MORBIDITY AND MORTALITY TRENDS OF OCCUPATIONAL ACCIDENTS AMONG FACTORY WORKERS IN SELECTED INDUSTRIES IN IBADAN, OYO STATE

BY

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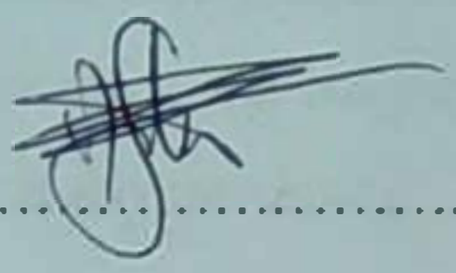
CERTIFICATION

I certify that this work was carried out by Ogbu Adaora Ijeamaka in the Department of Epidemiology and Medical Statistics, Faculty of Public Health, University of Ibadan, Ibadan.



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DECLARATION

I declare that the work entitled 'Morbidity and mortality trends of occupational accidents among factory workers in selected industries in Ibadan, Oyo State' has been performed by me in the Department of Epidemiology and Statistics under the supervision of Professor Olufunmilayo I. Fawole. The information derived from literature has been duly acknowledged in text and list of references provided. No part of this project report was previously presented for another degree or diploma at any university.

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DEDICATION

This research is dedicated to God Almighty, who preserved me and granted me the opportunity to carry out this work;

And to my mother for her motivation and love;

To all victims of occupational injuries and accidents

ACKNOWLEDGEMENT

I am forever grateful to the Almighty God for His grace, wisdom and protection throughout this period.

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ACRONYMS

COPD: Chronic Obstructive Pulmonary Disease

CFR: Case fatality rate

DALYS: Disability Adjusted Life Years

FMLE: Federal Ministry of Labour and Employment

FMLEID: Federal Ministry of Labour and Employment Inspectorate Department

GDP: Gross Domestic Product

ILO: International Labour Organisation

MSDs: Musculoskeletal Disorders

NESREA: National Environmental Standards and Regulations Agency

NIOSH: National Institute for Occupational Safety and Health

NSITF: National Social Insurance Trust Fund

OHS: Occupational Health and Safety-

OHSMS: Occupational Health and Safety Management Systems

WHO: World Health Organisation

UN: United Nations

ABSTRACT

The burden of occupational injuries is decreasing in industrialized countries due to a preventive health and safety culture. However, the trend in developing countries has not been easy to determine due to greater attention on infectious diseases and other health care issues. There is a dearth of data when attempting to establish trends of occupational injuries and accidents in Nigerian industries in relation to accident rates, fatality rates, causal factors and interventions. Industrial processes and sites where injuries occur most frequently should be identified. Thus, this study explores the pattern of reported accidents and injuries among factory workers as well as the occupational health and safety management systems of selected industries in Ibadan, Oyo State.

A mixed methods approach using both quantitative and qualitative methods of research was employed. A review of accidents and injuries reported by industries in Oyo state to Federal Ministry of Labour and Employment over a 17-year period (2000-2016) was carried out. Records were analysed using descriptive statistics and chi-square test to estimate the association between accident characteristics and outcome of occupational injuries. Logistic regression was used to identify risk factors for injuries leading to permanent disability. Focus group discussions and in-depth interviews were conducted among factory workers as well as key stakeholders involved in implementation of occupational health and safety respectively in selected industries in Ibadan. Thematic content analysis was used to categorize responses into common domains.

A total of 50 injuries were reported and documented during the 17-year period with a case fatality rate of 26 deaths per 100 workers. Young male factory workers (mean age=34.1±8.5), made up 98% of victims and were mostly machine operators. Most common injuries were wounds, fractures and dislocations (54%) of which the upper extremities (38%) were mostly affected and resulted from being caught between machine parts (38%). Majority of accidents took place in the morning (60.4%) and in the production hall (38%), mainly as a result of the victims' unsafe acts (50%). Age, working environment, nature of injury and affected body part were significantly associated with outcome of occupational injury (fatal versus non-fatal). Factory workers with injuries to the head and upper extremities were more likely to be permanently disabled. (Head injuries: AOR=11.8, 95% CI: 1.21, 114.9 $p<0.05$; Injuries to upper

extremities: AOR=12.1, 95% CI: 1.88, 78.3 p<0.05). Qualitative data highlighted the differences in safety organisation and accident reporting among various industries.

Accidents are inevitable in the industrial setting. The study demonstrated massive under-reporting of occupational accidents and injuries. The poor reporting of accidents among industries is largely due to nonchalant attitude to safety regulations and poor safety management systems. In order to develop an accurate National OHS profile, proper occupational accident statistics collection and analysis must begin at local government and state levels. Manufacturing industries must implement adequate safety management systems to establish a safety culture among its workers to minimize unsafe acts and unsafe conditions.

Word Count: 499

Keywords: mortality, industries, occupational accidents, occupational injuries, factory workers, Ibadan

CHAPTER ONE

INTRODUCTION

1.1 Background

Accidents are mostly a preventable cause of fatalities in society today accounting for a greater proportion of mortalities globally (ILO, 2012). The World Health Organisation (WHO) describes accidents as "unplanned and unanticipated events" (World Health Organization, 2008). Majority of deaths due to accidents are attributed to falls, drowning, poisonings, road traffic injuries and burns. These events occur often in workplaces where people are known to spend most hours of the day. The International Labour Organisation (ILO) defines occupational accidents as "events which may arise at work or in the course of work, which results in fatal or non-fatal injuries" e.g. a fall from a height or contact with moving machinery (ILO, 2014).

The absence of reliable information about the incidences of occupational accidents and diseases is a major obstacle to reducing the appalling toll of work-related deaths and injuries. Despite enormous advances in technology, preventive medicine and the means to prevent accidents, the International Labour Office (ILO) and the World Health Organisation (WHO) estimate that around 1.2 million work-related deaths, 250 million accidents and 160 million work-related diseases occur worldwide each year. Death, illness and injury on such a scale impoverish individuals and their families, and undermine attempts to improve working conditions. In addition to immeasurable human suffering, they cause major economic losses for enterprises and societies as a whole through lost productivity and reduced work capacity. It is estimated that around 4 per cent of the world's gross domestic product (GDP) is lost in terms of various direct and indirect costs including compensation, medical expenses, property damage, lost earnings and replacement training (ILO, 2012).

Globally, the socio-economic impact and human costs of occupational accidents are tremendous. Takala, Hämäläinen et al. (2014) estimated, based on 2012 data, that globally there are 2.3 million deaths annually attributed to work of which 300,000 are linked to accidents. Two hundred and sixty-four million industrial accidents occur every year with over 350,000 deaths worldwide, occupational injuries account for 15% of all work-related mortality (Taswell & Wingfield-Digby, 2008). Industrial accidents are usually associated with devastating outcomes such as permanent

disability, and death as well as economic losses to the victims and their families. Economic costs of work-related injury and illness vary between 1.8% and 6% of GDP in country estimates with an average of 4%(ILO, 2012). The ILO has estimated the impact of workplace morbidities from the point of view of occupational burden (Takala et al., 2014) while the WHO global estimate has a public health view point. Both conclude that of all fatalities 5-7% can be attributed to workplace related illnesses and injuries(World Health Organization, 2008). More than half of these mortalities occur in developing countries. Both ILO and WHO agree that the overall fatality rate of 14 per 100,000 is underestimated and predict worsening figures especially in the developing world (Hämäläinen et al., 2006).

Traumatic occupational injuries and fatalities occur in all occupational groups especially in the industrial sectors though risks vary by specific work activity (NIOSH, 1998). Drowning, asphyxiation and poisoning are considered injuries just like acute trauma, because they represent a relatively rapid departure from the normal body structure or function (Mirer & Stellman, 2008). Multiple risk factors lead to workplace injuries such as hazardous exposures, workplace and process design, work organisation and environment, economic and social factors. This necessitates hazard identification and risk assessment in every workplace to prescribe adequate preventive or control measures. Prevention strategies are varied and depend on the setting but may include engineering control, protective equipment or technology, management policy and investment in safety, regulations, and education.

In most industrialised countries, governments have enacted laws to ensure health and safety at work. Legislation and enforcement of these laws provide good opportunities for improving the health of workers and promoting a culture of safety and health at work (Burton, 2010). The Nigerian Federal government enforces the minimum safety and health standards in industries nationwide through the Occupational Safety and Health department (OHS) of the Federal Ministry of Labour and Employment (FMLE) under the Factories Act 2004 CAP 126 LFN(Umeokafor, Kostis et al. 2014). The Act mandates all industries to report dangerous occurrences and accidents that keep workers away from work for three days or more, to the factory inspectorate division of the Ministry. These events are documented and investigated with preventive measures recommended by OHS inspectors. There is, however, evidence that regulation enforcement tools

such as routine inspection of industries, reduces the incidence of occupational injuries(Van Der Molen et al., 2007).

1.2 Problem Statements

Occupational injuries especially traumatic ones exact a huge toll on the workplace and associated economic costs are high. Yet the investment in occupational injury prevention is very little compared to resources dedicated to research in preventing diseases such as AIDS, Cancer and heart disease (NIOSH, 1998). Efforts to set research and prevention priorities for industrial accidents must be driven by data that identify the nature and magnitude of these events. The need for data has informed the descriptive stage of this study which reviews accident records reported to FMLE.

Nigeria as a member of the ILO ought to submit a report of all occupational accidents with brief descriptions of injuries and fatalities recorded annually. However, the ILO has observed that underreporting is a common phenomenon with workplace accident reporting in developing countries (ILO, 2012). Inadequate records and poor funding of government offices have been blamed for insufficient data to enable suitable policy formulation and preventive measures. Studies by Ezenwa (2001) and Umeokafor et al (2014) showed poor reporting of workplace accidents in Nigeria by organisations due to fear of sanctions, defamation, ignorance and poor regulatory functions by the appropriate body. Umeokafor et al (2014) discovered that nationwide only 40 accidents and 95 injuries, of which 46 were fatal, were reported over an 11-year period to FMLE. The paucity of data, as distressing as it is, only reflects events that occur in formal registered workplaces. In Nigeria, a majority of workers are in the informal sector with little or no record of work related injuries from this sector, reflecting the dilemma of this sector of the economy.

1.3 Justification of the study

Evidence-based information is therefore needed, particularly by those charged with the task of workplace safety and health monitoring, to understand the requirements for a strategic action plan for reducing and preventing workplace accidents and injuries. This information should be sufficiently comprehensive and accurate (ILO, 2014). For any preventive measure at any level to be evidence-based and meaningful, the data will depend on the reporting of occupational diseases and injuries (Okojie, 2010) which should be based on international standards for adequate

comparison between countries. There is need to address the lack of empirical data required to ascertain the burden of occupational injuries and fatalities in the Nigeria's industrialized cities. review of accident records in government ministries will be one way to start.

Assessment of morbidity and mortality trends in industrial accidents to detect any changes in the pattern and occurrence of traumatic injuries and monitor improvements in safety can guide preventive efforts. It also informs policy makers and other stakeholders in policy formulation and implementation. Industries and occupations where injuries or fatalities occur most frequently and with greatest severity should be identified to rightly prioritise preventive strategies. This study informs factory owners and employees on the risks associated with their work and workplaces. Hence, they can take an active part in their own safety and evaluate the effectiveness of preventive measures while revealing new areas of risk.

Indicators appropriate in assessment of OHS status and possible areas for future research have been identified as this study serves as a template for research that will be carried out in other highly industrialized cities. Interaction with key stakeholders, safety management representatives and factory workers, in these industries has provided further insight into the current status of workplace safety. This aids in setting priorities for both research and prevention efforts. The criteria for setting priorities being the extent of the problem (frequency of injury and size of affected workforce), the risk to workers (injury rates), injury severity and amenability to prevention, as well as cost-effectiveness and likelihood for adoption of prevention strategies by the industry (NIOSH, 1998).

1.4 Research questions

The questions that this study endeavored to answer include:

1) What are the case-fatality rates and traumatic injury frequency rates due to workplace accidents in selected industries in Ibadan?
2) Do these accidents have a pattern in terms of work shifts, age, gender or industrial activity?
3) What are the common types of traumatic injuries and accidents occurring among these industries?
4) What are the causal factors associated with reported accidents in selected industries in Ibadan?
5) Are accidents underreported among registered industries in Ibadan?

6) Have government regulatory functions played a role in occupational health and safety in these industries?

1.5 Objectives of the study

1.5.1 General objectives

The objective of this study was to determine the trends of occupational injuries and accidents in industries in Ibadan, Oyo State.

1.5.2 Specific objectives

This study aimed to:

1. Describe the trends of occupational injuries and accidents in industries in Ibadan, Oyo State.
2. Identify patterns of reported and documented fatal and non-fatal injuries in the selected industries
3. Determine the prevalence and case fatality rates of occupational injury/accidents for 16 years (2000-2016)
4. Identify factors influencing occurrence of occupational injuries and accidents in the industrial sector
5. Describe the challenges associated with reporting and documentation of occupational injuries and accidents among factory workers

CHAPTER TWO

LITERATURE REVIEW

2.1 An overview of occupational injuries and accidents

There is a widening gap between the fields of public health and occupational health which must be bridged. In recent times, public health has shifted away from environmental factors of disease towards individual risk-taking behaviors(Quinn, 2003). Workplace public health practice has focused on smoking, diet, exercise, alcohol consumption and communicable diseases with less emphasis on physical exposures and stressful working conditions. This shift reflects a broader political trend toward reducing corporate social and environmental responsibility(Quinn, 2003).

Injuries are on the increase in most developing countries especially those in sub-Saharan Africa(Nordberg, 1994). This increase has been attributed to rapid growth of modern transport and industrialization without ensuring proper preventive or safety measures(Hämäläinen et al. 2009; World Health Organization, 2008). Globally, injuries contribute at least 5% of the total mortality. According to the ILO, every minute about 4 people are killed by work-related accidents and illnesses while over 600 people sustain various injuries while working during the same period (ILO, 2012). It is estimated that 2.3 million deaths occur annually across the world for reasons attributed to work and occupational injuries are responsible for 15% (318,000) of these deaths. (Hämäläinen et al., 2009) These figures are largely estimates as many countries do not report data on occupational injuries and accidents to the ILO especially African countries, which also do not account for injuries in the predominant informal sector (Pearson, 2009). Thus, the extent of impact on the workforce and general population by occupational injuries and accidents should not be underestimated.

The ILO submits that some member states in Asia (Indonesia, Kuwait) and Africa (South Africa and Nigeria) failed to report any fatalities or accidents for use in their estimation. However, the sectors responsible for almost half of all injuries and fatalities in South Africa were reported to be construction, agriculture, iron and steel production, and food and drink production (Pearson, 2009). Reliable data for accidents and fatalities across all industries in countries like India was not available as India reported just 222 fatalities and 928 notifiable injuries in 2001 whereas ILO estimates there were over 40,000 accident fatalities and over 30 million 3+day injuries (Laborsta

ILO, 2001). Industrial and agricultural workers have been said to have the most dangerous and hazardous jobs. According to estimates from the International Labour Office, some 170,000 agricultural workers are killed each year which means that workers in agriculture run at least twice the risk of dying on the job as compared with workers in other sectors (ILO, 2000). Agricultural mortality rates have remained consistently high as compared with other sectors, where fatal accident rates have decreased. However, widespread under-reporting of deaths, injuries and occupational diseases in agriculture have hidden the true status of the occupational health and safety of farm workers (Lerer & Myers, 1994). It is likely to be worse than what official statistics indicate.

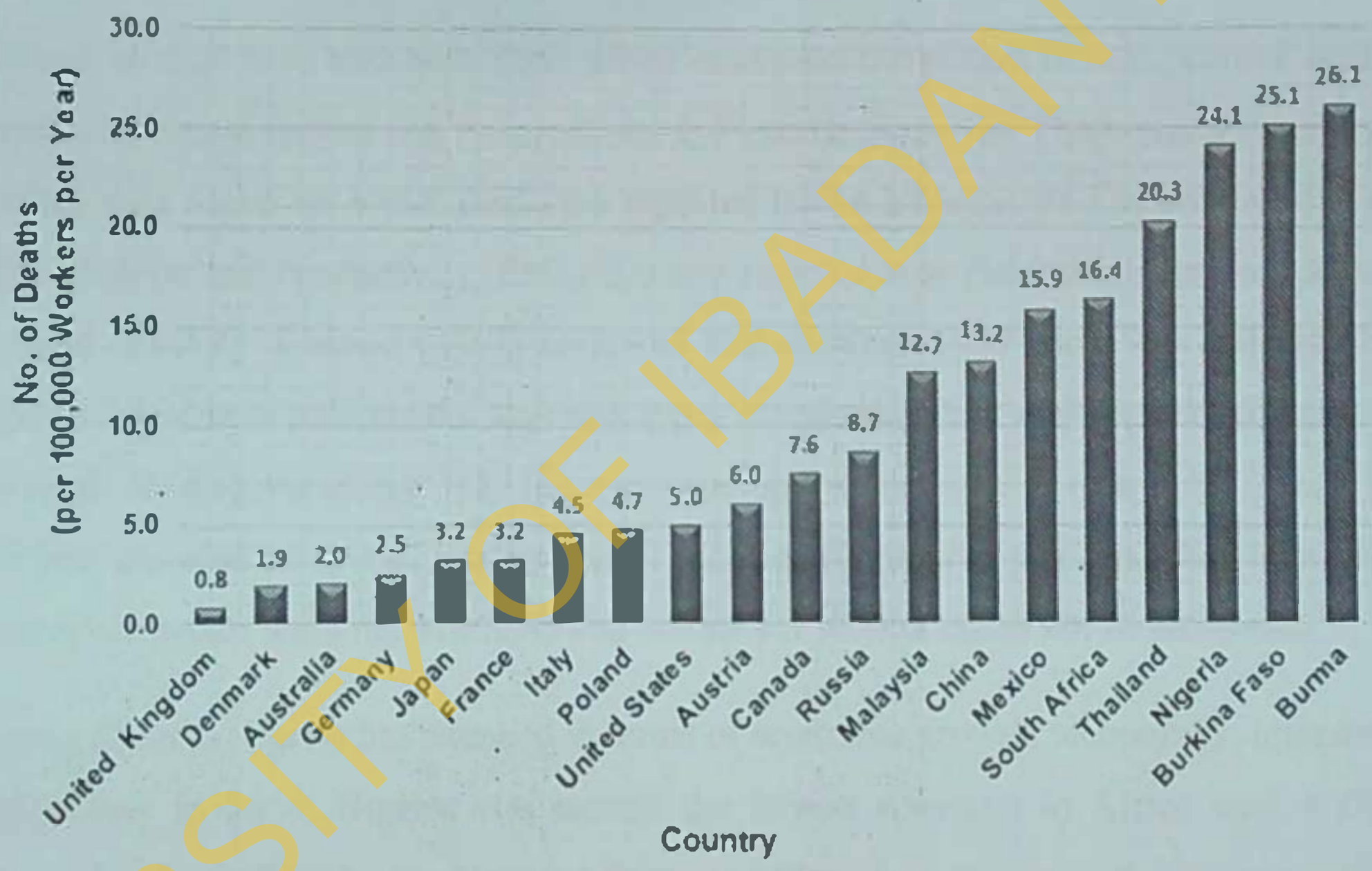

Figure 2.1: Work-related fatality rate for 20 countries in 2003 (Hämäläinen et al., 2009)

The burden and pattern of injuries in Africa are poorly known and not well studied (Nordberg, 1994). Lack of proper recording and inadequate notification systems have given rise to missing data on the official numbers of occupational accidents and work related injuries for many countries (Hämäläinen et al., 2009).

2.2 Epidemiology of occupational injuries and accidents in Nigeria

Government policies have favored funding mainly for research on infectious diseases while many OHS scientists have shifted away from studying working populations to studying individuals or materials causing harm to workers and leading to inadequate public health solutions. Currently, OHS databanks are rare in most parts of sub-Saharan Africa and when obtainable are incomplete and incoherent. There is no reliable online central OHS database in Nigeria(Okojie, 2010). A study by Hämäläinen which was based on data available in 2003 puts annual mortality rate due to occupational accidents in Nigeria at about 24 fatalities per 100,000 workers which was one of the highest globally(Hämäläinen et al. 2009).

Two national studies have also been done which examined the pattern of occupational accidents, their outcomes, causal factors and interventions in Nigerian factories. These studies were riddled with limited data based on actual field data reported to the Inspectorate Department of Federal Ministry of Labour and Productivity (FMLPID) now referred to as Federal Ministry of Labour and Employment (FMLE). Ezenwa (2001) reviewed data between 1987 and 1996 collected by the Inspectorate Division to indicate the high-risk types of industries and major causes of death at the national level. He discovered that 3183 injuries were reported nationwide of which 2.2% (71) were fatal. He also reported an overall fatality rate of 2.23 per 100 injured workers. Data on number of workers in each sector were not available and so rate per worker could not be computed.

After over a decade, Nigeria has changed in terms of economic growth, technology, infrastructure and regulations. In 2014, Nigeria was named the largest economy in Africa with a GDP of approximately $510 billion by the National Bureau of Statistics overtaking the economy of South Africa. Thus, Umeokafor, Kostis et al. 2014 reviewed data over an 11-year period (2002-2012) and noted a significant increase in total case-fatality rate since 2001 from 2.2% to 49.5%. The authors also reported inadequate legislations and limited enforcement by the FMLPID as well as under-reporting of accidents(Umeokafor et al. 2014). The records are worse than stated above as the poor OHS regulatory system in the country does not encourage mandatory reporting of workplace accidents (Ezenwa, 2001; Idoro 2008. Pearson (2009) estimated, based on 1998 data, that the number of fatal accidents in Nigeria for 2001 was 9392 with a fatality rate of 20.1% and 7,167,362 non-fatal accidents. Reports, however, failed to break down reporting systems into states

or regions. There are little or no qualitative studies on the industrial sector to determine the factors responsible for observed underreporting in Nigeria. This may be responsible for the lack of innovation and intervention displayed in regulating the sector in terms of occupational health and safety.

