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Awareness of Construction Workers on Occupational Hazards, Illness and Injuries Associated With Construction Industry in Mombasa County

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Abstract: *There are a variety of risks associated with working in a construction company that can pose dangerous health hazards to both the employer and the employees. Statistics on construction industry has shown increase in occupational hazards, illness and injuries in the world especially in developing countries. The aim of this study was to evaluate awareness of construction workers on occupational hazards, illness and injuries associated with construction industry in Mombasa County. The study employed a descriptive cross-sectional design. Purposive sampling method was used to select construction sites. The data was collected by questionnaires from 104 respondents giving a response rate of 100%. Majority of the respondents were male 85.6%. All (100%) the respondents in this study were very much aware of the existence of injuries and ailments associated with working in the construction sites. Chi square analysis showed that there was significant association [(χ^2=34.5, df=13, p=0.01) (p<0.05)] between awareness of the existence of injuries and ailments associated with working in the construction sites among the workers. Though all workers indicate having knowledge on various health risks at the construction site, little has been done to reduce the extent to which workers are exposed to these hazards. Constant awareness of all hazards, injuries and illness associated with constructions should be maintained. All sorts of injuries to workers should as much as possible should be minimized while on duties.*

Keywords: *Construction Sites, Occupational Hazards, Illness, Injuries, Health Risks, Accidents*

I. Introduction

The construction industry is one of the largest industries in any given society with many challenges of health and safety risks. Construction workers face these risks because of exposure throughout the building process (Kirenga, 2004). A report by World Health Organization (WHO, 2002) identifies the risks faced by workers in the construction industry, detailing the work related diseases and injuries which have been aggravated, accelerated or exacerbated by workplace exposure and which may impair working capacity. It also notes that construction workers are exposed to a wide variety of health hazards at work and these exposures differ from job to job and this hazards are classified into three classes; Chemical, physical and biological hazards. In Kenya, it is noted that construction workers have continued to suffer from injuries and illness due to work related exposures (Makhonge, 2005).Accidents are financially, physically and emotionally costly to individual workers, their families, their organizations and the nation as whole. These risks can be minimized by use of personal protective equipments if properly selected and worn by workers (Kirenga, 2004). Creating a safe and healthy workplace is therefore crucial hence occupational health and safety is important to everyone at workplace (Kirenga, 2004). Personal Protective Equipments (PPEs) plays a prominent role in ensuring overall health and safety on construction sites. PPEs includes the clothes offering protection against the weather which are intended to be worn or held against a person at work and which provides protection against risks to his health or safety (OSHA, 2007). According to annual report of Director of Occupational Safety and Health Services (DOSHS) report in Kenya (2009), the period between 2008 and 2009 recorded 3,099 accidents inclusive of fatality cases in the construction industry. This figure accounts only for the reported cases to the department hence does not give the real picture on the ground. In the recent past Kenya's construction workers lost their lives and suffered severe injuries (DOSHS, 2009). This study therefore aimed at evaluating awareness of construction workers on occupational hazards, illness and injuries associated with construction industry in Mombasa County.

II. Materials And Methods

2.0 Study Design

A cross-sectional study design was utilized in this study.

1.1 Study Site

The study was conducted in Mombasa County located in the coastal area of Kenya at construction sites registered by the Directorate of Occupational Health and Safety Services. The study targeted employees working on permanent, temporary and casual basis.

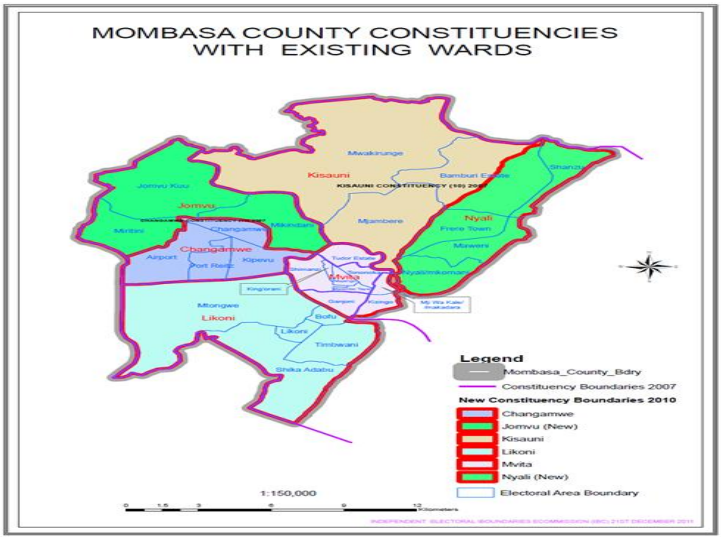

Figure 1: A Map of Mombasa County

3.0 **Sample size determination**

A sample size of 104 participants was obtained using Krejcie and Morgan (1970) formulae.

