Effectiveness of health and safety training in reducing occupational injuries among harvesting forestry contractors in KZN

This work is submitted in fulfilment of the requirements

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ABSTRACT

Work related injuries are of major public importance and have adverse economic and social impacts. Forestry work is one of the most hazardous occupations worldwide and accounts for a large proportion of occupational injuries. Employers frequently train workers in the proper and safe use of equipment, however the efficacy of these programmes are seldom rigorously evaluated. The aim of this study was to assess the effectiveness of health and safety training in reducing injuries among forestry workers in Kwa-Zulu Natal. A descriptive study was conducted among 300 Kwa-Zulu Natal harvesting contract workers. A questionnaire to assess the efficiency of health and safety training was administered. A retrospective review of the injury register and medical records of employees who sustained work related injuries, fatalities during 2009–2013 was done. The company injury data for harvesting contractors from 2009-2013 reported 3 fatalities and 68 lost time injuries during post commencement of training. About 23.3% workers reported injuries during the study period. Slip, trip and fall injuries were the most reported cause of injuries. Almost 95% of respondents reported that they had received health and safety training at work, with 84% reporting satisfaction with the quality of training received. A decreased prevalence of work related injuries was reported post training. The health and safety program was successful in increasing workers awareness and responsibility of health and safety issues. On- going specific job training, sustained work place inspections and adult learning for supervisors will improve health and safety of workers and reduce injuries in the forestry industry.

Key words: Occupational Health, Workplace safety, Workplace injuries, forestry

Aspects of this research were presented at the following forums below:

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- Occupational health and safety among forestry harvesting contractors in Kwazulu-Natal. **H Nkomo,** I Niranjan, P Reddy. DUT Institutional Research Day. Durban University of Technology, November 25, 2015.

DECLARATION

I, Gladys Hloniphile Nkomo declare that this research report is my own original work. It is being submitted for the degree of Masters of Health Sciences in Environmental Health of the Durban University of Technology.

It has not been submitted before in part or in full for any degree or examination at this or any other University

Signature:_____

Date: 29 February 2016

DEDICATION

This work is dedicated to my parents for laying a strong and unshakable foundation in my life, and to my GOD for the wonderful gift of life.

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DEFINITIONS

Cross cutting: To cut wood across the grain, hence, to cut trees into logs.

Debarking: It is a process of removing bark from timber or wood

Escape route: A predetermined or prepared track by which fellers move away from a tree or log during felling or crosscutting to avoid danger (ILO Code of Practice: 1998).

Extraction: General term for removing trees and logs from a felling area to a skid or road.

Felling trees: Act of cutting down trees

Forestry contractor: A person engaged by a person (other than as an employee) to do any work for gain or reward.

Hung-up tree: A cut tree caught in or lodged against another which prevents it falling to the ground (ILO Code of Practice: 1998).

Forest harvesting: Involves cutting trees and delivering them to sawmills, pulp mills and other wood-processing plants. Its practical components include road construction, logging and log transportation (ILO Code of Practice: 1998).

Lost-time injury: An incident that results in injury to an employee to the extent that they do not return to work at the start of the next regularly scheduled work day or any other subsequently scheduled shift, includes fatalities (ILO Code of Practice: 1998).

Personal protective equipment (PPE): Anything used or worn by a person to minimise risk to the person's health and Safety Occupational injuries

Project 0 – a global initiative that strives to achieve zero injuries across Sappi operations.

Skidding: Skidding or snigging: The process of dragging logs from stump to skid preventing it from falling to the ground (ILO Code of Practice: 1998).

Roll over protective structure: A canopy to protect the operator in the event of a machine roll over.

Windfall: An individual tree blown down by the wind.

Wind thrown: Area of trees blown down or significantly affected by wind (ILO Code of Practice: 1998).

LIST OF ACRONYMS AND ABBREVIATIONS

ACC – Accident Corporate Compensation

AOR – Adjusted odds ratio

ARS – Accident Reporting System

CI – Confidence Interval

COHFE – Centre for Human Factors and Ergonomics

DWAF – Department of Water Affairs and Forestry

FAO – Food and Agriculture Organisation

FICA – Forest Industry Contractors Association

FSC – Forest Stewardship Council

ILO – International Labour Organisation

OSHA – Occupational Safety and Health Administration

OHS Act – Occupational Health and Safety Act

PPE - Personal Protective Equipment

SAFCA - South African Forestry Contractors Association

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CHAPTER 1: INTRODUCTION

1.1 Background to the study

The forestry organization under study employs approximately 96 contractors, who employ 11 000 forestry workers. Contractor Lost Time Injury Frequency Rate results improved by 26% a year in the organization under study in Europe, but deteriorated by 60% in South Africa during the same time period (Company A Sustainable Development Report 2009). The relatively high level of fatalities and injuries accelerated discussions on appropriate action among management, health and safety officials and contractors. A review of the primary causes of these accidents was the lack of standardized comprehensive training for all employees, mainly fellers. Thereafter a standardized harvesting training and certification programme was developed to ensure that all forestry employees received the same high quality training. The company approved accredited training providers (KwaMahlathi and South African Forestry Training College) to continuously train and certify forestry workers. The forestry organization renewed its focus on the management, training and entrenching root cause analyses; visible senior leadership in the field; improving contractor management and performance; and generally energising the behaviour safety programme. Other risk mitigation included enforcing a one kilometre no-go area for active felling areas, machinery pre-start checks and introducing critical occupation licence cards. Company A Sustainable Development report (2009) stated that actions and good intentions were complicated, however, by the high labour turnover in forestry, particularly among contractors, so it is particularly difficult to ensure that quality training is continuous and sustainable.

A training matrix was developed to meet the requirements of the Occupational Health and Safety Act, Act 85 of 1993 and relevant regulations. The purpose was to ensure that forestry workers with different occupations have the knowledge, skills, abilities, work practices and attitudes that will enable them to function as safe, productive employees as reasonably practicable. All forestry contractors are required to submit a training matrix annually to the forestry companies and to the South African Forestry Association, however the success of this training has not been evaluated. This study

will assess the efficacy of this training by conducting a knowledge, attitudes and practice survey on forestry workers regarding health and safety.

The data base of the forestry company is used to train all forestry workers. There is constant communication with the training providers with regard to any changes of written safe work procedures and legislation, or if there are any other relevant changes. The training providers offer continuous training as well as refresher training that is required by forestry contractors. Training providers are also visited periodically to discuss the training they provide, although no evaluation is done. These training providers have been accredited by the Department of Labour to issue training certificates. Training has been provided to all new workers before starting work, when a worker has been assigned to a new task, and when there is a change in work procedure. Workers also get in-house induction training every year, particularly at the beginning of the year after the holidays. Workers are trained externally by training service providers and also get on-the-job training. Training includes hazard identification, prevention and control. The use of personal protective equipment (PPE) and safe felling techniques are covered, and chainsaw operators are certified after being found competent. Training also includes chemical handling; signalling and signal equipment; first aid and emergency preparedness; lockout procedure; hazard communication; as well as on the relevant sections of the Occupational Health and Safety Act. The level of training differs with the job categories, thus workers are provided with training that is relevant to their specific task. Training is an ongoing process; all contractors submit an annual training plan and they are required to provide training according to the plan.

1.2 Purpose of the Study

The purpose of the study is to assess the effectiveness of health and safety in reducing occupational injuries.

1.3 Study Objectives

- To establish the incident profile over a five year period (2009-2013), post the commencement of training, using retrospective records.
- To assess if health and safety training influenced attitudes, knowledge and work practices of contracted workers and;

- To recommend practical strategies to improve health and safety and to reduce injuries.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

Occupational injuries affect workers, employers and society through their impact on medical costs, workplace productivity and the pain and suffering associated with injuries. For employers, workplace injuries create disruptions in the work cycle and in some cases require the hiring of replacement workers. To achieve productivity goals with a minimum of injuries, employers train workers in the safe use of equipment, invest in ergonomic equipment, and experiment with a variety of work practices designed to reduce injuries (Waehrer and Miller 2009).

Forestry is a significant part of the South African economy, contributing approximately 1%-2% to the Gross Domestic Product (GDP) (Scott 2004). The industry employs approximately one million people, mainly rural South Africans. Of these, approximately 150 000 people were employed in the harvesting sector of commercial forestry (Statistics South Africa 2000). According to Scott (2004) about 23 000 people in South Africa were estimated to be employed by forestry contractors. Universally forestry work is characterised by physically demanding manual labour, with diverse natural and material hazards that contribute to the high risk of injury to forest workers. Blomback (2006) stated that forestry is characterised by a difficult working environment, heavy physical effort and high accident risk. In developing countries low productivity, poor wages and an unstable workforce could be the contributing factors to high injury statistics. Scott (2004) reported that harvesting in forestry is particularly hazardous and that most accidents in the industry are attributed to this activity. Logging is challenging physical work in a constantly changing environment. It may be that workers who are laid off or leave the job, even for short periods of time and returned to work, regress in their skills and attentiveness (Bell and Grushecky 2006).

Although falling trees and hand-held machinery are recognised to increase the risk of injury, fatigue has also been identified as contributing factor (Scott 2004). Forestry work is generally characterised by a combination of personal and environmental risks to the health and safety of the workers within the industry. In South Africa some of the large forestry industries have incorporated a voluntary Accident Reporting System (ARS), similar to that observed in New Zealand. Scott (2004) explained that the

principle of the ARS is that when an accident occurs, a report is filled in and sent to a central recording body. The information is summarised and analysed quarterly and then disseminated. A more comprehensive report is produced annually and contains information on accident trends, accident type, severity and frequency. Problem areas are identified and interventions are targeted towards those areas. Workers operate in small groups and in isolated places, frequently changing locations, therefore workers in this sector remain highly prone to accidents and these are usually unreported; thus, reliable statistics become a concern. Chainsaw operators are the most accident-prone group. In serious cases, the worker is injured by falling trees, branches or logs (Blomback 2006).

South African forestry is divided into three major components of commercial forestry: plantation forestry, conservation forestry and community forestry (Statistics South Africa 2000). Community forestry deals with the communal management of forests for generating income from timber and non-timber forest products in the form of goods while contributing to the ecosystem. Downstream settlements benefit from watershed conservation, carbon sequestration and aesthetic value. It is advantageous to combine forest conservation with rural development and community empowerment and poverty objectives. Commercial plantation is made up of compartments or blocks of trees where the trees of one compartment are all mostly the same species and age, and have all been planted at a fixed spacing. These species are mostly exotic in South Africa come from some other part of the world–and are light demanding. Plantation timber production is the cultivation and long-term management of trees on marginal agricultural land. Plantations are generally even-aged, planted and managed in rows, consist of a single species (sometimes two or three) and cover a large enough area to provide a suitable return on investment. Plantation forestry and the workers involved in the sector are the areas of interest in this study. Plantation forestry is further divided into silviculture, harvesting and processing. The commercial forest industry is the second largest cultivator of land in South Africa and has a capital base of R30 billion and annual turnover of R12 billion (Clarke 2005). All forestry activities are performed in isolation; workers are expected to perform their activities and meet their daily targets regardless of harsh working conditions such as extreme weather conditions, i.e. high temperatures (30-40ºC), wet and rainy conditions, and cold temperatures in winter. All forestry companies are required to comply with the Occupational Safety and Health

Act, Act 85 of 1993. Some companies participate in the National Occupational Safety Association (NOSA) programme, which guides and assists these companies in complying with the requirements of the Act. Safety standards have steadily improved in many companies, including the government-owned South African Forestry Company (SAFCOL) (Louw 2004). Workers in the industry have expressed ongoing concerns regarding health and safety provisions. Continuous improvement is needed and there is a long way to go in ensuring uniform minimum health and safety standards in the forestry and the wood processing industries (Mack 2010).

The success of this training was not evaluated; this study will assess the efficacy of this training by conducting a knowledge, attitudes and practice survey on forestry workers regarding health and safety. Skills and knowledge determine the effectiveness of work, while safety and health issues are linked with effective work practices. Safety awareness and training are considered to be particularly important factors when addressing the reduction and prevention of injuries (Nieuwenhuis and Lyons 2002).

Clarke (2005) reported that Company B's fatalities peaked in 2001, and they introduced a number of measures aimed at achieving a zero accident rate in their forests. The basis for improved safety was a revised upgraded set of prescribed safe work standards and a zero tolerance approach. An improved system for the management and delivery of training was also implemented. Spot checks and a card system (red, yellow and green) was introduced alongside other regular first and second party audits. Accident statistics showed that felling and labour transport accounted for the majority of serious and fatal injuries. A new standard for transport was introduced and all labour transport vehicles were replaced or retrofitted to meet these standards. Average annual fatalities decreased from 2.8 between 2000 and 2005, to 0.2 between 2006 and 2010 in Company B. During the same period, the number of working days lost to injuries decreased from an average of 156 days a year to ten days a year (Clarke 2005). Company B also had similar initiatives in preventing injuries and non-conformances.

Sustainable development of the forest sector and a competitive forest economy is dependent on a dynamic, skilled and competent workforce, whose members are

satisfied with their employment conditions, able to grow in their jobs, and are motivated to improve the competitiveness of the sector. The South African Government used its influence to work with industry and organised labour to move workers and management toward a progressive labour agreement within the provisions of the new Labour Relations Act 1995. This was the necessary first step towards jointly-agreed measures for employment conditions; skills recognition; job grading; industry-wide strategies for training and innovation; and the progressive improvement in operating practices required in a competitive and environmentally and socially responsible sector (Sustainable Forest Development in SA 1997).

The progressive labour agreement has allowed the rapid development of skills and progressive innovation and productivity improvement in forestry and forest product firms. Regarding employment conditions among contractors, the government also promoted the universal acceptance of contracting policies requiring sound employment conditions (including occupational health and safety), quality practices (including environmental management systems), and skills recognition among contractors providing services to companies, other growers (including small farmers), and firms in the sector in general (Sustainable Forest Development in SA 1997).

2.2 Forestry companies in South Africa

The forestry company under study supplies over 78% of the wood requirements of Company A, Southern Africa, from both self-owned land-holdings and privately owned land-holdings; this is equivalent to commercial timber plantations of approximately 495 000 hectares. Company A is an integrated forests product company meeting the needs of domestic as well as international customers through a wide range of products. The company is one of the major economic contributors in the South African economy and operates through three divisions: the specialised cellulose division, pulp and paper packaging division and plantation forests. The plantation forestry division supplies over 78% of the wood fibre needs of the company (Company A Sustainable Development Report 2009).

Company B is an integrated packaging and business paper producer, with key operations and interests in Western and emerging Europe, Russia and South Africa. Company B owns or leases 380 000 hectors of land in South Africa, of which 243 000

ha are planted with hardwoods (eucalyptus and wattle species) and softwoods (pine species). Company B first obtained Forest Stewardship certification (FSC) for their operations in 1997; 2011 was the last year of their third certification period (Clark 2005). Company A and Company B used the South African Forestry Training College, Kwamahlathi training services, College for Machine Operators (CMO) and other academic training institutions to address the shortage of skills. These training providers offered training to the forest industry. The training providers were provided with written safe work procedures for each company so that they could align their training with the procedures. They were offered a wide range of training, including the training of supervisors on basic health and safety and production; first aid training; health and safety representative training; chainsaw training, etc. The training providers contributed to the reduction of injuries by training and educating workers on different health and safety requirements.

2.3 Forestry activities

The main work tasks of harvesting are firstly the felling of trees, followed by cross-cutting the felled trees into sections by a chainsaw operator. These workers are followed by de-barkers, who are mostly females responsible for removing bark from the felled trees with the use of a hatchet. Lastly, the logs that have been de-barked are positioned onto a rack or stack by a group of stackers in preparation for removal from the area. The short-haul vehicles then remove timber from the plantations into the depot.

A range of difficult working conditions characterise all the tasks under assessment. The terrain is often steep, uneven and covered with forest debris, the environmental conditions harsh and work itself is physically demanding (Lilley *et al*. 2002). Additionally tools are sharp and heavy, and become dangerous if not used and maintained properly. Falling trees and loose branches add to the hazardous nature of the work. Plantations are isolated and remote and there are no medical facilities in close proximity. Associated with these factors are the issues of poor productivity and high costs. If forestry workers are exposed to many negative factors, the workforce cannot be stable and productive and the likelihood of injuries and fatalities increase. It is important that efforts are made to focus on the improved working conditions and

compliance with the Occupational Health and Safety Act to improve training and reduce injuries (Lilley *et al*. 2002)**.**

Chainsaws are used mainly in manual harvesting. Injuries to chainsaw operators commonly result from a lack of saw control or from failing to follow safe work practices. Operator fatalities occur as a result of being struck by rolling logs, falling trees or dislodged tree limbs. While improved technology and safety features on chainsaws and the correct use of personal protective equipment help to reduce injuries, these offer little protection if the operator is not properly trained or does not follow safe work operating techniques (Kestel and Mclead 2009). A chainsaw is one of the most efficient, productive but dangerous portable power tools used in the forestry industry, with the potential to cause terrible injuries. One of the biggest hazards is the kickback that happens when the chainsaw comes into contact with objects such as rocks, logs or branches. The saw kicks up and back towards the worker, who loses control of it. The parts of the body most exposed are the head, shoulders, upper arms, hands, legs and feet. Forest workers are trained and wear appropriate protective clothing. Most deaths occur as a result of falling trees. Felling should be carried out professionally to safeguard the health and safety of workers. A plan is developed for each felling and a risk zone established, with other workers excluded from the danger area and the logger retreating as soon as it moved. Falling trees often brush other trees and leave broken limbs hanging in the surrounding trees; these overhead hazards caused major or even fatal injuries. Clearing windblown trees is one of the most hazardous operations in forestry. Only workers fully competent in felling, the taking down of hung-up trees, de-branching and cross-cutting stems under tension should be employed to work with windblown trees.

Manual de-barking is normally performed with a sharpened hatchet. The bark is detached either as long or short strips, or small plates. Logging is comprised of four major operations, which are felling, trimming, breaking out and land work (skidding). Felling involves the cutting down of trees, either through motor manual (chainsaw) or fully mechanised means (harvesting machines). The greatest risk in this operation is caused by being hit or struck by a falling tree and other debris, and chainsaw lacerations. Trimming (de-branching) involves the removal of branches from a tree once it is on the ground. Common injuries during this operation are lacerations from

chainsaws. Breaking out is the removal of the trimmed tree from the stump to a flat area nearby to a road (landing or skidding). Injuries in the operation result mostly from slipping and being hit by dislodged material. Skid work takes place on landings and in the processing of trees into logs cut to a specification for mills or other market (Bentley *et al.* 2002).

2.4 Accident statistics

According to Helmkamp *et al*. (2004) few studies have been conducted worldwide with regard to logging safety. Most existing studies compiled and summarised logging injury and fatality statistics. Some of these statistics reflected safety concerns; others did not. Lilley *et al*. (2002) reported that forestry worker fatalities ranked the fourth highest among occupational groups with 121 deaths per 100 000 workers per year in New Zealand. The Bureau of Labour Statistics (BLS) (2012) reported that fatal injuries to logging workers remained the same for the previous three years, and decreased slightly to 62 in 2012. During 2000, approximately 389 logging injuries were reported in New Zealand, from which 121 workers required one day away from work (Bentley *et al*. 2002). In contrast, South Africa reported nine deaths from approximately 31 749 workers involved in harvesting in 2003 (Scott 2004). This was of concern, compared with other countries such New Zealand, Australia and Sweden, where cuts and lacerations were the most common injury during the mid-1980's, but sprains and strains were the most common by 1990. This trend may be attributable to the mechanisation of felling activities. It was determined that the accident rate in Sweden among chainsaw operators was four times higher than among machine operators (Lefort *et al.* 2003). Although felling trees and accidents associated with man-held machinery accounted for many injuries and fatalities in forestry, injuries occurred as a result of poor judgement due to fatigue from physically demanding work.

In South Africa statistics related to health and safety-related incidents in the workplace had not been seriously collated and it was likely that there was under-reporting, or inaccuracy with respect to the completion of forms (Scott 2004). Analyses of occupational injuries or accident frequencies in South African forestry indicated that 10% of the sample had at least one accident in their forestry working careers (Manyuchi *et al*. 2002). Most reports indicated that an incorrect working technique

was responsible for the injuries, whilst a poor working environment, equipment failure and inadequate use of PPE were other reasons cited for accidents during work. Chainsaw operation, de-barking, stacking, truck and tractor driving tasks were frequently associated with high accidents. Overall, the South African forestry industry had limited studies on work related injuries. Manyuchi *et al*. (2002) determined the extent of the problem.

A study by Bentley *et al.* (2005) in New Zealand analysed 351 lost time incidents (LTI) and minor injuries that were reported to the logging ARS during the period of 1996-2000. Approximately half of the reported injuries involved LTI's (49%), with the balance of minor injuries (51%) not requiring time off work. Injuries associated with tree felling operations comprised 23% of all logging injuries reported to the ARS over the period of the analyses, followed by injuries from skidding operations. Injuries associated with tree felling were reported to be significantly greater in numbers during 1999 than for the other years. The 351 injuries reported to the ARS resulted in 2 227 lost work days, at an average cost of 13.6 days. The highest number of incidents associated with tree felling were reported during the hottest summer months, with 36% of injuries reported between January and March. Few injuries were reported during the winter months, with 3% of the injuries reported in June despite an additional potential risk of injury due to slipping in wet weather. The increased risk of injury during the summer months may be attributed to longer hours of work, larger harvesting volumes, and the potential for dehydration and fatigue during hotter periods (Bentley *et al.* 2005). The study also showed that injuries were reported during the late morning, with peaks between 09h00 and 11h00 indicating fatigue and possibly dehydration prior to the morning break. A logger operator left home as early as 5h00 with no food or liquid intake until the first morning break at about 10h00 or 11h00. The risk of fatigue and dehydration was considerable and presented a potential critical injury risk (Bentley *et al.* 2005).

2.5 Fatalities and injuries in harvesting

2.5.1 Causes and activities during incidents

Bentley *et al.* (2005) stated that tree felling was the main activity associated with 51% of injuries. Tree felling injuries accounted for 54% of days lost at a mean cost of 12.7% days, compared with an overall days lost mean of 13.6 days. Walking either from tree to tree or to and from the escape route was the other notable activity, accounting for 21% of days lost at a mean of 13.9 days. Another 29 cases (8%) involved wedging, with the feller being struck in the face by the wedge. Wedging injuries accounted for 1% of days lost at a mean cost of 24 days. Seven incidents occurred involving persons supervising or observing the felling of trees; the injuries incurred during this activity appeared to be serious, with a mean cost of 54 lost days per injury. Further analysis revealed that the injured persons were all struck by falling objects. The study by Lilley *et al.* (2005) found that long working hours were common for forestry workers. The study also found that accidents and lost time injuries were common among forestry workers, with one in three reporting an accident in the previous twelve months, and one in five reporting a lost time injury.

The terrain in coastal British Columbia is mountainous; working on steep slopes created hazards from the effects of gravity on the object being worked with and heavy machinery having an effect on human bodies. Snags and other hazards in standing timber resulted in large numbers of injuries (Lilley *et al*. 2002). Ninety-one percent of all fatalities occurred in fourteen cause activity groups. Of these groups, tree fall/cutting, tree fall/unknown, and tree fall accounted for nearly 63% of all fatalities. Two risk comparisons (tree faller-employer size and tree faller-region) actually had slightly higher risks (Blomback 2006). In Sweden an analysis of six years of data reported to the logging ARS showed that 17.5% of lost time injuries were a result of slips, trips and falls. Bentley *et al*. (2002) declared that the highest incidents or injuries to loggers were reported with skid work and felling operations. Skid work injuries comprised of approximately 36% of logging injuries. Felling injuries comprised between 20% and 30% of all logging injuries annually.

Over the past decade the forestry sector has invested efforts into reducing fatalities and serious injury. Despite these effort, injuries, fatalities and social costs were still

unacceptably high. The sector's challenge was to reinvigorate injury prevention and continue the drive towards zero harm and fatalities. Between 2003 and 2008 the forestry sector had the highest rate of fatal work-related injuries. The rate of Accident Corporate Claims (ACC) for the forestry sector in New Zealand was almost six times the rate for all sectors, as indicated in Figure 2.1).

