AKENTEN APPIAH-MENKA UNIVERSITY OF SKILLS TRAINING AND ENTREPRENEURIAL DEVELOPMENT

OCCUPATIONAL HAZARDS AMONG ARTISANAL ALUMINIUM COOKWARE MOLDERS AT ASOKORE MAMPONG MUNICIPALITY IN THE ASHANTI REGION OF GHANA

ISHMAEL FOSU

2025

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BY

ISHMAEL FOSU

8201930010

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JULY, 2025

DECLARATION

Candidate's Declaration

I hereby declare that this thesis, with the exception of quotation and references contained in published works which have been duly acknowledged; is the result of own original work and that no part of it has been presented for another degree in this university or elsewhere.

Ishmael Fosu

Signature: ………………………………… Date: ………………………………..

Supervisors' Declaration

We hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the Appiah-Menka University of Skills Training and Entrepreneurial Development.

Prof. Bismark Dwumfour-Asare (Principal Supervisor)

Signature: ………………………………… Date: ………………………………..

Rev. Dr. Denis Dekugmen Yar (Co-supervisor Supervisor)

Signature: ………………………………… Date: ………………………………..

ABSTRACT

Artisanal aluminum cookware molders, who transform aluminum trash into household and commercial utensils, often work in unsafe conditions with minimal protection, facing high risks of occupational injuries, health issues, and exposure to hazardous substances. The study assessed occupational hazards among artisanal aluminium workers at Asokore Mampong in the Ashanti region of Ghana. A quantitative cross-sectional survey examined 275 artisanal aluminum cookware molders, recruited using a multi-stage sampling approach, including purposive, snowball, and convenient sampling. Socio-demographic and occupational health and safety practices data were collected using a structured questionnaire. Data analysis was performed, employing descriptive statistics, chi-square tests, and logistic regression to assess workplace conditions, safety measures, and health risks. All the participants in the study on artisanal aluminum cookware molders were male, with 41.5% having no formal education. Most participants (67.7%) had low awareness of health hazards from fume exposure during molding, while 59.3% of respondents reported that safety inspections occurred only occasionally. Only 30.2% consistently used PPE. Furthermore, 53.5% of participants had experienced workplace accidents or injuries, with 55.3% seeking medical care at hospitals and 25.5% relying on traditional healers. Several factors influenced consistent PPE use, including age, education, ethnicity, religion, number of workers per shop, work experience, and awareness of fume exposure risks ($p < 0.05$). Younger participants were 46% less likely to use PPEs than older workers [AOR=0.54 (0.31–0.96), p=0.036]. Those without formal education were 79% less likely to use PPEs [AOR=0.21 (0.11–0.41), p=0.001]. High awareness of fume exposure risks doubled the

likelihood of PPE use [AOR=2.01 (1.18–3.43), p=0.010]. Those with 1-5 years of experience were 69% less likely to have health issues [AOR=0.31 (0.14 – 0.69) p=0.004]. Workers with fewer weekly workdays (1-3) were 3 times more likely to experience health issues [AOR=2.93 (1.03 – 8.30) p=0.043], and those working 1-3 hours per day were 4 times more likely to report health problems. Safety practices among the molders were inadequate, with low PPE usage, infrequent safety inspections, and multiple occupational hazards, including aluminum fume exposure, high temperatures, and poor ergonomics. The lack of safety regulations and limited protective measures further heightened occupational risks. Artisanal cookware molding shops should provide and ensure easy access to essential PPE for workers to reduce occupational hazards, including hearing damage, respiratory problems, and cardiovascular risks.

KEYWORDS: Occupational Health and Safety Practices, Aluminium cookware, Health risks, Occupational hazards.

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DEDICATION

I dedicate this work to my beloved parents, Mr. Yaw Manu and to my late mom, Mrs. Mary Dennis (Adwoa Boa), whose unwavering love, sacrifices, and prayers have been the foundation of my journey. Your endless support and encouragement have shaped me into who I am today. To my wonderful siblings, your companionship and motivation have been my strength throughout this academic endeavour. To my extended family and dear friends, your belief in me, words of encouragement, and constant support have kept me going. This achievement is as much yours as it is mine. Thank you for being my pillars of strength and inspiration.

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LIST OF ACRONYMS

CHRPE	Committee on Human Research, Publications, and Ethics
GEA	Ghana Enterprises Agency
GSA	Ghana Standards Authority
GSS	Ghana Statistical Service
ILO	International Labour Organization
KMA	Kumasi Metropolitan Area
MELR	Ministry of Employment and Labour Relations
NBSSI	National Board for Small Scale Industries
OH	Occupational Hazards
OHE	Occupational Health and Exposure
OHS	Occupational Health and Safety
OHSP	Occupational Health and Safety Practices
OSHA	Occupational Safety and Health Authority
PHC	Population and Housing Census
PPE	Personal Protective Equipment
TUAWA	Trade Unions and Artisanal Worker Associations
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Globally, the lack of stringent safety regulations and enforcement in informal sectors, such as the artisanal aluminium cookware mounding business, makes them more susceptible to workplace hazards (Abdalla *et al.,* 2018). According to the International Labour Organization (ILO, 2021), an estimated 2.3 million people die each year from work-related accidents and diseases, with a significant portion of these occurring in informal sectors like artisanal manufacturing. In the case of artisanal aluminium cookware smelters, exposure to extreme heat, toxic fumes, and fine aluminium dust poses severe health risks (Upadhyay, 2023). Studies have shown that prolonged exposure to aluminium dust can lead to chronic respiratory diseases such as bronchitis and pulmonary fibrosis (Ferguson *et al.,* 2018; Lestari *et al.,* 2023).

In Ghana, the artisanal aluminium cookware mounding industry is a growing sector, particularly in urban areas such as Kumasi, Accra, and Takoradi, where high demand for locally made cookware sustains employment for many individuals (Fening *et al.,* 2021a). The Asokore Mampong municipality, a fast-growing urban area in the Ashanti Region, hosts a significant number of artisanal metalworkers, including aluminium cookware moulders. According to the Ghana Statistical Service (GSS, 2021), the informal sector in Ghana accounts for over 80% of employment, with metalworking and manufacturing contributing substantially to this figure. Within Asokore Mampong, a considerable

proportion of the working-class population is engaged in small-scale metal fabrication, including aluminium cookware production, due to its economic viability and low entry barriers (GSS, 2021).

These moulders often work in informal and under-regulated environments, making them vulnerable to a range of occupational hazards (Hasan, 2019). Reports indicate that injury rates in informal metalworking sectors are three times higher than in more regulated industries (Abdalla *et al.,* 2018; Fening *et al.,* 2021b). These industries often employ traditional methods that expose workers to various occupational risks. In recent years, there has been growing concern about the health and safety of workers in these informal sectors, as they typically operate with limited access to protective equipment and safety regulations (Panneer *et al.,* 2019).

The production process involves melting scrap metal in open fires and pouring the molten aluminium into sand moulds, exposing workers to hazardous fumes, dust, noise, and particulates (Vasylkiv *et al.,* 2021). A study conducted in Ghana found that over 70% of informal metalworkers, including aluminium smelters, report respiratory issues due to prolonged exposure to metal dust and fumes (Fening et al., 2021b; Mensah *et al.,* 2022). Similarly, a study also asserted that artisanal cookware makers are highly exposed to metal contaminants and particulate matter, increasing their risk of chronic health conditions (Bennett, 2021; Mensah *et al.,* 2022). Given these concerns, this study assessed occupational hazards among artisanal aluminium workers in the Asokore Mampong municipality in the Ashanti Region of Ghana.

1.2 Problem Statement

Studies have indicated that individuals with low levels of formal education may have limited knowledge about occupational hazards and their potential impact (Geleta *et al.,* 2021; Mensah *et al.,* 2022). Evidence suggests a positive relationship between safety training, socio-cultural factors, and adopting occupational safety and health practices among artisanal workers (Mensah *et al.,* 2022; Sherratt & Aboagye-Nimo, 2022). Meanwhile, the artisans in this informal vocation, like aluminium smelters, have little or no formal occupational health safety education. In Ghana, artisanal aluminium cookware moulders are among the informal workers with little or no formal education and limited formal training related to their craft. Those in Asokore Mampong are no exception and are unaware of the occupational hazards inherent in their work and the potential consequences on their health and safety (Appiah, 2019). The number of artisanal aluminium cookware moulders in Asokore Mampong Municipality is increasing with increasing occupational related injuries and accidents (Appiah, 2019). Moreover, there is a gap in the literature on occupational health and safety practices and injuries among these artisans. Furthermore, the operations of these informal artisans are rarely supervised or monitored by accredited institutions to ensure adherence to occupational health and safety standard practices (Asamani, 2018; Umoh *et al.,* 2023).

Although several studies have examined occupational health and safety (OHS) practices in informal sectors, including welding, metalworking, and small-scale manufacturing in other regions of Ghana and abroad, there is limited research specifically targeting artisanal aluminium cookware moulders in the Asokore Mampong Municipality. Existing studies

have often focused on general occupational hazards or other artisanal groups, leaving a gap in understanding the unique risks, safety practices, and health outcomes of this subgroup. Furthermore, few studies have systematically analyzed how socio-demographic factors influence PPE use and hazard exposure in this context. This study addresses this gap by providing empirical data on the prevalence of occupational hazards, assessing safety practices, and identifying factors influencing risk among artisanal aluminium moulders in Asokore Mampong. The findings are expected to inform targeted interventions and policy measures to enhance workplace safety in this high-risk informal sector.

1.3 Study Objectives

The main aim of this study was to assess occupational and health safety practices and hazards among artisanal aluminium moulders in the Asokore Mampong in the Ashanti region of Ghana.

1.3.1 Specific Objectives

In achieving this aim, specifically, the study sought to:

i. Assess artisanal aluminium cookware moulders' knowledge and awareness of occupational hazards.
ii. Determine the safety practices of artisanal aluminium cookware moulders.
iii. Assess occupational hazards and risks among artisanal aluminium cookware moulders.

1.4 Research Questions

i. What is the knowledge and awareness of the occupational hazards of artisanal aluminium cookware moulders?

ii. What safety practices do artisanal aluminium cookware moulders follow?

iii. What are artisanal aluminium cookware moulders' occupational hazards and risks?

1.5 Justification of the Study

Despite the growing artisanal aluminium cookware industry in Ghana, research on occupational hazards and safety practices among this group remains scarce. Previous studies have mainly examined occupational health risks in formal industrial settings or among other artisan groups such as welders, carpenters, and auto-mechanics, but have not provided sufficient evidence on aluminium cookware moulders. This subgroup operates under informal, poorly regulated conditions with unique exposures to toxic fumes, extreme heat, and ergonomic risks that have not been adequately quantified. Additionally, there is a lack of data on how socio-demographic factors influence safety practices, particularly PPE usage, and how these practices affect health outcomes. This study addresses these gaps by providing localized data from Asokore Mampong Municipality, which is a major hub for aluminium cookware production. The findings will not only fill a critical knowledge gap but also guide targeted interventions, enhance occupational health policies, and support advocacy for safer working environments in the informal metalworking sector.

1.6 Significance of the Study

This study will provide comprehensive information on occupational hazards among artisanal aluminium workers at Asokore Mampong in the Ashanti region of Ghana. In addition, this study outcome would provide a foundation for policy development and practical interventions that can enhance these vulnerable workers' well-being, contributing to academic literature and local policy efforts.

1.7 Scope of the Study

This study was conducted at Asokore Mampong in the Ashanti region of Ghana. It is focused on artisans who make aluminium cookware and is limited to occupational hazards and exposure and health and safety practices in the aluminium cookware mounding business.

1.8 Organization of the Study

The study is divided into six main chapters. The first chapter addresses the background of the study, the problem statement, objectives, research questions, justification, significance of the study, scope, and organization of the study. The second chapter thoroughly examined relevant literature related to this research topic. Chapter three focuses on presenting the study area and the methodology employed to conduct the research. Moving on to chapter four, the study data is presented. Chapter Five discussed the findings of the study. Lastly, in chapter six, the summary of the results is presented, conclusions based on the main findings are drawn, and recommendations are offered based on the study's outcomes.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter comprehensively reviews existing literature on occupational hazards among artisanal aluminium cookware moulders in the Asokore Mampong Municipality, Ashanti Region, Ghana. It explores relevant studies, theoretical perspectives, and empirical findings on occupational health risks, workplace injuries, and safety practices among informal sector workers, particularly those engaged in aluminium mounding.

The review critically examines the prevalence of occupational hazards, common workplace injuries, and factors contributing to unsafe working conditions in artisanal industries. Key concepts, such as exposure to toxic substances, ergonomic risks, personal protective equipment (PPE) usage, and regulatory frameworks governing occupational health and safety in Ghana are discussed. Additionally, the chapter highlights the implications of workplace hazards on the health and well-being of aluminium cookware moulders, emphasizing the need for improved safety interventions. The literature review is structured around subject areas that align with the thematic focus of this research, ensuring a thorough analysis of pertinent contributions. This approach provides a clear understanding of the existing knowledge in the field while identifying gaps that justify the need for this study.

2.2 Occupational Hazards

A hazard is often associated with a condition or activity that, if left uncontrolled, can result in an injury or illness. Identifying and eliminating or controlling hazards as early as possible will help prevent injuries and illnesses (Jagnoor & Peden, 2021). Accidents account for a range of injuries in the workplace. In recent years, hazards in the workplace resulted in 3,277,700 nonfatal injuries and illnesses, according to the Bureau of Labour Statistics; 965,000 of those injuries resulted in missed work days. Recognizing workplace hazards helps to keep employees safe and reduces costs related to injuries and illnesses, including those leading to lost productivity (Adamopoulos *et al.,* 2022). According to Spellman (2023), typical hazards and their descriptions in the workplace are Physical Hazards, including heat, cold, vibration, and high noise (Spellman, 2023).

