



## **Perception of Sawmill Workers towards Occupational Health and Safety at Linden/Soesdyke Highway, Guyana**

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### **Authors' contributions**

*This work was carried out in collaboration among all authors. Authors SZ, CB and RK designed the study. Author RK performed the statistical analysis and wrote the protocol. Author SZ wrote the first draft of the manuscript. Author RK managed the analyses of the study. Authors SZ and CB managed the literature searches. All authors read and approved the final manuscript.*

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### **ABSTRACT**

**Aims:** Occupational Safety and Health (OSH) is very important for sawmills just like any other occupation. Therefore, this study aims to assess the measures taken by sawmills to ensure safety is maintained at the workplace and to assess the level of knowledge, attitude and practice (KAP) exhibited by woodworkers.

**Methodology:** Using observation checklists and questionnaires, a cross-sectional survey design was used for the study. A total of 8 sawmills located on the Linden/Soesdyke Highway and 84 woodworkers were included in the study. Descriptive statistics were used to present the results. Analysis was done in SPSS software.

**Results and Discussion:** A total of 37.5% of sawmill workers scored above average. Workers showed inadequate knowledge, negative attitude and poor practice towards OSH as the overall mean scores for these were found to be 71%, 71.5% and 61.4% respectively. These were below the cut-off level (75%). There was a significant linear correlation between knowledge, attitude and practice.

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**Conclusion:** It was concluded that employers need to put extra effort in providing workers with safety education and personal protective equipment's (PPE). Education programs and training sessions need to be put in place as adequate knowledge results in positive attitude which results in good practice.

*Keywords: KAP; occupational health; sawmill; Guyana.*

## 1. INTRODUCTION

For centuries the importance of Occupational safety and health (OSH) has been realised since human occupations consist of a variety of hazards in one way or another. The health and well-being of workers are vital to ensure sustainable social and economic development on a global, national and local levels.

Issues concerning with occupational health and safety have gradually been increasing in types and magnitude and have resulted in serious diseases due to exposure to several risk factors [1]. According to the World Health Organization (WHO) [2], 120 million occupational accident injuries with 200,000 occupational fatalities along with 68-157 million cases of occupational disease occur globally each year. It has been noted that the small-scale enterprises have more OSH issues than large-scale enterprises as their number of fatal accidents and serious injuries are twice that compared to the large workplace. The numbers aforementioned may result in 5% loss of the world's Gross Domestic Production (GDP) [3].

Guyana is the first International Labor Organization (ILO) Caribbean member state to have introduced completely new health and safety legislation drafted along the lines of the Caribbean community (CARICOM) model which is the Occupational Safety and Health (OSH) Act No. 32 of 1997 [4]. In Guyana, the forestry sector is important for the country's national development as 75% of the country is covered with forests [5]. It contributes 4% to the country's GDP [6] and a section of the Guyana Forestry Commission (GFC) Code of Practice addresses occupational safety and health in the forestry sector to ensure the compliance of the Act in this sector [7]. The Code of Practice for Forest Operations mentions that forest employees do not comply with safety measures and the Act as there is not enough training done and also, workers do not approach their tasks with a risk taking attitude [6]. Sawmills in Guyana are no exception to the OSH issues faced by sawmills

around the world and the GFC has noted that this is because of the level of knowledge and attitude of woodworkers [6], hence it is important to analyze KAP of the workers regarding OSH.

## 2. MATERIALS AND METHODS

Cross-sectional research design was applied to this study to assess the Knowledge, Attitude and Compliance with OSH among woodworkers of the Linden/Soesdyke Highway, Guyana in April, 2016.

### 2.1 Study Population and Sample

The target population consisted of all woodworkers from the sawmills located on the Linden/Soesdyke Highway. The researcher was given a list of the sawmills found on the Linden/Soesdyke Highway and the production capacity of each sawmill by the GFC. The study area had a total of ten sawmills with one hundred and twenty-eight woodworkers (128). However, only eight (8) sawmills with eighty-four (84) woodworkers gave the permission for the study. The researchers were not informed the reason behind the denial from the two sawmill.

### 2.2 Research Instruments

The instruments used in the study for the primary data collection included questionnaires and observation checklists.