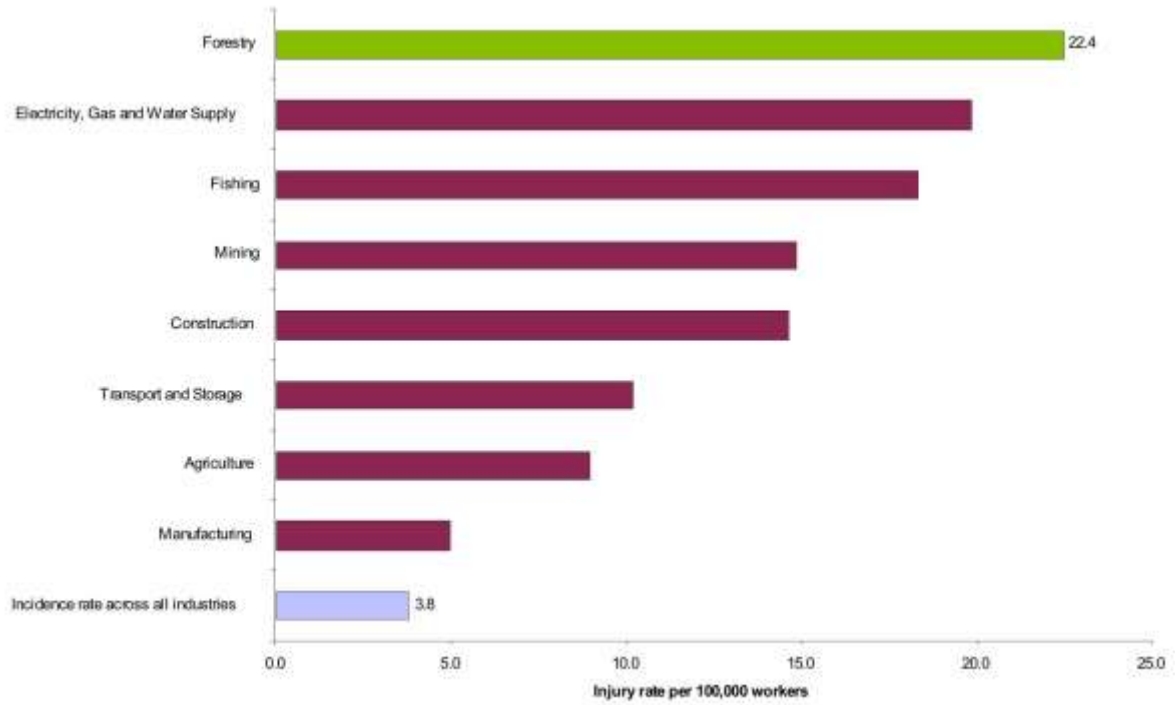


Figure 2.1: ACC claims for fatal work-related injuries, averaged 2003-2008 in New Zealand (ILO 1998).

The Forest Industry Contractors Association (FICA) conducted an analysis of fatal logging accidents between 1988 and 2005. The findings showed that 55% of work-related forestry fatalities occurred while tree felling or breaking out. Of particular concern was the 12% of fatal accidents relating to extraction; there was a shortage of experienced haulers, with a large number of steep terrain woodlots that required harvesting over the next ten years (International Labour Office 1998).

2.5.2 Accident rates and severity

A study in Louisiana in 1997 showed a decline in the accident rates from 1995-1998 (Lefort *et al.* 2003). This could be as a result of increased mechanization of felling; job inspections by insurance companies; an improvement in state government policies

relating the worker compensation insurance industry; the commencement of logging safety workshops in 1993; and the insistence of the major companies in the state that each logging company sent a representative to the logging safety workshops as a condition of contract. The decline in cuts and lacerations corresponded with the period during which manual felling with chainsaws was replaced by mechanical felling. This resulted in fewer employees being exposed to the potential danger of chainsaws ($p=0.0005$, $r^2=0.69$). Sprains and strains were increased significantly over the years between 1986 and1992, however this trend was reversed and was non-significant over the extended period through 1988 ($p=0.26$) (Lefort *et al.* 2003).

Lilley *et al.* (2005) highlighted that lost time over twelve months was reported by 19% of respondents. Of those reporting lost time injury, 43% reported one day off work; 34.9% reported having two to five days off; 23.8% had six to ten days off work; with the remaining 27% having more than two weeks off work. This study also found that long hours on the job contributed to accidents. A study by Potocnik *et al.* (2009) examined the severity of accidents in forest operations in a Slovenian state forest. They showed that 68% of accidents occurred during cutting, 24% during skidding and 8% during tending operations. High accident severity occurred during cutting arising from accidents due to tree parts, whereas skidding accidents mainly occurred due to mobile working machinery. There were relatively few chainsaw accidents (6%) in Slovenia due to constant application of safety procedures and the education of workers. Accident severity was significantly higher with bone fractures (123.9 lost days/accident) and lower for infections due to insect bites (lost days/accident) compared with other types of accidents. The majority of accidents by injured body parts occurred on arms and legs (60%). Research showed that accident severity depends on all studied factors, and mainly depends on injured body parts and the injury source when all factors were included (Potocnik *et al.* 2009).

2.6. Control measures

Montorselli *et al.* (2010) indicated that Italian authorities made a massive effort in improving safety in forestry by enhancing the use of PPE and by promoting a number of training campaigns focussing on safe working technique, as well as on the correct use of PPE. Many operators perceived safety as conflicting with both comfort and productivity and often deliberately chose to take risks. The perceived contradiction

between work pressure and safe behaviour seemed to be a universal problem. In West Virginia in the USA loggers received some form of logger training or certification, however this varied in the type and length of training. These training programmes often had multiple goals, including training in safe work practices for a variety of jobs, first aid, sound environmental management practices and business practices (Bell and Grushecky 2006).

In many states certified logger programmes only required approximately four to eight hours of training in safe work practices (primarily chainsaw). Few, if any, of these programmes had been evaluated in a quantitative manner to assess their ability to reduce injury. Even in other industries there were relatively few examples of studies that quantified injury reductions after training. Another challenge was that additional factors were often present, such as mechanisation and changing technology, which may impact on the effects of training. The state of West Virginia had a high rate of logging injuries as documented by workers compensation injury claims data (Helmkamp *et al.* 2004). Fellers received eight hours of hands-on training sessions regarding safe chainsaw use and directional felling practices. Participating logging companies were expected to maintain and encourage safe work environments for their employees. This included encouraging the use of safe work practices; the use of PPE; participating in ongoing training; and encouraging compliance with existing Occupational Health and Safety Administration (OHSA) standards (Bell and Grushecky 2006). This programme was considered to be a pilot project, although there was no evidence to suggest that the programme was effective in reducing injuries in companies participated in the training. Forestry operations ranked high in New Zealand against other sectors in terms of injury incidents (Bentley *et al.* 2002). In New Zealand, the highest number reported forest injury rates were found in logging operations. Harvesting and silvicultural work in New Zealand forests increasingly involved working on steep terrain, with various soil types and adverse weather conditions exacerbating the risk of slips and falls (Bentley *et al.* 2002). Accident Reporting System data had also been useful for providing evidence for the risk associated with the poor condition of loggers and in the evaluation of interventions to reduce the risk (Scott 2004). Accident Corporate Compensation had therefore directed research into exploring causation through the study of a sample of key

incident types and collating findings to identify common themes or concerns, in order to establish intervention needs for the industry.

While injury rates in the USA have steadily fallen over the years, logging figures indicated that entitlement claims remained high and ongoing interventions were necessary (Thelin 2002). Bell and Grushecky (2006) reported that logging safety programmes were rarely, if ever, evaluated for their effectiveness in reducing injuries in the USA. Periodic in-depth analysis of the characteristics of logging injuries helped to target the development of safety training programmes and materials to provide maximum impact in reducing accidents. Skills and knowledge determined the effectiveness of work, while safety and health issues were inherently linked with effective work practices. Safety awareness and training were considered to be important factors when addressing the reduction and prevention of injuries in harvesting operations (Lefort *et al*. 2003).

The evolvement of safety systems has led to more holistic programmes that embrace health and safety, such as Occupational Health and Safety Certification: OHSAS 18001 in South Africa. There were no correct safety-based statistics for the forest industry as a whole, so it was not possible to track trends. The audits by external parties were done annually and recommendations implemented as required. This was discussed at a training 'Indaba' hosted by the South African Forestry Contractors Association (SAFCA), where one of the outcomes was the necessity to create a safety statistics base for the industry (Mack 2010). Scott (2004) explained that the SAFCA was established and uses a grading system reflecting the quality of work of each contractor, however the efficacy of this system was not clear.

A major concern was the employment of workers who lacked the necessary skills, which was common practice in industrially developing countries generally, where unemployment and a lack of education predominate. Both Company A and Company B had regained control over the management of training for contractor employees. These companies established and funded a training matrix which was the basis for comprehensive training programmes (Mack 2010). Company B had shown some success: there were no fatalities in 2009 and two people were fatally injured in 2010. The group's policy of zero harm remained the target and a thorough investigation was

undertaken after each incident, to ensure that they continue to refine safety measures (including training programmes) that were necessary to keep all employees and contractors safe (Mondi Sustainable Development Report 2010).

2.7 Injury profiles in the forestry industry

Lefort *et al.* (2003) affirmed that injuries in the forestry industry occurred to the lower extremities. Knee injuries were more common than ankle and foot injuries; this was because the feet and ankles were usually protected with PPE. This resulted in fewer employees being exposed to the potential danger of chainsaws. It was also stated that the percentage of falls increased due to the slope; falls were simple and preventable accidents yet they caused very serious incidents (Lefort *et al.* 2003). A continuing study in New Zealand of all reported accidents found that most of these accidents occurred to the feet. In particular, these injuries usually occurred to the left foot at the base of the big toe, directly behind the steel toe-cap of the boot. Leg protection (saw chaps) worked relatively well to prevent chainsaw cuts, but foot protection development was lacking because long strings of textile that made leg protection effective cannot be incorporated into footwear (Lefort *et al.* 2003). Lacerations on the feet continued to be a problem, and were mostly caused by chainsaw accidents despite the developments of saw resistant boots and chaps. The wearing of safety chaps was common in Louisiana; their acceptance was difficult due to hot weather and a very humid tropical region. According to Lefort *et al.* (2003) the use of these chaps decreased worker comfort and worker productivity, and there was a need for cooler PPE.

The lack of enforcement of good safety programmes by management was a major problem in the industry. Of the 107 American logging fatalities summarised in an OSHA report, 92% were caused by human factors and involved violations of safe operating procedures. The most common violation of federal safety standards was logging operating training (Bell 2002). The New Zealand Forest Accident Reporting Scheme (ARS), from which data was drawn, was used by the Centre for Human Factors and Ergonomics (COHFE) to inform New Zealand forest industry prevention research and development programmes. The scheme covered both silvicultural and logging sectors. The ARS, which has been in existence for over sixteen years, contains details of lost time, minor and near-miss incidents (Bentley *et al*. 2002). The

New Zealand forest industry strongly supported the scheme, resulting in a large majority of reported forest injuries being included in the database.

Aderaw *et al.* (2011) stated that studies done in developed and developing countries reported that men had a higher risk of occupational injury than women in manufacturing industries. According to this finding, male workers were about 2.5 times more likely to report occupational injury than female workers (AOR: 2.54, 95% CI 1.58, 4.07). This was attributed to the willingness of male workers to engage in greater risk-taking behaviour than female workers. Various studies have reported that working at a younger age increased the risk of sustaining more occupational injury among factory workers when compared with older workers. Similarly, this study revealed that workers in the age group below 30 years old were about 1.9 times more likely to report occupational injury than workers who were 30 years and above (OR 1.90, 95% CI 1.22, 2.94). This may be due to the inaccessibility of health and safety information; a lack of training on health and safety; less work experience; and a low level of knowledge and skill towards the work among young workers. Aging may result in a decrease in physical and mental abilities, however, which would in turn alter the quality of work performance and the ability to notice work environment hazards, particularly when the demand level of the task is high (Tadesse and Kumie 2007). Most occupational health and safety studies conducted in developing countries revealed that an increased educational level was associated with decreased work-related injuries; this was due to the fact that education was more likely to increase worker safety and health practices that prevented them from occupational injuries. Education alone cannot reduce occupational injury when the level of hazards is high and the use of reliable techniques and safe work organisations are limited (Aderaw *et al.* 2011).

2.8. Health and safety in forestry

Nieuwenhuis and Lyons (2002) expressed that it was difficult to assess and compare the levels of health and safety in forestry and harvesting activities internationally. The differences in reporting procedures and hazard classification systems at a national level makes it a problem to appraise statistical information. The ILO attempted to lay down a guide for collecting and analysing health and safety statistics. According to Kofi Annan, Former UN Secretary General, safety and health at work was not only a

sound economic policy, it was a basic human right. The right to life was the most fundamental right, yet every year 2.2 million men and women were deprived of that right by occupational accidents and work related diseases (International Labour Office 1998). Occupational health and safety and the well-being and quality of life of working people are crucial prerequisites for productivity and are also important for overall socio-economic and sustainable development. Safety at work and a healthy work environment are among the most valuable assets of individuals, communities, and countries. In spite of this, conditions at work and in the work environment of many organisations in Ghana involved a distinct and even severe hazard to health that reduced the well-being, work capacity and even life span of a working individual. Occupational health and safety hazards which are common in many developing countries, including Ghana, persist partially because of inadequate legislation and inspection; poor infrastructure for monitoring and services; and a universal shortage of expert manpower institutions for occupational health and safety (Amponsah and Baah 2002).

The World Health Organization(2006) (WHO) declared that with regard to occupational health and safety and living conditions in forestry, the forestry workers were exposed to high risk situations while working in forests although it cannot be denied that workers' negligence played a decision role in the causation of occupational accidents (World Health Organization 2006). Levesque (2004) reported that harvesting systems in China utilise man - machine combinations involving operations in the woods, timber transport and operations at logging yards. Felling, de-limbing and skidding were conducted on site, and bucking was usually performed in a centralised wood yard. Typical logging operations are seasonal with a high labour intensity. Due to poor management, the low level of education of workers and a lack of resources, safety was often neglected in many Chinese logging operations.

New Australian Occupational Health and Safety (OHS) statutes imposed general duties upon employers in relation to their employees or workers, and adopted a wide definition of 'worker' that included voluntary labour and family helpers. The new statutes also placed duties on employers and self-employed persons in relation to persons other than the self-employed person's or employer's employees. From the early 1990's onwards, State OHS agencies became increasingly concerned at the

number of serious incidents involving contractors. One response was for enforcement agencies to introduce programmes covering contractors in specific industries. Two such programmes were introduced in New South Wales and Victoria. In 1998, for example, the New South Wales Government entered into a Memorandum of Understanding with seventeen major contractors in construction, to work together to implement OHS best practice. The contractors committed themselves to work with the government to improve the industry's OHS and to make OHS a priority in their organisations. In the construction industry this process was a catalyst for OHS reform by establishing a framework and timetable for change for the major contractors, which would flow on to sub-contractors (Johnstone *et al.* 2005).

A number of tools have emerged from the process, including: a supervising training resource manual (covering the duty of care, risk management, OHS management systems); helping sub-contractors manage OHS; a positive performance 'Safety meter'; and hazard profiles for key work activities. In 2000, the Victorian OHS inspectorate adopted a strategy of 'zero tolerance' in the construction industry to try to prevent repeated non-compliance from site to site. The inspectorate issued notices for each breach that was detected. Where the inspectorate detected non-compliance with improvement or prohibition notices, or where it found repeated contraventions on the same or another site, an immediate investigation for the purposes of prosecution was conducted. The inspectorate began to use tools such as spreadsheets to track notices issued to contractors and sub-contractors, and kept better records of contraventions by contractors and sub-contractors from site to site. Another response was an increased level of prosecution following serious incidents involving contractors. Agencies generally targeted the major contractor, although in some cases both the principal contractor and the sub-contractor were prosecuted for breaches under the general duty provisions. In the United States of America, unlike Australia, OHS legislation was largely a federal responsibility. The Occupational Safety and Health Act of 1970 covered federal government employees and most private sector employees (Johnstone *et al.* 2005).

The Occupational Safety and Health Act of 1970 (sections 18(b)-(h) and 23) encouraged the state to develop and operate (guided by the federal OSHA) State health and safety plans if certain conditions are met. These conditions included: (i)

that a State agency was designated to run the programme; (ii) that the State agency had sufficient funds and legal authority to conduct the programme; and (iii) that the State health and safety standards were at least as effective as the federal standards. Apart from the provisions of the Occupational Safety and Health Act of 1970, which applied to contractors, the federal government and its agencies adopted three types of controls on contractors. Firstly, the federal government introduced a series of requirements dealing with its own outsourcing and similar measures have been undertaken in some States. Secondly, individual government units, such as the Department of Energy, introduced elaborate contractor management systems to govern their own operations and suppliers. Finally, there were a number of regulatory controls on contractors in particular industries (Johnstone *et al.* 2005).

2.9 Health and safety training and legislation

Training was an important determinant of work performance and efficiency and was often ignored by some organisations. Training may be expensive, however, both in terms of production and wages, and thus its effectiveness was important. The Occupational Health and Safety Act 85 of 1993 required that in terms of Section 8 of the Act every employer trained and instructed workers on the hazards associated with their work South Africa (1993:9). Safety training requirements are specific to different hazards and vary widely in their instructions about content; frequency and duration; documentation of training; trainer qualifications; and training methods. The bulk of training activities involve fundamental programmes that instruct workers to avoid known hazards through the proper use and maintenance of equipment and materials. Training can also be proactive, however, teaching workers to recognise and head off potential problems through team work and encouraging workers and supervisors to be jointly accountable for injury control (Waehrer and Miller 2009).

The employer is responsible for ensuring that any method chosen to control risk is effective. Monitoring and review is a very important aspect of health and safety management and is included in regular performance reporting to management. The extent to which safety training is transferred to actual jobsite demands, together with the employer's commitment to promote training as well as improved post-training productivity and injury outcome, affects the success of training efforts. These factors

also complicate attempts to evaluate the effects of safety training separately from other workplace factors. Waehrer and Miller (2009) also stated that formal safety training is positively and significantly associated with a higher probability of an increased number of days away from work due to injuries, and is associated with a significant reduction in the injury rate (24%). This study offered a rare look at the effect of training, benefit packages, and workplace practices on work injury. The results suggested that safety training increases the reporting of injuries but also affected days away from work due to injuries, especially in smaller firms. Safety training appeared to be more effective in preventing severe injuries in larger firms when compared with smaller firms (Waerher and Miller 2009).

Burke and Sarpy (2006) reported that methods of safety and health training range from passive, information-based techniques (e.g. lectures) to computer-based, programmed instruction and learner centred, performance-based techniques (e.g., hands-on demonstrations). Lectures, one of the least engaging methods of safety and health training, are commonly used to present health and safety-related information. Other common passive techniques include videos and pamphlets or other types of written materials. Methods of training are categorised as moderately engaging incorporated knowledge of results, for example feedback interventions in which performance information is provided in small groups, allowing learners to correct their mistakes.

Feedback is also a characteristic of programmed instruction, a method of training designed to present information in a standardised manner, such as on a personal computer or in a workbook format. An extensively used moderately engaging method, computer-based instruction, has been created for the entire workplace health and safety topics, including occupational safety; industrial safety; systems safety; fire protection; hazardous materials and waste disposal and storage; industrial hygiene; risk management; and safety engineering and design. The most engaging methods of safety and health training focus on the development of knowledge in stages and emphasise principles of behavioural modelling. Behavioural modelling involves the observation of a role model, modelling or practice, and feedback designed to modify behaviour. These methods also include hands-on demonstrations associated with

behavioural simulations, which require active participation from the trainee (Burke and Sarpy 2006).

In the case of behavioural simulations and hands-on training, interactions between trainees and trainers frequently go beyond one-way feedback and engage trainees in dialogue concerning knowledge acquired or actions taken. Such dialogue is important because it is posited to enhance the quality of reflection with respect to actions taken. This action-focused reflection is regarded as the key to knowledge acquisition and transfer of training, in that it forces the trainee to infer causal and conditional relations between events and actions, leading to the development of strategies for handling unforeseen events and initiating and promoting self-regulatory motivational processes (e.g. self-monitoring and self-efficacy expectations). Consistent with these arguments, there is ample evidence in the training literature that active approaches to learning are superior to less active approaches. As training moved from more passive information-based methods (e.g, lectures) to the most engaging methods (e.g. behavioural modelling and hands-on demonstrations), the study hypothesises that greater knowledge acquisition and more transfer of training to the work setting occurs, thereby improving behavioural safety performance and reducing negative safety and health outcomes (Burke and Sarpy 2006).

It is clear that accidents occurred in relation to some sort of contact with trees, or logs. Since all logging equipment in Louisiana met the federal standards for roll-over and falling-over object protection, it appeared that better establishment and enforcement of safe work procedures within each company was needed. Since the industry consisted of small contracting companies, the owners and employees of these companies had not had the benefit of the safety training that is common in large corporations. Effective safety education required the combined efforts of mills, foresters, loggers, industry association, government and academia (Lefort *et al.* 2003).

Bentley *et al.* (2002) declared that further research was required to determine the specific risks faced by inexperienced logging workers, particularly those in their first few months of work. The research should further identify safe practices and systems to ensure that those workers acquired the necessary skills and safety knowledge to allow them to work safely following an initial induction period. The study on evaluation

of a logger training and education programme in Virginia confirmed that safety training was successful and resulted in a significant improvement in safety practices. Loggers were gradually accepting of PPE and other safety equipment, although the continued emphasis on safety was necessary. The study further stated that continued attention to safety practices was necessary for the logging industry to bring its safety record in line with other industries (Wightman and Shaffer 2000).

Teaching basic language skills or training a worker in production-related skills, such as how to operate or repair machinery, had positive safety consequences over and above their immediate effects on worker productivity. Formal training in workplace practices (equal opportunity, environmental, or collective bargaining provisions; policies on sexual harassment and diversity; how to work in groups; time management, leadership; communication skills) affected the reported injury rate by informing workers about the remedies available to them in the event of a workplace injury. Four motivations for providing formal job skills training were included to explain both safety training and the injury rate: bargaining contracts; workers lacking in skill or needing special skills; upgrading or introducing new technology; and legal requirements (Wightman and Shaffer 2000).

Literature has indicated that there is a strong relationship between training on health and safety and reduced work accident rates among industrial workers. This was due to the fact that health and safety training motivated workers to be safer and instructed them in correct safety behaviours. This study indicated that workers who did not train on health and safety were 1.8 times more likely to report occupational injury than workers who were trained in the last year or previous years. These findings were due to the fact that training on health and safety changed both attitude and safety behaviours (Aderaw *et al.* 2011). Accident frequency in forestry work was still very high compared to other sectors. It appeared that many accidents occurred as a result of infringements of safety and health regulations. This showed the strong impact of a worker's behaviour on accidents. On the other hand there was strong evidence that there were only limited technical means for improving safety in forestry work. It was therefore necessary to focus efforts to increase safety in forestry work on measures which encourage workers to adopt safer behaviour (Aderaw *et al* 2011). The group dynamics at play in work teams fostered the development of group individual safety

norms. These safety norms again affected the safety-related behaviour of individual team members. Moreover, the team leader (who was a supervisor or a foreman) was identified as the central person affecting the safe behaviour of his/her co-workers. Based on this assumption, three training concepts for forestry work teams were developed. The empirical field study analysed the effectiveness of the three concepts and showed that training which aimed at modifying behaviour had to include the team leaders. Furthermore, it was evident that group dynamic interactions within forestry work teams had a strong impact on the individual safety-related behaviour of the team members (Aderaw *et al*. 2011).

