



Wood harvesting accidents in the Austrian State Forest Enterprise 2000–2009



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ABSTRACT

This paper deals with the analysis of wood harvesting accidents in the period 2000–2009 in ÖBf AG, Austria's largest forest enterprise. In total 1077 accidents were associated with wood harvesting activities. The overall accident rate amounted to 54.2 incidents per million cubic meter or 77.1 accidents per million work hours. There was a clear spike in accidents between 10 a.m. and 12 noon. Most accidents occurred on Monday and Tuesday (24.7% and 22% respectively) and in March (10.8%) and February (10.6%). The majority of accidents were caused by slips, trips and falls (36.7%) and falling trees or harvesting equipment (22%). Frequently injured body parts were extremities such as legs (34%), arms and hands (26.9%) followed by the head and neck area (15.2%). Contusions (37.8%) were the most common kind of injury followed by bone fractures (12.8%), sprains or strains (11.6%) and punctures or lacerations (10.4%). An average wood harvesting accident required 18.2 days for recovery, compared to the 18.4 days for tree felling and 19.8 days for extraction by means of a tractor or skidder. Accident severity varied among body parts, head–neck injuries resulted in 10.1 lost work days, while injured legs required 21.9 days for recovery per injury. In the cases where multiple parts of the body were injured 30.7 days for recovery were required.

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1. Introduction

One crucial dimension of the social aspects of forest work is its impact on the safety and health of the workforce (Heinimann, 2000). Forestry professions belong to the most dangerous jobs in all fields of production (International Labour Organisation, 1981; Peters, 1991; Poschen, 1993; Rummer, 1995; Mitchell et al., 2001; Bentley et al., 2005; Potočník et al., 2009; Lindroos and Burström, 2010). Timber harvesting, with or without machinery, is difficult, especially on steep slopes and is connected to high accident risk.

The increased accident frequency in forest operations has triggered many studies with regard to accident analyses in forestry. Some of them investigated chainsaw accidents (McFarlane, 1977; Doyle and Conroy, 1989; Sullman, 1999b; Bentley et al., 2005; Montorselli et al., 2010) and fatal accidents in forest operations (Jarl, 1980; Peters, 1991; Rodriguez-Acosta and Loomis, 1997; Mitchell et al., 2001; Thelin, 2002). Other studies examined the severity of accidents in forest operations (Potočník et al., 2009),

the impact of weather conditions on injury during harvesting operations (Suchomel and Belanová, 2009) the frequency and severity of accidents during cable yarding operations (Tsioras et al., 2011), the identification of hazards during the harvesting of wind-thrown trees (Sullman and Kirk, 2001), the impact of mechanization on human factors in forest industry (e.g. Kirk et al., 1997), the role of protective equipment in injury prevention (Kenyon, 1989; Kirk and Parker, 1994; Sullman, 1999a) and, among others, the rehabilitation of injured workers (Sullman, 1996; Sullman and Biggs, 2001). Furthermore, possible linkages between fatigue and chainsaw related injury have been researched, with regard to nutrition (Paterson et al., 1998), physical workloads (Kirk and Sullman, 2001; Sullman and Byers, 2000), as well as heat stress and dehydration (Paterson et al., 1998; Staal Wåsterlund, 2001; Bates et al., 2001).

Knowledge on the frequency and characteristics of accidents during wood harvesting operations is necessary in order to review the progress made in the promotion of safety and health and the respective setting of future targets. In this context, the current study presents statistical data for the period 2000–2009, as they were recorded in the archives of the Austrian State Forest Enterprise (Österreichische Bundesforste, (ÖBf)). The analysis of these data is discussed and proposals for the promotion of safety and health during work are made.

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2. Material and methods

Data regarding accidents that occurred between January 1st 2000 and December 31st 2009 were gathered from the registries of the ÖBf. ÖBf is responsible for the management of 14.8% of the total forest area of Austria (Bundesamt für Wald, 2011) and, among other activities, harvests an annual timber volume of more than two million m³ (Österreichische Bundesforste, 2011). The number of the employed full-time forest workers by the company has been stabilized since 2002 to around 670, who get a monthly wage for 40 h of work per week. Wood harvesting operations are conducted all year long.