### 2.3 Questionnaires

The questionnaire was designed by the researcher based on the criteria for OSH in the Occupational Safety and Health Act, 1997, GFC Code of Practice for Forest Operation [6], GFC Code of Practice for Wood Processing Facilities (2012) and based on questions asked in the previous study done by Mitchual, et al. [8,9]. OSH is defined as "the science of the anticipation, recognition, evaluation and control of hazards arising in or from the workplace that could impair the health and well-being of workers, taking into account the possible impact

on surrounding communities and the general environment".

GFC code includes safety measure that should be taken in a sawmill for employers and the woodworkers. This further includes the Environmental Protection Act No.11 of 1996 which is solid waste management.

## 2.4 Pilot Study

A pilot study was conducted on April 1, 2016 where eleven (11) questionnaires were administered at a sawmill out of the selected sawmills. This was done to improve the questionnaire and test its validity. Also, it was done to ensure that all relevant questions were asked and that the woodworkers were able to understand the questions.

## 2.5 Analysis of Data

Data entry and analysis was done using the statistical software Social Package for Social Scientists (SPSS) version 20 and Microsoft Office. Descriptive statistics was used to present the results. Frequency and percentage (%) were used to represent categorical data. Based on the previous study done by Rus, et al. [10], a cut-off level of  $\leq 75\%$  was considered to be inadequate knowledge, negative attitude and poor practice. The mean  $\pm$  Standard deviation (SD) of the KAP scores and the scores of the checklists were calculated. The checklists were assessed by comparing each score obtained by the sawmills to 50% which was calculated to be the mean percent, in order to determine whether the sawmills were above or below average when it comes to putting control measures in place that are required by sawmills in Guyana so as to reduce and prevent hazards and accidents.

Inferential Statistics (T-test, Mann-Whitney and Kruskal Wallis tests,  $p \leq 0.05$ ) were used to assess the significance among study variables. Spearman's rank correlation coefficient was used to evaluate the association between the KAP.

Respondents were assured about the confidentiality of their responses. No names of sawmills or participants were collected during the study. They were also assured of their right to withdraw from the study at any time. Oral consent was given by the sawmill employers for the study to be conducted at their establishment and by the woodworkers. The study was approved by University of Guyana.

## 3. RESULTS

### 3.1 Socio-Demographic Data

A total of eighty-four (84) woodworkers participated in this study. All participants were males and most of the respondents (40.5%) were between the ages of 27-37 years. About 8.3% being under the legal age (which is sixteen (16) years) to be employed. Primary education is the highest level attained by the workers. Over half of the woodworkers (56%) had previous sawmill experience. Most (56%) of the woodworkers had been working in the forestry sector for more than one year (Table 1).

**Table 1. Demographic status of the participants**

Variables	n (%)
<b>Age group</b>	
$\leq 16$	7 (8.3)
16-26	21 (25.0)
27-37	34 (40.5)
38-48	14 (16.7)
49-59	5 (6.0)
$> 59$	3 (3.6)
<b>Sex</b>	
Male	84 (100.0)
Female	0
<b>Education</b>	
Illiterate	10 (11.9)
Nursery	1 (1.2)
Primary	39 (46.4)
Secondary	34 (40.5)
<b>Sawmill experience</b>	
$\leq 1$	35 (41.7)
1-5	42 (50.0)
6-10	3 (3.6)
11-15	2 (2.4)
16-20	2 (2.4)
<b>Previously employed in sawmill</b>	
No	37 (44.0)
Yes	47 (56.0)
<b>Experience in forestry sector</b>	
$> 1$	37 (44.0)
1-5	4 (4.8)
6-10	22 (26.2)
11-15	14 (16.7)
16-20	4 (4.8)
$> 20$	3 (3.6)

*Overall assessment of knowledge, attitude and practices among workers towards OSH*

In general, a larger percentage of woodworkers have inadequate knowledge of OSH. Out of the

84 respondents, 38 (45.2%) showed adequate knowledge of OSH while 46 (54.8%) were within the poor knowledge range. The mean±SD knowledge score for the entire study was 17±3.8. Overall, the woodworkers have a negative attitude towards OSH. Out of the 84 respondents, 29 (34.5%) have a positive attitude towards OSH while 55 (65.5%) are within the negative attitude range. Mean±SD attitude score was 39.3±4.9. Good practice was found to be very low. Only sixteen 16 (19%) woodworkers showed good practice towards OSH while 68 (81%) were within the range of showing poor practice. Total mean score for OSH practices was 14.7±3.1 (Fig. 1).

