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Assessment of Awareness and Compliance to Safety Measures and use of Protective Devices in Sunseed Oil Company Dakace, Zaria

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Results: Majority of the respondents were male(97.5%) with a mean age of 35.03years and a standard deviation of ±8.72.Most of the respondents (97,5%) had received some form offormal education. The respondents who had workplace injuries accounted for 42.5% of which more than half sustained hand injury (67.3%).Most of the respondents were aware of safety devices(93.4%) with hand gloves been the most known device (63%).

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Conclusion: The findings revealed that the overall knowledge of protective devices by employees was optimal. However,non-availability of the safety devices influenced utilization. We recommend that devices suited to the role of each worker be provided by the employers.

I. Introduction

a) Background

A healthy workforce is vital for sustainable social and economic development on a local, national and global scale. For workers to remain healthy on their jobs, it is important to provide an optimal work environment that minimizes the risk of developing health problems. This is important as the work place is considered a basic part of life. Most adults spend approximately one fourth to one third of their time at work and often perceive work as apart of their self-identity.[1] Although the data are incomplete, the International Labor Organization (ILO) estimated that among the world's 2.7 billion workers, at least 2 million deaths per year are attributable to occupational diseases and injuries. However, this ILO estimate is really just the tip of the iceberg, because data for estimating nonfatal illness and injury are not available in most developing countries.[1]

The concept of occupational healthas defined by W.H.O is the promotion and maintenance of the highest degree of physical, mental and social well-being from health, controlling risks and the adaptation of work to people, and people to their jobs.[2]

When work is associated with health hazards it may cause occupational disease; be one of multiple causes of other diseases or may aggravate existing ill health of non-occupational origin. In developing countries where work is becoming increasingly mechanized, a number of work processes have been developed that treat workers as tools in production putting their health and lives at risk.[2]

Historically, the existence of diseases related to work was documented since antiquity. Imhotep (2780BC) described cases of occupational injuries among the pyramid builders. One of the great pioneers in occupational medicine was the Italian physician Bernardino Ramazzini (1633-1714), who authored the book "De MorbisArtificumDiahriba" where he described occupational diseases. He is often described as the 'Father of Occupational Medicine'.[3]

Sunseed oil company is involved with vegetable oil processing. The production process of vegetable oil starts from receiving oil seeds to storing, cleaning, drying, tempering, cracking, dehulling, conditioning, flaking, expanding, solvent extraction, degumming, refining, bleaching and deodorizing. Specific hazards associated with the operational phase of vegetable oil processing include[4]:

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Chemical hazards: Vegetable oil processing activities may present a risk of exposure to hazardouschemicals by inhalation or other exposure routes, as well as a risk of explosions resulting fromvolatilization of solvent dissolved in the oil (e.g. hexane), and fire, from spent bleaching earthwith a high iodine value oil, high ambient temperature, and high circulation-draft of air. Operators in vegetable oil facilities may be exposed to hazardous substances including inhalation of hexane or other solvents used for extraction; inhalation of toxic chemicals (e.g. sodium methylate can cause burns on the skin and lung tissues if inhaled); eye or skin exposure to acids or bases; inhalation of dust from transportation of raw materials (e.g. seeds and beans to the crushing plant); inhalation of dust from meal treatment and shipment; inhalation of dust from bleaching earth, filter aid, and nickel catalyst; and inhalation of aflatoxins present in raw materials.[4]

Physical hazards: Physical hazards in vegetable oil processing facilities are similar to those present in other industrial sectors and includes the potential for falls caused by slippery floors and stairs, potential collisions with internal transport such as trucks, and accidental contact with conveyor systems, such as those used in the crushing plants and for the removal of spent earth. [6]Operators in vegetable oil plants are also exposed to noise from internal transport, conveyors, boilers, pumps, fans, and various steam and air leaks. [4]

b) Problem statement

According to a comparative risk assessment of a handful of occupational hazards conducted by World Health Organization which accounted for 40 percent (800,000) of the ILO-estimated 2 million deaths, findings showed that unintentional injuries caused 312,000 deaths globally per year for the world's 2.7 billion workers, compared to 6,000 deaths per year for 150 million workers in the United States. [1]

The Bureau of Labor Statistics reported a total of 4,836 fatal work injuries recorded in the United States in 2015. This figure was the highest since 5,214 fatal injuries in 2008. The overall rate of fatal work injury for workers in 2015 was at 3.38 per 100,000 full time equivalent workers, and was lower than the 2014 rate of 3.43.The 937 fatal work injuries in the private construction industry in 2015 represented the highest total since 975 cases in 2008. Fatal injuries in the private oil and gas extraction industries were 38 percent lower in 2015 than 2014.[5]

The annual report of census and analysis of occupational illnesses reported that in the years 1985-1996, the total numbers of occupational illnesses ranged between 400 to 706 cases annually. Subsequently the number went up suddenly to 2026 in 1997 and jumped to 4784 in 1998.[1]

Reporting of occupational illnessesis still far less than expected (particularly in developing countries) based on the size of the population and the documented shortage of occupational health services coverage of the working population.For example, estimates of the burden of occupational disease suggest that reporting systems in southern Africa probably underestimate the real burden of occupational disease 50-fold. This is not unassociated with weak monitoring and regulatory systems, job insecurity and high labor turnover. Studies in Southern African Development Community indicate that the reported annual injury rates for wage workers in the Southern African Development Community region ranged widely from 0.35 to 49.42 injuries per 1,000 workers, and reported occupational fatality in the region ranged from 0.85 to 21.6 fatalities per 100,000 workers. [2]

In African countries, for example, the injury rates in forestry, electricity production, mining, basic metal production, non-metallic mineral manufacturing, wood-product manufacturing, and transport were all greater than 30 injuries per 1000 workers. Epidemiological data of occupational health hazards in Nigeria is poor mainly because industries do not report cases to the relevant government agencies.[6] Despite the various labor Act, factories decree and legislations by the Federal Government, studies have shown that Nigerian workers are exposed to occupational hazards in industries.[7]

Occupational health problems have gradually increased in type and magnitude and have led to or aggravated diseases resulting from exposure to several risk factors only one of which is the work environment. For example, exposure to hexane (a chemical solvent used in the industrial production of vegetable oil) beyond the permissible exposure limit is associated with peripheral neuropathy.[2]

Failure of the national government to establish workplace rules and provide a system of information dissemination and enforcement of regulations expose workers to occupational health hazards. Law enforcement is patchy and criminal sanctions for breach of Occupational health laws are rarely invoked when such laws exist. Most developing countries are unable to garner enough resources to ensure compliance to safety measures; educate health professionals in occupational health, attract adequately trained personnel to conduct inspections, and to establish and monitor laboratories to support regulatory efforts.[8]

In the developing country workplace, very few employers know about industrial hygiene, safety and health practices, and available controls varies. On-site industrial hygiene expertise is largely lacking.[1] Output-related pay, introduction of new processes without accompanying hazard information, and insecure and flexible contracts weaken workers' ability to control their work environment.[8]

In developing countries, especially at large remote industrial complexes and farms, workers (with or

without families) often live and work in the same place, where workplace hazards, including noise, chemicals, and biohazards, are part of their non-work environment.[1]Training of supervisors and workers is often difficult because of impediments such as educational proficiency, language barriers, and the applicability of training material to local contexts.[1]

In an effort to address these challenges, the declaration of Alma Ata in 1978 led to the recognition of the importance of Primary Health Care workers and Community health workers in bringing health care to where people work. As such World Health Assembly resolution in 1987 requested the Director General of the WHO to develop guidelines on training PHC workers in occupational health.[2]

c) Justification

Work-related hazards, are very costly and can have many serious direct and indirect effects on the lives of the worker, their families and employers. For workers, some of the direct cost are: the pain & suffering of the injury or illness; the loss of income, possible loss of a job, health care cost. The most obvious indirect cost is the human suffering caused to workers' families, which many times cannot be compensated in monetary terms.[9]

Direct cost to employers include: Payment for work not performed; medical & compensation payment, repair or replacement of damaged machinery and equipment, reduction or a temporary halt in production, increased training expenses and administration cost, possible reduction in the quality of work, negative effect on morale in other workers.[9]

The indirect cost for employers are: the injured or ill-worker has to be replaced; a new worker has to be trained and given time to adjust to new roles, it takes time for the new worker to produce at the rate of the original worker , time must be devoted to obligatory investigations; to the writing of reports and filling out of forms, accidents often arouse the concern of fellow workers and influence labor relations in a negative way, poor health & safety conditions in the workplace can also result in poor public relations.[9] ILO estimates that about 4 percent of gross domestic product (GDP) worldwide is lost to work_related diseases and injuries.[1]

For all the reasons given above it is crucial that both workers & employers are informed of health and safety risk in the workplace. The rationale behind this study therefore, is to assess the awareness of health hazards and preventive measures including the use of protective devices with an emphasis on compliance as recent studies showed that despite adequate knowledge of occupational hazards and protective devices, compliance to their use is low.