2.10 Training effectiveness

A training programme should have a method of measuring the effectiveness of the training as one of its critical components. A written plan for evaluating the training sessions should be developed when course objectives and content are compiled. It should not be delayed until the training has been completed. Evaluation helps employers or supervisors to determine the amount of learning achieved and whether an employee's performance has improved on the job. According to Clark (2005) feedback with goal setting maximises the effectiveness of a training behaviour safety training programme in the workplace. Multi-method and participative small group training seems to have advantages for training in safety. Hands-on training methods, particularly behaviour modelling, result in the superior retention of knowledge, a transfer of learning and end-user satisfaction. If workers identify with the person doing the training, their behaviour changes as a result of the training more than those who do not identify with the trainer. Thus, if safety training is administered by a professional staff trainer or manager then it is likely to be more effective for workers than training provided by an acknowledged peer. Caring, supportive and empowering management significantly improves the impact and effectiveness of safety training (Mark 2010).

More research is needed in the area of developing safety culture change through training. Burke and Sarpy (2006) reported that the method of training ranges from passive, information based techniques (lecturers) to computer based, programmed instruction and learner centred, performance based techniques (hands-on demonstrations). Lectures were the least engaging methods of safety and health training but were commonly used to present safety and health-related information.

Other common passive techniques included pamphlets or other types of written materials (Burke and Sarpy 2006). In measuring training effectiveness, the training literature emphasized the importance of obtaining feedback from those being trained in order to maintain buy-in and for updating programmes. Sixty-eight percent (n=27) of the respondents said that they had never evaluated their employees' attitudes toward the company safety programme. Some of the comments from the thirteen companies who evaluated employee attitudes were that they had a round table discussion and asked employees about the training and what can be done better, they asked for feedback and they helped to develop the system that was used. Ninety-five percent (n=38) of companies provided training; documented it primarily by using sign-in sheets; kept attendance records; and provided certificates for workers who completed the training. Only 33 % (n=25) actually measured the effectiveness of the safety training. This was done by observing on-the-job performance (88%); measuring employees' satisfaction with the training (36%); looking at accident and near-miss accident rates (32%); conducting formal testing (28%); evaluating worker compensation rates (12%) and the experience modifier rate (Goldenhar *et al.* 2001).

2.11 Labour outsourcing

Prior to the mid-1990, full-time employees of the company carried out all core operations in the forestry industry in South Africa. At that time the use of contractors was limited to non-core work and operations took place on marginal sites. Between 1997 and 2001 over 10 000 workers were retrenched, which was 93% of the workforce. The same happened in all the major forestry companies in the country, with the exception of those still owned and managed by the State (Clarke 2005). There were a variety of reasons for this major shift in labour policy in the South Africa forestry industry in the late 1990's. Outsourcing was introduced after the 1994 elections and the promulgation of legislative reforms governed labour relations and basic conditions of employment. The trend also coincided with South Africa's re-entry into the global economy at a time when, internationally, labour outsourcing was a dominant trend across many sectors.

In Company B's forests, some key events were instrumental in the decision to outsource labour. There were disparate salaries and working conditions amongst labour as a result of the acquisitions and financial implications brought these on par.

These and other factors led to fears about the risks associated with the direct employment of a large unskilled work force and led to the decision to virtually outsource all wage labour. Clarke (2005) stated that the impacts of outsourcing on labour conditions of individual forest workers were immediate and catastrophic. In the first place, 10 000 jobs were lost and not all workers regained employment with contractors. Workers employed by contractors not only lost job security but also a range of other benefits, including pensions, access to loans and funeral assistance. Although union membership never reached more than 30% on any of the Company B estates during the years of full-time employment, after outsourcing membership fell away almost entirely. The services and villages had already begun to decline as a result of various factors, and outsourcing was their death knell. Meals served from kitchens in workers' villages were already being phased out at the request of unions, whose members elected to receive extra payment rather than food. After outsourcing, workers received neither the additional income nor meals. Clinics that provided workers and their families with primary and secondary health care were phased out, initially as a result of labour outsourcing and later because of a change in legislation that made it necessary for all persons dispensing medicines to have a license, rather than the company holding a single license for all its clinics. Company-supported crèches were closed too, as contractors who took over the villages for the housing of their staff were not able to maintain them and pay the salaries of the staff. Mondi began to address problems that arose out of the contracting environment in the early 2000's, culminating in a far-reaching and well-funded package of labour reforms introduced in 2008. Although FSC certification played a part in these reforms, the main impetus came from the direct effects of the labour crisis, including an increase in occupational injuries and fatalities; productivity decline; high levels of absenteeism and labour turnover; and a general labour shortage (Clarke 2005). A number of independent studies were published that highlighted the plight of forestry contractors and forestry labour (Manyuchi and Pulkki 2002; Scott 2004). These came to the attention of progressive senior staff and Board members who were instrumental in creating the vision and policy direction for the reform programme.

The standard of worker training declined as a result of outsourcing, which contributed to increased accident rates and lowered productivity. Previously, contractors were expected to ensure their workers were trained, and a flat rate of 2% of the total contract

price was paid over to contractors for this activity. An agency was contracted to manage the delivery of training on behalf of all contractors. Annual training plans were produced for all contractors based on a training matrix that specified training requirements for each job type. Company B paid training providers directly on the basis of the plans. Expenditure on training increased from 2% to between 6-7 % per tonne of timber delivered as a result of the new system, and according to Company B, the standard of training had improved significantly. Clark (2005) explained that a moratorium on the employment of new labour was declared in the early 1990's, along with the natural attrition of the remaining companies' workforce; this resulted in unbalanced work teams that impaired production. Harvesting, being a strenuous job, was the first to be passed on to contractors. In a number of companies the high capital investment replaced an ageing fleet of production machines, further boosting the outsourcing process.

In 1992 the Food Agriculture Organisation (FAO) reported a continued strong trend towards the use of contractors. Initially it was mainly transport and harvesting operations, although plantation maintenance soon followed. By the mid-1990's contract operations were beginning to dominate, as forestry companies did not justify the existence of their own harvesting operations. Some foresters and their workers were retrenched and given assistance to set up their own contracting businesses, a system that proved to be very successful in certain cases (Clark 2005). At the beginning of 2001 the relationship between contractors and companies was at a low point because of various conflicting issues. These issues related to a master/servant attitude towards contractors; the inflexibility of contractors; short-term contracts; a lack of training, and of research and development by contractors; frequent changes to timber orders by mills; a lack of mechanisms for the adjustment of paying rates to match fluctuating work volumes; and a lack of support by grower management (South African Forestry Magazine 2009).

SAFCA offered assistance to all contractors regarding public liability and other insurance, forestry technical assistance (harvesting, silviculture and transport), and business related assistance and training (capacity development). The SAFCA also had access to various consultants and entities and assisted contractors by introducing them to these persons or entities to address specific needs.

There has been a strong trend in recent year to use contractors in forestry operations. This includes transport, planting and harvesting, although each company differs in the work that it sub-contracts. About 15 000 people were estimated to be employed by forestry contractors (Clarke 2005). Problems have been experienced by both forestry companies and workers as a result of this trend, including the poor quality of work by contractors. This is related to being under-equipped, lacking experience, and employing workers without the necessary skills to adhere to accepted operating standards. Among the problems faced with contractor workers are issues of payment of unacceptably low wages, insecurity among workers employed by contractors and social problems in some of the forest villages.

2.12 Contract work and contractor management

The increasing reliance on contractors and self-employed people often meant that the forestry sector moved backwards in terms of skill levels, safety and health, working conditions and quality. Contractors were usually hired only for a specific and relatively short duration (Blomback 2006). The shift to contractual arrangements also meant that large companies transferred labour issues to the contractor, including safety and health matters; workers' compensation; regulatory requirements; unemployment insurance; fringe benefits and training. Voluntary and mandatory registration systems for contractors were established in South Africa, making safety and skill certification a pre-requisite for registration. In recent years contractors were forced to take safety more seriously due to increased pressure from their corporate clients, particularly work practices and the vehicles and travel-related aspect of their business. The safety costs and training were borne by the contractor with a relative increase in payment rates from their clients (Mack 2010). Permanent employees received the same training as the contract employees and sometimes had the opportunity of getting more advanced training, as the employer would be prepared to bear the cost. Additionally, the quality of the PPE that contract and permanent employees received differed considerably. With increased labour turnover, contractors were reluctant to invest in PPE, which compromised the health and safety of contract employees (Mack 2010).

Company B Forest Stewardship Council (FSC) stated that the standard of training declined as a result of outsourcing, and this contributed to increased accident rates

and lowered productivity. Previously, contractors were expected to ensure that their workers were trained and a flat rate of 2% of the total contract price was paid over to contractors for training. An agency is contracted to manage the delivery of training on behalf of all contractors. Annual training plans produced for all contractors based on a training matrix that specifies training requirements for each job type. Company B pays training providers directly on the basis of the plans. According to Company B the standard of training has improved significantly (Clarke 2005).

Lilley *et al*. (2002) advised that the restructuring of the forestry industry in New Zealand occurred in the late 1980's. The introduction of competitive independent contractors, rather than company crews, have influenced those within the industry to increase quality and productivity in an increasingly competitive environment. Contractors negotiated the rates of payment set on production rates, with the expectation of delivering high volumes and a better quality of timber. These structural changes had an impact on workers in terms of fatigue, stress and worker retention, with longer hours and poor pay being common (Blomblack 2006). Workers also travelled long distances every day or remained for several days or weeks in camps near the workplace, where camp standards were low. Working conditions were unattractive and turnover was high, which made it impossible to stabilise the workforce. A high labour turnover drained skills and reduced productivity and earnings (Blomback 2006), with longer hours and poor pay being common (Lilley *et al.* 2002).

The SAFCA was established to provide services to contractors and to improve the quality of services provided by the training providers. Additional concerns surrounded the fact that since the outsourcing of forestry operations to contractors within South Africa, it was believed that work practices had been negatively influenced due to contractors lacking the appropriate knowledge or resources concerning safe work practices (Manyuchi and Pulkki 2002). Workers were also affected by the payment of low wages, thus exacerbating the poor socio-economic status of workers. In South Africa, workforce stability varied amongst the forest harvesting contractors; some contractors had a stable workforce and others did not. Factors that influenced workforce stability included supervision and the management style of the organisation, the time of the month, cultural practices and geographical location. According to Manyuchi and Pulkki (2002) labour turnover was highest amongst manual log de-

barkers and stackers, who were the lowest paid workers. Increasing voluntary registration systems for contractors was established in South Africa, and the United Kingdom made safety and skill certification a pre-requisite for registration (Blomback 2006).

2.13 Issues associated with contractors

A policy for wage bargaining went towards relieving the conditions of employees who worked for small growers and contractors, however in relation to contractors (and particularly those involved in core forestry activities such as planting and harvesting) additional measures were necessary. The aim was to ensure that contractors met the minimum standards with regard to health and safety provisions, as well as wages and working conditions. Another option was to charge the large companies which employed the contractors with the responsibility to ensure that their contractors met basic conditions before employing them (Sustainable Forest Development in South Africa 1997).

The literature reviewed suggested that the majority of forestry companies experienced serious occupational incidents and poor working conditions. Given the difficult nature of the forestry industry both in terms of jobsite and workforce, it is understandable that accidents happen, even if workers had been trained. There is a need for future research to make training more attractive, accessible and efficient among forestry contractors. Providing tools to forestry contractors to assess training effectiveness will be beneficial for programmes as well as research. While the majority seem to provide training, there is little time spent assessing the quality or effectiveness of the training in terms of the actual knowledge gained, or skills enhancement. It was also recommended that adult learning principles be used to enhance existing training. Most contractors did not quantitatively evaluate their health and safety programmes in terms of increased production, reduced risk exposure or job satisfaction.

CHAPTER 3: RESEARCH METHODOLOGY

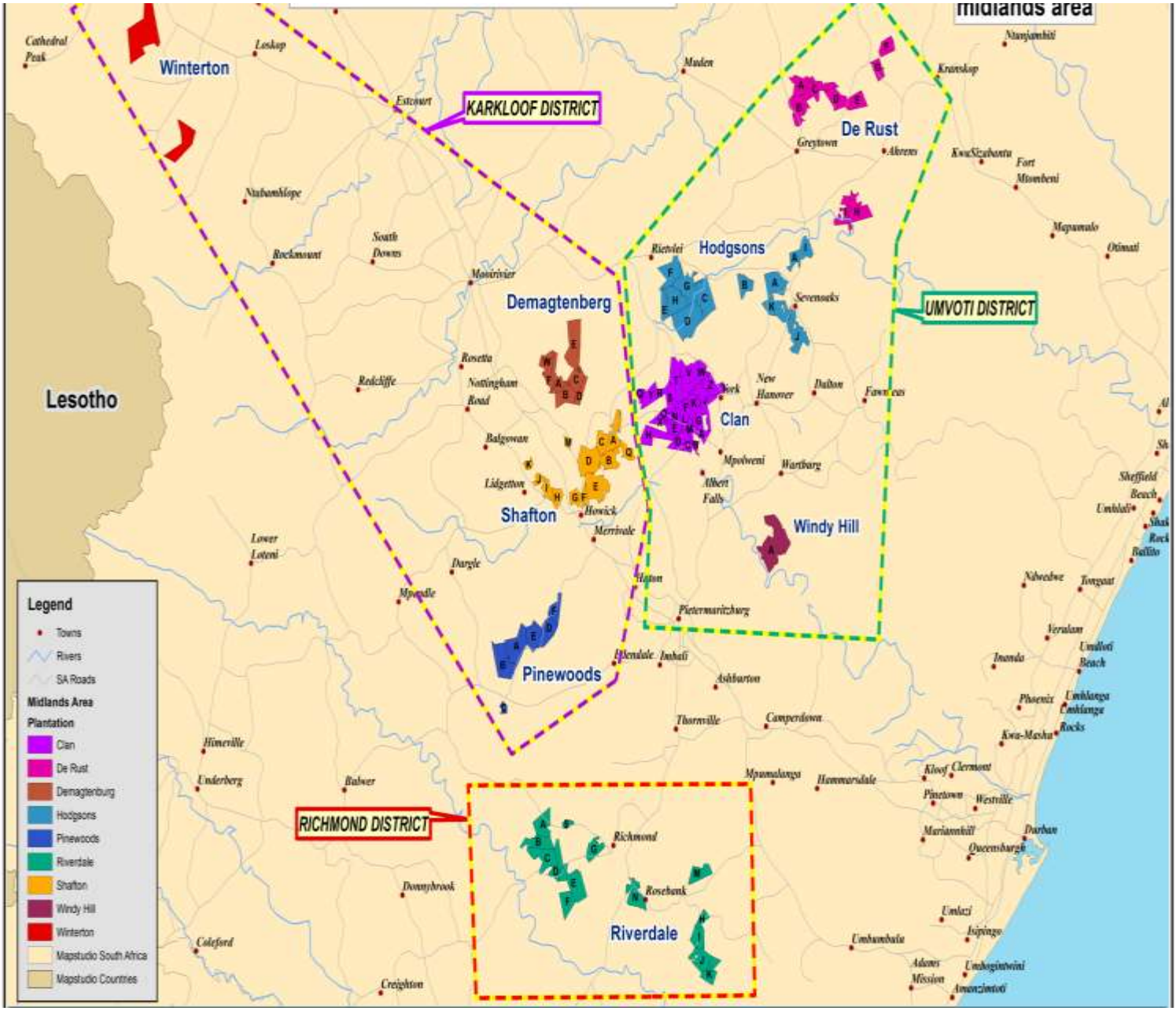
3.1 Study design

This is a cross-sectional descriptive study using a quantitative approach to assess the effectiveness of health and safety training to reduce occupational injuries.

3.2 Study Site

The study was conducted on a forestry company in KwaZulu-Natal province (KZN), South Africa, in the Midlands and KZN South areas. The study subject was an integrated forest products company meeting the needs of domestic as well as international customers through a wide range of products. The company is one of the major economic contributors in KZN. The company operates through three divisions, which are the specialised cellulose division, the pulp and paper packaging division and forests. The forest division supplies 70% of the wood fibre needs of the company. The research study focused on the forestry division of the company.

Figure 3.1: KZN Midlands study sites - Karkloof, Umvoti and Riverdale areas where three contractors are situated (Geographic Information System 2014). http//pmb/s17.za.sappi.com/GIS/index.html. (Accessed 12 November 2014).



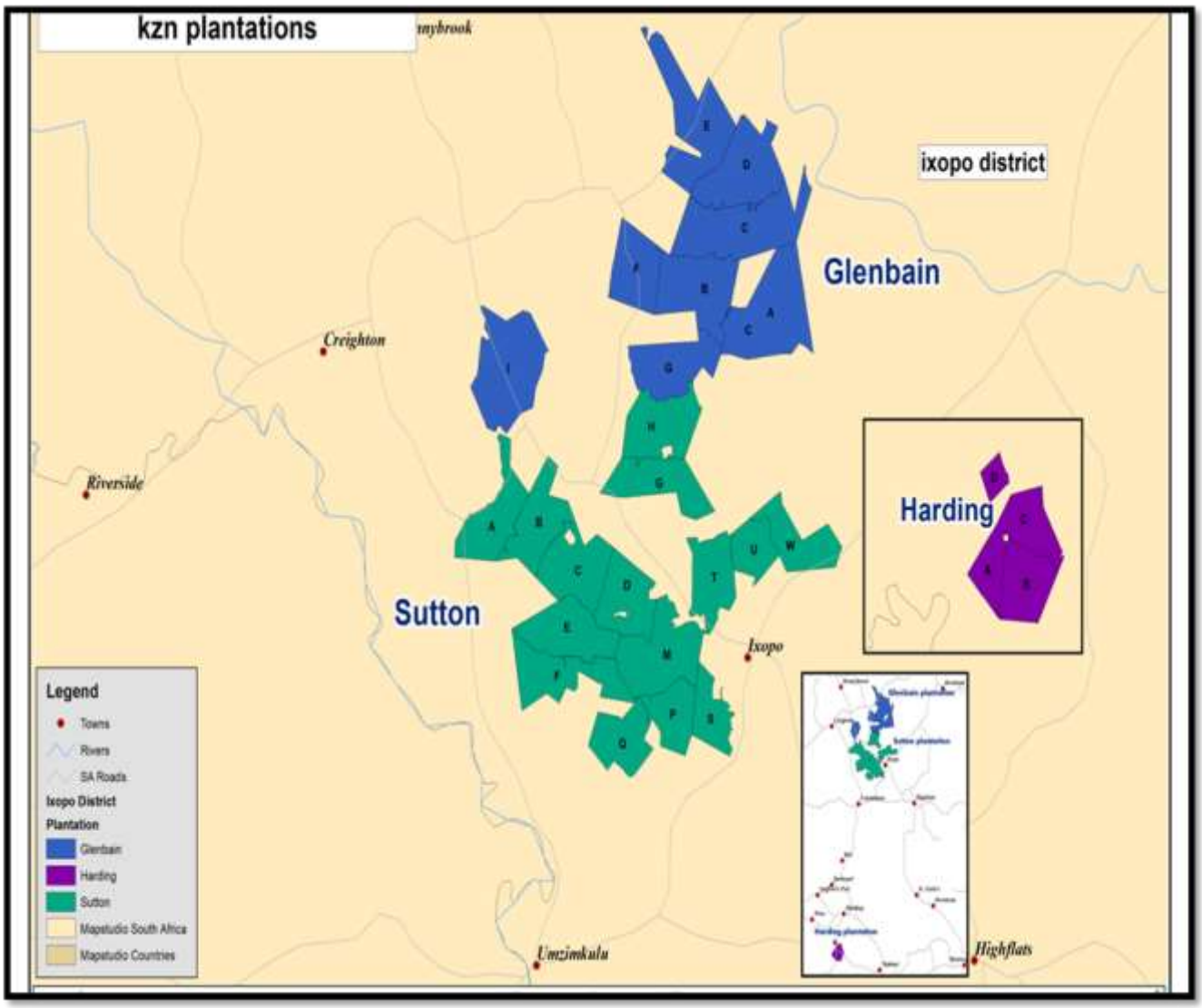


Figure 3.2: KZN South study sites - Ixopo area, Highflats where three other contractors are situated (Geographic Information System 2014) http//pmb/s17.za.sappi.com/GIS/index.html. (Accessed 12 November 2014).

KZN Midlands and KZN South districts were selected as study population as they were easily accessible to the researcher. These two districts have also employed more contract workers and the contractor employed more workers in harvesting operations. In addition, these two districts experienced more severe injuries and fatalities compared to the Zululand which was excluded in the study. There were more manual harvesting activities in KZN South and Midlands districts.

3.3 Study population

Six harvesting companies contracted to forestry company A in KwaZulu-Natal were used as the sampling population, they had employ more workers. A total of 300 contractor employees, including the harvesting crew, were sampled. The sample comprised of chainsaw operators who were felling trees; chainsaw operators who were cross-cutting and de-branching; manual stackers; pushers/markers; cable yarding operators; de-branchers; manual de-barkers; labour carrier drivers; bell logger operators; and tractor drivers. The sample represented all the harvesting contractors' employees operating at the forestry company's KZN plantations. The study focused mainly on the Midlands and KZN South contractors. Six contractors were selected from these areas, three contractor companies from the Midlands and three contractors from KZN South, with fifty questionnaires randomly distributed to each contractor employee. Forest contractors from the Zululand area were not included in the study, as this district was too far from the Midlands and South plantations.

3.4 Inclusion criteria

- Contractors with 100 or more employees.
- Must be contractor employees only and harvesting contractors located in KZN Midlands and KZN South.
- Employed for at least six months prior to the study.
- Contractors who have a fixed contract with the study company.
- Employees who have received health and safety training.

3.5 Limitations

The baseline of knowledge before health and safety training was not known. It was difficult to get more people who were injured previously due to labour turnover in forestry. The more trained workers left and join other forestry companies, looking for better prospects. Due to the under-reporting in certain instances the incidents may not be a true reflection, as only the ones that were recorded on the company incident register could be analysed. Answering the questionnaire may lead to bias and some people may be concerned about their jobs. Some participants indicated that they were not injured but they completed sections of the questionnaire about injuries.

The study focused on plantation forestry only, and manual harvesting operations which was a highly hazardous operation with many injuries and fatalities.

3.6 Data collection

3.6.1 Recruitment

The questionnaire was administered by the researcher and a trained field worker, and piloted prior to the commencement of the study. Pilot study suggested that questions were too long and that some questions were too vague and those concerns were addressed in the final data collection tool. The distribution of consent forms took place at the plantations. The field worker was used to assist with the completion of the questionnaire where assistance was required. The field worker received training on health and safety so that he understood the questions and the study. He was also trained on how to administer the questionnaires and to deal with subjects of the study who were illiterate. Questionnaires were formulated in English, translated into IsiZulu and then translated back to English to verify credibility. Data collection took place from the 6 March to the 6 April 2014. The administration of questionnaires took place from 09:00 a.m. from Mondays to Thursdays and was completed before 14:00 p.m. This was done in such a way that the normal daily tasks were not compromised. Questionnaire administration was done on site in the designated safety area (Appendix 4). Questionnaire was distributed to all participants and field worker assisted with the questionnaire completion. Direct observations of behaviour was recorded on the observation checklist by the researcher. The questionnaire consisted of the following sections:

Section A – Personal data (Demographics).

Section B – Health and safety knowledge.

Section C – Occupational injuries.

Section D - Attitudes of employees towards safety.

Section E – Safety practices.

Section F – General comments by the participant.

A period of two weeks was used to complete the questionnaires in KZN South and another two weeks was used for the completion of questionnaires in the Midlands area. The questionnaires were all completed and returned within one month.

3.6.2 Population sampling

Employees' knowledge, attitudes, and practices regarding health and safety were evaluated by means of a quantitative administered questionnaire. In addition, direct observation of work practice in terms of Occupational Health and Safety standards was undertaken by the researcher. A planned job observation in each category was done using a checklist; this was compared with the written safe work procedures. A direct observation checklist was also used to collect data on the behaviour and attitude of workers (Annexure 6).