### 3.2 Correlation between KAP

Spearman rank correlation revealed significant positive linear correlations between Knowledge-Attitude ( $r=0.29$ ,  $p\leq 0.01$ ), Knowledge-Practice ( $r=0.23$ ,  $p\leq 0.05$ ) and Attitude-Practice ( $r=0.34$ ,  $p\leq 0.01$ ). This result reaffirms the relationship between knowledge, attitude and practice of OSH among woodworkers.

### 3.3 Assessment of Sawmill

The mean score of the checklists (according to OSH criteria) was calculated to be 11.5± 2.6 suggested that overall the sawmills do a poor job in putting control measures in place to protect the health and well-being of woodworkers and other employees. It was found that only 3 (37.5%) of the sawmills scored above the average percent (50%) in providing the necessary control

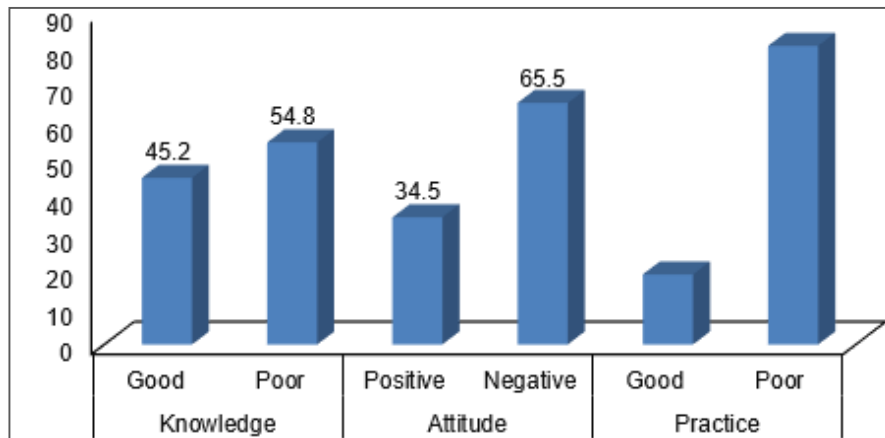
measures to prevent or reduce hazards and accidents that are required of them. Two (25%) of the sawmills that scored above average by obtaining a score of 11 (65.2%) while the other sawmill which scored above average scored 13 (56.5%) (Table 2).

**Table 2. Scores obtained by sawmills**

	Score	%
Sawmill A	10	43.5
Sawmill B	11	47.8
Sawmill C	10	43.5
Sawmill D	15	65.2
Sawmill E	8	34.8
Sawmill F	15	65.2
Sawmill G	13	56.5
Sawmill H	10	43.5
<b>Mean±SD</b>	<b>11.5±2.6</b>	<b>50.0</b>

### 3.4 Association of Socio-Demographic Characteristics and Mean KAP Scores

Among the demographic variable, a statistical significant relationship was noted between level of education and the mean scores for knowledge ( $p\leq 0.5$ ). Age, years of experience in the forestry sector and previous employment were significantly associated with the mean score for both knowledge and attitude ( $p\leq 0.5$ ). The study revealed that there was no association between the duration of employment at the sawmills the woodworkers are currently employed at and the mean KAP scores (Table 3).