$s = X^2NP(1-P) \div d^2(N-1) + X^2P(1-P)$……equation 1

2.2. Sampling Methods

Purposive sampling methods was used to select 26 construction sites that were registered by DOSHS and thereafter convenient sampling methods was used to select 13 construction sites. Within each construction site, simple random sampling method was used to choose 8 individuals per site. Random numbers were generated and those choosing odd numbers and meeting inclusion criteria were included in the study.

2.3 **Research Permission and Ethical Considerations**

The permission for conducting this survey was obtained from the Institute for Energy and Environmental Technology of Jomo Kenyatta University of Agriculture and Technology. Consent of the respondents was sought and an assurance of confidentiality affirmed. All the questionnaires and the interview forms that were used in data collection were placed under lock and key.

III. Data Analaysis

All data forms were scrutinized for logical inconsistencies; skip patterns and missing values. The data was coded and double entered into a relational database on Microsoft Access. The percentages and their 95% confidence intervals (CIs) were presented. The data was analyzed using the statistical package for social scientist (SPSS) version 20. The results were presented in form of frequency tables, pie charts and bar graphs.

IV. Results And Discussions

4.0. Response rate

The study targeted a sample size of 104(100%) workers in 13(100%) selected construction sites in Mombasa County. A sample is a smaller group or sub-group obtained from the accessible population (Mugenda and Mugenda, 1999). This subgroup is carefully selected so as to be representative of the whole population with the relevant characteristics. The 13 construction sites were sampled to represent all registered construction sites in Mombasa County. Each member or case in the sample is referred to as subject, respondent or interviewees according to Ogula (2005). In research, sample size is normally directly proportional to the population of interest. The different sample from different construction sites in this study was a representative of the population of workers in each particular construction site. All the respondents filled in and returned the

questionnaires giving a response rate of 100%. Response rate was excellent and the respondents were willing to participate in the study. Babbie (2007) suggests that in research a response rate of at least 50% is considered adequate for analysis and reporting; a response of 60% is good; a response of 70% is very good; a response of 80% and above is excellent". According to Mugenda and Mugenda (1999) a response rate of 50% is adequate for analysis and reporting while 100% response rate is excellent.

4.1. Participant's Gender

Majority of the respondents were male [89 (85.6%)] while female were very few [15(14.4%)] in this study (Figure 1). Most often than not, work in construction sites require strength and masculinity that's why it attracts more males than females as seen in this study. Hard work with high occupational risk is always done by men according to ILO (2007) and WHO (2010). The results on gender concur with a similar study by Acharya (2014) on Utilization Pattern of Personal Protective Equipment among Industrial Workers of Nepal, majority of the respondents were male (68.4%). Kimeto (2014) in his study on safety provision among tea factory workers reported that male workers in the factories were high (75.0%) compared to their female counterparts (25.0%).

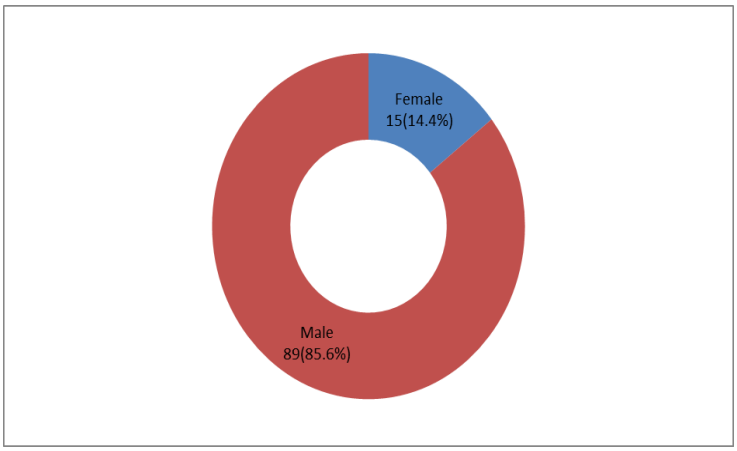

Figure 2: Gender of the construction workers (participants)

