Forestry work accident rates: a case study for 2004 to 2014

Mohammad Reza Ghaffariyan, AFORA, University of the Sunshine Coast

Introduction

Research projects carried out by CRC for Forestry and AFORA have investigated economic and environmental impacts of forest operations. These projects have mostly helped the industry improve machine productivity, reduce costs of harvesting operations, reduce the potential environmental impacts and improve yield and stand productivity. However, there is little knowledge available regarding Australian forestry work safety and accident rates. Machine operators and forestry workers are a vital part of the forestry sector, and their health and well-being can greatly impact on their work quality and efficiency. To increase our knowledge on forest workers' safety, this project aimed to analyse the frequency, type and root causes of work accidents which occurred within different forestry activities of five industry partners of AFORA over the period from 2004 to 2014.

Research method

Five industry partners of AFORA (27% of total) participated in this project. A questionnaire was designed and distributed to the partners to collect the safety incident reports from 2004 to 2014 (this period was selected to match most of the provided information of each partner). The information was classified and put in a Excel-based data base including; date of accident, time of accident, type of forestry activity, operation, harvesting system, harvesting machine/forestry tool, age of worker, root cause, category of accident, type of injury, injured parts, side of body, type of first aid provided, number of days off work, cost paid for medical insurance/treatments and employment type. Root causes were classified into personal errors (fatigue, lack of personal protective equipment (PPE), operator error, poor body position, poorly applied technique and poor judgment), environment (such as poorly maintained equipment and excessive heat) and system (such as lack of safety training, pre-existing injuries). The body parts were classified into the upper body (including hands/fingers), the lower body and head/neck. Injury types were classified as skin damages (including cut, abrasion, scratch, rash and laceration), contusion (bruise/struck, fracture, dislocation, struck and broken bone), muscular damage (strain, sprain and soft tissue), and others (object in eye, bitten by insect/snake, blood nose, infection and dehydration).

Results

The total number of work accidents was 470 for 11 years (a rate of 43 accidents per year). Considering the estimated yearly production rates of the industry partners that participated in this project, the accident rate was about 14.40 accidents/million cubic meters of harvested wood. Frequency and percentage of the work accidents for each forestry activity are presented in Table 1.

The majority of accidents occurred in operations (37%) and forest management (30.2%). Operations included harvesting, transport and roading. Forest management included activities such as silviculture, planting, nursery, planning, assessment, establishment, and fertilisation. Based on the results 8.1% of the accidents occurred during firefighting. Figure 1 presents the distribution of accidents for different

months. The worst months for accidents were January and February (>10%) while the lowest accident rates occurred in December and September (Figure 2). There is a suggestion that workers aged between 50 to 59 years may have had a higher accident rate while workers older than 65 years had the lowest share of the accidents. However, 51% of the incidents reports (shown as n/r (not reported) in Figure 2) had no records of worker age which make it difficult to get an accurate estimate of age distribution and the proportion of accidents.

Table 1. Frequency and percentage of accidents for different activities

Activity	Frequency	%
Forest management	142	30.2
Operations	176	37.4
Firefighting	38	8.1
Other	114	24.3
Total	***470***	***100***