II. Literature Review

a) Introduction

A study by Tarn etal on knowledge, awareness and practice of using personal respiratory protective equipment among Hong Kong workers showed that many workers were unaware of potential hazards present in their working environment, which made them more vulnerable to injury. The workers complained that using personal protective devices slowed down their efficiency, and made them uncomfortable. About 63.6% of the respondents understood the importance of using respirators. It was found that about 78.9% of the respondents were familiar with the risks of respirator fitting and about 80.8% of the respondents were familiar with respirator fitting. 86.6% of the management team respondents and about 48.6% of the frontline worker respondents did not use respirators while working on construction sites. 74.6% of the 100 respondents did not perform the regular body checkup. [10]

Even when knowledge and awareness of respondents to occupational hazards and formal training in occupational safety is adequate, compliance rate is not encouraging typified by a recent study by Aliyu et al on pattern of occupational health hazards and provision of occupational health services and safety among workers of Kaduna refinery ,where almost all of the 250 respondents (97.0%) were aware of safety measures in the workplace; and majority (92.1%) had formal training on occupational safety. Most of the respondents (78%) admitted to regular use of protective devices. Reasons given for non-regular use were; feels uncomfortable (29.1%), makes work difficult to perform (25.5%) and no cogent reason(23.6%).[11]

Another study by Shobowole etal on ocular health status and practices among the workers of a steel rolling mill in Nigeria ,showed that of the 107 workers studied 65 (60.7%) of them had tertiary education, 19 (17.8%) had secondary education, 8 (7.5%) had primary education, while 15 (14%) had no formal education. Only 20.4% of them had ever received eye health education since joining the industry. 94.3% of the workers were aware of the fact that potential ocular hazard existed in the industry and 98.9% believed that the hazard could be prevented with the use of some eye protective device (EPD). About two-thirds (49 subjects; 68.9%) of the workers reported that they had had some work related eye injuries. Thirty-six (73.4%) of them did not use any protective device available.[12]

In a study by Sabitu et al on awareness of occupational hazards & safety measures among welders in Kaduna metropolis, of the 330 respondents, 85.3% of respondents had experienced work related accidents of which 38% had sustained cuts or injuries to the hands, 77.9% were aware of one or more workplace hazards. However, only 34.2% used one or more types

of protective devices, with eye goggles (60.9%), hand gloves (50.3%) and boots (34.5%) being more frequently used.[13]In the same study by Sabituet al., 1%of the welders studied had hearing impairment.[13]

In a similar study by Aliyu etal on stone quarry workers in Zaria, 64.9% of the 74 respondents were aware of the need to use safety devices as well as preventive measures at the worksite. However, none of the quarry sites made efforts at instituting preventive measures and/or providing safety devices. The quarry sites lacked first Aid facilities to treat minor on-site injuries before proper referral and none of the industries recruited any medical personnel nor did they have any partnership with any government or private hospital.[7]

A study of semen quality of cleaners at the Chernobyl sites in Ukraine showed that the men had asthenooligospermia and were observed in men exposed to a dose of radiation higher than l00mSV.[14]

In a study by Loewenson, chemical related injury rates varied between 6.4 and 37.2 injuries per 100,000 workers in Tanzania, Kenya, South Africa, and Zimbabwe.[15] It had been estimated in Africa that 3.2% of workers suffer pesticide poisoning.[15] A study by Jung-sun park etal on hematopoietic and reproductive disorders due to solvents containing 2-bromopropane in an electronic factory in Korea revealed varying degree of pancytopenia, ovarian failure and oligospermia among staff who had contact with the solvent.[15]

A study by Oladapo etal on fertility and occupational hazards, revealed that pesticides, solvents & heavy metals had detrimental effects on many organs in the body including the reproductive system. The reproductive effects included reduced fecundity, abnormal sperm 'quality, increased risk of low birth weight, miscarriages and permanent sterility.[14] In Italy, among workers engaged in production of coins, whose exposure was mainly to metal fumes (cadmium, lead, nickel, chromium and manganese) and solvents, a reduction of fecund ability was observed.[14]

A study of women farmers in mixed cropping systems, by the University of Benin (Nigeria), found that the vast majority suffered from intense muscular fatigue, heat exhaustion ,and skin disorders, forcing them to take days off from attending to crops.[16]

A detailed survey of occupational and musculoskeletal disorders at a garri-processing co-operative in Ghana revealed that every respondent complained of having suffered from musculoskeletal pain or discomfort from work over the past 12 months 92% of the women interviewed reported having suffered pain in the lower back and right shoulder in the last year.[17]

Studies in Botswana and South Africa, for example, signal the potential problem of Silicosis in developing nations from prolonged exposure to crystalline silica in mineworkers in the rural areas of southern Africa .[8]Coal dust has also been a serious hazard causing coal workers' pneumoconiosis or 'black lung' and chronic obstructive pulmonary disease.[18] Exposures to coal tar pitch volatiles in Soderbergaluminum smelters have been reported to increase the risk of lung cancer and bladder cancer. Occupational asthma has also been a problem in the pot rooms of aluminum smelters.[18]

At other times ignorance constitutes the problem. A Korean study by Jung-sun etal on an outbreak of hematopoietic and reproductive disorders in an electronic factory revealed that all workers did 12-hour shift work and never used personal protective devices such as gloves and masks when handling a new cleaning solution as they were oblivious of its toxicity and so were exposed to considerable high concentration each day. [30]

In the same light, a study by Yanggen etal on Ecuador farmers, showed that more than 70 percent of men and 80 percent of women did not understand the color coding on pesticide labels indicating toxicity, despite a near 90 percent literacy rate and substantial industrial education on "safe use." Farmers made minimal use of protective clothing during pesticide preparation and application, and many failed to shower off pesticide residues or change their clothes immediately after application. Farm based families stored pesticides in their homes and washed their application equipment and clothing nearby.[16]

In a recent study on occupational eye injury among sawmill workers in Nigeria by Uhumwangbo etal, only 7 out of 557 respondents used eye protective devices (10.7%). The prevalence of ocular injuries was 1.6%. The level of compliance in the study was very low, as workers were left on their own to decide on whether to use or not to use protective eye wear.[19]

A study by Onajole et al on awareness of workers on hazards exposure and safety measures in an aluminum industry in Lagos; males were more likely to regularly use protective devices than females 46.5% and 23.5% respectively. Workers who had tertiary education were less likely to regularly use personal protective equipment compared with those with secondary education 32.1% and 50% respectively.[20]

III. Methodology

a) Background of the study area

Sunseed Oil company Dakace, is located in Dambo ward of Zaria Local Government Area. It has boundaries with SabonGari L.G.A on the North; Igabi L.G.A on the south, BirninGwari L.G.A on the west and Soba L.G.A on the east. It was established in 1998 by the Kewalram Chanrai group a business enterprise with interest in manufacturing, agro commodities, international trade and property development.

The company had 5 Departments which included administration, accounting, production, engineering, and commercial departments. The company at inception had a clinic which wasno longer functional. However, First Aid was available and a retainer ship existed between the factory and some government and privatehospitals which catered for the health needs of the employees.

There were 4 factories, only 2 were functional. The company had 130 Factory workers(70 of which were permanent workers and 50 temporary workers).The factory made use of domestically produced oil seeds, predominantly soya bean and comprises of an area of land with a plant and equipment for storing, crushing, refining and packaging.

A brief on the industrial process

The oilseeds arrived the facility by truck and were sampled for moisture content,foreign matter, and damaged seeds. Then the beans were weighed and conveyed to concrete silos or metaltanks for storage until processing. At the time of processing, the beans were removed from storage and cleaned. When cleaning was complete, the beans were dried. After drying, the beans were tempered for 2 to 3 days to allow the moisture to equilibrate and the hulls loose. Next was cracking and the purpose of cracking was to break the soybeans into pieces suitable for dehulling and flaking. The removed hulls may be combined with hulls from the earlier cleaning steps and used in animal feeds. It was then transported to conditioners where the soybeans were heated and moistened to make them pliable enough to ensure proper flaking. Conditioned soybeans were fed through large, smooth-surfaced rollers and emerged as flakes. Flaking was the final step prior to solvent extraction.

b) Study design

This was a Cross-sectional descriptive study assessing awareness and compliance to safety measures and use of protective devices in Sunseed oil company, Dakace, Zaria.

c) Study population

All factory workers in various sections of production were studied.

d) Inclusion and exclusion criteria

Inclusion criteria - 120 factory workers.
Exclusion criteria - administrative staff, Accountants, staff of commercial department, security guards, cleaners, errand men.

e) Sample Size Determination

$n=Z^2(pqVd^{220}$
where:
n=sample size
z=standard normal deviate at 90% confidence interval=l .96
P-prevalence rate as gotten from previous study =50%(0.5) [20]
q=probability of prevalence=(l-p)=l-0.5
= 0.5
D=margin of acceptable sampling error=5%(0.05)

$$\frac{N = [1.96]^2\ [0.5x0.51}{[0.05]^2} = 384$$

f) Sample technique

The sample size was estimated to be 384. However, the total number of factory workers in Sunseed oil company was 120 and fell short of the estimate ,as such all factory workers were interviewed.

g) Data Collection Methods and Instruments

The data collection was via semi-structured interviewer-administered questionnaire which sought to obtain information on the socio-demographic characteristics of the respondents, their level of awareness and compliance with use of safety protective devices on the job, as well as the patterns of injury among the factory workers. .Both open and closed ended type questions were used.

