

## AN INVESTIGATION INTO THE PERSONAL PROTECTIVE EQUIPMENT USED BY CONSTRUCTION WORKERS IN NORTHERN NIGERIA

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### ABSTRACT

This study was carried at a construction company in Northern Nigeria to investigate the use of personal protective equipment by construction workers. One hundred and twenty workers were interviewed with the use of questionnaires. Results obtained revealed that 45.8% of the workers wore face masks, 15.8% wore aprons, 15% wore hand gloves, 9.2% wore goggles, 7% wore helmets, 5.8% wore safety belts and 5% wore safety shoes. All the workers reported that they have been injured at some point during their work. While 55.8% reported minor injuries, 19.2% reported severe injuries. Provision of adequate protective equipment for workers by construction companies and the strict use of these equipment by workers is recommended to reduce injuries at work sites.

**Keywords:** Personal protective equipment, injury, safety, accident, hazard

### INTRODUCTION

Personal protective equipment (PPE) refers to protective clothing, helmets, goggles, or other garments or equipment designed to protect the wearer's body from injury or harm<sup>1</sup>. The purpose of personal protective equipment is to reduce employee exposure to hazards when engineering and administrative controls are not feasible or effective to reduce these risks to acceptable levels. PPE is needed when there are hazards

present. PPE has the serious limitation that it does not eliminate the hazard at source and may result in employees being exposed to the hazard if the equipment fails<sup>2</sup>. The hazards addressed by protective equipment include physical, electrical, heat, chemicals, biohazards, and airborne particulate matter. Protective equipment may be worn for job-related occupational safety and health purposes, as well as for sports and other recreational activities. "Protective clothing" is applied to traditional categories of clothing, and "protective gear" applies to items such as pads, guards, shields, or masks, and others<sup>1</sup>. Practices of occupational safety and health can use hazard controls and interventions to mitigate workplace hazards, which pose a threat to the safety and quality of life of workers. Personal protective equipment can be categorized by the area of the body protected, by the types of hazard, and by the type of garment or accessory<sup>3</sup>.

Some personal protective equipment for protection against electric shock include<sup>1</sup>: insulating gloves, shoes and safety belt against fall. For protection of the face and eye: goggles, spectacles, shields, combination lenses, dust screen, head frame, lenses, wire mesh, hoods and helmets. For protection of arms, hand, fingers, foot and leg: shoes, guards, chaps, gloves band cuff, finger cots or stalls. For protection of the head: head safeguards, hard hats and protective caps. For protection of ears

against audible noise: ear plug, cushion and helmet. For protection of respiratory system: respirator, gas mask, airline helmet, hoods, hose blower, chemical cartridge and mechanical filter. For safety against falls: safety belt and for protection of the skin and body against fire: protective costumes.

In the construction industry in Nigeria, workers are exposed to various forms of hazards which include<sup>4</sup>: *Physical hazards* such as heat which can cause heat exhaustion, heat stroke, heat cramps, increased fatigue and thus enhance accident rate; *Mechanical hazards* which occur through appliances present in various forms in the work place such as machines, pointed objects, unprotected electrical cables, shape apparatus, welders' flash etc.; *Chemical hazards* may come in the form of vapor, gases, fumes, dust, and mist and when inhaled can cause serious health problems; *Biological Hazards* such as bacteria, fungi, viruses, and other parasites which the workers may come in contact with in the course of their work; *Occupational Accidents* such as falls from roof tops or cranes etc. The objective of this study is to determine the PPE used by construction workers in Northern Nigeria and the level of injuries sustained by these workers.

#### MATERIALS AND METHODS

This study was carried out at Haddock Quest Construction and Engineering Company located at Madobi, Kano state in Northern Nigeria. The company is involved in the construction and maintenance of roads and building of housing estates. The workers comprise of people from different parts of Nigeria and speak different languages such as Hausa, Igbo, Yoruba and other languages within the minority groups in the country. The study was a descriptive observational study. The simple random sampling technique was used to create a sample size of both males and females above 18 years. The workers were given questionnaires which they filled out and submitted. Data was computed and represented in tables.

#### RESULTS

A total 120 workers, 75 (62.6%) were males and 45 (37.4%) were females. A distribution of the PPE used by the workers is shown table 1. Face masks were the most commonly used PPE worn by 45.8% of the workers followed by aprons, 15.8%; hand gloves, 15%; goggles, 9.2%; helmets, 7%, safety belts, 5.8% and safety shoes, 5%. Table 2 shows the history of injury experienced by the workers. None of the workers reported that they have never been injured. 54.2% reported being injured between 1 and 5 times while 45.85 have been injured more than 5 times. When questioned on the level of their injuries, 55.8% reported minor injuries, 25% reported major injuries while 19.2% reported severe injuries.