2.3 Occupational Hazards in Industrial Setting

The global workforce is about 2.8 billion (Ahmad *et al.,* 2017). Workers spend about one-third of their lifetime at the workplace. Workers expect a safe working environment as their fundamental human right. However, there are still poor working conditions, especially in developing countries. Workers worldwide face dual occupational hazards, which are traditional and novel in complex work settings due to rapid industrialization, technological advancement, and globalization over the last few years (Adamopoulos *et al.,* 2022). This is resulting in injuries, accidents, disabilities, and death. Occupational health issues affect individuals, families, communities, and the world's citizens, hence the need for occupational health (Ahmad *et al.,* 2017).

According to Andel & Spector (2015), employees are often exposed to a wide range of potentially harmful conditions or hazards that can lead to safety outcomes that adversely affect physical and psychological health. Although not every hazard exposure necessarily leads to injury or illness, reducing hazards can enhance safety (Ayob *et al.,* 2018). Workplace occupational hazards have always been the prime concern for policymakers, stakeholders, and researchers (Leka *et al.,* 2016). Occupational hazards occur in all employment sectors, including agriculture, construction, manufacturing, and service industries (Abdalla et al., 2018).

Hazards can be introduced as workstations and processes change, equipment and tools become worn, maintenance is neglected, or housekeeping practices decline. Muwanga (2016) opined that the Parliament of Uganda enacted the Occupational Safety and Health Act to provide for the right of persons to work under satisfactory, safe, and healthy conditions. However, despite the existence of the Act, many workers were not aware of their rights to a safe and healthy working environment and have remained exposed to unhealthy working conditions, faulty plants and equipment, dangerous civil works, and construction, leading to ill health and death. A study by Tadesse *et al.* (2016) in the textile industry indicated that the sector is a labour-intensive production and the most technologically complex of all industries, and is a place of work where workers are exposed to different safety hazards, like cotton dust, excessive noise, accidents, and diseases.

2.4 Occupational Hazards in the Ghanaian Context

Much research (International Labour Organization, 2005; Takala *et al*., 2014) has revealed that workplace hazards account for over 2.3 million deaths every year globally. According to Machida (2010), occupational injuries and diseases that result from harmful work environments account for approximately 4% of the world's Gross Domestic Product (GDP). The implication here is that occupational hazards or health and reduced working capacity of workers create an economic loss of about 20% of the Gross National Product of a country, according to the WHO (1994). Consequently, safety and health at the workplace cannot be seen solely as a sound economic policy but as a fundamental human right (Amponsah-Tawiah & Dartey-Baah, 2011). Approximately 75% of the world's labour force lives in developing countries, with only 10% having access to occupational health services (Kumar *et al.,* 2016).

Presently, Ghana has no national Occupational Health and Safety (OHS) policy to streamline issues concerning occupational hazards, according to Adei & Kunfaa (2007). The two main statutes that back the implementation of OHS in Ghana are the Factories, Offices, and Shops Act 1970 (Act 328) and Workmen's Compensation Law 1987 (PNDC Law 187). Act 328 focuses on meeting the internationally accepted standards for workers' safety, health, and welfare. Ghana's Factories, Offices and Shops Act, 1970 (Act 328) Part 5 sections 10, 11, and 12 make it mandatory for employers or occupiers of the premises to report accidents that cause death or disabled employees for more than three days. Again, dangerous occurrences and industrial diseases are to be reported to the District's Chief Inspector or Inspector of factories. The provisions of the Factories, Offices and Shop Act

of 1970 are insufficient in scope since most industries, agricultural and informal sectors (including those in the bakery industry) are not explicitly covered (Clarke, 2005).

The Workmen's Compensation Law 1987, on the other hand, directs the payment of cash compensation by employers to employees in the event of work-related injuries and diseases and the unlikely event of death. The benefits are payable to the employer's dependents through the Law Court (Amponsah & Dartey, 2011; Asumeng *et al.,* 2015), with an accumulative amount of GH¢ 13,541,106.09 being paid to employees from the period 2008 to 2013 across the public and private sector (Ministry of Employment and Labour Relations, 2016).

Ghana's aluminium smelting industry is an essential sub-sector of the economy. The sector plays a vital role in employment creation in the informal sector and income generation. This implies that bakers contribute to their livelihoods, communities, and the country (Amponsah & Dartey, 2011). Despite the enormous contribution, the aluminium smelting industry, like other occupations, is prone to several occupational hazards and safety challenges, as indicated by Joshua et al. (2017). According to Doaa *et al.* (2017), the informal sector, such as the bakery business, poses several hazards to the health of its workers.

The aluminium smelting business is similar to the bakery since both sectors primarily deal with exposure to fire. Occupational hazards include electric shock, fall/explosion, cuts, burns, skin irritation, muscle problems, chest tightness, cough, catarrh, sneezing, and

symptoms of asthma are common in such sectors (Joshua *et al.,* 2017). Because of this, the aluminium smelting business as an economic activity exposes workers to work injuries and diseases that affect production and productivity, which translates into low incomes (Stoia & Oancea, 2008; Yossif & Abd Elaal, 2012). Further, occupational injuries and diseases among workers result in absenteeism, reduce the ability of households to earn income, and affect the local and national economy (Doaa *et al.,* 2017).

2.5 History of Occupational Health and Safety in Ghana

Before the early 1990s, little was known about the global burden of diseases, injuries, and risk factors in the workplace. This problem instigated the World Bank and the WHO to initiate a Global Burden of Disease study in 1991, which was meant to provide up-to-date information on the trend of the global burden of occupational workplace injuries and diseases. The global burden of disease studies in 187 countries in 2010 reported critical prevention mechanisms for occupational diseases and injuries (Murray & Lopez, 2013).

Indeed, work-related injuries and illnesses are among the critical factors contributing to the global burden of diseases and injuries in recent times. Essentially, the impacts of such diseases affect not only the individual, family, community, and country but also the international community, as it implies global productivity. For as many countries that report such incidences, the estimated cost is not consistent. While some countries estimate about 2% of their Gross Domestic Products (GDP), others report a GDP of around 14% (Kuboniwa et al., 2019).

The ILO, for example, estimates it to be around 4% of the annual global GDP (ILO, 2006). Hence, several scholars and international organizations (Rodgers et al., 2004; Nelson et al, 2005; Schulte, 2005; Takala *et al.,* 2014; WHO, 2009) have taken a keen interest in workplace injuries and diseases, reporting statistics on their growth and seeking ways to help reduce the rate of occupational injuries and diseases. Such concerns may be explained, in part, by the fact that knowledge of the causes, rate, and regional distribution is key to preventing workplace diseases and injuries in various geographical settings (WHO, 2009).

WHO has taken much responsibility for updating the world on the global burden of occupational injuries and diseases. In their project, Global Burden of Disease*,* the WHO reports an estimate on mortality and morbidity by work-related diseases for more than 135 causes of workplace injuries and diseases. Several other documents on comparative risk assessment have been produced, including "The Global Health Risk Report" (WHO, 2009). Additionally, ILO (2005) reports estimates that occupational injury and illness represent about 2.2 million deaths annually. About 350,000 of this number account for only fatal occupational injuries. Nonetheless, the challenges of informing the world about such a crucial issue are poor data and different reporting systems within countries, making inter-country comparisons difficult (Leigh *et al*., 1999).

While these studies help update future researchers on the current growth and dimension of occupational injuries and illnesses, the studies are done at the macro level with little emphasis on the local dynamics of occupational injuries and illnesses. As Leigh et al. (1999) observed, to offer the appropriate solution to the rising global burden of

occupational illnesses and injuries, “local estimates, particularly at the subnational and national levels, would be a valuable contribution.” The current study moves in that direction by examining a national and local context of workplace injuries and illnesses, focusing on the informal economy in a developing country.

2.6 Importance of Occupational Health and Safety

Work provides economic and other benefits to the worker, the immediate family, and the community. A wide range of occupational hazards, however, presents risks to the health and safety of the work (European Commission, 2011). These include biological agents, chemicals, physical factors, adverse ergonomic conditions, allergens, a complex network of safety risks, and a broad range of psychosocial risk factors. As such, the European Commission (2016) argued that workers should be aware of the benefits of adopting safe working practices regarding reduced hazards.

The importance of OHS to organizational management cannot be overemphasized. Helpful management of the OHS of workers helps them to live longer and happier lives and reduces the costs associated with illness and injury to the workers and their communities (Bennet, 2011; Cudjoe, 2011; Adjotor, 2013). According to the European Commission (2011), OHS issues are important to every organization's quality management, risk management, and corporate social responsibility. It should, therefore, be an integrated element of all managerial development processes.

A growing body of research demonstrates the link between improved health and functional status of the worker, worker productivity, and lowered total costs of production, which ensures the employer's benefit. Goetzel *et al.* (2007). The view is that well-designed health programs could achieve long-term health and productivity improvements among workplace populations, eventually leading to higher productivity. According to Tadesse and Admassu (2006), providing healthy and safe environment benefits workers, employers, governments, and the general public. Therefore, good occupational safety and health practices, as noted by Levy, Wegman, Baron, and Sokas (2011), significantly reduce employee injury and illness-related costs, including medical care, sick leave, and disability benefit costs, resulting from occupational hazards (Tanko, Molnar, Fulesdi & Molnar, 2014). Safety Matters at Work (2011) also shares this view and states that workplaces with good communication and functioning safety programs have the potential to reduce injuries and illness, as well as improve quality and production rates.

Workplace injuries and illnesses lead to absenteeism and presentism, resulting in low productivity and high cost of productivity (Adjotor, 2013; Grinza & Rycx, 2018; Nagata et al., 2018). Therefore, when workplace injuries are reduced, it will lead to increased productivity, which is of great importance to the employer, especially in countries where there is a shortage of skilled labour (Tadesse & Admassu, 2006). There will be a reduction in wage losses and decreased compensation costs paid by employers to workers due to injuries at the workplace. Effective workplace safety management will also reduce absenteeism and presentism and lead to the retention of skilled labour (ibid). In this way,

Funmilayo (2014) argues that managing workplace safety is as important for the company and employers as much as it is for the employees.

As noted by Tanko *et al.* (2014), healthy workers increase industrial output and lower production costs; their incomes can contribute to the health of their families and communities. Workers constitute a large sector of every nation's population. Therefore, no country can survive when its labour force is weak and ill because of the occupational hazards they are exposed to (European Commission, 2011).

Workplace safety is also important to the business organization. In the view of the Royal Society for the Prevention of Accidents (2014), ensuring workplace health and safety is not just a social responsibility; it also makes good business sense and must be regarded as important as achieving any other key business objective. According to Burton (2010), creating healthy workplaces that do not harm workers' mental or physical health, safety, or well-being is important for the business argument. Tung, Chang, Ming, and Chao (2014) also believe that workplace safety improves the maintenance and promotion of workers' health and working capacity and creates a favourable social climate and smooth operation at the workplace.

2.7 Occupational Hazards and Safety Management

According to Benjaoran and Bhokha (2010), safety management is a set of actions or procedures relating to health and safety in the workplace. It comprises three key tasks: hazard identification, safety measure planning, and control. According to Safety Matters at

Work (2011), there is evidence that some workplaces have a high rate of injuries while others, with similar work, have none or less. The difference has been identified in how workplace health and safety plans are managed in various workplaces.

In Ghana, occupational health and safety management is recognized as an essential component of overall organizational management, playing a key role in core managerial functions (Dwumfour-Asare & Asiedu, 2013). Its success necessitates management commitment to health and safety, professional freedom of the service, privacy, and consultation among management and workers. According to Quansah (2008), OHS management entails managing workers' mental, social, and physical welfare and, for that matter, the whole person. A labour force's working capability sustains a society's material and economic base. OHS of workers is thus a vital prerequisite for productivity and is important to socio-economic and sustainable development (Adu-Gyamfi, 2019).

At a minimum, 7% of Ghana's GDP is expended on resolving problems associated with the inappropriate management of health and safety (Adjotor, 2013). The safety of workers against work-related injuries and illnesses has, over the past decades, been a subject of pronounced distress to workers, employees, governments, and the entire populace in Ghana (Money *et al.,* 2014). This is because a safe working environment promotes workers' mental, physical, and social well-being and saves costs associated with work interruption, medical bills, compensation, and loss of experienced personnel (Monney *et al.,* 2014).

In Ghana, regulations addressing issues regarding managing the OHS of employees at the workplace are fragmented. There is the Labour Act 2003 (Act 651), the Factories, Offices, and Shops Act 1970 (Act 328), and the Workmen's Compensation Law 1987 (PNDC Law 187) (Dwumfour-Asare & Asiedu, 2013; Adei *et al*.., 2011; Adei & Kunfaa, 2007). The execution of these laws is fraught with numerous challenges, including loopholes in existing laws that guide OHS management (Ametepeh, 2011; Cudjoe, 2011).

According to Lambert (2005), when effective management of the safety of the work environment is achieved, productivity increases beyond the initial observed level (Fartasch, Diepgen, Schmitt & Drexler, 2012). Policy-level health and safety management initiatives and advancing workers' health are relevant, especially those initiated through increased stakeholder involvement within frameworks such as collective agreements and enterprise responsibility (Leka *et al*., 2010). This will lead to compliance with safety regulations. According to Park (2018), businesses usually comply with health and safety regulations when they have experienced occupational injuries in the preceding years.

Institutions such as the Trades Union Congress exist in Ghana to take health and safety initiatives and establish employee unions within organizations to improve employees' working lives (Fartasch *et al*., 2012; Adei & Kunfaa, 2007). These institutions often protect workers who refuse to accept hazardous tasks and offer support and representation for workers in accident compensation claims (Dartey *et al.,* 2010).

2.8 Awareness of Occupational Hazards

Applying health promotional measures at workplaces (especially among artisans) is essential to providing a healthier workplace, especially in developing countries where such measures are generally not well considered (Pham *et al*., 2020). Although awareness and regulatory measures exist to adhere to safety precautions in developed countries, the same cannot be said in many developing countries (Osagiede *et al*., 2020). However, awareness of occupational hazards and their safety precautions among artisans is an important health issue that needs to be addressed, especially in developing countries (Kumar *et al*., 2013). Awareness of occupational safety and health plays an important role in preventing injuries and diseases in the workplace (Manuel *et al.,* 2015).