Field pretest

A pretest was done on 12 factory workers in Olam Nigeria limited, the aim was to assess the validity and accuracy of the questions in the questionnaire and level of understanding of the structured questions. Based on the outcome of the pre-test, necessary adjustment were made such as simplifying ambiguous questions and additional informative questions were added such as; nature of employment, specific segment of production, among others.

h) Data management

The data collected from the study was checked for errors and then edited accordingly. It was entered, validated and analyzed using the Statistical Package for Social Sciences (SPSS') software version 17.0. For the descriptive aspect of the analysis, frequency distributions were generated. For all categorical variables, means and standard deviations and other descriptive measures were determined. Frequency tables and graphs were constructed to represent quantitative data, while qualitative data were represented with charts by using the software program me Microsoft® Excel® 2007. Chi-square test was applied for comparison of proportions and for evaluating associations of categorical variables in contingency tables.

i) Ethical consideration

Approval to carry out the study was obtained from the Head of the Department of Community Medicine, Faculty of Medicine, Ahmadu Bello University, Zaria. The permission of the General Manager of Sunseed company was also obtained. Each respondent was enlightenedon the purpose of the study and

Informed consent obtained.Highest level of confidentiality was ensured and respondents were not required to give their names

j) Limitation of study

- The number of factory workers surveyed was less than the estimated number.
- The research was conducted over a limited time period. However, most health problems evolve over a long period of time.
- Possible fallacy of certain information obtained from respondents.

IV. Results

A total of 120 questionnaires were administered all of which were returned.

Table 1: Age distribution of respondents

Age(Years)	Frequency	Percentage(%)
15-24	15	12.5
25-34	40	33.3
35-44	47	39.2
45-54	17	14.2
55-64	1	0.8
Total	120	100.0

Majority of the respondents were between the ages of 25 and 44 years(72.5%), most of whom were between 35 and 44years (39.2%). The mean age of respondents was 35.03 and standard deviation was 8.723.

Table 2: Educational status of Respondents

Educational status	Frequency	Percentage (%)
Primary	4	5.0
Secondary	49	40.8
Tertiary	62	51.7
Adult literacy	1	0.8
None	2	1.7
Total	120	100

About half of the respondents had tertiary education (7%), 40.8% had secondary education, those with primary education accounted for only 5%. 0.8% of the respondents had acquired some form of adult literacy 1.7% had no form of education.

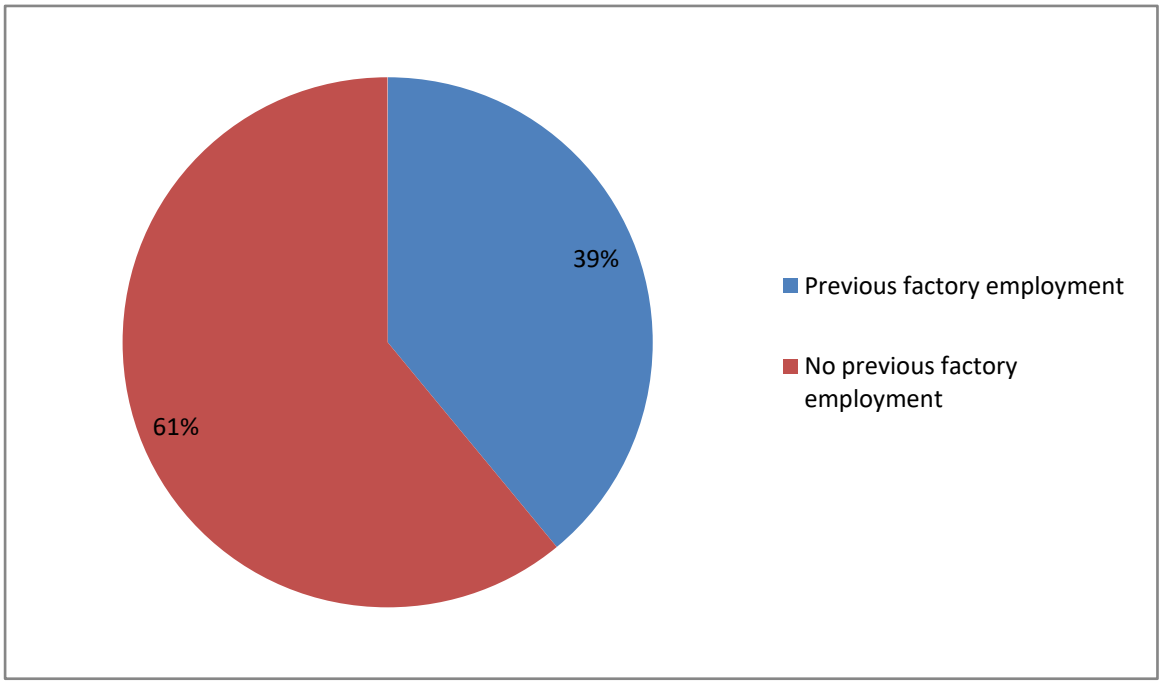

Figure 1: Previous factory employment among respondents .Out of 120 respondents 39% had previously worked in a factory before their present employment 1% had not.

Table 3: Respondents duration of employment in present factory

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Number of years	Frequency	Percentage(%)
<1	4	3.2
1-5	49	40.8
6-10	36	30.0
11-15	30	25.0
>15	1	0.8
Total	120	100.0

Of the 120 respondents 40.8% worked for 1-5yrs, 30% had worked for 6-11yrs, 25% had worked for 2-15 years, 3-2% had worked for less than 1yr and only 0.8% had worked for more than 15yrs.

Table 4: Number of work hours per day

Work hours	Frequency	Percentage (%)
<5hrs	4	3.3
5-8hrs	86	71.7
9-12hrs	30	25.0

Most of the factory workers worked between 5 and 8hours daily(71.8%), 25% worked 9 -12 hours daily, while 3.3% worked for less than 5hours.

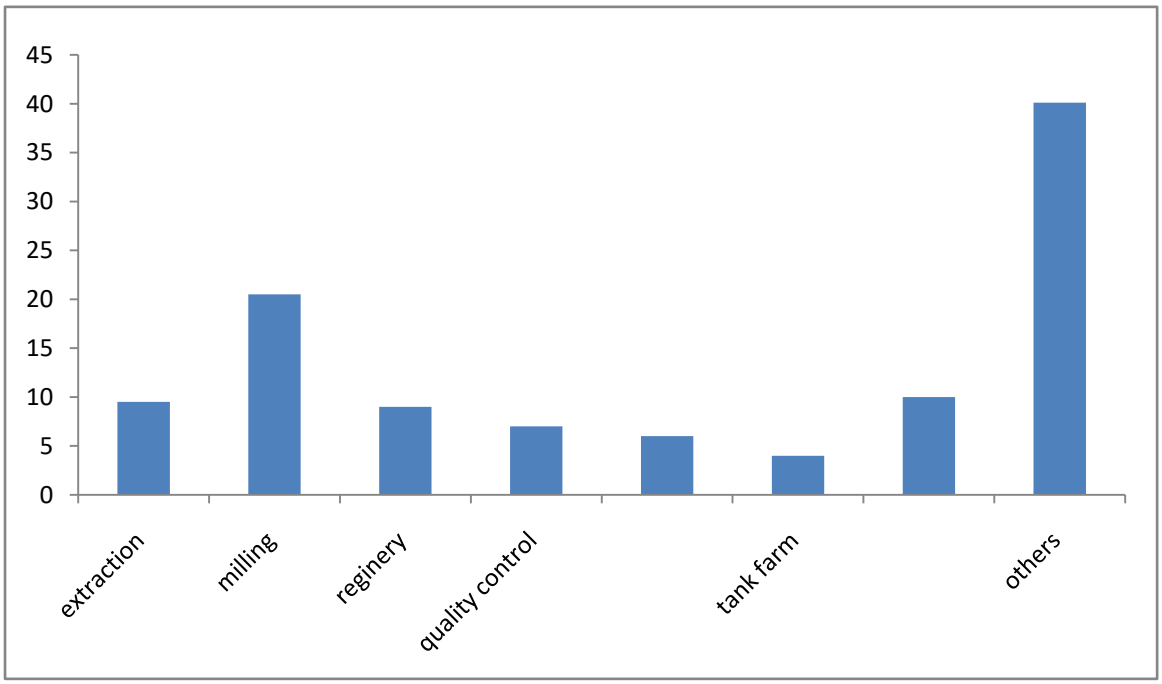

Figure 2: Various segments of production where respondents work

Only 1.7% of the respondents worked in the tank farm,8.3% worked in extraction plant,9.2% in the refinery,20.8% in milling plant,45.8% worked with other segments not highlighted like the boiler section, store e.t.c.

