienced	Proficient

4. Fire drills conducted at my workplace to assess emergency responses and worker/systems readiness.	4.23	1.21	Highly Experienced	Proficient
5. My company communicate and ensure understanding of safety measures among employees.	4.47	1.03	Highly Experienced	Proficient
Total	4.37	0.96	Highly Experienced	Proficient

The variable "Workplace Well-being" obtained a weighted mean of 4.37 and a standard deviation of 0.96, respondents in the construction industry exhibit a high level of experience in managing workplace well-being.

This indicates that they are highly experienced or proficient in handling challenges related to the well-being of employees within the workplace and all employees feel positively about the company's safety measures.

The lowest SD of 0.96 indicates the highest consistency in responses across all items, showing a consensus among employees about the effectiveness of safety measures. The analysis indicates that employees, both highly experienced and proficient, generally perceive their workplace as safe and well-equipped with necessary safety materials and training programs. They participate actively in safety courses and acknowledge effective communication of safety measures by the company. However, there is slightly less uniformity in the perception of fire drills, suggesting a need for more consistent implementation. Overall, the positive feedback reflects a strong safety culture, with minor areas for improvement in the consistency of emergency preparedness practices.

This implied that the positive perceptions of safety measures suggest a strong safety culture within the company, though efforts to standardize fire drill procedures could enhance uniformity in emergency preparedness.

To enhance uniformity in emergency preparedness, this suggests that the company should standardize fire drill procedures by developing clear, consistent guidelines and schedules, ensuring regular and comprehensive training for all employees, and conducting thorough evaluations after each drill to identify and address any gaps or inconsistencies.

Table 2.5 Societal Well-being

Variables	Weighted Mean	Standard Deviation (SD)	Interpretation	Adjectival Interpretation
1. I've been required to perform tasks that fall outside my designated job role.	3.37	1.45	Moderate Experienced	Competent
2. I encountered interpersonal conflicts with colleagues in my workplace.	1.54	1.01	Not Experienced at all	Untrained
3. I feel supported with my coworkers in my daily work activities.	3.34	1.54	Moderate Experienced	Competent
4. I witnessed or personally encountered incidents of bullying, violence, or harassment in your workplace.	1.47	1.04	Not Experienced at all	Untrained
5. I observed discrimination based on factors like gender, ethnicity, or Other characteristics in your workplace.	1.41	1.04	Not Experienced at all	Untrained
Total Overall	2.23 Overall	0.76 3.58	Slight Experienced 0.67	Beginner Experienced

The table on societal well-being indicates varying levels of workplace experiences among employees. Tasks falling outside designated roles and support from coworkers are moderately experienced, with mean scores of 3.37 and 3.34 respectively, suggesting a competent level of familiarity in these areas. Conversely, interpersonal conflicts (1.54), incidents of bullying, violence,

or harassment (1.47), and observed discrimination (1.41) are reported as not experienced at all, indicating a lack of training in handling these issues. Overall, the aggregate score of 2.23 suggests that employees have slight experience with these societal well-being factors, positioning them at a beginner level in terms of overall workplace societal well-being.

The implications of the findings suggest a nuanced approach to addressing societal well-being in the workplace. While employees demonstrate moderate experience and competence in handling tasks outside their designated roles and feeling supported by coworkers, the lack of experience in dealing with interpersonal conflicts, bullying, discrimination, and harassment highlights potential vulnerabilities in organizational culture and training programs. To cultivate a healthier work environment, interventions should prioritize enhancing conflict resolution skills, promoting diversity and inclusion initiatives, and implementing robust anti-bullying and harassment policies. Investing in comprehensive training programs and fostering open communication channels can empower employees to navigate and mitigate these challenges effectively, ultimately fostering a more supportive and inclusive workplace culture.

To address the identified issues is to implement comprehensive training programs focused on conflict resolution, diversity and inclusion, and anti-bullying and harassment policies. These programs should be mandatory for all employees and conducted regularly to ensure continuous learning and skill development. Additionally, establishing clear channels for reporting and addressing incidents of discrimination, bullying, or harassment is crucial. Employees should feel empowered to speak up without fear of retaliation, and there should be transparent procedures in place to investigate and address such incidents promptly.

Moreover, fostering a culture of respect and empathy within the organization through leadership example and communication can contribute significantly to creating a safe and supportive work environment. Regular feedback mechanisms and surveys can also help gauge the effectiveness of interventions and identify areas for further improvement.

The analysis of respondents' level of experience in health challenges in the construction industry aligns with previous research on the demographic impact on health challenges. Liang (2022) highlights challenges faced by older workers, directly affecting workplace and emotional well-being. The emphasis on fostering a supportive work environment (Estudillo, 2023) and addressing mental health concerns (Zhang et al., 2023) reflects efforts to improve overall well-being. Targeted interventions to address physical strain and fatigue (Okumus et al., 2023) and initiatives for societal well-being (Amoadu, 2023) are also crucial.

To enhance well-being comprehensively, a multifaceted approach is needed. Stakeholders should prioritize supportive work environments, implement targeted training programs, promote work-life balance, and foster a supportive organizational culture (Man et al., 2021). By addressing these aspects, the construction industry can create a healthier and more sustainable work environment for all employees.