Many workers are unaware of potential workplace hazards, making them more vulnerable to injuries and diseases (Pui *et al.,* 2017; Tam & Fung, 2008). Research findings have identified knowledge gaps of potentially harmful workplace exposures and that awareness differed substantially across occupations and exposures (Pui *et al.,* 2017). Some studies have found a high level of knowledge and awareness, while others have found otherwise (Trevethan, 2017; Xu *et al.*, 2020). The awareness of occupational health hazards tends to be high among some workers in the informal economy. Budhathoki *et al*. (2014) found that awareness of occupational hazards and the use of safety measures among welders was high; specifically, 90.7% of welders were aware of at least one hazard of welding.

Similarly, Kumar *et al.* (2013) suggested that artisans (mainly welders) are more aware of occupational hazards than safety measures and practices. A study conducted by Diwe *et al.*

(2016) also reported a high level of awareness of occupational hazards among timber workers, a situation they explained to be due to the level of education attained by respondents and the length of work experience. Relatedly, Tadesse *et al.* (2016) found a high (86.5%) awareness level of occupational hazards and their associated factors among welders. They further reported that awareness was significantly associated with work experience, well-defined work regulation, job satisfaction, marital status, and higher education attainment.

Similarly, Awosan et al. (2017) observed that almost all the respondents in their study knew occupational awareness. Their findings were not different from those of Pui *et al.* (2017), who found that study participants were aware and concerned about their exposure to diesel exhaust but had an incomplete and sometimes incorrect understanding of the exposure pathways, health effects, and practical strategies to reduce their exposure to it. Manuel et al. (2015), in a study on awareness of hazards in the laundry department of a hospital in Karnataka, India, found that 53.3% of the respondents were aware of the falls which could occur due to their profession, 93.3% were aware of hearing problems, and 20% showed awareness of headaches. Regarding chemical hazards, 93.3% of them were aware of latex allergy as a hazard, and 26.6% mentioned dermatitis. In contrast, 13.3% were aware of respiratory problems as an occupational hazard due to their profession (Adewoye *et al.,* 2014).

Despite the high level of knowledge found in some studies, others have recorded low knowledge and awareness among workers. A lower level of knowledge and awareness was

found among welders in Nigeria by Isah and Okojie (2006) compared to the previous studies reviewed. *Hassan et al.* (2018) also reported a lack of awareness among the welders in Pakistan regarding the health risks and safety hazards associated with their trade. The study showed that as much as 45.7% of the respondents indicated no significant risk to their health in welding. Budhathoki *et al.* (2014) found that a gap exists between being aware of workplace hazards (90%) and the use of PPE (47%) at work.

Concerning socio-demographic characteristics, Budhathoki *et al.* (2014) found a positive association between the level of education and awareness of hazards among welders in Nepal, indicating an increase in awareness with higher education. However, they found that the number of years spent as an artisan was negatively associated with awareness of hazards. This finding is not supported by the conclusion of Tadesse *et* al. (2016), which suggests a significantly positive relationship between work experience and awareness of workplace hazards. Tadesse *et al.* (2016) also found that marital status and educational level are significantly related to awareness of workplace hazards. Awareness of workplace hazards was associated with age among Indian sand and stone miners (Ahmad, 2017). A similar situation was reported by Onowhakpor, Abusu, Adebayo, Esene, and Okojie (2017), who aver that knowledge of occupational hazards increases as one advances in age among respondents of sawmill workers in Nigeria.

The plausible explanations for the discrepancies among the various study findings could be due to methodological differences, such as study population, definitions of hazard

awareness, data collection methods, workplace conditions, and the differences in the studies' times.

2.9 Awareness of Safety Practices

Several studies have been conducted worldwide on safety practices. For example, in Nepal, Marahatta *et al.* (2018) studied the awareness of occupational hazards and associated factors among automobile repair artisans in Kathmandu Metropolitan City. They found that 56% of those aware of occupational hazards were literate. Joseph *et al.* (2017) conducted a study to assess welders' awareness of occupational hazards and usage practices of protective gear. The cross-sectional study found that awareness of occupational health hazards was fairly associated with welding (62.6%). Syed, Ahmed, Akram, Qureshi, and Shakoor (2010) conducted a study on welding and its associated ocular injuries. Their knowledge of safety measures was satisfactory.

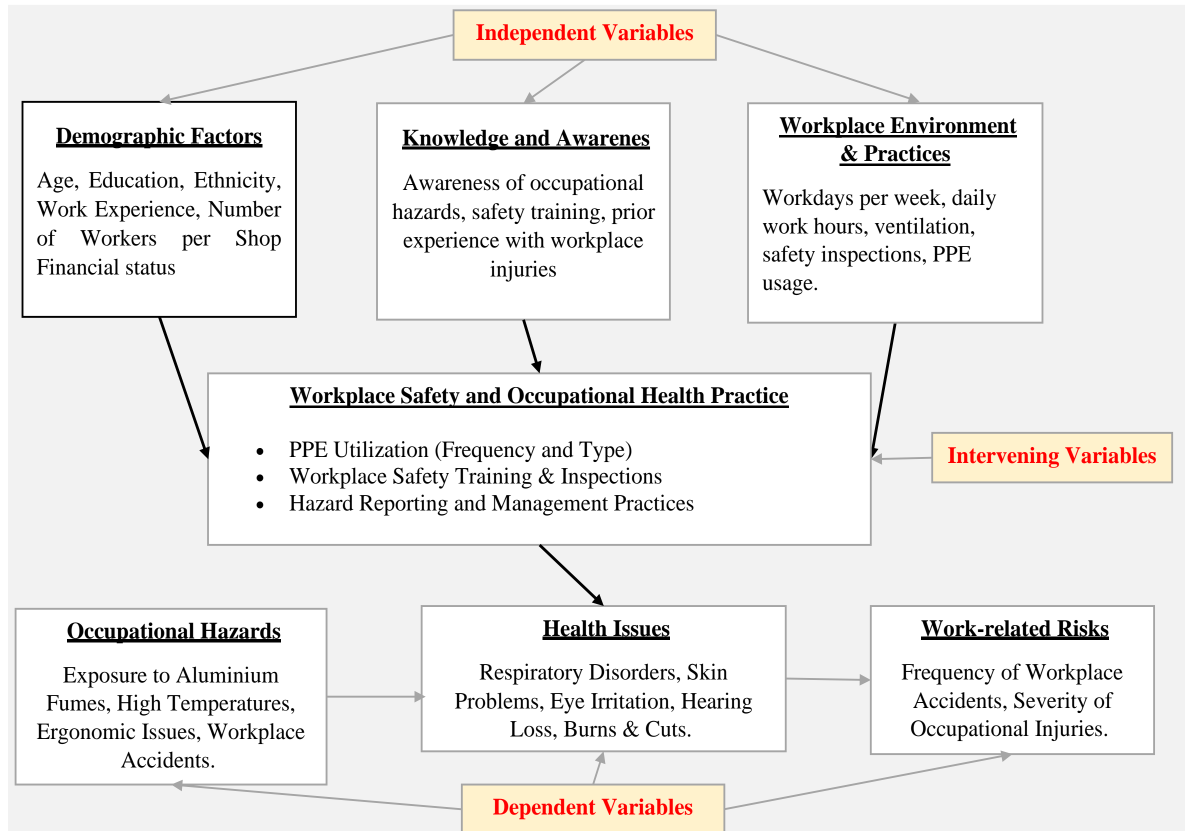
Similarly, awareness of occupational hazards among auto-artisans has been well-documented in Nigeria, Zambia, and India. The studies further revealed that work experience, employment pattern, marital status, educational status, job satisfaction, safety training, supervision, and work regulation showed significant associations with awareness. (Eze, Okoye & Aguwa, 2015; Adewoye *et al.,* 2014; Kumar et al., 2013; Awosan *et al.,* 2017, and Tadesse *et al.,* 2016).

On the other hand, Adewoye *et al.* (2014) posit that educational intervention has a positive relationship with the awareness and use of PPE. Their study on the effect of educational

intervention on awareness and use of PPE found that 97.9% of artisans reported that educational intervention had positively impacted their awareness of using eye goggles as protection. However, Abraham, Megbelayi, and Akpan (2015) reported that 78% of artisans studied claimed they had never heard about protective eyewear at work.

A critical comparison of occupational safety literature across informal sectors in Ghana and similar settings reveals consistent patterns of poor adherence to OHS practices despite varying levels of awareness. For example, studies among welders (Budhathoki et al., 2014; Tadesse et al., 2016) report high hazard awareness but low PPE usage, often due to cost, discomfort, and lack of enforcement. In contrast, research on auto-mechanics (Adewoye et al., 2014) highlights both low awareness and poor practice, attributed to minimal safety training. Timber workers and bakers (Diwe et al., 2016; Joshua et al., 2017) show that socio-demographic factors such as age, education, and cultural beliefs significantly influence safety behaviours. These findings indicate that awareness alone does not guarantee compliance with safety measures, suggesting the importance of contextual factors such as availability of PPE, economic constraints, and the regulatory environment. However, limited evidence exists on how these factors interact within artisanal aluminium mounding, a sector with unique exposures to toxic fumes and extreme heat. This study addresses this gap by examining both awareness and adherence, as well as socio-demographic and workplace factors influencing OHS practices in this specific context.

2.10 Conceptual Framework



The conceptual framework illustrates the relationship between demographic factors, workplace environment, and knowledge levels in influencing occupational hazards among artisanal aluminium cookware molders. It highlights how safety practices, such as PPE usage and workplace inspections, act as intervening variables that impact the prevalence of hazards and associated health risks. The framework underscores the need for improved safety training, hazard management, and regulatory enforcement to reduce occupational injuries and illnesses in this industry.

2.11 Gaps in the Literature

Despite extensive research on occupational hazards in various informal sectors, few studies have focused on artisanal aluminium cookware moulders in Ghana. Existing research has either generalized occupational risks or concentrated on other artisanal groups (e.g., welders, carpenters, auto-mechanics). There is also limited exploration of how socio-demographic characteristics, workplace environment, and external factors jointly influence PPE use and health outcomes. Furthermore, most studies have not examined these issues in the context of Asokore Mampong, a key production hub with unique socio-economic and cultural dynamics. This study addresses these gaps by investigating not only the prevalence of occupational hazards but also the factors that influence safety practices and health risks among artisanal aluminium cookware moulders, thereby providing localized evidence to guide policy and intervention strategies.

2.12 Theoretical Framework: Health Belief Model (HBM)

This study is underpinned by the Health Belief Model (HBM), which explains health-related behaviours by focusing on individual perceptions. According to the HBM, health behaviour (such as the use of PPE and adherence to safety practices) is influenced by perceived susceptibility to hazards, perceived severity of potential outcomes, perceived benefits of preventive actions, and perceived barriers to adopting these actions (Rosenstock, 1974). Cues to action (e.g., safety training, workplace inspections) and self-efficacy also play a role in promoting safer practices. In the context of artisanal aluminium moulders, workers' awareness of the risks associated with fumes, burns, and ergonomic hazards affects their perception of susceptibility and severity, which in turn influences their

likelihood of adopting safety measures. This model supports the conceptual framework by linking individual perceptions to workplace practices and health outcomes, emphasizing the need for interventions that enhance risk perception and reduce barriers to PPE use.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This thesis chapter focuses on the study area and the methodology employed. It discusses the following sections: Study Design, Study Area, Study Site, Study Population, Inclusion and Exclusion Criteria, Sample Size Estimation, Sampling Techniques, Data Collection Tools and Techniques, Sample Collection, Sample Processing, Data Management, Statistical Analysis, and Ethical Review and Clearance.

3.2 Study Area

This study was conducted in the Asokore Mampong Municipality. Asokore Mampong is the capital city of the Municipality and is located in the middle of the Ashanti region. According to the 2021 Ghana Statistical Service Population and Housing Census, the municipality has a total population of 191,402, with the majority, 51.1% (97,896), females and 48.9% (93,506) males. (GSS, 2021). The municipality covers a total land area of 24.3 Km^2, and it is located in the Northeastern part of the Kumasi Metropolis (GSS, 2021). It shares boundaries with the Kumasi Metropolitan Assembly (KMA) to the East, South, and West, Kwabre East District to the northwest, and Ejisu Juabeng Municipal Assembly to the northeast.

The average minimum temperature is about 21.5^oC, and the maximum average temperature is 35.7^oC, with a mean humidity of about 84.16 per cent at 0900 GMT and 60 per cent at 1500 GMT (GSS, 2021). About 92.6 % of the active population is employed, mostly in

agriculture and petty trading. Most of the working population is employed by an integrated system of markets, financial institutions, wholesalers and retailers, transportation companies, hotels, restaurants, etc. Most aluminium cookware workers are scattered in Asokore Mampong.

The research data was collected from the aluminium cookware mounding business shops in the Aboabo and Sawaba communities of the municipality. The study was conducted at these sites because most cookware moulder shops in the Ashanti region are found here, and data from these sites will be suitable for making inferences.

Aboabo and Sawaba communities were purposely chosen for this study because they host the largest clusters of artisanal aluminium cookware mounding shops within the Asokore Mampong Municipality. Unlike Suame Magazine, which is primarily located in the Kumasi Metropolitan Area, these communities fall directly under the administrative jurisdiction of Asokore Mampong where the study is focused. Additionally, the majority of moulders in these areas operate under informal conditions, making them representative of the target population. Thus, selecting Aboabo and Sawaba ensured that data captured would reflect the realities of artisanal aluminium workers within the municipality of interest.

