

Accidents at Work in the Finnish Food Industry between 2016–2020 - Analysis of Finnish national accident statistics database

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Abstract Current international, European, and Finnish regulations, policies and programs emphasize improving safety and health at work, and strategic goals for reducing accidents at work have been set. In general, the accident frequency rate is higher in the Finnish food industry than other manufacturing industry. Hence, there is a need to implement further actions to prevent occupational accidents and improve health and safety at work in the food industry. To guide these actions, up-to-date information on accidents at work is needed. This study descriptively analyzed the circumstances, causes, and consequences of accidents at work in the Finnish food industry between 2016–2020 (n = 8481). The data were retrieved from the Finnish official national occupational accident database. The results reveal that most of the injuries were minor, such as wounds and superficial injuries, resulting in 0–3 days of incapacity for the work. The most accident-prone activities were handling objects, movement, and carrying loads by hand. Hands were the most exposed body parts. The most common causes of injury were related to movement and slipping, stumbling, and falling. Focusing on these factors to may support the food industry in preventing and reducing the number of accidents at work.

Keywords Food Processing, Safety and health, Accident prevention, Occupational accident, Accident database

1. Introduction

Current international, European, and Finnish regulations, policies and programs emphasize improving safety and health at work, and strategic goals for reducing occupational accidents have been set (European Commission, 2021b, 2021a; In-

ternational Social Security Association, n.d.; Occupational Safety and Health Act, 2002; Sauni, 2019). The statistical data and related analyses on occupational accidents are important tools for the further development of prevention policies (Jacinto & Aspinwall, 2004).

The food processing industry (hereafter, the food industry) is a large segment of the national economy and employment (The Food Chain Workers Alliance, 2012; Zielińska & Bajdur, 2019); hence, it is essential to improve occupational health and safety (OHS) in this sector. OHS development is also needed in the food industry to further improve the availability of workforce, employees' well-being and productivity, and companies' competitiveness (Puisto et al., 2010). In 2018, about 14% of all manufacturing enterprises in the European Union (EU) were food and beverage processing enterprises (Cook & Eurostat, 2021). Most of them are micro or small enterprises, but a few are very large enterprises characterized by global brands. Based on a previous study conducted in Italy from 2006 to 2013, big companies in the food industry reported a larger reduction in the number of accidents at work than small and micro enterprises; hence, safety improvement policies should be targeted to small companies (Comberti et al., 2018).

Previous studies have highlighted that food industry employees are exposed to several OHS risks, so the resulting frequency of accidents is high (Comberti et al., 2018; Stave & Törner, 2007). The food industry includes manually working with sharp tools, production and packing along assembly lines, operating machines, and hazardous work environments, which can increase OHS risks (Kim, 2015; Stave & Törner, 2007). Although OHS has been studied in the food industry and improvements have been made (see, e.g., Comberti et al., 2018; Kim, 2015; Puisto et al., 2010; Shaw et al., 2006; Stave & Törner, 2007; Willquist & Örtengren, 2005; Zielińska & Bajdur, 2019), the number of occupational injuries and diseases are high in comparison to other lines of business (Kim, 2015; Newman et al., 2015). In Finland, in general, the accident frequency rate trend has been very positive in the industry during the last 15 years (Finnish Workers' Compensation Center, 2021). However, in 2020 the accident frequency rate was 33.9 in the food industry and 27.5 in manufacturing industry in general (Finnish Workers' Compensation Center, 2022). Consequently, there is a need to implement further actions to prevent accidents and improve health and safety at work in the food industry. To guide these actions, up-to-date information on occupational accidents is needed. However, recent sector-specific analyses on occupational accidents occurring in the food industry in Finland are not available.

This study aimed to descriptively analyze the circumstances, causes, and consequences of accidents at work in the food industry in Finland between 2016–2020 to produce relevant and topical information to support efforts to improve safety at work and enhance the well-being and productivity of the industry's employees. The Finnish official national occupational accident database (Finnish Workers' Compensation Center, 2022) was utilized to survey the accidents at work in the food industry in that country. The food industry is the biggest manufacturer of consumer goods and the fourth largest industrial sector in Finland employing

about 38,000 people (The Finnish Food and Drink Industries' Federation, n.d.). Based on the study's results, actions focusing on accident prevention are discussed to guide the food industry in its efforts to reduce the number of occupational accidents and improve safety and health at work. Moreover, priorities are set for the subsequent projects aiming at developing safety culture in the food industry.

2. Materials and Methods

In this study, the food industry includes the food processing industry but not the beverage processing industry. Moreover, the focus is on accidents at work, excluding commuting accidents (accidents that occur on the way to and from work) because the employer has a limited influence on them, and they were not the focus of this study. An occupational accident is typically defined as a sudden incident where injury, ill health, or fatality occurs at work (Workers' Compensation Act, 2015).

The Finnish Workers' Compensation Center (2022) provides information about an official national database of the occupational accidents in Finland, which was used in this study to survey the incidence of accidents at work in the food industry in Finland. The web-based database includes all the accidents reported and compensated through the statutory accident insurance system in Finland (Finnish Workers' Compensation Center, n.d.; Workers' Compensation Act, 2015). The coverage of the database is considered good, in common with insurance-based accident registering systems in general (European Agency for Safety and Health at Work, 2000). A contractual-based user interface was utilized to retrieve the information from the database.

