



Original Article

Nonfatal Occupational Injuries in Norwegian Farmers[☆]Kristin Svendsen^{1,*}, Oddfrid Aas², Bjørn Hilt^{2,3}¹ Department of Industrial Economics and Technology Management, Norwegian University of Science and Technology (NTNU), Trondheim, Norway² Department of Occupational Medicine, St. Olavs University Hospital, Trondheim, Norway³ Department of Occupational Medicine, Department of Public Health and General Practice, Norwegian University of Science and Technology (NTNU), Trondheim, Norway

ARTICLE INFO

Article history:

Received 29 November 2013

Received in revised form

11 April 2014

Accepted 1 May 2014

Available online 15 May 2014

Keywords:

accident
agricultural workers
farming
safety

ABSTRACT

Background: Agriculture ranks among the most dangerous trades worldwide. There is, however, still a lack of knowledge on nonfatal injuries in agriculture. The aim of this study was to describe the nature and occurrence of nonfatal injuries in farmers in two counties in central Norway.

Methods: A questionnaire was sent to 7,004 farmers in Norway. We asked for information about the respondents and the farm, whether the farmer had had work-related injuries on the farm during the past 12 months, and details about the incidence and seriousness of the injury.

Results: A total of 2,699 respondents gave a response rate of 42%. Of the respondents, 249 (9.2%) reported one or more work-related injuries. The most usual cause of injury involved an animal, and >75% of these happened inside the outbuilding. Among these, 17.5% had a consequence of sick leave or a more serious result. When all the accidents were analyzed by stepwise logistic regression, only the variables: works alone, has >3,500 stipulated working hours at the farm, and the type of production were statistical significant explanatory variables for having an injury.

Conclusion: Incorporating safety aspects to a greater extend in the design and construction of out-buildings would make a substantial contribution to injury prevention in agriculture.

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1. Introduction

Agriculture ranks among the most dangerous trades worldwide. According to estimates by the International Labor Organization, at least 170,000 agricultural workers are killed each year which means that workers in agriculture run twice the risk of dying on the job compared to workers in other sectors [1]. In Norway every fourth workplace fatality happens in agriculture, even though <3% of the working population works in this sector [2]. In addition, agricultural workers also suffer serious nonfatal injuries with accidents related to animals, together with machinery and falls, being the most common [3,4]. Earlier studies have indicated that better-designed facilities could contribute to the prevention of many injuries [5]. A recent Swedish study has pointed out three main themes that have an impact on risk and safety when handling animals, including the facilities [4].

An earlier Norwegian study showed that farming was the trade with the highest number of person injuries per million working hours in Norway [6]. Studies from other countries have shown that ~10% of farmers have had an accident during 1 year [7–9]. Even though tractors are the cause of almost 50% of the fatal injuries in Norway [2], it has been pointed out in an early Finnish study that the chain of causation probably is different for fatal injuries and nonfatal personal injuries [10]. There is, however, apart from some scattered information, still a lack of knowledge on the incidence and nature of nonfatal injuries in agriculture. There is therefore an urgent need for more knowledge on the occurrence, mechanisms and causes of all accidents in farming in order to prevent injuries and fatalities in the future [11].

In Norway, a regional department of the Farmers' Union, The Farmers' Association for health, safety and environment (HSE) Services, and the Labour Inspection Authority had already in 2003,

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together with a national insurance company (Gjensidige), declared a vision of zero accidents in agriculture. This project is a follow-up that will try to contribute to the realization of that vision. The study was performed in two counties in the middle part of Norway. These two counties are regarded as representative for most farmers in Norway, because the distribution of the type of production in these two counties is the same as the distribution of production types for the whole country [12].

The aim of this study was to describe the nature and occurrence of nonfatal injuries in farmers in two counties in the middle part of Norway.

