Developing Country Studies
ISSN 2224-607X (Paper) ISSN 2225-0565 (Online)
Vol.4, No.15, 2014

The Pattern of Occupational Accidents, Injuries, Accident Causal Factors and Intervention in Nigerian Factories

Nnedinma Umeokafor*; Kostis Evaggelinos; Shaun Lundy; David Isaac; Stuart Allan
School of Architecture, Design & Construction, University of Greenwich. UK

Ogechukwu Igwegbe; Kosi Umeokafor
Nedselite Safety International, Abuja, Nigeria

Boniface Umeadi
NanoMind IDC, Communications House, London, UK
Corresponding author: Email: nnedinmaik@hotmail.com

Abstract
Understanding the status quo of occupational incidents in Nigeria in relation to accident rates, fatality rates, accident causal factors and intervention is vital in developing effective strategies for improving the problematic state of occupational health and safety (OHS) in Nigeria. As such, this study explores the pattern of reported accidents, injuries, near misses, accident causal factors and intervention in Nigeria. It reviews and discusses accidents reported to the custodian of OHS in Nigeria, the Federal Ministry of Labour and Productivity Inspectorate Division (FMLPID) over an 11-year period (2002-2012). Analysis of the data collected was also conducted, the findings from which prompted interviews of 10 staff out of 48 staff employed by FMLPID. Over the 11 year period, this study found that of the reported accidents: 80% occurred at night; manufacturers of rubber products accounted for the highest number of injuries at 53.8% and 63% for death; the total case fatality rate was 49.5, hence a significant increase in case fatality rate compared with the last study in 2001 by Ezenwa. Fire resulted in 53% of the deaths, while management factors accounted for 91.3% of the remote or contributory accident causal factors in which 90% were due to lack of training. Also, with a notable reduction in accident reporting in Nigeria and the FMLPID reportedly failing to penalise offenders as specified by the OHS legislation as established in this study, an overhaul of the operations of the FMLPID is therefore recommended. This is in addition with development and adoption of free mobile accident reporting system for victims.
Keywords: Accidents, accident causal factors, fatality, injuries, intervention and Nigeria.

Introduction

Background of Study

There is consensus that occupational health and safety (OHS) is poor in the developing countries (Diugwu, Baba, & Egila, 2012; Idoro, 2008; Umeokafor, Isaac, Jones, & Umeadi, 2013; Umeokafor, Umeadi, & Jones, 2014). This is on the grounds that: occupational accidents are under-reported; the OHS regulatory and enforcement systems (which are intervention strategies) are ineffective and dysfunctional; accident and injury rates are on the increase. Consequently, developing effective strategies for improving OHS is challenging. Understanding the trend, distribution and risk factors of accidents, injuries, fatalities, accident causal factors and intervention remains pertinent in developing effective strategies for the improvement of OHS globally. This explains why Hamalainen, Takala, and Saarela (2006) report: 350,000 fatalities globally in 1998; a case fatality rate of 11.5 per 100,000 workers and an accident rate of 8700 per 100,000 workers for India; a fatality rate of 10.5 per 100,000 and an accident rate of 8028 accident per 100,000 for China. Similarly, a study in Egypt by Ade (1993) in Ezenwa (2001) shows a significant case fatality rate of 52.5 %, where 123 injuries and 64 deaths were reported, while a study analysing road accidents in Kenya by Odero (2005) shows an increase in fatality rate per 10,000 vehicles from 50.7 in 1962 to 64.2 in 1992. Also, showing fatality per 100,000 population of between 7.3 and 8.6 and 66% of the accidents occurring during daytime. In Nigeria, a study of the nature and extent of fatal injuries, and fatalities causes from 1987 to 1996 of Nigerian factories by Ezenwa in 2001, indicates: that 3183 injuries were reported of which 71 or 2.2% were fatal; the highest annual case fatality rate of 5.41 in 1994; the lowest case fatality rate of 0.94 in 1990. In general, these studies above aim at providing reliable information and knowledge to some extent and helping in policymaking and prevention of accidents. Correspondingly, adopting adequate intervention strategies is essential in accident prevention and OHS improvement (Ayres & Braithwaite, 1992; Fairman & Yapp, 2005;Umeokafor et al., 2013), but this area remains under examined by researchers. The Nigerian Factories Act F1 LFN 2004 requires every factory to report occupational accidents (which keep any worker out of work for more than 3 days) to the Federal Ministry of Labour and Productivity Inspectorate Division (FMLPID), empowering the ministry to enforce the Act. It also empowers the above ministry to oversee/intervene in OHS related issues; it stipulates measures that should be taken by organisations to protect

the health, safety and welfare of workers. Unfortunately, due to inaction, injury rates and accident rates are on the increase.