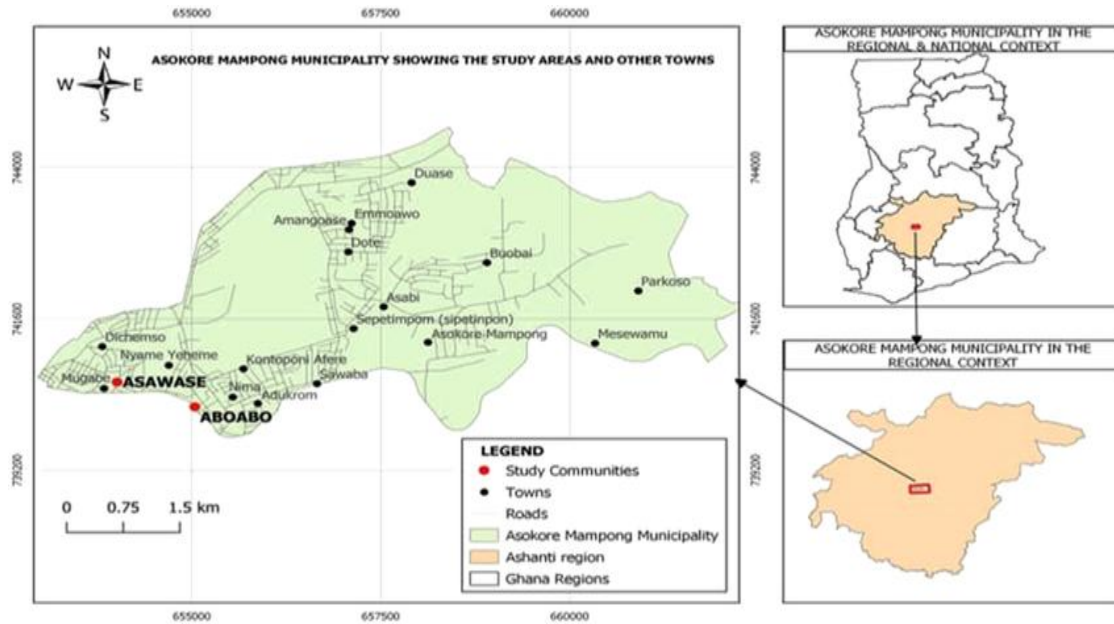


Figure 3.1: Map of Asokore Mampong (GSS, 2014)

3.3 Design of the Study

This study employed a cross-sectional design to assess occupational hazards among artisanal aluminium workers at Asokore Mampong in the Ashanti region of Ghana.

3.4 Study Population

The study population consisted of aluminium cookware mounding business shops masters and apprentices aged 18 years and above living in the Asokore Mampong Municipality of the Ashanti region of Ghana.

3.4.1 Inclusion and Exclusion Criteria

Shop masters and apprentices who are aluminium cookware moulders, have worked for at least one year in the study area, and are 18 years or older were included. Participants who

lived permanently outside the study area but came to visit a particular shop within the study period were excluded.

3.5 Sample Size Estimation

The sample size for this study was estimated using Cochran's formula, as outlined by (Sarmah et al., 2013):

$$\mathbf{N = (Z^2pq)/e^2}$$

Where:

- **N** = required sample size
- **Z** = standard normal deviation at a 95% confidence level (Z = 1.96)
- **p** = estimated proportion of the population (0.5, used to ensure maximum variability)
- **q** = 1 – p = 0.5
- **e** = margin of error (0.05)

The proportion (p) was set at 0.5 because there were no prior studies with reliable prevalence estimates of occupational hazards among artisanal aluminium cookware moulders in the study area. Using p=0.5 is a conservative approach recommended in sample size calculations when the true prevalence is unknown, as it maximizes the required sample size and ensures adequate statistical power. Using these values:

$$N = [(1.96)^2 (0.5 \text{ X } 0.5)]/ (0.05)^2 = 384.16$$

Although the estimated minimum sample size was 384, the study conveniently included 275 participants due to practical constraints.

3.6 Sampling Techniques

This study used a multi-stage sampling approach, including purposive, snowball, and convenient sampling techniques. Firstly, a purposive sampling technique was used to select the study areas. Snowball sampling was used to select the shops and the participants, and the study participants were conveniently sampled from these selected shops.

Non-probability sampling techniques (purposive, snowball, and convenience sampling) were used due to the absence of an official sampling frame for artisanal aluminium moulders, as most operate in informal and unregistered workshops. These methods allowed the researcher to identify and recruit participants who met the inclusion criteria efficiently. However, this approach may introduce selection bias and limit the generalizability of findings. To minimize bias, the researcher sampled moulders from multiple locations and shop types within the municipality to ensure diversity and representation.

3.7 Data Collection Tool(s)

This study used a structured questionnaire to collect data from the study participants. The questionnaires consisted of 4 sections: socio-demographic characteristics of the participants, their knowledge and awareness, safety practices of occupational hazards and risks among artisanal aluminium cookware moulders an occupational hazard. This instrument was crucial in gathering relevant and essential data for the study.

3.7.1 Validity of Instrument

Experts in occupational health and safety evaluated the questionnaire for face and content validity by checking whether the items adequately covered the study objectives, were clear,

and contextually appropriate. They assessed the wording, relevance, and completeness of the questions. A pilot test was conducted among 20 moulders at Suame Magazine, and the responses were analyzed for internal consistency using Cronbach's alpha, which yielded a coefficient of 0.82, indicating good reliability of the instrument.

3.8 Data Collection Procedure

Data were collected from artisanal aluminium workers operating within the Asokore Mampong Municipality using a combination of face-to-face interviews and on-site observations. The data collection was conducted by the researcher, who personally administered a standardised semi-structured questionnaire along with a checklist. The questionnaire gathered information on participants' knowledge and awareness of occupational hazards, while the checklist was used to guide direct observation of their routine work practices. This included evaluating how workers used personal protective equipment (PPE), as well as how they handled heat sources, molten metal, and related tools or equipment during their daily tasks. Observations were conducted at the participants' actual work sites to assess real-life practices and behaviours. Additionally, demographic data such as age, sex, and educational background were recorded to support analysis of occupational risk factors.

3.9 Data Management Statistical Analysis

3.9.1 Data Management

The researcher checked the data collected from the field for completeness and consistency. The data were entered into a Microsoft Excel (version 2016) database and cleaned. Microsoft Excel 2016 spreadsheet was initially employed for data organization and

preliminary processing. The clean dataset of the survey data was subsequently exported into IBM SPSS version 22.0 for comprehensive statistical analysis.

3.9.2 Statistical Analysis

Descriptive statistics was employed to determine the frequencies and percentages of the variables. The sources of the samples were compared using cross-tabulation and the chi-square test to determine the significant difference.

Binary logistic regression was used to examine associations between independent variables and the main outcome variables (consistent use of PPE and occurrence of work-related health issues). The dependent variables included (1) consistent PPE use (yes/no) and (2) presence of work-related health issues (yes/no). Independent variables included age, education level, ethnicity, religion, work experience, number of workers per shop, and awareness of hazards. Confounding factors were controlled by including them as covariates in the regression model. Adjusted Odds Ratios (AOR) and their 95% Confidence Intervals (CI) were calculated from the multivariable logistic regression model to account for potential confounding. Missing data were minimal (<5%) and were handled through listwise deletion, ensuring that only complete cases were analyzed.

3.10. Ethical Review and Clearance

Ethical clearance was acquired from the Committee on Human Research, Publications, and Ethics (CHRPE) at the Kwame Nkrumah University of Science and Technology (KNUST), with reference number CHRPE/AP/719/25. Written permissions were obtained from the Asokore Mampong Municipal Chief Executive and all the study shops. Before data

collection, each study participant signed informed consent. The study received approval from the University (AAMUSTED).

CHAPTER FOUR

RESULTS

4.1 Introduction

This chapter presents the study's results, which are based on specific objectives. It is organized under the following subheadings: Demographic Characteristics of Aluminium Cookware Moulders, Knowledge and Awareness of Artisanal Aluminium Cookware Moulders Regarding Occupational Hazards and Safety, Safety Practices of Artisanal Aluminium Cookware Moulders in Their Workplaces, and Occupational Hazards Among Artisanal Aluminium Cookware Moulders.

4.2 Demographic Characteristics of Artisanal Aluminium Cookware Moulders

Table 4.1 and **Figure 4.1 to 4.3** show that all the participants were males, 65.1% were aged ≥ 31 years, 41.5% had no formal education, 40% were Ashanti, and 48.0% were Muslims. The majority (52.4%) were single, 47.6% were "work and pay" artisans, and 49.8% indicated having 4-10 workers in their shops. Additionally, 48.7% had work experience between 1 and 5 years.

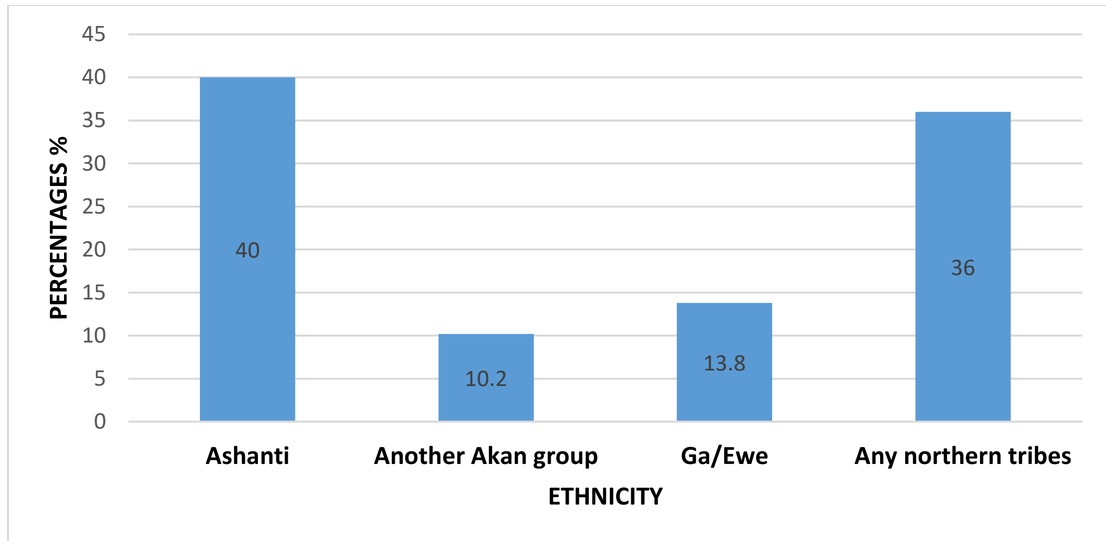


Figure 4.1: Ethnicity of the Respondents

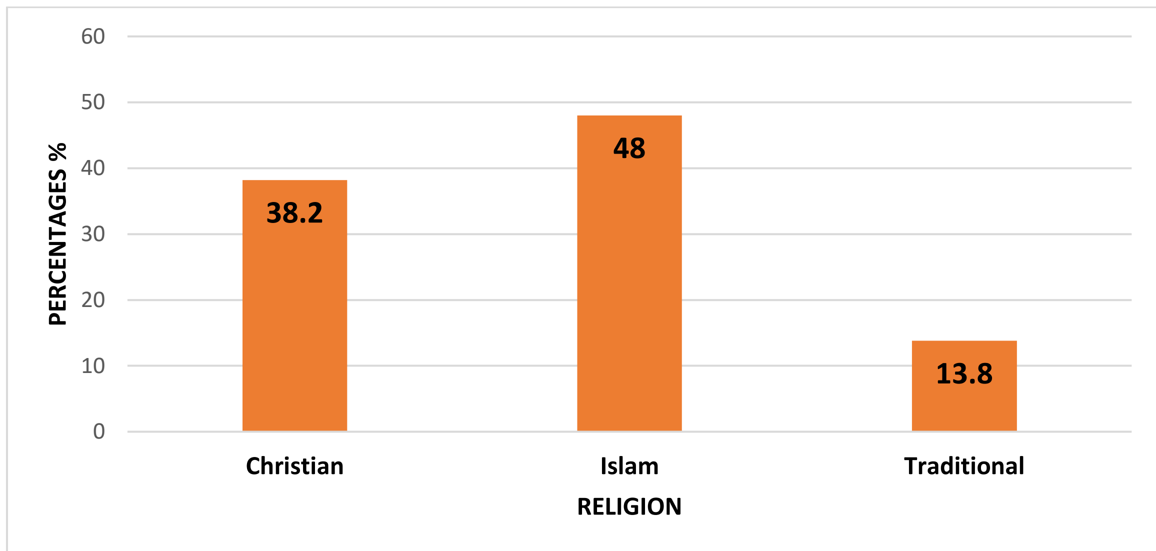


Figure 4.2: Religion of the Respondents

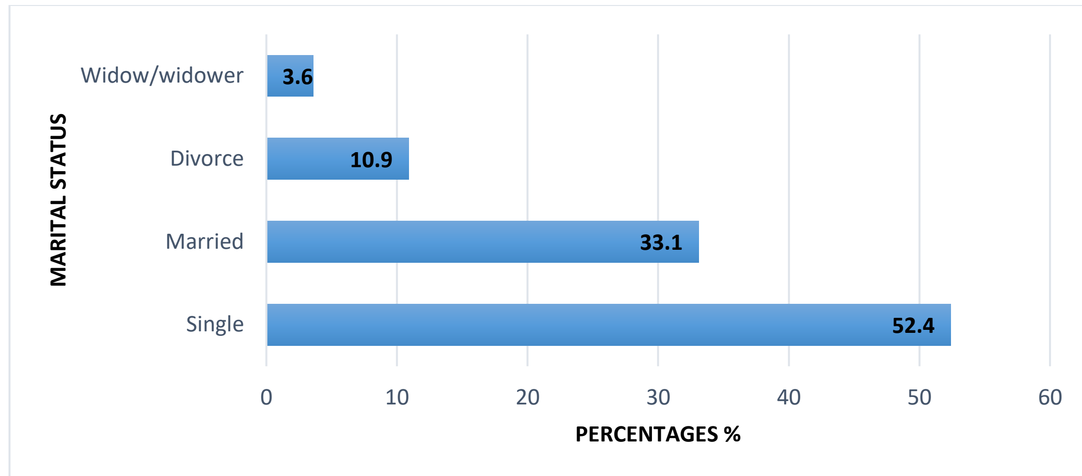


Figure 4.3: Marital Status of the Respondent

Table 4.1: Demographic Characteristics of Artisanal Aluminium Cookware Moulders

Demographic Characteristics	Frequency	Percentage %
Gender		
Male	275	100.0
Age		
18-30	96	34.9
31 and above	179	65.1
Level of education		
No formal education	114	41.5
Primary/JHS/Middle school	75	27.3
SHS/Secondary/Technical	78	28.4
Tertiary	8	2.9
Occupation status		
Master artisan	79	28.7
Work and pay artisan	131	47.6
Apprentice	65	23.6
Number of workers in your shop		
1-3	98	35.6
4-10	137	49.8
10+	40	14.5
Working experience		
1-5 years	134	48.7
6-10 years	107	38.9
more than 10 years	34	12.4

4.3 Knowledge and Awareness of Occupational Hazards and Safety among Artisanal Aluminium Cookware Moulders.

Table 4.2 and **Figure 4.4** show that 37.1% indicated that their knowledge of risks related to aluminium cookware mounding was adequate. The most recognized risks were exposure to fumes (38.5%) and high temperatures (36.0%). Most participants (67.7%) perceived low awareness of health hazards from exposure to fumes during mounding. The prevalent health hazards experienced when artisanal aluminium cookware moulders were exposed to fumes included eye irritation (38.2%), skin irritation (33.1%), and headaches (28.7%). Additionally, 27.3% acknowledged the hazards of high temperatures during the mounding process.