Specific duty in factory

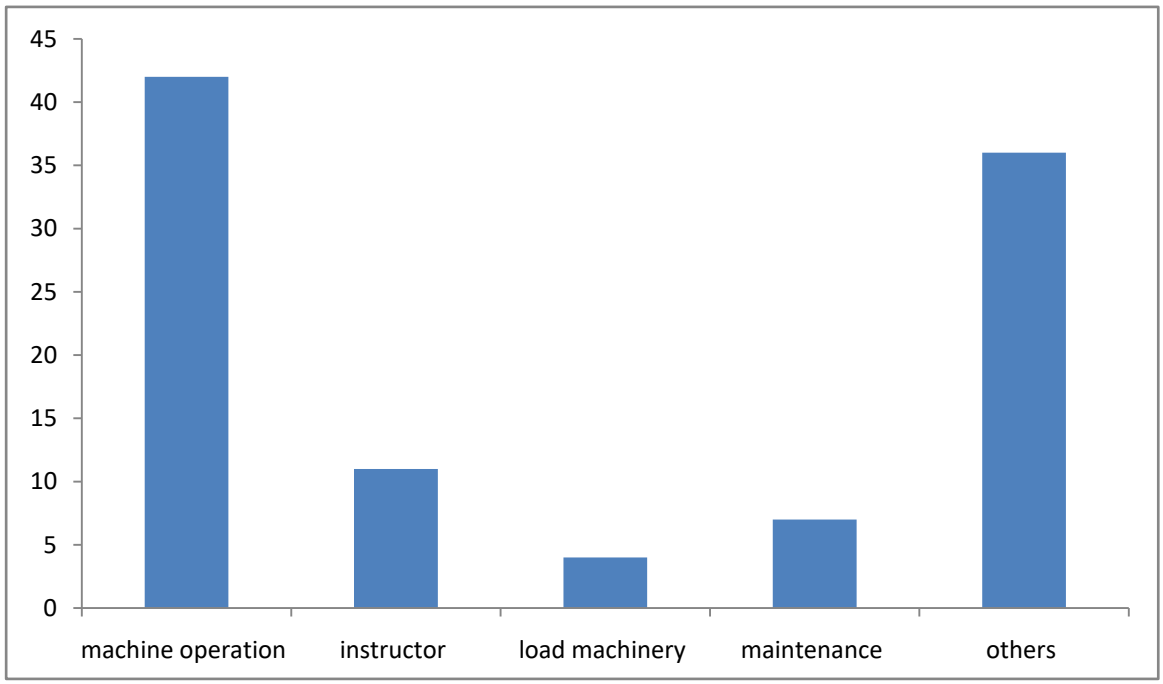

Figure 3: Specific duty assigned to respondents in the factory

Majority of the respondents were responsible for machine operations(75%), 35% were involved with other responsibilities, 11.7% were instructors, 7.5% were responsible for maintenance of machineries while 4.2% loaded machineries.

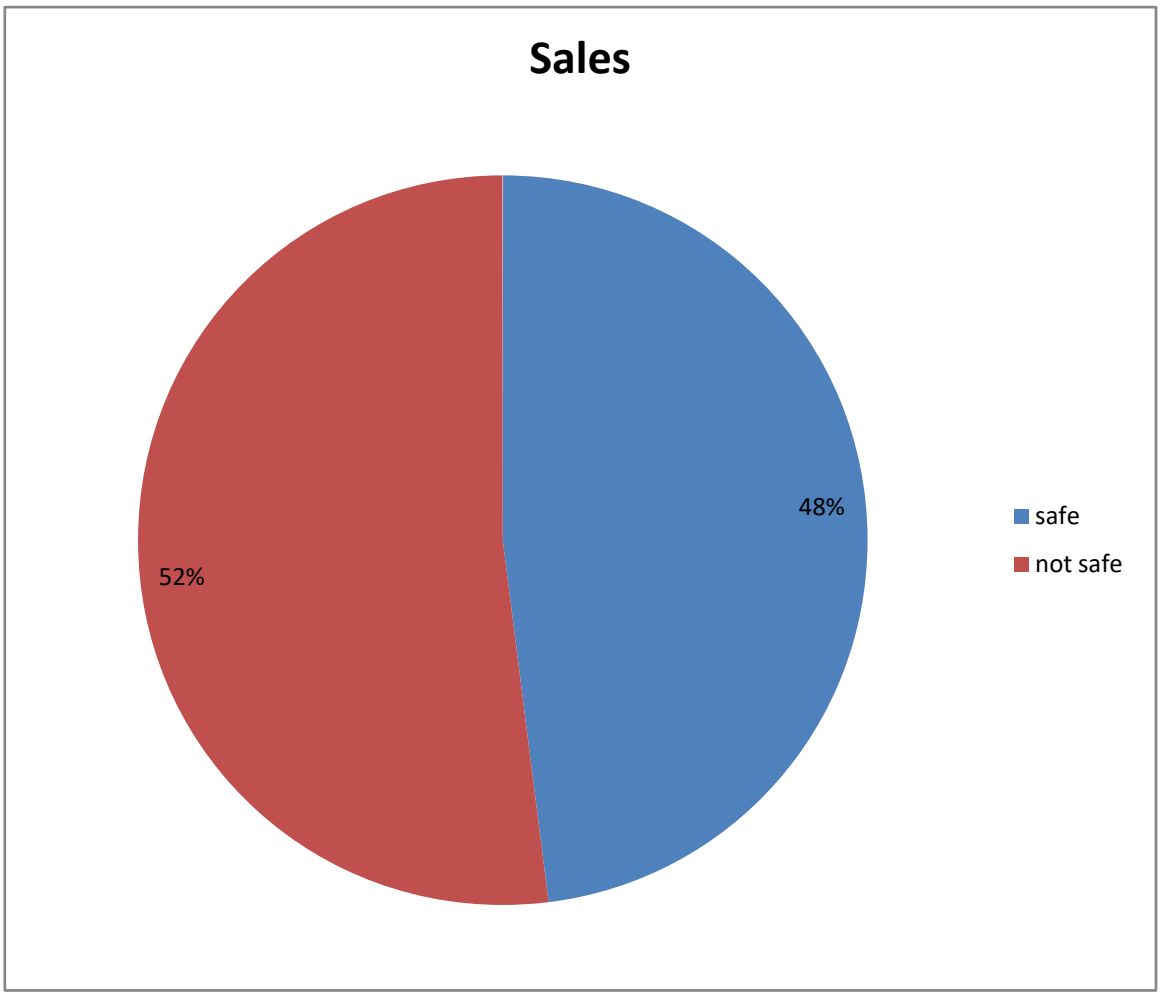

Figure 4: Respondents views on their job safety.

Half of the respondents said their job was unsafe(52%), only 48% thought their job was safe.