Significance of Study

Noted elsewhere in this paper is a study by Ezenwa in 2001, which examines the pattern of occupational mortality rates and causes of death in Nigerian factories, 12 years on, there has been a lot of changes in Nigeria e.g., economic growth, infrastructural growth, and changes in regulations. Specifically, the Organisation for Economic Co-operation and Development (OECD) (2002) reports gross domestic product (GDP) growth of 1.8 % in 1998 to 3.8 % in 2000. Besides, according to the Nigerian National Bureau of Statistics 2014 GDP rebase results, Nigeria is presently the largest economy in Africa with a GDP of approximately $510 billion. Thus, overtaking South Africa's GDP of $390 billon. The argument being that Nigeria is currently the 26th largest economy in the world as against its former 40th position in 1990. Of course, the above arguments demonstrate the rate of economic development in Nigeria. As such, it can be argued that this may bring about increased infrastructural development and in turn an increase in accidents, injuries and deaths. Secondly, from 1997 to date, there has been a development of various workplaces that are not recognised by the OHS regulations; therefore, some regulations were reviewed. For instance, the Workman's Compensation Act of 1987 was updated to the Workman's Compensation Act of 2004 and further updated to the Employee's Compensation Act of 2011. The Safety, Health and Welfare Bill of 2012 was passed in September 2012 but still awaits the presidential assent, hence repealing the Factories Act of 2004. Equally important is understanding the pattern of intervention and accident causal factors, which has been underexamined by previous research. In that if: inadequate intervention patterns are adopted, accidents proliferate (Umeokafor et al., 2013); accident causal factors- the root of accidents, are examined, the interaction between the events and causal factors will be understood (Inel &Inel, 1995). This therefore, highlights parts of the chain of events leading to an accident (Inel &Inel, 1995). As a result, studies such as Ezenwa (2001), which is now more than 12 years old, need to be repeated to provide updated and reliable information and knowledge. Analogically, it will help in: developing effective strategies for reducing accidents in Nigeria; understanding how industries have faired since the last study by Ezenwa; unpacking pertinent issues as per enforcement of OHS regulations. As a result, this paper explores the pattern of reported accidents, deaths, injuries, near misses, accident causal factors, and intervention (enforcement) in Nigeria, over a period of 11 years (2002-2012) in detail. In doing this, it reviews and discusses accident reports collected from the Inspectorate Division of the Federal Ministry of Labour and Productivity from 2002 to 2012, which informed the second stage of the study.

Methods

Reported accident data for a period of 11 years (2002 - 2012) was collected from the Nigerian FMLPID, analysed and presented below. To determine the lethality of the injuries, the annual case fatality rate was calculated thus:

$$\frac{\text{The number of deaths}}{\text{Number of injured workers}} \times 100$$

To understand the phenomenon (i.e., the underlying determinants of some findings after the analysis) and for cross-validation (Denzin, 1970; Kipo, 2013), 10 staff out of the 48 staff of the FMLPID were interviewed, hence methodological triangulation (Denzin, 1970; Kipo, 2013). The research population was restricted to 48, as they were working in the FMLPID during the 11-year period, hence can provide adequate information. The face-to-face semi-structured interviews were recorded, transcribed and analysed; the results section below highlights how the themes emerged.

Results

Results of Accident Data Collected from the FMLPID (2002 - 2012)

Table 1: Annual distribution of injuries, deaths, near misses, case fatality rates and number of accidents reported (2002-2012)

YEAR	NO. OF INJURIES	% of injuries	NO. OF DEATHS	% of deaths	NO. OF NEAR MISSES	% of near misses	NO. OF ACCIDENTS REPORTED	% of accidents reported	CASE FATALITY RATE
2002	50	53.8	29	63	1	25	1	2.5	58
2003	1	1.1	1	2.2	-	-	1	2.5	100
2004	-	-	-	-	-	-	1	2.5	-
2007	4	4.3	1	2.2	1	25	3	7.5	25
2008	8	8.6	6	13	-	-	2	5	75
2009	3	3.2	2	4.3	-	-	16	40	66.7
2010	5	5.4	1	2.2	1	25	3	7.5	20
2011	8	8.6	2	4.3	-	-	7	17.5	25
2012	14	15.1	4	8.7	1	25	6	15	28.6
TOTAL	93	100	46	100	4	100	40	100	49.5

Table structure, partly adopted from Ezenwa (2001) and modified by authors; content from accident reports collected from the FMLPID (2002-2012).