#### DISCUSSION

Personal protective equipment are needed by construction workers to protect themselves from injuries. However, these devices do not provide 100% protection and as fatalities do occur despite wearing these devices. No protective device can protect a worker from instant death when he falls from a high building during construction work. A study<sup>5</sup> reported that a disproportionately high percentage (67%) of deaths from roof falls occurred in small construction establishments. Roofers, ironworkers, workers employed with roofing contractors, or working at residential construction sites, had a higher risk of roof fatalities. From table one, 45.8% of the workers wear face masks at the work site. This of course is due to the fact that a lot of their work has to do with construction of roads. Environmental pollutants in the air in the form of dusts, fumes from gases and chemicals used in construction work have harmful effects to the body when inhaled. Welch, *et al.*,<sup>6</sup> examined beryllium disease among construction workers and revealed that 2.2% of the workers showed an abnormal Beryllium test. This resulted from exposure, most likely during maintenance, repair, renovation, or demolition in facilities where beryllium was used. Respiratory

diseases from inhalation of asbestos and fumes were reported in another study<sup>7</sup>. Goggles, hand gloves, safety belts and other protective devices used by the workers prove useful in different areas of specialty. The electrician working on electricity cables need to protect himself while making the required electrical connections to install power to the infrastructure. Electrocutions however, do occur at the work sites especially when the workers do not have adequate protection. Falls can also occur when working on electric poles if safety belts are not properly worn. McCann, *et al.*,<sup>8</sup> examined the causes of electrical death and injury among construction workers and reported that contact with "live" electrical wiring, equipment, and light fixtures was the main cause of electrical deaths and injuries among electrical workers, followed by contact with overhead power lines. Glazner, *et al.*,<sup>9</sup> examined factors contributing to construction injury and analyzed over 4,000 injury reports. They reported that environmental factors, slip/trip injuries and building materials contributed to more than 40% of injuries to workers in carpentry, concrete construction, glass installation, and roofing.

All of the workers in this study reported that they have been injured at work at some point. Just above half (55.8%) reported their injuries to be minor. The degree of injuries sustained by the workers was however severe in 19.2% of the workers. Some of these injuries may lead to death either on the long run after months or years of medications like respiratory diseases or on the short term. Studies<sup>10,11</sup> have reported deaths at construction places resulting from crane platforms, boom-supported lifts, suspended scaffolds and electrocutions. Workers who have been disabled through injuries at the work place undergo rehabilitation to enable them live the rest of their life being productive. Some of these workers are not able to get another job due to their disability and they become a burden to their families who have to take care of them. Some construction workers retire early or change to another job which they

find much safer due to fear of injury. Welch, *et al.*,<sup>12</sup> reported that medical and musculoskeletal conditions are strongly associated with work limitation, missed work, and reduced physical functioning and these factors are also associated with premature departure from the workforce. Participation in the community level can be quite helpful in education and position workers to be aware of safety conditions and protective devices. Community participation is a viable tool by which construction workers can be well educated and enlightened on the various prevention and control measures to ensure that accidents and injuries at the work place is reduced to a barest minimum<sup>13</sup>. Construction companies should ensure that adequate protective equipment are provided for their workers and the workers are strongly advised to wear their personal protective equipment at work as this will greatly reduce injuries at work sites.

#### ACKNOWLEDGEMENT

The authors would like to thank the staff and management of Haddock Quest Engineering and Construction Company Limited for giving their full support and cooperation toward this research.

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**TABLES**

Table 1: Distribution of Personal Protective equipment (PPE) used by the workers

<b>PPE</b>	<b>Frequency</b>	<b>%</b>
Apron	19	15.8
Helmet	9	7.0
Hand glove	18	15.0
Goggles	11	9.2
Safety shoes	6	5.0
Facemask	55	45.8
Safety belts	7	5.8

Table 2: History of Injury experienced by workers

<b>Injury Exposure</b>	<b>Frequency</b>	<b>%</b>
Never Injured	0	0
Few (1-5 Times).	65	54.2
Above 5 Times	55	45.8
<b>Level of Injury</b>		
Minor	67	55.8
Major	30	25.0
Severe	23	19.2