Table 5: Reasons given by respondents who said job was unsafe

Reasons	Frequency	Proportion (%)
Had an injury in the past	15	24.6
A fellow worker had been injured	5	8.2
Several risky procedures	39	63.9
Not healthy since I started work	1	1.6
Others	1	1.6
Total	61	100.0

Of the 61 respondents who said their job was unsafe, 63.93% thought so because of the several risky procedures they were exposed to at work. Another 24.59% had an injury in the past. 1.64% of the respondents gave other reasons for their assertion

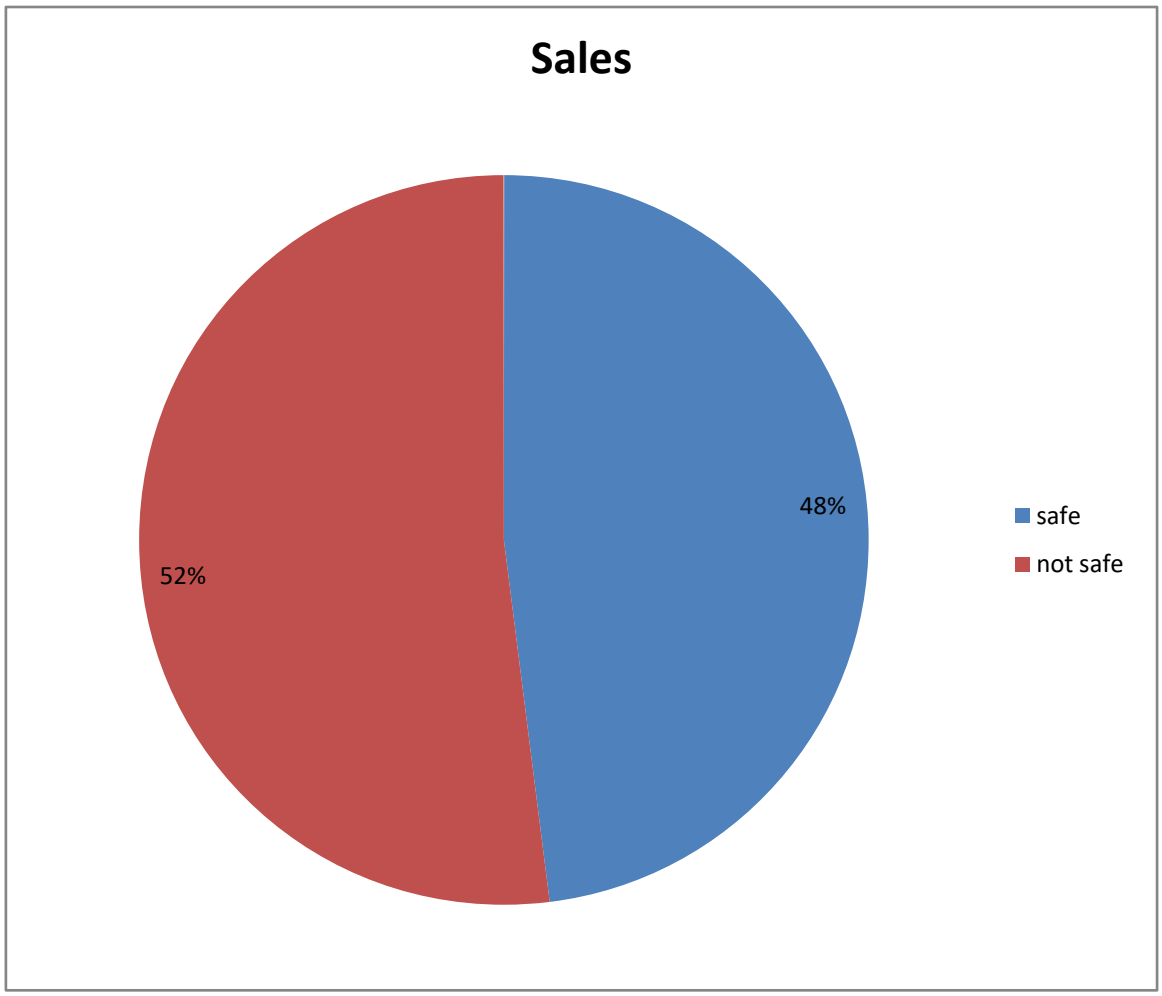

Figure 5: workplace injuries as experienced by respondents

Those who ever had any form of workplace injury at the factory accounted for 42%, however 58% had never experienced any form of injury.

Table 6: Types of workplace injuries experienced by respondents

Workplace injury	Frequency	Percentage(%)
Hand injury	37	67.3
Eye injury	3	5.5
Fall from height	8	14.6
Vehicle accident	2	3.6
Facial injury	2	3.6
others	3	5.4
Total	55	100.0

The most common workplace injury among the 55 respondents was hand injury accounting for 67.27%.,14.55% had fallen from heights, eye injury accounted for 5.45%, other types of injury 5.36% ,vehicle accident and facial injury each had 3.64%

Table 7: Payment of compensation to respondents who ever sustained injuries.

Payment of Compensation	Frequency	Percentage
Paid	8	12.5
No paid	56	87.5
Total	64	100.0

Most of the 64 respondents who had injuries were not paid any compensation(87.5%), only 12.5% received compensation.

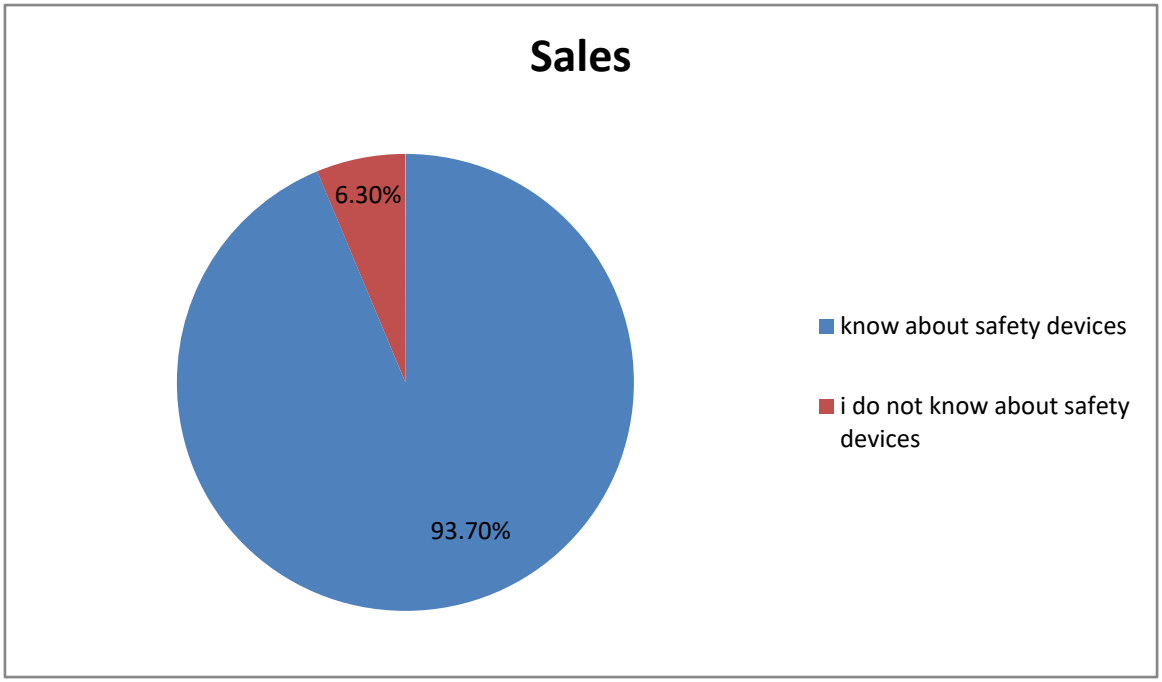

Figure 5: Awareness of respondents on safety protective devices

Majority of the 120 respondents were aware of at least one safety device that can be used in a factory(93.7%), only 6.6% did not know about safety devices.

Table 8: Specific protective devices that respondents were aware of

Safety devices known	Frequency	Percentage(%)
Eye goggle	66	55.0
Hand/finger gloves	76	63.0
Face mask	55	45.8
Safetyhelmet	60	50.0
Overall	74	61.7
Earplug	54	45.0
Safetybelt	41	34.2
Others	42	35.0

Hand gloves was the device most known among the 120 respondents(61.7%), 55% were aware of eye goggles, 50% of safety helmet, the least known device was safety belt.