4.2. Participants' Age

According to this study, 2(11.7%) respondents were aged between 18-20 years old, 18(17.5%) were between 21-25 years old, 20(19.4%) were aged between 26-30 years old, 19(18.4%) were aged between 31-35 years old, 22(21.4%) were aged between 36-40 years old, 11(10.7%) were aged between 41-45 years old and 1(1%) was over 46 years old. Only one participant did not know his/ her age or was not sure since it was not indicated in the questionnaire (Figure 2). The results on age of participants concurs with a similar study by Khairuzzaman et al., (2014) who found workers age ranging being between 25 and 60 years with a majority being in the age group of 30–40 years.

Most of the employees (50.5%) were in the age group 31-45 years old and are considered to be middle age, age group 18-30 are considered to be young generation while 46 years and above are considered to be old age since working in construction site require a lot of energy according to (ILO, 2007). In this study construction work attracted middle age people because of the need to feed their families. Age group 18-30 normally takes their time in searching for white color jobs and takes up construction work when they realize that other jobs are not forthcoming as observed by this study. According to a similar study by Guidotti, (2011), young workers tend to feel immune to hazards and do not take PPE usage seriously while older workers feel that they are used to certain types of equipments and that they have experience to work safely despite the hazards involved.Acharya (2014) in a similar study in Nepal also found that majority of the construction workers were in age group 30-40 years and were more likely to use PPE compared to others.

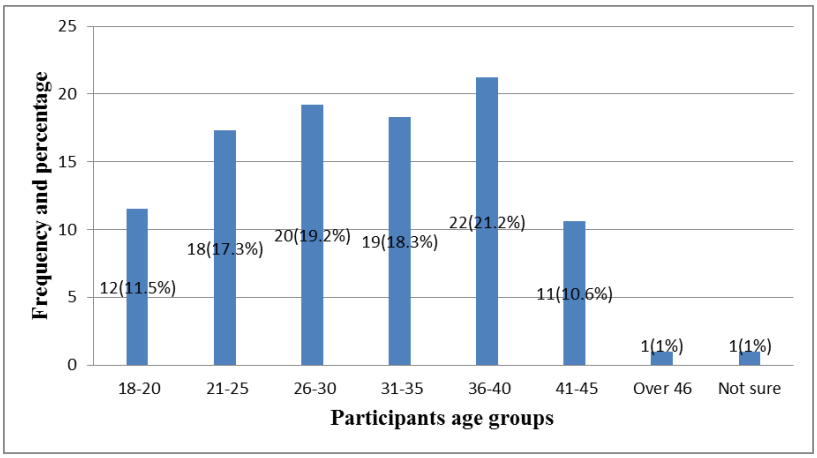

Figure 3**: Age groups of the participants**

4.3. Educational level of the participants

The results showed that 10(9.6%) workers had no formal education, 34(32.7%) had up to primary school level of education, 45(43.3%) had up to secondary school level of education, 11(10.6%) had other forms of tertiary college education and the remaining 4(3.8%) had university level of education (Figure 3). Majority (57.7%) of the respondents were literate with above secondary school level of education. Very few were illiterate (9.6%) and semi literate (32.7%), respectively. In normal circumstances people seeking employment in the industries have low level of education because work in the construction industries does not require a lot of skills. A similar study by Acharya (2014) on PPE utilization among construction workers also found that majority of the respondents (87.1%) in his study were literate hence concurs with results of this study. A similar study by Khairuzzaman et al., (2014) found that the level of education achieved by his participants was comparatively low hence does not concurs with the results of this study in terms of educational level.