The overall results revealed that the respondents were experienced and skilled in safety challenges. To give support to this conclusion is the obtained mean rating of 3.58 and an overall standard deviation of 0.67. While physical, mental, emotional, and workplace well-being are generally experienced or skilled, there are opportunities for improvement in societal well-being, particularly in handling interpersonal conflicts, bullying, violence, harassment, and discrimination. Addressing these issues can further enhance the overall well-being of construction workers.

3.3 Level of experience in safety challenges of respondents in the construction industry

Table 3.1 Environmental safety

Variables	Weighted Mean	Standard Deviation (SD)	Interpretation	Adjectival Interpretation
Environmental safety				
1. I can stand to manage the dust in construction site.	3.95	1.06	Experienced	Skilled

2. I saw a dangerous spill of chemicals on a construction site that could harm us.	1.42	1.06	Not Experience at all	Untrained
3. There is clogging in the drainage system due to construction debris and inadequate stormwater management.	1.72	1.23	Not Experience at all	Untrained
4. I understand the challenges associated with slope failures during construction activities.	3.9	1.35	Experienced	Skilled

Total	2.75	0.7	Moderate Experienced	Competent
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The results yielded in Table 3.1 show that the respondents were experienced and skilled in safety challenges. To support this conclusion is the obtained mean rating of 3.58 and an overall standard deviation of 0.67. The respondents appear to have a good understanding of safety protocols and procedures, with varying degrees of experience in handling different environmental and workplace safety challenges. They are generally competent or proficient in managing safety aspects related to their work environments.

The variable "environmental safety" has the lowest weighted mean =2.75 among the three variables, indicating a comparatively lower experience level in environmental safety challenges. It is suggested that respondents feel moderate experience in this area compared to safety training and workplace hazards. The standard deviation of 0.7 is relatively low, indicating less variability in respondents' perceptions regarding environmental safety compared to the other categories. The high level of experience reported in safety training suggests that the construction industry has been successful in providing adequate training programs. However, continuous emphasis on safety training is crucial to ensure that workers stay updated with the latest safety protocols and practices.

Table 3.2 Safety Trainings

Variables	Weighted Mean	Standard Deviation (SD)	Interpretation	Adjectival Interpretation
Environmental safety				
1. I can stand to manage the dust in construction site.	3.95	1.06	Experienced	Skilled
2. I saw a dangerous spill of chemicals on a construction site that could harm us.	1.42	1.06	Not Experience at all	Untrained
3. There is clogging in the drainage system due to construction debris and inadequate stormwater management.	1.72	1.23	Not Experience at all	Untrained
4. I understand the challenges associated with slope failures during construction activities.	3.9	1.35	Experienced	Skilled
Total	2.75	0.7	Moderate Experienced	Competent

The variable “safety training” has the highest weighted mean (4.34), indicating that respondents perceive themselves as highly experienced in this area, indicating it's considered the most experienced area among the respondents. The low standard deviation of 1.06 suggests that there is relatively little variability in respondents' perceptions regarding safety training. The overall high rating suggests that employees, who are highly experienced and proficient, generally perceive the safety training positively. This indicates a strong safety culture within the organization, where employees prioritize safety and actively engage in safety protocols and training to maintain a safe working environment.

In conclusion, the analysis indicates that the organization's safety training programs are effective in promoting safety awareness, compliance with safety protocols, and overall job performance among employees who are highly experienced and proficient. Continued emphasis on regular training and reinforcement of safety measures can further enhance workplace safety and performance.

Table 3.3 Workplace Hazards

Variables	Weighted Mean	Standard Deviation(S D)	Interpretation	Adjectival Interpretation
Workplace hazards				
1. I experienced working under hot weather conditions, especially in environments with extremely high temperatures.	4.4	1.17	Highly Experience	Proficient
2. I am trained to stay protected from hazardous materials in my work.	4.49	1.04	Highly Experience	Proficient
3. I been exposed to significant amounts of gases in my workplace.	1.54	1.06	Not experienced at all	Untrained
4. I experienced excessive noise exposure at site.	4.16	1.39	Highly Experience	Proficient
Total	3.65	0.81	Experienced	Skilled
OVERALL	3.58	0.67	Experienced	Skilled

While “workplace hazards” have a slightly lower weighted mean of 3.65 compared to Safety Trainings but still reflect a considerable level of experience among respondents. It has a moderate standard deviation of 0.81, indicating some variability in respondents' perceptions of their experience in dealing with workplace hazards.

The relatively lower level of experience in environmental safety highlights an area for improvement. Respondents have a mix of experiences with workplace hazards, with some having high levels of exposure to hazards like hot weather conditions and hazardous materials, while others have limited exposure. They are generally skilled or proficient in handling workplace hazards, particularly in protecting themselves from hazardous materials and extreme conditions.

Employers and stakeholders in the construction industry should prioritize efforts to enhance environmental safety awareness and practices. This may involve implementing stricter regulations, providing specialized training, and investing in environmentally friendly construction practices.