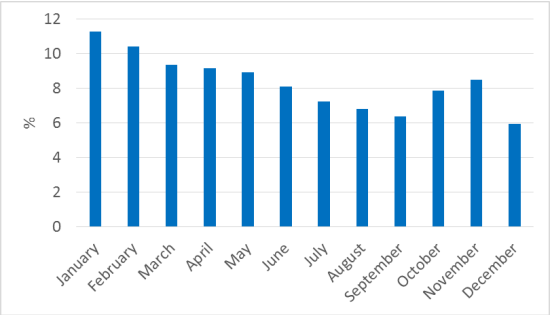


Figure 1. Percentage of accidents for different months

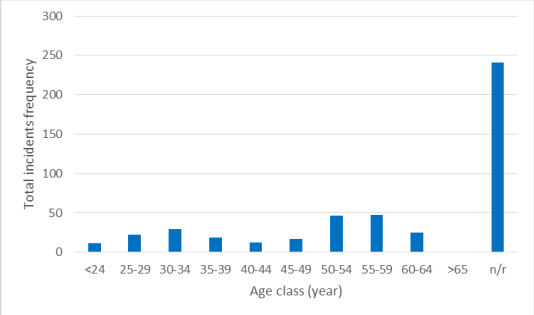


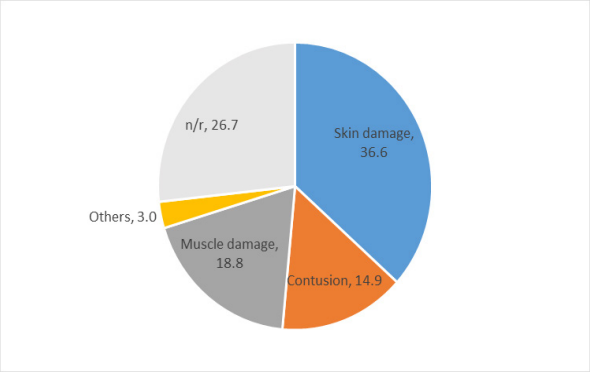
Figure 2. Percentage of accidents for age classes

Harvesting accidents

There were 101 harvesting accidents which correspond to an average rate of 2.85 accidents/ million m^3 of harvested wood in this case study. The rate is lower than accident rate of 6.03 accidents/ million m^3 for harvesting using harvester and forwarder, and it is also lower that severity rate of 12.00 accidents/ million m^3 for harvesting using skidders in Austria (Jänlich, 2009; Kühmaier, 2011). Most of the accidents (72.3%) were caused by personal error, and 5.9% were due to system/management issues, 1.0% were caused by the environment while 20.8% were not recorded. Categories of accidents included first aid (26.7%), injury (21.8%), lost time (24.8%), medical treatment (25.7%) and n/r (1.0%). Most workers were employees (workers employed by the company) (48.5%) while 39.6% were contractors and 11.9% was not recorded. Major types of injury were skin damage (such as bitten by an insect or cut) and muscle damage (such as sprain and strain) (Figure 4). The main injured part of the body was the upper body with 39.6% of total injuries followed by lower body (27.7%), head/neck (20.8%) and n/r (11.9%). Main injury points included eye (12.9%), leg (12.9%), back (8.9%), ankle (6.9%) and knee (5.9%) while the rest of injuries (52.5%) were on other points of the body.

Transportation accidents

There were 61 transportation accidents in the database. Personal errors were the main cause of accidents (90.2% of accidents, e.g. excessive speed (as a personal error) caused 4.9% of the accidents). Other root causes included systems (1.6%), the environment (1.6%) and n/r (6.6%).The accidents were categorised as lost time (45.9%), medical treatment (31.2%), first aid (13.1%) and injury (9.8%). Employment type of operators included contractor (78.7%), employee (4.9%) while 16.4% were not recorded.



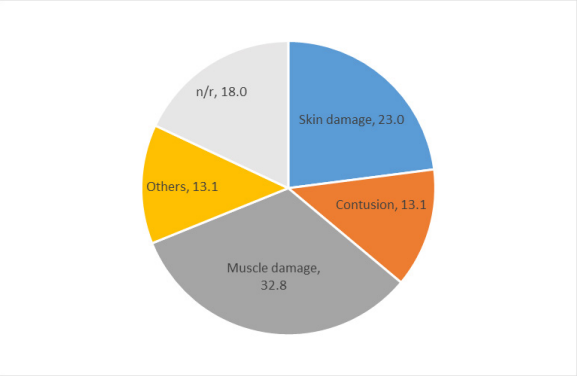


Figure 4. Percentage of injury types for harvesting accidents **Figure 5.** Percentage of injury types for transport accidents

Major injury types were muscle damage (32.8% of accidents) (such as strain and sprain) and skin damage (such as cuts which formed 11.5% of records) (Figure 5). Upper body and lower body were the main area of injury which consisted of 39.3% and 26.2% of total accidents respectively. Head/neck accounted for 19.7% of injuries while 14.8% were n/r. Drilling down to specific body parts, ankle injuries were the most prevalent for transportation (11.5% of injuries), while injuries to other parts of body such as back (9.8%), shoulder (9.8%), knee (6.6%) and fingers (6.6%) were also more frequently injured than other parts.