Many authors have observed that the industrial sector in Nigeria is largely male dominated (Eyayo 2014; Agwu & Olele 2014; Saidu et al. 2011; Okokon et al. 2014) considering the nature of work involved. Inegbenebor (1999) surveyed five manufacturing companies in north eastern Nigeria and reported that in the course of ten years of production most accidents occurred due to carelessness of workers followed by poor maintenance of machines. He also observed that the common accident agents were manual handling of goods, power-driven machinery and lifting equipment, and concluded that it was the responsibility of management to create a safe working environment even though individuals should strive to comply with safety regulations(Inegbenebor, 1999).

2.3 Patterns of Workplace injury and accidents in Nigerian industrial settings

Forestry work, agriculture, fishing, construction and manufacturing industries have been classified among the most hazardous occupations by many researchers (Okokon et al., 2015; Loomis et al. 1997; Laursen et al. 2008; Jinadu, 1987; Agwu & Olele, 2014). Millions of agricultural workers are seriously injured in workplace accidents with agricultural machinery or poisoned by pesticides and other agrochemicals(ILO, 2000). Authors in Nigeria have studied patterns of injuries and occupational hazards in sawmills(Bello & Mijinyawa, 2010), refineries (Eyayo, 2014), paint manufacturing industries(Awodele et al., 2014) , bottling companies ((Aliyu & Auwal 2015; Maji 2006)and textiles(Ezenwa 2001) in different parts of the country. However, very few were able to access or describe accident records in these industries and mostly reported on hazards workers were exposed to in the particular work environment.

The types of accidents reported depend largely on the hazards associated with each type of industry i.e. the work activity or process carried out. Manufacturing industries are machine-intensive and most accidents occur among machine operators resulting from being caught between machinery parts (Windau, 1998). Petroleum refinery workers are exposed to mostly chemical, mechanical and physical hazards (Eyayo, 2014). Forestry workers in Oku Iboku town in Akwa Ibom especially those in the Logging and mechanical engineering departments were found to have high incidence

rates of traumatic injuries at work of 447.6 traumatic injuries per 1000 workers and 122 traumatic injuries per 1000 workers respectively(Okokon et al., 2015). The authors also reported that the wrist, hands and fingers were most affected body parts while open wounds and fractures were suffered mainly by chainsaw operators and being struck by falling heavy objects was the commonest cause of severe injuries(Okokon et al., 2014; Okokon et al. 2015).

Recommendations made from these studies do not reflect in current legislation as no new law or drive has been injected into the industrial sector to minimize workers' exposure (Umeokafor, Umeadi, et al. 2014)

2.3.1 Traumatic workplace injury in Nigerian industrial settings

Work-related traumatic injury can be considered as sudden damage to any anatomical part of the body by any external cause and arising in the course of carrying out an employee's duties (Okokon et al. 2014). Researchers in Nigeria have studied traumatic injuries among industries that are known to be high risk based on literature. In a longitudinal morbidity study, workers in a paper-producing industry were followed up for one year as a case study for traumatic injuries(Okokon et al. 2014; Okokon et al. 2015). They discovered that all those involved in accidents were males, in their early thirties' with "struck by falling object" as the most common cause of severe injury followed by "contact with powered hand tool". Superficial injuries were more frequent and crush injury the least while open wound and fracture were intermediate in frequency. They concluded that 'struck by thrown, projected or falling objects' as well as 'caught, crushed, jammed or pinched in or between objects' were the two main categories of injury causation that can result in fatalities in the paper-producing industry.

In 2005, a four-storey building under construction in Port Harcourt collapsed and not less than twenty workers died in the incident barely 24 hours after a similar incident in Lagos (Agwu & Olele 2014). The construction industry is known for traumatic accidents usually with a high case fatality rate.

2.4 Occupational safety and health management in Nigeria

OHS programmes were first introduced in Nigeria during the era of British colonization ensuring that occupational health workers were dispatched to industrial plants and establishments such as

plantations for monitoring (Onyejeli, 2011). This led to the development of legislation such as the Labour Act of 1974, the Factories Act of 1987 and The Workmen's Compensation Act of 1987 based on existing OHS laws in foreign countries. These laws have been reviewed over the years to reflect industrial and technological growth. Nigeria signed the Geneva Convention on Occupational Health and Safety in 1981, yet implementation of the provisions of the convention to date is insignificant (Adeogun & Okafor, 2013). Nevertheless, many authors have observed that OHS standards are not being enforced in Nigeria with reports of unhealthy exposure to risks of workers and employees in various organisations as evidence (Okoye & Okolie, 2014; Diugwu et al., 2012).

Idoro (2008) maintained that focusing on proactive efforts was a better approach by dealing with risk factors responsible for such accidents and injuries and how to control them. To this end, the need to acquire sufficient and relevant data on current OHS status of the Nigerian workplace environment becomes paramount in order to develop appropriate interventions and formulate effective policies (Okoye & Okolie, 2014).

Okojie (2010) observed from the FMLEID Abuja that in practice, sealing or prohibitions of defaulting factories are rare because the factories are usually owned by influential individuals in the society. In situations where a factory inspector attempts to insist on enforcement of the existing regulations, he may be molested or victimised. As at 2010, he also noted that there were only 60 factory inspectors distributed all over the country. Therefore, his conclusion was that although, there is a system in place in Nigeria for the reporting of occupational accidents and injuries, the system is weak and ineffective(Okojie, 2010).

Adeogun and Okafor (2013) examined the trend of OHS practice in Nigeria through time and concluded that only the multinational organisations recognize occupational health and safety because they apply foreign safety policies. They also reported that Occupational health and safety practice is still at infancy in most indigenous organisations in Nigeria and therefore recommended that the International Convention and Treaty on occupational health and safety jointly signed by Nigeria and other countries should be domesticated into the local laws and enforced in order to achieve acceptable occupational health and safety standards in Nigeria (Adeogun & Okafor, 2013)

The Institute of Safety Professionals of Nigeria (ISPON), National Industrial Safety Council of Nigeria (NISCN) and Society of Occupational & Environmental Health Physicians (SOEPHON) are all partners with the government and ILO to ensure minimal workplace injuries and fatalities. The ISPON Act was signed into law in 2014 and established ISPON as a body to enforce the law regulating the practice of Professional safety management in Nigeria though the Institute has been in existence since 1980 (Laws of the Federation of Nigeria 1999-2015). SOEPHON brings together occupational health physicians with the sole aim of producing a healthy workforce in a safe working environment. The NISCN was established in May 1964 by a Cabinet decision under the sponsorship of the Federal Ministry of Labour and Productivity based on ILO convention 187, with a tripartite structure in line with international best practice on promotional Framework on Occupational Safety and Health in the workplace. These organisations have offices or branches across the nation comprising of employers of labour, government representatives, health workers, safety professionals and the labour congress. Therefore, it is noteworthy that there is poor implementation of OSH regulations in the nation despite the efforts of both the private and public sectors.

2.4.1 Occupational health and safety regulatory framework in Nigeria

Occupational safety and health management in Nigeria is mainly based on the Factories Act 2004 which provides the minimum safety requirements and standards for factories (Diugwu et al. 2012; Idoro 2011; Ezenwa 2001; Umeokafor, Umeadi, et al. 2014; Agwu & Olele 2014). The Factories Act of 1990 is the Nigerian version of the Factory Act of Britain and was first enacted and came into force in 1990. The provisions of the Act did not apply to the construction industry because Article 87 defines a factory as including only premises in which articles are made or prepared incidentally to the carrying on of construction work; this definition does not extend to premises in which such work is being conducted overall (Factories Act CAP126 LFN, 1990). Thus, construction sites and the activities conducted therein were not covered under the 1990 Act and the more recent 2004 Act (Agwu & Olele 2014).

The Factories Act has been reviewed and amended over the years and there have been inclusions of various workplaces that were previously not recognized by the OHS regulations. The Safety Health and Welfare Bill of 2012 was initially passed in September 2012 but still awaits presidential

assent, with a subsequent repealing of the Factories Act of 2004. The bill contains the inclusions of those workplaces omitted in previous regulations such as construction sites (Agwu & Olele, 2014). In early 2016, the bill was sent back to the Legislative for another reading by the newly elected Executive. Other complementary regulations have also been reviewed. For instance, the Workman's Compensation Act of 1987 was reviewed to the Workman's Compensation Act of 2004 and further updated to the Employee's Compensation Act of 2011. The enforcement of OHS regulations in Nigeria lies under the purview of the Inspectorate Division of the Federal Ministry of Labour and Employment.

The Factories Act stipulates that all owners of factories or industrial workplaces referred to in the law as occupiers should report work related injuries or dangerous occurrences to the FMLEID. Nigerian researchers have found the enforcement of this law to be poor and have attributed the failure to deficiencies in its structure (Umeokafor, Umeadi, et al. 2014; Adeogun & Okafor 2013). For example, failure to report such incidents are punishable with a fine no more than N1000 (Factories Act 1990 Section 51(4)) thereby defeating the goal to correct or deter such behaviours.

In assessing Nigeria's OHS regulatory framework based on robustness of OHS laws, efficiency of judicial system, degree of independence of enforcement agency and adequacy of financial budgets, good workforce-inspector ratio, accident history and activities of civil rights groups, (Abubakar 2015) reported the following:

- Current OHS laws are inadequate in terms of coverage, empowerment, independence and currency.
- The government agency responsible for enforcement of OHS laws is grossly underfunded and lacks sufficient number of personnel with sound technical skills or expertise
- The impact of litigation delays in the judicial system may be used to frustrate OHS regulatory efforts
- The OHS regulatory body i.e. FMLEID is not shielded from unnecessary political interference and should be a non-departmental or non-ministerial body.

- Civil societies and human right groups have contributed immensely to development of OHS regulations and enforcement by sustained pressures on the government.

- The government is reactive to accidents and there is poor documentation of such experiences especially in this era of advanced information dissemination technologies and evidence-based decision making.

2.5 Reporting and notification of occupational accidents and injuries

For any preventive measure at any level to be evidence-based and meaningful, the data required depend heavily on the reporting of occupational diseases and injuries (Okojie, 2010). Part VI section 51, 52 and 53 of the Factories Act Cap 126, LFN 2004 makes provision for reporting of occupational diseases and accidents. This law is enforced by OHS officers in the Inspectorate Department of FMLE. Umeokafor et al. (2014) have decried the lack of data on occupational accidents due to poor reporting of accidents or diseases in the workplace to the Federal Ministry of Labour and Employment Inspectorate Division. Ezenwa (2001) reported a total of 3183 injuries nationwide between 1987 and 1996 whereas Umeokafor et al reported only 93 documented accidents spanning a period of 11 years (2002 – 2012) and reaffirming that accidents are highly under reported in the nation. The latter study also recorded lack of accident records for 2005 and 2006. (Agwu & Olele, 2014) also noted the lack of reliable data on accidents in the construction industry because contractors failed to report at the ministry nor keep proper records. He proposed that the onus of a positive safety culture lies with top management to challenge unsafe acts and unsafe behaviours.

Obehi (2010) described the reporting system in Nigeria as weak and effective noting that there was little or no information documented on reported occupational diseases available at the FMLE for five years while praising multinational companies for having excellent reporting and OHS management systems because they are directed by OHS laws of the countries of origin.

Under reporting of occupational accidents has been said to be a challenge in developing countries(Takala, Hämäläinen, et al. 2014) and where some authors have advocated for increased coordination by the government others have enjoined employers and workers to cooperate fully with OHS laws requiring them to notify appropriate agencies in such cases. Other African

countries like South Africa have investigated this phenomenon. Lerer & Myers (1994) reviewed over 8000 registered deaths from the medical examiner in Cape Town over an 18-month period and matched these records with the occupational safety inspectorate records. They discovered that 28% had not been reported according to OHS regulations mostly from construction, agriculture and fishing industries and concluded these were due to deficiencies in safety surveillance and enforcement in the country(Lerer & Myers, 1994). It can be argued, however, that agriculture and fishing industries were no reports were made at all form a major part of the highly unregulated informal sector. Such activities are usually located in rural areas where safety awareness is poor and limited. The construction industry is also riddled with casual or temporary labour who are not formally registered as workers on site, thus injuries and accidents to such workers are not investigated or documented(Okojie, 2010; Helmut & Shengli, 2012; Benavides et al., 2004).

Establishment/employer

- Economic activity (industry)
- Size (number of workers)
- Location
- Other important characteristics

Worker

- sex
- age
- occupation
- status in employment
- other important characteristics

At the time of the accident

- type of location of the accident
- place of occurrence
- work process
  - specific activity and associated material agency

Sequence of events

- deviation from the normal and associated material agency
- mode of injury and associated material agency

Injury

- Type of injury
- Part of body injured
- Consequences (death/permanent incapacity/Temporary incapacity/none)

Fig 2.2 Conceptual Framework for Occupational Injuries Statistics ((Parmeggiani, 1983)

2.6 Occupational injury and accident statistics: data sources and methodology

Data relating to occupational accidents form an essential foundation for their prevention and promotion of occupational health and safety. Statistical data provide knowledge on the extent of occupational accidents, who they involve, what they are like and when, where and how they occur that is a complete epidemiological picture of the health and safety status of workers (Takala, Hamalainen et al., 2014).

The 16th international Conference of Labor Statisticians (ICLS) adopted the following scheme for the classification of occupational injuries:

- according to type of injury
- according to part of body injured, and
- according to size or characteristics of establishment

The following variables were proposed as essential to statistics of occupational accidents:

- type of location of the accident
- mode of injury according to type of accident
- material agency of injury
- place of occurrence
- work process
- specific activity
- deviation(unsafe act or unsafe condition)

ILO thereby recommended that the statisticians should classify occupational accidents at least according to branch of economic activity, significant characteristics of enterprise and workers (such as status in employment, sex, age or age group) and the enterprise. They can also be classified by total number of victims grouped by outcome of either death or non-fatal injuries resulting in incapacity for work of at least three consecutive days, excluding the day of the accident. The total days lost due to the accident should be considered if such data is available. (ILO, 1996)

2.7 Risk factors associated with occupational injuries and accidents

Injuries have distinct patterns of risk that vary hy age, sex, race, geographic region, industry and occupation. Risk, is the likelihood of a substance, activity or process to cause harm. No workplace is entirely free of risk and no matter how minimal, risks are usually inherent in human behavior.

Causes of occupational accidents may be attributed either directly or indirectly to oversights, omissions, or process and equipment malfunctions as they apply to one or more of the following:

- human factors due to the employee, other employees, clients served, or other individuals;
- situational work factors and practices contributed to by tools, facilities, equipment, and materials;
- environmental factors or conditions caused by noise, vibration, temperature extremes and/or illumination.(Gibb et al. 2001; Khanzode et al. 2012)

Many risk factors such as work stress, poorly designed work environments, work experience and so on are not included in investigation forms and therefore not considered in examining occupational injury statistics (ILO, 1996). The term "occupational risk factor" is defined as a chemical, physical, biological or other agent that may cause harm to an exposed person in the workplace and is potentially modifiable. Concha-barrientos et al. (2004) examined selected occupational risk factors and discovered that the leading occupational cause of death among six risk factors investigated was unintentional injuries (41%). The authors also reported that the main cause of years of healthy life lost (measured in disability-adjusted life years [DALYs]), within occupational diseases, was unintentional injuries with 48% of the burden followed by hearing loss due to occupational noise (19%) and Chronic obstructive pulmonary disorder (COPD) due to occupational agents (17%)(Concha-barrientos et al., 2004).

According to Hughes and Ferrett (2007) a job hazard is anything that can cause physical and mental injury at the workplace. The National Institute of Occupational Safety and Health (NIOSH) guidelines (NIOSH, 1988) distinguishes between health and safety hazard. It states that safety hazard cause immediate injury, direct injury or trauma such as severed finger, crushed hand, broken nose and eye damage; while health hazard cause immediate illness (acute) or over a long period (chronic). It listed the followings as safety hazard: unguarded machinery, damaged plugs, outlets and wires, unbalanced walking surface, tripling hazard, falling objects, holes in the ceiling, blind spots (vehicles). Health hazards were listed as chemicals (dusts, gases, vapours) which causes fire, burns, and explosions or affects the vital organs. Biological hazards (animals, insects, bacteria, and virus/blood) may result in HIV, flu, hepatitis, tuberculosis, and rabies and so on.

Physical hazards are noise, radiation, heat, cold, stress, repetitive motion which causes, deafness, burns, blood disorder, cancer, musculoskeletal injury and heat stroke (hypothermia)(NIOSH, 1988). Ergonomic hazards are those hazards to health due to poor ergonomic design where ergonomics is the study of the interaction between workers and their work in the broadest sense (Hughes & Ferrett, 2007). They generally fall within the physical hazard category and include the manual handling and lifting of loads, pulling and pushing loads, prolonged periods of repetitive activities and work with vibrating tools(Lind, 2008; Asogwa, 1987; Saidu et al., 2011).

2.7.1 Unsafe acts and unsafe conditions

Accident investigation techniques and reporting systems identify what type of accidents occur and how they occurred without identifying possible root causes which is only done by applying theories of accident causation and human error (Abdelhamid & Everett, 2000). Literature has identified 3 major models of accident causation and numerous theories based on the assumptions which underpin these models which range from simplistic domino models that focus on human behaviour through more complex linear models that analyse time sequence of events, epidemiological models, to systemic models that consider barriers and defenses. The most commonly applied are complex and nonlinear models which presume that accidents are a result of a combination of unsafe acts and latent hazardous conditions within the system and need not follow a linear pathway (Toft and Dell, 2012).

It is a common assumption that employees engaged in unsafe acts are the primary cause of accidents. Although employee carelessness or reckless behavior increases the probability that an accident will occur, other factors also contribute to the likelihood of an accident. Employee inattention or fatigue, inadequate or unsafe equipment and a lack of adequate training are other examples of accident causes(Concha-barrientos et al. 2004). Unsafe work conditions may include improper ventilation, poorly designed equipment, unsafe design or inadequate safety devices. Unsafe work practices include failure to use personal protective equipment, horseplay, driving at excessive speeds, or tampering with safety devices to render them inoperative (Rahmani et al., 2013).

2.8 Occupational health and safety management systems:

An Occupational Health and Safety Management System(OHS-MS) is a coordinated and systematic approach to managing health and safety risks helping organisations to continually improve their safety performance and compliance to health and safety legislation and standards (Gallagher et al. 2001). OHS – MS is the management protocol that should be followed in Occupational Health and Safety in order to protect, promote and rehabilitate the health and well-being of workers in the workplace (Eyayo, 2014). Effective leadership is required to provide strategic direction for safety and health management, motivating workers to comply with OHS standards ensuring good safety and health performance. Management's commitment to effective worker participation in the system must be visibly communicated to the entire workforce. A good OHS-MS should be based on risk assessment, with the objective of identifying key occupational hazards and key at-risk groups, and developing and implementing appropriate prevention measures. Thus, there are five steps to an effective OHSMS, forming a continual cycle of improvement:

1. Top management commitment and policy: a general plan of intent to guide future decisions based on measurable objectives and targets
2. Planning: how to deliver the OHS policy, objectives and targets ensuring that hazards are identified, risks are assessed and then controlled.
3. Implementation: developing the capabilities and support mechanisms necessary to achieve set goals
4. Measurement and evaluation: monitoring and evaluating OSH performance to determine the effectiveness of the program and take necessary preventative and corrective actions. This involves audits and inspections.
5. Review and improvement of the system (Hudson, 2001; Gallagher et al., 2001)

2.9 The Public Health approach to preventing workplace injuries:

A public health approach to occupational injury prevention is based on the assumption that injury is a health problem and can be prevented or its consequences mitigated (Occupational Injury Prevention Panel, 1992; Smith and Falk, 1987; Waller, 1985). The usual practice in workplaces is to minimize risks and losses within the organisation. Public health practitioners are, however,

concerned about the individual worksites and the health status of people within the geographic areas exposed to the hazards associated with industrial activities(Mirer & Stellman, 2008). Thus, the outcomes of interest in injury control to the public health practitioner are the occurrence, severity and long-term consequence of injury.

Most models of public health practice focus on three elements: (1) assessment, (2) development of prevention strategies and (3) evaluation (Stellmann, 1998). Assessment is a multidisciplinary effort involving surveillance, research and community needs assessment. This is to identify high-risk populations, injuries with significant public health impact, detect and monitor trends and to generate hypotheses. Preventive actions are taken based on the findings from incident investigations. Investigating the causation of occupational accidents and injuries involves the application of epidemiology to identify risk factors as well as applied social sciences to identify the determinants of organizational and individual behaviors that lead to unsafe conditions and unsafe acts(Khanzode et al., 2012). Evaluation is an essential process which attempts to determine systematically the relevance, effectiveness and impact of activities in light of the objectives (Last, 1988). Surveillance systems are used to determine whether communities or organisations have met their disease and injury reduction targets. Evaluation also focuses on determining how effective policies, programmes and specific interventions are using scientific methods. Unfortunately, such scientific evaluations are rare and often methodologically flawed (Goldenhar &Schulte, 1994).