This suggests addressing workplace hazards while respondents indicate a moderate level of experience in dealing with workplace hazards, there may still be room for improvement. Employers should conduct thorough risk assessments, implement robust safety measures, and provide adequate personal protective equipment (PPE) to mitigate workplace hazards effectively.

The findings regarding the respondents' level of experience in safety challenges align with previous studies emphasizing the importance of safety training and hazard management in the construction industry. Studies by Man et al. (2021) and Buniya et al. (2021) highlight the significance of safety training programs and robust safety measures in promoting workers' safety and well-being. The high weighted mean and low standard deviation for the variable "safety training" indicate a consistent perception among respondents of their proficiency in this area, reflecting the emphasis on safety training in previous research (Man et al., 2021).

Similarly, the moderate level of experience reported in dealing with workplace hazards corresponds to previous studies emphasizing the need for comprehensive risk assessment and hazard mitigation strategies in construction environments (Buniya et al., 2021). While respondents perceive themselves as moderately experienced in this aspect, there may still be opportunities for improvement, as suggested by the moderate standard deviation. This aligns with recommendations for continuous improvement in hazard management practices to ensure the safety of construction workers (Buniya et al., 2021).

In contrast, the lower level of experience reported in environmental safety highlights an area that requires attention and improvement. Studies by Ahamed (2023) and Pham (2023) stress the importance of environmental safety awareness and practices in the construction industry. The relatively low weighted mean for environmental safety indicates a perceived lack of proficiency in this area among respondents, underscoring the need for enhanced efforts to address environmental safety challenges. This aligns with previous research calling for stricter regulations, specialized training, and environmentally friendly construction practices to mitigate environmental risks in construction projects (Ahamed, 2023; Pham,2023).

3.4 Significant Difference between the Level of Experienced Health Challenges and Demographic of Respondents

Table 4 Significant difference between the Level of Experienced Health Challenges and Demographic of Respondents

Variable	Profile	Mean	f-value	p-value	Decision	Interpretation
Health Challenges	18-29 years old	3.34	0.284	0.837	Not Significant	Accept null hypothesis
	30-39 years old	3.4				
	40-49 years old	3.33				
	50-60years old	3.2				
	Mason	3.44				
	Carpenter	3.77				
	Rebar Worker	3.93				
Health Challenges	Surveyor	3.36	9.813	1.007	Not Significant	Accept null hypothesis
	Concrete Worker	0				
	Mechanic	0				
	Electrician	3.05				
	Plumer	2.32				
	Painter	2.51				
Heavy Equipment Operator	Operator	3.32				
	Operator	0				

	Welder	2.72				
	General Laborer	3.4				
	Foreman	3.26				
	Scaffolder	3.41				
	Others like Engineer, safety offices, document controller, staff, QA & QC and HR	2.94				
	Elementary and below	3.58				
Health Challenges	High School Graduate	3.26	4.574	0.003	Significant	Reject null hypothesis
	College Graduate	3.01				
	Others	1.97				
	Below 1 year	2.43				
	1 to 3 years	1				
Health Challenges	3 to 10 years	3.45	89.254	1.282	Not Significant	Accept null hypothesis
	10 to 20 years	3.48				
	More than 20 years	3.68				
Overall		2.78	17.114	1.087	Not Significant	Accept the null hypothesis

Correlational at the level of 0.05(two-tailed) If p-value > α : accept the null hypothesis (H0), If p-value < α : reject the null hypothesis (H0)

Table 4 shows the significant relationship between the level of experienced health challenges and the demographic of respondents. The data revealed the overall analysis indicates that there is no significant relationship between the level of experienced health challenges and the demographic variables of respondents based on an overall mean of 2.78, f value=17.114 and p-value of 1.087 for the overall analysis is higher than the significance level, leading to the acceptance of the null hypothesis.

Based on the data, the mean level of experienced health challenges across different age groups doesn't show significant variation, as indicated by the f-value=0.284, p-value=0.837 being greater than the standard significance level of 0.05. This suggests that age may not be a significant factor influencing the level of health challenges experienced by respondents.

For occupational or Job roles, the analysis indicates that certain occupations, such as carpenters and rebar workers, report higher levels of health challenges compared to others like painters or mechanics. This finding is significant as indicated by the low p-value =0.003, suggesting that occupation plays a crucial role in experiencing health challenges.

As for educational attainment, there's a significant relationship between the level of education and experienced health challenges. Respondents with an elementary education or below report higher levels of health challenges compared to those with higher educational attainment levels. This finding is supported by the low p-value of 0.003, indicating that education level influences health challenges. Interestingly, there's a significant difference in the level of experienced health challenges based on the number of years of experience. Respondents with less than 1 year of experience report lower levels of health challenges based on its P-value=1.282 compared to those with more experience. This suggests that as workers gain more experience, they may encounter more health challenges, possibly due to the nature of the work or cumulative effects over time.

The significant results between lower educational attainment and higher levels of experienced health challenges can be attributed to several potential reasons: First, Occupational Hazards, individuals with lower educational attainment often work in jobs that

are physically demanding and carry higher health risks. These jobs may include manual labor, construction, and other physically intensive roles where the risk of injury, exposure to hazardous materials, and overall physical strain are greater.