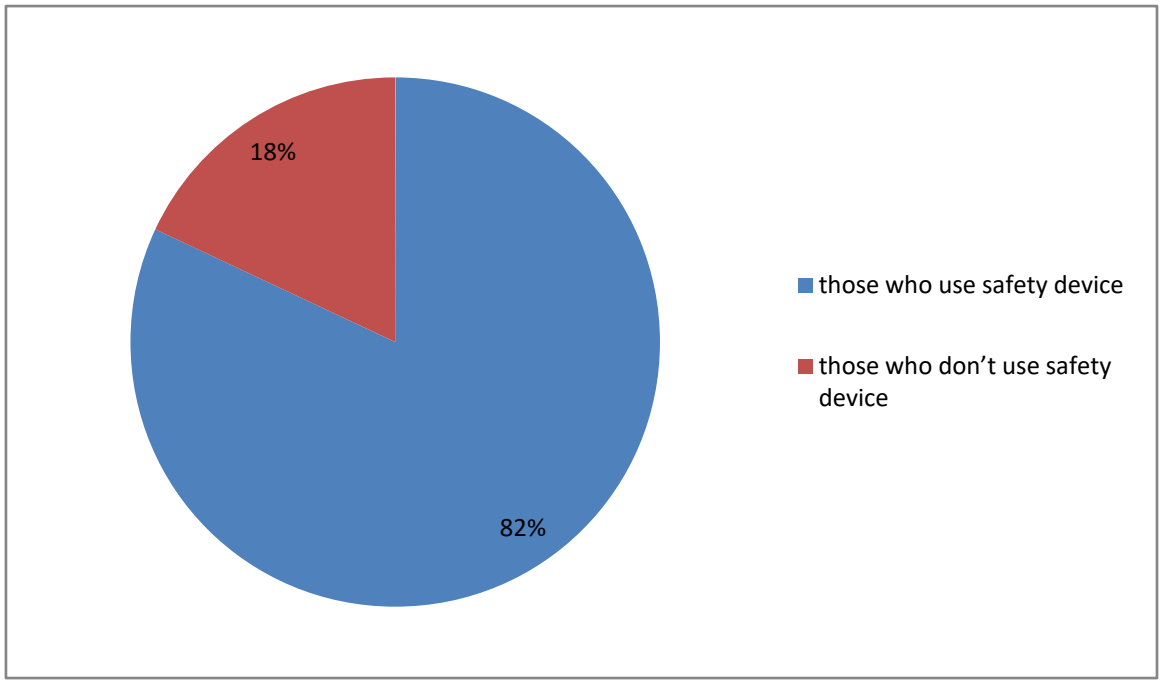

Figure 6: Utilization of safety protective devices among respondents

Majority of the respondents had used atleast one form of protective device (81.8%), 18.33% never used a protective device.

Table 9: Distribution of safety protective devices used among respondents.(n= 116)

Protective devices used by respondents	Frequency	Percentage (%)
Eye Goggles	27	23.3
Hand/finger gloves	41	35.3
Facemask	19	16.4
Safety helmet	20	17.2
Overall	57	49.1
Ear plug	16	13.8
Safety belt	9	7.8
Others	23	19.8

Overalls were the most frequently used safety protective device amounting to 49.14% of the 116 who responded to this question. The least used device was safety belt(7.76%).

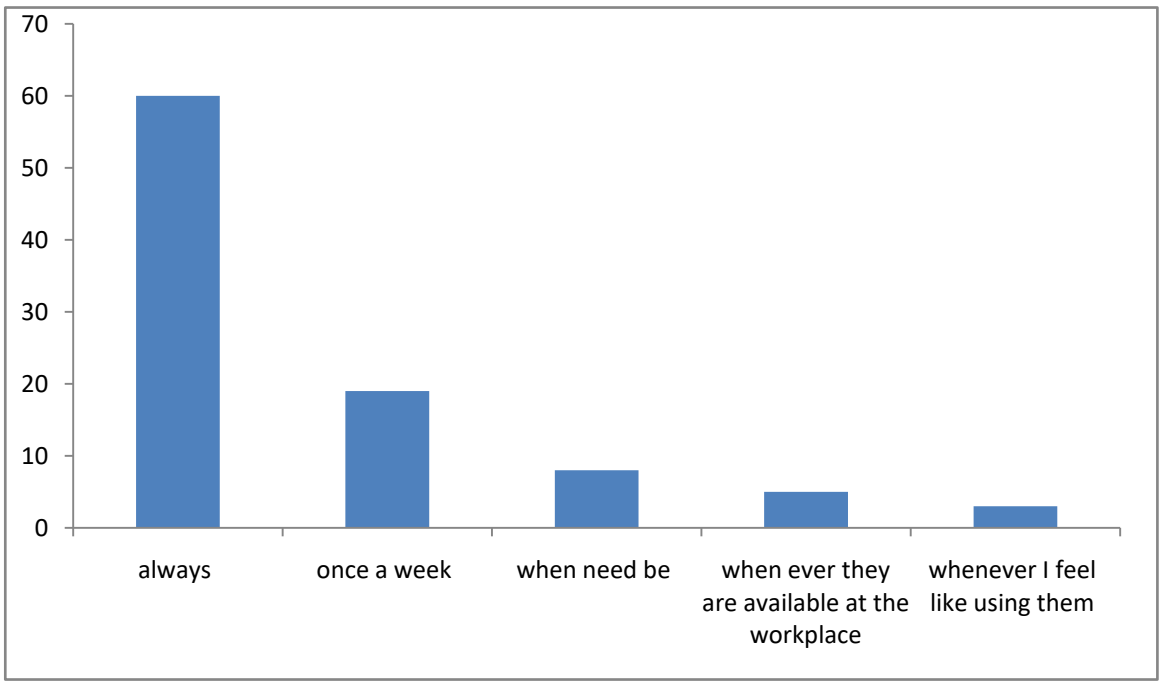

Figure 7: Frequency of utilization of safety protective devices by respondent

Of the 116 respondents, 69.6% of the respondents used the devices frequently.

Table 10: Respondents reasons for not using safety protective devices(n=21)

Reasons for not using safety devices	Frequency	Percentage (%)
Am very careful at work	3	14.3
I do not have resources to buy them	2	9.5
They are not available	12	57.1
I don't enjoy using them	3	14.3
Others	1	4.8
Total	21	100.0

Of the 21 respondents who did not use any safety protective devices 57.14% of them said it was due to the non-availability of the devices. 14.29% said they were careful at work and did not need the devices.

Table 11: Distribution of symptoms as experienced currently by respondents

Symptoms	Frequency	Percentage (%)
Cough	20	16.7
Body pains	4	3.3
Finger/joint problems	6	5.0
Body pains	39	32.5
Hearing problems	4	3.3
Headache	12	10.0
Skin problems	5	4.2
Others	2	1.7

The most common symptom experienced currently by respondents was body pains (32.5%), another commonly encountered symptom was cough (16.7%), 10% of them had headache, very few had other symptoms as highlighted above.

Table 12: Duration of symptoms as experienced by respondents

Symptom duration(years)	Frequency	Percentage (%)
<1	26	46.4
1-2	12	21.4
3-4	6	10.7
5-6	4	7.1
7-8	3	5.4
9-10	4	7.1
>10	1	1.8
Total	56	100.0

Of the 56 that hadsymptoms, majority had the symptoms for lessthan a year(46.43%), 21.43% of them had the symptoms for 1-2yrs.

Table 13: Distribution of symptoms in the last 3months.

Symptoms	Frequency	Percentage (%)
Cough	10	8.3
Breathing problems	2	1.7
Finger/jointpains	1	0.8
Bodypains	24	20.0
Hearing problems	2	1.7
Headache	8	0.8
Skin problems	1	0.8

Of the 45 respondents who had symptoms in the last 3months, 20% of them had body pains, breathing problems and hearing problems accounted for 1.7% each, other symptoms accounted for 0.8% each.

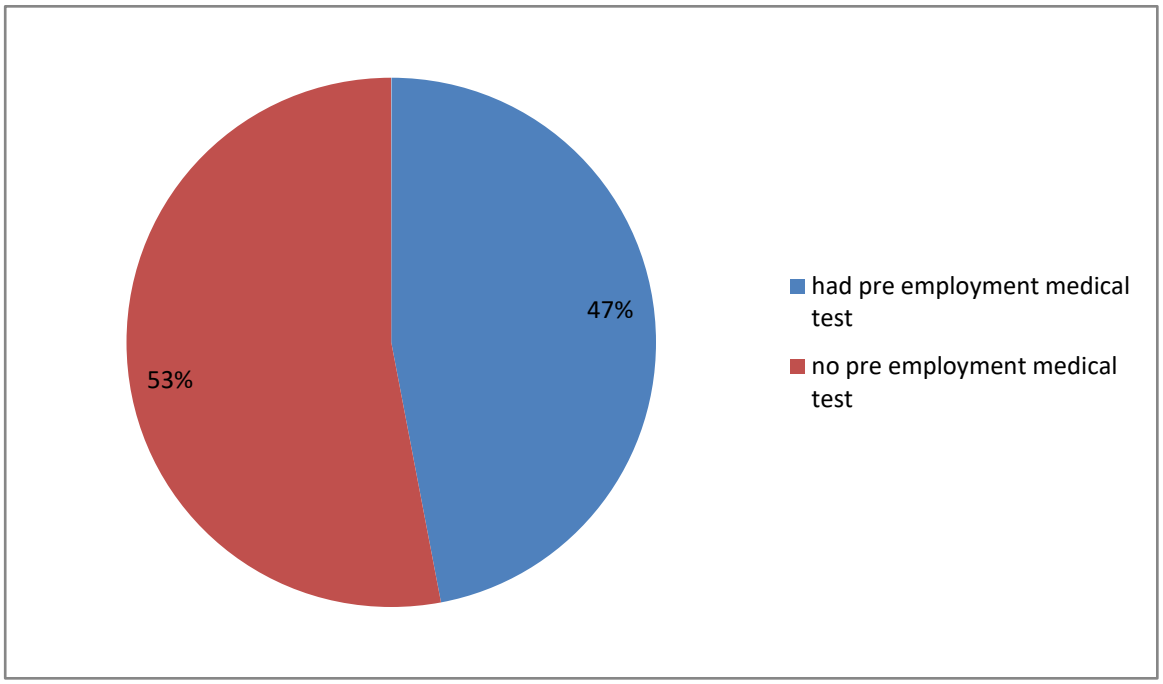

Figure 8: Respondents who had pre-employment medical examination

Of the 120 respondents47.5% had pre-employment medical examination before commencing work at the factory, 52.5% did not.