Through the financial and technical support of the ILO the Federal Government of Nigeria has embarked on the development of a National Occupational Safety and Health Management System. Key stakeholders were trained in July 2016 on preparation of the first National OSH profile which is an essential step for implementing ILO strategies on safe work environment. A national OSH profile is a diagnostic document which summarizes the existing OSH situation including national data on occupational accidents and diseases, high risk industries and occupations and a description of the national OSH system and its current capacity (ILO, 2016). This development is expected to benchmark safety and health in workplaces in Nigeria. However, the issue of decentralization of such government efforts and political influence in the sector as identified by some authors (Abubakar, 2015; Idoro, 2011) is still a barrier to successful implementation. Also, the selection of stakeholders in ensuring safe workplace in developing countries has not been greatly extended to public health practitioners and most especially epidemiologists(Quinn 2003). A rigorous search

of literature revealed that there are few, if any, occupational epidemiologists in Nigeria applying statistical methods to study the effects of workplace exposures on the frequency and distribution diseases and injuries though this might be attributed to unavailability of necessary data.

2.10 The concept of safety culture

The ILO recommends sustainable prevention of occupational injuries and accidents by adopting a national preventative safety culture(ILO 2014). Safety culture is an idea that many OHS professionals and researchers agree might have the potential to move organizations to higher standards of safety by creating a culture of prevention (Kim, Park & Park, 2016). The term appeared for the first time in literature when the International Atomic Energy Agency introduced it in its 1986 Chernobyl Accident Summary Report. It was used to describe how the thinking and behaviours of people in the organisation responsible for safety in the infamous nuclear plant contributed to the accident. In 1993 the Advisory Committee on Safety of Nuclear Installations (ACSNI) investigated nuclear plant disasters and concluded that safety systems in those workplaces had broken down propounding that 'it is essential to create a corporate atmosphere or culture in which safety is understood to be and is accepted as the number one priority"

Agwu & Olele (2014) viewed safety culture as the set of beliefs, norms, attitudes, roles, social and technical practices that are concerned with minimizing the exposure of employees, managers, customers and members of the public to conditions considered injurious. In their study of fatalities in construction industries in Nigeria, a significant relationship was discovered between poor safety culture and increased rate of unsafe acts in the industry. Therefore, the authors recommended the complete implementation of Occupational Safety and Health management system by such companies (Agwu & Olele 2014). Adeogun and Okafor (2013) defined the concept as a special culture in which safety concerns are paramount for those who work for the organization where culture involves common ways of thinking, behaving and believing by members of a social unit. They also reiterated that a way of preventing injuries and accidents was by integration of safety culture into the organization's values.

Studies in Hong Kong assessing accident statistics from 1986 to 2013 showed that the development of a safety culture markedly reduced the number of accidents. Hence, the Hong Kong OSH council

strategically promoted work safety awareness in employers and employees of high-risk trades. They did this, as well, at the community level and developed a "safety culture index" to evaluate the effectiveness of these strategies (Wah-shing & Koon-chuen, 2012). A safety culture aims to reduce work related risks whereas a prevention culture aims to reduce both work related and non-work related risks thereby addressing the societal level as well as workplace. Safety culture can be divided into five levels of development:

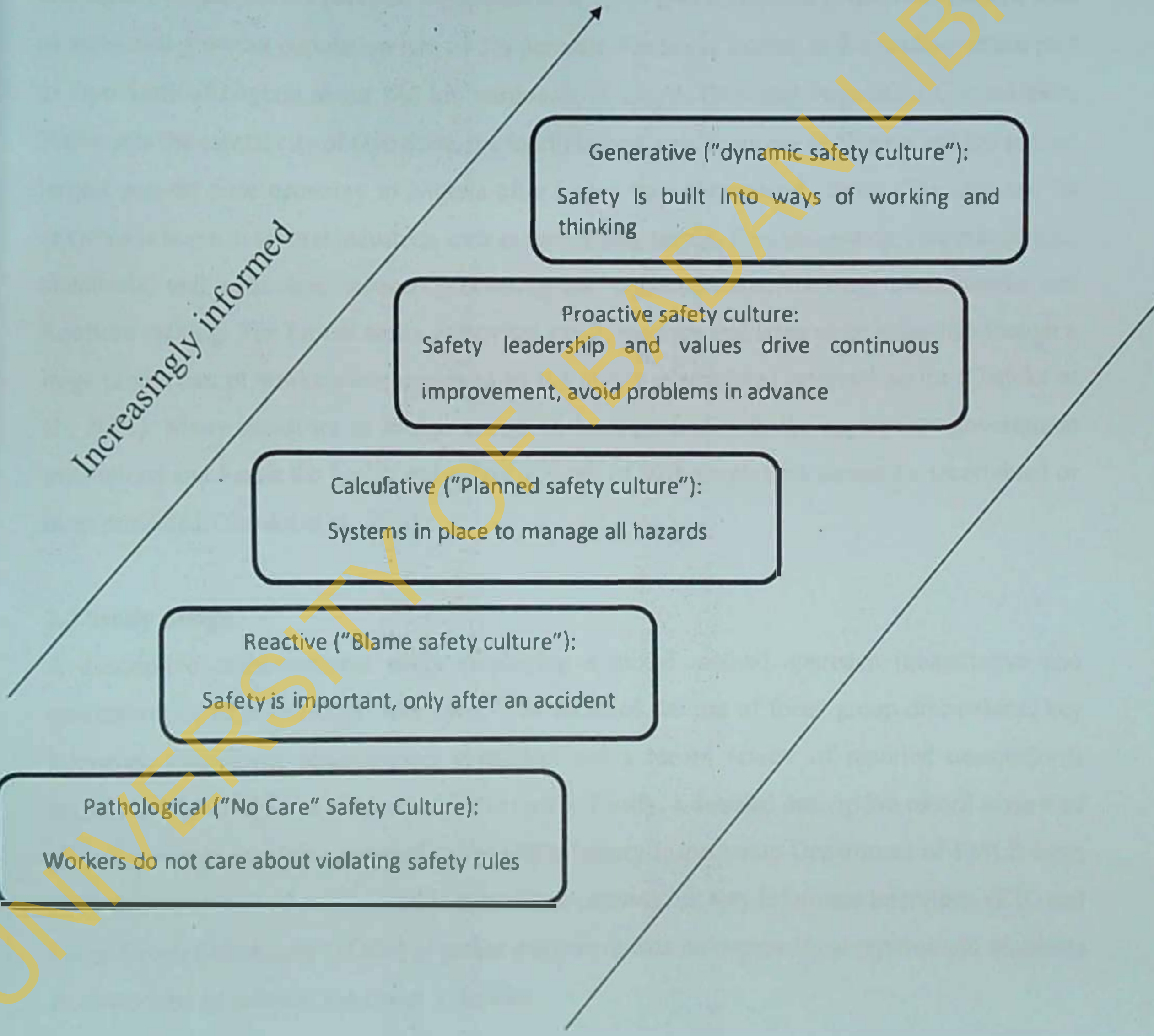

Figure 2.3: The Safety Culture Ladder (Hudson, 2001)

CHAPTER THREE

METHODOLOGY

3.1 Study area

Oyo state is located in the southwestern Nigeria. It has a landmass of 27,249 square kilometres and has common boundaries with Ogun State, Kwara state, Osun State and the Republic of Benin. The 2006 national census revealed a population of 2,809,840 males and 2,781,749 females with an estimated growing population rate of 3% per year. Ibadan is located in the south-western part of Oyo State of Nigeria about 145 km north-east of Lagos. (National Population Commission, 2009). It is the capital city of Oyo State, the fourth largest state economy in Nigeria and the second largest non-oil state economy in Nigeria after Lagos state (Fourchard, 2003). The city and its environs is home to several industries such as agro-allied, textile, food processing, pharmaceutical, chemicals, and cosmetics, tobacco processing and cigarette manufacturing, leatherworks and furniture making. The formal sector comprises small, medium and large scale industries though a large proportion of workers are employed by the highly unregulated informal sector (Olajoke et al., 2013). Many industries in Ibadan are yet to be registered with the appropriate government institutions and hence the health and safety at work of such employees cannot be ascertained or even protected(Olajoke et al., 2013).

3.2 Study design

A descriptive cross-sectional study employing a mixed method approach (quantitative and qualitative) of data collection was used. This included the use of focus group discussions, key informant interviews, observational checklists and a record review of reported occupational accidents. The study was carried out in two parts. Firstly, a detailed descriptive record review of all occupational accidents reported to the OHS/Factory Inspectorate Department of FMLE from 2000-2016 was carried out. Secondly, it involved carrying out Key Informant Interviews (KII) and Focus Group discussions (FGDs) to gather qualitative data on occupational injuries and accidents from workers in selected industries in Ibadan.

3.3 Study site

The quantitative data was collected from the Factory Inspectorate department of FMLE in Ibadan where industrial accidents are reported, investigated and documented. Qualitative research was carried out on-site at 10 manufacturing industries which consented to interviews with staff. These consisted of two multi-nationals involved in manufacturing of packaging and chemicals respectively along with two feed mills, one poultry farm, one flour mill, a vegetable Oil manufacturing plant, a food beverage processing plant, one plastics industry and one manufacturer of confectioneries. Interviews, discussions and observational checklists were employed on factory premises (see Table 1 in Appendix VI). Two study sites objected to focus group discussions but permitted interviews with key informants.

3.4 Study population

The study population were factory workers exposed to injuries or accidents in the industries. Key informants were identified as senior officers or supervisors in charge of occupational safety and health in each organisation. These officers included risk managers, Health, Safety and Environment (HSE) managers, Quality Assurance managers. FGD participants were selected from each department or unit of each consenting establishment selected for the research. They consisted of machine operators, laboratory attendants, storekeepers, warehouse attendants, technicians, engineers, cleaners and administrative assistants.

3.5 Sample size

The accident review sample included all available records related to fatal and non-fatal occupational injuries reported by registered factories to the Oyo state branch of FMLE from the year 2000-2016. Accidents were documented within the file belonging to a specific factory. A total of 110 files were reviewed. Eight focus groups discussions and 12 in-depth interviews were carried out. Focus group participants were selected as representative from each unit involved in production process and ranged from 5 to 9 participants depending on the site. A total of 50 employees participated in the focus group discussions. Focus groups participants were heterogeneous, that is, they were both male and female workers, and represented one employee type from different departments comprising administrative, maintenance or engineering, production, laboratory, warehouse or logistics and loading units. (See Tables 2 in Appendix VI)

3.6 Sampling techniques

Total sampling in which all available accident records reported to FMLE from 2000-2016 were reviewed. A non-probability sampling technique was used to purposively select 10 industries engaged in diverse industrial activities and varying in scale of production within Ibadan metropolis for focus group discussions and key informant interviews.

3.6.1 Inclusion criteria

Industries included in this study were all duly registered and had an open file with the Factory inspectorate/OHS department of FMLE Ibadan. They were located within the city of Ibadan. Qualitative research was carried out in selected manufacturing industries who gave permission for their staff to be interviewed. Industries were selected to reflect various levels of operations and different economic activities.

3.7 Instrument/data collection technique

3.7.1 Quantitative data

A record review proforma was used to extract data from all available records of reported occupational accidents from 2000-2016. The proforma was divided into 6 sections namely:

a) Socio-demographic characteristics of accident victims- sex, age, job designation
b) Workplace profile which referred to the nature of economic activity carried out and number of employees
c) Work characteristics included number of shifts, duration of break periods and hours worked per day
d) Accident details or variables characterizing the type of accident:
   i) Date of occurrence and date reported to FMLE
   ii) Shift of accident occurrence which could be morning shifts (between 0600 and 1200 hours), afternoon shift (between 1200 hours and 1630 hours) or night shifts (between 1700 hours and 0600 hours)
   iii) Time of the week referred to either a weekday or a weekend
   iv) Number of victims involved in the accident
   v) Location in factory premises such as production hall, warehouse/storage area, loading bay and gas or power plants

vi) Working environment where accident occurred - indoors, outdoors or confined space

vii) Material agent referred to the agent, substance or equipment with the victim came into contact or was exposed

viii) Mode of injury/accident described how the victim was hurt by the material agent that caused the injury

ix) Outcome of injury referred to medical consequences as a result of the injury e.g. temporary disability, permanent disability or death. Temporary disability was defined as hospitalization, and temporary incapacitation i.e. inability of the victim, due to an occupational injury, to perform the normal duties of work in the post occupied at the time of the occupational accident. Permanent disability referred to injury that produces an occupational handicap, which is of direct concern to the worker, his family and his employer and which calls for the prompt application of rehabilitation if an early return to work is to be achieved. It also referred to victims that lost fingers, limbs or any part of the body. Workers who could not return to work after the accident or were given less active jobs as a result of the injuries were also classified as permanently disabled. Fatalities included workers who died as a result of workplace injuries or the consequences up to one year after the accident.

e) Injury details

i) Nature of injury e.g. wounds, fractures, internal injuries, burns, asphyxiation etc.

ii) Part of the body injured or body system affected by the accident

f) Causal factors reported in form of unsafe acts, unsafe conditions and remote or contributory factors were further grouped into human factors or Management system factors. (Table 3.1)

g) Occupational safety and health organisation referred to the safety management systems of the industry where the accident occurred noting the availability of the following: safety policies, OHS officer, regular or specialized safety training for staff and first-aid kits or on-site clinic.

h) Interventions prescribed by the ministry took note of government sanctions or warning notices, training, follow-up inspection, and engineering controls recommended as a result of the accident.

Table 3.1 Definitions of categories of unsafe acts and unsafe conditions

Categories	Definition
Unsafe Acts:	Performance of a task or activity in a manner that threatens the health and safety of workers.
Human Factors (victim)	Errors and violations on the part of the victim
Human factors (other workers)	Unintentional behaviours or willful disregard of safe work procedures by third parties e.g. other workers
Management system factors	Organizational lapses or failures by decision or omission to provide safe work environment, supervision, safe work methods, emergency services, resources and equipment.
Unsafe conditions:	Hazardous work environment, equipment, weather, activities which workers may be involved with;
Human factors	Hazardous conditions created by workers
Management system factors	Hazardous conditions created by management lapses or decisions
Remote or Contributory causes:	Underlying reasons why the immediate causes (unsafe acts and unsafe conditions) existed
Human factors:	Personal/individual inadequacies that allow workers to violate safety measures unchecked
Management System factors:	Inadequacies in the OHS management system that allow unsafe acts or unsafe conditions to occur

3.7.2 Qualitative data

3.7.2.1Focus group discussion and key informant interview approach

Qualitative method of data collection was used to elicit employees' work-life experiences regarding occupational accidents and injuries in their various work environments. Collection of data using FGD and KII methodology aimed at obtaining information on workplace accidents and reporting practices of the selected industries. FGD and KII guides with specific themes drawn from relevant literature were used (Dollar & Merrigan, 2002). FGD sessions were carried out in selected industries during production break periods because this was when workers were accessible for interviews. The interviews lasted for about 40 minutes. Discussions were recorded in English language following informed consent. The following thematic areas were explored:

i. trends of occupational injuries and accidents in the industry
ii. patterns of fatal and non-fatal injuries due to industrial accidents
iii. factors promoting occurrence of occupational injuries and accidents in the selected industries

Questions were purposively open-ended. This allowed FGD participants to discuss factors influencing their safety in the working environment, their experiences and issues leading to occupational mortalities and morbidities. The full FGD guide is given in Appendix II. The KII also explored the aforementioned themes. However, KIIs explored the working relationships between safety managers (where not applicable, human resource managers were used) and factory workers. The challenges and patterns of reporting accidents as well as OHS management systems were also discussed. The full KII guide is given in Appendix III. Focus groups and Key informant interviews were held from June to October 2016.

3.7.2.2 Undertaking the focus group discussions

Training of research assistants was carried out for two days. This involved familiarisation with the instrument and hours of testing of the recruited and intended interviewers. Eight FGDs at different study sites were undertaken by a team made up of three members: FGD facilitator, a note-taker/recorder and an observer. Each FGD lasted between 25 to 60 minutes and an incentive was given to participants to appreciate them for their time. Following introduction of investigators and

explanations of the research purpose, FGD team facilitated the interviews. The discussions were recorded in writing and using electronic recorders. Results were transcribed and trends identified.

3.7.2.3 Undertaking the key informant interview

Following familiarization with the KII guide, and a day of pre-test, KIIs were undertaken by experienced interviewer conversant with industrial settings. Each KII lasted approximately 40 to 60 minutes. Following introductions and explanations, interviewer recorded the interview and produced summarized reports soon after conducting the interviews. 11 key informants were interviewed of which 5 were Health and Safety Managers or supervisors while the remaining 6 were Human resource managers who performed the duties of HSE officers in organisations that did not meet that criterion.

3.8 Study variables

3.8.1 Independent variables:

The explanatory variables were classified into 3 groups namely:

Individual/socio-demographic characteristics: age (in years), sex, job designation or occupation of the worker at the time of the injury.

Organisation characteristics: economic activity, work shifts, OHS profile of the industry

Accident type factors: unsafe acts, mode of injury, type of location of accident, material agent/equipment and physical unsafe conditions/risk or contributory causes. In terms of physical risk, the identifiable cause in the investigation is the one considered by experts to be the most likely trigger of the injury e.g. poor working conditions, manual handling, deficient safety management systems etc.

3.8.2 Dependent variables:

Dependent variables included case-fatality rates, frequency of accidents, accident reporting patterns, injury patterns (nature of injury and body part affected) prescribed interventions, and accident outcomes.

3.9 Data analysis

3.9.1 Quantitative data

Descriptive statistics was used to describe the general characteristics of the records reviewed using percentages, means and frequency counts. The Chi-Square test was used to test for association between the independent variables (such as gender, age group, work duration, working environment, nature of injury, affected body parts, time of occurrence and staff cadre) and dependent variables (outcome of injury which could be permanent disability, temporary disability or fatality) at 95% confidence interval ($p = 0.05$). Binary logistic regression was done to further identify independent predictors of outcome of injury. A probability level of $p < 0.05$ was considered as statistically significant.

3.9.2 Qualitative data

Responses to open-ended questions categorized under major themes were analyzed. The transcripts were reviewed using the side note and ideas noted. Thematic content analysis was used to categorize participants' responses into domains that represent common themes. Similarities and differences among data set were identified and noted. Refusals to participate fully were also noted. Presentation of the qualitative result is narrative with supporting quotations from categorized responses.

3.10 Ethical considerations

Ethical approval for the research protocol was obtained from the Oyo State Ethics Review Committee. Consenting participants signed the written informed consent form after the study details were given. (See Appendix II and III)

3.10.1 Confidentiality of Data: Confidentiality was maintained during data analyses. Participants remained anonymous as names were not required. Data was stored in a pass-worded computer. The anonymity of participants in the discussion was protected in the report,

3.10.2 Beneficence to participants: Financial reward was not given to any of the study participants. The study enlightened participants on the need to be informed on OHS regulations as well as reporting of workplace accidents to appropriate bodies.

3.10.3 Non-maleficence to participants: This research work was not harmful to participants in any way. No harm was done to the companies involved and workers interviewed in the course of the study. Efforts were made to ensure that the interviews or FGDs did not interfere or disrupt significantly the production activities of the participating organisation.

3.10.4 Voluntariness: Participation in this study was voluntary and without any compulsion.

CHAPTER FOUR

RESULTS

4.1 Qualitative data analysis

The major occupational issues reflecting morbidities and mortalities of occupational accidents narrated below emerged from the interviews and were raised by employees. Also, there were high levels of agreement about the occurrence of workplace injuries, OHS regulations implementation and enforcement with significant consistency in how these issues were talked about among groups. In situations where an issue was addressed by all groups but talked about differently by different groups, these differences are identified and explained.

4.1.1 Socio-demographic data of the respondents

A total of 61 respondents participated in the study. The ages of the respondents ranged from 25 to 45 years of age. Majority of the participants of the study (both for FGDs and KII) were male (53, 86.9%), while 8(13.1%) were female. Majority (20, 40.0%) of the respondents were between 30-35 years of age, 12 (24.0 %) were between the ages of 40 years and above, 10(20.0%) were between 36-40 years of age, while the remaining 7(14.0%) were between 25-30 years of age as shown in Table 4.1.

Of those who responded to the question on previous industrial experience, 52(85.2%) reported to had worked in industries before, while the remaining 9(14.8%) were having their first work experience. (See Table 4.1) Periods worked at current industrial settings varied. Majority (27, 44.3%) have worked between 1-5years, 8(13.1%) have worked between 0-11 months and 6-10years respectively; 7(11.5%) have spent above 15years, while the remaining 5(8.2%) have worked between 11-15years in their current industrial workplace.

Table 4.1: Respondents socio-demographic characteristics and work experience

Variables	No (%)
Sex **	
Male	53(86.9)
Female	8(13.1)
Age (years) *	
25-30	7 (14.0)
30-35	20(40.0)
36-40	10(20.0)
40 and above	12(24.0)
Previously worked in industrial settings before **	
Yes	52(85.2)
No	9(14.8)
Period worked at current industry (years) **	
<1 year	8(13.1)
1-5years	27(44.3) 3
6- 10years	8(13.1) 4
11-15years	5(8.2)
>15years	7(11.5)

** FGDs and KIIs respondents were included, *N= 61*

*Only FGDs respondents were used for this, *N= 50*

4.1.2 Factors influencing occurrence of occupational injuries and accidents in industries:

A) Perceptions of respondents towards workplace safety

Participants were asked to talk about how safe they perceived their workplace to be in relation to the hazards associated with their respective work environments. A good number of FGD participants reported feeling safe in their workplace environment. Most of the respondents were optimistic about their safety, believing that the provision of necessary safety equipment guaranteed their safety.