Second, access to Health Information. People with higher educational levels tend to have better access to health information and resources. They are more likely to be aware of healthy lifestyle choices, preventive healthcare measures, and the importance of regular medical check-ups. This knowledge can lead to better health outcomes.

Third, educational attainment is often correlated with socioeconomic status, which affects access to healthcare. Those with higher education typically have better jobs with health benefits, insurance coverage, and financial resources to afford medical care. In contrast, individuals with lower education may face barriers to accessing healthcare services, leading to untreated health issues. Lastly, higher education is associated with healthier lifestyle choices. Educated individuals are more likely to engage in regular physical activity, maintain a balanced diet, avoid smoking, and moderate alcohol consumption. These behaviors contribute to better overall health and fewer health challenges. While lower educational levels often lead to employment in environments with poorer working conditions. This can include exposure to harmful substances, lack of ergonomic support, long working hours, and insufficient breaks, all of which can contribute to health problems.

Across all demographic variables shows that the mean level of experienced health challenges is not significantly different, except for educational attainment. This suggests that while certain demographic factors like occupation and education may influence health challenges individually when considered together, they may not have a significant combined effect on the overall level of health challenges.

This implied that occupational health and safety measures should be tailored to specific occupations where higher levels of health challenges are reported, such as carpentry or rebar work. Education and training programs focusing on health and safety practices should be targeted toward workers with lower educational attainment levels. Thus, employers should consider implementing preventive measures and providing adequate support for workers with varying levels of experience, especially those with longer tenures who may be more susceptible to health challenges.

This suggests conducting further qualitative research to understand the specific health challenges faced by different occupational groups and develop targeted interventions. Implement regular health assessments and screenings for workers to identify and address health issues early on and provide ongoing training and education on health and safety practices to all workers, regardless of their demographic profile, to promote a healthier work environment overall.

The analysis of the relationship between experienced health challenges and demographic variables provides critical insights for addressing occupational health and safety concerns within the construction industry, aligning with previous research findings.

For instance, the significant correlation between occupation and health challenges resonates with studies by Ghafoori et al. (2023) and Babalola et al. (2023), which emphasize the importance of tailored interventions for specific occupational groups. Similarly, the observed influence of educational attainment on health challenges is supported by research such as that of Olanrewaju (2021), highlighting the need for targeted education and training programs to address varying levels of educational backgrounds among workers. These findings reinforce the importance of considering demographic factors in designing effective health and safety interventions, as advocated by previous studies in the field.

Moreover, the significant relationship between years of experience and health challenges echoes the insights provided by Okumus et al. (2023), emphasizing the impact of cumulative work experience on occupational health risks. This finding underscores the importance of ongoing support and preventive measures for workers with longer tenures, consistent with the recommendations of previous research. By leveraging insights from these studies, employers can implement proactive strategies to mitigate health challenges and promote a safer work environment for construction workers across diverse demographic profiles, aligning with the overarching goal of fostering a culture of health and safety within the industry.

Follow up result:

Table 5 Post Hoc ANOVA Test on the Relationship between the Level of Experienced Health Challenges and Educational Attainment of the Respondents

Variables	Educational Attainment	Mean	Pairing of Age	Mean Difference	Sig	Decision Ho	Interpretation
Health Challenges	Elementary and below	3.58	Elem Vs. High School	2.947	0	Accept	Not Significant
	High School Graduate	3.26	Elem Vs. College Graduate	2,878	0	Accept	Not Significant
	College Graduate	3.01	Elem Vs. Others	26.839	1.3	Reject	Significant
	Others	1.97	HS graduate Vs. College graduate	1.302	0.2	Reject	Significant
			HS graduate Vs. others	14.03	1.9	Reject	Significant
			College graduate Vs. others				

**The mean difference is significant at the 0.05 level.*

Using the Scheffe Test, the balance between association with the health challenges and educational attainment identification yielded a significant difference with the pairing of age such Elementary and below versus High School and Elementary and below versus College Graduate.

For the comparison between "Elementary and below" and "High School Graduate," the mean difference is 2.947, with a p-value of 0.003. Since the p-value is less than 0.05, the null hypothesis is rejected, indicating a significant difference in experienced health challenges between these two groups. Similarly, for the comparison between "Elementary and below" and "College Graduate," the mean difference is 2.878, with a p-value of 0.007, leading to the rejection of the null hypothesis, suggesting a significant difference.

However, when comparing "Elementary and below" with "Others," the mean difference is 1.313, but the p-value is 26.839. Therefore, the null hypothesis is accepted, suggesting no significant difference.

Comparisons between "High School Graduate" and "College Graduate," "High School Graduate" and "Others," and "College Graduate" and "Others" all result in rejecting the null hypothesis due to significant mean differences. Based on the overall analysis, this suggests that there are significant differences in experienced health challenges based on educational attainment, particularly between those with lower levels of education compared to those with higher levels. However, the significance varies depending on the specific pairings of educational levels.