Education and experience is considered a human resource asset in any given organization. Training on PPE utilization are mostly conducted in English hence most workers were able to benefit from these training due to their literacy level. The proportion of workers with above high school level of education who use PPE was not significantly different from the proportion of workers with high school and below, that use PPE. This is contray to the general expection whereby workers who are relatively knowledgeble are expected to embrace the work safety measures than the rest of the workers. Studies of Karwowski and Marras (2010), acknowledges that education of both workers and foremen in the construction industry is key in informing and training the construction crew of the necessary equipments, in addition this help in selecting competent workforce, the views are equally shared by Reese and Eidson (2006) in their study on occupational safety of construction workers in relation to their educational level.

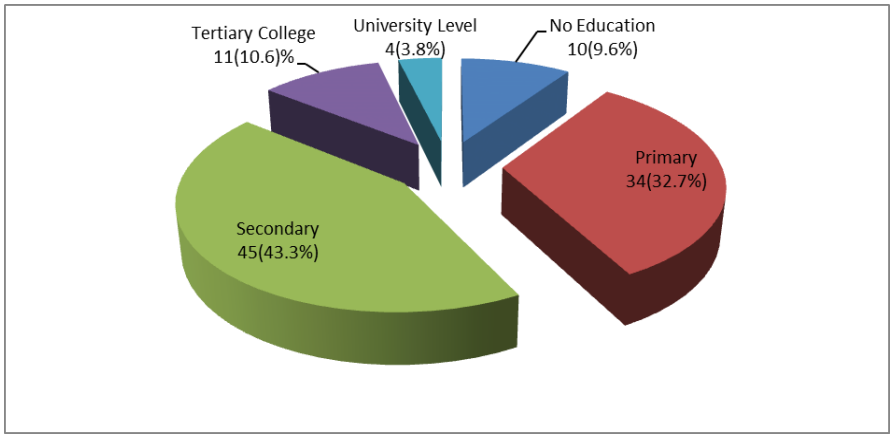

Figure 4: Respondents educational level

4.4. Working years' experience

The results showed that, 48(46.2%) participants had worked between 0-5 years, 34(32.7%) had worked between 6-10 years, 15(14.4%) had worked between 11-15 years, 5(4.8%) had worked between 16-20 years while 2(1.9%) had worked for over 25 years. Majority (78.9%) of the participants had work experience of 10 years and below (Figure 4). These few who had worked for over 25 years can be considered as

career/professional construction workers. Normally due to hazards associated with construction work, an employee does not work for long according to ILO, (2007).

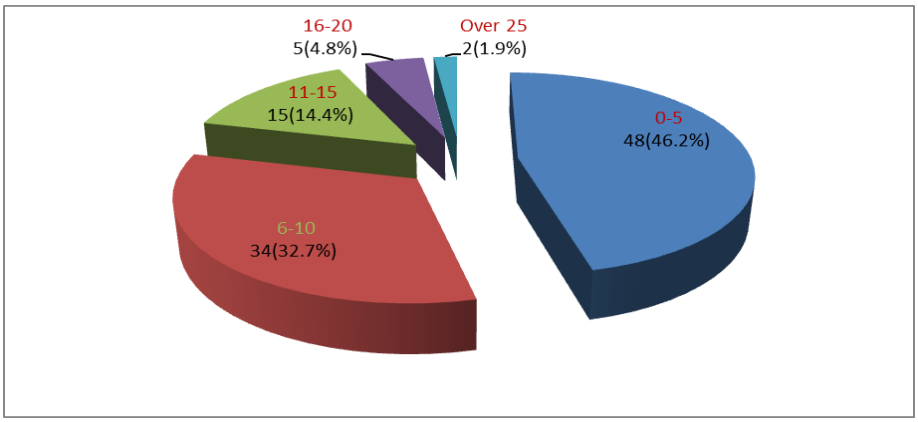

Figure 4: Number of work experience in years by contruction workers

4.5. Nature of employment

The finding of this study showed that the respondents were employed as casuals, temporary or permanent. In total 7(6.8%) participants were employed permanently in their respective sites, 38(36.9%) were working on temporary basis while the remaining 58(56.3%) were working on casual basis (Figure 5). Only one person did not respond (not sure). The term of employment in construction sites is temporary because the term of engagement between the contractors and the owner of the construction is temporary. Contractors, managers and foremen are sometimes engaged permanently by construction industry. For occupational health and safety issues in terms of training and implementation, workers employed permanently are better placed. According to WHO (2007) and ILO (2007) all employees regardless of their terms of employment must be trained on occupational health and safety including PPE utilization.