3.6.3 Retrospective accident analysis

The work-related accidents that occurred in the period 2009-2013 that had resulted in lost time injuries and fatalities were analysed on the basis of the company accident reports made by Safety, Health, Environment and Quality (SHEQ) department (Appendix 5). The reliability of the accident data was regarded as high because these incidents were reported, captured and investigated as they occurred and reports were kept for future reference. The contractor companies provided the information on the number of hours worked monthly and other statistics. The incident registers were obtained from the regional office with the permission of the Safety, Health, and Environment and Quality manager. A retrospective review of injury registers and the medical records of employees who sustained work related injuries during 2009-2013 was undertaken. A dataset was compiled from the records of each fatal and lost time incident; variables in the dataset included sex, age, occupation, cause of fatality or injury and agency (lost time=cost to company). Additionally, the training records of each employee involved in an incident was obtained from the contractors' office and reviewed.

3.7 Ethical considerations

Ethical approval was sought from the Institutional Research Ethics Committee at the Durban University of Technology (IREC Ref No 51/13) Appendix 3. Informed consent was signed by all participants (Appendix 2) before the commencement of the study. This was translated into IsiZulu (Appendix 2). No coercion was used. Permission was obtained from the study company to conduct this study. Permission to access electronic data was obtained from the regional SHEQ manager of the Forestry Company. Both confidentiality of data collected, participants' identification and the company name was maintained in the final report and all outputs emanating from this study. Participation was voluntary.

3.8 Data management and analysis

Data was initially captured into Microsoft Excel Software and the process of cleaning and editing the data was completed. Statistical analysis was performed using SPSS Statistics version 18.0 (IBM, Somers, NY) and STATA (version 12, College Station, TX, USA).

After completion of the data collection, data entry and data verification phases, descriptive analyses were conducted. Frequency distributions of categorical variables and means, standard deviation and ranges of continuous variables were calculated. Bar charts, line graphs, and pie charts were used to illustrate data variables and cross tabulations. Fatalities and lost time injuries were analysed in terms of demographic, occupational and accident variables to identify patterns and key risk factors. Bivariate associations between categorical variables were done using the Pearson's Chi squared test. A score of responses on the likert scale was used to determine effectiveness of safety training. Training effectiveness was determined as a raw score from questions based knowledge of emergency procedures, safety training and hazard information, their ability to work safe, understand the importance of safety training and the use of PPE.

Ordinal regression modelling was used to explore effectiveness of safety training with respect to knowledge, attitude and practices of workers. Age, work experience and gender were used as independent variables. Odds ratios were calculated for ordinal outcome variables. 95% Confidence intervals were calculated and p values <0.05 were considered statistically significant.

CHAPTER 4: RESULTS

4.1 Demographics

The demographic characteristics of the study population (N=300) are summarised in Table 4.1. All participants who met the inclusion criteria for the study were approached and a 100% participation rate was achieved. Permission to conduct the study on site was granted by the company concerned. The average age of the respondents was 30.6 years and a higher proportion of forestry workers were males (72%). The majority of participants were between 25-34 years of age. The results showed that 87.4% of the respondents had less than four years of experience. In forestry the results showed that supervisors, chainsaw operators, manual stackers and de-barkers formed a larger proportion of the sampled population.

Table 4.1: Demographic characteristics of the study population (N=300).

Variable	**N (%)**
Age (Mean, SD)	30.68(9.33)
Younger than 25	38(12.6)
25-29 years	101(33.6)
30-34 years	63(20.9)
35-39 years	52(17.3)
40-44 years	29(9.6)
45-49 years	8(9.6)
50 and above	9(3.0)
Sex (Male)	216 (72%)
(Female)	84 (28%)
Experience	
Less than 1 year	76(25.3)
1 year	65(21.7)
2 years	69(23.0)
3 years	53(17.7)
4 years	11(3.7)
5 years	12(4.0)
More than 5 years	14(4.7)
Position	

Supervisor	61(20.3)
Chainsaw operator	40(13.3)
Cable yarder operator	1(0.3)
Marker/pusher	64(21.3)
Manual debarker	67(22.3)
Manual stacker	46(15.3)
Short haul unit operator	11(3.7)
General worker	9(3.0)
Other	1(0.3)

A chi-squared test analysis of the data showed a statistically significant difference ($p<0.05$) between male and female employees within and between all age groups with the exception of the 35-39 years ($p=0.26$) and age group 50 and above ($p=0.96$) as summarised in Table 4.2.

Table 4.2 Age and gender distribution of study population (N=300).

Age	**Gender Male**	**Gender Female**	**p-value***
<25	31 (81.6%)	7 (18.4%)	0.000
25-29	70(69.3%)	31 (30.70)	0.000
30-34	45(71.4%)	18(28.6%)	0.001
35-39	30 (57.7%)	22 (42.3%)	0.267
40-44	26(89.7%)	3(10.3%)	0.000
45 – 49	7(87.5%)	1(12.5%)	0.034
50+	7(77.8%)	2(22.2%)	0.096

P<0.05 was considered significant.

4.2 Health and safety training

Figure 4.1. Summary of the Likert scale responses to statements relating to health and safety training.

About 95% of respondents indicated that they had received health and safety training at work, both when they commenced the job and then annually. Eighty percent of respondents indicated that training providers need to improve the quality of training, with 97.3% stating that they can work safely after having attended the training (Figure 4.1). Information about the hazards associated with their work was explained to about 93% of the respondents, with 74% of respondents reporting that training was given in a language understood by everybody. When asked about whether health and safety training reduces incidents and improves worker safety, 96.7% of respondents were in agreement that it does (Figure 4.1).

Table 4.3: Evaluation of Health and Safety training received by participants (N=300).

Period trained	**N(%)**
During the past 6 months	182(60.9)
Last year	77(25.8)
Over a year ago	30(10.0)
Never	10(3.3)
Respondents rating training	
Excellent	116(38.7)
Good	135(45.0)
Average	44(14.7)
Poor	5(1.7)
Contents of training provided	
Too general	74(24.7)
Satisfactory	109(36.3)
Visual aids used	104(34.7)
Waste of time	13(4.3)

When asked about the period they were trained, 60.9% of respondents reported that they were trained during the past six months; 10.0% were trained over a year ago; and 3.3% indicated that they were never trained. Regarding health and safety training content, 24.7% responded that the contents of the training was too general, whereas 36.3% were satisfied with the training and 34.7 indicated that visual aids were used to make training more meaningful. Only 4.3% of the respondents felt that health and safety training was a waste of time. Nearly 84% of the respondents were satisfied with the training (Table 4.3).

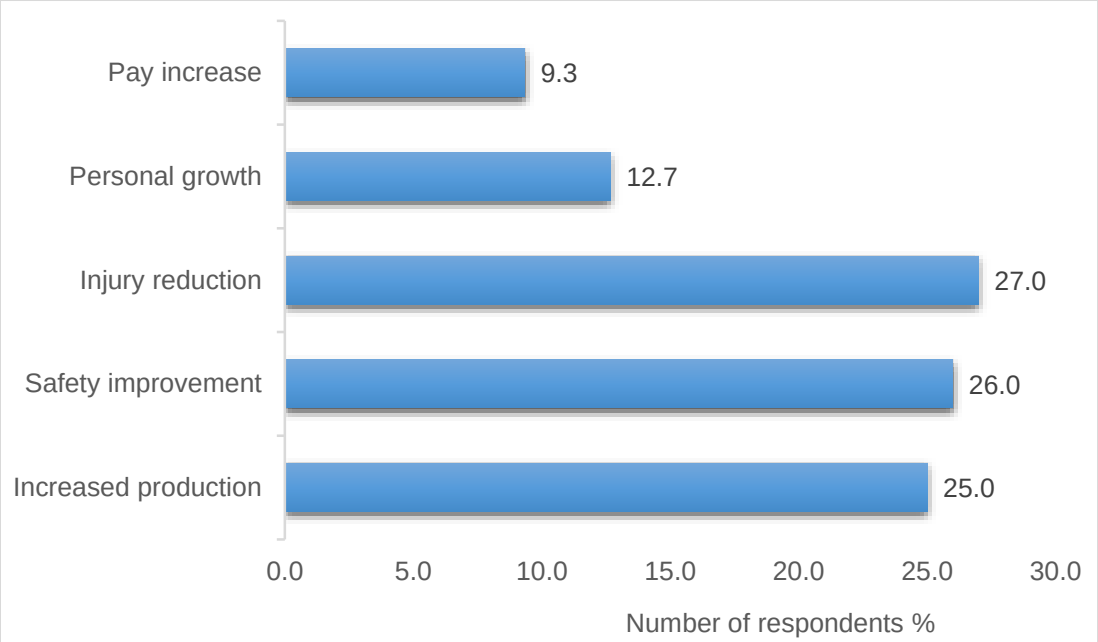


Figure 4.2 Positive outcome associated with health and safety training (N=300).

Twenty-seven percent of the respondents indicated that the benefit of training was that it reduced injury; 26% stated that training improved health and safety; whereas 25% indicated that training increases production (Figure 4.2).

4.3 Characteristics of occupational injury

Seventy respondents indicated that they had experienced accidents while at work and 230 had not been injured at work.

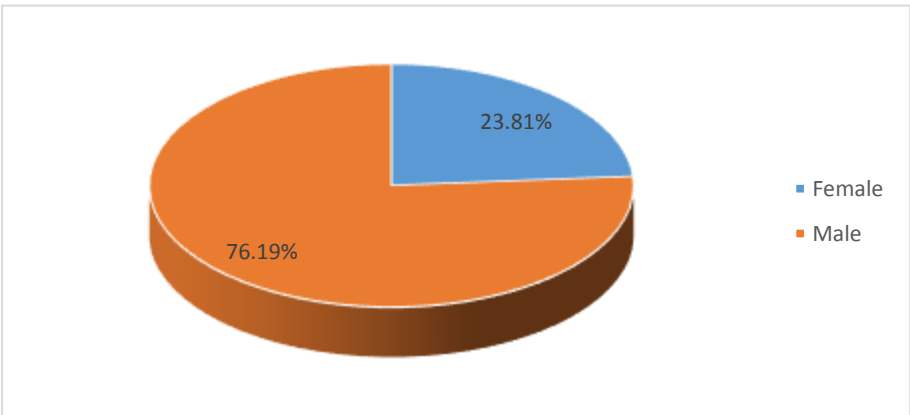


Figure 4.3 Respondents occupational injuries (N=300)

About 76.2% of the respondents who experienced injury at work were males, with only 23.8% female workers experiencing an occupational injury (Figure 4.3).

Table 4.4 Injury stratified by age (N=70)

Variable	Injured N (%)
Age(years)	
<25	17(26.9)
25-29	23(36.5)
30-34	8(12.7)
35-39	5(7.94)
40-44	9(14.29)
45-49	1(1.5)

Almost 36.5% of the injured respondents were between the ages of 25-29 years, while 22.1% of injured respondents were between 30-34 years and 26.9% of the respondents who experienced injury were younger than 25 years. Almost 8% workers who experienced an injury at work were between the ages of 35-39, 14.3% were between 40-44 years, with only 1.5% who were between 45-49 years experiencing injuries while at work. This data set showed that the majority of young workers sustained more injuries than older workers (Figure 4.4).

Table 4.5 Occupational injuries stratified by work experience (N =70).

Work experience	Injuries
Less than 1 year	27(42.8)
1 year	12(19.0)
2 years	13(20.6)
3 years	6(9.5)
4 years	2(3.1)
5 years	2(3.1)
5years and above	1(1.5)

It was evident that employees with less experience at work experienced more injuries than employees with more years of experience at work (Table 4.5).

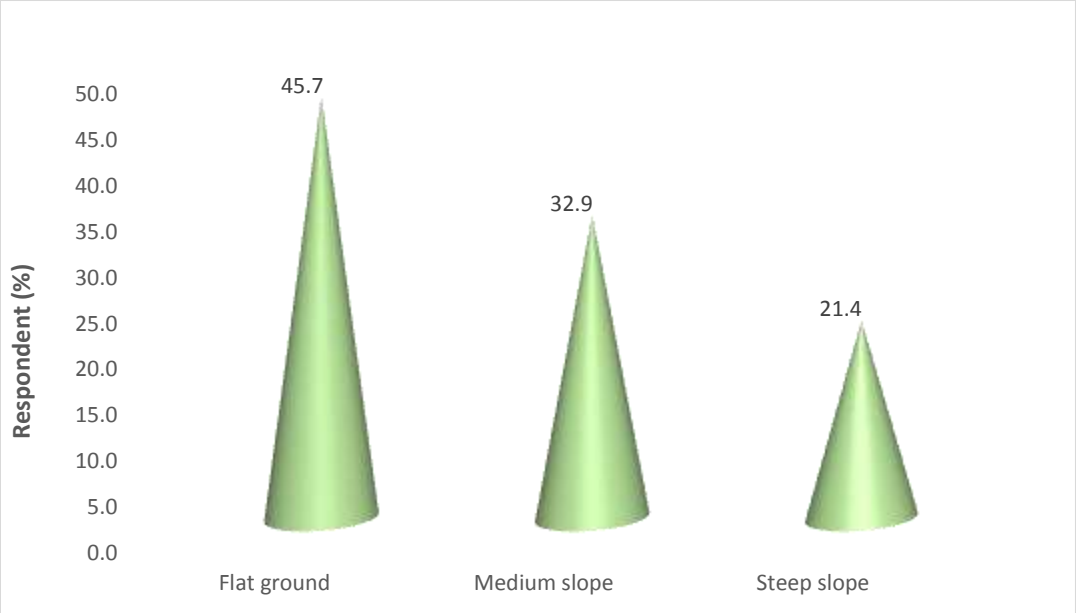


Figure 4.4 Description of the terrain where accidents occurred (N=70).

Nearly half (45.7%) of the respondents indicated that the injury occurred on flat ground; 32.9% of the accidents occurred on a medium slope where slip, trip and fall accidents were experienced; and only 21.4% of accidents occurred on a steeper slope. Workers have practiced precautions on steep areas compared with flat areas (Figure 4.4).

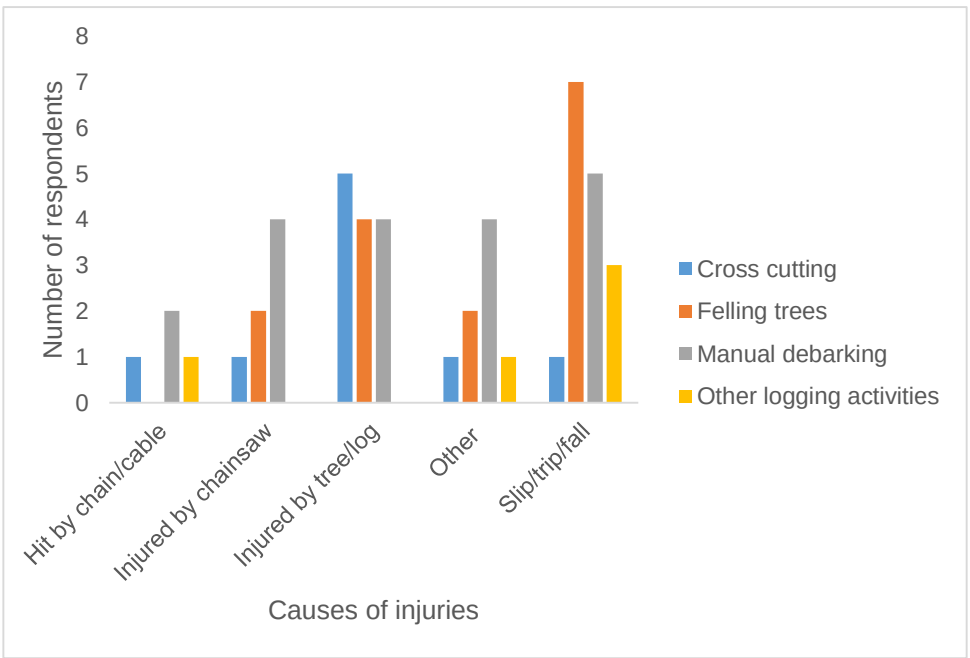


Figure 4.5 Relationship between activity and cause of the accidents (N=70).

(p=0.04)

Almost 31.3% of the accidents occurred while felling trees, the primary cause, whilst felling trees was slip/trip/fall (14.6%). Only 8.3% of the injured workers were struck by a tree or log whilst felling trees. Injuries caused by a chainsaw cutting the workers were only 4.2%. About 8.3% of injuries from de-barking were as a result of being hit by a rolling log while. Eighteen percent of the accidents happened whilst cross-cutting trees, with 10.4% of injuries occurring as a result of being hit by tree or log, and 2.1% of injuries occurred due to slip, trip and fall. Ten percent of injuries occurred while workers were involved in other logging activities such as driving short haul vehicles and transporting labour on the plantation roads and extracting timber using cable yarding (Figure 4.5). Bivariate testing using the chi-squared test showed no significant association between activity and cause of accidents ($p > 0.05$).

Table 4.6 Factors contributing to the occupational injuries (N =300).

Variable	**N (%)**
Defects in tree	10(3.3)
Dead tree	18(6.0)
Weather conditions	15(5.0)
Heavy brush/ground cover	9(3.0)
Rough terrain	20(6.7)
Distracted by co-workers activities	2(0.7)
Working too fast	22(7.3)
Excessive noise	3(1.0)
Working when tired/ too fatigued	9(3.0)
Handling heavy objects	8(2.7)
Misjudged time/distance	1(0.3)
Not paying attention	8(2.7)
Unaware of hazards	11(3.7)

When asked about factors contributing to the injury, 10.6% reported that the injury was caused by dead trees whereas 6.7% reported that rough terrain contributed to the injuries. Five percent indicated that weather conditions were a contributing factor to the injuries (Table 4.7). Working too fast in chasing production targets was reported by 7.3% of injured workers as another contributing factor, while 3.7% reported that they were injured as they were not aware of the hazards. Working when tired or fatigued was reported by only 3.0%.

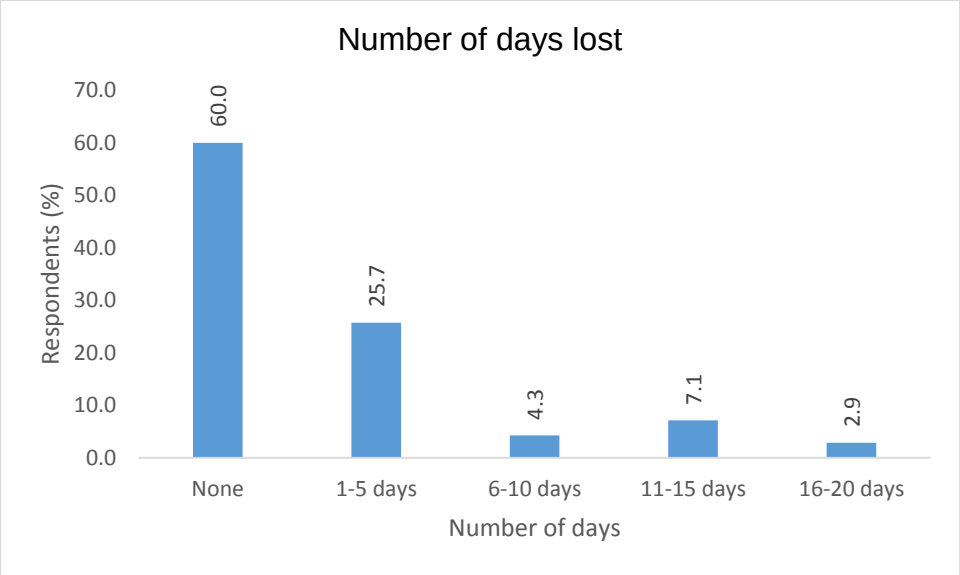


Figure 4.6 Number of days lost as a result of occupational accidents (N=70).

Twenty-five percent of workers had to stay away from work for at least five days. Injuries caused by tree felling had the highest severity of eleven to fifteen days away from work. Almost 40% of accidents were lost time incidents where workers had to stay at home, with severity days not more than 20 days.

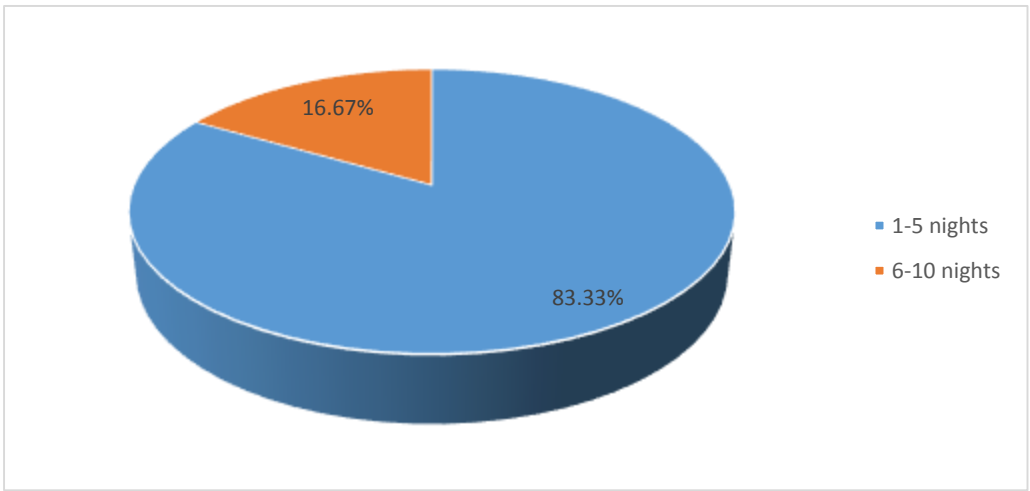


Figure 4.7 Period hospitalised as a result of occupational injury (N=12).

Of the 70 injured participants only twelve were hospitalised, with 83.3% staying for not more than five nights. The remainder were hospitalised for between six and ten nights. These accounted for 85% of the injuries causing lost time. This indicates that the injuries were severe and required medical attention.

Table 4.7 Refresher training given after an accident (N=70).

Variable	N (%)
Refresher training given	
Strongly agree	19(30.6)
Agree	13(20.9)
Neutral	0
Strongly disagree	7(11.3)
Disagree	23(37.1)

About 50% of the workers who were injured agreed that they were given refresher training pertaining to their jobs, after an injury before going back to work (Table 4.7).

4.4 Company injury profile 2009-2013

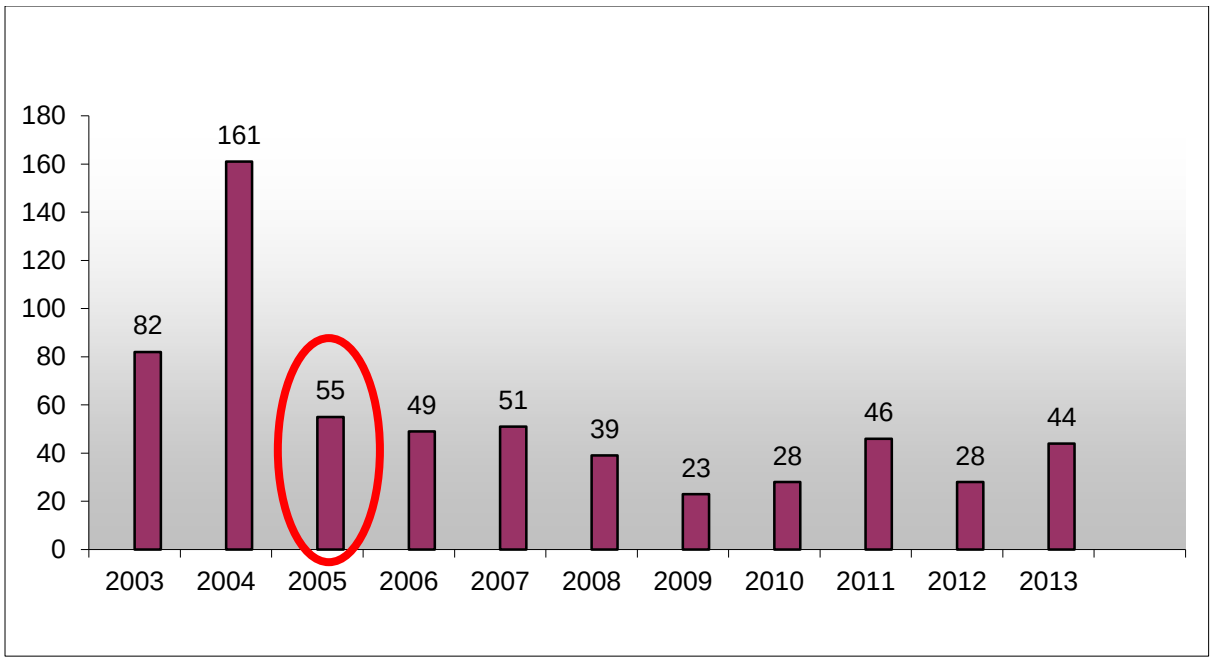


Figure 4.8 Lost time injuries of Company A study company for the period 2003-2013.