The findings suggest massive under-reporting of accidents for the 11-year study period, where 40 accidents were reported. Table 1 shows the annual distribution of injuries, deaths, near misses, case fatality rates and number of accidents reported during the 11-year study period (2002-2012). For the entire 11 years, a total of forty (40) accidents were reported out of which there were ninety-three (93) injuries. 46 (49.5%) of these injuries were fatal and 4 near misses were reported. The annual case fatality rates of these injuries do not show a definite range of increase or decline as it indicates case fatality rates of 58% in 2002, 100% in 2003, no fatality in 2004, 25% in 2007, 75% in 2008, 66.7% in 2009, 20% in 2010, 25% in 2011 and 28.6% in 2012. This is in contrast to the study by Ezenwa (2001), which shows an increase in annual fatality rate from 0.9% in 1992 to 5.4% in 1994. However, this may be due to the decline in reported accidents in Nigeria at that time. Table 1 also shows the annual distribution of death, near misses and reported accidents in the year 2002 which recorded 29 deaths (63%), which is the highest number of deaths, 1 (25%) near miss and 1 (2.5%) accident report for the year. This was followed by 6 deaths (13%), no near miss and 2 (5%) accidents reports in the year 2008. The accidents which led to the highest and second to the highest number of lives lost in these years occurred as a result of a fire accident in a rubber factory, which claimed 29 lives in 2002, and the fall of a storage tank, which trapped 6 workers in 2008. Mention must also be made of 2005 and 2006 where no record of reported accidents were found. This also partly informed the interview sessions of the study.

Results of Death and Injury Pattern, and Causes of the Accidents Reported (2002-2012)

Table 2: Death and injury pattern, and causes of the accident (2002 - 2012)

CAUSES OF DEATHS AND ACCIDENTS	NO. OF INJURIES	% of injuries	NO. OF DEATH	% of death	CASE FATALITY RATE
FIRE	52	55.9	29	63	59.6
INHALING OF POISONOUS GASES	1	1.1	1	2.2	100
FALL OF A HEAVY OBJECT DURING LIFTING	10	10.8	6	13	60
MACHINERY DRIVEN BY POWER	13	14	1	2.2	7.7
HOT THERMAL FLUID	1	1.1	1	2.2	100
TRAPPED BY A MOVING PARTS OF MACHINES	2	2.2	2	4.3	100
EXPLOSION	5	5.4	4	8.7	80
ELECTROCUTION	1	1.1	1	2.2	100
MALFUNCTION OF A MACHINE	2	2.2	1	2.2	50
TOTAL	93	100	46	100	49.5

Table structure, partly adopted from Ezenwa (2001) and modified by authors; content from accident reports collected from the FMLPID (2002-2012).

From Table 2 above, the death trend and causes during the 11-year period indicate that the highest number of deaths occurred as a result of fire outbreaks, which led to 52 injuries (55.9%) and 29 deaths (63%) with case fatality rate of 59.6%. Next are deaths as a result of the fall of heavy objects during lifting, which caused 6 deaths (13%), 10 injuries (10.8%) with a case fatality rate of 60%. Another major cause of death during the years of study. was explosions, which led to 4 deaths (8.7%), 5 injuries (5.4%) and case fatality rate of 80%. Trapping of workers by moving parts of machines led to 2 deaths (4.3%), 2 injuries (2.2%) while inhaling of poisonous gases, machinery driven by power, hot thermal fluids, electrocution and malfunction of a machine all led to 1 death each (2.2%)

Furthermore, according to Table 2, the three highest causes of injuries were fire outbreaks, machinery driven by power and fall of heavy objects during lifting while the three highest causes of death were fire outbreaks, fall of heavy objects during lifting and explosions. This is in contrast to a similar study conducted by

Ezenwa (2001) between 1987 and 1996, which found that there were 71 deaths out of which machinery driven by power caused 12 (16.9%) which ranked highest. This was followed by explosions 10 (14.1%) and then people falling 9 (12.6%). It should however be noted that during the ten years of the study by Ezenwa (2001), 3183 injuries were reported while during the period of this study only 93 injuries were reported. This reaffirms that accidents are presently under-reported in Nigeria as stated elsewhere in this paper. Table 2 also shows case fatality rates due to inhaling of poisonous gases, hot thermal fluids, trapping by moving parts of machines and electrocution all showing equal and highest case fatality rates at 100% each. This is followed by explosions (80%), fall of heavy objects during lifting (60%), fire outbreaks (59.6%), malfunctioning of machines (50%) and lastly machines driven by power (7.7%).