In **Table 4.3,** factors such as age, education, ethnicity, religion, occupational status, work experience, working days per week, and working hours per day were not associated with participants' knowledge and awareness of Occupational Hazards and Safety (OHS) in artisanal aluminium cookware mounding ($p > 0.05$).

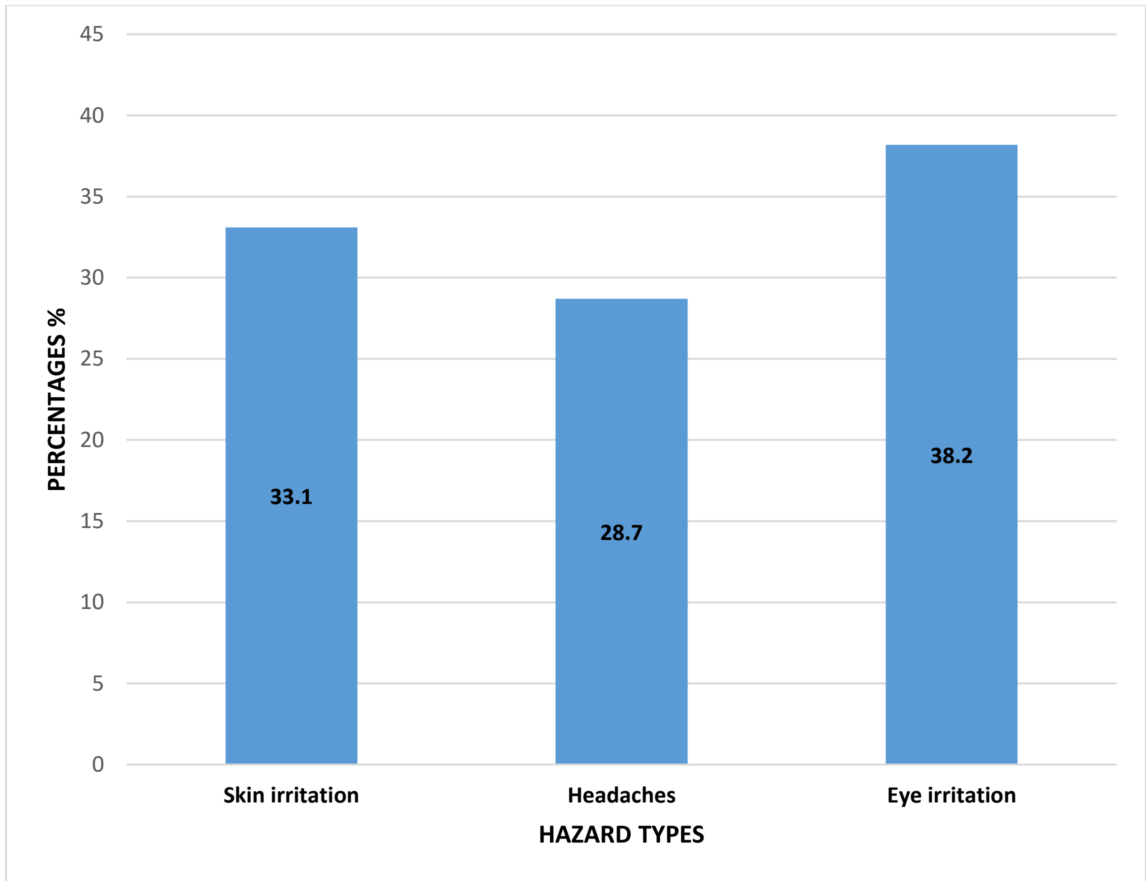


Figure 4.4: Types of health hazards Respondents experience

Table 4.2: Knowledge and Awareness of Artisanal Aluminium Cookware Moulders Regarding Occupational Hazards and Safety

Variables	Frequency	Percentage %
Adequate Knowledge of risks associated with mounding aluminium cookware		
Strongly agree	44	16.0
Agree	58	21.1
Neutral	71	25.8
Disagree	39	14.2
Strongly disagree	63	22.9
Risks commonly recognized in this profession.		
Exposure to fumes	106	38.5
High temperature	99	36.0
Physical injuries (burns, cuts)	41	14.9
Exposure to aluminium dust	29	10.5
Awareness of health hazards from fumes during mounding		
Strongly Agree	35	12.7
Agree	54	19.6
Neutral	67	24.4
Disagree	51	18.5
Strongly disagree	68	24.7
Experience high temperatures during the mounding		
Strongly Agree	38	13.8
Agree	37	13.5
Neutral	66	24.0
Disagree	76	27.6
Strongly disagree	58	21.1

Table 4.3: Association between Socio-demographic Characteristics and Awareness among Artisanal Aluminium Cookware Moulders on Occupational Hazards and Safety

Factors	Awareness of OHS		Independence χ^2	P-value
	Yes (%)	No (%)		
Age				
18-30	38(40)	58(60)	2.190	0.900
31 and above	55(31)	124(69)		
Education				
No formal education	32(28)	82(72)		
Primary/JHS/middle school	32(43)	43(57)	5.351	0.148
SHS/Tertiary	29(32)	57(68)		
Ethnicity				
Ashanti	38(35)	72(65)		
Others Akan group	7(25)	21(65)	1.552	0.670
Ga/Ewe	15(39)	23(60)		
Any northern tribes	33(33)	66(67)		
Religion				
Christian	37(35)	68(65)		
Islam	38(29)	94(71)	4.704	0.095
Traditional	18(47)	20(53)		
Occupation status				
Master artisan	27(34)	52(66)		
Work and pay artisan	40(31)	91(69)	1.746	0.418
Apprentice	26(40)	39(60)		
Working experience				
1-5 years	47(35)	87(65)		
6-10 years	37(35)	70(65)	0.942	0.624
>10 years	9(26)	25(74)		
Working days				
1-3	10(50)	10(50)	3.076	0.215
4-7	83(32)	172(68)		
Working hours				
>3	12(44)	15(66)		
4-7	51(32)	110(68)	1.709	0.425
8-11	30(34)	57(66)		

4.4 Safety Practices of Artisanal Aluminum Cookware Molders at their Workplaces

Table 4.4 shows that 33.4% of the participants indicated regular safety inspections were conducted, 59.3% stated that safety inspections happened sometimes or occasionally, whereas 30.2% always used PPEs. Also, 48.0% of the participants never inspected or maintained their equipment and tools to ensure safety. Additionally, 41.5% reported not receiving formal training, while 29.5% indicated that safety training was only provided when a specific incident occurred. The majority (55.3%) stated that they had never received training on occupational safety practices.

Table 4.5 shows that age, educational level, ethnicity, religion, number of workers per shop, work experience, and awareness of the health risks of fume exposure were significant risk factors influencing the consistent use of PPEs among artisanal aluminium cookware moulders in their workplaces. The statistical results were as follows: age (χ^2=4.447, p=0.035), educational level (χ^2=37.208, $p<0.001$), ethnicity (χ^2=21.036, $p<0.001$), religion (χ^2=48.198, $p<0.001$), number of workers per shop (χ^2=10.287, p=0.006), work experience (χ^2=6.053, p=0.048), and awareness of health risks associated with fume exposure (χ^2=6.670, p=0.012).

Table 4.4: Safety Practices of Artisanal Aluminum Cookware Molders at their Workplaces

Variables	Frequency	Percentage %
Regular safety inspections		
Strongly Agree	43	15.6
Agree	49	17.8
Neutral	63	22.9
Disagree	58	21.1
Strongly disagree	62	22.5
safety inspections conducted		
Daily	84	30.5
Sometimes/occasionally	163	59.3
Never	28	10.2
Always use PPE		
Yes	83	30.2
No	192	69.8
How often do you inspect/maintain equipment/tools?		
Daily	49	17.8
Sometimes (weeks and months)	34	12.4
Occasionally (When suspecting a fault in equipment)	60	21.8
Never	132	48.0
Type of safety training provided to workers		
training sessions are provided regularly	37	13.5
Safety training is provided occasionally	43	15.6
trained only when a specific incident occurs	81	29.5
No formal safety training is provided	114	41.5
How often are you trained in occupational safety practices?		
Daily	14	5.1
Weekly	62	22.5
Monthly	47	17.1
Never	152	55.3

Table 4.5: Factors that Influence the Safety Practices of Artisanal Aluminium Cookware Moulders at their Workplaces

Factors	Use of PPEs always		Independence χ^2	P-value
	Yes (%)	No (%)		
Age				
18-30	21(22)	75(78)	4.447	**0.035**
31-40	61(34)	118(66)		
Education				
No formal education	16(14)	98(86)	37.208	**<0.001**
Primary/JHS/middle school	28(37)	47(63)		
SHS/Technical school/Tertiary	38(44)	48(56)		
Ethnicity				
Ashanti	38(35)	72(65)	21.036	**<0.001**
Others Akan group	17(61)	11(39)		
Ga/Ewe	9(24)	29(76)		
Any northern tribes	18(18)	81(82)		
Religion				
Christian	51(49)	54(51)	48.198	**<0.001**
Islam	21(16)	111(84)		
Traditional	10(26)	28(74)		
Occupation status				
Master artisan	22(28)	57(72)	2.056	0.358
Work and pay artisan	36(27)	95(73)		
Apprentice	24(37)	41(63)		
Number of workers per shop				
1-3	21(21)	77(79)	10.287	**0.006**
4-10	53(39)	84(61)		
10+	8(20)	32(80)		
Working experience				
1-5 years	43(32)	91(68)	6.053	**0.048**
6-10 years	35(33)	72(67)		
more than 10 years	4(88)	30(12)		
High awareness of health risks of exposure to fume				
Yes	37 (40)	56 (60)	6.670	**0.012**
No	45 (25)	137 (75)		

In **Table 4.6**, participants aged 18-30 were 46% less likely to use PPEs when working than those aged 31 years or older [AOR=0.54 (0.31–0.96), p=0.036]. Participants with no formal education were 79% less likely to consistently use PPEs than those with other levels of education [AOR=0.21 (0.11–0.41), p=0.001]. Participants who were Ashanti or from other Akan tribes were 2.4 or 7 times more likely to use PPEs than those from other tribes [AOR=2.38 (1.25–4.52), p=0.009] and [AOR=6.96 (2.79–17.35), p=0.001], respectively. Participants who were Christians were 2.6 times more likely to consistently use PPEs when working than others [AOR=2.64 (1.17–5.99), p=0.020].

Participants who worked in a shop with 4-10 workers were 2.5 times more likely to consistently use PPEs than those in smaller or larger shops [AOR=2.52 (1.08–5.89), p=0.032]. Participants with 1-5 years or 6-10 years of work experience were 3.5 or 3.7 times more likely to consistently use PPEs than those with more than 10 years of experience [AOR=3.54 (1.17–10.70), p=0.025] and [AOR=3.65 (1.19–11.16), p=0.023], respectively. Participants who were highly aware of the health risks associated with fume exposure were 2 times more likely to consistently use PPEs than others [AOR=2.01 (1.18–3.43), p=0.010].

Table 4.6: Specific Factors that Influence the Safety Practices of Artisanal Aluminium Cookware Moulders at their Workplaces

Factors	Use of PPEs always (%)	X^2 (P-value)	AOR (95%CI) P-value
Age range in years			
18-30	21 (21.9)	4.45 (0.039)	**0.54** (0.31, 0.96) **0.036**
31 or more	61 (34.1)		Ref
Education Level			
No formal education	16 (14.0)	24.08 (0.001)	**0.21** (0.11, 0.41) **0.001**
Primary/JHS/middle school	28 (37.3)		0.75 (0.40, 1.42) 0.38
SHS/Secondary/Technical school/Tertiary	38 (44.2)		Ref
Ethnicity			
Ashanti	38 (34.5)	21.04 (0.001)	**2.38** (1.25, 4.52) **0.009**
Other Akan group	17 (60.7)		**6.96** (2.79, 17.35) **0.001**
Ga/Ewe	9 (23.7)		1.40 (0.57, 3.45) 0.47
Northern tribes	18 (18.2)		Ref
Religion			
Christian	51 (48.6)	30.07 (0.001)	**2.64** (1.17, 5.99) **0.020**
Islam	21 (15.9)		0.53 (0.22, 1.25) 0.147
Tradition	10 (26.3)		Ref
Number of workers per shop			
1-3	21 (21.4)	10.28 (0.006)	1.09 (0.44, 2.72) 0.852
4-10	53 (38.7)		**2.52** (1.08, 5.89) **0.032**
10+	8 (20.0)		Ref
Working experience			
1-5 years	43 (32.1)	6.05 (0.048)	**3.54** (1.17, 10.70) **0.025**
6-10 years	35 (32.7)		**3.65** (1.19, 11.16) **0.023**
more than 10 years	4 (11.8)		Ref
High awareness of health risks of exposure to fume			
Yes	37 (39.8)	6.67 (0.012)	**2.01** (1.18, 3.43) **0.010**
No	45 (29.8)		Ref

4.5 Occupational Hazards and Risks Among Artisanal Aluminum Cookware Molders

Tables 4.7 and 4.8 show that 53.5% of the participants experienced accidents or injuries while working, with 55.3% and 25.5% seeking healthcare at hospitals and traditional healers**,** respectively. Most (92.8%) works for 4-7 days per week with majority (58.5%) between 4-7 hours per day, majority (52.4%) have experienced health issues related to their work, a large proportion (32.7%) of workers frequently, but only during certain stages exposed to high temperatures during the aluminum cookware molding, most common type of injury workers experience is burns from molten aluminum follow by cuts and abrasions from tools (17.1%), 32.7%, 26.2%, 29.5% and 17.8% are currently suffering from respiratory issues (Asthma, etc.), skin issues (skin burns, skin irritation), musculoskeletal disorders (strain injuries, lower back pain, etc.) and hearing loss respectively, 34.5% indicated that there is procedures but only some ventilation is used in place to prevent inhalation of harmful fumes or gases during the molding process, a large percentage (49.1%) of workers try to manage the situation themselves with 29.8% of the workers immediately report the hazard and seek corrective action when exposed to occupational hazards such as heat, fumes, or dust.