Six hundred and six lost time injuries were experienced during the period 2009 to 2013 in the forestry company understudy on all its operations. Figure 4.8 depicts injuries stratified per year. Most injuries were reported in 2004. The formal training of all workers, especially chainsaw operators, was enforced in 2005.

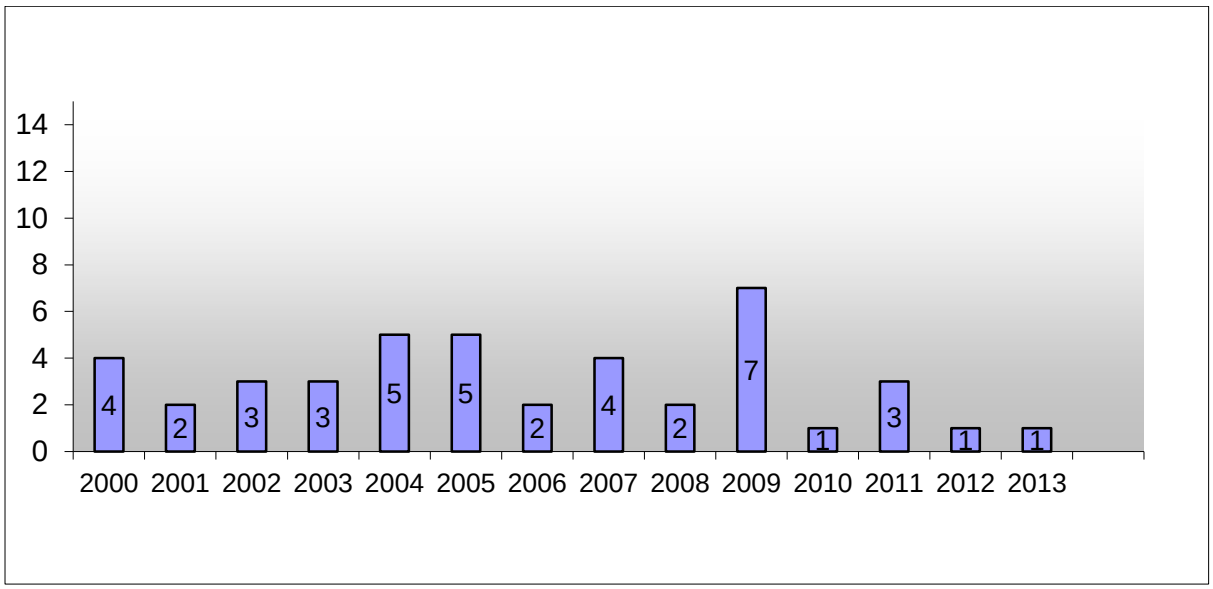


Figure 4.9 Fatalities experienced in the study company's forestry operations for the period 2000-2013.

Forty-three fatalities were reported for the period from 2000 to 2013. Most of these fatalities involved chainsaw operators felling trees and the transportation of workers within the plantations, as well as the use of three-wheelers whilst loading timber.

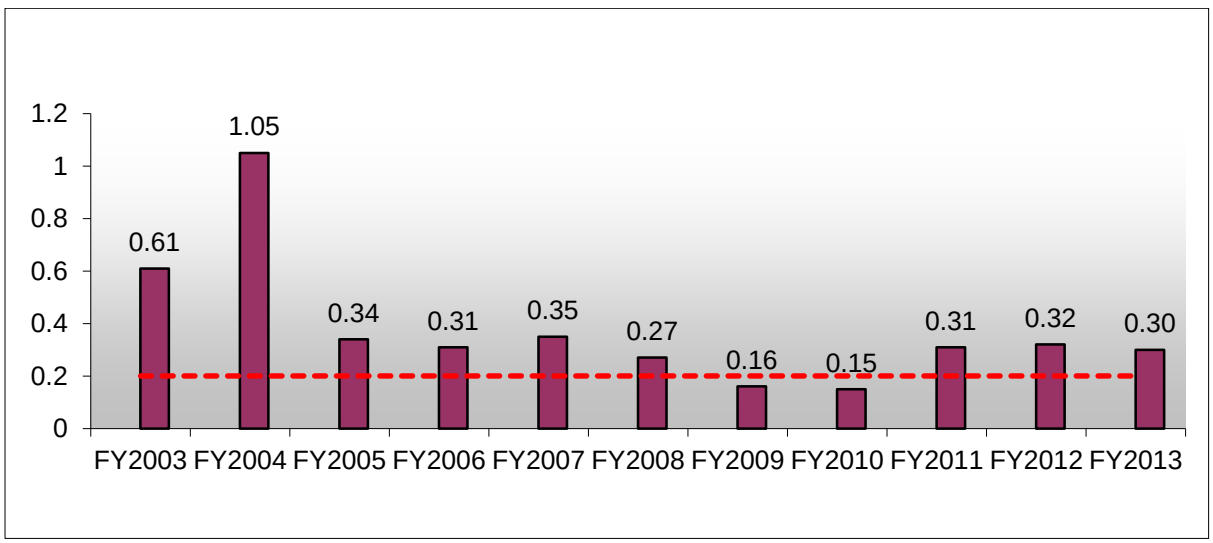


Fig 4.10 Lost time injury frequency rate for the period 2003-2013 (target = 0.20).

The lost time injury frequency rate is the number of lost time injuries occurring in a workplace per 1 million man-hours worked. In other years the lost time injury frequency rate exceeded the target set by the study company as an accepted injury

index (target =0.2). A total of 68 lost time injuries were reported amongst employees of the outsourced labour sector in the years 2009-2013 in KZN operations alone.

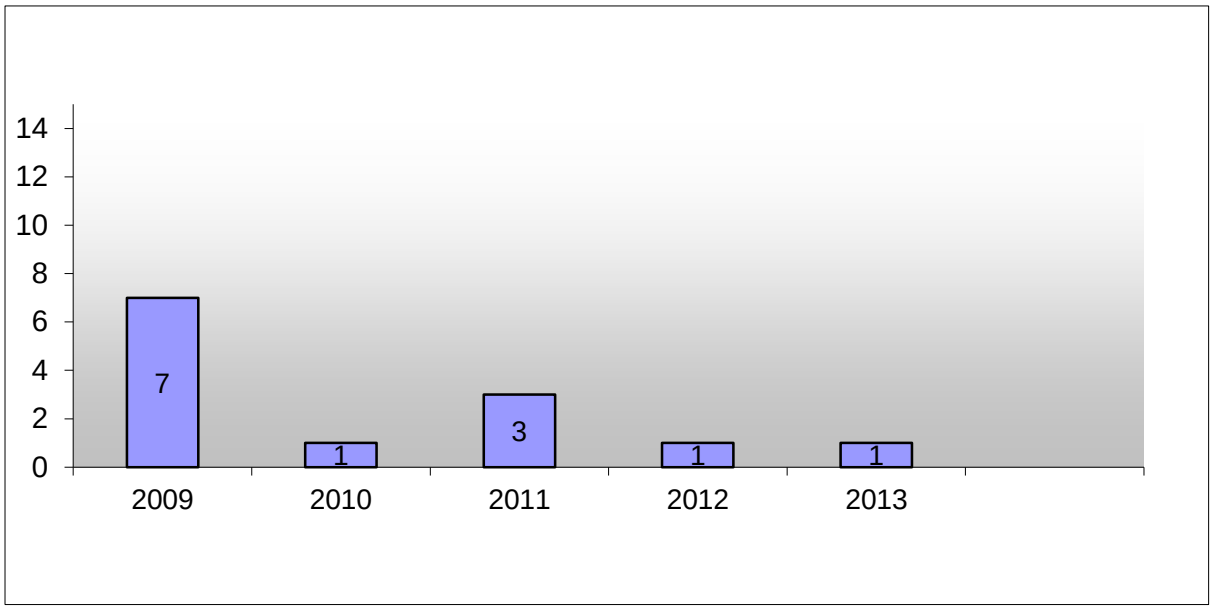


Figure 4.11 Study company fatality profile during the study period (2009-2013).

Thirteen fatalities were experienced during the year 2009 and 2013, throughout the study company operations. The company under study in KZN experienced eight fatalities in the year 2009-2013 in harvesting operations only. These occurred whilst felling trees, driving on plantation roads, operating short haul vehicles and electrocution whilst felling trees. In 2012-2013, only single fatalities were reported (Figure 4.11).

4.5 Logistic regression

Table 4.8 Adjusted logistic regression models of occupational injury outcomes and health and safety training using gender, age and work experience as independent variables (n=300)

*p value <0.05

[1] Male was used as the reference category, [2]Participant older than 30 years was used as the reference group; [3] Participants with less than 2 years' experience was used as the reference group, p-value <0.05 was considered statistically significant

Characteristics	Gender[1]		Age[2]		Work Experience[3]	
	OR	CI	OR	CI	OR	CI
Have you been injured recently while performing your work?	0.78	0.39;1.56	1.65	0.89 ;3.05	**0.49**	**0.23;1.04***
I have received health and safety training.	**2.45**	**1.41;4.24***	0.61	0.37;1.01	**0.49**	**3.981.34***
Health and Safety training reduces incidents and improves worker safety	1.24	0.72 ; 2.15	0.59	036;0.98	**2.53**	**1.48;4.33***
Training was given in a language understood by all	3.53	2.14;5.79	**0.56**	**0.36,0.86***	**2.47**	**1.54;3.98***
Do you use PPE provided at all times?	**4.22**	**2.43;7.33***	0.55	0.33;0.93	1.51	0.88;2.57
Training on the importance and correct use of PPE was given	0.80	0.47; 1.39	0.88	0.55; 1.37	1.46	0.86;2.46
Written safe work procedures relating to your job was explained to you	1.72	0.86;3.45	**2.60**	**1.34;5.03***	0.57	0.27;1.21
Dou you feel that training providers need to improve quality of training?	1.03	0.62;1.70	0.93	0.59;1.47	1.60	0.99;2.60

Logistic regression included gender, age and work experience as independent or explanatory variables while participant responses to various injury and health and safety training related variables were used as the dependent variables. Significant differences were observed between male and female workers in the likert scale responses linked with health and safety training and the use of PPE. Females were significantly more likely to acknowledge receipt of health and safety training (OR=2.45; 95% CI 1.41, 4.24; p<0.05) and understanding the training given (OR=3.53; 95% CI 2.14, 5.79; p<0.05). They were also more likely to use PPE at all times while working compared to men (OR=4.22; 95% CI 2.43, 7.33; p<0.05).

A significant difference in ranking was observed with age as younger workers (<30 years) were more likely to acknowledge that written safe work procedures relating to their jobs were explained to them compared to older workers (OR=2.60; 95% CI1.34,

5.03; p<0.05). Work experience of participants was significantly associated with health and safety training. Workers with greater working experience (>2 years) had experienced significantly fewer occupational injuries than those who less than 2 years of work experience (OR=0.49; 95%CI 0.23,1.04; p<0.05). Conversely, more experience workers tended not to agree when questioned about the receipt of health and safety training (OR=0.49; 95% CI 0.98, 1.34; p<0.05). However, experienced workers tended to understand the training better than their less experienced colleagues and they were more likely to agree that health and safety training reduces injuries and improves worker safety (OR=2.53; 95% CI 1.48, 4.33; p<0.05).

Table 4.9: Training scores allocated to evaluate efficiency of Health and Safety training (N=295)

Training score	Frequency (N)	Training Evaluation
8 - 10	85 (28.8)	Very effective
11 - 13	147 (49.8)	Satisfactory
14 - 16	45 (15.3)	Needs improvement
17 – 19	18 (6.1)	Very poor

The optimal score was 8 which reflected the highest score in each of the questions relating to the efficiency of health and safety training.

The overall training score reflected in Table 4.9 was based on participants' ability to understand safety training and emergency procedures, to understand hazard information, to work safely and use appropriate PPE and acknowledge the importance of safety training. Approximately 29% of all participants interviewed scored between 8-10, which categorised the training received as "very effective". However, almost half of all participants (50%) perceived training to be satisfactory and may be improved. Only 6% of participants felt that training was poor.

4.6 Health and safety knowledge

Data was collected on the health and safety knowledge of workers. This included information on general knowledge of safety.

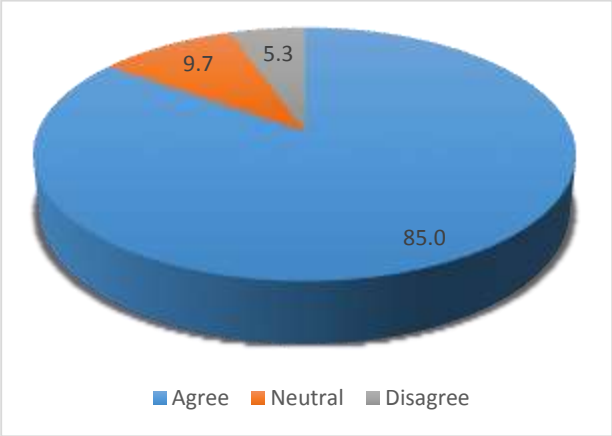


Figure 4.12 Participants agreement of whether emergency procedures were available and explained to respondents in the field.

The majority of respondents (85.0%) agreed that the procedures were available, with only 5.3% who disagreed with the statement and 9.7% respondents being neutral ($p \leq 0.05$).

4.7 Knowledge of the written safe work procedures

When asked if written safe work procedures were explained to the workers, all of the respondents indicated that this had been done. When asked about the understanding of written safe work procedures, 79% indicated that they did not completely understand the procedures. A little less than 30% of participants indicated that they did not know the emergency numbers. Twenty-six percent indicated that 10177 is the number they will dial in case of emergency; 16.7% respondents indicated that they know 082911 for emergencies; 15.0% indicated that 112 is the number to dial and 13.0% said 10111 was the ambulance number.

Table 4.10 Respondents opinion on dangerous work* (N=300)

Variable	N (%)
Felling trees	194(64.7)
Cross-cutting	25(8.3)
Manual de-barking	26(8.7)
Manual de-branching	26(8.7)
Stacking logs	4(1.3)
Cable yarding and skidding	35(11.7)
Short haul unit operating	7(2.3)
Manual loading and off loading	4(1.3)

*p value ≤0.000

Nearly two-thirds (64.7%) of the respondents identified tree felling as being the most dangerous work-related activity, with 11.7% of participants reporting that cable yarding when extracting timber is also dangerous. Manual de-barking and cross-cutting was also reported as dangerous work by 8.7% and 8.3% of participants, respectively (Table 4.9).

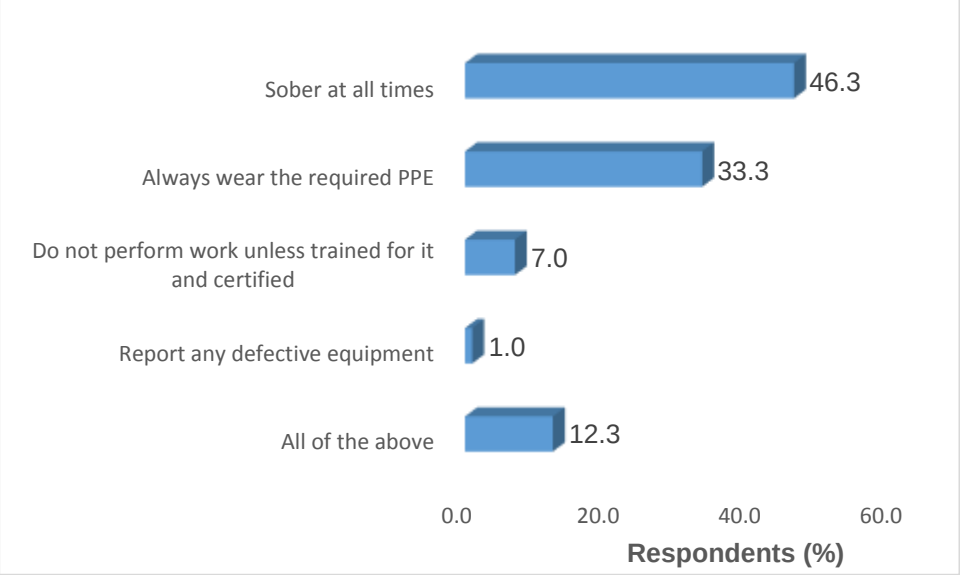


Figure 4.13. Knowledge of workers about general safety pertaining to their individual work tasks (N=300).

Forty-six percent of workers indicated that they need to be sober at all times, and 33.3% indicated that the required PPE should be worn at all times (Figure 4.13).

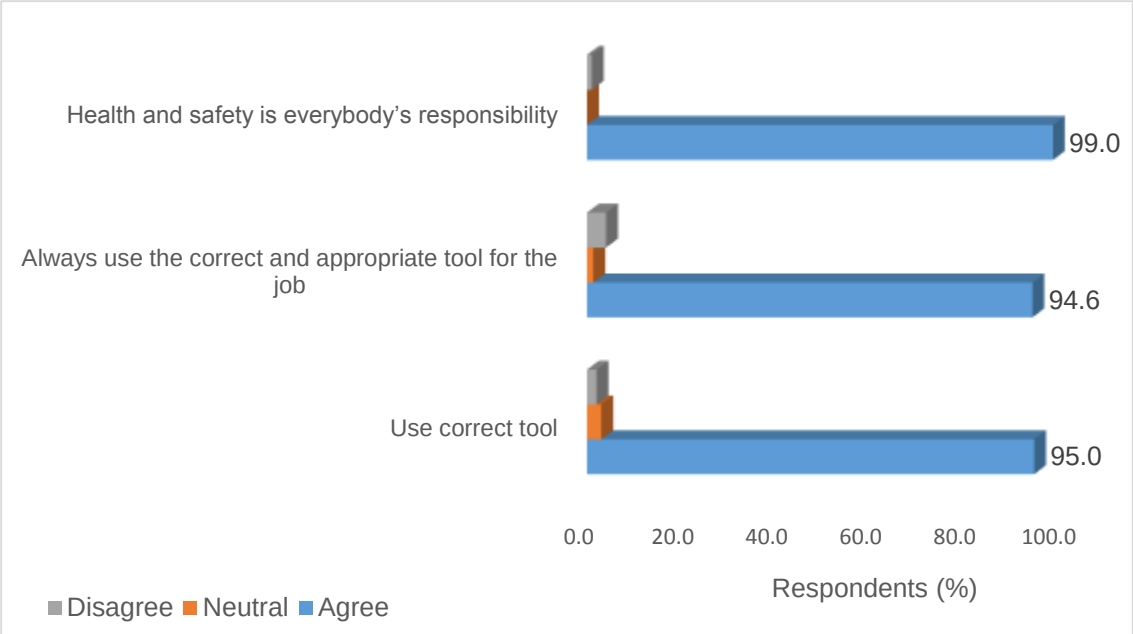


Figure 4.14 Summary of the participants regarding the use of tools and responsibility (N=300).

Almost all workers agreed that health and safety is the responsibility of everybody, while 95% of participants agreed that they need to use the correct tool for the job (Figure 4.14).

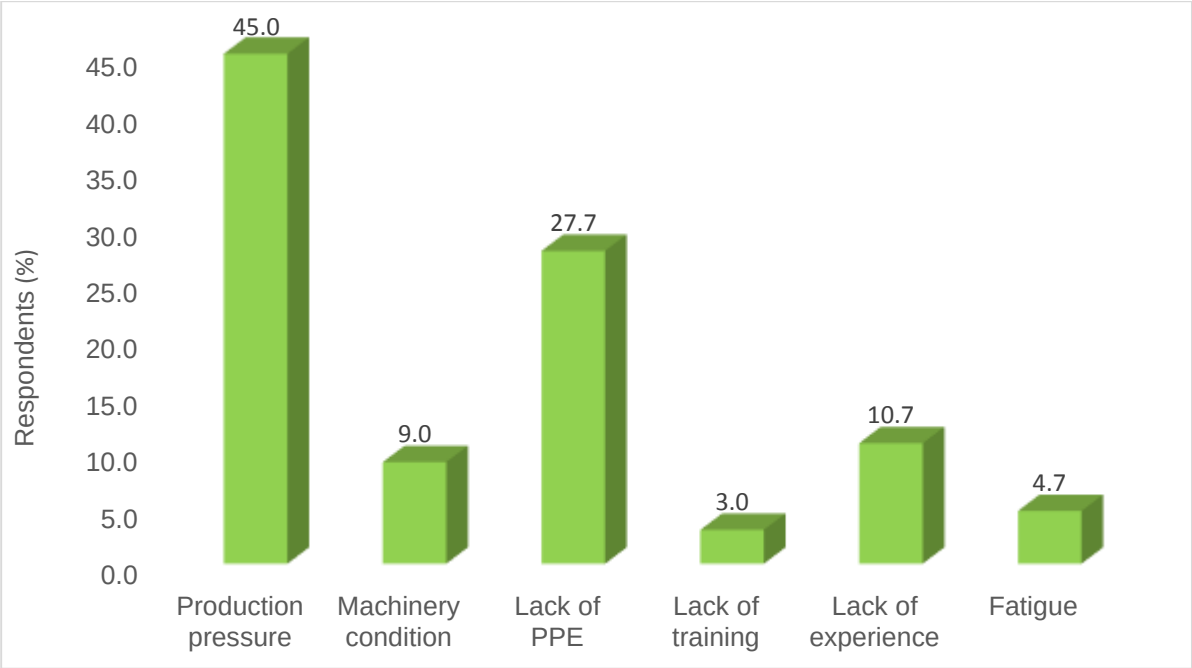


Figure 4.15 Perception of factors affecting worker safety.

Forty-five percent of respondents reported that worker safety is affected by production pressure where they sometimes take a short-cut to meet the target, with 27.7% reporting

that safety is affected by a lack of PPE and 10.7% reporting that safety is affected by a lack of experience (Figure 4.15).

4.7 Health and Safety practices

This section investigates the practices of workers with regards to safety when working.

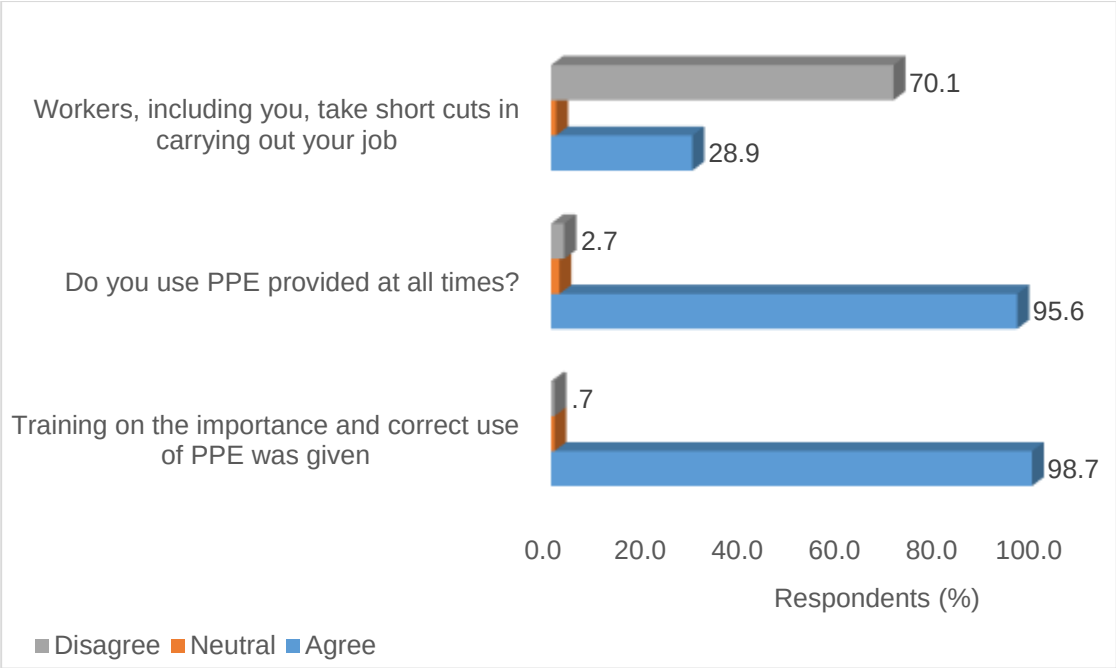


Figure 4.16 Summary of the response to work practices.