As stated by one of the respondents:

> *'This environment is 100% safe., because the company provided us with safety wears, safety shoes, safety uniforms, hand gloves, eye goggles, shower caps. Everything is provided'* **(Respondent 3, AF Factory).**

All safety managers and HR managers stated that factory management had provided safe work environment and equipment. Also, workers underwent safety training to prevent injuries and accidents. However, some of the FGD respondents were of the opinion that an individual's safety culture is paramount. As explained:

> *'I believe it is safe, and then it depends on how paramount we take safety precautions; there is no one that is working that does not have any hazards or side effects. If you are working in the house, there is a side effect. But if you take safety as the main thing, you are safe.'* **(Respondent 3, SWK Factory)**

References were made to **personal protective equipment, safety policies, employment of safety officers, regular in-house training and standard operating procedures** to buttress the presence of safety management systems. One FGD participant in a packaging manufacturing firm put it this way:

> *'... Considering all the safety rules and there is a safety officer and rules that guide everyone here. When you come to work, the first thing is you are supposed to wear your safety materials, your safety boots, everything needed to work with the machine. The machine you want to work with, you check, not that you start running the machine immediately.'* **(Respondent 1, NPK Factory).**

Nevertheless, few respondents in a plastic manufacturing firm claimed that management had failed to provide a safe work environment.

B. Knowledge and awareness of OHS regulations

The contradictions between Factories Act and Compensation Act in OHS and the poor knowledge of workers right in the Acts were common among FGD participants interviewed during this study. The contents, implementation and enforcement agencies of these laws was a source of confusion for many participants. In particular, they were confused about the main contents, as many only talked about compensation of workers who experienced fatal occupational injuries. When respondents were asked about Factories Act and Employees Compensation Acts, little over half of the respondents claimed they had heard of it. Of the 29(58.0%) who had heard of it, some perceived these laws to comprise of medical care and compensations provided to victims of major accidents and injuries. Some FGD participants voiced out their complete ignorance of the Factories Act and confused the law with company policies and regulations. As observed:

> *'It 's the same thing as concerns what we are saying. What I know is the regulation of the company. I think that is the Factory Act'* **(Respondent 1, AF Factory)**

However, few respondents reported to have heard, read and digested the contents and were glad to outline some of the contents of these Acts. As reported by these participants, the Factories Act was old, needed review and recommended that it be given due recognition by all companies, regardless of the type of industrial settings. One FGD respondent from a multi-national organisation put it this way:

> *'Concerning this, I think they worked on the amendment of the Factories Act 1990 to get the 2004. If you go through that Act, all what that act required we have it here, like the workroom for staff, a good bathroom after the daily work where they can take their bath, a good convenience room for the staff, we have virtually all that is required to make the factory work.* **(Respondent 1, NPK Factory)**

On the contrary, the knowledge of government OHS regulations was relatively wider among key informants interviewed during the course of this study. As observed among the key informants, all except one had heard of the Factories Act and Employee Compensation Act. Both human resource

managers and safety managers had knowledge of these acts but it was evident that safety managers were more knowledgeable about the contents than HR managers. However, a small number of safety managers were able to defend their knowledge of the contents adequately. Generally, it was observed that most key informants (90%) had knowledge of the regulatory bodies in charge of enforcing these acts.

C. Provision and compliance of workers with Personal Protective Equipment

When describing management policies concerning provision of Personal Protective Equipment (PPE), most participants affirmed to the fact that they were with the required PPE. Majority of respondents identified the PPE provided to include **overalls, safety boots, safety goggles, black socks, helmets, hand gloves, reflective jacket, nose covers, welding masks**, etc. As reported by respondent:

> *'...We deal with coldness, yes. We have socks, we are dealing with cold room... there is a coat the company is making provision for us. Then, there is hand gloves that will not allow the coldness to enter us. So, when you are entering the cold room, they have all those things provided. And while you are on the field... there is a provision of safety boots for us in case of anything.'* **(Respondent 2, AF factory)**

Nevertheless, it was revealed that many workers did not comply with PPE use as they reported discomfort and inconvenience associated with it. It was evident from body language and responses that many tried to comply with management's demands but did not understand the value of using PPE. Though some FGD respondents agreed that compliance is for better health in the long-term.

> *'....your life is very important; moreover, people have to be enlightened: they have to enlighten them; you have to teach them the benefits of using it.'* **(Respondent 2, SWF factory)**

Few respondents were honest about discarding PPE due to discomfort to enable them carry out their work activities more effectively.

> *Yes, it's possible (that many find it difficult to use). It happens in maintenance: we are provided with gloves. You may be thinking that the work may not be properly done and you quickly remove it to use your hand. It makes work faster.*
>
> **(Respondent 1, BH factory)**

'Some of these things cause difficulties, like the nose mask causes difficulty in breathing. What happen is that anytime we put it, it doesn't allow us to breathe, actually it's safer than the disposable ones. But anytime we use that one, we have difficulty in breathing' **(Respondent 1, PF Factory).**

Despite the mandatory regulations placed on the provision of PPE by law, some of the discussants expressed dissatisfaction on the segregation on the provision of inferior PPE to some sets of workers and or inadequate provision of the required PPE as the case may be thus exposing workers to industrial hazards. As expressed in disappointing tone by some of the discussants:

'At least, the primary protective equipment should be provided... For example, if you go to a company like P&G...all the workers in the factory use safety wears, even visitors. When you are coming in, you would put on your safety boot and your helmet but here, only maintenance put on safety boot...' **(Respondent 1, BH Factory).**

According to key personnel responsible for safety in these industries, it was reported that the needed PPE were provided, but workers deterred from utilizing them. Some attributed the non-compliance to ***poor organisational policies and culture, workers' attitude, negligence on the part of supervisors, inadequate training and resources.*** As opined by some of them:

'Actually, there was a time Federal Ministry of Labour came, their representatives: from time to time they do come, so we take them into the factory for inspection on how they are using PPE...He saw one or two that was not using: he was furious. But, he asked why they are not using them. I told him that these things are provided: they are provided and these people are using these things, but unfortunately, I don't know. So, he decided to go and asked them. When he got there, he asked the man: "where is your hand glove". He pulled it from his back bag and showed him, and said "why are you not putting it on? He said it is inconveniencing him.' **(HRM, BH Factory)**

'The funny part now is... it's not even them seeing the supervisor coming; even the supervisor himself will not even put it on... even the supervisor is part of it. As I said, the culture was not there. Before now, PPE are provided, people see it as inconvenience..... Last year, we issued out safety boots, new ones.....And then, they will still keep the new ones at home and... come to work with the old ones. Same with

uniform...And then, somebody will still come to work even with slippers and old ones'.

(HRM, EF Factory)

The key informants expressed exasperation with workers who refused to comply despite trainings or warnings. Most managers claimed to have resorted to stiff penalties such as suspension, wage deductions and even termination of appointment. Both safety managers and HR managers agreed that they carried out monitoring exercises themselves by walking round the factory at impromptu times. They expressed little faith in production supervisors. The safety personnel of a food processing industry cited non-compliance as a hazard on its own calling it a disease that needs to be curbed if any organisation will move forward. In order to curb this habit, some of the key informants reported carrying out various strategies and methods in ensuring workers compliance with use of PPE. Among the outlined strategies included **training and re-training, enforcement, counseling, issuance of threat letters, constant verbal warning, regular communication with union members and periodic sanctions.** Many believed these have worked, while others were of the opinion that it was slowly yielding success. Two key informants registered successes from working with the workers' unions to achieve better PPE and overall safety compliance.

As suggested by some informants:

'...First, I invited the union members, because everything that happens they run to their union. I issued these uniforms, both the uniform, they will keep the new ones at home; but the uniform and the safety boots we purchased. By Monday, if I go round, and I see anybody... it's dismissal.' **(HRM, EF Factory)**

'So, what I will suggest we will have to give them penalty.....penalty is the only answer...but then how much is the salary so, if you send somebody on two weeks suspension, that is already out of the salary, that two weeks he is going to sit down doing nothing. How is he going to survive with two weeks' salary in a month? so the best thing is... I give them talks a lot, I give it a lot, and I mean it I will tell them 'look ..... but you see they still don't change....so what can we do about it? It's a problem to every organisation.' **(HRM, AF Factory)**

'Ehmm, initially, we had serious conformity issues when you have people using helmets to scoop water, scoop chemicals,....helmets that have been provided to shield them. They see it as...you know this culture of ehmm....Permit me to say it in yourba, when they say 'nkan kan lo ma pa eyan' (meaning: something must kill a man). So, whether or not, if don't die here....., so, I will tell them that I would rather you not die on me, I will tell them that. We had to start putting in sanctions before we could get a bit of compliance. And, you see that now, is not 100%, but at least it is better than what it used to be'

(HRM, RML Factory)

Thus, it was evident from the participants that many of the industries provided basic PPE. However, **poor compliance with usage, inadequate organisational policies on PPE, and the inability of management to ensure or sustain workers' compliance** were some of the major issues ravaging the selected industries.

Table 4.2: Responses on provision of PPE by employers and compliance by workers

Study Sites(factories)*	Provided with PPE	Not provided with PPE	Workers find it difficult to use PPE	Not finding it difficult to use PPE	PPE provided and sufficient	PPE provided but not sufficient	Workers comply with PPE(response from KII) *
NPK	Y	N	Y	Y	Y	N	Y
RML	Y	N	Y	N	Y	N	N
AF	Y	N	N	Y	Y	N	N
BH	Y	N	Y	N	N	Y	N
SWK	Y	N	Y	N	Y	N	N
PF	Y	N	Y	N	Y	N	N
SWF	Y	N	N	Y	Y	N	N
OFIL	Y	N	Y	-	Y	N	N
SKM	Y	N	Y	N	Y	N	N
EF	Y	N	Y	-	Y	N	N

Y= Yes

N= No

**see Table 1 in Appendix VI for description on industrial activity. Abbreviations used for anonymity.*

D. Common hazards peculiar to organisation and units prone to them

Data from focus group interviews revealed poor knowledge of what hazards are. A number of hazards peculiar to different workplace were identified by the respondents in lay terms. As observed, hazards experienced and encountered were based on the type of industrial activities in each factory. Among the ones identified by all were **cuts, chemical spills/splash, bruises, minor burns and falling objects or falling from height**. Ergonomic hazards were also described by workers who engaged in manual handling. They reported back pains from heavy lifting and muscular strains due to prolonged sitting or standing **(See Table 4.3)**. The safety manager of a feed milling industry expressed his dissatisfaction with heavy lifting by factory workers without adequate equipment and this was echoed by participants from a plastics industry.

Many participants believed that common hazards like cuts, falls, bruises, minor bums and the likes are inevitable, as such they are part of industrial activities and work-life experience:

> *'There are so many. The hazards that are here...have to do with all these burns. You know, if they are not careful, when they are purging the materials, .. Is not all the time, but there are times you purge all the materials, you know they are very hot. The thing will splash out and if you are not well kitted, of course, the thing will enter your hands. And then, ehmm, other hazards have to do with ehmm, you know, there are times you have to lift materials, there are times they have to like the mixer: they have to lift the materials into the mixer into the mixing machine. Maybe if you don't position yourself well, you get strained up.'* **(HRM, BH Factory)**

> *'Maybe those people in mill can be exposed to dust during milling and another that we are usually expose to is falling objects: people supplying raw materials sometimes some of those things they carry may fall.'* **(Respondent 2, PF, Factory)**

'In the maintenance department, the one that are peculiar to us is different according to specification of your job. Those on production line, the supervisors and technicians, it is material spillage, hot materials. If you look at their hands and checks, hot materials..., check like this, you see the burns there...the operators... I think the knife cutting their fingers...Like our own, hammer cut all those ones: minor cuts. At times, maybe you are hammering something accidentally you knock you hand or the hot iron just cut your finger: all those ones.... You, see most of us in maintenance department you cannot see our hand smooth. These are all the hazards'. **(Respondent 1, BH Factory)**

Some FGD participants related incidents involving workers inserting their hands or fingers into moving parts of machines like mixers or grinding equipment resulting in traumatic injuries such as amputations and fractures. Some respondents also stated that they were subjected to carrying heavy loads as there was no fixed limit on manual lifting

Safety managers were more conversant with technical definitions of hazards and were able to describe the types of hazards associated with their workplaces than the HR managers. However all agreed on the need to protect workers from these hazards. Most key informants cited the production departments as most vulnerable to hazards and occupational accidents, however one safety manager in a chemical industry dealing with volatile and highly explosive materials reported that the laboratory workers most exposed to dangerous chemicals either by inhalation or skin exposure. He stated that vapours and gas levels were regularly monitored in the work environment to ensure minimal exposure but was worried about the long term effects of the residues in the human body especially in the laboratory where ventilation was minimal. It was evident that all respondents had a general idea of hazards common to their work environment. However, the type and quantity depended on the work activity, materials used as well as type of industrial settings.

Table 4.3: Common hazards peculiar to organisation and units prone to them

Study sites	Common hazards peculiar to each workplace settings									Units Prone to hazards				
	Cuts	Chemical spills	Falls	Bruises	Burns	Noise	Dust	Mechanical	Ergonomic	Production (milling, finishing,)	Laboratory/Quality control	Operation	Loading/logistic	Maintenance/Technical
NPK	Y	N	N	Y	N	N	N	N	Y	Y	Y	Y	Y	Y
RML	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
AF	Y	N	N	Y	Y	N	N	N	Y	Y	N	N	N	Y
BH	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
SWK	N	Y	Y	Y	N	N	N	N	Y	Y	Y	Y	Y	Y
PF	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	N	Y	Y	Y
SWF	N	Y	N	Y	Y	N	N	N	Y	Y	N	Y	N	Y
OFIL	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
SKM	Y	N	Y	Y	N	Y	Y	Y	Y	Y	N	Y	Y	Y
EF	Y	N	Y	Y	Y	Y	Y	N	Y	Y	N	Y	Y	Y

Y = Ycs

N= No

E. Chemical safety: use of material safety data sheet and standard operating procedures

Many factory workers discussed the benefits of following SOPs in their daily activities. The way in which these benefits could be helpful were relatively consistent across focus groups. Some of the chemicals reported to be in use in some industries included Hexane, Nitrocellulose, and Hydrochloric acid amongst others. When workers who handled chemicals were asked about material safety data sheet (MSDS), many affirmed to the usage of its guidelines for handling each chemical. Many of the respondents therefore seemed to have a consensus on the need of MSDS and proper adherence to SOPs during production. These procedures were not always documented for each department but were verbally communicated to workers during induction or training. As revealed by an FGD participant:

> '*Yes there are standard procedures for each operation and it is pasted in each department.*' **(Respondents 1, PF Factory)**

Another put it in this way for clarification:

> *'Like my department, as a boiler operator, I cannot just go there and switch on the machine, I have to check every part and ensure everything is ready'.* **(Respondent 2, PF Factory).**

On the other hand, some of the respondents reported to be carrying out chemical handling and procedures without a written document or Standards Operating Procedures (SOP) manual. Therefore, activities involving chemical handling and SOPs were purely due to intuition and previous experience from former industrial settings. As reported by some of the respondents:

> *'We don't have a written document, but I have worked in another company before I came here. I have the manual of safety from that other company. They gave it to workers; I have been reading it in case of necessity. But such manual in not in this present work place'.* **(Respondent 1, AF Factory)**

Some factory workers reported skin rashes and burns due to lack of proper knowledge of chemical handling in their various establishments. Majority of respondents from the production

sections revealed exposure to manual mixing of chemicals with their hands and reported discomfort despite gloves or nose covers.

> *'See, as a matter of fact, they have no standard. The major standard is for production. Let's be sincere: no standard. What we mean by standard I would give an example. I have a friend in P and G. If a load is more than 5kg, you don't carry by yourself: you carry forklift. But here, if you can carry100kg, carry on: they would ask you to go ahead. They don't bother. Their own is once their work is going on, no wahala'.* **(Respondent 1, BH Factory)**

Amongst key informants, safety managers were more knowledgeable on chemical handling and SOPs than their HR counterparts. It was revealed that the laboratory and quality assurance personnel were charged with proper execution of SOPs as regards all chemicals. HR managers were of the opinion that workers were protected from chemical hazards by precautionary measures in place and that the SOPs were the duty of Unit Supervisors to enforce. Few safety managers reported carrying out any risk assessment for departments handling chemicals.

F. Emergency preparedness and response planning: fire drills and first aid

Participants' in focus groups painted a picture of what they understood by emergency fire drills and how they had participated in it during its outbreak and training sessions. Factory workers in multi-national companies were conversant with drills and had undergone basic first aid training.

> *'We know it as fire drill. Like we are now, probably if there is any form of fire, we all have to leave the premises and go out to the muster point there. Whereby a roll call will be made to know...it is just once in a while, not always'* **(Respondent 3, SWK Factory)'**

> *'Yes ... We do it, we do have alarm and at times...when you hear an alarm, you go to the nearest exit and don't run, and we have two assembly points: one is here, one is there So, you go to the nearest one to you; after that part we now meet at this one here then we do head count to know if there is anyone left. So, we do drills'.*
>
> **(Respondent 1, NPK Factory)**

Some factories only made use of selected individuals called fire marshalls, 'fire champions and first aiders.:

'We have people that are specially trained for it. If there's any fire, we call them. Each department has a representative. We call them fire champions. When they go for the training, they return to teach everyone in their section.' **(Respondents 1 and 2, RML Factory)**

Some factory workers reported lack of fire alarm system or procedure to evacuate in time of emergency in their workplaces. Nevertheless, some of the factories used for this study had no idea of emergency preparedness. They had not carried out training or practical sessions on emergency drills. Some workers equated it with the provision of and training on usage of fire extinguishers. As observed:

(Interviewer: What do you understand by fire drills?) *'... Ok, fire trainings. We have in-house trainings. At times, periodically every three months, we come for this training on how to use fire extinguishers.'* **(Respondent 2, SWF Factory)**

Almost all the safety personnel in the management of the study sites selected reported to have adequately trained workers on issues relating to fire prevention. However, few believed that fire and emergency evacuation drills might not be necessary since fire extinguishers were available. Limited resources was cited as a reason for poor emergency planning.

4.1.3 Trends of occupational injuries and accidents

Despite the buffers that the government and organisations provide to workers for the purpose of preventing accidents, it is evidenced in this study that no industrial setting can do without recording two or more industrial injuries and accidents, fatal or non-fatal injuries/accidents in its life time. Therefore, regardless of the simplicity of industrial activities and precautionary measures put in place to guard against its occurrence, it is bound to happen. That is, incidence and accidents could not be averted. Many participants, while recalling these accidents still felt overwhelmed to describe what they felt when such incident happened. Both the focus groups and key informants narrated issues ranging from near-misses, fingers chopped off, arms amputated, fatal falls, machine trapping, incapacitation, suffocation and even to death. The results of these fatal and non-fatal events unpredictable and unavoidable events were, in most cases, *attributed to workers ignorance.*

poor industrial knowledge, non-compliance with the use of PPE and SOPs, absent mindedness and overconfidence and are described in a myriad of ways. (**Table 4.4** shows summary).Thus, all the industries used for this study reported experiencing two or more cases in recent times.

The safety manager of the packaging manufacturing industry reported having witnessed two traumatic accidents in recent years. They included a crushed finger and a fractured elbow amongst other minor incidents including cuts, bruises and burns. Other key informants also narrated experiences of traumatic injuries in the workplace as well as fatalities. Fatal injuries were reported by interviewees though were said not to occur as often as chopping off of fingers or chemical splash. Reportable injuries were common place and interviewees gave examples of recent accidents in their workplaces that resulted in hospitalisation of the victims. Falls from ladders, entrapment under crane, fire explosions, and chopping off of limbs are examples of some reported accidents by key informants.