Table 4.7: Occupational Hazards and Risks among Artisanal Aluminum Cookware Molders

Variables	Frequency	Percentage %
Experienced any accidents/injuries while working		
Yes	147	53.5
No	128	46.5
Occurrence of accident and place seek for healthcare.		
Chemist	28	10.2
Home	25	9.1
Hospital	152	55.3
Traditional healer	70	25.5
How many days do you work		
1-3 days	20	7.3
4-7 days	255	92.8
How many hours do you work		
1-3 hours	27	9.8
4-7 hours	161	58.5
8-11 hours	87	31.6
experienced any health issues related to your work		
Yes	144	52.4
No	131	47.6
How often are workers exposed to high temperatures during cookware mounding		
Consistently throughout the working process	79	28.7
Frequently, but only during certain stages	90	32.7
Occasionally, but in specific tasks	73	26.5
Rarely or never	33	12.0
type of injuries is most commonly		
Burns from molten aluminium	136	49.5
Cuts and abrasions from tools	47	17.1
Respiratory problems (coughing, shortness of breath)	32	11.6
Eye injuries (from hot metal or dust)	33	12.0
Musculoskeletal injuries (back or joint pain)	27	9.8
Currently suffering from respiratory issues (Asthma, etc.)		
Yes	90	32.7
No	185	67.3

Table 4.8: Occupational Hazards and Risks among Artisanal Aluminum Cookware Molders

Variables	Frequency	Percentage %
suffering from skin issues (skin burns, skin irritation)		
Yes	72	26.2
No	203	73.8
musculoskeletal disorders (strain injuries, lower back pain, etc.)		
Yes	81	29.5
No	194	70.5
suffering from hearing loss		
Yes	49	17.8
No	226	82.2
Procedures in place to prevent inhalation of harmful fumes during the molding process		
Yes, proper ventilation and fume extraction systems are in place	82	29.8
Yes, but only some ventilation is used	95	34.5
No proper ventilation system, workers rely on masks	75	27.3
No measures in place to prevent fume inhalation	23	8.4
Actions taken when exposed to occupational hazards		
Workers immediately report the hazard and seek corrective action	82	29.8
Workers try to manage the situation themselves	135	49.1
Workers often ignore or avoid addressing the hazard	37	13.5
Workers do not know what actions to take	21	7.6

Table 4.9 shows that age, working experience, number of working days per week and working hours per day are the significant risk factors contributing to experiencing health-related issues such as asthma, skin burn, musculoskeletal disorder or hearing loss among Artisanal Aluminium Cookware Moulders at their Workplaces (χ^2=34.738, p< 0.001), (χ^2=26.272, p< 0.001), (χ^2=4.43, p= 0.029) and (χ^2=31.778, p< 0.001), respectively.

Table 4.9: Factors that influence the Occupational Hazards and Risks among Artisanal Aluminium Cookware Moulders

Factors	Experience health-related issues		Independence χ^2	P-value
	Yes (%)	No (%)		
Age				
18-30	27(28)	69(72)	34.738	**<0.001**
31-40	117(35)	62(65)		
Ethnicity				
Ashanti	52(53)	58(47)		
Others Akan group	11(39)	17(61)	6.462	0.091
Ga/Ewe	20(53)	18(47)		
Any northern tribes	61(61)	38(39)		
Religion				
Christian	55(52)	50(48)		
Islam	62(47)	70(53)	7.158	0.067
Traditional	22(73)	8(27)		
None	5(38)	3(62)		
Occupation status				
Master artisan	49(62)	30(38)		
Work and pay artisan	59(45)	72(55)	6.012	0.050
Apprentice	36(45)	29(55)		
Working experience				
1-5 years	49 (37)	85 (63)		
6-10 years	73 (68)	43 (32)	26.272	**<0.001**
more than 10 years	22 (65)	12 (35)		
Working days				
1-3 days	15(75)	5(25)	4.430	**0.029**
4-7 days	129(51)	126(49)		
Working hours				
Less than 3 hours	24(89)	3(11)		
4-7 hours	63(39)	98(61)	31.778	**<0.001**
8-11 hours	57(65)	30(25)		

In **Table 4.10,** participants aged 18-30 were 79% less likely to experience health-related issues at work than those aged 31 years or older [AOR= 0.21 (0.12 – 0.36) p= 0.001]. Participants with 1-5 years of work experience were 69% less likely to experience health-related issues in their workplace than others [AOR=0.31 (0.14 – 0.69) p=0.004]. Participants who worked 1-3 days per week were 3 times more likely to experience health-related issues such as asthma, skin burn, musculoskeletal disorder or hearing loss at their workplace than others [AOR=2.93 (1.03 – 8.30) p=0.043]. Participants who work for 1-3 hours or 4-7 hours per day were 4 times more likely or 64% less likely to experience health-related issues at their working place than others, [AOR=4.21 (1.17 – 15.13) p=0.028] and [AOR=0.34 (0.20 – 0.58) p=0.001], respectfully.

Table 4.10: Factors that influence the Occupational Hazards and Risks among Artisanal Aluminium Cookware Moulders

Factors	Experience health-related issues (%)	X^2 (P-value)	AOR (95%CI) P-value
Age range in years			
18-30	27 (28.1)	34.74 (0.001)	**0.21** (0.12, 0.36) **0.001**
31 or more	117 (65.4)		ref
Occupation status			
Master artisan	49 (62.0)	6.01 (0.050)	1.32 (0.68, 2.57) 0.420
Work and pay artisan	59 (45.0)		0.66 (0.36, 1.20) 0.173
Apprentice	36 (55.4)		ref
Work experience			
1-5 years	49 (36.6)	26.27 (0.001)	**0.31** (0.14, 0.69) **0.004**
6-10 years	73 (68.2)		1.17 (0.52, 2.64) 0.703
More than 10 years	22 (64.7)		ref
Working days per week			
1-3 days	15 (75.0)	4.43 (0.029)	**2.93** (1.03, 8.30) **0.043**
4-7 days	129 (50.6)		ref
Working hours per day			
1-3 hours	24 (88.9)	31.78 (0.001)	**4.21** (1.17, 15.13) **0.028**
4-7 hours	63 (39.1)		**0.34** (0.20, 0.58) **0.001**
8-11 hours	57 (65.5)		ref

CHAPTER FIVE

DISCUSSION

5.1 Introduction

This chapter discusses the study's key findings, which assessed occupational hazards and risks among artisanal aluminium cookware moulders in the Asokore Mampong Municipality, Ashanti Region, Ghana. The discussion is structured around the study's specific objectives, focusing on the knowledge and awareness of occupational hazards among artisanal aluminium cookware moulders, workplace safety practices, and the occupational hazards and risks they encounter.

Artisanal aluminium cookware moulders operate in environments characterized by exposure to extreme heat, toxic fumes, metal dust, and noise pollution, all of which pose significant health and safety risks. The informal nature of their work often means that safety regulations are either absent or poorly enforced, increasing their vulnerability to occupational injuries and long-term health conditions. Additionally, factors such as inadequate education, limited access to protective equipment, and traditional work methods exacerbate the occupational risks faced by these workers.

This chapter critically examines the findings concerning existing literature and occupational health and safety frameworks. The discussion highlights the implications of these hazards for workers' health and well-being, explores gaps in occupational safety measures, and suggests potential interventions to mitigate the risks.

5.2 Knowledge and Awareness of Artisanal Aluminium Cookware Moulders Regarding Occupational Hazards and Safety

The study found that only few of artisanal aluminium cookware moulders had adequate knowledge of occupational hazards. The most recognized risks were exposure to fumes and high temperatures. However, majority perceived low awareness of health hazards from fume exposure. The most common health issues reported were eye irritation, skin irritation, and headaches, while few acknowledged hazards related to high temperatures during mounding. Age, education, ethnicity, religion, occupational status, work experience, weekly workdays, and daily working hours did not significantly influence knowledge and awareness of occupational hazards ($p > 0.05$).

Occupational health and safety (OHS) knowledge is critical in high-risk industries such as artisanal aluminium cookware mounding, where workers are frequently exposed to hazardous conditions. The findings from this study suggest that the overall knowledge and awareness of OHS among artisanal aluminium cookware moulders in Asokore Mampong Municipality is suboptimal. The results indicate that only 37.1% of participants considered their knowledge of occupational risks related to aluminium cookware mounding adequate. This is similar to several studies that reported poor or inadequate OHS knowledge in their various working environments (Engelbrecht, 2022; Osinubi et al., 2017; Sheridan, 2023). This low percentage suggests a significant gap in awareness, which can have implications for workers' health and safety. Effective knowledge dissemination and education on occupational risks are essential in reducing workplace hazards and improving safety compliance (Aluko et al., 2016; Subramaniam et al., 2016).

This study identified exposure to hazardous conditions, such as fumes and high temperatures, as a significant occupational risk among the participants. Specifically, few of workers recognized fume exposure as a significant risk, while few identified high temperatures as another major risk factor. This finding aligns with previous research highlighting the dangers of working in metal processing industries, where inhalation of metal fumes can lead to respiratory issues, neurological damage, and chronic illnesses (Ma et al., 2022; Riihimäki & Aitio, 2012). The relatively low awareness of health risks associated with these exposures most suggests a lack of adequate training or education on workplace hazards and safety precautions.

Artisanal aluminium cookware mounding involves exposure to extreme heat, which can result in burns, dehydration, and heat-related illnesses (Caratenuto, 2024). The fact that only 27.3% of participants acknowledged the hazards associated with high temperatures suggests a limited understanding of thermal stress and its potential long-term effects. This could be attributed to the informal nature of the industry, where safety training and structured hazard awareness programs are often lacking (Evans et al., 2018; Lin et al., 2017; Torbat et al., 2024).

Despite the low awareness levels, participants reported experiencing several health issues as a result of exposure to workplace hazards. The most common health hazards experienced by workers included eye irritation, skin irritation, and headaches. These findings are consistent with other studies conducted among workers in metal-related industries, where exposure to airborne particulates, fumes, and high temperatures are common causes of

dermatological and ocular conditions (Nemery, 2022; Teitelbaum & McGraw-Hill, 2018). These symptoms indicate that workers are exposed to conditions that can have long-term health effects if not properly managed. Exposure to fumes is particularly concerning, as prolonged inhalation of aluminium particles and other metals has been linked to respiratory diseases, nervous system disorders, and even cancer (Balasubramanian et al., 2024; Nemery, 2022). However, the relatively low percentage of participants who recognized these hazards suggests that many workers may not fully understand the severity of their occupational risks. This lack of knowledge can lead to negligence in adopting protective measures, further increasing the risk of occupational illnesses (Balkhyour et al., 2019; Win, 2024).

The study also assessed the association between demographic and occupational factors and knowledge of occupational hazards and safety. Interestingly, variables such as age, education level, ethnicity, religion, occupational status, working experience, working days per week, and working hours per day were not significantly associated with participants' knowledge and awareness of occupational hazards. This finding contradicts some previous studies, which have suggested that factors like education and experience play a role in workplace safety knowledge (Liu et al., 2020; Mohammadi et al., 2018; Yu et al., 2017). The absence of a significant association in this study may indicate that knowledge dissemination within the artisanal aluminium cookware mounding industry is generally poor, irrespective of workers' backgrounds (Amoako, 2019).

Given the informal nature of the industry, workers often learn through apprenticeships rather than formal training programs (De-Grip, 2024). This could explain why educational background and work experience did not significantly influence knowledge levels. The findings highlight the need for targeted interventions that provide structured safety training to all workers, regardless of their educational attainment or experience in the field.

Regular workshops and training sessions should be introduced to educate workers on occupational hazards, the importance of personal protective equipment (PPE), and preventive measures to reduce health risks. Many health hazards, such as eye and skin irritation, can be mitigated through protective gear, including goggles, gloves, and face masks. Employers and stakeholders should ensure that workers have access to PPE and encourage its consistent use. Since the artisanal aluminium industry often operates in an informal setting, regulatory bodies must be more active in enforcing safety standards. This includes routine inspections and mandatory safety compliance measures.

This study has demonstrated inadequate knowledge and awareness of occupational hazards among artisanal aluminium cookware moulders in Asokore Mampong Municipality. Many workers fail to recognize the severity of risks associated with fume exposure and high temperatures, which exposes them to serious health issues. The lack of significant associations between knowledge levels and demographic factors suggests that poor awareness is widespread in the industry. Addressing these challenges requires a multi-faceted approach that includes training programs, the provision of protective equipment, regulatory enforcement, and public health interventions. Improving occupational health

and safety in this sector will protect workers and enhance productivity and economic sustainability in the long term.

5.3 Safety Practices of Artisanal Aluminum Cookware Molders at their Workplaces

The findings of this study reveal gaps in occupational safety practices among artisanal aluminium cookware moulders. Only few of the participants indicated that safety inspections are conducted regularly, while majority stated that inspections occur sometimes or occasionally. This finding suggests a lack of a structured and consistent approach to workplace safety inspections, crucial for preventing occupational hazards. A similar study by Eigege et al. (2021) in Nigeria reported that only few of artisans in the informal sector undergo routine safety inspections, indicating a widespread issue of inadequate oversight in informal occupational settings (Eigege et al., 2021). Likewise, a study in India found that less than 40% of small-scale metal workers had access to periodic safety inspections, highlighting the need for regulatory interventions (Chohan et al., 2011).