Table 3 shows the death statistics based on the type of industries during the 11-year period. The rubber products manufacturing industry topped the list with 29 deaths (63%), 50 injuries (53.8%) and a case fatality rate of 58% with a total number of 1 accident (2.5%). This was followed by the food processing industry, which recorded a total number of 9 accidents (22.5%), 12 deaths (26.1%), 20 injuries (21.5%) and case fatality rate of 60%. Cement production, foam production and the non-metal manufacturing recorded 1 accident each (2.5%) with no fatalities. Petrol stations recorded 1 accident (2.5%), 1 death (2.2%), 1 injury (1.1%) and case fatality rate of 100%. Plastic recycling/production and building construction sites/companies recorded a total number of 3 accidents (7.5%) each. The plastic recycling accounted for 1 death (2.2%), 5 injuries (5.4%) and case fatality rate of 20% while building construction sites/companies accounted for 7 injuries (7.5%), and no fatalities.

Result of Accidents in Various Industries

Table 3: Record of accidents and deaths and the type of industries involved from 2002 to 2012.

INDUSTRY	NO. OF ACCIDENTS	% of accidents	NO. OF INJURY	% of injuries	NO. OF DEATHS	% of deaths	CASE FATALITY RATE
FOOD PROCESSING	9	22.5	20	21.5	12	26.1	60
MANUFACTURING OF RUBBER PRODUCTS	1	2.5	50	53.8	29	63	58
PETROL STATIONS	1	2.5	1	1.1	1	2.2	100
PLASTIC PRODCTION/RECYCLING	3	7.5	5	5.4	1	2.2	20
STEEL/PIPE MILLS	4	10	5	5.4	-		-
BUILDING CONSTRUCTION SITES/COMPANIES	3	7.5	7	7.5	-		-
NON-METAL MANUFACTURING (TILES)	1	2.5	1	1.1	-		-
FOAM PRODUCTION	1	2.5	-		-		-
COPERATE ESTABLISHMENT	1	2.5	1	1.1	1	2.2	100
FABRICATED METAL PRODUCTS	1	2.5	2	2.2	2	4.3	100
CEMENT PRODUCTION	1	2.5	1	1.1	-		-
UNKNOWN	14	35	-	-		-	
TOTAL	40	100	93	100	46	100	49.5

Table structure, partly adopted from Ezenwa (2001) and modified by authors; content from accident reports collected from the FMLPID (2002-2012).

The highest case fatality rate occurred in the petrol filling stations, cooperate establishment and fabricated metal production industry with 100% fatality rate each. These were followed closely by food processing industry (60%), rubber products industry (58%) and plastic production and recycling (20%).

Result of Accident Causal Factor

Table 4: Accident causal factors (2002-2012)

Accident causal factors		Frequency	Percentage
Unsafe acts	Mgt. Factor	8	40
	Human factor	12	60
Unsafe conditions	Mgt. Factor	39	78
	Human factor	11	22
Remote or contributory factors	Mgt. Factor	42	91.3
	Human factor	4	8.7

Designed by authors

From Table 4, it can be seen that the 60% of unsafe acts that were reported during the 11 year period were due to human factors and these include: employees hurrying up to finish the task on time, cutting corners to increase productivity etc. However, this may be due to pressure from management or high workload, designating untrained or inexperienced employees to activities that they are not competent for. The latter accounts for 40 % of the accidents reported to the FMLPID, hence management's unsafe act.

Moreover, it can be seen from Table 4 that under unsafe conditions, 78% of the accidents reported during the 11-year period were due to management factors. These could be due to management using unsafe equipment, using obsolete machines, failure to isolate malfunctioning lift or restrict the use of the lift. On the other hand, maintenance works being carried out without machine being switched off, which is one of the human factors reported, accounted for 22%.

In terms of remote and contributory causes of the accidents reported, management factors accounted for 91.3% and these include: inadequate training, hence low level of awareness, lack of supervision. In addition, human factors, which accounted for 8.7% include: failure of employees to attend training sessions. Lack of training was the highest occurring remote or contributory factors of the reported accidents (this partly informed the interview sessions), followed by lack of supervision. The use of obsolete machines accounts for about 50% of the management factors in terms of unsafe conditions.

Intervention Pattern

The data collected informed the enforcement pyramid of the FMLPID in Figure 1. It shows that throughout the 11-year period covered by this study, there was just one prosecution, 10 warnings issued to offenders, 8 safety precaution recommendations, 1 case that was yet to be investigated, and no recorded actions taken for the rest. From the pyramid below (Fig. 1), it can be seen that the FMLPID adopts the lower sanction base level in the pyramid, which is consistent with most food safety enforcement agencies (local authorities) as posited by Fairman and Yapp (2005). From the critical analysis of the data collected, it is evident that most if not all the offenders for the 11-year period breached section 3 of the Factories Act F1 LFN 2004**.**