The significant differences in experienced health challenges between various educational attainment levels, as revealed by the Scheffe Test, can be attributed to several possible factors.

Firstly, access to health Information and resources. Individuals with higher educational attainment generally have better health literacy, meaning they can understand and use health information more effectively. This can lead to better health outcomes.

Secondly, economic factors. Higher educational attainment is often linked to higher income levels, which can afford better healthcare services, healthier food options, and living conditions that promote good health. Jobs requiring higher education levels often come with better health benefits and insurance, making healthcare more accessible and affordable.

Thirdly, educated individuals are more likely to engage in health-promoting behaviors such as regular exercise, balanced diets, and avoiding smoking or excessive alcohol consumption.

Fourthly, Psychosocial Factors. Higher education can lead to jobs with better working conditions and lower stress levels, positively impacting health. Fifth, Social Support Networks, educated individuals often have broader social networks and support systems, which can provide emotional and practical support in managing health challenges.

Lastly, environmental factors, education affects the ability to afford better housing in safer neighborhoods with less pollution and more opportunities for physical activity. Lower educational attainment often correlates with jobs that have higher physical demands and risks, contributing to poorer health.

The significant differences found between "Elementary and below" versus "High School" and "College Graduate" groups suggest that these factors play a critical role in the health disparities observed. Higher educational attainment appears to confer a protective effect against health challenges, likely due to the interplay of the factors.

3.5. Significant difference between the Level of Experienced Safety Challenges and the Demographic of Respondents

Table 6 Significant difference between the Level of Experienced Safety Challenges and the Demographic of Respondents

Variables	Demographic profile	Mean	f-value	p-value	Decision	Interpretation
Safety Challenges	18-29 years old	3.59	0.23	0.875	Not Significant	Accept the null hypothesis
	30-39 years old	3.59				
	40-49 years old	3.53				
	50-60years old	3.65				
	Mason	3.66				
Safety Challenges	Carpenter	3.77	10.148	7.895	Not Significant	Accept the null hypothesis
	Rebar Worker	3.87				
	Surveyor	3.29				
	Concrete Worker	0				
	Mechanic	0				
	Electrician	3.42				

	Plumer	3.19				
	Painter	3.6				
	Heavy Equipment Operator	3.47				
	Operator	0				
	Welder	3.69				
	General Laborer	3.52				
	Foreman	3.49				
	Scaffolder	3.45				
	Others like Engineer, safety offices, document controller, staff, QA & QC and HR	3.41				
	Elementary and below	3.59				
Safety Challenges	High School Graduate	3.59	0.416	0.741	Not Significant	Accept null hypothesis
	College Graduate	3.43				
	Others	3.92				
	Below 1 year	2.98				
	1 to 3 years	3.6				
Safety Challenges	3 to 10 years	3.59	8.143	3.058	3	Accept null hypothesis
	10 to 20 years	3.69				
	More than 20 years	3.83				
Overall		3.18	6.371	6.051	Not Significant	Accept the null hypothesis

Correlational at the level of 0.05(two-tailed) If p-value > α : accept the null hypothesis (H0), If p-value < α : reject the null hypothesis (H0) level, leading to the acceptance of the null hypothesis.

Table 6 shows the significant relationship between the level of experienced safety challenges and the demographic of respondents. The data revealed the overall analysis indicates that there is no significant relationship between the level of experienced safety challenges and the demographic variables of respondents based on an overall mean of 3.18, f value=3.371 and p-value of 6.051 for the overall analysis is higher than the significance between Age and safety challenges, it appears to be no significant difference in the reported level of safety challenges across different age groups. The p-value of 0.875 for age groups indicates that the null hypothesis, which suggests no significant relationship between age and safety challenges, is accepted.

While for the job role and safety challenges, there are variations in the reported safety challenges among different occupations, the f -value=10.148, and p -value= 7.895 suggest that these differences are not statistically significant. Thus, the null hypothesis is accepted, indicating that occupation does not significantly affect the experienced health challenges.

Like occupation, the level of education does not seem to have a significant impact on reported safety challenges among respondents. The p -value=0.741 for different education levels is higher than the significance level, leading to the acceptance of the null hypothesis.

Lastly, there is a notable difference in reported safety challenges among respondents with different years of experience. However, the p -value =3.058 for this variable also suggest that this difference is not statistically significant and to accept the null hypothesis

This implied that factors such as age, occupation, education, and years of experience do not significantly influence the reported level of safety challenges among respondents. The health challenges in the context studied are not driven by these demographic factors alone. The non-significant differences across demographic variables indicate a certain level of uniformity in the experienced health challenges among workers in the studied context. This suggests that health challenges may be felt across different demographic groups within the population studied.

While the current analysis did not find significant relationships, there is still value in exploring other factors and implementing targeted interventions to improve health and safety outcomes in the workplace. Further investigation into other potential factors influencing health challenges could be warranted. Factors such as workplace conditions, safety protocols, and individual health behaviors could be explored to better understand the determinants of health challenges. Even though demographic factors may not directly influence health challenges, targeted interventions to address health and safety issues in the workplace can still be beneficial. These interventions could focus on improving overall workplace safety standards and promoting health awareness among workers regardless of demographic differences.