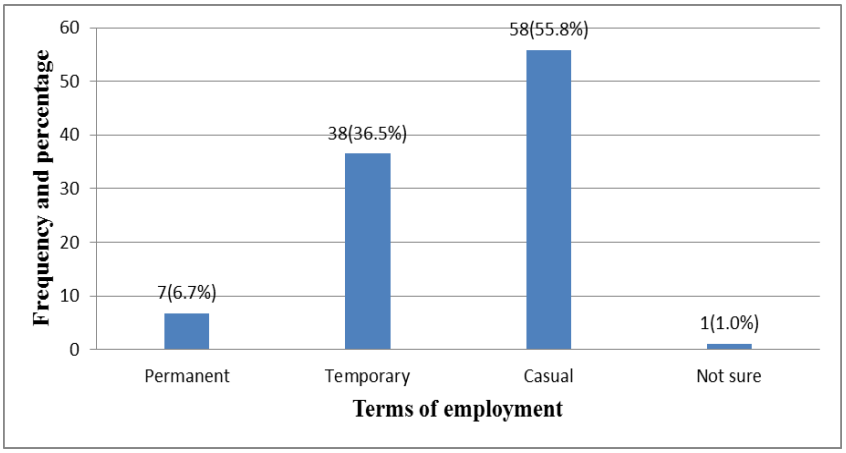

Figure 5: Workers terms of employment

4.6. Awareness of construction workers on injuries and ailments

All [104(100%)] the respondents in these study were very much aware of the existence of injuries and ailments associated with working in the construction sites. Workers could be aware of the hazards associated with their work but they cannot do anything to reduce the hazards because it is the responsibility of the occupier to provide a safe working environment to the employees. Muchemedzi and Charamba (2006) noted in his study that accidents result from unsafe conditions, equipment or materials in the work environment. A similar study conducted among cement workers in United Arab Emirates by Ahmed and Smith (2010), showed that only 52.9 % of the workers knew the hazards other than the dust that were associated with their work.

From all the construction sites under investigation, 42(46.2%) of the participants had injuries, 11(12.1%) had fallen from abnormally high heights, 12(13.2%) had muscular back/ neck pain, 3(3.3%) had hearing impairment, 21(23.1%) had chest problem while the remaining 2(2.2%) had dermatitis problems (Table 4.4)

Working in construction sites is a risk factor for illness/injuries since occupational safety and health are compromised sometime if not always. Majority (88.5%) of the participants had suffered from either injuries or illness or both in their respective construction sites. These imply that all the construction sites investigated had almost equal characteristics in terms of occupational safety of the workers. Acharya (2014) in a similar study reported almost similar results regarding the prevalence of injuries/ailments among construction site workers. In his study, out of 187 respondents, 60(32.1%) workers had faced health problems or hazards while working in the industry (Table 1). Most of the workers suffered from accidents/injuries followed by muscolo-skeletal problems. Studies of Aguwa (2013) on workplace personal protective equipments also reported similar results on the type of injuries/ailments experienced by industrial workers. A similar study in a developing country (Nepal) showed that there were high industrial hazards due to low use of PPE. Improper utilization of PPE in the workplace has lead to various health hazards according to studies of Acharya (2014). Similarly the current study reported similar occupational hazards experienced by the construction workers.

The workers in the construction industries must be made aware of the WIBA Act of 2007 because the study found out that the prevalence of accidents were too high. The Work Injury Benefits Act, 2007 was enacted to provide for compensation to employees for work-related injuries and diseases contracted in the course of their employment. It requires that employers obtain and maintain insurance in respect of liabilities incurred under the Act (WIBA, 2007).