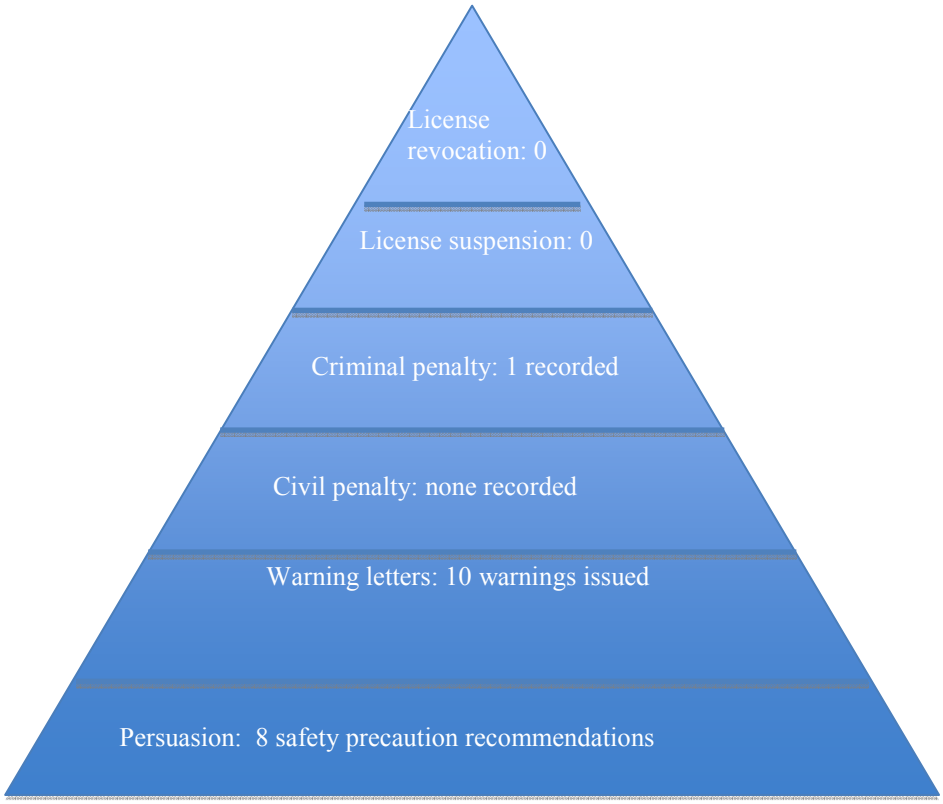

Fig: 1: Enforcement pyramid of Nigeria based on reported accidents (2002-2012).
Structure, adopted from Ayres and Braithwaite (1992) and modified by authors.

It requires the registration of premises with the Director of Factories before the commencement of business or at least 6 months after commencement, but no record of penalties was found for this violation. Additionally, the analysis also found that 80% of the accidents happen at night and most resulted to fatalities or

as a result of lone working. 92% of the accident reported kept the victims out of work for more than 5 days or even permanently out of work. In general, the data collected shows a lower rate of reported accidents compared with what Ezenwa (2001) presents, whereas there has been no record of a reduction in the rate of accidents in Nigeria, rather an increase. This section of the result also partly informed the second method of the research where 10 officers were interviewed so as to understand the underlying determinants of the level of sanctions.

Results of Selected Interviews

The sub-section below presents the results of the interviews so as to understand the intervention pattern. Interviewees' responses to why organisations that breached the section 3 of the Factories Act of 2004 were not prosecuted varied. Also, lack of training in the workplaces reported, is highly a contributory factor to accidents, but the interviewees could not demonstrate adequate provisions in place to rectify the above. In terms of enforcement, the pyramid above shows a greater concentration on low levels of sanctions. The interviewees blamed it on the legal system once again and prosecution system, opining that the process of prosecution is not friendly. Worse still, most of the interviewees were unable to demonstrate the rationale behind the non-sanctioning of the offenders.

One of the respondents however, stated,

'*We leave the sanctions to the management of the ministry; the Factories Act stipulates just 2000 Naira* (i.e £7.40 where £1 = 270 Naira) *for the offence'*, while another stated, '*The process of prosecution is the problem. I can remember that sometime ago, during enforcement, the then Minister, called our Director and told him to pull his men out of site as he has interest in the site'*.

The site in question was being inspected and had violated most of the regulations. Another respondent stated: '*The decision to prosecute is on the management, the management decides who will be prosecuted'*

On the other hand, another respondent expanded:

'*We do not want to scare off those that co-operate with us a little. We want to get them to do what we want gradually. If we are hard on them, they would not co-operate with us again. They can even leave us at the gate if we visit for inspections, after all, we do not have police men with us during inspection.'*

The process of reported accidents may be a contributory factor to the low level of accident reporting in Nigeria. Therefore, to understand the phenomenon, the interviewees were asked about it and the low level of reported accidents. The interviewees' responses demonstrated adequate official procedure for accident reporting. The question as to the efficacy of the procedure remains an issue that is worth investigating. In relation to their perception for the low level of reported accidents, one respondent stated:

'*The low level of accident reported is due to low level of publicity. Also, most times companies do not report accidents because they want to avoid compensating victims. It is the affected employee that comes to inform the ministry and then the ministry writes the company'*.