**Fig. 1. KAP scores of sawmill workers**

**Table 3. Association of socio-demographic characteristics and mean KAP scores**

Description	Knowledge score Mean±SD	p value	Attitude score Mean±SD	p value	Practice score Mean±SD	p value
<b>Any previous employment</b>						
Yes	15±3.0		39.9±4.9		14.7±2.9	
No	18±3.6	0.00	38.5±4.8	0.16	14.7±3.3	0.97
<b>Age group</b>						
>16	13.9±3.5		35.9±3.4		11.4±3.9	
16-26	15.4±3.2		39.2±4.4		14.7±3.1	
27-37	18.5±3.2		39.5±5.2		15.3±2.6	
38-48	18.5±3.0		40.6±4.2		15.4±2.7	
49-59	17.6±5.3		40.4±3.8		13.8±3.4	
>59	11±1.7	0.00	38.3±9.9	0.36	15.0±3.0	0.28
<b>Education</b>						
Illiterate	18.30±4.2		39.2±6.5		14.9±2.6	
Nursery	13.0±0.0		32.0±0.0		14.0±0.00	
Primary	16.2±3.8		39.5±3.9		14.7±2.9	
Secondary	17.7±3.5		39.4±5.3		14.8±3.4	
Tertiary		0.15		0.5		0.97
<b>Employment length</b>						
<1	16.7±3.9		38.6±4.8		14.5±3.4	
1-5	17.8±3.7		40.2±4.7		14.7±2.8	
6-10	16.3±3.2		38.7±3.5		18.0±2.6	
11-15	11.5±2.1		35.0±11.3		13.5±2.1	
16-20	15.0±1.4	0.25	38.5±2.1	0.98	16.5±2.1	0.61
>20						
<b>Years in forestry sector</b>						
<1	15.0±3.0		38.5±4.8		14.7±3.3	
1-5	16.3±4.0		41.5±7.6		13.5±3.4	
6-10	18.8±3.2		39.4±4/9		14.8±3.0	
11-15	18.9±4.2		40.2±4.8		14.4±2.9	
16-20	18.5±3.4		39.5±3.4		15.3±2.2	
>20	19.7±4.9	0.04	43.0±3.0	0.30	16.7±1.5	0.89

\*Mann–Whitney test was used as there were only two subgroups in this category.  
 Δ Kruskal Wallis test was used as there were more than two subgroups in this category

**Table 4. OSH measures obtained at sawmills**

OSH measures	n(%)
Contract OSH Act	No 8 (100)
Accidents reported	Yes 6 (75.0)
Reporting procedure	No 2 (25.0)
NIS paid	Yes 6 (75.0)
PPE Provided	No 2 (25.0)
PPE's	Yes 5 (62.5)
Hard hat	No 8 (100)
Safety boots	No 0
Visibility vest	7 (87.5)
Ear plugs	1 (12.5)
Goggles	1 (12.5)
Gloves	2 (25.0)
Respiratory masks	4 (50.0)
	7 (87.5)
	6 (75.0)

OSH measures		n(%)
PPE inspected	Yes	1 (12.5)
	No	7 (87.5)
PPE good condition	Yes	1 (12.5)
	No	7 (87.5)
Joint workplace safety	Yes	1 (25.0)
	No	6 (75.0)
Safeguard on equipment	Yes	7 (87.5)
	No	1 (12.5)
Safeguards inspected	Yes	8 (100)
	No	0
Safeguards conditions	Yes	3 (37.5)
	No	5 (62.5)
Signs in place	Yes	8 (100)
	No	0
Control measures for fire	Yes	7 (87.5)
	No	1 (12.5)
Electric Circuits good condition	Yes	3 (37.5)
	No	5 (62.5)
First Aid	Yes	8 (100)
	No	0
Ventilated	Yes	5 (62.5)
	No	3 (37.5)
Waste disposal	Yes	8 (100)
	No	0
WD proper	Yes	2 (25.0)
	No	6 (75.0)
Eating area	Yes	3 (37.5)
	No	5 (62.5)
Washroom	Yes	5 (62.5)
	No	3 (37.5)
Washrooms clean	Yes	6 (75.0)
	No	2 (25.0)
OSH explained	Yes	1 (12.5)
	No	7 (87.5)
Training for using PPE's	Yes	3 (37.5)
	No	5 (62.5)

Table 4 showed the OSH measures in the sawmills that were observed. Surprisingly none of the sawmills had OSH contract act. Even though the percentage of sawmill employers that provide PPE and safeguards on the sawmill equipment and machineries were revealed to be high, 8 (100%) and 7 (87.5%) respectively, the percentage of sawmills that carry out inspections on these were found to be very low. It was found that only 1 (12.5%) of the sawmills inspect the PPE provided and none of the sawmills inspect the safeguards on the machineries and equipment. Also, their conditions were observed to be very poor as 1 (12.5%) of the sawmills have the PPE in good condition while 3 (37.5%) of them have safeguards in good condition. Additionally, waste disposal was not properly done as it was found that only 2 (25%) of the sawmills are properly disposing their waste as

most of them noted that they burn the sawdust and wood shavings. A high percentage of sawmills 6 (75%) was found to have clean washroom facilities.