When workers were questioned about their current practice, most respondents (70.1%) believed that no short-cuts were taken, while nearly 28.9% indicated that the practice did occur (Figure 4.16).

4.8 Direct observation

Figure 4.17 Chainsaw operator above is cross-cutting felled pine trees. (Nkomo 2015).

Chainsaw operator was observed to be working within safety parameters and wore correct PPE. The area that he was working in was not pre cleaned properly as there is overgrowth and debris on the ground that might result in tripping hazard (Fig 4.17).

Figure 4.18 Housekeeping observed in the dermarcated safety area. (Nkomo 2015).

The dermarcation safet area was observed to be cleaned and housekeeping was according to the standard operating procedures and safety procedures. All standard operating procedure of the risk management system with regards to demarcation area were met (Fig 4.18).

Figure 4.19 Stacking height of logs at the depot, and housekeeping in depot. (Nkomo 2015).

Compliance to general safety standards and rules were observed at the depot where processed timber was stacked, and stacking height was found to be compliant below 3meters (Fig 4.19).

Figure 4.20 Manual de-barker with correct PPE, and she is carrying a hatchet that she uses to de-bark. (Nkomo 2015).

A worker involved in debarking of logs with a hatchet/axe was observed to be wearing the required PPE and tools were observed to be in good condition (Fig 4.20).

Figure 4.21 Gum compartment with felling taking place and logs lying on the ground. (Nkomo 2015).

Stacking of timber in the compartment was done neatly on rows, with bark lying on the ground for collection. Short haul vehicles (tractors) were observed for roll over protection, and training certification (Fig 4.21).

Table 4.11 Site Inspection and Observation Analysis N= 200

Task	Number of times Behaviour observed	Correctly done	Incorrectly done
1. Good housekeeping	10	5	5
1.1 Waste and general refuse placed in bins provided			
1.2 Area kept free of debris, brushwood	16	14	2
1.3 Items and bags stored in demarcation area	7	6	1
1.4 Soap used for washing hands after chemical use	5	4	1
2. Stacking and storage			
2.1 Chemicals stored safely	10	8	2
2.2 Roadways between stacks kept free of debris	8	5	3
2.3 Firefighting equipment available and adequate	9	6	3
2.4 Stacking of timber not exceeding 2m height	12	7	5
3. Emergency preparedness	9	6	3
3.1 Emergency procedure available infield and known	7	5	2
3.2 Emergency numbers displayed			
4. Hand tools (Hatchet/axe, Chainsaw, lifting tongs	14	11	3
4.1 In good condition			
4.2 Correctly stored in tool box and safely transported	9	7	2

4.3 Safe hand ergonomics when using tools	14	12	2
5. Personal Protective Equipment			
5.1 PPE issued in time	26	20	6
5.2 PPE stored correctly	8	4	4
5.3 PPE used at all times	12	10	2
6. Incident reporting			
6.1 Incidents/near misses reported to the supervisor	8	5	3
6.2 Incidents investigated	6	4	2
6.3 Incidents reported captured on the form	5	4	1
7. General safety			
7.1 Visitors inducted and sign the access form before entering the site	5	3	2
Total	200	147	53

Table 4.10 shows the health and safety non-conformances to procedures and general safety rules, by workers present at the time of the observation. Workers were observed for 5 hours per day for three days during a two week period. The observations were done in the morning and afternoon before the end of their work shift. Two hundred behaviours observed during the period.

CHAPTER 5: DISCUSSION OF RESULTS

This descriptive cross-sectional study assessed the effectiveness of health and safety training in reducing occupational injuries in forestry harvesting in KZN. The company incident profile over a five year period reported six hundred and six lost time injuries through its operations, with sixty eight lost time injuries reported (2009-2013) in harvesting. In 2005 the study company initiated a project zero and intensified health and safety training, a decline in occupational injuries has been observed. Ninety-seven percent of the participants agreed that health and safety training reduces injuries at work and increases worker awareness. The overall prevalence rate of work-related injury in this present study during the study period was 23.3%. The magnitude of injuries in this study was lower compared with a study conducted by Bentley *et al.* (2005) in New Zealand, where 49% of lost time injuries were reported in 1996-2000. The injury prevalence was higher than the prevalence of work-related injury in small and medium scale industry (33.5%) as reported by Yiha and Kumie (2010), but it was lower than injury rates in the large scale metal manufacturing industry and Tendaho agricultural development sector, which were 48.9% and 78.3% respectively. This discrepancy resulted from the variation and nature of activities performed in different work sectors. The majority of the injured participants were males (76.19%). This was as a result of the fact that previously forestry industry was dominated by male employees, and that male workers were involved in more dangerous work than females. Males were also more likely to engage in risky behaviour than females, resulting in higher injuries. Studies done in developed and developing countries reported that men had a higher risk of occupational injury than women in manufacturing industries (Yiha and Kumie 2010). According to Bentley *et al.* (2005), male workers were about 2.5 times more likely to report occupational injury than female workers (OR: 2.54, 95% CI 1.58, 4.07). In the present study an association was found between injury and gender, with males sustaining more injuries ($p \leq 0.005$).

This study showed that young age workers between 25-34 years were more likely to be injured compared with those who were 35 and above, which contradicts the study by Bentley *et al*. (2005), who found that the age group of 35-44 was more prone to accidents. A study by Yiha and Kumie (2010) found that young workers between seventeen and 29 years were more likely to be injured compared with those who were 30 years and above.

According to this study, the number of accidents declined after the age of 35. The reasons for higher work-related injuries among young people included a lack of training, lack of supervision, lack of experience on the job, and a lack of knowledge and skill. Many workers started work at an early age, sometimes without safety training (Tadesse and Kumie 2007). As in the previous studies, most workers in the present study believed that they were adequately trained and that they can work safely after attending health and safety training. The level of knowledge about health and safety was adequately demonstrated. The majority of participants (27%) reported the benefit of health and safety training leading to the reduction of injuries or incidents

The number of male workers actively involved in the sector exceeded female workers (72% -vs- 28%). The mean (+- SD) age of survey respondents was 30.68 +- 9.33 years. The majority of workers were manual de-barkers (22.3%) who had the responsibility of stripping off the felled timber. Markers and pushers constituted about 21.3% of the study respondents; these workers assisted the chainsaw operators during felling and cross-cutting of timber. About 20.3% of the survey respondents were supervisors, as it is a requirement that each team has at least one supervisor who checked production as well as safety aspects of the business. Chainsaw operators made up only 13.3% of the study respondents; these were skilled workers who were certified to fell trees. The stackers who stacked felled trees for primary transport consisted of 15.3% of the respondents. About 55% of the workforce were between the ages of 25-34 years, with only 12.6% younger than 25 years. Those who were in the mid-40 and mid-50 were less than 10% and 5% combined, respectively. There was a significant difference on all age categories except for ages (35-39) years. The results showed that 87.4% of the respondents had less than four years work experience, with only 12.6% of workers with four or more years of work experience.

High employee turnover is very common in the forestry industry; this makes it difficult to retain workers who are more experienced. Blomback (2006) reported that labour turnover was high in forestry compared with other sectors due to the fact that working conditions were unattractive and unstable. Labour turnover drained skills and reduced productivity earnings and working in forestry is the last resort for people with no other alternatives. On the other hand, there was a high fluctuation rate in forestry staff. One reason for this

was the attempt by forestry workers to exchange a more or less insecure job in contractual business for more secure employment in another sector.
In recent years there was a strong trend towards using contractors in forestry operations; these included transport, planting and harvesting, although each company differed in the work that it was sub-contracting. About 150 000 people were estimated to be employed by forestry contractors. The major companies developed comprehensive policies for managing their relationships with contractors. The trend for contracting helped to maintain employment levels in the industry. Forestry contracting offered an important avenue for the creation of new black enterprises in rural areas. The promotion of small business was an important part of South Africa's national economic strategy. On the other hand, however, satisfactory working conditions and human resource management needed attention if these were to be sustainable (White Paper 1995).

The majority of the injured respondents were in the employment of company A for less than one year (33.8%), followed by those with one year experience and two years' experience accounting for 25.7%. The work experience of the worker was also significantly associated with occupational injuries. Workers with less than three years' working experience were more likely to be injured compared with those who had five years and more working experience (OR:0.81;95%CI: 0.64;0.99). This may be explained by inaccessibility to health and safety information, a lack of training on health and safety, less work experience and a low level of knowledge and skill towards the work. Occupational injuries declined after three years of work experience. Bentley *et al.* (2002) found that the greatest number of injuries were reported by loggers in their first few months of logging. The large number of injuries incurred by workers in their first few months of employment and reported to the Accident Reporting System in New Zealand was in line with the assertion that the safety of fellers was highly dependent on good assessment and decision-making. These findings further highlighted the urgent need for research in this area (2). A study done in Ethiopia by Tadesse and Kumie (2007) also found that five years or less in the present job played a role in work-related injuries. These studies showed that a lack of experience influences the interaction between the worker and other workers, the knowledge of machines and tools in use and their defects, and awareness of surrounding hazards (Tadesse and Kumie 2007).

In the present study more injuries occurred on a flat surface or ground; this might be due to workers practicing more precautions when working in steep areas, and that detailed

risk assessment had been conducted and hazards communicated and mitigated. This is contradicted the study by Lilley *et al.* (2002) in British Columbia, where more accidents occurred while workers worked in steep areas. Blomback (2006) stated that forestry was characterised by working on steep terrain. In this present study only 21.4% of injuries occurred in steep areas. Falls were difficult to prevent, despite the footwear that workers were given, especially on steep terrain. The relationship between the activity and the cause of injury revealed that more injuries occurred with manual de-barkers (39.6%). These workers were unskilled workers who had just received informal training; there was no formal training given to most de-barkers by service providers and contractors did internal training (OR:0.71;95%CI: 0.61;0.87 $p<0.05$). Manual de-barkers used sharp tools such as hatchets and slashers to de-bark the logs. Slip, trip and falls in this category accounted for more injuries and this was due to the fact that these workers de-barked logs lying on the floor with heavy brushwood and debris, and that the bark became slippery after it had been stripped off. A direct observation revealed that de-barkers sometimes walked and stood on the felled trees, which is an unsafe practice. De-barking logs on rough terrain and steep areas also exposed them to hazards. Another cause of injuries with the de-barkers was the rolling logs from steep areas hitting the de-barkers below; where de-barkers were not following a procedure; where they worked on top while others were de-barking below; and it was due to soil stability that also exposed de-barkers to hazards. Only 8.3% of the respondents reported being hit or cut by a hatchet or axe. Some workers de-barked at chest height in trying to avoid prolonged bending, and it was where they got cut by hatchet; at the knee level they were protected by shin guards that they wear at all times. The other explanation is that an incorrect method of de-barking was observed and the procedure was not followed. More planned job observations and inspections are required to observe such behaviour and to correct them. Refresher training and more frequent training on written safe work procedures for de-barking is necessary in order to reduce these incidents.

Surprisingly, only 31.3% of injuries were reported during the felling of trees. This finding was in contrast to the finding by other researchers, where felling accounted for the majority of serious injuries in harvesting. Injuries associated with tree felling were reported to be significantly greater (51%) during 1999. A study on wood harvesting in Australia by Tsioras *et al.* (2014) also found that tree felling accounted for 45% of injuries. In the present study there had been a reduction of tree felling injuries, with most injuries

experienced in manual de-barking. The slip, trip and fall injuries in this category of felling trees were most frequently reported. The feller walked to and from the felling site at the start and end of the day and at break times, walked between trees and through the escape route when felling trees. Tsioras *et al.* (2014) stated that slips and falls accounted for 35.8% of injuries in wood harvesting. This activity was subjected to risks associated with working in an uncontrolled, all-weather, outdoor working environment (Bentley *et al*. 2005). Here, fall prevention measures employed in indoor controlled work environments (e.g. housekeeping) were not applicable, with major underfoot hazards including undergrowth, logs and slippery slopes. One design solution for reducing forest slip and fall injuries is spiked-soled boots, which had been available for some years but was still under-utilised by New Zealand forest workers. This finding supported a study conducted in Sweden, where the analysis of six years of data reported to the logging Accident Reporting Scheme (ARS) showed that 17.5% of lost time injuries were as a result of slips, trips and falls (Bentley *et al.* 2002).

Although felling trees and accidents associated with man-held machinery accounted for many injuries and fatalities, in forestry injuries occurred as a result of poor judgement due to fatigue from physically demanding work. This study reported that injuries where chainsaw operators were hit or struck by trees comprised 8.3%. This was due to few measures recommended by the Code of Practice for Forestry which prevented these injuries, for example keeping a two three length rule; doing risk assessment; making escape routes; provision of proper PPE; and removing hung ups and dead trees before felling takes place. There were few injuries reported by chainsaw operators; this was a result of continuous training that fellers attended and the introduction of safety features on the machinery, together with daily safety talks and daily checks of the machine. Operating logging machines and transport accounted for only 10% of injuries, with a majority being slip and falls (ILO 1998).

There were factors that contributed to the lost time injuries reported. The majority of participants reported dead trees whilst felling, which was due to the fact that the feller failed to identify these before felling, followed by rough terrain. Forestry is characterised by difficult terrain, and weather is a contributing factor. Other contributing factors raised by injured participants included working too fast, which could be due to production pressure to meet the target, where a chainsaw operator was required to fell about 400-500 trees in about four hours. At about 9.00 a.m. to 10.00 a.m. chainsaw operators were

required to stop felling, so that de-branching followed, as there was a rule that no-one was allowed within 100 to 150 metres of where felling was taking place. Some participants reported that when they were injured they were not aware of the hazards, which might mean that the safety team and supervisor (including the injured worker) did not walk around the work environment and identify potential hazards.

The majority of workers had to stay away from work due to an injury for about five days. Injuries caused by felling trees were the most severe and led to the workers being off work from eleven to fifteen days. Thirty percent agreed that they were involved in the process of investigating an injury, and 10.7% agreed that refresher training was given before going back to work after an injury. It was concerning to note that 10% of the injured workers resumed duty without refresher training. Literature has indicated that there was a strong relationship between training on health and safety and reduced work accident rates among forestry workers. This was due to the fact that health and safety training motivated workers to be safer and instructed them in correct safety behaviours (Blomback 2006). These findings were due to the fact that training on health and safety changed both the attitude and safety behaviours. On the other hand, lack of training in health and safety led to lack of know-how and job knowledge. By linking health and safety training to a reduction in injuries, this study provided important evidence of the effectiveness of training in reducing the injuries among harvesting forestry workers, especially chainsaw operators in general, and among younger workers in particular. Younger workers with less training reported more injuries than older and more experienced co-workers. This meant that younger workers were an appropriate target for training interventions aimed at preventing injuries at work. It is possible that the association between training and injuries was attributed to differences in training, whether it was a formal and informal training. Results showed that occupational injury rates varied significantly by age and gender, with younger and male workers having a greatest risk of work-related injury. The study also confirmed that the behaviour of respondents had an association with the occurrence of injuries ($p \leq 0.000$). A study conducted in Ireland by Nieuwenhuis and Lyons (2002) also found that age, work experience, health and safety training of the individual workers all influenced the occurrence and severity of accidents.

Approximately 95.0% of the study participants indicated that they had received health and safety training at work - when they started work, annually, and all workers had an induction process where they were trained on hazards and procedures about their jobs.

This was done before a worker is allowed to do his/her work. Females were 2.51 times more likely to have received health and safety training ($p \leq 0.005$). Thereafter, they received job-specific training and 80% of participants indicated that training providers needed to improve the quality of training, with 97.3% stating that they can work safely after attending the training. Information about hazards associated with their work was explained to about 93% of the respondents. Several studies had indicated that health and safety training was not evaluated or assessed for its effectiveness, thereby putting workers at high risk of injury. Of concern was that contractors spent money to train their workers, but they did not evaluate if the training made a difference or the training achieved the desired results. They sent workers for training just to fulfil the requirements of the main company that they were contracted to. Most workers, such as de-barkers and manual stackers, received informal training pertaining to the hazards associated with their jobs. Workers should be orientated to the safety rules and procedures, and this form of training should be an ongoing process. Management should be proactive in educating the workers in the potential risks in the working environment and incorporate strategies on how to prevent them.

According to Nieuwenhuis and Lyons (2002) safety awareness and training were considered to be important factors when addressing the reduction and prevention of injuries. The study by Waehrer and Miller (2009) reported that safety training increased the reporting of injuries and had a positive effect on days away from work because of injuries, especially in smaller firms. Safety training appeared to be more effective in preventing severe injuries in large firms than in small firms. About 93% of participants indicated that information about the hazards pertaining to their tasks were explained, as well as the written safe work procedures, only 27% of participants fully understood the contents of the procedures. When they were asked to rate the training, about 84% of participants were satisfied with the way training was conducted, with 1.7% of participants reporting that training was poor. It was agreed that health and safety training was conducted in a language understood by everybody. The number of training sessions and hours was not adequate to deliver all the training content. This may be due to the fact that contractors paid training service providers to conduct the training and that they did not allow their workers to be away on training for more days than necessary due to production pressure and the cost factor. Management has the responsibility of creating time, however, and documenting training schedules that are both cost effective and

comprehensive in order to ensure competency and effectiveness of the results from such training.

The majority of respondents reported the safety improvement at work (26%) and 25% of the participants indicated that health and safety training had increased production. When workers are safe there will be less injuries, and the safety record will improve and lead to high production. These results were supported by the studies done among Assiut spinning factory workers in 2004 in Egypt and among small- and medium-scale factory workers in Ethiopia. These findings were due to the fact that training on health and safety changed both attitude and safety behaviours. Conversely, a lack of training on health and safety led to lack of know-how and job knowledge (Tadesse and Kumie 2007). Burke and Sarpy (2006) stated that proof of training effectiveness has been difficult to find in the field of occupational of health and safety.

All participants reported that written safe work procedures were available infield and that these procedures were explained to them (OR: 1.68; 95%CI: 0.84; 3.41); only 21% indicated that they understood the written safe work procedures. Poor knowledge was noted in areas of general health and safety rules applicable to their workplace, and with regard to knowledge of the Occupational Health and Safety Act, Act 85 of 1993 (OHS Act), despite the fact that some sections of the Act and safety rules were covered when they attended basic safety training and during the inductions. About 95% of participants indicated that emergency procedures were available infield and was explained to them, but the majority of the respondents were unable to explain the procedure in case of an emergency. There was a significant difference between an injury and the knowledge of emergency procedure ($p \leq 0.005$). The majority of the respondents did not recall the emergency numbers. Some workers indicated that they did not receive adequate training and it is imperative that Management ensures that this is an ongoing process. Illiteracy levels in forestry played a role in the understanding of policies and procedures. Management and training service providers should make sure that they were being practical when explaining the policies and procedures and implementing practical implications of the procedures. Both theoretical and practical competence must be acquired and maintained by all workers. There is an obvious need to identify workers who did not participate actively and fully in the health and safety programmes. All workers

must be encouraged to adopt a more positive attitude towards preventing injury and working safely at work.

All participants indicated that written safe work procedures were explained to them, although 79% of the participants did not completely understand them. This could be due to the fact that some of these procedures were explained in a language that workers did not understand, or that the procedure was explained once and this was not done continuously. The majority of respondents indicated that they knew the numbers to dial in case of emergency, with only 29% indicating that they did not know the emergency numbers. When asked about the dangerous work in forestry, about 64.7% reported that tree felling was the most dangerous job, with only a few reporting cross-cutting as the second after felling; very few reported that manual de-barking was dangerous. Most workers indicated that they need to be sober at all times when at work; this showed that they were aware of the alcohol policy or any other intoxicating drugs, which was covered during the inductions. The majority also indicated that wearing the correct PPE at all times was the right thing to do. According to Montorselli *et al.* (2010) many workers perceived safety as conflicting with both comfort and productivity and often deliberately chose to take risks. They also reported that they did not use or operate any machine or equipment that they were not trained or certified to operate. When asked about their level agreement with some statements testing their attitudes towards Health and Safety it was the found that the majority of respondents reported that health and safety was the responsibility of everybody at work, particularly responsibility toward their own health and safety. Most workers also indicated that it was imperative to use the correct tool for the job and to report defective tools. With regard to factors affecting health and safety at work, about 45% reported production pressure as affecting health and safety as they had to meet targets. So that they can go home early, they usually start very early in the morning, leaving their homes between 3.00 a.m. and 4.00 a.m. in the morning. Others reported a lack of PPE, as sometimes their employer did not replace defective PPE in time. Few reported that a lack of experience was affecting safety as there was no retention strategy in forestry. Eighty-four percent of the participants indicated that health and safety training was needed to improve health and safety of all workers. The practices by workers toward safety was also tested, where a quarter of all participants admitted to taking short-cuts that compromised safety procedures. Some indicated that they did not have a choice, as they sometimes had to compromise between working safely and meeting production

targets. The majority believed that it was dangerous to compromise health and safety procedures in carrying out work tasks (70%).

A site inspection of the work area and workers was undertaken with respect to compliance by workers regarding health and safety procedures and protocols. Most workers in all study plantations were observed and there were serious safety violations; about 9% safety violations were observed. Generally there was good housekeeping as most workers maintained their work area as a clean working environment and work areas were kept clear of debris and brushwood. Special management zones were also cleaned of timber. Good housekeeping was the responsibility of every worker and a clean working environment indicated a successful health and safety programme. The stacking and storage of timber infield and at depots were adequate, where timber was observed to be stacked neatly at the appropriate height. Logs were also stacked neatly and no was worker worked below stacked timber on steep terrain. The majority of workers were observed with PPE in poor condition; PPE included helmet, safety shoes; Shin guards; safety vests; hand gloves; chainsaw cutter pants; overalls and critical identification cards. The PPE should be issued to all and maintained in a good serviceable condition. On a positive note, workers used the issued PPE correctly. Hand tools used by workers were also observed, examples included hatchets, logging tongs and felling levers. Defective tools were reported to the supervisor and not used. The majority of workers did not report all near misses observed, as well as minor injuries. It is possible that workers assumed that the incidents and near misses were minor and that they did not need to be reported, however workers are required to report all incidents before the end of the shift, no matter how minor at the time.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

Given the difficult nature of the forestry industry both in terms of the job site and the workforce, it is important that contractors see the value of providing safety and health training to their workers. It was hoped that the findings presented here and the need for increased training in the future, will improve health and safety training, thereby making it more accessible and efficient amongst small and large forestry contractors. Providing tools to the forestry contractor to assess training effectiveness will be beneficial for such existing programmes. The majority of contractors provided training for their workers, although less time was spent assessing the quality or effectiveness of the training in terms of an actual knowledge gain or skills enhancement. Guidelines for effective mentoring programmes could be developed, maintained and evaluated for their effectiveness.

Most contractors did not quantitatively evaluate their safety and health training programmes in terms of increased productivity, reduced risk exposure or job satisfaction. The industry should introduce adult learning programmes for illiterate supervisors to improve leadership skills and basic competency in health and safety management. In terms of occupational health and safety knowledge, more training is required in the area of general health and safety rules that are applicable. Workers need to understand the procedure to follow in case of emergencies and must know the emergency numbers. In addition, on-site supervisors should maintain their competency on health and safety issues by annually updating their knowledge with appropriate courses or workshops.