Discussion

Analogous to, Ade (1993) in Ezenwa (2001), which presents a high case fatality rate of 52.5 for Egypt, is this study which shows that from 2002 to 2012, 40 accidents were reported to the FMLPID in which the following were recorded: 93 injuries, 46 deaths, 4 near misses and a high case fatality rate of 49.5. Although the above is just a tip of the iceberg of the level of accidents in Nigeria (Ezenwa, 2001), the findings show a significant increase in case fatality rate in Nigeria, in that Ezenwa (2001) shows a case fatality rate of 2.2 for a 10-year period (1987-1996). Nevertheless, it should be noted that availability of data remains a hindrance to OHS in developing countries (Diugwu et al., 2012; Ezenwa, 2001; Idoro, 2008; Idubor & Osiamoje, 2012; Umeokafor et al., 2013), thus affecting achieving one of the objectives of this research. Nevertheless, the findings from this study suggest a significant reduction in the rate of accidents reported to the FMLPID compared with what Ezenwa (2001) reports.

In particular, the data in Table 1 demonstrates that there are no records of reported accidents for 2005 and 2006. Obviously, accidents are highly likely to have occurred but may not have been reported; if reported, they were not documented by the relevant authority. Arguments must be raised in terms of accident and death trend in Table 2, where electrocution, trapping of persons by moving parts of machines, inhalation of poisonous gases, hot thermal fluid account for case fatality rate of 100% each; demonstrating the high degree of fatal potentiality of these risks. Although they account for lower number of deaths and injuries, the likelihood of survival on exposure to such hazards is slim. Therefore, it is suggested that industries with employees at risk of injury or death due to the above should develop effective strategies to control the risks. Although fire does not record a case fatality rate of 100, it remains an area of concern as the damages in terms of lives and properties are daunting. The same can be said of industries like petrol stations, cooperate establishments, fabricators of metals products, where case fatality rates of 100 were recorded (Table 3). This demonstrates the high-risk levels of these industries; not forgetting the manufacturers of rubber products, where the highest number of injuries was recorded and the food processing industry, where the highest number of deaths was recorded. Although the

incident in the cooperate establishment is not a regular occurrence (use of dysfunctional lift that was left unsecured), the degree of negligence remains conspicuous and poses great concern.

Consistent with Odero (2005), which found that human factors were responsible for 85% of the causes of the road accidents in Kenya, is this study, which found that 80% of unsafe acts, 22% for unsafe conditions and 8.7 for remote or contributory factors. The contention being that the contribution of human factors to accidents remains significant. This study also reports that 80% of the accidents occurred at night.

In terms of the level of sanctions as seen in the enforcement pyramid in Figure 1, the FMLPID concentrates more on issuing warnings and safety precaution recommendations, while one reported accident as seen elsewhere in this paper is yet to be investigated. Thus, demonstrating that the FMLPID does not take accident investigation seriously, as the evidence in relation to the incident may have been tampered with or even destroyed by the offenders. Also, the results show that there is no record of sanction/prosecution for violation of section 3 of the Factories Act F1 LFN 2004, which most of the offenders violated. Consequently, arguments can be made that although the Factories Act F1 LFN 2004 stipulates penalities of imprisonment and fines or any of the two depending on duration of contravention of the legislation, the data collected shows no record of the FMLPID sanctioning the offenders, which they confirmed during the interview. This reaffirms Okojie (2010) findings that enfrocement actions, in particular the issuing of prohibition notices is rare in Nigeria. Factoring in that the interventions explored are reactive ones, thus does not report proactive ones, agreement must be made that if reactive interventions account for the result in Figure 1, then little can be said of proactive interventions (i.e. if it occurs).

Furthermore, the responses of the interviewees do suggest lack of management commitment, which is consistent with Idubor and Osiamoje, (2012); Umeokafor et al. (2014). This is on the grounds that most respondents attest to the prosecution decision being on the management, who can be seen as lagging behind. The above arguments factored in, allude the inference of the significant evident decay in the upstream public entity sector of OHS in Nigeria; this is irrespective of arguments that may be in favour of the FMLPID. Equally important is a response by a respondent that they avoid scaring off organisations that co-operate with them a little (see results section). Although this is consistent with Benign Big Gun philosophy by Ayres and Braithwaite (1992), which recognises the prospects of the regulator carrying big sticks (ie., having enormous power) but speaking softly, hence hardly using the sticks; it should not apply to cornerstone regulations and where OHS is problematic. In that selective compliance with OHS regulations is tantamount to non-compliance, hence compliance should be non-negotiable. However, it can be argued that the FMLPID plays down unsafe practices as the above augments demonstrate. The poor state of OHS in Nigeria (Idubor & Osiamoje, 2012; Umeokafor et. al., 2014) requires more than safety precautions, recommendations and warning. This enforcement approach may be adequate in situations were OHS system is functional and the level of OHS is not poor, but it should be for a short period of time and monitored to avoid being abused. It must be mentioned that the interviewees blame inadequate publicity as a deterrence to accident reporting; this is in line Diugwu et al. (2012), who found that 79.5% of their respondents are not aware of the custodian of OHS in Nigeria. As a result, little is expected of these organisations in terms of accident reporting (Umeokafor et al., 2013). Nevertheless, it is evident that the FMLPID needs a regeneration of attribute.