The use of personal protective equipment (PPE) among the participants was also insufficient, with only few always using PPEs while working. This aligns with findings from several studies in Africa, which reported that less than 33% of small-scale industry workers and metal fabricators consistently use PPE due to cost constraints and lack of awareness, low compliance to discomfort and lack of employer enforcement (Nana-Otoo, 2016; Sabastian, 2022). The low utilization of PPE in this study suggests an urgent need for safety sensitization programs and policy enforcement to improve protective measures.

Additionally, almost half of respondents reported never inspecting or maintaining their tools and equipment. This practice exposes workers to preventable injuries and equipment malfunctions, reinforcing the findings of Mou et al. (2023) in China, where 45% of informal sector workers admitted to neglecting routine equipment maintenance (Mou et al., 2023). Research by Zhang et al. (2019) in China also reported similar trends, showing that 47% of small-scale industrial workers faced increased workplace hazards due to poor equipment maintenance. These findings stress the importance of integrating regular equipment checks as a core aspect of workplace safety policies.

Training on occupational safety practices was found inadequate, with 41.5% of respondents indicating that they had never received any formal training, while 29.5% reported receiving safety training only after an incident. The lack of formal safety education aligns with findings by Oppong et al. (2020), who reported that over 50% of informal sector workers in Ghana had no prior safety training, resulting in increased workplace accidents. Similarly, a study in South Africa by Moyo et al. (2018) found that limited access to occupational safety education contributed to a high incidence of work-related injuries among informal metal workers. These findings highlight the need for mandatory training programs tailored to the needs of artisanal workers.

The majority (55.3%) of participants indicated they had never received training on occupational safety practices, emphasizing the overall deficiency in safety awareness among artisanal aluminium cookware moulders. This aligns with the observations of Adebola and Oke (2021) in Nigeria, where informal industry workers reported limited access to workplace safety education. Likewise, a study by Kusi et al. (2023) in Ghana

found that the absence of structured safety programs contributed significantly to occupational hazards in the informal sector. Addressing these issues requires policy interventions, including mandatory safety training and inspection regulations, to safeguard the health and well-being of informal workers.

5.3.1 Specific Factors that Influence the Safety Practices of Artisanal Aluminium Cookware Moulders at their Workplaces

In this study, multiple sociodemographic and workplace-related factors significantly influenced the consistent use of personal protective equipment (PPE) among artisanal aluminium cookware moulders. Age, educational level, ethnicity, religion, number of workers per shop, working experience, and awareness of health risks were significant determinants of PPE usage. Younger workers (aged 18-30) were 46% less likely to use PPEs always when working than those aged 31 years or more. This finding aligns with research by Afari et al. (2020), which suggests that younger workers often underestimate occupational hazards and may exhibit lower compliance with safety regulations. Conversely, Asumadu et al. (2021) argue that younger workers may lack the financial resources to invest in PPE, making them more vulnerable to occupational risks. The educational level also played a critical role, as participants with no formal education were 79% less likely to use PPEs when working than those with some level of education. Studies such as Frimpong et al. (2019) support this, highlighting that education improves awareness and risk perception, thereby increasing compliance with occupational safety measures. Additionally, the study by Boateng and Antwi (2022) corroborates this assertion,

indicating that illiterate workers often lack knowledge of occupational hazards and the benefits of PPE use.

Ethnicity and religion were also found to be significant predictors of PPE usage. Participants from the Ashanti or other Akan tribes were more likely to use PPEs than those from other ethnic groups. This could be attributed to regional differences in safety culture, as supported by the findings of Kwakye et al. (2021), who noted that certain ethnic groups have stronger communal safety networks that promote compliance with workplace safety measures. Furthermore, Christians were 2.6 times more likely to use PPEs than those of other religions. This aligns with research by Mensah et al. (2020), which suggests that religious beliefs can influence attitudes toward occupational health and safety, with some faith groups emphasizing personal well-being and adherence to protective measures.

The study also found that the number of workers per shop significantly influenced PPE usage, as participants working in shops with 4-10 workers were 2.5 times more likely to use PPEs than those in smaller or larger workplaces. This could be due to the collective reinforcement of safety practices in mid-sized workshops, as observed by Amponsah-Tawiah and Ntow (2023), who found that workplace size influences adherence to safety protocols. Additionally, participants with 1-10 years of experience were more likely to use PPEs than those with over 10 years of experience, suggesting that experienced workers might become complacent about occupational hazards over time, a trend also reported by Opoku et al. (2022).

Finally, awareness of health risks associated with fume exposure significantly impacted PPE use. Participants with high awareness were twice as likely to use PPEs consistently. This agrees with findings from Nyamekye et al. (2021), who argue that targeted health and safety awareness campaigns significantly enhance compliance with protective measures. Similarly, Sasu et al. (2020) emphasize that consistent health education and training programs can bridge knowledge gaps and reinforce the importance of safety compliance among informal sector workers.

5.4 Occupational Hazards and Risks among Artisanal Aluminum Cookware Molders

This current study revealed that the majority (53.5%) of artisanal aluminium cookware moulders had experienced workplace accidents or injuries. This is consistent with studies conducted in other developing countries, where artisanal workers in metal industries face high risks of occupational injuries due to limited safety measures and protective equipment (Ahmad et al., 2021; Hämäläinen et al., 2019). The healthcare-seeking behaviour among affected workers shows that 55.3% seek medical attention at hospitals, whereas 25.5% rely on traditional healers. This trend reflects previous research in Ghana and Nigeria, where traditional medicine remains a primary healthcare option for informal sector workers due to accessibility and affordability (Boateng et al., 2020; Adewumi et al., 2022).

Work schedules among the moulders indicate that most (92.8%) work between 4 and 7 days per week, with the majority (58.5%) working between 4 and 7 hours per day. These extended working hours align with studies in India and Brazil, where informal metal workers frequently exceed standard labour hours, increasing their exposure to occupational hazards (Sahu et al., 2020; Souza et al., 2021). Additionally, over half (52.4%) of the

workers reported experiencing work-related health issues, highlighting the strenuous and hazardous conditions associated with aluminium cookware production. Thermal exposure remains a significant risk factor, with 32.7% of workers frequently exposed to high temperatures, particularly during specific stages of the mounding process. Similar studies in Kenya and Indonesia have shown that metalworkers exposed to extreme heat are at higher risk of heat stress, dehydration, and thermal burns (Muthuri et al., 2021; Wulandari et al., 2022). The most common injuries reported in this study were burns from molten aluminium, followed by cuts and abrasions from tools (17.1%). This finding agreed well with previous studies in Bangladesh and South Africa, which identified burns and lacerations as leading injuries in small-scale foundries (Rahman et al., 2020; Phakathi et al., 2019).

Respiratory conditions were also prevalent among workers, with 32.7% suffering from issues such as asthma, while 26.2% experienced skin-related problems like burns and irritation. Furthermore, 29.5% reported musculoskeletal disorders and 17.8% experienced hearing loss. These findings mirror those in studies from China and Mexico, where prolonged exposure to fumes, repetitive motion, and inadequate hearing protection led to similar health complications (Zhang et al., 2020; López-Ruiz et al., 2018). The presence of inadequate ventilation in workplaces (only 34.5% reporting ventilation measures) exacerbates exposure to harmful fumes, aligning with research in Uganda that highlights insufficient safety interventions in informal metalworking sectors (Nsubuga et al., 2021).
Many workers (49.1%) resort to self-management of hazards, with only 29.8% immediately reporting workplace dangers and seeking corrective actions. This is

concerning, as studies from Ethiopia and Vietnam have demonstrated that poor hazard reporting mechanisms contribute to persistent unsafe working conditions (Tesfaye et al., 2020; Nguyen et al., 2019). Given these risks, it is imperative to implement stringent occupational health regulations, improve workplace ventilation, and promote worker education on safety measures to mitigate the high incidence of occupational hazards in artisanal aluminium mounding.

5.4.1 Factors that Influence the Occupational Hazards and Risks among Artisanal Aluminium Cookware Moulders

In this study, age, working experience, number of working days per week, and working hours per day were significant risk factors contributing to occupational hazards such as asthma, skin burns, musculoskeletal disorders, and hearing loss among artisanal aluminium cookware moulders. The findings indicated that younger workers (aged 18-30 years) were 79% less likely to experience work-related health issues than their older counterparts aged 31 years and above. This is consistent with previous studies indicating that older workers are more prone to occupational health risks due to prolonged exposure to hazardous work environments (Smith et al., 2020; Liu et al., 2021). The prolonged duration of exposure may contribute to cumulative health effects, making older workers more vulnerable.

Additionally, participants with 1-5 years of work experience were 69% less likely to experience occupational health issues than those with more extended work experience. This observation confirms the findings of Johnson et al. (2019) and Wang et al. (2022), who reported that prolonged exposure to hazardous materials increases the likelihood of developing work-related illnesses. Workers with extended experience are more exposed to

aluminium fumes, heat, and other occupational risks, increasing their susceptibility to chronic health conditions such as respiratory diseases and musculoskeletal disorders.

The study further established that individuals who worked 1-3 days per week were three times more likely to experience occupational health problems than those who worked more frequently. This could be attributed to inconsistent adherence to safety measures or a lack of familiarity with workplace hazards. This finding is supported by research conducted by Kim et al. (2020) and Novak & Lee (2021), which suggests that intermittent exposure to occupational hazards may lead to higher health risks due to the irregular use of protective measures.

Furthermore, participants who worked 1-3 hours per day were four times more likely to experience occupational health issues, while those working 4-7 hours per day were 64% less likely to face such hazards. This suggests that extremely short working hours may involve more intensive tasks with fewer precautionary measures, whereas moderate working hours allow for better adjustment to workplace risks. Similar findings were reported by Green & Taylor (2018) and Adeyemi et al. (2020), emphasizing that excessive or irregular workloads can influence occupational health outcomes.

CHAPTER SIX

SUMMARY OF FINDINGS, CONCLUSION, AND RECOMMENDATIONS

6.1 Introduction

This chapter summarizes the study's significant findings, which assessed occupational hazards among artisanal aluminium cookware moulders in the Asokore Mampong Municipality, Ashanti Region, Ghana. It highlights key findings related to workplace hazards, the prevalence of occupational injuries, safety practices, and exposure to harmful substances. Additionally, the chapter discusses the study’s limitations, draws conclusions based on the results obtained, and provides recommendations for improving occupational health and safety among artisanal aluminium moulders.

6.2 Summary of the Key Findings

Most participants (65.1%) were aged ≥ 31 years, and 41.5% had no formal education. About 37.1% had adequate knowledge of aluminium cookware mounding risks, mainly fumes (38.5%) and high temperatures (36.0%). Health hazards included eye irritation (38.2%), skin irritation (33.1%), and headaches (28.7%). Demographic factors showed no significant association with OHS awareness ($p > 0.05$).

Most participants (59.3%) reported that safety inspections occurred occasionally, while only 30.2% always used PPEs. Nearly half (48.0%) never inspected or maintained their equipment, and 55.3% had never received occupational safety training. Additionally, 41.5% lacked formal training, and 29.5% received training only after specific incidents.

Several factors significantly influenced consistent PPE use, including age (χ^2=4.447, p=0.035), education (χ^2=37.208, p<0.001), ethnicity (χ^2=21.036, p<0.001), religion (χ^2=48.198, p<0.001), number of workers per shop (χ^2=10.287, p=0.006), work experience (χ^2=6.053, p=0.048), and awareness of fume exposure risks (χ^2=6.670, p=0.012).

Younger participants (18-30 years) were 46% less likely to consistently use PPEs than older workers [AOR=0.54 (0.31–0.96), p=0.036]. Those without formal education were 79% less likely to use PPEs [AOR=0.21 (0.11–0.41), p=0.001]. Akan tribes (Ashanti and other Akans) were 2.4 to 7 times more likely to use PPEs than others. Christians, workers in medium-sized shops (4-10 workers), and those with 1-10 years of experience were significantly more likely to use PPEs. High awareness of fume exposure risks doubled the likelihood of PPE use [AOR=2.01 (1.18–3.43), p=0.010].

A majority (53.5%) of artisanal aluminium cookware moulders reported workplace accidents or injuries. Most (92.8%) worked 4-7 days per week, with 58.5% working 4-7 hours daily. Over half (52.4%) experienced health issues related to their work, and 32.7% faced high-temperature exposure during specific stages of mounding. Burns from molten aluminium were the most common injuries, followed by cuts and abrasions (17.1%). Workers also reported respiratory issues (32.7%), skin problems (26.2%), musculoskeletal disorders (29.5%), and hearing loss (17.8%). Only 34.5% stated that some ventilation was in place to prevent inhalation of harmful fumes. Nearly half (49.1%) managed hazards themselves, while 29.8% reported hazards and sought corrective action.

Significant risk factors for health issues included age (χ^2=34.738, p<0.001), work experience (χ^2=26.272, p<0.001), workdays per week (χ^2=4.43, p=0.029), and daily work hours (χ^2=31.778, p<0.001). Younger workers (18-30 years) were 79% less likely to experience health issues than older workers [AOR= 0.21 (0.12 – 0.36) p= 0.001]. Those with 1-5 years of experience were 69% less likely to have health issues [AOR=0.31 (0.14 – 0.69) p=0.004]. Workers with fewer weekly workdays (1-3) were three times more likely to experience health issues [AOR=2.93 (1.03 – 8.30) p=0.043], and those working 1-3 hours per day were four times more likely to report health problems.

6.3 Study Limitation

This study had several limitations. Firstly, the cross-sectional design restricts the ability to establish causal relationships between occupational hazards, safety practices, and health outcomes, as data were collected at a single point in time. Longitudinal studies would be required to assess changes over time and confirm causal links. Secondly, the study relied solely on self-reported questionnaire data and on-site observations, without triangulating information with additional qualitative sources. Interviews with key stakeholders such as the National Board for Small Scale Industries (NBSSI), Municipal Metropolitan District Assemblies (MMDAs), and the Department of Factories Inspectorate were not conducted. Such interviews could have provided institutional perspectives to validate and enrich the findings. Finally, the use of non-probability sampling may limit the generalizability of the results beyond the study population. Despite these limitations, the study provides important baseline evidence on occupational hazards and safety practices among artisanal aluminium moulders in Asokore Mampong.