At forestry company understudy, the injury rate was significantly decreased after the introduction of mandatory health and safety training, and after implementing Project Zero. The questionnaire analysis suggested that although workers reported having received training on general health and safety, limited knowledge was noted in the areas of specific health and safety policies and procedures. To be attracted to an industry and to remain working within it, potential workers need to understand the work, the working conditions and the career pathways that are available to them. Their pathways should include training and development opportunities. More specific health and safety education of all workers is needed to encourage a more dynamic and proactive attitude towards preventing injuries at the workplace. Training should address the multivariate factors of injury, such as the emotional, psychological and physical assaults on a worker. The

efforts of addressing injury should not only be in the area of developing health and safety educational programmes, but also implementing and evaluating the effectiveness of such programmes.

Information, training and instruction, and supervision should take into account the nature of the work carried out by the worker, the associated risks and measures implemented to control the risks. In addition to task-specific training, workers undertaking forestry operations work should be provided with induction training to inform them of site-specific hazards and to familiarise them with the forestry operations and safe work procedures. Induction training should include:

- Site-specific forestry hazards
- Emergency procedures
- Safe operating and work procedures
- Communication systems and radio frequencies if radios are used.
- First aid and amenities
- Fatigue management
- Hazard and incident reporting
- Record keeping
- Consultation arrangements and issue resolution processes

Refresher training may be necessary to ensure key work health and safety information and competencies are addressed and maintained. Monitoring working techniques and practices is important for maintaining health and safety standards. For example, inspecting the stumps of a manual feller may show poor techniques which can create risks for the feller and others at the harvesting site.

The site inspection and observational analysis showed condition of PPE as poor, and defective PPE was not normally replaced in time. An employer should ensure that PPE is:

- Selected to minimise risk to health and safety
- Suitable for the work and the hazards associated with the work, and
- A suitable size and fit and reasonably comfortable for the worker that is going to use it.

PPE should be properly maintained and replaced if damaged or ineffective. Workers should not use PPE if it is damaged, defective or has not been maintained correctly.

The review of the injury profile data revealed that the manual de-barking activity recorded the highest incidence of injury followed by the manual stackers. Chainsaw incidents showed a decrease compared to previous years. The forestry company, harvesting and haulage contractors should inspect the work site together to assess the conditions and plan how to do the job. They should go over the machinery, methods to be used, identify foreseeable hazards and how to deal with them. The management should decide on the best ways to bring down trees safely and discuss emergency procedures and ways to ensure unauthorised people are kept out
of the area or kept from harm if they enter the forest. The forestry company should continue to monitor the contractor's systems of work to ensure they are implemented according to the harvesting plan and remain effective in terms of safety. Longer-term harvest plans should look at how activities over a three to five year period can have an impact on work health and safety during forestry operations. Forest managers should have longer-term strategic harvesting plans. When developing a long-term forest harvesting plan, the company should consider information about:

- Recognising high risk forest types e.g. forests affected by fire, snow, wind, draught or insect damage
- Harvesting system being matched to terrain and ground conditions
- Entry to harvesting sites and the suitability of road networks

Choosing equipment and contractors which will be available and capable of harvesting the areas of forests identified in plans. Annual harvesting plans should provide more detailed information about harvesting sites including location, road access and when to harvest. Forest managers should consider whether the harvesting method is suitable for the harvest site.

The most suitable method for harvesting timber to be considered is mechanical felling, the use of mechanized equipment, particularly for felling and debarking will reduce the frequency of accidents. Where harvesting machines will not be able to work like steep areas, specialised chainsaw operators could be used to fell that compartment. Contractors should be committed to safety and have good people management skills and be able to retain experienced workers. Workforce Stability Tenure, and Experience**,**

contractors should be encouraged to employ and retain experienced and skilled workers. When employee turnover is reduced, the worker's experience and knowledge of each other's work habits create an environment where they sincerely care and watch-out for each other, which leads to a safer operation.

In forestry operations the risk of fatality or serious injury increases dramatically when operators are not effectively separated into safe work areas. A work area is the active area of a harvesting site or the site at which individual operators work. This work area should be dominated by one activity, for example manual felling or skidding. However, the nature of forestry operations means there can often be several operators working in adjacent work areas. A work area can be made safe by separating the work activities by the use of:

- Physical barriers—Machine canopy
- Distance—the common separation distance is two tree lengths of a tree being felled, and
- Time—risks can be minimised by scheduling different parts of the process to be carried out at different times.

Effective communication practices include:

- Two-way radio communication between workers in the harvesting site as well as visitors to the site effective emergency communication systems agreed whistle or hand signals in operations safety signs and barricades, and
- Tree markings. An emergency plan should be prepared and maintained for the workplace.

Given the risk factors for musculoskeletal disorder development during use of the chainsaw, manual debarking and during use of large equipment a more detailed analysis is required. Ergonomic study is also recommended to the manual debarking teams. Skills development, supervision and performance expectations of newly qualified should be considered.

Opportunities to keep strong teamwork but to limit inter-dependency of tasks should be explored. Alternative methods to volume related payments for forestry workers should be considered. Industry should have number of measures used by a variety of contractors to recognise and reward performance. A review of measures to facilitate and encourage taking of at least two breaks per day is required. This will require further education through all levels of harvesting management about the effects of fatigue.

From this study it was concluded that being a male worker, younger in age, working under production pressure and with less experience increased the risk of occupational injury. The provision of ongoing health and safety training can reduce the occurrence of occupational injury. It is also recommended that the contractors employ qualified health and safety officer who will be available on sites and qualified forester to oversee operations is essential. The study company should also consider formalising training for manual debarkers and manual stacking employees to reduce trip, falls and slip injuries and other injuries. More studies are required in the forestry industry to provide reliable epidemiological information on occupational injuries that could lead to effective preventative strategies. Future research is also needed to assess if health and safety training reduces injuries at work.

REFERENCES

Aderaw, Z., Engdaw, D. and Tadesse, T. 2011. Determinants of occupational injury. A Case control study among textile factory workers in Amhara Regional State, Ethiopia. *Journal of Tropical Medicine,* 2011(1):1-8.

Amponsah,T.K. and Baah, D.K. 2002. *International Journal of Business and Social Science, 2(14)*: 119-124.

Bell, J.L. 2002. Changes in logging injury rates associated with the use of feller – buncher in West Virginia. *Journal of Safety Research,* 33(1): 463-471.

Bell, J.L. and Grushecky, S.T. 2006. Evaluating the effectiveness of a logger program. *Journal of Safety Research,* (37)1: 53-61.

Bentley, T.A., Parker, R.J. and Ashby, L. 2005. Understanding felling safety in the New Zealand forest industry. *Applied Ergonomics,* 36: 165-175.

Bentley, T.A., Parker, R.J., Ashby, L., Moore, D.J. and Tappin, D.C. 2002. The role of the New Zealand forest industry injury surveillance system in a strategic ergonomics, safety and health research program. *Journal of Applied Ergonomics*, 33(5): 395-403.

Blomback, P. 2006. Applying reduced impact logging to advance sustainable forest management. Improving occupational safety and health. *Forestry and Wood Industries Unit, International Labour Organisation*.

Bureau of Labour Statistics. 2010. Occupational Outlook Handbook.

Bureau of Labour Statistics. 2012. U.S. Department of Labour.

Burke, M.J. and Sarpy, S. 2006. Relative effectiveness of worker safety and training methods. *American Journal of public health,* 96(2): 315-316.

Clarke, J.M. 2005. Changing labour practices at Mondi Forests, South Africa.

Gandaseca, S. and Yoshimura, T. 2001. Occupational safety, health living conditions of forestry workers in Indonesia. *Journal of Forestry Research,* 6: 281-285.

Goldenhar, L.M., Moran, S.K. and Colligan, M. 2001. Health and safety training in a sample of open shop construction companies. *Journal of Safety Research*, 32: 237-255.

Helmkamp, J.C., Bell, J.L., Lundshom, W.J., Ramprasad, J. and Haque, A. 2004. Assessing safety awareness and knowledge and behavioural change among West Virginia Loggers. *Injury Prevention Journal,* (10)4: 233-234.

International Labour Office. 1998. Safety and Health in forestry work. ILO Code of Practice. International Labour Office, Geneva.

Johnstone, R., Mayhew, C. and Quinlan, M. 2005. Outsourcing a risk? *The Regulation of occupational health and safety where subcontractors are employed.* 10(24).

Kestel, B.R. and Mclead, I. 2009. Chainsaw Operator's Manual 9th edition, Forests works.

Lefort, A.J., de Hoop, C. F. and Pine, J.C. 2003. Characteristics of injuries in Logging industry of Louisiana USA. *Journal of Forest Engineering,* 14(2): 1-12.

Levesque, J. 2004. Building health and safety leadership. *Ontario Forestry Safe Workplace Association, 7(1):* 1-3.

Lilley, R., Feyer, A., Kirk, P. and Gander, P. 2002. A survey of forest workers in New Zealand. Do hours of work, rest, and recovery play a role in accidents and injury? *Journal of Safety Research,* 33(1): 53-71.

Louw, W.J.A. 2004. General history of South African Forest industry 1991-2002. *Southern African Forestry Journal, 201: 65-75.*

Mack, R. 2010. How to strengthen the link between training, health and safety. *SA Forestry Magazine, 16*-19.

Manyuchi, K. and Pulkki, R. 2002. A framework for analysing workforce dynamics in forest harvesting in South Africa. *Southern African Forestry Journal,* 196: 41-48.

Mondi Group Sustainable Development Report. 2010. People safety and Health.

Montorselli, N.B., Lombardini, C., Magagnotti, N. and Marchi, E. 2010. Relating safety, productivity and company type for motor manual logging operations in Italian Alps. *Journal of Accident Analysis and Prevention*, 42(6): 2013-2017.

Mujuru, P., Helmkamp, J., Mutambudzi, M. and Bell, J.L. 2009. Evaluating the impact of an intervention to reduce injuries among loggers in West Virginia. 1999-2007. *Journal of Agricultural safety and health,* 15(1): 75-88.

Nieuwenhuis, M. and Lyons, M. 2002. Health and Safety Perceptions of Forest Harvesting Contractors in Ireland. *International Journal of Forest Engineering,* 13(2): 69-76.

Occupational Safety and Health Administration 1996. US Department of Labour.

Poschen, P. 2002. Forest Worker Safety. FAO Corporate document repository. Geneva.

Potocnik, I., Pentek, T. and Poje, A. 2009. Severity Analysis of Accidents in Forest operations. *Croat Engineering Journal*, 30(2): 171-179.

Sappi Geographic Information System (Online). 2014. Available: http//pmb/s17.za.sappi.com/GIS/index.html. (Accessed 12 November 2014).

Sappi Sustainable Development Report. 2009. *Prioritizing wellbeing, safety and health.* Braamfontein.

Scott, P.A. 2004. Ergonomics report forest harvesting. *Southern Journal of Applied Forestry*, 31(3): 124-128.

South Africa. Department of Agriculture 1995. White Paper on Agriculture. Government Gazette number 06211161:11 Available: http:www.nda.agric.za/doc/Policy/WHITEPAPER.htm (Accessed 19 March 2014).

South Africa Forestry Magazine September/October 2002: 63-72.

South Africa. 1995. Labour Relations Act, 1995. Department of Labour, Pretoria: Government Printer.

South Africa. 1993. Occupational Health and Safety 85 of 1993 and Regulations. Department of Labour, Pretoria: Government Printer.

South Africa. 1997. Sustainable Forest Development in SA. The policy of the Government of national unity. White Paper. Pretoria: Government printer.

Statistics South Africa, 2000. Mortality and causes of death in South Africa. Pretoria: Government Printer.

Tadesse, T. and Kumie, A. 2007. Prevalence and factors affecting work related injury among workers engaged in small and medium scale industries in Gondar Weredia, north Gondar zone, Amhara regional state, Ethiopia. *Ethiopian Journal Health Development,* 21(1): 25-33.

Thelin, A. 2002. Fatal accidents in Swedish farming and forestry 1988-1997. *Journal of Safety Science*, 40(6): 501-517.

Tsorias, P.A., Rottensteiner, C. and Stampfer, K. 2014. Wood harvesting accidents in the Austrian State Forest Enterprise 2000-2009. *Safety Science Journal*, 62(1): 400-406.

Waehrer, G.M. and Miller, T.R. 2009. Does Safety Training Reduce Work Injury in the United States. *Ergonomics Open Journal,* (2): 26-39.

Wang, J., Bell, J. L. and Grushecky, S.T. 2003. Logging injuries for a 10 year period in Jilin Province of the people's Republic of China. *Journal of Safety Science Research,* 34(3): 273- 279.

Wightman, A.R. and Shaffer, R.M. 2000. Evaluation of a Logger and Education Program in Virginia. *Journal of Extension,* 38(1).

World Health Organization. 2006. *Working together for health* (online). Geneva: World Health Organization. Available: http://www.who.int/whr/2006/whr06_en.pdf (Accessed 12 November 2014).

Yiha, O. and Kumie, A. 2010. Assessment of occupational injuries in Tendaho Agricultural Development S.C. Afar Regional State. *Ethiopian Health Development Journal*, 24(3): 167-172.

APPENDIX 1

Sappi

Forests Products (Pty) Ltd
Cascades

(Reg. no. 1978/002426/07)
P.O. Box 13124
3202 Cascades
South Africa
Tel +27 (0)33 347 6600
Fax + (0) 33 347 6789

To	Ms. H. Nkomo
Copy	Area SHEQ Manager Divisional Logistics & Fibre Supply Manager
From	Logistics & Fibre Supply Manager- KZN
Date	29th January 2010
Reference	MTechApproval.doc
Subject	**Approval of MTech Research – Sappi Forests**

Dear, Hloni

Your letter (dated 30th November 2009) requesting permission to conduct research work at Sappi Forests from 2010 to 2011 serves as reference.

In your letter you indicate your intention to register with Durban University of Technology for a master's degree. You also state that your area of interest is safety & health management and would like to conduct a specialist retrospective study evaluating the impact health and safety training on occupational injuries and incidents amongst harvesting contractor at the Sappi forests plantations.

Your request has been reviewed and based on the mutual benefits that can be derived from such a study, **permission has been granted to this effect**. However, the study must be conducted in accordance to the following conditions where you agree:

- To comply with company's code of conduct and ethics
- To sign the confidentiality form provided by the company.
- Confidentiality will be maintained - there will be no mentioning of names of participants and the company.
- All discussions, materials and findings will be held in strictest of confidence.
- All information collected during the study will be treated with highest confidentiality and used solely for the purposes identified in the research.
- All dissemination of the findings will be communicated to the company.
- Upon completion of the study, you undertake to provide the company with a bound copy of the full research report.

Sappi Forests takes this opportunity of wishing you all the best for this study.

[redacted]

Kind regards

A. Thistle
Logistics & Fibre Supply Manager KZN

APPENDIX 2

INSTITUTIONAL RESEARCH ETHICS COMMITTEE (HREC)

LETTER OF INFORMATION AND CONSENT

Dear colleague,

My name is Hloni Nkomo, I am doing a study through Durban University of Technology. I am interested in hearing about personal experiences of safety and training of workers in the company and other issues that may contribute to injuries in the plantations. You are hereby requested to participate in the study that is mentioned below, please read it carefully and sign the letter.

Title of the Research Study:
Effectiveness of health and safety training on reducing occupational incidents among forestry harvesting contractors in KZN.

Principle Investigator/s/researcher: : Miss Gladys Hloniphile Nkomo
Co-Investigator/s/supervisor/s: Dr Poovendhree Reddy & Mr Ivan Niranjan

Brief Introduction and Purpose of the Study:
Forestry harvesting operations is associated with a high accident rate and some workers die while doing their work. Workers in the forests work in isolation and also work in steep areas these also contribute to accidents. Felling trees with a chainsaw and other harvesting operations has been identified as dangerous duties in harvesting. Workers attend training before they perform their duties; this study aims at checking if training has influence on reducing the injuries in the forestry industry. The completion of the questionnaire will be done during normal working hours, permission has been granted from the company to conduct this study. Harvesting contractor managers will be notified of the study as well as the time it will take to complete the questionnaire.

Benefits: The study will help to improve health and safety training programs in order to create a work environment that is safe for everybody in forestry harvesting.

Reason/s why the Subject May Be Withdrawn from the Study: If you feel that you cannot continue answering the questions you are allowed to stop. Nothing will happen to you if you do not want to take part in the study.
Remuneration: There will be no remuneration paid to the participants for participating.

Confidentiality: All information collected during this study will be treated confidentially. Only the researcher will have access to this data.
Persons to Contact in the Event of Any Problems or Queries:
Mr Ivan Niranjan Tel (w) 031 373 2034
Dr Poovendhree Reddy Tel (w) 031 373 2808

Statement of Agreement to Participate in the Research Study:

I

_____

Subject's full name and ID number

have read this document in its entirely and understand its contents. Where I have had any questions or queries, these have been explained to me by _____to my satisfaction. Furthermore, I fully understand that I may withdraw from this study at any stage without adverse consequences and my future health care will not be compromised. I, therefore, voluntary agree to participate in this study,

Participant's name (print) _____

Participant's signature_____ Date_____

Researcher's name (print)_____

Researcher's signature_____

Date_____

Witness name (print)_____

Witness signature_____

Date_____

I**sithasiselo 2**

INSTITUTIONAL RESEARCH ETHICS COMMITTEE (HREC)

LETTER OF INFORMATION AND CONSENT

IKOMIDI LEMITHETHO EPHATHELENE NOKUCWANINGA (IREC)
INCWADI EQUKETHE IMININGWANE KANYE NEMVUME YOKUSEBENZA

Siyanibingelela – niyacelwa ukuba nithathe iqhaza kulesisifundo esilandelayo.
Isihloko sesiFundo soCwaningo:
Ukuhlolisiswa komthelela wokufundiswa ngendlela yokusebenza ngokuphepha futhi uphilile ezingozini ezidaleka uma kusetshezwa ezinkontilakini zokuwisa amahlathi KwaZulu-Natali.
UmHloli omKhulu/umCwaningi:: uNkz. Gladys Hloniphile Nkomo
AbaHloli abaKhulu/iziNduna: uDkt. Poovendhree Reddy kanye noMnz. Ivan Niranjan

Umlando omfushane kanye neNhloso yalesi siFundo:

Umsebenzi wokuwiswa kwamahlathi ungomunye wemisebenzi eyingozi kakhulu njengoba abanye abasebenzi belahlekelwa impilo yabo ngesikhathi benza lo msebenzi. Abasebenzi basemahlathini basebenza ngabodwana futhi basebenze ezindaweni ezikhuphukelayo, lokhu-ke nakho kuba umthelela walezi zingozi. Ukuwisa izihlahla ngomshini wokuwisa kanye nangezinye izinsiza zokusebenza kubalwa njengokuyingozi kakhulu kulo msebenzi wokuwiswa kwezihlahla. Abasebenzi bayafundiswa ngaphambi kokuba benze lo msebenzi; inhloso yalesi sifundo ukuhlola ukuthi ukufundiswa ukusebenza kunawo yini umthelela ekunciphiseni izingozi embonini yezamahlathi. Imvume yokwenza lesisifundo ifunyenwe kubaphathi benkampani, nabaphathi benkontileka bazisiwe ngale sisifundo. Ukugcwaliswa kwemibuzo izokwenziwa ngesikhathi somsebenzi.

Okuzozuzwa: Lesi sifundo sizosiza ukuthuthukisa izinhlelo zokufundiswa ukusebenza uphilile futhi uphephile ngenhloso yokudala ukusebenza okuphephile kuwona wonke umuntu osebenza emahlathini.

Isizathu esingadala ukuthi lesi sifundo sihoxiswe ukuba sifundwe: Uma ubona ukuthi ngeke ukwazi ukuqhubeka nokuphendula le mibuzo, uvumelekile ukuba uyeke. Ngeke wenziwe lutho uma ufisa ukungabi yingxenye yalesi sifundo.

Inkokhelo: Ayikho imali ezokhokhelwa abantu ababambe iqhaza kulesi sifundo.

Ukugcinwa kolwazi: Lonke ulwazi olutholakale ngesikhathi kwenziwa lesi sifundo luzogcinwa luyimfihlo. Abacwaningi kuphela abazokwazi ukusebenzisa lolu lwazi.

Abantu ongaxhumana nabo uma unenkingo noma uma unemibuzo:

uMnz. Ivan Niranjan Ucingo (lomsebenzi) 031 373 2034

uDkt. Poovendhree Reddy Ucingo (lomsebenzi) 031 373 2808

Incwadi yesiVumelwano kuBantu abaBambe Iqhaza esiFundweni sokuCwaninga:

Mina

_____

Amagama aphelele kanye nenombolo kamazisi(ID)

Ngiyifundisisile le ncwadi futhi ngayiqonda ukuthi isho ukuthini. Lapho benginemibuzo noma ngidinga ukuchazelwa khona, ngichazelwe ngu- _____futhi nganeliseka. Ukwengeza, ngiyaqonda ukuthi ngingasiyeka lesi sifundo uma ngithanda ngingasolwa ngalokho futhi ikusasa ngempilo yami ngeke lithinteke. Ngakho-ke, ngibamba iqhaza kulesi sifundo ngoba ngithanda,

Igama lobamba iqhaza (bhala ngesandla) _____

Ukusayina kobamba iqhaza_____ Usuku_____

Igama likaMcwaningi (bhala ngesandla)_____

Ukusayina kukaMcwaningi_____

Usuku_____

Igama likafakazi (bhala ngesandla)_____

Ukusayina kukafakazi_____

Usuku_____

APPENDIX 3

DURBAN UNIVERSITY of TECHNOLOGY

Institutional Research Ethics Committee
Durban University of Technology
P O Box 1334
Durban
4000

27 June 2013

Ms G H Nkomo
P O Box 824
New Germany
3620

Dear Ms Nkomo

ACKNOWLEDGEMENT OF RECEIPT OF APPLICATION FOR ETHICAL APPROVAL

Title: Effectiveness of health and safety training on reducing occupational incidents among forestry harvesting contractors in KZN
Reference Number: REC 51/13

The Institutional Research Ethics Committee wish to acknowledge receipt of your research proposal received on 20 June 2013 which is to be reviewed via the expedited process.

A reference number has been assigned to your proposal. You are required to quote this number for all queries relating to the study.

Yours Sincerely

[redacted]

Prof J K Adam
Chair: IREC

APPENDIX 3 ETHICS APPROVAL LETTER

Institutional Research Ethics Committee
Faculty of Health Sciences
Room MS 49, Mansfield School Site
Gate 8, Ritson Campus
Durban University of Technology

P O Box 1334, Durban, South Africa, 4001

Tel: 031 373 2900
Fax: 031 373 2407
Email: lavishad@dut.ac.za
http://www.dut.ac.za/research/institutional_research_ethics

www.dut.ac.za

29 August 2013

IREC Reference Number: **REC 51/13**

Ms G H Nkomo
P O Box 824
New Germany
3620

Dear Ms Nkomo

Effectiveness of health and safety training on reducing occupational incidents among forestry harvesting contractors in KZN

I am pleased to inform you that Full Approval has been granted to your proposal REC 51/13.

The Proposal has been allocated the following Ethical Clearance number IREC 070/13. Please use this number in all communication with this office.

Approval has been granted for a period of one year, before the expiry of which you are required to apply for safety monitoring and annual recertification. Please use the Safety Monitoring and Annual Recertification Report form which can be found in the Standard Operating Procedures [SOP's] of the IREC. This form must be submitted to the IREC at least 3 months before the ethics approval for the study expires.

Any adverse events [serious or minor] which occur in connection with this study and/or which may alter its ethical consideration must be reported to the IREC according to the IREC SOP's. In addition, you will be responsible to ensure gatekeeper permission.
Please note that any deviations from the approved proposal require the approval of the IREC as outlined in the IREC SOP's.

Please note that you may continue with validity testing and piloting of the questionnaire. Research on the proposed project may not proceed until IREC reviews and approves the final questionnaire. If there are no changes to the questionnaire kindly notify IREC in writing.