Meanwhile, it is not enough to identify the causes of accidents, as causal factors which encompass: unsafe acts, unsafe conditions and remote or contributory factors are the root of accidents; all of which are management made or human made. Therefore, if situational analysis highlights them, the chain of events and the interaction between the events and the causal factors will be understood, thus digging deep into accident investigation (Inel &Inel, 1995). Consequently, referring to Table 4, the case studies below demonstrate the accident causal factors, which include remote factors and contributory factors.

1.50 workers were injured, 29 of which later died of severe burns as they were trapped during a fire, which started at the raw materials store of a rubber footwear factory, consequently resulting in series of explosions. The escape routes were blocked. Unsafe conditions for work provided by the management such as locating of steam boilers within the main production hall, absence of fire detectors, fire alarm and water hydrant were reported after investigating the accident. The major unsafe condition noticed was the failure of the management to isolate and partially compartmentalise the flammable materials store, while poor communication due to language barrier between the supervisors (Chinese) and the workers (Nigerians) was the remote and contributory factor.

2.A worker suffered a crush injury to the head and was certified dead upon arrival at the hospital. The same worker was employed in a metalising and packaging company and was deployed after 5 days to work with a blow-molding machine during a night shift without prior training, which is a major causal factor of the accident. Others include: leaving the worker to work alone; absence of first aid, which may have helped save the life of the worker as stated in the report; lack of supervision; no safety instructions on the machine. These therefore reinforce the role of management causal factors in the incident.

3.A lone worker in an attempt to remove dirty particles from a machine he was working with lost his right

index finger to the machine while his palm was partly injured. The causal factor of the accident is the unsafe act on the part of the worker who should have switched off the machine before attempting to remove the particles. The remote or contributory factors are the ignorance of the worker in relation to basic health and safety while using the machine and the lack of supervision of workers by the management.

As regards case 1, most of the accident causal factors are management factors. This is on the grounds that adequate communication, a major ingredient for effective management should be in place in the organisation; the three steam boilers should not be located in the production hall, as they endanger the lives of the workers in any case of explosion; fire detectors, fire fighting equipment like fire extinguisher and water hydrants and sprinklers should have been in the factory. As much as most of these are due to management failures, the FMLPID should have observed most of these, especially the latter point above if there has been adequate OHS management monitoring by them. Similar to case 1 is case 2, where the accident causal factors are due to management factors in that a newly employed staff should not be a lone worker; adequate supervision and training, adequate first aid should have been in place. The unsafe condition of the machine, which has no safety instruction, suggests that the machine may have been an old machine or may have fallen off, as new machines will have safety instructions as specified in international standards. Further arguments are made in favour of the management as per case 3, in that human factors, which are non-adherence to instructions, trying to cut corners are to blame for the accident. However, lack of supervision, which is the responsibility of the management, is also a contributory factor.

Conclusion and recommendations

Compared to Ezenwa (2001), this study demonstrates that in Nigeria: accidents are still under-reported; fatality, injury and accident rates are increasing; management commitments to accident prevention remain poor. The latter arguably contributes hugely to accident causation. It goes further to demonstrate that the custodian of OHS in Nigeria adopts insignificant sanctions for offences. In that irrespective of offence, mainly safety precaution recommendations and warnings were issued by the FMLPID, overlooking many cases of violation of OHS legislation. Although the legislation is inadequate, as a custodian of OHS, and with the high case fatality rate in the country, their operations should aim at best practices. Most significantly, this study reveals that for the 11-year study period: fire accounted for the highest number of deaths and injuries, manufactures of rubber products accounted for the highest number of deaths and injuries; lack of training was the highest occurring accident causal factor. The findings that the intervention strategies adopted by the FMLPID remains inadequate and that the OHS legislation is inadequate are well highlighted in this paper. Factoring all that this paper has demonstrated so far, a number of managerial and policy implications are set forth. These include: adoption of a more pragmatic enforcement approach, where deterrence based approach (i.e., severe sanction oriented) and system management approach are combined; stipulating a deadline for adhering to post-inspection recommendations set-out by FMLIPD; development and adoption of a free mobile accident reporting system for victims and their jobs protected upon reporting accidents. Likewise, active governmental involvement is solicited in developing adequate strategies for accident prevention. Although like every study, this study has encountered some limitations that include dearth of OHS data, methodological triangulation was adopted for cross-validation of data and for better understanding of the phenomena. However, future research can focus on improving accident reporting in Nigeria and understanding the intervention process of FMLPID.