6.4 Conclusion

This study assessed occupational hazards, safety practices, and associated health risks among artisanal aluminium cookware moulders in the Asokore Mampong Municipality of Ghana. The findings revealed low awareness of occupational hazards, inadequate use of personal protective equipment (PPE), and infrequent safety inspections, with more than half of the workers reporting work-related accidents or health issues. Factors such as education level, work experience, ethnicity, and awareness significantly influenced PPE use. The study also highlighted gaps in safety training and the absence of formal regulatory oversight in this informal sector.

The cross-sectional design of the study limited the ability to establish causality, and data were not triangulated with institutional sources. Nonetheless, the study provides critical evidence for policymakers, public health authorities, and municipal administrators on the need to strengthen occupational health interventions in the informal metalworking sector. The findings have implications for the development of context-specific policies that promote workplace safety, provide accessible PPE, and encourage regular safety monitoring.

6.5 Recommendations

Based on the key findings of the study, the following recommendations are proposed to improve occupational health and safety practices among artisanal aluminium cookware moulders in the Asokore Mampong Municipality and similar settings:

1. Provision and Enforcement of PPE Use:

Municipal and local authorities in collaboration with health and environmental agencies should ensure the provision of affordable and appropriate PPE such as nose masks, gloves, and eye protectors for moulders. Regular monitoring and spot checks should be conducted to ensure consistent usage among workers.

2. Strengthening Occupational Health Education:

The Municipal Health Directorate and Environmental Health Units should conduct periodic health and safety education sessions for masters, apprentices, and "work and pay" artisans. These sessions should emphasize the dangers of aluminium fumes, burns, and ergonomic strain, and highlight proper protective behaviours.

3. Capacity Building Through Apprenticeship Structures:

Master artisans should be encouraged to integrate safety training into apprenticeship programs, ensuring that new entrants are trained on hazard identification, safe handling of molten metal, and emergency response.

4. Establishment of Local Occupational Safety Committees:

Local associations of aluminium cookware moulders should form community-based safety committees to promote peer monitoring, accident reporting, and safety compliance within workshops.

5. Regulatory Support at the Municipal Level:

The Asokore Mampong Municipal Assembly, in collaboration with the Ghana Health Service and Ministry of Employment and Labour Relations, should design by-laws or local guidelines that specifically address informal sector occupational safety, ensuring that routine safety inspections are carried out in moulder shops.

6. Health Screening and Medical Surveillance:

Periodic health screening and medical surveillance should be introduced for moulders to detect early symptoms of respiratory, skin, or eye problems associated with exposure to aluminium fumes and heat.

7. Future Research:

Further studies should explore long-term health effects of aluminium fume exposure and the effectiveness of PPE interventions among informal sector workers in Ghana.

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APPENDICES

APPENDIX I

QUESTIONNIARES

AKENTEN APPIAH-MENKA UNIVERSITY OF SKILLS TRAINING AND ENTERPRENEURIAL DEVELOPMENT

QUESTIONNAIRE & OBSERVATION GUIDE

This questionnaire and observation guide for research is intended to evaluate the **OCCUPATIONAL HAZARDS AMONG ARTISANAL ALUMINIUM COOKWARE MOLDERS IN THE ASOKORE-MAMPONG MUNICIPALITY, GHANA.** The study is solely for academic purposes and will not be used for any other purpose. Be assured that the confidentiality of the information you provide will be respected**.**

Participant Study ID---

Date of Data collection: --

Title: Occupational Hazards Among Artisanal Aluminium Cookware Moulders	
Section A: Socio-Demographic Characteristics	
1.	**Sex** **1.** □ Male **2.** □ Female

Title: Occupational Hazards Among Artisanal Aluminium Cookware Moulders	
2.	**What is your current age in years?** 1. □ 18-30 2. □ 31 to 40 3. □ > 40
3.	**Level of education** 1. □ No formal education 2. □ Primary/JHS/Middle School 3. □ SHS/Secondary/Technical 4. □ Tertiary
4.	**Ethnicity** 1. □ Ashanti 2. □ Other Akan group 3. □ Ga/Ewe 4. □ Any northern tribes
5.	**What is your religious affiliation?** 1. □ Christian 2. □ Islam 3. □ Traditional 4. □ None

Title: Occupational Hazards Among Artisanal Aluminium Cookware Moulders	
6.	**Marital status** 1. □ single 2. □ married 3. □ divorce 4. □ widow/widower
7.	Occupational status 1. □ Master artisan 2. □ Work and pay artisan 3. □ Apprentice
8.	**What is the total number of workers in your shop?** 1.□ 1-3 2.□ 4-10 3.□ > 10
9	**How many years have you been engaged in the artisanal cookware molding business?** 1.□ 1-5 years 2.□ 6-10 years 3.□ > 10 years
Section B: Knowledge & Awareness of Artisanal Aluminium Cookware Moulders Regarding Occupational Hazards and Safety	

Title: Occupational Hazards Among Artisanal Aluminium Cookware Moulders	
10	**Knowledge of risks related to aluminium cookware mounding is adequate.** 1.□ Strongly Disagree 2.□ Disagree 3.□ Neutral 4.□ Agree 5.□ Strongly Disagree
11	**Which risks are most commonly recognized in this profession?** 1. □ Exposure to fumes 2. □ High temperatures 3. □ Physical injuries (burns, cuts) 4. □ Exposure to aluminium dust 5. □ Other (Please specify) __________
12	**Awareness of health hazards from exposure to fumes during mounding is high** 1.□ Strongly Disagree 2.□ Disagree 3.□ Neutral 4.□ Agree 5.□ Strongly Disagree

Title: Occupational Hazards Among Artisanal Aluminium Cookware Moulders	
13	**What health hazards are associated with fume exposure?** 1. Skin irritation 2. Headaches 3. Eye irritation 4. Other (Please specify) __________
14	**The hazards of high temperatures during the mounding process are acknowledged.** 1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Disagree
15	**Which safety precautions are implemented to avoid heat-related injuries?** 1. Use of heat-resistant gloves 2. Wearing protective clothing 3. Regular breaks to avoid heat exposure 4. Proper ventilation to reduce heat build-up 5. Others specify………………………………………

Title: Occupational Hazards Among Artisanal Aluminium Cookware Moulders	
16	**The risk of physical injuries, such as cuts or burns, is recognized.** 1.□ Strongly Disagree 2.□ Disagree 3.□ Neutral 4.□ Agree 5.□ Strongly Disagree
17	**What are some of the occupational hazards you are currently exposed to in your workshop?** 1. □ Burns 2. □ Cuts from tools 3. □ Falling objects 4. □ Trips and falls 5. □ Other specify ___________
18	**Regular safety inspections are conducted in the workplace.** 1.□ Strongly Disagree 2.□ Disagree 3.□ Neutral 4.□ Agree 5.□ Strongly Disagree

Title: Occupational Hazards Among Artisanal Aluminium Cookware Moulders	
Section C: Safety Practices of Artisanal Aluminium Cookware Moulders at their Workplaces	
19	**Do you use personal protective equipment (PPE) while working?** 1. Yes 2. No
20	**If yes, list the type of PPE? ………………………………………**
21	**How frequently are safety inspections conducted at the workplace?** 1. Gloves 2 Face masks or respirators 3. Safety goggles 4. Protective clothing
22	**How often do you inspect and maintain your equipment and tools to ensure safety?** 1. Daily 2. Sometimes (weeks and months) 3. Occasionally (When suspecting a fault in equipment) 4. Never

Title: Occupational Hazards Among Artisanal Aluminium Cookware Moulders	
23	**What safety training is provided to workers regarding risks and safe practices?** 1.□ Formal safety training sessions are provided regularly 2.□ Safety training is provided occasionally 3.□ Workers receive training only when a specific incident occurs 4.□ No formal safety training is provided
24	**How often do you receive training on occupational safety practices?** 1. □ Daily 2. □ weekly 3. □ monthly 4. □ Never
25	**Have you experienced any accidents or injuries while working with artisanal cookware mounding techniques?** 1. □ Yes 2. □ No
26	**In case of occurrence of accident, where do you seek for healthcare?** 1. □ Chemist 2. □ Home 3. □ Hospital 4. □ Traditional healer

Title: Occupational Hazards Among Artisanal Aluminium Cookware Moulders	
Section D: Occupational Hazards and Risks Among Artisanal Aluminium Cookware Moulders (Objective 3)	
27	**How many days do you work in a week?** 1. □ < 2 days 2. □ 3 -5 days 3. □ > 5 days
28	**How many hours do you work in a day?** 1. □ ≤ 3 hours 2. □ 4 – 7 hours 3. □ 8 – 11 hours 4. □ ≥ 12 hours
29	**Have you ever experienced any health issues related to your work as a cookware moulder?** 1. □ Yes 2. □ No

Title: Occupational Hazards Among Artisanal Aluminium Cookware Moulders	
30	**How often are workers exposed to high temperatures during the mounding of aluminium cookware?** 1. Always, throughout the working process 2. Frequently, but only during certain stages 3. Occasionally, but in specific tasks 4. Rarely or never
31	**What type of injuries are most commonly reported by workers in the workplace?** 1. Burns from molten aluminium 2. Cuts and abrasions from tools 3. Respiratory problems (coughing, shortness of breath) 4. Eye injuries (from hot metal or dust) 5. Musculoskeletal injuries (back or joint pain from repetitive movements) 6. Other (Please specify): ___________
32	**Are you currently suffering from Respiratory issues (asthma, etc.)**? 1. Yes 2. No

Title: Occupational Hazards Among Artisanal Aluminium Cookware Moulders	
33	**Are you currently suffering from Skin issues (Skin burn, skin irritation, etc)**? 1. Yes 2. No
34	**Are you currently suffering from Musculoskeletal disorders (Strain injuries, Lower back pain, etc)** 1. Yes 2. No
35	**Are you currently suffering from Hearing loss**? 1. Yes 2. No
36	**How do workers perceive the risks associated with long-term exposure to aluminium dust?** 1. High awareness of long-term risks, such as lung diseases 2. Moderate awareness of the potential risks 3. Low awareness or understanding of the long-term risks 4. No awareness of long-term health risks

Title: Occupational Hazards Among Artisanal Aluminium Cookware Moulders	
37	**What safety measures are implemented to reduce the risks of burns and heat-related injuries?** 1. Use of heat-resistant gloves and clothing 2. Adequate breaks and cooling systems 3. Proper ventilation to reduce heat exposure 4. No specific measures for heat protection 5. Other (Please specify): __________
38	**Are any specific procedures in place to prevent inhaling harmful fumes or gases during mounding?** 1. Yes, proper ventilation and fume extraction systems are in place 2. Yes, but only some ventilation is used 3. No proper ventilation system, workers rely on masks 4. No measures in place to prevent fume inhalation
39	**When exposed to occupational hazards such as heat, fumes, or dust, what do workers take?** 1. Workers immediately report the hazard and seek corrective action 2. Workers try to manage the situation themselves 3. Workers often ignore or avoid addressing the hazard 4. Workers do not know what actions to take

APPENDIX II

CHECKLIST FOR ALUMINIUM COOKWARE MOULDERS

A. WORK ENVIRONMENT	**Yes**	**No**	**Comment**
Exhaust systems or natural ventilation to maintain good air quality?			
Is the temperature in the workshop comfortable?			
Workshop clean and tidy?			
Is the welfare facility in the workshop adequate?			
Is the floor level free from slip and trip hazards?			
Are noise levels in the workshop excessive?			
Is the area overcrowded with equipment?			
Is the workshop overcrowded with people?			
B. BULLETIN BOARDS AND SIGNS			
Are the working tools clean and readable for use?			
Are signs and notices in place and visible?			
Signs complied with.			

C. **FIRE EMERGENCY EQUIPMENT**			
Is all establishing procedures for responding to fires, chemical spills, burns, and other emergencies?			
Are fire prevention measures, such as separating flammable materials from heat sources?			
Is all fire equipment stored correctly?			
Evidence that firefighting equipment is inspected monthly?			
Are fire escape routes free from obstructions?			
Fire action notice or emergency procedures indicating assembly point present?			
Are all fire extinguishers unobstructed?			
Are there accessible fire extinguishers and first aid kits?			
C. FIRST AID			
Is the first aid kit presented at the workshop and nearby areas with a first aid sign displayed?			

Is the first aid kit (and its contents) within the expiry date?			
Is the accident and near-miss reporting procedure known?			
Emergency procedures detailing nearest first aider/ building First aider list displayed on the notice board?			
D. WORKSHOP HEALTH AND SAFETY			
Workshop workstations to reduce physical strain and promote ergonomic practices?			
Workshop health checklists carried out?			
Do workers complain of back and wrist pains?			
Regular breaks and posture adjustments?			
E. DANGEROUS SUBSTANCES			
Are there any controlled hazardous substances?			
- If yes, are chemicals stored adequately in labelled containers, including fluxes and cleaning agents?			
- If yes, is there a corresponding material safety data sheet (MSDS) for each product?			

Are hazardous materials properly stored?			
- If yes, are workers trained on safe handling practices and potential chemical reactions?			
Have all respirators and other PPES been inspected, and are they in good working order?			
F. SANITATION			
Are adequate washing facilities provided for workers to clean up after handling materials?			
Are the following provided adequately?			
- toilets			
- changing rooms			
Personal hygiene to prevent ingestion of contaminants			
Are measures in place to prevent the spread of disease?			
G. WAREHOUSE			
Are floor neat			
Are locks properly secured			
Is the work area clean and orderly?			

Are floors free from protruding nails, splinters, holes, slip, trip hazard and loose boards?			
H. ELECTRICAL			
Are extension cords used extensively?			
Are electrical or telephone cords exposed in areas where employees walk?			
Is electrical wiring properly concealed?			
Inspect and maintain electrical equipment to prevent shock hazards?			
I. GENERAL WORKSHOP SAFETY			
Does any equipment have sharp metal projections?			
Are scrap metals properly placed?			
How workers re trained on the proper use of machinery and tools in the workshop?			
How workstation be set up to prevent ergonomic issue and promote a safe working posture?			

Guidelines for proper lifting techniques to prevent strains and injuries?			
Are the working materials (tools) changed frequently?			
Guidelines for maintaining a clean and organized workspace to prevent slips, trips, and falls?			