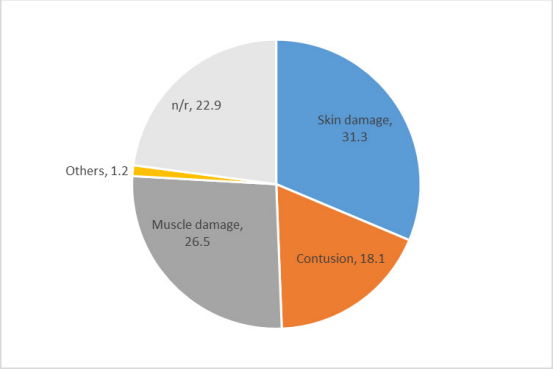
Silviculture accidents

Of the 83 accidents occurring in silvicultural operations, the cause of most injuries was not recorded on the incident forms (54.2%). However, personal errors were the major cause of accidents (38.6%) while the environment (3.6%) and systems (3.6%) were the minor root causes. The main category of accidents was injury accounting for 38.6% while the share of first aid, medical treatment, and n/r accounted for 31.3%, 20.5% and 9.6% respectively. The majority of workers were employees (80.7%) while 19.3% were contractors.

Major types of injury occurred were skin damage (31.3%, such as cuts) and muscle damage (26.5%, such as sprain and strain). 18.1% of accidents were contusions, in which hit (9.6%) was most frequent. Based on the results 22.9% of the accidents had no injury type reported (Figure 6). The upper body was injured more (41.0%) than other parts (lower body: 35.0%, head/neck: 20.4% and n/r: 3.6%). Back injuries resulted from 14.5% of all silvicultural accidents while foot (12%), knee (9.6%), eye (7.2%), shoulder (6%) and ankle (6%) were also frequently injured in silviculture operations.

Planting accidents

There were 48 cases of planting accidents (85.4% of these workers were employees, and 14.6% were contractors). While most root causes were not recorded in the incident reports (68.7%), personal errors and systems caused 25.0% and 6.3% of accidents respectively. Planting accidents were categorised as injury (64.6%), lost time (16.7%), first aid (10.4%) and medical treatment (8.3%). Figure 7 illustrates the majority of planting injuries included muscle damage (e.g. strain) and skin damage (e.g. cut) while the largest share of the accidents reported (37.5%) had no record of injury type. Upper body injuries accounted for 62.4% of planting accidents, and lower body accounted for 29.2%.Head/neck had 6.30% of injuries and 2.1% of injuries were n/r. Shoulder (20.8%), finger (10.4%), knee (10.4%) and back (8.3%) were also prevalent injuries planting operations.



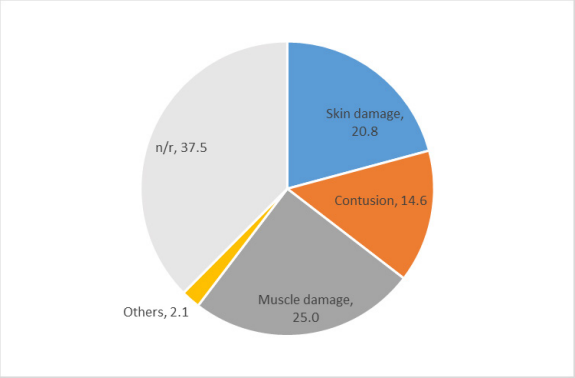


Figure 6. Percentage of injury type for silviculture accidents **Figure 7.** Percentage of injury type for planting accidents