> '*....just ehm bruises...i think it was while welding. The person was not conscious enough, so, by the time they pointed the light.... It was one person inflicting on the other person: not even on himself. So, I guess the person wasn't conscious enough; he wanted to turn with the flame. He didn't switch it off before he turned it. So, he glazed the other person's skin.* **(HRM, RML Factory)**

> *So, there is a time someone was working as one of the intakes and, I believe, as it was explained that time, I have forgotten the right word to use for it: he was just checking and opening, just ,the cover just released unexpectedly and then hit him at the mouth. So, he lost one or two three teeth...There is ehmm, another issue was someone was trying to handle repair, but without notice another person just switched on the line and he has ehmm some fingers chopped up...He is still working, with us ..the third one.. the steam, just came out, hit the person at this side of the body.'* **(HRM, PF Factory)**

Dangerous occurrences with chemicals were commonly reported among factory workers at feed mills. An incident with agrochemicals was reported thus:

'I witnessed, ehmm, the boy who was mixing the chemical, the boy has a general way of sweating...after sweating, you can see some particles of dust on my body now...What did he do? The following day, the uniform we wore to work yesterday, the vitamins that spilled on it, he still wore on the following day. The third day now, the thing had effect on his body? Like rashes.' **(Respondent 3, AF Factory)**

Table 4.4: Patterns of occupational injuries and accidents reported by respondents

Study Site	Pattern of Occupational Injuries and Accidents				
	Witnessed/ recorded accidents? Yes/No	Events	No. of cases	Incident outcome	Injury outcome
NPK	Yes	i. Finger was crushed ii. elbow impacted	2	i. Treated, compensated, reported to FMLE ii. Treated and back to work.	Non- fatal, permanent disability
RML	Yes	i. Two cases of improper leaning of ladder against the wall. ii. A case involving fork-lift mismanagement	3	i. Treated, medically fit and back to work. ii. Led to the death of the victim	i. Non-fatal ii. Fatal
AF	Yes	i. Fire incident ii. Finger chopped off. iii. Chemical irritation	3	All cases treated	i. Non-fatal ii.Permanently disabled
BH	Yes	i. Chopping off of fingers. ii. Arm amputated iii. Fire incident	2	Cases treated Workers compensated and retained. Fire put off immediately	Non-fatal, permanent disability
SWK	Yes	i. Fire incident. ii. Chemical splash	2	i. Put out before spreading. ii. Cleaned up immediately.	Non- fatal
PF	Yes	i. Loss of teeth. ii. Fractured arm iii. Trip and fall incident	3	Treated, reported and back to work	Non-fatal
SWF	Yes	Sustained wounds during production	3	Treated	Non-fatal
OFII	Yes	i. Ladder in contact with electric pole. ii. Ladder not properly keyed, resulted to fall and chemical splash iii. Blasted rock cut off workers leg. iv. Folk-lift somersaulted on a worker.	4	i. Led to death of the contractor. ii. Treated and back to work. iii. Treated, disabled iv. Treated, yet to be compensated	i. Fatal ii. Non-fatal iii.Non-fatal, permanently disabled iv.Temporarily disabled
SKM	Yes	i. Fire incident ii. Heavy load fell on worker	2	i. Feedmill completely burnt, resulted to death of the founder due to smoke inhaled. ii. Still undergoing treatment.	i. Fatal ii Non-fatal, Permanent disability
EF	Yes.	i. Cuts ii. Off-site motorbike accident	2		Non-fatal

4.1.4 Patterns of fatal and non-fatal injuries due to industrial accidents

a. Frequency and outcomes of minor accidents

Issues relating to cuts, bruises, and minor burns were raised. Most of the respondents believed minor accidents were unavoidable and were regular occurrences. Few were of the opinion that it was not a frequent occurrence. As narrated by one of the respondents:

> *'Yes, yes, yes. Like cuts? Ehmm, cut. We normally have cuts, though we have first aid boxes that we used to treat any minor accidents. For example, for the people that are working in the workshop now, there is no way they can do without cuts because they are dealing with metals, chips. So, all those chips can cut them slightly'.* **(SM, RML Factory)**

Thus, the frequency of occurrence of these minor incidents was reported to vary greatly with the type of industrial activities. Half of the industries had on-site clinics and rendered the treatment at their sites while majority had first-aid boxes and also did the same thing referring to hospitals when necessary:

> *'We have provision for first aid. We have stand by clinic where they...most of the time, those things get treated on time, but we as we still ensure they get to the #hospital no matter what, then, and then, a doctor certifies them ok.'* **(HRM, RML Factory)**

Table 4.5: Patterns of fatal and non-fatal injuries due to industrial accidents

Patterns of fatal and non-fatal injuries due to industrial accidents

Study Site	Outcomes of minor accidents(cuts)	Frequencies(cuts)	Outcomes of major accidents	Frequencies	Presence of on-site clinic	Have first aids boxes	Have first aiders
RML	Treated(cuts)	Often(cuts)	Hospitalised and compensated	Rare	Yes	Yes	Yes
SKM	Treated(cuts)	Often(cuts), burns(sometimes)	Hospitalised/ compensated	Rare	No	Yes	Yes
SWK	Treated	Rare	Treated	Rare	No	Yes	No
AF	Treated(cut)	Sometimes(cuts)	Treated/compensated	Rare	No	Yes	No
BH	Treated	Rare	Treated/compensated	Rare	Yes	Yes	Yes
PF	Treated	Once in a while	Hospitalized, compensated	Rare	Yes	Yes	Yes
NPK	Treated	One in every 4 months	Hospitalized, compensated	Rare	Yes	Yes	Yes
SWF	Treated	Once a while	Hospitalised and compensated	Rare	-	Yes	-
EF	Necessary action taken	Once in a while	None	Rare	Yes	Yes	Yes
OFII	Treated	Rare	Treated, back to work	Rare	Yes	Yes	Yes

b. Frequency and outcomes of major accidents

On the contrary, the frequencies of major accidents involving prolonged hospitalization, permanent disability, and death were reported by the discussants to be not so common, occurring once in a few months. In view of this, most of the major accidents that occurred in all the study sites used for this reported to have taken care of the bills and medical treatment of victims, with support from the concerned insurance companies used.

4.1.5 Patterns of accident reporting and investigation by management

Among the challenges identified by discussants in this studies limiting proper reporting to concerned bodies include: ignorance of who to report to aside the management; poor knowledge and implementation of OHS regulations; unawareness of the concerned bodies for proper documentation, inadequate safety management system due to poor policies and practices, and the understanding of what to be reported. It is evident from this study that some of the key informants misunderstood the differences between documentation of accidents and proper reporting of such to the concerned bodies.

Among the focus group discussants, almost all (98.0%) did not know the patterns of reporting of incidence. For many participants, once major accident were reported to the management, there was no need reporting to other bodies. Thus, it was purely management's responsibility to carry out such activities. In addition, they opined that it was not necessary to report minor incidents to management or authorities because they were normal work-life experiences. As observed:

> ***(Interviewer: What about government bodies? Was it reported to them?)***
> *'I don't think so'... 'I don't think they used to involve government. I know they used to involve the insurance people. The insurance people will come to the scene of the accidents to see what has happen so that when they want to pay the compensation, they would write the report.'* **(Respondents 1 and 2, BH Factory)**

One participant put it this way:

> *'Since it won't make us to stop coming to work, why reporting?... 'If the person reports the accidents that is when it will be investigated. But since it was not reported, there is nothing...No documentation.* **(Respondent 3, SWK Factory)**

Majority of FGD respondents described the reporting channels for accidents as through their supervisors to the human resource manager or safety manager. None of the respondents made mention of reporting to concerned government agencies:

> *'Everything that happen is supposed to be known by the management, because once there is incident, your supervisor will report to line manager and they will report to safety manager and they take the necessary step. The safety people will ask questions on how the thing happens then we would explain to them.'* **(Respondent 1, RML Factory)**

Similar trend of poor reporting was also observed by the key informants, where some respondents stated that notifying the government was not necessary inasmuch proper care had been taken of the victim. Most key informants owned to knowledge of relevant bodies to be notified on such issues. The HR manager of a poultry farm cited carelessness on their part for failing to report. They did not see the need and vehemently insisted that they were not afraid of government sanctions. Two safety managers felt that only fatalities should be reported as follows:

> **'(Interviewer:** ***Are you aware of other body that is responsible that you need to notify apart from NSTIF?) No. I know we need to notify the ministry but since it was not a fatality case. (Interviewer: Ok, you don't know the issues that suppose to be reported to the ministry?) Yes, yes, yes. (Interviewer: Ok. Are you aware of the aspect of notification and reporting of accidents)*** *'Yes, I am aware but, concerning this situation, it was not reported.'* **(SM, SKM Factory).**

Poor management systems, nonchalant attitude to OHS were major reasons observed for failing to notify government authorities. Certain key informants were of the idea that insurance policies taken by the company may be a factor in the failure to report as victims are usually compensated with cash. They also cited a lack of understanding of the need to report and investigate these accidents by senior management stating that the fear of disrepute to the organisation and products could be paramount in their desire not to report. Few key informants claimed ignorance and most showed limited understanding of characteristics of reportable incidents. Only two study sites could be said to carry out prompt reporting at management levels.

4.1.6 Consequences of occupational accidents on safety management system

As reported by some of the key informants, accidents led to actions taken by management to prevent future occurrences. Thus, revealing a predominantly reactive rather than proactive nature among these industries. Following accidents, strict precautionary measures were periodically taken to forestall unsafe acts and unsafe conditions in the workplace. An example was cited by the HRM of the vegetable oil producing factory where hexane is used to extract the oil. Hexane is flammable and very volatile thus no sparks or phones are allowed in the vicinity of the Hexane plant. Following an explosion in a similar factory (a competitor) stringent measures were taken. This ranged from increased number of warning signage to regular monitoring of hexane levels in the atmosphere every hour. Management also mandated security search to ensure no phones are carried into the plant.

Respondents reported examples of **restructuring, special committees, risk assessments and internal audits, employment of safety personnel and specialised HSE training** in response to traumatic workplace accidents.

As noted:

'Well, for the fatal one, it made us do a reality check: it made us take stock. We have to invite someone to do a risk assessment for us, to further ehm, identify what we are actually lacking, because we can't say we are 100%...even though all of the things pointed to the operators' non-conformity to procedures, but you cannot say that you are off the hook from the identified loopholes in existence.... Yes, yes. There were SOPs you have to carry out. We even have SOP committee. One of the measures we took was that ehmm, we activated the SOP committee to now go back and review all operating procedures again; propose again, then we doubled up on our provision for PPEs, then we even ehmm restructured. What I mean by that is that we have to create an independent safety department. Prior to now, the safety department was reporting to ehmm the technical manager. So, the incident made us to restructure. get more employees, and now the safety head is now reporting directly to the GM. no longer to the technical. We had to get more people, even run shift and all of that...we came up with very stringent rules and measures, disciplinary measures for

anybody caught not wearing PPEs. So, if we can at least block all avenues, we will prevent future occurrences'. **(HRM, RML Factory)**

4.1.7 Organisational policies and priorities on occupational safety and health

Almost all the interviewees excluding one study site attested to the presence of some form of Occupational Safety and Health Management System (OHSMS). They revealed that progress had been made over the years in terms of policies and OHS was more of a priority in recent times. They pointed out the rapid pace of change accomplished in their industrial settings where issues of safety are concerned. Interviewees from multi-national companies reported strict adherence to policies and stipulated that international OHS standards were applicable and expected in their work environment. Most key informants agreed that OHS was a priority to top management however there were some study sites which lacked evidence of this by ***lack of designated safety officers, no documented safety policy and no safety induction on employment, inadequate PPE provision and poor implementation of local OHS laws.*** Some FGD participants opined that management was more concerned with profits than health of workers.

Six study sites reported having a documented safety policy which was been implemented in the workplace. Key informants were more knowledgeable than factory workers on the contents of the policy document. Factory workers in companies applying international safety standards reported to signing an agreement form to abide by safety rules and were also given a safety handbook at induction. Two study sites noted to be multinationals, attested to having a separate health and safety department and a budget for its activities. Therefore, varying levels of OHS priority was observed across all sites ranging from very low to very high. The following were major areas where improvements in OHS organisation were carried out:

i. Periodic trainings on health and safety
ii. Fire drills/Emergency planning
iii. OHS Policy development and implementation
iv. Provision of PPE
v. Automated machinery and reduced manual handling
vi. Engagement of designated safety personnel

As observed from many of the participants, almost all echoed similar statements of achievements regarding the above:

> *'Every meeting we have trainings. We have safety talk for the month... We have first aid training with the red-cross and fire safety prevention, service... Training is good, but without training the people will not know what they are supposed to do,..there is a budget for safety. Things have to be planned for: you appropriate it as much as you can....and because of the template that we have in this company, you know, we bring in emergency response team, for every member, for every department. And the same time, we also have first aiders. We have the fire man, we have the waste man and they all work together.... we have developed HSE policy and given it to the workers to let them know what it is. .'***(SM, OFII Factory)***

> *(Respondent responded to the question with a loud tone) 'When I joined this place, they did not knowanything about safety, but now I can really say they have really improved on safety aspect, because there are some things that I have introduced to them...we normally do safety awareness, which I normally send to all staff: every first day of the month. (Interviewer: you said you trained them on OHS policy at least from time to time?)Every month, once in a month (Interviewer: What about fire drills?)They normally carry out drills every three months. But we are still working on some things to make it more resourceful* **(SM, RML Factory)**

Key informants all reported management's desire for continual improvement with one HR manager citing economic downturn as reasons for poor OHS performance. Few safety managers showed hesitation in rating their organisations' OHS performance. Some were able to speak off record about the *poor commitment to reward incentives, improved work process and specialized safety training for staff by top management*. However, most FGD participants were of the opinion that management could still do more to improve safety of workers excluding two study sites where interviewers praised their organisations' efforts.

4.1.8 Awareness of Factories Act and Employees Compensation Act and impact on organisation's safety performance

a) Awareness of government regulations on occupational safety and health was quite high among many key informant respondents. A good number of the respondents highlighted some contents in the Factories' Act, but there appeared to be insufficient knowledge of some of the key components of these regulations. These included the ***reporting/investigation of accidents, the need to create awareness about government OHS regulations to workers, compensable incidents, provisions of safe machinery and work environment***. The knowledge and understanding of some of the components of OHS regulations was quite high among key informants with greater work experience in the industrial setting than others who were relatively new. Many key informants were observed as having difficulty in implementing and following government regulations especially as regards reporting and notification of accidents. Nevertheless, safety professionals tend to understand the applications of these laws than their counterparts, the human resource managers.

b) Assessment of government agencies roles on OHS improvement in industries: Respondents across the key informant appreciated the efforts of government agencies in ensuring safety practice in industrial settings.

> *'So, any time they come and they identify any gap, we try to fix. That is why their coming, we usually welcome it, because we see them as auditors for us. If they don't come, probably we may not see those things.'* **(HRM, EF Factory).**

All respondents at various sites affirmed to routine visits by government bodies. However, most FGD participants expressed disappointment in ability of government representatives to enforce the law and place sanctions on organisations that were found wanting. Almost all the participants (90.0%) alleged **the government of bribery, corruption, negligence, sentiments, nonchalant attitude and 'mundane' ways of doing things.** Few key informants alleged fear of expatriates who ran some of these industries was the reason for failure of government workers to fully enforce OHS laws. As opined:

> *'...You will find out that when they set guidelines...it rests on the shelves. And If they now come around to enforce it, is like, they are not too bold enough to say this is what you are doing and it's not good...in Nigeria, they would rather go to the office.*

The moment they go to the office and they give them one thing or the other, they will just forget about whatever they are writing. And that is the problem of having so much expatriates, I mean, foreigners...I think the government are seriously failing.

(SM OFII Factory)

Some claimed it was because the government agencies were poorly funded. Others opined that management as part of policy was inclined to comply with OHS regulations despite any government shortcomings.

4.1.9 Recommendations to improving Occupational Safety and Health in industries

Recommendations suggested by respondents varied according to each industrial setting and what each individual desired at the point of the interview. Thus, it was evident that no industrial settings can have a perfect working environment that satisfies the needs of its workers. Focus group respondents in sites where OHS performance was rated low demanded that protective gear for all workers be given greater priority. Other FGD respondents put the onus on government bodies to enforce fully all aspects of OHS laws in the industrial sector. One respondent stressed the point of protecting casual workers in the factory despite management's outlook that it was a waste of money:

'We still have to improve on the area of the temporary workers, casual workers... They still have to be equipped .... Even though they are temporary staff; they may come now and go tomorrow...so we just have to look at that area.' **(Respondent 3, NPK factory)**

KII interviewees suggested **government sanctions for erring industries, provision of adequate numbers of safety managers to cater for large number of staff and diverse processes or units, provision of adequate resources for safety, job rotation, utilisation of key performance indicators, staff motivation and rewards** as ways of improving OHS in industries.

'Give them maybe fine, sanctions. You know, corporate social image goes a lot. If government comes in here, they found out something, they put it in the paper; no company will want to hear that. The moment they know that this one goes on air, is trouble: they want to avoid it as much as possible. Government should just not make the law; they need to enforce it.' **(SM, OFII Factory)**

Most key informants reported that they were working towards continual improvement of their OHS status and felt that everyone had a role to play in ensuring minimal injuries and accidents in the workplace. A striking view was that of the safety manager at a chemical industry who opined that society should inculcate safety culture starting from the home and this would ensure compliance to rules and regulations in the workplace creating less problems for the organisations.

4.2 Quantitative data analysis

4.2.1 Characteristics of reported workplace injuries (2000 - 2016)

From the record review, 50 injuries were reported over the 17-year study period. The mean age of accident victims was 34.1±8.5 years. Less than one-third (26 %) of the accidents were fatal. 49 (98.0%) of the victims were male and more than half (27, 54.0%) had wounds, fractures and dislocation of which the most affected body part was the upper extremities (19, 38.0%). Most of the accidents took place during the morning shifts (60.4%) and occurred mainly in the production hall (38%) (See **Table 4.6**). Half of the injuries (50%) were reported to be caused by the victim's unsafe behaviours.

Table 4.6: Characteristics of reported accident/injury (2000 to 2016)

Variable	Frequency (N=50)	Percentages (%)
Age group of victims (years)		
Below 40yrs	37	74.0
≥ 40yrs	13	26.0
Sex of Victims		
Male	49	98.0
Female	1	2.0
Outcome of accident		
Fatal	13	26.0
Non-fatal	37	74.0
Nature of Injury		
Wounds, fractures and dislocation	27	54.0
Internal injury	5	10.0
Burns	13	26.0
Asphyxiation	5	10.0
Affected body parts		
Head	8	16.0
Trunk	3	6.0
Lower extremities	7	14.0
Upper extremities	19	38.0
Body systems	13	26.0
Time of occurrence		
Morning	29	60.4
Afternoon	10	20.8
Night	9	18.8
Missing*	2	
Location of occurrence		
Production hall	19	38.8
Loading area	2	4.1
Storage house	5	10.2
Power plant	2	4.1
Hexane Plants	5.	10.2
Site premises	16	32.7
Missing*	1	
Unsafe acts		
Human factor (victim)	25	50.0
Management factors	19	38.0
Human factor (other workers)	6	12.0

4.2.2 Annual distribution of injuries, deaths, accidents and case fatality rates (2000-2016).

Over the 17 years review period, the total case fatality rate was 26.0%. There was an increase in the records of injuries and deaths from 2011- 2016. The highest number of injuries 10 (20%) and deaths 4 (30.8%) was reported in 2016. There were no records of accidents for the years 2001, 2004, 2005 and 2007 (**Table 4.7**).

Table 4.7: Annual distribution of injuries, deaths, accidents and case fatality rates (2000-2016).

Year	No. of injuries (%) n= 50	No. of deaths (%) n=13	No. of accidents reported (%) n=37	Case fatality rate (%) Total CFR=26.0
2000	2 (4)	-	2 (5.4)	-
2001	-	-	-	-
2002	2 (4)	-	2 (5.4)	-
2003	1 (2)	-	1 (2.7)	-
2004	-	-	-	-
2005	-	-	-	-
2006	3 (6)	-	3 (8.1)	-
2007	-	-	-	-
2008	4 (8)	1 (7.7)	2 (5.4)	25.0
2009	3 (6)	2 (15.4)	2 (5.4)	66.7
2010	4 (8)	2 (15.4)	4 (10.8)	50.0
2011	3 (8)	-	3 (8.1)	-
2012	3 (6)	-	3 (8.1)	-
2013	4 (8)	-	3 (8.1)	-
2014	5 (10)	1 (7.7)	5 (13.5)	20.0
2015	7 (14)	3 (23.1)	5 (13.5)	42.9
2016	10 (20)	4 (30.8)	3 (8.1)	40.0

4.2.3 Incidence of occupational injury

There were no records of occupational injury in the years 2001, 2004, 2005 and 2007. The reported incidence of occupational injury between 2000 and 2011 did not follow a consistent trend. There was an increase in the occurrence of occupational injury from the year 2012 to 2016. The highest incidence of occupational injuries was observed in 2016. **(Figure 4.1).**

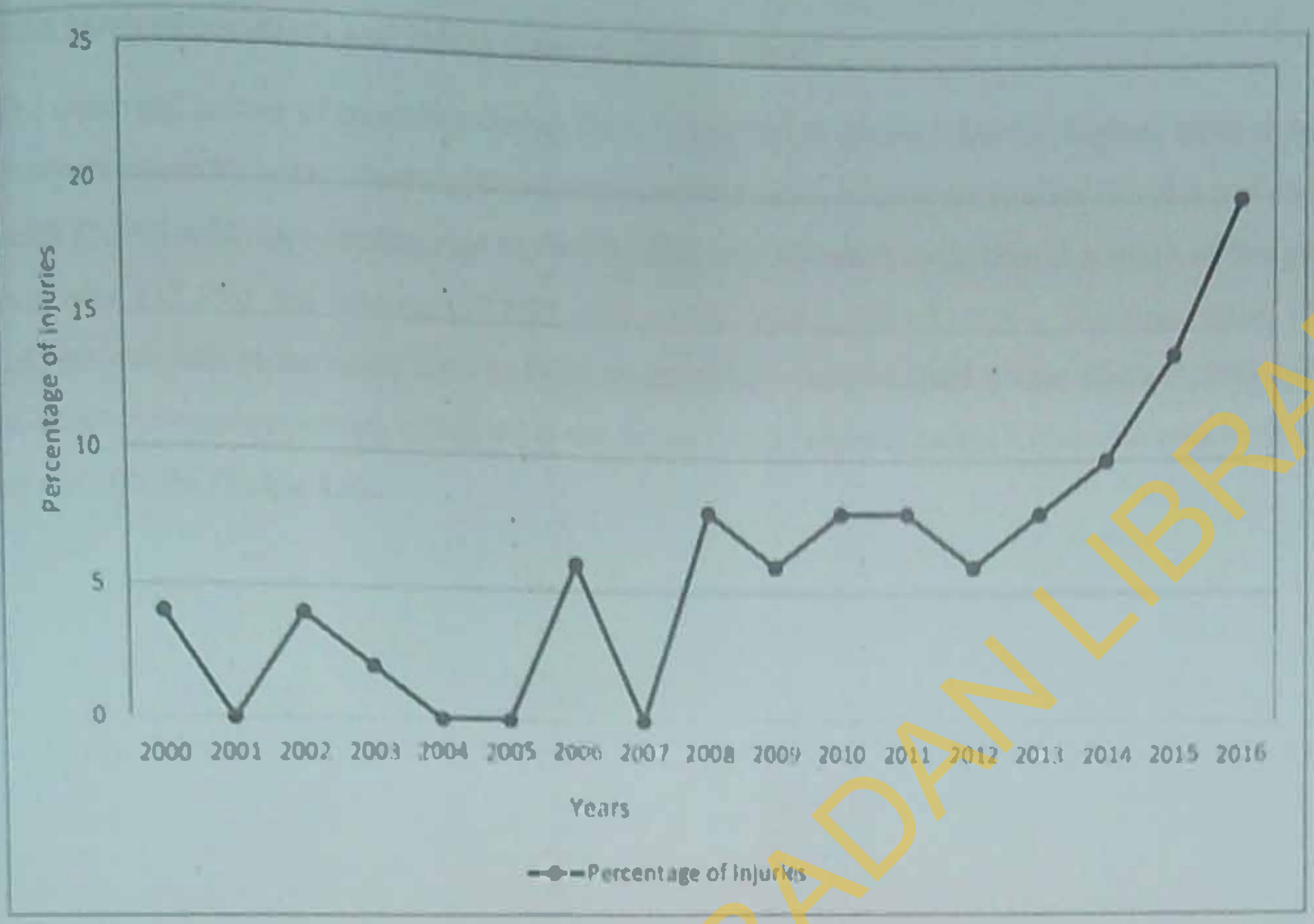

Figure 4.1: Incidence of occupational injury

4.2.4 Mode of accidents and injury pattern (2000 - 2016)

The trend and causes of mortality during the 17-year period showed that the highest number of deaths occurred by being caught in or between machine parts. It led to 19 injuries (38.0%) and one death (5.3%) with case fatality rate of 59.6%. This was followed by deaths as a result of fire or explosion (38.5%) and injuries (10.8%) with a case fatality rate of 50.0%. The least cause of injuries was falls at the same level or from an elevation which resulted in one injury (2.0%) and no death. Also, electrocution which led to one injury (2.0%) and one death (7.7%) with case fatality rate of 100.0% **(Table 4.8).**

Table 4.8: Mode of accidents resulting to injuries and fatality (2000 - 2016)

Mode of accident	No. of injuries (%) n=50	No. of deaths (%) n=13	Case fatality rate (%) Total CFR=26.0
Caught in or between machine parts	19(38.0)	1(7.7)	5.3
Fall at the same level or from an elevation	1(2.0)	-	-
Struck by falling object	7 (14.0)	2(15.4)	28.6
Fire/explosion	10(20.0)	5(38.5)	50.0
Striking against stationary/moving objects	3(6.0)	1(7.7)	33.3
Extreme temperatures	3(6.0)	-	-
Electrocution	1(2.0)	1(7.7)	100.0
Inhalation or ingestion of harmful substances	5(10.0)	2(15.4)	40.0
Others*	1(2.0)	1(7.7)	100.0

**Others: Victim collapsed at work due to undetected high blood pressure*

4.2.5 Accidents, deaths and the type of industries involved (2000 – 2016)

The confectioneries industry topped the list with 6 deaths (46.2%), 50 injuries (53.8%) and a case fatality rate of 31.6%. This was followed by the construction industry with 2 deaths, case fatality rate of 25.0% and manufacturing of vegetable oil/crushing which recorded two deaths, case fatality rate of 33.3%. No injury and death was recorded in feed milling, sheets/steel pipes, packaging and plastic industries (**Table 4.9**).