Acknowledgement

The authors wish to thank the Federal Ministry and Labour and Productivity (Inspectorate Division) Nigeria for providing the data for the study and Nedselite Safety International for helping in data collection.

References

Ayres, I. and Braithwaite, J. (1992). *Responsive regulation: Transcending the deregulation debate.* New York: Oxford University Press.

Denzin, N.K. (1970). *The research act in sociology: A theoretical introduction to sociological Methods.* London: Butterworths.

Diugwu, I. A., Baba, D. L., and Egila, A. E. (2012). Effective regulation and level of awareness: An expose of the Nigeria's construction industry. *Open Journal of Safety Science and Technology*. 2, pp 140-146.

Ezenwa, O.A. (2001). A study of fatal injuries in Nigerian factories. *Occupational Medicine*. 51(8), 485-489.

Fairman, R. and Yapp, C. (2005). Enforced self-regulation, prescription, and conceptions of compliance within small Business: The impact of enforcement. *Law and Policy*, 27 (4).

Hamalainen, P., Takala, J., and Saarela, K., L. (2006) Global estimates of occupational accidents. *Safety Science*. 44, 137–156.

Idoro, G. I. (2008). Health and safety management efforts as correlates of performance in the Nigerian

construction industry. *Journal of Civil Engineering and Management*. 14 (4), 277-285.
Idubor, E. E., & Oisamoje, M. D. (2013). An exploration of health and safety management issues in Nigeria's efforts to industrialize. *European Scientific Journal*, 9 (12), 154-169.
Inel J.R. B. and Inel, J.L. C. (1995). Events and causal factors analysis. Technical *Research and Analysis Center SCIENTECH, Inc*. Retrieved from http://www.jkltd.net/trac14.pdf
Odero, W. (1995). Road traffic accidents in Kenya: An epidemiological appraisal. *East African medical Journal* 72 (5), 299-305.
OCED Organisation for Economic Co-operation and Development. (2002)
'*African Economic Outlook'*. Retrived from http://www.oecd.org/countries/nigeria/1826208.pdf
Okojie, O. (2010). System for reporting occupational diseases in Nigeria. *African Newsletter on Occupational Health and Safety*, 20 (3), 51-53.
Kipo, D.D. (2013). Mixed research methods: Reflections on social policy. *Asian Social Science* 9 (17), 259-268.
Nigerian National Bureau of Statistics (2014). *Measuring better: presentation of preliminary results of the rebased nominal gross domestic product (GDP) estimates for Nigeria 2010 to 2013.* Retrieved from http://www.nigerianstat.gov.ng/pages/NBS%20eLibrary#!
Umeokafor, N., Isaac, D., Jones, K. G., & Umeadi, B. (2013). *Enforcement of occupational safety and health regulations in Nigeria: An exploration.* Proceedings of the 1st International Scientific Forum, 3: 92-103.
Umeokafor, N. I., Umeadi, B., & Jones, K.G. (2014). *Compliance with Occupational Health and Safety Regulations: A Review of Nigeria's Construction Industry*. In Ejohwomu, O. & Oshodi, O. (eds) proceedings of the 3rd International Conference on Infrastructure Development in Africa ICDIA 2014, pp 70-84.

The IISTE is a pioneer in the Open-Access hosting service and academic event management. The aim of the firm is Accelerating Global Knowledge Sharing.

More information about the firm can be found on the homepage:
http://www.iiste.org

CALL FOR JOURNAL PAPERS

There are more than 30 peer-reviewed academic journals hosted under the hosting platform.

Prospective authors of journals can find the submission instruction on the following page: http://www.iiste.org/journals/ All the journals articles are available online to the readers all over the world without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. Paper version of the journals is also available upon request of readers and authors.

MORE RESOURCES

Book publication information: http://www.iiste.org/book/

IISTE Knowledge Sharing Partners

EBSCO, Index Copernicus, Ulrich's Periodicals Directory, JournalTOCS, PKP Open Archives Harvester, Bielefeld Academic Search Engine, Elektronische Zeitschriftenbibliothek EZB, Open J-Gate, OCLC WorldCat, Universe Digtial Library , NewJour, Google Scholar