During the data capture period wood felling, debranching and bucking of the trees took place, in most cases, with the help of a chainsaw (see Table 1 for terminology used). Almost 90% of felling has been done by chainsaw, whereas harvesters were used for the remaining 10%, a percentage increased from 5% 10 years ago. A wide range of machinery was used for wood extraction (skidders, specialized forest tractors and tower yarders) which facilitated the subsequent transportation of wood to the wood industry. All forest workers had been offered protective equipment (helmet with ear and eye protection, cut-resistant trousers, boots and gloves), which is replaced when worn. Furthermore, a safety day is organized every year, during which information is given and preventive health checks are carried out. Every new worker attends an introduction seminar on safety in his field of work (machinery and work assessments) in the company.

According to the current legislation in Austria, all accidents resulting in at least three days of lost work have to be reported (ASVG, 2011). The injured forest worker or their supervisor (in cases of serious accident or death) contacts the Head of the Forest District (Revierleiter). They fill in a standardized accident form and report the incident to AUVA (Austrian Workers' Compensation

Board) which is the responsible social insurance agency for occupational risks, as well as to the ÖBf Headquarters. However, the company has been systematically keeping record of all accidents of its employees since 1981, including all minor accidents which resulted in less than three lost work days.

In the context of this study, the ÖBf archives were examined for logging accidents during the period 2000–2009. All accidents that occurred during wood felling, wood extraction and the production of fuelwood were included for further analyses.

The final version of the dataset included details on five fields: personal data of the injured worker (year of birth, etc.), temporal data (month, day and time of accident), incident initiating event, injured part of the body and type of injury. All accidents causes were encoded to 12 different categories, which included the work activity during the time of accident.

Injured body parts were categorized into seven groups: head and neck, chest and back, abdomen and pelvis, arms and hands, legs, feet and multiple injured body parts. In the case of multiple injuries no more detailed information was available. With regard to the type of injury, four major groups were identified: by mechanical force (e.g. lacerations, sprains, broken bones, eye injuries, etc.), by natural forces (e.g. lightning and sunburns), by chemical action or poisoning and others (e.g. insect bites).

Production data of the company enabled the estimation of commonly used incidence rates such as the number of accidents per million production units. Furthermore, the recorded lost work hours per accident were used for the classification of accident severity. To obtain the number of lost work days an eight-hour workday was assumed.

Statistical analysis has been conducted with the help of the statistical package SPSS 17. Statistical differences have been checked with the help of chi-square tests, with Yates correction for

Table 1
Glossary of terms.^a

Wood harvesting (logging)	Preparation of logs in a forest or tree plantation according to the requirements of a user, and delivery of logs to a consumer
Felling	Severing a tree from the stump and bringing it down
Extraction	Pulling the tree from the harvested area to a landing or roadside
Topping and debranching, (delimiting)	Cutting off the tree crown and the branches
Cross-cutting (bucking)	Cutting the stem to the length specified by the intended use of the log
Debarking	Removing the bark from the stem
Tree processing	All processes required for tree topping, delimiting, cross-cutting and debarking
Wood (or log) stacking	Classification of logs in assortments and temporary storage in the form of piles
Wood extraction	The process of moving trees or logs from the felling site to a landing or roadside
Skidder	Machine used in wood extraction equipped with winches or grapple
Cable yarding	Wood extraction method, where logs are either a) extracted by dragging on the ground (skidding) or b) fully suspended in the air (skyline operations)
Tower yarder	Power source (winching machine) used in skyline operations

^a Dykstra and Poschen (1998).

Table 2
Accidents and accident rates per production units during the study period.

Year	Wood harvesting accidents		Total	Accident rate per million m ³		All accidents
	Non fatal	Fatal		Production units in million m ³	Minor accidents excluded	
2000	117		117	1.956	52.1	59.8
2001	116		116	1.883	55.8	61.6
2002	111		111	1.691	58.0	65.6
2003	150		150	1.848	62.2	81.2
2004	95	1	96	1.931	36.3	49.7
2005	83		83	2.488	27.3	33.4
2006	94		94	2.019	37.1	46.6
2007	98	1	99	1.938	33.5	51.1
2008	104		104	1.785	47.1	58.3
2009	107		107	2.35	35.3	45.5
Total	1075	2	1077	19.889	44.4	54.2

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