Table1: Injuries/illness experienced by the Participants

Site code	Injury- n (%)	Fall from heights	Muscular pain-back/ neck	Hearing Impairment	Chest Problem	Dermatitis
001	3 (42.9)	2 (28.6)	0 (0.0)	1 (14.3)	1 (14.3)	0 (0.0)
002	4 (57.1)	1 (14.3)	1 (14.3)	0 (0.0)	0 (0.0)	1 (14.3)
003	2 (28.6)	2 (28.6)	0 (0.0)	1 (14.3)	2 (28.6)	0 (0.0)
004	4 (50.0)	2 (25.0)	0 (0.0)	0 (0.0)	2 (25.0)	0 (0.0)
005	1 (14.3)	0 (0.0)	1 (14.3)	0 (0.0)	5 (71.4)	0 (0.0)
006	5 (62.5)	0 (0.0)	0 (0.0)	0 (0.0)	3 (37.5)	0 (0.0)
007	4 (66.7)	0 (0.0)	1 (16.7)	0 (0.0)	1 (16.7)	0 (0.0)
008	5 (71.4)	0 (0.0)	0 (0.0)	0 (0.0)	1 (14.3)	1 (14.3)
009	1 (12.5)	0 (0.0)	5 (62.5)	1 (12.5)	1 (12.5)	0 (0.0)
010	2 (28.6)	2 (28.6)	1 (14.3)	0 (0.0)	2 (28.6)	0 (0.0)
011	4 (57.1)	0 (0.0)	2 (28.6)	0 (0.0)	1 (14.3)	0 (0.0)
012	3 (42.9)	2 (28.6)	1 (14.3)	0 (0.0)	1 (14.3)	0 (0.0)
013	4 (80.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (20.0)	0 (0.0)

Key: Frequency-n, Percentage (%)

In total 12(11.5%) participants in this study had never suffered any illness or injuries in the course of their duties while 92(88.5%) had suffered from either injuries or illness or both in their respective construction sites (Figure 7). The respondent confirmed (100%) that they were aware of the risks, hazards, illness and injuries associated with construction work.

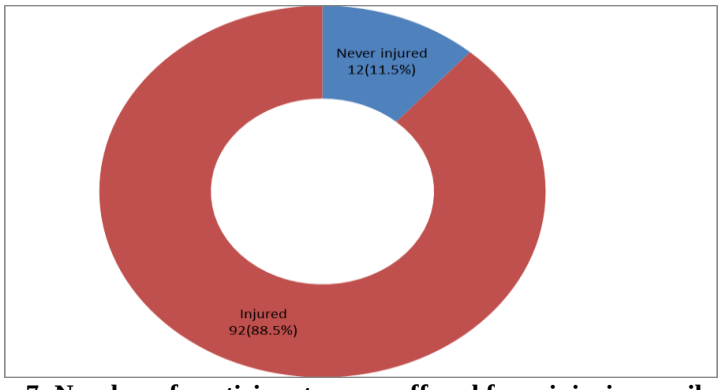

Figure7: Number of participants ever suffered from injuries or ailments

4.7 Hazard awareness by the workers as per the checklist

An observational checklist was used to collect data that could not be gathered using questionnaires. The checklist showed that all the construction sites [12(92.3%)] had fumes hazard except site 001 [1(7.7%)]. All the construction sites [13(100%)] in this study had dust hazards, radiation hazards and excessive noise hazard.

Majority of the construction sites [12(92.3%)] had falling debris hazard while one [1(7.7%)] did not experience falling debris hazards.

Fumes and dust are associated with chest pain and respiratory infections reported by the workers in this study. All the construction sites in this study had dust hazards, radiation hazards and excessive noise hazard. Fire was also recognized as a hazard in the construction sites according to the checklist. Electricity used for welding and fire which is used to burn rubbish and debris in the construction sites were recognized has fire hazards. Only five (001, 003, 005, 012 and 013) construction sites were free from fire hazards in this study.
Only one construction site [1(7.7%)] did not experience vibration hazard while the rest [12(92.3%)] had vibration hazard. Construction site 001 did not experienced heat hazards while the rest [12(92.3%)] experienced heat hazard. Only construction site 013 did not experienced manual handling hazards of loads while majority [12(92.3%)] experienced manual handling of loads hazard.