Table 4.9: Accidents, fatalities and the type of industries involved from 2000 to 2016.

Industry	No. of Accidents (%) n=37	No. of fatal injury (%) n=13	No. of non-fatal injury n=37	Case fatality rate (%) Total CFR=26.0
Construction	4(10.8)	2(15.4)	6(16.2)	25.0
Pharmaceutical	1(2.7)	1(7.7)	-	100.0
Feed milling	2(5.4)	-	2(5.4)	-
Mfg. FMCG	2(5.4)	1(7.7)	1(2.7)	50.0
Mfg. GCI sheets/steel pipes	3(8.1)	-	3(8.1)	-
Mfg. confectioneries	14(37.8)	6(46.2)	13(35.1)	31.6
Mfg. feed/poultry processing	1(2.7)	1(7.7)	-	100.0
Mfg. packaging	5(13.5)	-	5(13.5)	-
Mfg. plastics	3(8.1)	-	3(8.0)	-
Mfg. vegetable oil/crushing	2(5.4)	2(15.4)	4(10.8)	33.3

4.2.6 Factors associated with occupational accidents (2000-2016)

About 12 (24%) of unsafe conditions that were reported during the 17-year period were due to human factors for 40 % of the accidents reported to the FMLEID. About half of the contributory causes were due to management factors while human system factor accounted for about 48%. Human system factors were responsible for about 40% of the remote causes of occupational accidents while management system factors accounted for others (60%) (**Table 4.10**).

Table 4.10: Occupational accident causal factors (2000-2016)

Accident causal factors	Factors	Frequency (N=50)	Percentage (%)
Unsafe condition	Human system	12	24.0
	Management system	38	76.0
Contributory causes	Human system	26	52.0
	Management system	24	48.0
Remote causes	Human system	20	40.0
	Management system	30	60.0

4.2.7 Occupational accident reporting pattern of industries to FMLEID (2000-2016)

More than half of reported injuries (60%) were documented at FMLEID within a week of occurrence. Few injuries 2 (4%) were reported a year after the accident had taken place (Table 4.11).

Table 4.11: Pattern of reporting: time lapse between accident and notification of FMLEID (2000-2016)

Time to report	Frequency(N=50)	Percentage (%)
0 - 7 days	30	60
8 - 30 days	13	6
1 - 6 months	3	6
6 - 12 months	2	2
> 1 year	2	4

4.2.8 Reported occupational safety and health organization (2000-2016)

Among industries where accidents occurred within the period under review, the evidence of OHS management system was seen in availability of first aid kits (37.3%), presence of on-site clinic (30.9%), documented safety policy (16.4%), safety personnel (8.2%) and safety training for staff (7.3%) (**Figure 4.2**).

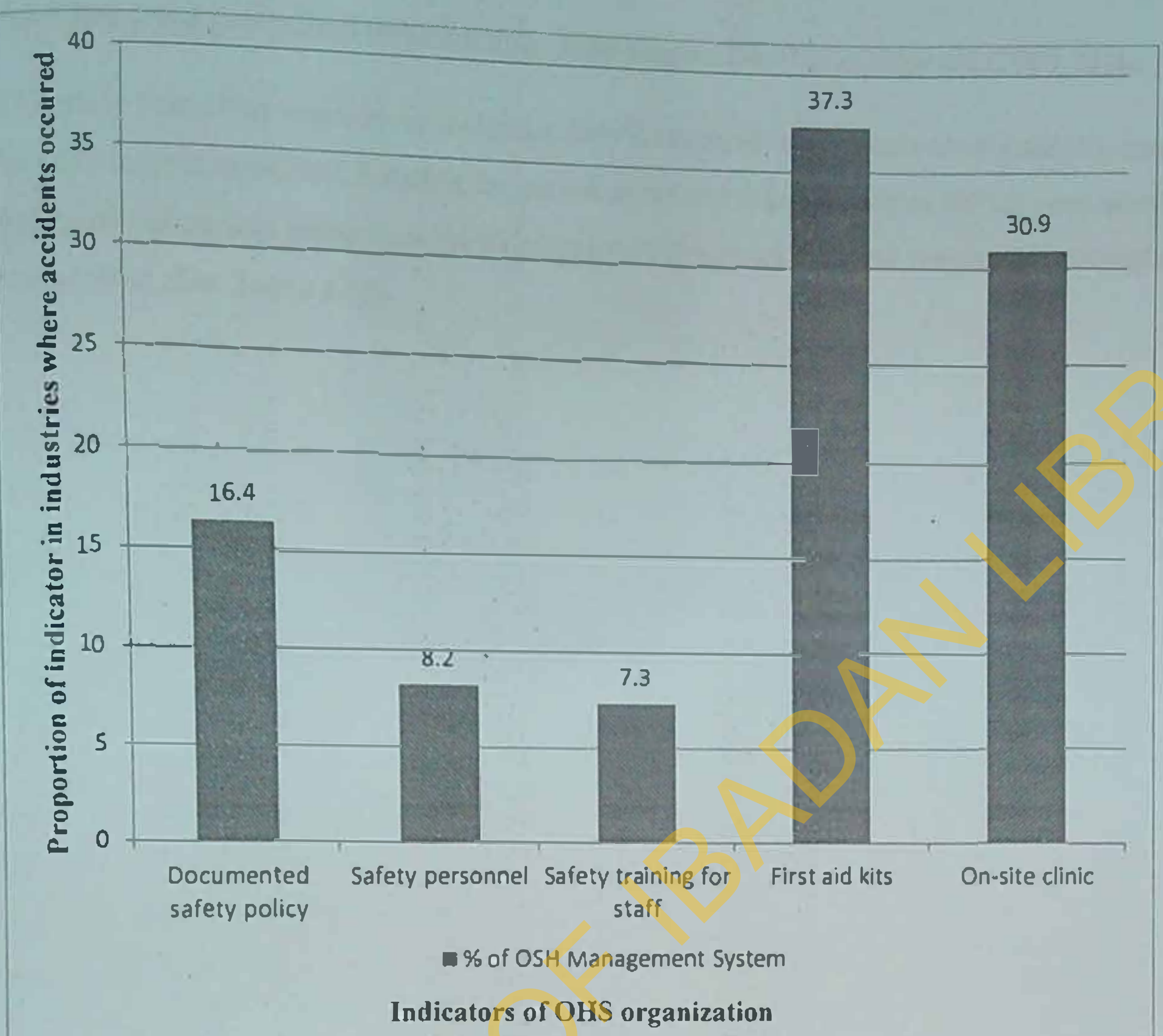

Figure 4.2: Reported evidence of OHS Management System

4.2.9 Reported prescribed interventions following accident investigation (2000-2016)

The study found that majority of industries (94%) involved in accidents were routinely inspected by OHS inspectors of FMLE during the period of review. Most industries (90%) were sanctioned. Safety education was recommended following 44 (88%) incidents and engineering controls in 25 cases (50%) **(See Table 4.12).**

Table 4.12: Reported prescribed interventions following accident investigation (2000-2016)

Variable	Frequency N=50	Percentage (%)
Government sanctions	45	90.0
Safety education	44	88.0
Routine inspection by authorities	47	94.0
Engineering controls	25	50.0

4.2.10 Factors associated with the outcome of reported occupational injury (2000-2016)

A) Fatal injuries versus non-fatal injuries:

The association between the outcome of reported occupational injury and other variables is shown in **Table 4.13**. The association between victim's age and fatality following occupational injuries was statistically significant (p = 0.033). Factory workers (20%) who were below 40 years sustained more fatal injuries when compared to those that were at least 40years of age (55%). There was a statistically significant association between working environment and the outcome of occupational accident (p = 0.009). Most deaths (47.1%) occurred in the outdoor environment. The association between nature of injury and the outcome of occupational was statistically significant (P = 0.000). All five (100%) cases that sustained internal injury resulted in death. There was a statistically significant association between affected body parts and fatality following occupational accident (p = 0.000). Fatalities occurred mostly in persons with injuries that affected multiple body systems (76.9%).

Table 4.13: Association between the outcome of reported occupational injury and other variables

Variable	Reported occupational injury			χ^2	P-value
	Fatal n=13	Non-fatal n=37	Total		
Gender					
Male	13 (26.5)	36 (73.5)	49	0.36	0.549
Female	0 (0.0)	1 (100.0)	1		
Age group					
Below 40yrs	7 (20.0)	28 (80.0)	35	4.56	0.033*
≥ 40yr	5 (55.6)	4 (44.4)	9		
Missing**	1	5			
Work duration					
Below 12 hours	8 (22.2)	28 (77.8)	36	0.95	0.329
≥ 12 hours	5 (35.7)	9 (64.3)	14		
Working environment					
Outdoors	8 (47.1)	9 (52.9)	17		
Indoors	2 (7.7)	24 (92.3)	26	9.48	0.009*
Confined space	3 (42.9)	4 (57.1)	7		
Nature of Injury					
Wounds, fractures and dislocation	1 (3.7)	26 (96.3)	26		
Internal injury	5 (100.0)	0 (0.0)	5	22.70	0.000*
Burns	5 (38.5)	8 (61.5)	13		
Asphyxiation	2 (40.0)	3 (60.0)	5		
Affected body parts					
Head	2 (25.0)	6 (75.0)	8		
Trunk	1 (33.3)	2 (66.7)	3		
Lower extremities	0 (0.0)	7 (100.0)	7	26.74	0.000*
Upper extremities	0 (0.0)	19 (100.0)	19		
Multiple body systems	10 (76.9)	3 (23.1)	13		
Time of occurrence					
Morning	6 (20.7)	23 (79.3)	29		
Afternoon	3 (30.0)	7 (70.0)	10	0.75	0.686
Night	3 (33.3)	6 (66.7)	9		
Staff cadre					
Temporary (Contract)	10 (30.0)	23 (69.7)	33	0.93	0.334
Permanent	3 (17.6)	14 (82.4)	17		

**missing data not included in bivariate analysis

B) Permanent disability versus temporary disability:

Considering the outcome of reported injuries as either permanent disability or temporary disability working environment was significantly associated with the type of disability observed (p=0.038). Injuries leading to permanent disability was reported more in factory workers who worked outdoors. Furthermore, the nature of injury showed a statistically significant relationship (p=0.012) with type of disability experienced after an accident. Majority of factory workers (74.1%) that were reported to have wounds, dislocations and fractures were temporarily disabled. This study also found a statistically significant association between affected body part and type of disability experienced (p=0.002). Most factory workers (75%) who had injuries affecting multiple body systems were permanently disabled. The type of task carried out or work activity during the accident was significantly associated with the outcome of injury (p=0.027). Majority of factory workers (60.9%) reported to be permianently disabled following accidents were engaged in non-routine tasks. **(Table 4.14)**

Table 4.14: Association between the outcome of occupational injury (disability) and accident characteristics:

Variable	Outcome of occupational injury		χ^2	p-value
	Permanent disability n=22	Temporary disability n=28		
Gender				
Male	22(44.9)	27 (55.1)	0.80	0.371
Female	0 (0)	1 (100)		
Age group				
Below 40yrs	15 (42.9)	20 (57.1)	1.62	0.200
≥ 40yrs	6 (66.7)	3 (33.3)		
Missing**	1	5		
Time of week				
Weekday	19 (42.2)	26 (57.8)	2.40	0.301
Weekend	3 (75)	1 (25)		
Working environment				
Outdoors	11 (64:7)	6 (35.3)		
Indoors	7 (26.9)	19 (73.1)	6.52	0.038*
Confined space	4 (57.1)	3 (42.9)		
Nature of Injury				
Wounds, fractures and dislocation	7 (25.9)	20 (74.1)		
Internal injury	5 (100)	0 (0)	10.97	0.012*
Burns	7 (53.8)	6 (46.2)		
Asphyxiation	3 (60)	2 (40)		
Affected body parts				
Extremities	10 (29.4)	24 (70.6)	9.17	0.002*
Multiple body systems	12 (75.0)	4 (25.0)		
Location of occurrence				0.512***
Production areas	18 (47.4)	20 (52.6)		
Loading/Storage areas	4 (33.3)	8 (66.7)		
Job designation				
Technician	8 (47.1)	9 (52.9)		
Machine operators	8 (40.0)	12 (60.0)	0.96	0.800
Supervisors	4 (57.1)	3 (43.9)		
Logistics	2 (33.3)	4 (66.7)		
Staff status				
Temporary (Contract)	15 (45.5)	18 (54.5)		
Permanent	3 (50.0)	3 (50.0)	0.706	0.872
Contractors	3 (42.9)	4 (57.1)		
Task on accident				
Routine	8 (29.6)	19 (70.4)	4.91	0.027*
Non-routine	14 (60.9)	9 (30.1)		
Unsafe act				
Human factors	12 (38.7)	19 (61.3)	0.927	0.336
Management factors	10 (52.6)	9 (47.4)		

***missing data excluded from bivariate analysis*

****Fishers exact test*

4.2.11 Binary logistic regression analysis of factors affecting outcome of occupational injuries (2000-2016):

After adjusting for confounders, factory workers who were engaged in routine tasks were 2.15 times more likely to have injuries leading to permanent disability than those engaged in non-routine tasks. However, the association was not statistically significant. There was a statistically significant relationship between injuries to the head and upper extremities with disability. Factory workers who had injuries to the head and upper extremities were 11.8 and 12.1 times more likely to result in permanent disability. (Head injuries: AOR= 11.8, 95% CI: 1.21, 114.9, $p<0.05$); (Upper extremities: AOR=12.1, 95% CI: 1.88, 78.3, $p<0.05$) **(Table 4.15).**

Table 4.15: Logistic regression model for occupational injuries resulting in permanent disability among reported accidents (2000-2016):

Variable	OR	CI 95%		p-value
		Lower	Upper	
Task on accident	**2.15**	0.533	8.714	$0.282^{n.s}$
routine tasks				
Non-routine tasks (ref)	**1**			
Affected body part				
Head	11.8	1.21	114.9	0.033*
Trunk	6.3	0.32	126.1	$0.227^{n.s.}$
Lower extremities	6.61	0.76	57.01	$0.085^{n.s.}$
Upper extremities	12.1	1.88	78.3	0.009*
Multiple body systems (ref)	**1**			

OR= Odds ratio

CI 95% = 95% confidence interval

**p<0.05: statistically significant*

n.s : not significant

CHAPTER FIVE

DISCUSSION

Industries in Ibadan are made up mainly of manufacturers of diverse products including chemicals, confectioneries, fast moving consumer goods, agricultural products, plastics, building materials, food and beverages amongst others. Despite the buffers provided by management of industries and government agencies responsible for occupational health and safety to prevent accidents to workers, it is evidenced in this study that no industrial setting can completely avoid the occurrence of fatal or non-fatal injuries and accidents in their life time. Therefore, regardless of the simplicity of the work process and preventive measures put in place to guard against their occurrence, accidents are bound to happen in industrial settings.

5.1 Trends of occupational injuries and accidents

A relatively small number of occupational accidents and injuries was reported (50 injuries and 37 accidents) and documented by the FMLEID in the past 17 years. Poor reporting is in consonance with the findings of Umeokafor et al (2014) where 93 injuries and 40 accidents were documented nationwide over a period of 11 years. The case fatality rate observed for the period (2000-2016) was lower than the rates observed by Umeokafor et al (2014) but were still higher than Ezenwa (2001) which showed a case fatality rate of 2.2 per 100 injured workers for the period of 1987-1996. The annual case fatality rates of these injuries did not show a definite trend probably due to underreporting of accidents. FGDs and KIIs did not reveal a specific trend, however reportable accidents were said to occur "once in a while" while minor accidents requiring first-aid occurred every other day and even daily at industries prone to cuts and bruises. There is a possibility that the increasing trend of occupational accidents (figure 4.1) observed in recent times may be due to improved monitoring by OHS inspectors as more officers were recruited nationwide over this period. It may also reflect better appreciation of the need to report by workers or management.

Salminen (2004) showed that young male factory workers were a higher risk group for occupational injuries than older males. Although this was often less fatal than those of older workers because of better resistance to strenuous activities by the young men (Salminen, 2004). Being male represented a higher risk of having an occupational injury which may because of their job designations. The men's jobs had a higher level of exposure to risks than women's jobs. The

industrial sector in Ibadan is male dominated. Hence, they are more likely to experience occupational injuries and accidents. There was a higher frequency of injuries among individuals 20 to 44 years of age. The association between age and workplace injuries has been reported by previous studies in both industrialized and developing countries (Ezenwa 2001; Jackson, 2001;Umeokaforet al., 2014; Gonzalez-delgado et al. 2015;). The mean age of victims for the period was also similar to that reported by Okokon et al (2014) among workers in the paper producing industry. On the contrary, Khan et al. (2006) reviewed accident records and observed that majority of injured workers (72%) in Bangladesh factories were above 40 years of age. The author explained that this observation was probably due to poor sight, impaired hearing and slower reflex actions in older workers(Khan et al., 2006).

Industrialization of rapidly developing countries like Nigeria, South Africa and Ghana implies considerable increase in occupational accidents and injuries (Pearson, 2009). Traumatic injuries and high case fatality rates have been associated with manufacturing, agricultural, construction, crude oil exploratory and refining industries (Ezenwa, 2001; Pearson, 2009). The high occurrence of fatal and non-fatal injuries observed in food processing industries was also reported by Umeokafor et al. (2014), Ezenwa (2001) and Loomis et al.(1997). This observation may be due to large number of employees and scale of activities which makes supervision and compliance with safety measures more tedious. However, Ezenwa (2001) argues that smaller employers experienced more fatal and non-fatal injuries at work due to lowered investments in safety equipment in order to improve profit margins.

The information in accident reporting forms did not include data such as work experience, educational background, marital status or wages and as such these areas could not be explored. In line with Helmut, Ehnes and Shengli (2012), for an effective reporting system to be established, the appropriate data is required to draw useful conclusions for local, national, industry-specific or enterprise-specific prevention strategies and action plans. Most injuries were found to occur among contract or temporary staff. Although the relationship with outcome of injury was insignificant, it may give credence to the claims by authors who have examined similar trends in developing countries. They are of the opinion that subcontracting of industry staff is a dangerous trend and a predictor for occupational accidents (Viego & Sagui ,2015; Akram, 2014).

Additionally, the analysis found that majority of accidents occurred in the morning hours though mostly resulting to non-fatal injuries. This is contrary to the findings of Umeokafor et al. (2014) who reported that 80% of accidents happened at night and mostly resulted in fatalities. This finding may however be due to better availability of emergency medical response given the time of day than at night. This was also evidenced by responses from FGDs and KIIs which lauded the medical care provided for workers in case of illness or accidents. Khan et al. (2006) discovered a strong relationship between time of accident and extent of outcome, reporting that most accidents occurred during the day. Otieno (2012) reported no significance in the relationship between accident rates and time of occurrence. Figure 4.3 also shows that the commonest implementation of an OHS management system applied by most industries was seen in availability of first-aid kits. However, this is indicative of a reactive safety culture, rather than proactive, by a majority of industries in this study.

Most industries encountered were manufacturing industries. These industries are considered relatively safe in terms of fatal work injuries unlike Agriculture and Construction, usually considered dangerous (Windau, 1998; ILO, 2000; Stallones, 1990). Agro-industries engage in multiple and diverse tasks which was evidenced from respondents in a study site where chicken feed, day-old chicks and eggs were produced. FGD respondents with narratives of poisoning by agro-chemicals and traumatic injuries in the feed milling section affirmed the claim that agriculture is one of the most hazardous occupations. In several countries, the fatal accident rate in agriculture is double the average for all other industries because intensive use of machinery, pesticides and other agrochemicals has raised the risks. Available data from developing countries shows that there has been an increase in the accident rate in agriculture(ILO, 2000).