Yours Sincerely

[redacted]

Prof J K Adam
Chairperson: IREC

APPENDIX 3 Acknowledgement receipt of pilot study

Institutional Research Ethics Committee
Faculty of Health Sciences
Room MS 49, Mansfield School Site
Gate 8, Ritson Campus
Durban University of Technology

P O Box 1334, Durban, South Africa, 4001

Tel: 031 373 2900
Fax: 031 373 2407
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http://www.dut.ac.za/research/institutional_research_ethics

www.dut.ac.za

4 September 2013

IREC Reference Number: **REC 51/13**

Ms G H Nkomo
P O Box 824
New Germany
3620

Dear Ms Nkomo

Effectiveness of health and safety training on reducing occupational incidents among forestry harvesting contractors in KZN

The Institutional Research Ethics Committee acknowledges receipt of your notification regarding the piloting of your data collection tools.

Please note that you may now proceed with research on the proposed project.

Yours Sincerely,

[redacted]

Prof J K Adam
Chairperson: IREC

APPENDIX 4

QUESTIONNAIRE

Effectiveness of health and safety training on reducing occupational injuries among forestry harvesting contractors in KZN.

Please tick the option(s) that apply to you, when required indicate your level of agreement with the statements. Additional space is provided for you to enter details as you feel necessary.

SECTION 1

A. Demographics

1. Gender

Male	1
Female	2

2. Age

Younger than 25 years	1
25-29 years	2
-34 years	3
35-39 years	4
40-44 years	5
45-49 years	6
50 years and older	7

3. Indicate the number of years you have been working for the contractor

Less than 1 year	1
1 year	2
2 years	3
3 years	4
4 years	5
5 years	6
More than 5 years	7

4. Which of the below categories do you fit into?

Supervisor	1
Chainsaw operator	2
Cable yarder operator	3
Marker/pusher	4
Debarker	5
Stacker	6
Tractor, skidder, three wheeler operator	7
Other	8

B. Health and Safety Knowledge

5. What is your understanding of the role of the Occupational Health and Safety Act in the workplace?_____

---

6. Emergency procedure is always available in field, and it was explained to me.

Strongly agree	1
Agree	2
Neutral	3
Disagree	4
Strongly disagree	5

7. What is the number for an ambulance?_____

8. Cell phone network coverage is always available on site.

Strongly agree	1
Agree	2
Neutral	3
Disagree	4
Strongly disagree	5

9. Which work is more dangerous? You may tick more than one option.

Felling trees	1
Cross cutting trees	2
Debarking	3
Debranching	4
Stacking logs	5
Cable yarding/ skidding	6
Short haul units operating	7
Loading and off-loading logs	8

10. I have received safety training.

Strongly agree	1
Agree	2
Neutral	3
Strongly disagree	4
Disagree	5

10.1 When were you trained?

During the past 6months	1
Last year	2
Over a year ago	3
Never	4

11. How do you rate the training course you have attended?

Excellent	1
Good	2
Average	3
Poor	4

12. How would you describe the contents of training provided?

Too general	1
Satisfactory	2
Visual aids used	3

Waste of time	4

13. Dou you feel that training providers need to improve quality of training?

Strongly agree	1
Agree	2
Neutral	3
Disagree	4
Strongly disagree	5

If you agree, how? ----------

_____

_____

14. Information about the hazards associated with your job was given.

Strongly agree	1
Agree	2
Neutral	3
Disagree	4
Strongly disagree	5

15. After having attended the training you are able to work safely.

Strongly agree	1
Agree	2
Neutral	3
Disagree	4
Strongly disagree	5

16. Do you have any suggestions on how to improve the training program?

_____

_____

_____

17. Training was given in a language that is understood by me.

Strongly agree	1
Agree	2
Neutral	3
Disagree	4
Strongly disagree	5

18. What do you consider as a positive outcome from the training attended?

Increased production	1
Safety improvement	2
Injury reduction	3
Personal growth	4
Pay increase	5
All of the above	6

19. Health and Safety training reduces incidents and improves worker safety

Strongly agree	1
Agree	2
Neutral	3
Disagree	4
Strongly disagree	5

20. Written safe work procedures relating to your job was explained to you

Strongly agree	1
Agree	2
Neutral	3
Disagree	4
Strongly disagree	5

21. Did you understand written safe work procedure?

Yes	1
No	2

C. Occupational injuries

22. Have you been injured recently while performing your work?

Yes	1
No	2

If yes what happened? ----------

Which year was it?_____

22.1. Terrain when the accident occurred

Flat ground	1
Medium slope	2
Steep slope	3

22.2. What was the activity performed during the time of the accident?

Felling trees	1
Cross cutting	2
Debarking	3
Other logging activities	4

22.3. What was the cause of the accident?

Injured by tree/log	1
Slip/trip/fall	2
Injured by chainsaw	3
Hit by chain/ cable	4
Other	5

22.4. Which factors or conditions contributed to the accident, you may select more than one option.

Defects in tree	1
Dead tree	2
Weather conditions	3
Heavy brush/ground cover	4
Rough terrain	5
Other	6

22.5. Other factors that contributed to the accident, you may tick more than one option.

Distracted by coworkers activities	1
Working too fast	2
Excessive noise	3

Working when tired/ too fatigued	4
Handling heavy objects	5
Misjudged time/distance	6
Not paying attention	7
Unaware of hazards	8
Wrong cutting method	9
Other	10

22.6. How long were you off as a result of this accident?

None	1
1-5days	2
6-10 days	3
11-15 days	4
16-20 days	6
More than 21 days	7

22.7. Were you hospitalized?

Yes	1
No	2

22.8. How long were you in hospital?

1-5 nights	1
6-10 nights	2
11-15nights	3
16-20nights	4
21 nights and more	5

22.9. Were you invited to the incident investigation after the accident?

Strongly agree	1
Agree	2
Neutral	3
Disagree	4
Strongly disagree	5

22.10. Refresher training was given after the incident.

Strongly agree	1
Agree	2
Neutral	3
Disagree	4
Strongly disagree	5

23. Please complete the following statement:

When working you need to be, you may select more than one option.

Sober at all times	1
Always wear the required PPE	2
Do not perform work unless trained for it and certified	3
Report any defective equipment	4
All of the above	5

24. It is allowed to modify any power tool.

Strongly agree	1
Agree	2
Neutral	3
Disagree	4
Strongly disagree	5

25. Always use the correct and appropriate tool for the job.

Strongly agree	1
Agree	2
Neutral	3
Disagree	4
Strongly disagree	5

26. Avoid stepping on wet logs or bark.

Strongly agree	1
Agree	2
Neutral	3
Disagree	4
Strongly disagree	5

27. Health and safety is everybody's responsibility.

Strongly agree	1
Agree	2
Neutral	3
Disagree	4
Strongly disagree	5

D. Attitudes

28. Do you believe that training is needed to improve the health and safety of?

Supervisors	1
All workers	2
Only chainsaw operators	3

29. What, do you think affects worker safety? You may select one or more options.

Production pressure	
Machinery condition	
Lack of PPE	
Lack of training	
Lack of experience	
Fatigue	
All of the above	

E. Practices

30. Workers, including you, take short cuts in carrying out your job.

Strongly agree	1
Agree	2
Neutral	3
Disagree	4
Strongly disagree	5

Please state an example_____

31. Do you use PPE provided at all times?

Strongly agree	1
Agree	2
Neutral	3
Disagree	4
Strongly disagree	5

If not, why?_____

If yes, what are the benefits of using PPE correctly at all times?_____

32. Training on the importance and correct use of PPE was given.

Strongly agree	1
Agree	2
Neutral	3
Disagree	4
Strongly disagree	5

F General

33. Do you have any comments relating to the study?_____

_____

_____

Thank you for participating

ISITHASISELO 4

UHLELO LWEMIBUZO

Ukuhlolisiswa komthelela wokufundiswa ngendlela yokusebenza ngokuphepha futhi uphilile ezingozini ezidaleka uma kusetshezwa ezinkontilakini zokuwisa amahlathi KwaZulu-Natali.

Sicela ubeke uphawu kulokho okuhambisana nawe, uma kunesidingo khombisa ubungako bezinga ovuma ngalo ngokubhala imisho. Kunesikhala esengeziwe ukuze ukwazi ukuchaza imininingwane uma ubona kufanele.

ISIGABA A

Ubulili

1. Ubulili

Owesilisa	1
Owesifazane	2

2. Iminyaka yobudala

Oneminyaka engaphansi kwengu-25 ubudala	1
25-29 weminyaka	2
30-34 weminyaka	3
35-39 weminyaka	4
40-44 weminyaka	5
45-49 weminyaka	6
50 weminyaka noma ngaphezulu	7

3. Beka uphawu ukukhombisa iminyaka osuyisebenzele yona le nkontilaki

Unyaka ongaphansi kowodwa (1)	1
Unyaka owodwa (1)	2
Iminyaka emibili (2)	3
Iminyaka emithathu (3)	4
Iminyaka emine (4)	5
Iminyaka emihlanu (5)	6

Iminyaka engaphezulu kwemihlanu (5)	7

4. Yimuphi umsebenzi owenzayo kulena engezansi?

Induna	1
Usebenzisa umshini wokuwisa	2
Usebenza ukubopha amakhebula	3
Ubeka omaka/ i-pusher	4
Uxebula amagxolo	5
I-Starker/amatakisi	6
Umshayeli woganda ganda/ ibell logger/ iskida	7
Okunye, chaza	8

B. Ulwazi lwezokuphepha nezempilo

5. Ngabe wazini ngoMthetho wezokuphepha nezempilo wezabasebenzi kahulumeni?_____

_____

_____

_____

6. Ngabe uyayazi inqubo elandelwayo esimweni esiphuthumayo sengozi

Ngivuma kakhulu	1
Ngiyavuma	2
Ngiphakathi nendawo	3
Angivumi	4
Angivumi kakhulu	5

7. Ithini inombolo yokushayela i-ambulensi?_____

8. Umakhala ekhukhwini uyabamba la usebenza khona ngaso sonke isikhathi

Ngivuma kakhulu	1
Ngiyavuma	2
Ngiphakathi nendawo	3
Angivumi	4
Angivumi kakhulu	5

9. Ngokwakho ukubona, yimuphi umsebenzi oyingozi kakhulu?

Ukuwisa izihlahla	1
Ukusika izihlahla	2
Ukuxebula amagxolo	3
Ukuxebula amahlamvu	4
Ukutaka izingodo	5
Ukubopha/ Ukudonsa Amakhebuli	6
Ukusebenzisa amaketanga namasondo okufasa	7
Nokunye ke	8

10. Izifundo zokusebenza ngokuphepha emsebenzini usuke wazenza wafundiswa.

Ngivuma kakhulu	1
Ngiyavuma	2
Ngiphakathi nendawo	3
Angivumi	4
Angivumi kakhulu	5

10.1. Uma ukhe wafundiswa , wafunda nini?

Ezinyangeni eziyisithupha (6) ezedlule	1
Ngonyaka odlule	2
Ngaphezulu konyaka owodwa odlule	3
Awukaze	4

11. Ngabe zazinjani izifundo owazenza?

Zazisezingeni eliphezulu	1
Zazisezingeni elifanele	2
Zazisezingeni elikahle	3
Zazisezingeni eliphansi	4

12. Ungachaza uthini nje ngendlela okwakufundwa ngayo?

Yayilula kakhulu	1
Yayincomeka	2
Kwakusetshenziswa nezinto zokuphepha ezibonakalayo	3
Kwakuchithwa isikhathi	4

13. Abaqeqeshi kumele benzengcono izinga abafundisa ngalo

Ngivuma kakhulu	1
Ngiyavuma	2
Ngiphakathi nendawo	3
Angivumi	4
Angivumi kakhulu	5

Uma uvuma, mele benzenjani nje ----------

_____

_____

14. Ngesikhathi niboniswa futhi nifundiswa umsebenzi, utsheliwe ngokwanele ngobungozi bomsebenzi owenzayo

Ngivuma kakhulu	1
Ngiyavuma	2
Ngiphakathi nendawo	3
Angivumi	4
Angivumi kakhulu	5

15. Ngemuva kokufundiswa, usuyakwazii ukusebenza ngendlela ephephile.

Ngivuma kakhulu	1
Ngiyavuma	2
Ngiphakathi nendawo	3
Angivumi	4
Angivumi kakhulu	5

16 .Ngabe ikhona imibono onayo ngendlela ekungathuthukiswa ngayo uhlelo lokuqeqesha?

17. Uqeqesho lunikezwa ngolimi oluqondwa yiwona wonke umuntu?

Ngivuma kakhulu	1
Ngiyavuma	2
Ngiphakathi nendawo	3
Angivumi	4
Angivumi kakhulu	5

18. Yikuphi obona ukuthi kwaba yimpumelelo ngesikhathi nifundiswa?

Ukukhuphuka komkhiqizo	1
Ukuthuthuka kwezinga lokuphepha	2
Ukuncipha kwezingozi	3
Ukukhula kolwazi kumuntu ngamunye	4
Ukukhuphuka kwenkokhelo	5
Konke okungenhla	6

19. Izifundo ezimayelana nezokuphepha nezempilo zinciphise izingozi zathuthukisa nendlela yokusebenza ngokuphepha.

Ngivuma kakhulu	1
Ngiyavuma	2
Ngiphakathi nendawo	3
Angivumi	4
Angivumi kakhulu	5

20. Imigomo yokusebenza ngokuphepha ebhaliwe emayelana nomsebenzi owenzayo yachazwa uyayiqonda yonke.

Ngivuma kakhulu	1
Ngiyavuma	2
Ngiphakathi nendawo	3
Angivumi	4
Angivumi kakhulu	5

21. ngabe wayizwa kahle imigomo:

Yebo	1
Cha	2

C. Izingozi ukulimala

22. Ngabe uke walimala usemsebenzini?

Yebo	1
Cha	2

Uma uthi yebo, kwenzekeni? ----------

Bekungamuphi unyaka?_____

22.1. Indawo lapho kwenzeke khona le ngozi-

Indawo eqondile	1
Indawo ekhuphukelayo kancane	2
Indawo ekhuphukelayo kakhulu	3

22.2. Yimuphi umsebenzi okade uwenza ngesikhathi ulimala?

Ukuwisa izihlahla	1
Ukusika izihlahla	2
Ukuxebula amagxolo	3
Eminye imisebenzi yokudonsa izingodo	4
Okunye	5

22.3. Yini edale ukuthi ulimale?

Ulinyazwe isihlahla/ugodo	1
ushibilikile/ukhubekile/uwile	2
Ulinyazwe umshini wokuwisa	3
Ushaywe iketanga/ ikhebuli	4

Okunye	5

22.4 Imbangela noma isimo esidale ukuthi ulimale

Isihlahla esingesihle	1
Isihlahla esifile	2
Isimo sezulu	3
Ibhulashi elisindayo/ikhava yaphansi	4
Indawo emazombezombe	5
Esinye isimo esejwayelekile	6
Akukho simo esejwayelekile esenzekile	7

22.5. Ezinye izinto ezidale ukuthi ulimale

Ezinye izisebenzi ekade zisebenza	1
Ukusebenza usheshisa	2
Umsindo omkhulu kakhulu	3
Ukusebenza usukhathele	4
Ukuphakamisa izinto ezisindayo	5
Ukugeja isikhathi/isikhala ozikalele sona	6
Ukunganaki	7
Ungayiboni ingozi	8
Ukusika ngendlela okungesiyo	9
Azikho izinto ezidale ukulimala	10

Okunye:----

22.6. Izinsuku obekelwe ukuba uzihlale ungezi emsebenzini, ungakhetha eziningi impendulo.

Azikho	1
1-5wezinsuku	2
6-10 wezinsuku	3
11-15 wezinsuku	4
16-20 wezinsuku	6
Izinsuku ezingaphezulu kwezi ngu- 21	7

22.7 Ngabe ubusesibhedlela?

Yebo	1
Cha	2

22.8.. Isikhathi osihlale esibhedlela

Azikho izinsuku	1
1-5 wobusuku	2
6-10 wobusuku	3
11-15 wobusuku	4
16-20 wobusuku	5
Ngaphezulu kuka-21 wobusuku	6

22.9.Wawuyingxenye yabantu ababuzwa imibuzo ngemuva kwengozi eyenzeka.

Ngivuma kakhulu	1
Ngiyavuma	2
Ngiphakathi nendawo	3
Angivumi	4
Angivumi kakhulu	5

22.10 Ngemuva kokulimala wazithola izifundo zokuzivuselela, nokusebenza ngokuphepha.

Ngivuma kakhulu	1
Ngiyavuma	2
Ngiphakathi nendawo	3
Angivumi	4
Angivumi kakhulu	5

23. Uma usebenza mele ube yilokhu okulandelayo, ungakhetha noma kuningi

Hlala usesimweni sokusebenza esigculisayo ngasosonke isikhathi, ungaphuzi	1
Gqoka izingubo ezimelene nomsebenzi okufanele uwenze	2
Ungawenzi umsebenzi ongawufundelanga	3
Bika kumphathi noma yini engalungile esezimpahleni zokusebenza	4
Konke okungenhla	5

24. Ithulusii elisebenza ngogesi kuvumelekile ulilungise ngokunganaki nokulishinsha.

Ngivuma kakhulu	1
Ngiyavuma	2
Ngiphakathi nendawo	3
Angivumi kakhulu	4
Angivumi	5

25.Sebenzisa amathulusi afanele umsebenzi owenzayo ngaso sonke isikhathi.

Ngivuma kakhulu	1
Ngiyavuma	2
Ngiphakathi nendawo	3
Angivumi	4
Angivumi kakhulu	5

26. Gwema ukugibela phezu kwezingodo noma kumagxolo amanzi

Ngivuma kakhulu	1
Ngiyavuma	2
Ngiphakathi nendawo	3
Angivumi	4
Angivumi kakhulu	5

27. Ezokuphepha nezempilo zisezandleni zawo wonke umsebenzi.

Ngivuma kakhulu	1
Ngiyavuma	2
Ngiphakathi nendawo	3
Angivumi	4
Angivumi kakhulu	5

D. Ngokubona kwakho

28. Uyakholelwa ekutheni le zifundo ziyadingeka ukuthuthukisa indlela yokuphila kanye nokuphepha kwalaba?

Izinduna	1
Zonke izisebenzi	2
Izisebenzi ezisebenzisa umshini wokuwisa kuphela	3

29. Ucabanga ukuthi yini ebangela ukuphazamiseka ukusebenza ngokuphephile? Beka uphawu kokukodwa noma ngaphezulu.

Ingcindezi yokudingeka komkhiqizo	
Isimo semishini engalungile	
Ukuntuleka kwe-PPE	
Ukuntuleka kokufundiswa	
Ukuntuleka kolwazi lokusebenza	
Ukukhathala	
Konke okungenhla	

E. Indlela yokusebenza

30. Kuyenzeka ukuthi wena nabanye osebenza nabo nithathe indlela enqamulelayo uma usebenza?

Ngivuma kakhulu	1
Ngiyavuma	2
Ngiphakathi nendawo	3
Angivumi	4
Angivumi kakhulu	5

Yisho indlela oye wenze ngayo _____

31. Impahla yokuvikela ingozi(iPPE) oyinikeziwe uyayisebenzisa ngaso sonke isikhathi.

Ngivuma kakhulu	1
Ngiyavuma	2
Ngiphakathi nendawo	3
Angivumi	4
Angivumi kakhulu	5

Uma uthi cha, yini edala ukuthi ungawasebenzisi?_____

Uma uthi yebo, yini uyizuzayo ngokusebenzisa ama-PPE ngaso sonke isikhathi?_____

32. Uqeqesho ngendlela ekahle yokusebenzisa i-PPE kanye nokubaluleka kokuyisebenzisa waluthola.

Ngivuma kakhulu	1
Ngiyavuma	2
Ngiphakathi nendawo	3
Angivumi	4
Angivumi kakhulu	5

F. Imibono

33. Kukhona ukuphawula onakho mayelana nalemibuzo nesifundo?_____

_____

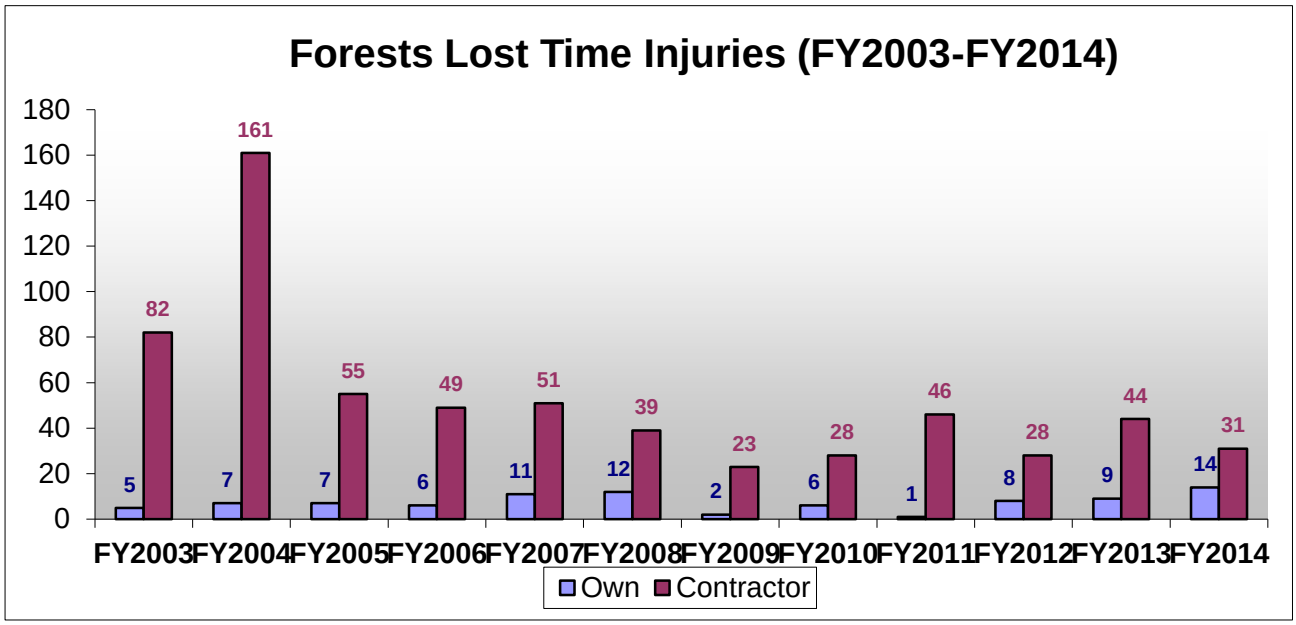
_____

SIYABONGA NGOKUBAMBA IQHAZA

APPENDIX 5

COMPANY INJURY DATA

YTD LTI figures-update monthly



FATALITY RECORDS

FY	Contractor	Own	Untoward
FY2000	4		3
FY2001	2		2
FY2002	3		1
FY2003	3		1
FY2004	5		0
FY2005	5		0
FY2006	2		1
FY2007	4	1	0
FY2008	2		0
FY2009	7		2
FY2010	1		0
FY2011	3		6
FY2012 (YTD)	1		8
FY2013	1		10
FY2014	0		2
FY2015			
	43	**1**	**36**

APPENDIX 6

DIRECT OBSERVATION

Task	Number of times Behaviour observed	Correctly done	Incorrectly done
1. Good housekeeping 1.1 Waste and general refuse placed in bins provided			
1.2 Area kept free of debris, brushwood 1.3 Items and bags stored in demarcation area 1.4 Soap used for washing hands after chemical use			
2. Stacking and storage 2.1 Chemicals stored safely 2.2 Roadways between stacks kept free of debris 2.3 Firefighting equipment available and adequate 2.4 Stacking of timber not exceeding 2m height			
3. Emergency preparedness 3.1 Emergency procedure available infield and known 3.2 Emergency numbers displayed			
4. Hand tools (Hatchet/axe, Chainsaw, lifting tongs 4.1 In good condition 4.2 Correctly stored in tool box and safely transported 4.3 Safe hand ergonomics when using tools			
5. Personal Protective Equipment 5.1 PPE issued in time 5.2 PPE stored correctly 5.3 PPE used at all times			

6. Incident reporting 6.1 Incidents/near misses reported to the supervisor 6.2 Incidents investigated 6.3 Incidents reported captured on the form			
7. General safety 7.1 Visitors inducted and sign the access form before entering the site			