Accidents are caused by unsafe acts or practices (the human element that results from poor attitudes, physical conditions and lack of knowledge or skills to enable one to work safely) as explained by (Muchemedzi et al., 2012) in a similar study. According to Frank bird accident ratio study in 1969, 88% of accidents are caused by unsafe acts of persons, 10% are caused by unsafe mechanical or physical conditions and the remaining 2% are unpreventable. Muchemedzi and Charamba (2006) established that the majority of accidents (98%) do not just happen, instead; people who perform unsafe acts and create unsafe conditions cause them and therefore accidents are preventable. When accidents are prevented injuries/illness are also gotten ride off. Use of PPE can protect a worker from potential injuries/ illness as a result of accidents.

4.8. Awareness of construction workers on occupational hazards

There was a significant association (χ^2=34.5, df=13, p=0.01) between awareness of the existence of injuries and ailments associated with working in the construction sites and PPE utilization among the construction workers. Some workers were not utilizing them (PPE) due to some challenges. Some were not provided with PPE by the management of the construction sites. A similar study by Tylor, (2011)in UK showed that some construction workers continue to have a rather low utilization of protective clothing, despite the fact that they were very much aware of the association between PPE utilization and associated injuries/ailments. The results of another study by Cong, (2008) which was carried out on knowledge attitude and practice on PPEs to rattan craftsmen in trade village in Vietnam showed that majority of the workers had low knowledge on PPEs and also the usage was low. There was no significant association (χ^2=20.5, df=13, p=0.37) between not having fume hazard and any particular construction site except site 001 ($p \geq 0.05$). Again there was no significant association between (χ^2=20.5, df=13, p=0.37) not experiencing vibration hazards and any particular construction site ($p>0.05$) except construction site 012.

In this study the prevalence of injuries remains high although there was no significant association (χ^2=19.8, df=13, p=0.10) between the type of injuries/ailments and any particular construction site under investigation. Again there was no significant association (χ^2=20.5, df=13, p=0.37) between not experiencing falling debris has hazard and any of the construction site in this study except site 013. Analysis revealed that there was no significant association (χ^2=20.5, df=13, p=0.37) between experiencing fire hazards and any particular construction sites in this study. In Kenya according to Kirenga, (2004), workers especially those working at construction industry are ignorant and have low awareness on prevention measures which involves utilization of PPE in injury prevention in building construction industry especially of falling debris and manual handling of loads. In this study there was no significant association (χ^2=20.5, df=13, p=0.37) between experiencing manual handling of loads hazards and any particular construction site except construction site 013. There is was no significant association between their knowledge of use of PPE and awareness of these hazards among the workers according to Kirenga (2004). In this study all (100%) the participants were aware of all these hazards in their respective construction sites (Table 2).

Table 2: Chi square analysis

Variables analyzed by chi square test	χ^2	df	p-value
Awareness of the existence of injuries/ailments and PPE utilization	34.5	13	0.01
Type of injuries/ailments and any particular construction	19.8	13	0.10
Having fumes vs. Construction sites	20.5	13	0.37
Falling debris has hazard vs. not experiencing falling debris has hazard	20.5	13	0.37
Fire hazards vs. Construction sites	20.5	13	0.37
Vibration hazards vs. Construction sites	20.5	13	0.37
Manual handling of loads vs. Construction sites	20.5	13	0.37
Not using PPE vs. Construction site	5.5	13	0.30
PPE matching the hazards vs. Construction sites	5.5	13	0.30
PPE maintenance vs. Construction sites	5.5	13	0.30
Securing construction site vs. Construction site	5.5	13	0.30

V. Conclusion

In this study majority (85.6%) participants were males compared to their female counterparts. More than 70% of the workers had between primary and secondary school level of education.Most workers with secondary school level of education were aged between 36-40 years old. There was no significant association ($p = 0.50$) between the highest education level attained by the workers and PPE utilization at 95% ($p \leq 0.05$) confidence interval in this study.

All workers were aware of all hazards, injuries and illness associated with constructions work. More than 80% of the workers had suffered illness or injuries in the course of their duties. The prevalence of injuries remain high although there was no significant association ($p = 0.10$) between the type of injuries/ailments and any particular construction sites under investigation. The null hypothesis which states that there is no relationship between utilization of PPEs by construction workers and reduction of injuries and illness associated with construction work is rejected in favor of the alternative hypothesis.

VI. Recommendation

Constant awareness of all hazards, injuries and illness associated with constructions should be maintained. All sorts of injuries to workers should as much as possible should be minimized while on duties.

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