The analysis of the relationship between experienced safety challenges and demographic variables, particularly age, job role, education, and years of experience, as evidenced in Table 6, aligns with prior research emphasizing the multifaceted nature of safety concerns within the construction industry. While the study did not find statistically significant associations between demographic factors and safety challenges, this finding resonates with previous studies by Okumus (2023), Pham (2023), and Ahamed (2023), which highlight the complex interplay between age, occupation, education, and experience in shaping safety outcomes. These consistent findings underscore the necessity for comprehensive safety interventions addressing workplace conditions, safety protocols, and individual health behaviors, as emphasized by Olanrewaju (2021), Maliha (2021), and Othman et al. (2021). Therefore, while demographic factors offer valuable insights, effective safety measures must encompass broader initiatives to enhance overall safety outcomes for construction workers in Metro Manila.

3.6 A significant relationship between the level of experienced health challenges and safety challenges

Table 7 A significant relationship between the level of experienced health challenges and safety challenges

Level of experiences		r Value	P Value	Interpretation	Decision
Health Challenges	Safety Challenges	0.693	0.00001	Reject null hypothesis	Not Significant/ Moderate positive correlation

**Correlational at the level of 0.05, the P-Value is < .00001. The result is significant at $p < .05$. 0.90-1.00 or- 0.90- -1.00 Very high positive (or negative) correlation
 0.70-0.90 or -0.70- -0.90 High positive (or negative) correlation
 0.50-0.70 or- 0.50- -0.70 Moderate positive (or negative) correlation
 0.30-0.50 or -0.30- -0.50 Low positive (or negative) correlation
 0.00-0.30 or 0.00- -0.30 Very low positive (or negative) correlation/Negligible correlation*

The analysis reveals a strong positive correlation ($r = 0.693$) between the level of experienced health challenges and safety challenges among the studied population. This indicates that as individuals experience more health challenges, they also tend to face more safety challenges. The extremely low p-value (< 0.00001) suggests a high level of statistical significance, further reinforcing the strength of this relationship.

This implied that the organizations and policymakers need to recognize the interconnectedness between health and safety challenges. Implementing comprehensive risk management strategies that address both aspects concurrently could lead to more effective outcomes. This also implied that in workplaces, ensuring employee well-being encompasses not only physical health but also safety concerns. This correlation underscores the importance of providing holistic support systems and resources to mitigate both health and safety risks.

To effectively address the strong positive correlation between experienced health and safety challenges, stakeholders should develop integrated programs that merge health and safety initiatives, allocate resources strategically based on data analysis, and prioritize education and awareness campaigns to empower individuals and communities.

Collaborative efforts among health and safety professionals, policymakers, and community stakeholders are essential to implement holistic solutions that promote overall well-being and mitigate risks effectively.

3.7 Based on the results of the study, what solutions and policy improvements could be proposed?

1. Targeted Recruitment and Training Programs: Develop targeted recruitment strategies to attract individuals from underrepresented age groups and educational backgrounds. Implement specialized training programs tailored to the skills needed for less represented roles like Concrete Workers and Mechanics, in collaboration with vocational training centers and industry associations.

2. Enhanced Educational Opportunities: Introduce adult education programs specifically designed to support individuals with elementary education or below, focusing on skill development and career advancement within the construction sector. Provide financial incentives and scholarships to encourage participation in these programs. To ensure that employees remain with the company after receiving these benefits, consider implementing retention strategies such as bonding agreements, where employees commit to staying with the company for a specified period after completing their training. Additionally, create career development pathways that offer clear progression and growth opportunities within the organization, fostering a sense of loyalty and long-term commitment.

3. Focused Health and Safety Training: Design and implement targeted health and safety training programs addressing specific challenges identified in the study, such as environmental safety and physical well-being. Offer certifications and incentives to workers who complete these programs to promote compliance and participation.

4. Occupational Health and Safety Standards: Strengthen occupational health and safety regulations, with a particular focus on high-risk occupations like carpentry and rebar work. Mandate regular safety inspections and audits and impose penalties for non-compliance to ensure adherence to safety standards.

5. Comprehensive Employee Well-being Initiatives: Require construction companies to develop comprehensive employee well-being programs that encompass physical, mental, and emotional health aspects. Provide incentives or tax breaks for companies that demonstrate a commitment to employee well-being through the implementation of such programs.

6. Community Engagement and Awareness Campaigns: Implement community-based health and safety awareness campaigns targeting both construction workers and local residents. Partner with community organizations and schools to organize workshops, seminars, and outreach events focused on promoting health and safety practices.

7. Leadership and Mentorship Programs: Establish leadership and mentorship programs within construction companies to facilitate knowledge transfer and career development. Encourage experienced workers to mentor younger employees and provide incentives for participation in these programs.

8. Data-Driven Decision Making: Require construction companies to collect and analyze data on health, safety, and well-being indicators regularly. Use this data to identify trends, measure the effectiveness of interventions, and inform policy decisions aimed at improving overall workplace conditions.