The data in Table 8 shows there were no records of reported accidents for several years. Obviously, accidents were likely to have taken place but may not have been reported as observed from responses of interviewees who narrated recent traumatic injuries in their factories that were not documented by FMLEID. Otieno (2012) reported that in the Babagodo industrial area of Kenya, 38% of factory workers failed to report injuries to their employers depicting failures in the management systems of such organisations. These lapses in reporting and notification may have limited the full achievement of this objective.

5.2 Patterns of reported and documented fatal and non-fatal injuries

According to the Occupational Safety and Health Administration (OSHA) the leading cause of occupational injuries in industrial settings is being struck by an object whether a vehicle, machine, or loads (OSHA, 2008). An important finding of this study was that the nature of injuries reported and documented were mostly traumatic with several cases of amputations, severe fractures, chemical and fire burns, as well as electrocutions sometimes resulting in death. Victims caught between machine parts and those involved in fire/explosion accounted for the highest frequency of injuries. These patterns were similar to those of Ezenwa (2001) and Umeokafor et al. (2014) and may have been reported to the inspectorate by the organisation due to the severity of the accidents for fear of prosecution by the victims or their families. However, some KII and FGD respondents exhibited reluctance to divulge accident information for fear of reprisals from management.

Occupational injuries are associated with longer disability, high fatality and expensive medical treatment costs (Khanzode et al., 2012). Cuts, bruises, laceration, fractures and dislocation were found to be relatively common among factory workers worldwide(Rhee, Choe et al. 2013; Khan et al. 2006; L. Jackson, 2001; Windau, 1998; Marty et al. 1983;). Jackson (2001) reported similar results of such injuries representing one fourth of the US Emergency department-treated occupational injuries, mostly to hand and fingers. The loss of upper extremities (fingers, hands, arms) led to most cases of permanent disability encountered in the record review. Hand injuries count for one-third of all injuries at work and one-fifth of permanent disability according to Marty et al. (1983) and the most prevalent injuries in California's private sector in 20114 were upper-extremity disorders (Department of Industrial Relations SOII, 2014). A study in Bangladesh also revealed that 73.26% of accidents caused injury to hands, arms and lower extremities resulting in different forms of disability (Khan, Halim and Iqbal, 2006). These observations may be due to frequent use of the hands to carry out work processes with various machinery and hand tools. Okokon et al. (2015) reported the case of a worker in paper producing plant who sustained a fracture of the right radius and ulna when out of inattention he placed his hand wrongly on a dangerous part of the paper slitting machine. Carelessness, overconfidence and low safety awareness were also cited as reasons for most of such cases by FGD and KII respondents in this study. Khan et al (2006) suggested that this type of injury pattern was due to workers not being

accustomed to using personal protective equipment during their working hours and interviews with various levels of factory workers revealed overconfidence as a major reason for non-compliance.

Manufacturing industries are basically machine-intensive and routine tasks such as normal operating or feeding of the machine are becoming increasingly automated and less accident prone. Windau (1998) showed that the sector accounted for the largest proportion of deaths resulting from factory workers being caught in operating machinery. Machine operators in this study were found to be more prone to injuries requiring mostly first-aid treatment or resulting in temporary disability. However, Gonzalez-delgado et al. (2015) observed that fatal occupational injuries were more common among machine operators. FGD respondents were of the opinion that such first aid cases were inevitable having come to accept such injuries as a way of life. These workers are in constant contact with power-driven machinery, however low safety awareness and carelessness due to overconfidence may have led to such frequent cuts and bruises observed among this group of workers. Levels of work experience and education were not available in this present study in order to estimate any potential association.

Windau (1998) also reported that over half of the workers were carrying out non-routine tasks or maintenance-related tasks while one fifth of workers were performing general repairs, usually with the machine running when the accident occured. Similar instances reported in this study were also observed by Windau (1998) where workers had turned the machine off to work on it but were killed or injured when a co-worker unknowingly switched it on and wearing of loose clothing close to machines resulting in being trapped. These scenarios suggest that proper procedures were not followed and necessary safe guards were not in place. Physical barriers i.e. *guards* ought to be mounted around moving parts of machinery which is clearly stated in the Factories Act 2004 CAP126 LFN. During maintenance or non-routine work activities, safeguards in form of supervision, management rules and safe work systems such as "permit-to-work" system and "lockout/tagout" procedure are also applicable. Non-routine tasks are not performed regularly and workers may not fully understand the hazards associated with such activities (Windau, 1998). Hence, the high proportion of injuries occurring while carrying out non-routine tasks resulting to permanent disability in this study may not be surprising.

Working environments play an important role in the outcome of occupational accidents. Most incidents occurring in confined spaces are often fatal as a result of low oxygen levels and technicality of emergency rescues associated with such work activities(MacCarron 2006). Confined spaces can be hazardous as they have limited openings for entry and exit. There may be unfavorable natural ventilation which could contain or produce dangerous air contaminants and is not intended for continuous employee occupancy (NIOSH, 1998). One study found that 92% of fatalities in confined space was attributed to inadequate supervision (MacCarron, 2006). Furthermore, most non-fatal injuries resulting in temporary disability were found to occur indoors often in the production section. This can be explained by the numerous machinery installed in such sections which are responsible for majority of wounds, fractures and dislocations reported.

5.3 Factors influencing occurrence of occupational injuries and accidents in the industrial sector

The findings by the present work can be explained in the context of theories about the causality of occupational injuries which identify unsafe acts and unsafe conditions to be the immediate causes of occupational injuries, tying factors related to the workers themselves and their behaviors to the environment and workplace. The causes of accidents encompass not only unsafe acts and conditions but also remote or contributory factors which may be management made or human made. Accident causation theories analyse the chain of events and the interactions between them to further understand the factors responsible. The case studies below demonstrate these factors:

1. Five workers were injured, 2 of which died instantly of asphyxiation and one other comatose after they attempted to clean an LFPO tank. The first victim entered the confined space without a breathing apparatus or harness (unsafe act) and collapsed immediately he inhaled the poisonous gases. The second victim also collapsed while trying to rescue the first. The third victim suffered severe brain trauma due to lack of oxygen for an extended period. No measurement of oxygen level was done and no gas detector provided to check for poisonous gases (unsafe conditions). The causal factors in this case show failures in the management system that could result in reluctance on the part of management to make necessary reports. Obviously, workers were not trained for such a procedure and there was no documented SOP to follow. Generally, the poor safety awareness of these workers also

contributed to their demise. Workers' unions also have a responsibility to make members aware of dangerous jobs and when to say "NO" to certain endangering work situations.

2. A hexane gas explosion occurred during routine maintenance in hexane extraction plant. The gas valves were not all shut off as stipulated in the standard operating procedure (unsafe condition). The supervisor in charge failed to submit his phone at the plant entrance (unsafe act) as the use of cell phones is banned in hexane plants due to high volatility and flammability of the gas. As the cleaning was about to commence, the phone rang causing an explosion around the five workers within the area. The supervisor and worker closest to him were burnt and died instantly. The other three victims suffered severe burns and were hospitalized. The security system failed in ensuring that no worker enters the plant with a cell phone (contributory cause). Hence the interplay of both human and management factors can be seen in this case.
3. A contractor in an attempt to install closed circuit television (CCTV) cameras in a factory premises was working at a height without any harness or protective gear (unsafe act and unsafe condition). The factory management did not supervise the project and did not stipulate safety conditions to be met (remote/contributory causes) which shows a gap in the OHS management system. The victim fell from the height into the blades of a powered large generator and died instantly.
4. A common experience seen in both record review and interviews was chopping off of fingers when workers inserted hands into the moving parts of machines (unsafe acts). Some were fortunate to survive these unsafe acts with just bruises and cuts but many lost fingers, hands and even arms due to such accidents. Lack of proper supervision, over confidence, carelessness and no machine guards were common features of such accidents. Management must own responsibility for providing a safe working environment and machinery. There should be effective training and supervision of all workers to carry out tasks without endangering themselves or other co-workers.

Though the contribution of human factors to accidents remains significant, the company's OHS management system is fundamentally important in creating a safety climate. This in turn establishes a preventative culture not only in accidents but occupational diseases. The record review revealed poor safety management systems evidenced in lack of policies, designated OHS personnel, inadequate emergency services and lack of training programmes. Various authors agree

that remote and contributory causes such as lack of supervision, OHS awareness, are evidence of management commitment to health and safety (Idoro 2011; Adeogun & Okafor 2013; Umeokafor, Isaac, et al. 2014). Some responses from the FGDs suggest lack of management commitment even in provision of safe work environment and safety equipment citing profit as the main goal of such organisations.

Umeokafor et al (2014) stated that adequate communication among workers as well as between factory staff and management was a major ingredient for effective safety climate. The authors reported that 78% of accidents might have been due to management lapses e.g. use of unsafe equipment, obsolete machines, and failure to isolate faulty equipment (Umeokafor et al, 2014). These lapses were also noted both in the record review and interviews. Otieno (2012) also reported that safety standards, housekeeping standards, and chemical and physical hazards level were shown to be the significant factors in relation to the occurrence of accidents.

All FGD respondents agreed that there were various types of hazards in their work environments that could lead to injuries with level of risk depending on the work process and departments. Hazards are generally said to be speeific to the work system(Khanzode et al., 2012). A reactive approach to safety characterized most study sites as most OHS reforms were carried out following the occurrence of accidents. A proactive approach was seen in multinational industries where hazards were identified and regular risk assessments took place without the occurrence of accidents. Very few study sites had carried out risk assessments and hazard identification in order to apply adequate control measures. This corroborates the opinion of Adeogun & Okafor (2013) that OHS in Nigerian industries is still at infancy where some establishments see the concept as neatness of employees, cleanliness of toilets and the environment. Okojie (2010) observed that sealing or prohibitions of defaulting factories were a rare occurrence because they are owned by influential individuals in society. Also, the inadequacy of the punishments listed in the Factories Act 2004 reported by various authors may be responsible for the persistent trend (Adeogun & Okafor 2013; Idoro 2011; Umeokafor, Isaac, et al. 2014; Agwu & Olele 2014; Okokon et al. 2015).

5.4 Challenges associated with reporting of occupational injuries and accidents

It should be noted that availability of data remains a hindrance to OHS in developing countries (Diugwu et al., 2012; Idoro, 2008) and Ibadan metropolis is not left out. Fig 4.2 shows an increase

in injuries over the years however, this may be due to slightly improved reporting as a result of frequent inspections. The Federal Government recruited over 100 new factory inspectors across the nation in 2013 and Oyo state was sent 10 inspectors between 2013 and 2015. Prior to this, the state had only two inspectors (Jinadu, 1987). It is the role of OHS inspectors of FMLEID to train employers and workers as well as investigate accidents to identify root causes and implement preventive measures. Routine OHS inspections have been shown to decrease the rate of injuries in industrial establishments (Levine et al., 2012). Thus, the impact of such routine visits cannot be underestimated. This study established that in Ibadan industries are routinely inspected with FGD and KII participants attesting to regular visits by inspectors from FMLE, NSITF, NESREA and Ministry of Environment.

Collection, recording and notification of data concerning occupational accidents and diseases are instrumental in development of preventive measures(ILO, 1996). Under reporting of injuries is a worldwide issue (Matiko, 2010).Gross under reporting of accidents was evidenced in this study. Table 8 showed no accidents were documented for several years and in some cases only one in a year. Underreporting of injuries may confuse these statistics. The lack of documentation of accidents for some years was also experienced by Umeokafor et al. (2014) at the national level. It was apparent from focus group discussions that majority of factory workers were not aware of the OHS regulation on notification of accidents. Key informants were more knowledgeable and should notify the inspectorate of any accident either by written communication or verbally during routine inspections. However, when asked why accidents were not reported gave reasons of carelessness, nonchalance and fear of disrepute on the part of management. One safety manager at a feed mill described three different reportable accidents in the past year that were not reported to the FMLEID because they were not fatal even when one of the victims had been incapacitated and unable to return to work.

Matiko (2010) observed that in Tanzania occupational accidents are reported mainly to obtain compensation for insured employees. This was also evident from focus group discussions where factory workers commenting on notification of accidents referred to compensation of injured workers by insurance companies and had little or no understanding of accident investigations by factory inspectors. FGD participants all affirmed the regular presence of factory inspectors from FMLEID in their respective industries though some participants alluded that government workers

were usually influenced by the management. However, it was deduced from interviews that management of most industrial organisations prefer to keep such matters away from government agencies while making sure the victims are well compensated and medically taken care of. Obehi (2010) noted that attitude of employers and workers continue to be nonchalant on OHS issues as well as poor enforcement by the government of existing regulations and penalties because of political forces in play, thus hindering compliance. This view was echoed by key informants when asked on the role of government in improving their organizations' OHS status

The study by Umeokafor et al (2014) cited reasons given by OSH inspectors from FMLE for low level of accident reporting as due to the questionable efficacy of the reporting procedure and low level of publicity. They also quoted that reports were often made when companies failed to compensate victims. Only few FGD respondents reported failure to compensate accident victims by their industries. However, KII respondents suggested an easy- to-use notification system which would greatly reduce paperwork and bureaucratic processes.

Ignorance of OHS regulations and its custodian in Nigeria cannot be claimed by the management of selected factories in Ibadan as given by Diugwu et al (2012) as all key informants were found to have a fair knowledge of the Factories Act, Employees Compensation Act and their respective government agencies though the same cannot be said for FGD participants.

5.5 Conclusion

In comparison with studies done at the national level (Ezenwa 2001; Umeokafor, Kostis, et al. 2014) this study demonstrates that there is massive under-reporting of occupational incidents at the state levels and hence the observation by previous authors. Previous authors have blamed this finding on failures in the reporting system and OHS laws enforcement by the Federal Ministry of Labour and Employment. However, it appears as shown by this study, that industries may have failed to report workplace incidents out of fear of reprisals. The improvement of reporting systems for occupational injuries and accidents is essential for the accurate development of a national OSH profile however, occupational statistics collection and analysis should begin at the state level to ensure accuracy. It was evident from this study that fatal and non-fatal accidents are inevitable in industries and were more often due to poor safety management systems than human factors as majority of industries reviewed and visited did not have designated safety personnel or safety

policies which validated the poor OHS status of Nigerian industries. The complete implementation of the OHS-MS by these firms can aid in establishment of a safety culture to reduce unsafe acts and unsafe conditions in factories.

5.6 Recommendations

Epidemiological analysis of the data on occupational injuries and accidents can be useful in formulating prevention policies and identifying areas for resource allocation on a priority basis. The trends and patterns of occupational injuries and accidents in industries can be better understood with improved reporting by industries and adequate enforcement of OHS regulations. The following recommendations are therefore suggested:

i. There should be improved collection and analysis of occupational health statistics at local government and state levels. Employers need easy- to- use reporting/notification systems. The reporting systems can be upgraded even as far as applying modern information technology to digitalize the system.

ii. Government agencies may have to reassure the industries that the essence of such reports and any subsequent investigations is not primarily to apportion blame but to identify the causative factors and find ways to prevent or control future occurrences.

iii. All stakeholders in OHS must ensure proper documentation of relevant OSH records.

iv. There should be improved awareness at community level to reduce public misconceptions and ignorance. This can be achieved by government enlightenment campaigns to ensure all employers know their reporting duties and whom to report. Frequent campaigns through mass media, seminars and training workshops will prove invaluable

v. Industries should carry out regular safety training among factory workers especially for machine operators and review their processes by regular risk assessment and hazard identification to minimize frequent injuries among this group of workers.

vi. OSH management systems should be adopted by every industry no matter the scale of activity and compliance duly enforced as well as monitored among workers.

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APPENDIX I

Record Review Proforma

SECTION A: CASE PROFILE

1. Accident Victim Case No. [ ]

2. Age of Victim.....

3. Gender: 1. Male [ ] 2.Female [ ]

4. Precise Occupation/Job designation: .....

5. Staff Status: 1. Permanent Staff [ ] 2. Contract Staff [ ]

SECTION B: WORKPLACE PROFILE

6. **Company ID:** [ ]

7. Nature of work carried out:

1. Packaging [ ] 6. Chemical [ ] 11. Tobacco [ ]

2. Printing [ ] 7. Wood Products/Furniture [ ] 12. Electricity [ ]

3. Food Manufacturing [ ] 8. Plastics Manufacturing [ ] 13. Farming [ ]

4. Beverage manufacturing [ ] 9. Pharmaceutical [ ] 14. Petroleum/Natural Gas [ ]

5. FMCG [ ] 10.Plastics [ ] 15. Metal Industry [ ]

16. Others [ ] specify.....

8. Number of Employees: .....

9. Male employees .....

10. Female employees .....

SECTION C: HOURS OF WORK

11. Number of Shifts.....

12. Hours per day:

1. Up to and including 8 hours [ ] 2. More than 8 hours excluding overtime [ ] 3.Others [ ]

13. Rest periods.....

SECTION D: ACCIDENT DETAILS

14. Date of occurrence.....

15. Date Accident Reported.....

16. Location in Factory Premises.....

1. Production hall ☐ 2. Warehouse/Storage ☐ 3. Loading bay ☐ 4. Others ☐

17. Number of victims involved.....

18. Shift event occurred:

1. Morning/ Worker started on or after 0600 hours and before 1200 hours ☐
2. Afternoon/Worker started on or after 1200 hours and before 1600 hours ☐
3. Night/Worker started on or after 1600 hours and before 0600 hours ☐

19. Time of Accident: 1. Weekday ☐ 2. Weekend ☐

20. Classification of industrial injuries : mode of accident

1. Caught in or between objects ☐
2. Fall at the same level or from an elevation ☐
3. Struck by falling object ☐
4. Fire/explosion ☐
5. Stepping on, striking against/struck by objects (stationary/moving), excluding falling objects ☐
6. Exposure to or contact with extreme temperatures ☐
7. Exposure to or contact with electric current /Electrocution ☐
8. Exposure to or contact with harmful substances (inhalation, ingestion or absorption) ☐
9. Others ☐ specify .....

21. Classification of industrial accidents according to equipment/agent

21A. Machines

1. Prime movers (steam engines, internal combustion engines) except electrical motors ☐
2. Transmission Machinery (shafts, gears, pulleys) ☐
3. Metal working machines (Lathes, milling machines, rolling machines) ☐
4. Wood and assimilated machines (saws, overhead planes) ☐
5. Agricultural machines ☐ Others ☐

21B. Means of Transport and Lifting equipment

1. Cranes ☐ 2.Lifts and elevators ☐ 3. Others ☐

21C. Pressure vessels

1. Boilers ☐ 2. Pressurized containers/Air compressor ☐ 3. Gas cylinders ☐

4. Others ☐

21D. Furnaces, Ovens

1. Blast furnaces ☐ 2. Ovens ☐ 3. Kilns ☐ 4. Others ☐

21E. Electrical installations/tools

1. Rotating machines ☐ 2.conductors ☐ 3. Transformers ☐

4. Electric hand tools ☐ 5. Others ☐

21F. Ladders/Scaffolding ☐

21G. Materials, Substances, Radiation

1. Explosives ☐
2. Dusts, gases, liquids and chemicals ☐
3. Flying fragments ☐
4. Radiations ☐
5. Others ☐

21H. Working environment:

1. Outdoor ☐ 2.Indoor ☐ 3. Confined space ☐ 4. Underground ☐

22. ACCIDENT OUTCOME:

1. Fatal injury ☐ 2. Non-fatal Injury ☐

23. CAUSAL FACTORS REPORTED

23A. Unsafe Act: 1. Human factors ☐ 2. Management/System Factors ☐

23B. Unsafe Condition: 1. Human Factors ☐ 2. Management/System factors ☐

23C. Remote/Contributory Factor: 1. Human Factor ☐ 2. Management/System Factor ☐

SECTION E: INJURY DETAILS

24. Nature of injury:

24A.Wounds, Fractures, Dislocations

1. Cuts, lacerations, puncture ☐
2. Crushing, bruising ☐
3. Amputations ☐
4. Fractures ☐

5. Foreign body in eye or ear ☐

24B. Internal injuries

1. Concussion/internal bleeding ☐
2. Paralysis ☐
3. Electric shock ☐
4. Cardiac Failure ☐

24C. Burns ☐

24D. Asphyxiation, drowning, suffocation ☐

25. PART OF BODY AFFECTED:

25A. Head:

1. Skull ☐ 2. Eyes ☐ 3.Face ☐ 4.Neck & Throat ☐

5. Ears ☐ 6. Nose ☐ 7. Teeth ☐

25B. Trunk:

1. Thorax ☐ 2.Pelvic Girdle ☐ 3. Lumbar/lower spine ☐

4. Genital Area ☐ 5. Abdomen ☐ 6. Upper/thoracic spine ☐ 7. Multiple ☐

25C. Upper Extremities:

1. Wrist ☐ 2.Hand ☐ 3.Fingers and Thumbs ☐

4. Arm ☐ 5.Shoulder ☐ 6. Multiple ☐

25D. Lower Extremities:

1. Toes ☐ 2.Foot ☐ 3. Ankle ☐ 4. Thigh and Hip ☐

5. Lower Leg ☐ 6. Knee joint ☐ 7. Multiple ☐

25E. Body System:

1. Respiratory ☐ 2.Circulatory ☐ 3.Digestive ☐ 4. Nervous ☐

5. Multiple body systems ☐

26. INJURY OUTCOME

1. Permanent disability ☐ 2. Temporary disability ☐

SECTION E: OCCUPATIONAL SAFETY AND HEALTH ORGANISATION

27. Documented Safety policy: Yes ☐ No ☐

28. Safety Officer: Yes ☐ No ☐

29. Safety Training for Staff: Yes ☐ No ☐

30. First Aid Kits Available: Yes ☐ No ☐

31. On-site Clinic: Yes ☐ No ☐

SECTION F: INTERVENTIONS PRESCRIBED:

32. Government Sanctions/Warning ☐

33. Safety Training ☐

34. Regular Factory Inspection by authorities ☐

35. Engineering Controls ☐

APPENDIX II

FOCUS GROUP DISCUSSION (FGD) GUIDE

Organisation ID NO._____

Type of Industrial Activity_____

Date of Interview_____2016

Number of participants_____

MORBIDITY AND MORTALITY TRENDS OF OCCUPATIONAL ACCIDENTS AMONG FACTORY WORKERS IN SELECTED INDUSTRIES IN IBADAN, OYO STATE

The purpose of this study is to provide a profile of occupational injuries and accidents in industrial settings in Ibadan. The information you provide is completely confidential and neither you nor your organisation will be associated with any information obtained in the course of the discussion. You can choose whether or not to participate in the focus group. You may refuse to respond to any question or withdraw from the discussion at any time. We would also like to record your responses so that we can adequately capture your thoughts and ideas. Although the focus group will be tape recorded, your responses will remain anonymous and no names will be mentioned in the report. There are no right or wrong answers in FGDs. We want to hear many different viewpoints and would like to hear from everyone. We hope you can be honest even when your responses may not be in agreement with the rest of the group. In respect for each other, we ask that only one individual speak at a time in the group and that responses made by all participants be kept confidential.
Do you understand this information and agree to participate fully under the conditions stated above? Please sign/thumbprint below if you consent to be a part of this study:

Unit/Department	Signature/Thumbprint

Warm up session before the interview

- Introduction of the Principal Investigator and Moderators
- Introduction of the research, its objectives, purpose of tape recording, etc.
- Reassurance on confidentiality and obtaining consent from the interviewee
- **Information about factors influencing occurrence of occupational injuries and accidents in the industrial sector.**
    - Do you feel safe in your work environment?
    - What do you know about the Factories Act and Employees compensation Acts?
    - Have all workers been provided with suitable protective equipment?
    - Do workers find it difficult to use PPE?
    - Can management do more to improve safety in your department? If yes, how?
    - What are the common hazards peculiar to your organisation?(e.g. falls, chemical spills, electrocution, cuts, bruises, burns, etc)
    - Are there units in your organisation that are more prone to hazards?
    - Do you work with chemicals that can hurt you? (**MSDS knowledge**)
    - Are there standard operating procedures for carrying out your various duties?
    - What do you know about emergency drills? Do you partake in them?
- **Information about the trends of occupational injuries and accidents.**
    - Since you joined this organisation, have you witnessed any occupational accidents? >>>>Can you describe them-- Who, when, where and how?
- **Information about patterns of fatal and non-fatal injuries due to industrial accidents.**
    - What were the outcomes of these incidents? E.g. fatal injury, temporary/permanent disability, hospitalization, retrenchment, compensation,
    - Can you say these incidents occur often?
    - How often do minor accidents (require only first aid) occur?
    - How often do major accidents (require hospital attention) occur?
    - Are these incidents or accidents reported or investigated by management or government bodies?