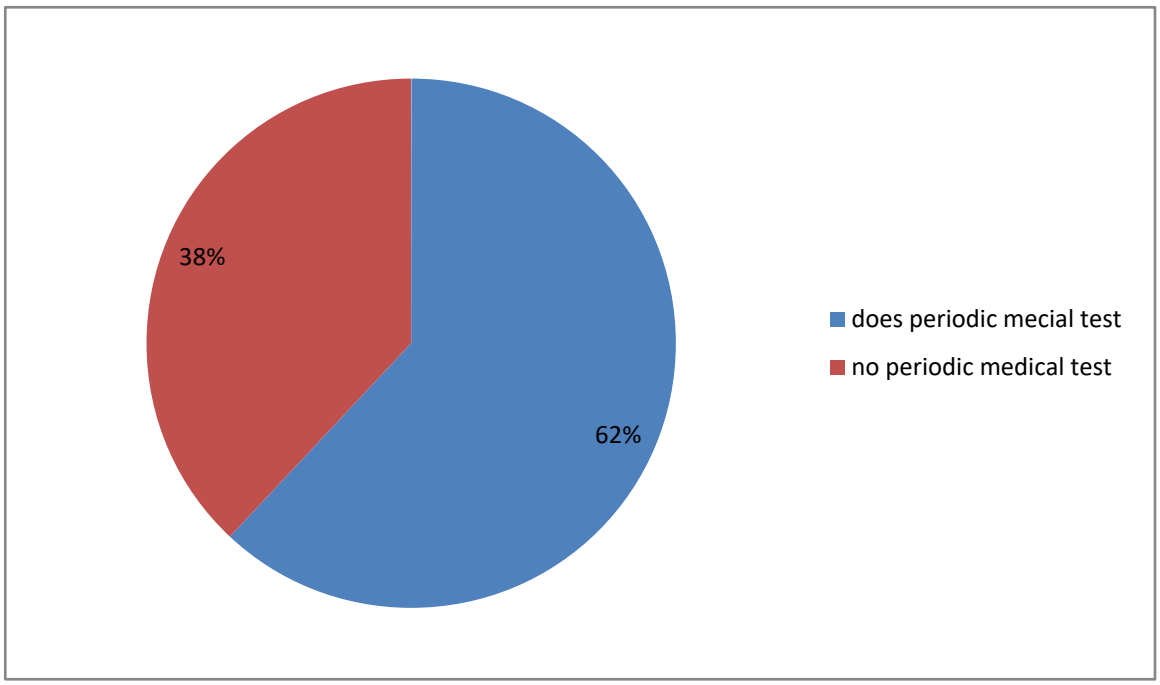

Figure 9: Distribution of respondents who undergo periodic medical examination

Most of the respondents underwent periodic medical examination (62%), only 38% did not.

Table 14: Relationship between nature of employment & workplace injury

Nature of employment	Previous workplace injury		Total
	Yes	no	
Permanent	18	34	52
Temporary	33	35	68
total	51	69	120

X-2.834 df= 2 p= 0.242

The table above shows more work place injuries among the temporary staff and less injuries among the permanent staff. However, the relationship between nature of employment and workplace injuries was not statistically significant.

Table 15: Relationship between nature of employment & use of safety protective devices

Nature of employment	Use of safety protective devices		Total
	Yes	No	
Permanent	47	5	52
Temporary	51	17	68
Total	98	22	120

X-4.721 df= 2 p= 0.094

From table above the use of protective devices was higher among temporary staff but the relationship between nature of employmentand useof safety devices was not statistically significant.

Table 16: Relationship between specific factory duty & work place injury

Specific factory duty	Had workplace injury		Total
	Yes	No	
Machine operation	23	27	50
Instructor	6	8	14
Load machinery	5	0	5
Maintenance	4	5	9
Others	13	29	42
Total	51	69	120

X-9.322 df= 4 p= 0.054

From the table, machine operators had the highest number of injuries, those responsible for maintenance had the least injuries. Furthermore, the relationship between specific role in factory and occurrence of injuries was not statistically significant.

V. Discussion

a) Sociodemographic characteristics

Majority of the factory workers were male(97.5%).This finding was similar to that by Tam etal where 87% of the workforce was male.[10] This pattern of distribution can be attributed to the nature of the core business activity of the company which involved a lot of physical exertion.

Factory workers aged 25-44years accounted for 75% of the respondents.The mean age was 35.03 years with a standard deviation of +/- 8.72.This finding differs from a similar study by lyiade etal which reported a mean age of 39years.[21] This finding further buttresses the fact that physically able individuals were employed due to the nature of operation of the industry. It therefore suggests that majority of the factory workers were young on the job with minimal work experience making them more vulnerable to workplace hazards. The married accounted for 65.8%and 34.2% were single, suggesting that most of the factory workers had families they had to cater for using the resources they earnedfrom their jobs. This factor may influence how much of their income will be available to take care of their own personal health. This finding is similar to that of a study by Samuel etal which found that 80% of the respondents were married and 20% were single. [22]

Most of the respondents (97.5%) had formal education of which 51.5% had tertiary education, 0.8% had adult literacy and only 2 workers had no form of education.This is similar to the study by Shobowole et al (60.7% for tertiary education,17.8% for secondary

education,7.5% for primary education and 14% no formal education).[12]

Half (50%) of the respondents lived outside Dakace; 20% had their accommodation around the factory ,16.7% lived 2-5km away from the factory and 13.3% lived beyond 5km from the factory which predisposed them to stress sincethey have to travel a long distance daily to reach their place of work.

b) Awareness and compliance to use of safety protective devices

The duration of employment of 40.8% of the respondents in their current employment ranged from 1-5 years, 30% had worked for 6-10years as opposed to73% reported by Shobowole etal.[2] Those who had worked for 10-15years accounted for 25% with 93.3% working for 6 - 7 days in a week and 95% working for 8 - 12 hours per day.This is consistent with results of studies by Tarn and colleague in which 73.3% worked for 6days.[10]Lakhwinder etal reported that 85% worked for more than 5hours. Long work-hours meant long exposure timeto occupational hazards at the workplace.[23]It should be noted that with the largely informal nature of the Nigerian economy, many people work in cottage and small-scale industries such as dyeing and pesticide making. In these industries, workers are exposed to hazards for long hours and the exposure dose is largely unregulated as the primary gain is financial.[24]

A work profile of continual stress each day for the workers may over time lead to job dissatisfaction, reduced performance and increased psychosomatic disorders such as peptic ulcer disease, headache, and hypertension. Further heightening risk for workplace injuries. This is the hypothesis of the Job-Demand Control Model postulated by Karasek, which states that employees working in high strain or stressful jobs will have an increased risk of developing high blood pressure, reduced job satisfaction and ill health over time.[25]

Since only 41% of the respondents were involved in machine operation, indicating that a lot of manual work went on in the factory. Manual work had a higher demand on the workers compared to mechanized work, as the former required more energy input and time. Only 68.3% of the respondents worked at night, of whom 62.7% worked for 8-12hours per night. This finding differs from the report of the study in Northern Nigeria by Aliyu andcolleague, which stated that none of the quarries operated night shift.[7] They were more at risk of health hazards because they had a longer time of exposure to risk factors for ill health.

A little over half of the respondents (51.67%) thought their work was not safe. The reasons given were because they had an injury in the past (12.5%), a fellow worker had been injured in the past (5%), there were several risky procedures (32%).However,48.33% of all the respondents thought the work was safe.

The respondents who had workplace injury accounted for 42.5% less than 68.9% reported by Shobowole etal .[12] Of the 42.5% who ever had injuries; 67.27% had hand injury,14.55% had fall from height, 5.4% eye injury, with no respondent having loss of limb which differs from results of similar studies by Sabitu etal in which 85.5% had experienced one form of occupational injury or the other, of which 38% had hand/finger injuries,17% eye injury.[13]In another study by lyiade etal, the most common injury reported was eye injury accounting for 45.9%.[21] In yet another study by Samuel etal , 80% had hand injuries,75% backpain,55% knee injury.[22] Only 12.5% of the respondents who experienced injury were paid some form of compensation by their employer at the time of injury.