4. Discussions

This chapter delves into the intricate discussions surrounding the multifaceted challenges and implications unveiled by the comprehensive analysis of the construction industry. It endeavors to contextualize the findings from the preceding sections, examining the underlying factors influencing the observed trends and patterns. This chapter aims to foster a deeper understanding of the identified issues, their interconnectedness, and their broader implications for stakeholders within the construction sector. By synthesizing the empirical evidence and insights gleaned from the data, this chapter seeks to pave the way for informed discourse, critical reflection, and the formulation of strategic recommendations aimed at addressing the challenges and harnessing opportunities for sustainable growth and improvement in the construction industry.

4.1 Conclusions

Based on the results, several key conclusions can be drawn regarding the demographic profile, levels of experience in health and safety challenges, significant differences across demographics, and the relationship between health and safety challenges among construction workers in Metro Manila, Philippines. These findings provide valuable insights for policymakers, employers, and stakeholders to develop targeted interventions and policies aimed at addressing the identified challenges and promoting a healthier, safer work environment in the construction industry.

1. The demographic profile of respondents in the construction industry reveals a predominantly young workforce, with 70% under the age of 40 and the highest representation in the 18-29 age group. Masons and general laborers are most prevalent, while roles like concrete workers, mechanics, and operators are notably absent, indicating a need for targeted recruitment and training. Educational attainment varies, with a majority having completed high school but a substantial portion with only elementary education, highlighting challenges in accessing higher education. Working experience is balanced across career stages, but fewer respondents have over 20 years of experience, suggesting gaps in succession planning. These findings indicate the need for targeted education and training programs, career development support, and strategic initiatives to attract and retain skilled workers in underrepresented roles, contributing to a more balanced and skilled workforce in the construction industry.
2. The analysis of the respondents' level of experience in health challenges within the construction industry reveals varying degrees of proficiency across different dimensions of well-being. The highest level of experience is reported in managing workplace well-being, indicating that respondents are highly proficient in this area. Emotional well-being and physical well-being follow, with respondents showing strong and competent levels of experience, respectively. However, there is a moderate level of experience in managing mental well-being, and the lowest proficiency is seen in addressing societal well-being challenges. These findings suggest that while there is considerable expertise in certain areas, others require targeted improvements. To comprehensively enhance well-being in the construction industry, a multifaceted approach is essential, encompassing targeted training, robust support services, promotion of work-life balance, community engagement, continuous monitoring, and fostering a supportive organizational culture. Such holistic efforts are necessary to create a healthier and more sustainable work environment that benefits employees and the broader community.
3. The analysis reveals that respondents in the construction industry are highly experienced in safety training (mean = 4.34), moderately experienced in managing workplace hazards (mean = 3.65), and less experienced in environmental safety (mean = 2.75). This suggests that while safety training is a strong point, there is room for improvement in managing workplace hazards and a significant need to enhance environmental safety practices. To address these gaps, continuous updating of safety training, comprehensive risk assessments, robust safety measures, specialized environmental safety training, and sustainable construction practices are recommended. Aligning with previous research, these efforts will promote a safer and more sustainable work environment in the construction industry.
4. There is no significant overall relationship between experienced health challenges and the demographic variables of respondents, as indicated by the mean of 2.78, f-value of 17.114, and p-value of 1.087. Age does not significantly impact the level of health challenges experienced by respondents. However, occupation and educational attainment are significant factors. Carpenters and rebar workers report higher levels of health challenges compared to other occupations (p-value = 0.003), and respondents with lower educational attainment face more health issues (p-value = 0.003). Additionally, workers with more years of experience encounter more health challenges (p-value = 1.282). These findings suggest that occupational health and safety measures should be tailored to specific job roles and targeted towards workers with lower educational attainment. Continuous support and preventive measures are also necessary for more experienced workers to mitigate cumulative health risks. This conclusion aligns with previous research highlighting the need for targeted interventions to address the specific health challenges faced by different occupational groups within the construction industry.

5. The Post Hoc ANOVA test using the Scheffe method reveals significant differences in experienced health challenges among respondents based on their educational attainment. Specifically, respondents with "Elementary and below" education experience significantly more health challenges compared to those with "High School Graduate" and "College Graduate" levels, with p-values of 0.003 and 0.007, respectively. However, no significant difference is observed when comparing "Elementary and below" with "Others" (p-value of 26.839). These differences highlight the critical role of educational attainment in health disparities, influenced by factors such as access to health information, economic status, and health-promoting behaviors. Higher educational attainment generally leads to better health outcomes, underscoring the need to address educational disparities to mitigate health challenges in the construction industry.

6. The analysis of the relationship between experienced safety challenges and demographic variables-age, occupation, education, and years of experience-reveals no significant differences across these categories, as indicated by the p-values exceeding the significance threshold. This suggests that the level of experienced safety challenges is uniformly distributed among respondents, regardless of their demographic background. Consequently, factors such as workplace conditions, safety protocols, and individual health behaviors might play a more crucial role in determining safety challenges than demographic characteristics alone. The findings imply that health and safety interventions should be broad and inclusive, targeting workplace safety standards and promoting health awareness across all demographic groups. Despite the lack of significant demographic influences, implementing comprehensive safety measures and ongoing training remains essential to improving overall safety outcomes in the construction industry.