Thank you for your time

APPENDIX III

KEY INFORMANT INTERVIEW (KII) TOPIC GUIDE

Organisation ID NO._____

Type of Industrial Activity_____

Interviewee Identification Number_____

Date of Interview_____2016

MORBIDITY AND MORTALITY TRENDS OF OCCUPATIONAL ACCIDENTS AMONG FACTORY WORKERS IN SELECTED INDUSTRIES IN IBADAN, OYO STATE

The purpose of this study is to provide a profile of occupational injuries and accidents in industrial settings in Ibadan. The information you provide is completely confidential and neither you nor your organisation will be associated with any information obtained in the course of the discussion. We would also like to record your responses so that we can adequately capture your thoughts and ideas. You may refuse to respond to any question or withdraw from the discussion at any time. There are no right or wrong answers.

Do you understand this information and agree to participate fully under the conditions stated above.

Please sign/thumbprint below if you consent to be a part of this study:

Signature/thumbprint:

Warm up session before the interview

- Introduction of the Interviewer/Principal Investigator
- Introduction of the research, its objectives, purpose of tape recording, etc.
- Reassurance on confidentiality and obtaining consent from the interviewee

- **Information about the trends of occupational injuries and accidents.**
  - Since you joined this organisation, have you witnessed any occupational incidents? >>>>Can you describe these incidents-- Who, when and how?
- **Information about patterns of fatal and non-fatal injuries due to industrial accidents.**
  - What were the outcomes of these incidents? E.g. fatal injury, temporary/permanent disability, hospitalization, retrenchment, compensation,
  - Can you say these incidents occur often?

- How often do minor accidents (require only first aid) occur?
- How often do major accidents (require hospital attention) occur?

- **Information about factors influencing occurrence of occupational injuries and accidents in the industrial sector.**
  - What are the common hazards peculiar to your organisation?
  - How much of a priority is occupational health and safety in your organisation? (do you have a safety policy, do you train your staff on OHS policies, first aid, fire drills etc)
  - Were they reported to appropriate authorities and investigations carried out?
  - Are there units in your organisation that are more prone to these incidents?
  - Did these incidents (if any) give rise to OHS review and improvement of policy within the organisation? If yes, How?
  - Are you aware of Government regulations on OHS in Nigeria? /What can you say about Factories Act 2004 or Employees Compensation Act?
  - Has the role of government and its agencies in any way improved OHS in your organisation and how?
  - What recommendations would you give to improving Occupational Safety and Health in industries?

Thank you for your time....

APPENDIX IV

KII CHECKLIST

SAFETY ORGANIZATION AND POLICY (Yes/No)

1. Availability and implementation of Documented Safety poli
2. Designated Safety Personnel
3. Regular government inspections
4. Internal workplace safety inspections/audits
5. Certification of medical fitness of workers
6. Good environmental hygiene
7. Provisions for waste disposal
8. Good housekeeping
9. Regular Execution of emergency Drills
10. Provisions for First aid
11. Proper Material Storage system
12. Provision of suitable PPE
13. Recordkeeping of Occupational Accidents
14. Investigation of Accidents
15. (Prompt)Accident reporting to regulatory bodies
16. Compensation of accident victims
17. Documented Risk assessment/hazard identification
18. Proper machine/Equipment maintenance
19. Prevention of ergonomic hazards
20. Organization of regular training of workers on workplace safety

APPENDIX V
FGD CHECKLIST

Knowledge and Perceptions of workers on Safety and Hazards at work

1. Knowledge of Safety information/Regulations
   - Ever heard of safety policy document (Yes/No)
   - Use of standard operating procedures at work (Yes/No)
2. Use of fire extinguishers
   - Staff have been trained to use fire extinguishers (Yes/No)
3. Fire prevention
   - Regular fire drills (Yes/No)
4. Knowledge of Material Safety Data Sheet
   - Staff working with chemicals are familiar with MSDS (Yes/No)
   - Staff follow SOPs when working with hazardous chemicals (Yes/No)
5. Knowledge of workers' rights in OSH
   - Staff are familiar with Factories Act 2004 (Yes/No)
   - Staff know about reporting of accidents to regulatory bodies (Yes/No)
   - Staff are aware of Employees Compensation Act (Yes/No)
   - Staff are aware of duty of MGT to provide safe work environment for all workers (Yes/No)
6. Knowledge of workers obligations in OSH
   - Staff are compliant with company OSH policies (Yes/No)
7. Knowledge of accident prevention (Yes/No)
   - Staff can identify peculiar workplace hazards (Yes/No)
8. Use of PPE (Yes/No)
9. Compliance with safety regulations
   - Staff always use recommended precautions to protect themselves from hazards (Yes/No)
10. Knowledge of Safety signage
    - Staff can interpret safety signs and warnings posted in premises (Yes/No)
11. Training on workplace safety
    - Management organizes regular training on safety (Yes/No)
12. Perception of workplace safety climate
    - Management cares about my safety at work (Yes/No)
    - Protection of staff from exposure to hazards is high (Yes/No)
    - Staff have adequate training (Yes/No)
    - PPE always provided when needed (Yes/No)
    - Supervisors and unit heads are very strict about following recommended precautions (Yes/No)
    - Is it easy to relay work issues to senior staff (Yes/No)
    - Work area is messy in terms of cleanliness (Yes/No)
    - There are no constraints in ability to protect oneself (Yes/No)

APPENDIX VI

Table 1: Names and types of industrial activities of companies used

S/N	Types of industrial activities	Code Names of industries selected for the study (*Numbers of industries used= 10*)	KII conducted (yes/no)	FGD conducted (yes/no)
1	Manufacturers of Packaging	NP	yes	yes
2	Manufacturer of vegetable oil/Crushing and extraction of oils	RML	yes	yes
3	Industrial Poultry Farming	AF	yes	yes
4	Manufacturer of Feed/Feed milling	EF	yes	no
5	Manufacturer of Feed/Feed milling	PF	yes	yes
6	Manufacturer of Feed/Feed milling	SKM	yes	yes
7	Manufacturer of confectioneries	SWF	yes	yes
8	Manufacturer of Food and Beverages	OFL	yes	no
9	Production of Industrial Ink	SWK	yes	yes
10	Manufacturer of Plastics	BH	yes	yes

**Names of industries represented with alphabets to ensure confidentiality*

Table 2: FGD participants and respective departments across all industries selected.

S/N	Department/Units	Numbers recruited
1	Administration	2
2	Electrical	2
3	Sanitation/Cleaners	1
4	Kitchen	1
5	Laboratory	3
6	Risk Control	1
7	Operator/Production	13
8	Store	5
9	Quality Assurance/Control	6
10	Maintenance/Engineering	4
11	Packaging	1
12	Printing	1
13	Supervisory	7
14	Human Resource	2
	Total for the FGDs	**50**

Table 3: Distribution of respondents recruited for the study

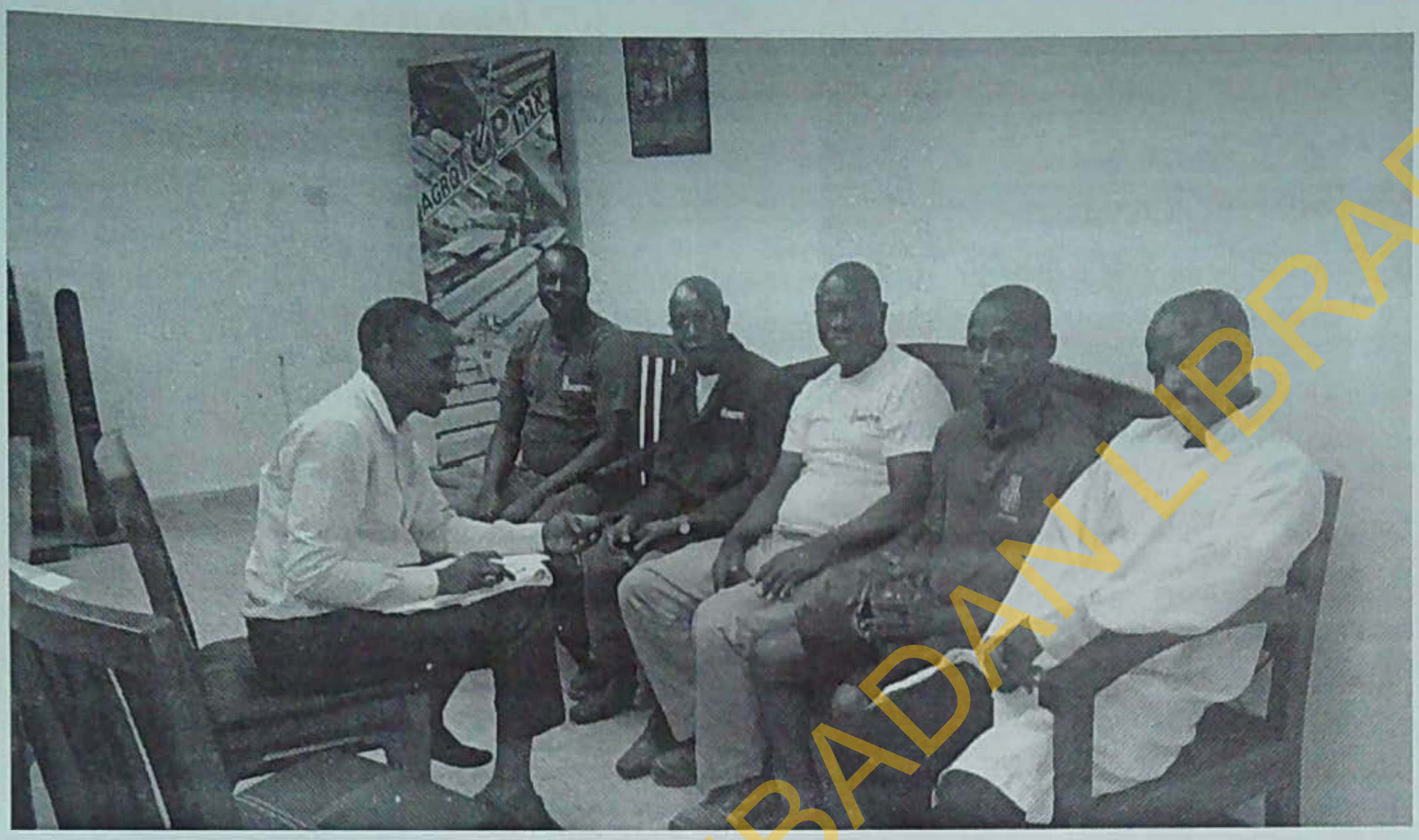
S/N	Names of industries*	Total number of respondents recruited for the Study: No of FGDs Participants	No of Safety Manager interviewed	No of Human Resources Manager interviewed**
1	NPK	6(all males)	1(Male)	
2	RML	7(all males)	1(Female)	1(Female)
3	AF	5(all males)		1(Male)
4	BH	7(all males)		1(Male)
5	SWK	7(5males,2females)	1(Male)	
6	PF	6(4males,2females)	1(Female)	1(Male)
7	SWF	6(all males)		1(Male)
8	OFIl		1(Female)	
9	SKM	6(all males)		1(Male)
10	EF			1(Male)

Total numbers of respondents:
FGDs = 50
KIIs = 11
Total Number of participants, *N*= 61

*Names of industries represented with alphabets to ensure confidentiality.
** Human Resource Managers were interviewed at industries with no certified Safety Manager

PLATE 1

Focus group discussion carried out among factory workers in an agricultural industry:



GLOSSARY

1. Case-fatality Rate: The number of deaths resulting from a work-related incident per 100 workers over a given period
2. Engineering controls: common control measures, including isolation and enclosure ventilation.
3. Ergonomic principles: a concept whereby the work to be carried out is organized and specified – and tools and equipment designed and used – in such a way as to be matched with the physical and mental characteristics and capacity of the worker.
4. Hazard: a physical situation with a potential for human injury, damage to property, damage to the environment or some combination of these.
5. Housekeeping: keeping the workplace clean and organized.
6. Incapacity for work: inability to perform normal duties of work.
7. Incident: a dangerous occurrence arising out of or in the course of work where no personal injury is caused, or where personal injury requires only first-aid treatment.
8. Inspection: a government function carried out by specially appointed inspectors who regularly visit work sites in order to establish whether legislation, rules and regulations are being complied with. They normally give verbal and written advice and guidance to reduce the risk factors and hazards at the workplace. They should, however, possess and use stronger power, e.g. to stop the work in cases of immediate and serious safety and health hazards or if their advice is repeatedly and unreasonably neglected by the employer. The goal is to improve the work conditions and the work environment.
9. International Labour Organisation (ILO) is a tripartite (trade unions, governments and companies) UN agency that brings together governments, employers and workers of its 186 member states in common action, setting labor standards, developing policies and devising programmes to promote decent work for all men and women.
10. Labour inspectorate: a government authority with the task of advising and giving directions on issues concerning the protection of workers and the work environment, as well as checking that the protection provided is sufficient
11. Mode of accident: The action, exposure or event that best describes the circumstances that resulted in the most serious injury.
12. Occupational Accidents: An occurrence arising out of or in the course of work which results in fatal or non-fatal occupational injury. An occupational accident is an unexpected

and unplanned occurrence, including acts of violence, arising out of or in connection with work, which results in one or more workers incurring a personal injury, disease or death".(ILO, 2011)

13. Occupational disease: is a disease contracted as a result of an exposure over a period of time to risk factors arising from work activity
14. Occupational injury: Any injury incurred by an employee in the performance of or in connection with his or her work. It could be :

a. Fatal occupational injury: refers to all injuries and their complications resulting in death within six months to a year of a workplace accident
b. Non-fatal occupational injury leading to permanent or temporary disability
   i. Temporary disability of a worker is defined as incapacity to work due to an occupational injury preventing him from resuming work for more than three days
   ii. Permanent disability: Injury that produces an occupational handicap. Permanent disability in this study means total or partial loss of capacity to work including reduced function as a result of loss of a body part e.g. phalanges, toes, limbs, eyes as well as inability to resume work due to injuries sustained in the workplace.
   iii. A disabled person is an individual whose prospects of securing and retaining suitable employment are substantially reduced as a result of physical or mental impairment.

15. National policy: refers to the national policy on occupational safety and health and the working environment developed in accordance with the principles of Article 4 of the Occupational Safety and Health Convention, 1981 (No. 155).
16. National preventive safety and health culture: a culture in which the right to a safe and healthy working environment is respected at all levels, where government, employers and workers actively participate in securing a safe and healthy working environment through a system of defined rights, responsibilities and duties, and where the principle of prevention is accorded the highest priority
17. Notification: procedure specified in national laws and regulations which establishes the ways in which:

- the employer or self-employed person submits information concerning occupational accidents, commuting accidents, dangerous occurrences or incidents; or
- the employer, the self-employed person, the insurance institution or others directly concerned submit information concerning occupational diseases.

18. Occupational safety and health management systems (OSHMS): A set of interrelated or interacting elements to establish OSH policy and objectives, and to achieve those objectives

19. In this study, the term "occupational risk factor" is defined as a chemical, physical, biological or other agent that may cause harm to an exposed person in the workplace and is potentially modifiable.

20. Personal protective equipment; equipment a worker wears as a barrier between himself or herself and the hazardous agent(s).

21. Potential hazard: something that may be hazardous.

22. Preventive safety and health culture: one in which the right to a safe and healthy working environment is respected at all levels; where governments, employers and workers actively participate in securing a safe and healthy working environment through a system of defined rights, responsibilities and duties; and where the principle of prevention is accorded the highest priority.

23. Remote/Contributory Cause: also known as underlying causes defined as inadequacies in the occupational safety and health management system that allow the immediate causes to arise unchecked leading to accidents.

24. Recording: procedure specified in national laws and regulations which establish the means by which the employer or self-employed person ensures that information be maintained on: (a) occupational accidents; (b) diseases; (c) commuting accidents; and (d) dangerous occurrences and incidents.

25. Reporting: procedure specified by the employer in accordance with national laws and regulations, and in accordance with the practice at the enterprise, for the submission by workers to their immediate supervisor, the competent person, or any other specified person or body, of information on:

    (a) any occupational accident or injury to health which arises in the course of or in connection with work;

(b) suspected cases of occupational diseases;

(c) commuting accidents; and

(d) dangerous occurrences and incidents.

26. Risk: the likelihood of an undesired event with specified consequences occurring within a specified period or in specified circumstances. It may be expressed either as a frequency (the number of specified events in unit time) or as a probability (the probability of a specified event following a prior event), depending on the circumstances.
27. Risk management: all actions taken to achieve, maintain or improve the safety of an installation and its operation.
28. Unsafe act: Performance of a task or activity in a manner that threatens the health and safety of workers. Unsafe acts are linked to human behavior e.g. operating equipment without qualification or authorization, improper use or non-use of PPE, bypass or removal of safety devices, using defective equipment, negligence, etc.
29. Unsafe Condition: Condition in the work place that is likely to cause property damage or injury to workers e.g. defective tools/equipment, poor housekeeping, congestion in the workplace, inadequate support/constructions etc.
30. Trauma: injury or wound to a living body caused by the application of force or violence (NIOSH, 1998)

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TELEGRAMS..... TELEPHONE.....

MINISTRY OF HEALTH

DEPARTMENT OF PLANNING, RESEARCH & STATISTICS DIVISION

PRIVATE MAIL BAG NO. 5027, OYO STATE OF NIGERIA

Your Ref. No. .....

All communications should be addressed to

the Honorable Commissioner quoting

Our Ref. No. AD 13/ 479/244 15th November, 2016

The Principal Investigator,
Faculty of Public Health,
Department of Epidemiology and Medical Statistics,
University of Ibadan,
Ibadan,
Oyo State.

Attention: Ogbu Adaora

ETHICAL APPROVAL FOR THE IMPLEMENTATION
OF YOUR RESEARCH PROPOSAL IN OYO STATE

This is to acknowledge that your Research Proposal titled: "Morbidity and Mortality Trends of Occupational Accidents among Industries in Ibadan, Oyo State." has been reviewed by the Oyo State Ethical Review Committee.

2. The committee has noted your compliance. In the light of this, I am pleased to convey to you the full approval by the committee for the implementation of the Research Proposal in Oyo State, Nigeria.

3. Please note that the National Code for Health Research Ethics requires you to comply with all institutional guidelines, rules and regulations, in line with this, the Committee will monitor closely and follow up the implementation of the research study. However, the Ministry of Health would like to have a copy of the results and conclusions of findings as this will help in policy making in the health sector.

4. Wishing you all the best.

Dr. Abbas Gbolahan
Director, Planning, Research & Statistics
Secretary, Oyo State, Research Ethical Review Committee