Only 65% of all the respondents, attested to the presence of a mechanism put in place by their employers to cater for their health. The mechanism was the use of First Aid box. Similar to a study by Aliyu and colleague, all the quarry sites had First Aid facilities to treat minor on-site injuries before referral for proper medical attention.[7]

Only 47.5% of all the respondents underwent any pre-employment or pre-placement medical examinations, while 62,5% of them underwent periodical medical fitness examination which contrasted findings by Tarn et al who reported 74.6% respondents had regular medical checkups.[10]

Less than half (41.7%) of the respondents were solely responsible for paying their medical bills when ill or injured, while 45% had their medical bills catered for solely by their employer, 11.7% respondents contributed to benefits from employers.

Only 10.8% of the respondents attested to currently being on medications. Antacids and Antihypertensive were the drugs taken by those that had been diagnosed to have peptic ulcer disease and hypertension respectively.

Majority (93.4%) of the respondents were aware of safety protective devices that could be used in a factory,only 6.6% were not aware of such devices. The study by Aliyu and colleague showed that 64.9% of the workers were aware of the need for them to use safety devices and also to institute safety/preventive measures at the worksite. The devices these respondents were aware of (in decreasing order of frequency) included eye goggles (55%), hand/finger gloves (63%), face masks (45.8%), safety helmet (50%), ear plugs (54%), safety seat belts in vehicles (34.2%), overalls (61.7%).This contrastedstudies by Shobowole etal in which the most known equipment was eye goggles (79.7%). [1]

Majority (81.8%) of the respondents used at least one safety protective device at work. Most other studies reported varying figures such as 34.2% by

Sabitu etal.[13] The safety protective devices most commonly used by these respondents were overall (49.14), hand/finger gloves (35.34%) and eye goggles (23.28.%); others include face masks (16.38%), safety helmets 17.24%), ear plugs (13.79%) and safety seat belts in vehicles (7.56%). The study by Ogbogu etal showed that among the workers involved 0% used eye goggles, 5.9% attempted covering their nostrils, while 12.3% used overalls.[26] In contrast, Lakhwinder and colleagues reported 41% for use of gloves,35% for use of goggles,25% nose mask,17% for ear plugs.[23]About 71% of these respondents used the devices always, which showed that there was a high level of compliance with the use of the safety protective devices among the respondents who used them.

Only 18.33% of all the respondents did not use safety protective devices at work. More than half (57%) of them said the reason for non-use was non-availability. 9.52% of the respondents said they did not have the resources to buy the devices, 4.55% said they did not enjoy using the devices. Other reasons given for not using the devices included the claim that they were very careful at work (14.29%). In a similar study by Lakhwinder etal, the workers said their non-utilization of the safety devices was for the following reasons; did not feel comfortable(40%),management did not provide the devices(25%),30% admitted to negligence, 10% were not use to wearing it.[23]These reasons reflect their relatively poor knowledge, attitude and practice of safety at work.

About 35% of the respondents had worked in a factory before their present employment, of whom (47%) had less than 5 years' previous job experience. Inadequate experience on the job suggested inadequate awareness of job requirements as well as occupational hazards.

c) Clinical history

The most common symptoms complained of by the respondents with symptoms were body pains (32.5%), cough (16.7%), headache (10%), finger/ jointpain(5%). Only 4.2% of them complained of skin problems & 3.3% complained of breathing problems and hearing problems. This finding differs from a similar study by Marc who reported 60.5% of respondents had skinproblems, 32% back pain, 63.2% chestpain.[17]

Most (47%) of the respondents that complained of symptoms had been having such symptoms for less than two years. Just a little less than half of them (29%) had received some treatment or had commenced treatment for their symptoms.

The chronic medical conditions found were hypertension, peptic ulcer disease, asthma, affecting 5% ,4.2 %, 3.3 % of the respondents respectively. Only 3 individuals had HIV,and 1 person had tuberculosis. These co-morbid conditions could affect the performance of the factory worker as the factory job required physical exertion day. Furthermore, such individuals pose a medical risk to co-workers at the work place.

d) Psychosocial history

Majority (92.5%) of the respondents attested to being usually stressed up at or after work. This has a risk of increased susceptibility to occupational hazards since fatigue, stress and anxiety may contribute to human error and could predispose workers to occupational hazards, as reported by Victory and colleague.[27] When stressed up most of the respondents feel tired (78%) and weak (10%), while some others have headaches (8.3%). To relieve their stress, majority of the respondents resorted to rest (85%), alcohol (5%). Other stress-relieving methods used included cigarette smoking(2.5%), sexual activity (1.7%). Drug and alcohol abuse has been a difficult issue to deal with, but policies and procedures are now in place in most large establishments.[19]

With regard to disability, WHO found that back pain accounts for the largest portion of non-fatal conditions: 37 percent of all back pain worldwide is attributable to work.[1] Most industries operate 24 hours per day, 7 days per week, so shift work is essential, where this is not effective, fatigue in relation to shift work, sleep deficits, have been shown to cause impairments of cognitive and motor performance.[18]

In a study by Jae et al on work related sleep problems among Korean workers, the overall prevalence was 5.1% and was linked to a variety of occupational health issues.[28]

Most of the 64 respondents who had injuries were not paid any compensation (87.5%), only 12.5% received compensation. Workers in developing countries increasingly find themselves in insecure, poor quality jobs, sometimes involving technologies which are obsolete or banned in industrialized countries.[1]Worse still is the fact that the welfare of the worker is often not of primary interest to the management of industries and explains why very little or no compensation is given when work place injuries occur. This problem is heightened by the fact that litigation in such countries is not common place and there are no compelling economic incentives on employers as labor is plentiful, its replacement cost is low, and a high portion of the real cost of injury and illness will not be borne by the employer as such employers care less on controlling risks for injury or illness on the job.[1]

Only 15% of the respondents had an extramarital sexual partner, relevant because of the risk of transmission of sexually transmitted infections (STI), Hepatitis and the Human Immunodeficiency Virus (HIV) as reported in a study by Weeks.[29] Remote locations are common for citing industries as a result employees are separated from their families and communities during

work periods.[18]This is usually more likely in workers who live far away from the quarry and have to travel a long distance to come to work or among quarry workers who live together in isolated locations.[29]

The relationship between nature of employment and workplace injuries was not statistically significant. So also the relationship between nature of employment and use ofprotective devices.

In like manner the relationship between level of education and use of safety protective devices was not statistically significant similar to what obtained in a study by Onajole and colleagues on safety measures in an Aluminium company. [20]

VI. Conclusion

Workers are exposed to multiple hazards during the course of their work and majority of them are aware of these hazards which they learnt mainly on the job and did not receive any training in that regard.The awareness of these hazards was not commensurate with the use of personal protective devices. They also had several health problems and a pattern of injury that involved the hands, legs, eyes and face in most cases. The study highlighted some of the injuries and health hazards the workers were exposed to, and indeed the impact of such hazards on the well-being and performance of the workers. Furthermore, the study revealed that majority of the workers who suffered injuries were not compensated.

Most work-related hazards could be avoided, prevented, or reduced through education public enlightenment, compliance to work ethics, legislation enforcing provision and use of protective devices.[12]Protection of the worker through the provision of personal protective devices also goes a long way in reducing the exposure of the workers.

VII. Recommendations

Based on the findings of this study, the following recommendations were proffered:

Proper Training and Re-training of factory Workers to improve their Skill at Work:

It has been recommended that no one should work in a factory unless they are competent or they are under the supervision of a competent person, using a definition based on knowledge, experience, training and other qualities related to the job they are to do.[24]

Occupational Health Education for both Workers and their Employers: Occupational safety as well as occupational health hazards to which workers are exposed to should be explained to both workers and employers by occupational specialist.

Provision of Safety Protective Devices for Workers by the Employers:

The employers should see it as their responsibility to provide safety protective devices for each worker under their employment. The devices provided should be suited to the role of each worker.

Use of a Health and Safety Document in the factory:

A Health and Safety Document is recommended to be used in the factory. The employer must ensure that no work is carried out at the factory unless a Health and Safety document has been prepared to demonstrate that risks have been assessed and control measures identified, put in place, followed and reviewed.[24]

Safety and Warning Signs in the factory:

Safety and warning signs that are boldly displayed and easily seen should be placed at strategic points in the factory by the employer so as to remind the workers about safety measures and precautions to take while at the site.

Regular Breaks and Recreational Facilities for factory Workers:

It is necessary for the employer to include in the daily work schedule at the factory a period for break so as to allow the workers to rest, relax and relieve stress. This will also help to reduce exposure time to the health hazards.

Pre-employment and Periodic Medical Examination:

Pre-employment and periodic medical examination should be a rule. This can be provided at the employer's expense in collaboration with an occupational health specialist or a hospital or clinic that signs an agreement with the employer for this purpose.[24]

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