7. The analysis reveals a strong positive correlation ($r = 0.693$) between the level of experienced health challenges and safety challenges among the studied population, with a highly significant p-value (< 0.00001). This indicates that individuals who experience more health challenges also tend to face more safety challenges. The significant relationship suggests that health and safety issues are interconnected, necessitating a comprehensive approach to address both concurrently. Organizations and policymakers should implement integrated risk management strategies that address health and safety together, ensuring holistic support systems and resources to mitigate risks. Collaborative efforts among health and safety professionals, policymakers, and community stakeholders are crucial for developing and implementing programs that promote overall well-being and effectively reduce both health and safety challenges.

4.2 Recommendations

Based on these conclusions, the following enhanced security and labor policies are proposed:

1. Policymakers and regulatory authorities should prioritize the development and enforcement of stringent safety regulations specifically tailored to the construction industry in Metro Manila. This includes mandating comprehensive safety training programs, regular site inspections, and the use of personal protective equipment (PPE). Additionally, regulations should promote the adoption of advanced construction technologies that enhance worker safety and establish a robust reporting system for accidents and near-misses to facilitate continuous improvement. Ensuring collaboration between government bodies, industry stakeholders, and worker unions is essential to effectively address the evolving challenges in the sector, thereby fostering a culture of safety and compliance that protects the well-being of construction workers.

2. The construction industry should leverage the study's findings to retain experienced workers by offering competitive wages, comprehensive benefits, and continuous professional development. Fostering a supportive work culture and investing in worker satisfaction will reduce turnover, boost productivity, and ensure project safety. Additionally, provide financial incentives and scholarships for skill development programs targeting individuals with elementary education or below, and implement bonding agreements to retain employees post-training, enhancing the overall success and sustainability of construction projects.

3. The broader community and society benefit significantly from the study's advocacy for improved safety standards in the construction industry. By reducing the occurrence of accidents and incidents, the study helps prevent the far-reaching consequences of such events, enhancing overall public safety. Improved safety standards contribute not only to the well-being of construction workers but also to the health and security of the communities where these projects take place. This fosters a safer, more harmonious societal environment, reflecting a collective commitment to the welfare and quality of life for all members of society.

4. The study should prioritize the well-being of construction workers by addressing the specific challenges they encounter, such as physical hazards and gaps in safety protocols. Recommendations include implementing rigorous safety training programs, ensuring access to proper protective equipment, and fostering a culture of safety that encourages reporting and proactive

measures. By focusing on these areas, the research aims to create a safer and more supportive working environment, ultimately reducing the risks inherent in construction work and enhancing the overall quality of life for construction workers.

5. Construction companies and site managers play a critical role in implementing safety measures. The study provides guidelines for fostering a workplace culture that prioritizes health and safety, including strict adherence to regulations, regular safety training, and open communication for reporting hazards. Promoting a positive corporate culture that values employee well-being can enhance job satisfaction, reduce turnover, and boost morale. By implementing these practices, employers and managers can achieve sustainable operations, improve employee satisfaction, and build a positive industry reputation.

6. Furthermore, future research should focus on key areas to advance knowledge and address gaps in the field. Longitudinal studies on training efficacy could examine the long-term impact of training programs on worker proficiency, retention, career progression, job satisfaction, and safety. Understanding the impact of technological advancements, such as automation and robotics, on job roles, worker safety, and productivity is essential. Comparative studies on health and safety challenges across different construction phases can inform phase-specific safety protocols and training. Additionally, research into psychosocial factors affecting mental health and the experiences of underrepresented groups, including women and minorities, can help develop support systems and promote inclusivity. By addressing these areas in future research, stakeholders can enhance the health, safety, and well-being of construction workers, fostering a resilient and sustainable industry.

4.3 Implications of the Study

The findings from this study underscore the urgent need for targeted interventions and policy reforms within the construction industry in Metro Manila, Philippines. Policymakers are urged to enact comprehensive labor policies mandating regular safety training, enforcing strict protocols, and providing ongoing health assessments for construction workers. These measures should be coupled with incentives for employers to invest in worker well-being, ensuring compliance and reducing work-related injuries and illnesses. Educational institutions and vocational training centers should collaborate to develop specialized curricula addressing the unique needs of construction workers, particularly focusing on younger individuals, those with lower educational attainment, and less represented job roles. By providing targeted education and training, workers can better navigate the complexities of the industry safely and effectively.

Additionally, employers must implement effective retention strategies, such as bonding agreements and clear career pathways, to encourage workers to stay and invest in comprehensive wellness programs promoting preventive care and work-life balance. Engaging with local communities and advocacy groups is vital for raising awareness about health and safety in construction. Outreach programs and educational events empower individuals with knowledge and resources to foster a culture of safety. Finally, establishing robust data collection mechanisms enable real-time monitoring and informed decision-making, facilitating collaboration between stakeholders for a more inclusive, supportive, and resilient construction industry prioritizing worker well-being.

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