#### 4. DISCUSSION

This study assessed control measures taken by sawmill employers to prevent or reduce the likeliness of accidents and injuries at the work site and to assess necessary measures are taken as per the Occupational Safety and Health Act, 1997, the GFC Code of Practice for Forestry Operations for State Forest Commission Holders (2013) and the Code of Practice for Wood Processing Facilities.

All workers were males working at sawmills can be seen in the studies conducted by Rus et al.

[10] and Faremi et al. [11] who suggested that this was because of the high level of physical manual labour required in operating heavy machines and moving timber in the sawmill industry. Similar to the findings done by Mitchual et al. [9], primary education was the highest level attained by workers 39 (46.4%).

The results of the assessment of the control measures taken to ensure workers' well-being and to prevent or reduce the likeliness of accident and injuries at the sawmills were not encouraging. This suggested that, overall, the sawmills on the Linden/Soesdyke Highway do a poor job in putting control measures in place to protect the health and well-being of woodworkers and other person at the worksite and to prevent and reduce hazards, which was similar to the findings done by Bello and Mijinyawa [12].

Information that was gathered during the interviews with the employees using the questionnaires, as well as employers or the supervisor suggested that because these sawmills are small-scale, employers did not think they should have to put all the control measures in place that are required of them by the Occupational Safety and Health Act, 1997 and GFC. It was in their perception that because their workforce is small and they do not have a lot of machines and equipment or produced a large quantity of lumber, they should not have to invest in all the control measures required of them. Interviews with a few sawmill employers revealed that they cannot afford to buy all PPEs. There was also a lack of enforcement as it was observed that even some of the supervisors and employers do not wear PPE on the worksite. This can be noted in the study conducted by Adei and Kunfaa [13].

The main measures provided at the sawmills are PPE, appropriate signs, first aid and disposal measures. Hu et al. [14] found that most of the employers surveyed in this study believed that they were responsible for providing PPE (89.2%) and putting up relevant warning posters (78.8%). The solid waste at the sawmills such as the sawdust are mostly burnt and this technique is not good for the environment. Similar to Bello and Mijinyawa, it was noted during the on-site observation that there were heaps of sawdust and wood shaving around the working area for most of the sawmills. However, not much litter (plastic bottles, cardboards, papers) was observed and almost all of the sawmills had bins.

With regards to training, most sawmills do not have any formal training or an induction period where the Occupation Safety and Health Act, 1997 or where the job and safety practices is formally explained to the woodworkers. It was noted that sawmill employers hire workers who never had experience working in the forestry sector before and the only form of training was that they were place to work along with old staff and to "watch on and learn". This is in line with the study conducted by Bello and Mijinyawa where preference was not given to basic training on workplace safety yet there were woodworkers who were hired that had no experience in working at a sawmill. The lack of education programs and training can also be seen in the KAP study done by Rus et al which concluded that educational programs and training are needed to improve the knowledge, attitude and practice of the woodworkers.

In general, the level of knowledge, attitude and practice is low. Majority of the woodworkers have inadequate knowledge, negative attitude and poor practice of OSH. Also, the mean percent for the scores of knowledge (71%) and attitude (71.5%) were below the cut-off level which was 75%. The mean practice score was revealed to be remarkably low (61.4%). This is in line with the study conducted by Rus et al. (2008) where the woodworkers of the sawmill had poor knowledge, attitude and practice of the topic of noise-induced hearing loss in Kelantan. Many of the woodworkers claimed that they did not know what the term "Occupational Safety and Health" meant. However, majority of them could have still given a definition of the term. Most of them defined it as simply wearing "safety gears" when they are doing their work at the sawmill which meant that they know it is concerned with workplace safety.

In the current study, it can be seen that inadequate knowledge of OSH due to the lack of training and measures taken to raise awareness of OSH among woodworkers, this result in negative attitude towards OSH which result in very bad practice of the topic.

## 5. CONCLUSION

Sawmills employers need to upgrade the standards in providing control measures such as having safety representatives or safety committees, providing proper training sessions, explaining the Occupational Safety and Health Act, 1997 to the woodworkers and paying NIS.

Regular inspections to ensure that PPE, safeguards, sign and electric circuits are in good conditions is a must. Hence, employers need to start realizing the importance of OSH at the sawmills and really improve on providing control measures to ensure the safety and well-being of the woodworkers and the other individuals at the sawmills.

## CONSENT

All authors declare that informed consent was obtained from the participants.

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## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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