2. Methods and materials

The survey was conducted in 2010 among all farmers in two counties in the central part of Norway. A questionnaire was sent to 7,004 addresses obtained from the Norwegian Agricultural Producers Register. In this register all farmers who had applied for economic support from the government during the past year are included, which means practically all active farmers in Norway. For those who had an e-mail address (3,700 persons) the questionnaire was sent electronically with the possibility to also reply online, whereas for the others, a paper version of the questionnaire was sent by mail (3,304 persons) with a prepaid response envelope. In the questionnaire we asked for background information about the respondents and the farm, and whether the farmer had had work-related injuries on the farm during the past 12 months. Specific background information that was inquired about was: age, family situation, having work outside the farm or being a full-time farmer, working alone on the farm or having an assistant, and having co-production with other farmers. The farmers were also asked if they had joined a voluntary health and safety program and if they had access to an occupational health service. Moreover, we asked if the farmers had an organized locum for vacations and/or illness, the number of working hours per year at the farm, the field area available to the farm, and about the main additional production types at the farm. The variables included in the questionnaire that were entered into a stepwise logistic regression are shown in Table 1. If the farmer reported having had an injury during the past

12 months, the questionnaire also inquired about where the injury happened, how it happened, and what object, if any, was involved in the injury. In addition, we wanted to know about the seriousness of the injury in terms of days of sick leave, if the victim had consulted a medical doctor or was hospitalized, and if the injury had other long-lasting consequences. The question about days for sick leave was given in intervals and the questions on medical consultation, hospitalization, and long-lasting consequences could be answered as yes or no. In the questionnaire we deliberately gave no specific definition of the term injury. The responders decided themselves what to report. The wording of the question was: "Have you, during the last 12 months, experienced an injury related to farm work?"

2.1. Statistical analysis

The data were analyzed with IBM SPSS statistics version 19.0. (IBM, Armonk, N.Y) Odds ratios for the outcome injury were determined by logistic regression in relation to the different determinants. When a farmer had reported more than one injury, all injuries were analyzed as separate cases. We used a stepwise procedure for initial model selection, including independent variables that showed statistical significance at $p < 0.05$. All potential risk factor variables available from the questionnaire given in Table 1 were used for model selection. Independent variables included in the final model were works alone, stipulated working hours at the farm of $>2 \times 1,750$ hours/year, and has cattle on the farm. Other calculations were done by crosstabs and frequencies tables.

2.2. Ethical considerations

The study was approved by the REC central (Regional Committee for Medical and Health Research Ethics; approval ref. 2010/1048). The participation was voluntary and all persons gave their informed consent prior to their inclusion in the study. Written information about the project was given to every participant, also stating that he/she could withdraw from the study at any time.

3. Results

For 450 of the 7,004 persons in the study population, the e-mail or postal addresses that we received from the Production Register were not correct, and, they were therefore not reached. There were 76 persons who reported back that they were retired or had quit farming for non-accident-related reasons, and another 31 who reported that they were not farmers. In addition, 86 responded that they did not want to participate, and 10 of the returned questionnaires lacked signed consent to participate in the study, and were thus excluded. There were 2,699 persons who answered the questionnaire and consented to participate, giving a response rate of 42%. Among the responders, 11% were female, which is in accordance with the sex distribution in the whole population, and the rest were male, except for 12 who did not report sex. Some background data for the respondents are given in Table 2.

Of the respondents, 249 (9.2%) reported one or more work-related injuries during the past 12 months, with a total of 304 injuries. There were 23 farmers who reported two injuries and 16 with three injuries. Most of the injuries happened in the groups aged 40–49 years and 50–59 years, but the highest proportion of injuries was among the youngest farmers aged 20–29 years. The distribution of injuries by age and seriousness is given in Table 3. There were no sex differences in the injury rate. The distribution of the 304 injuries sorted by the cause of injury and some other determinants is given in Table 4. As we can see from Table 4, the most

Table 1
Variables used in logistic regression

Independent variable		
Age	Continuous	
Family situation	Married/has a co-habitant	Lives alone
Has other work	Has work outside the farm	Full-time farmer
Working alone	Has an assistant	Works alone
Has co-production with other farmers	Yes	No
Has joined the voluntary health and safety program	Yes	No
Has access to an occupational health service	Yes	No
Has organized locum for vacations and/or illness,	Yes	No
No. of stipulated yearly working hours at the farm	$<2 \times 1,750$ h/y	$>2 \times 1,750$ h/y
Field area available to the farm	Continuous	
Production type	Cattle Swine Corn Vegetables Forest	No cattle No swine No corn Not producing vegetables Not forest

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