Firefighting accidents

There were 38 accidents for firefighting in the database (92.1% of workers were employed while 7.9% were contractors). More than 76.4% of the accident reports had no record of root causes, however, personal errors (18.4%), the environment (2.6%) and systems (2.6%) were frequent root causes of accidents. The accident categories included injury (52.6%), medical treatment (26.3%), first aid (15.8%) and lost time (5.3%). Skin damage (42.1%) and muscle damage (15.8%) were most frequent types of injuries (Figure 8). Most frequently injured were upper body and lower body accounting for 44.7% and 26.3% of accidents while 18.4% were on the head/neck but 10.6% were n/r.

Accidents of other forestry activities

Within other forestry activities including assessment, establishment, etc. 114 work accidents occurred within the study period. Employment statistics indicated that 76.3% of workers were employees while 23.0% were contractors and 0.7% was not reported. The cause of a large proportion (53.2%) of accidents was not documented. However, personal errors were most frequent root causes (40.3%) while system and environment caused 5.0% and 1.5% of the accidents. The accidents were categorised as injury (43.9%), medical treatment (23.0%), first aid (22.3%), lost time (9.4%) and n/r (1.4%). Skin and muscular damages were most frequent injury types (Figure 9). 65.5% of injuries occurred on the upper body part while lower body and head/neck accounted for 15.1% and 17.3% of accidents (2.1%

were n/r). Mostly injured were fingers (11.5%), back (9.4%), leg (9.4%), hand (8.6%), shoulder (7.9%) and knee (7.2%).

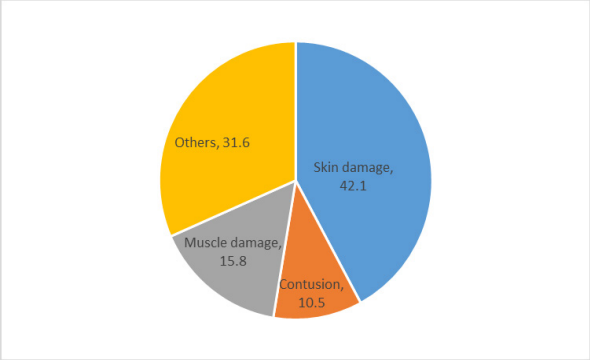


Figure 8. Percentage of injury types for firefighting accidents

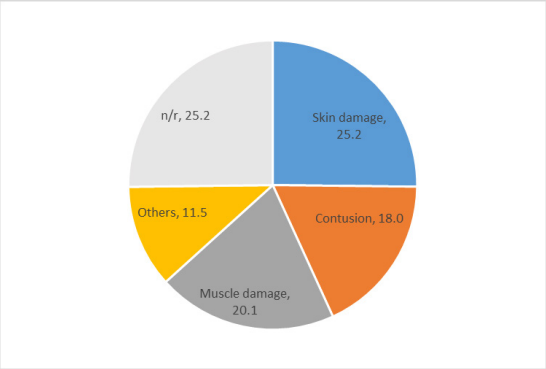


Figure 9. Percentage of injury types for other forestry accidents

Take-home messages

- Incomplete incident reporting limits the ability to use current reports to properly understand the cause and consequence of an incident. This possibly indicates a need for better enforcement of reporting and for workers to recognise a value, though improvements implemented as a result of incident reports, coming from incident reporting.
- Important information not included in incident reporting prevents in-depth analysis on: the time of day the accident occurred, the machine involved, specific location of the injury, resulting time lost, cost of treatment/recovery and near miss incidents. The incident reporting system should be improved to capture details pertinent to managing work accident risk.
- Personal errors were the main cause of the most accidents and may be effectively addressed with improved work safety training and follow up.

More information

Project Scientist, Mohammad R Ghaffariyan – mghaffar@usc.edu.au
Alliance Director, Mark Brown - mbrown2@usc.edu.au
AFORA website - *www.usc.edu.au/research/research-partnerships/australian-forest-operations-research-alliance/*

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