An analysis was conducted to identify the factors contributing to accidents in the food industry (industry code 10 Food processing industry) between 2016–2020 ($n = 8481$). The data were analyzed with descriptive statistics according to European Statistics on Accidents at Work (ESAW) classification, which is an EU-wide methodology for collecting comparable data on occupational accidents (European Commission & Eurostat, 2013) and also in use in official national accident database in Finland. The application of ESAW system has changed in Finland in 2016. To avoid inconsistency in the analysis the most recent years with final data and similar use of ESAW classification, i.e., years 2016–2020 were chosen for the analysis (Finnish Workers' Compensation Center, 2022). The number of accidents at work and the frequency rate (number of accidents per million working hours) were retrieved from the database between 2016–2020. The frequency was compared to the frequency rate of manufacturing industry (including the food industry). Variables describing circumstances, causes, and consequences of the accidents at work were selected for the analysis.

3. Results

Between 2016 and 2020, a total of 8481 accidents at work were compensated for through the statutory accident insurance system in the food industry in Finland. This is 11% of the accidents in the manufacturing industry. The annual number of accidents varied between 1825 and 1492 (average 1696) and the frequency rate varied between 31 and 37 (average 34) between 2016 and 2020 with a slightly decreasing trend both in the food and manufacturing industries (see Fig. 1). The percentages of the severity of the accidents at work (in terms of the number of days an employee was incapacitated and unable to work) were 58% (0–3 days), 35% (4–30 days), and 7% (over 30 days), including one fatal accident. In manufacturing industry, the percentages of the severity of the accidents at work were 65% (0–3 days), 28% (4–30 days), and 7% (over 30 days) including 13 fatal accidents.

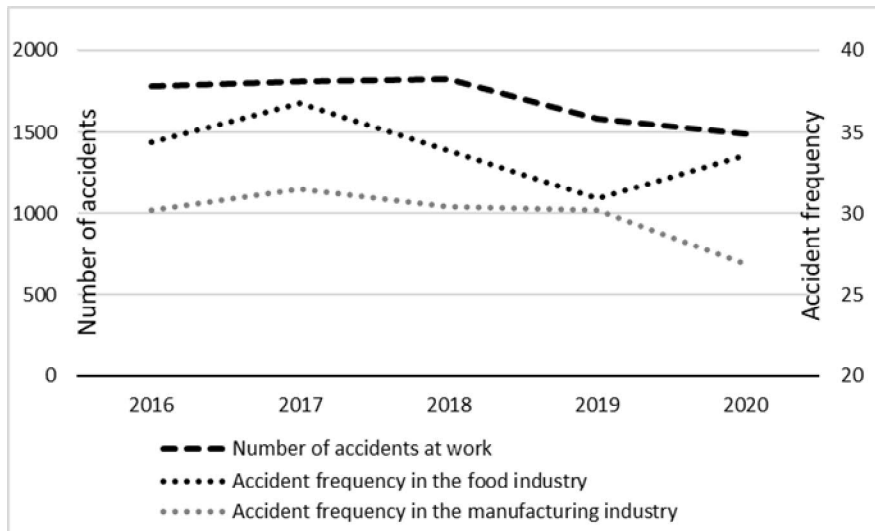


Fig. 1. Trends in the frequency (per million working hours) and number of accidents at work in the food industry and the frequency in manufacturing industry between 2016–2020

Descriptive analysis was conducted to gain an overall view of the circumstances, causes, and consequences of the accidents at work. The distribution of the most important variables was calculated as follows. According to the ESAW variable, specific physical activity, the most common circumstances of accidents at work were: handling of objects (26%), movement (22%), carrying by hand (18%), working with hand-held tools (13%), and operating machinery (9%) (Fig. 2). The injuries caused by handling of objects included compression of the hand or slash injuries with a knife and blades. Movement-related injuries included falling, slipping, and stumbling injuries to the lower limbs. Carrying loads by hand typically caused back strain when lifting. Working with hand-held tools, typically knives,

caused wounds to fingers and hands. Operating machinery typically caused hand and finger injuries when they were pressed or caught in a strap or a conveyor belt.

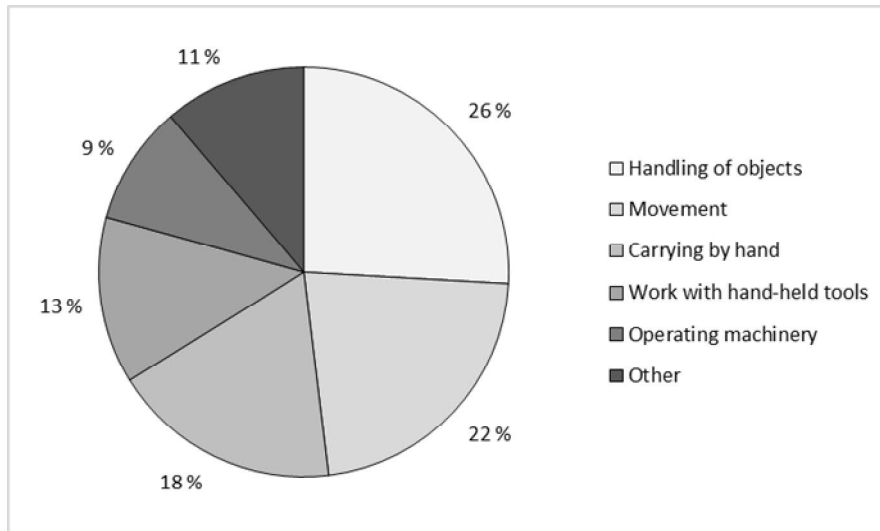


Fig. 2. Percentage of accidents based on the ESAW variable, specific physical activity, between 2016–2020 (n = 8481)

The most common causes of accidents related to the ESAW variable, deviation, were body movement without any physical stress (23%), slipping, stumbling, and falling (18%), body movement under or with physical stress (14%), breakage, bursting, splitting, slipping, fall, collapse of material agent (12%), loss of control of a machine, means of transport or handling equipment, hand-held tool, object (12%) (Fig. 3).

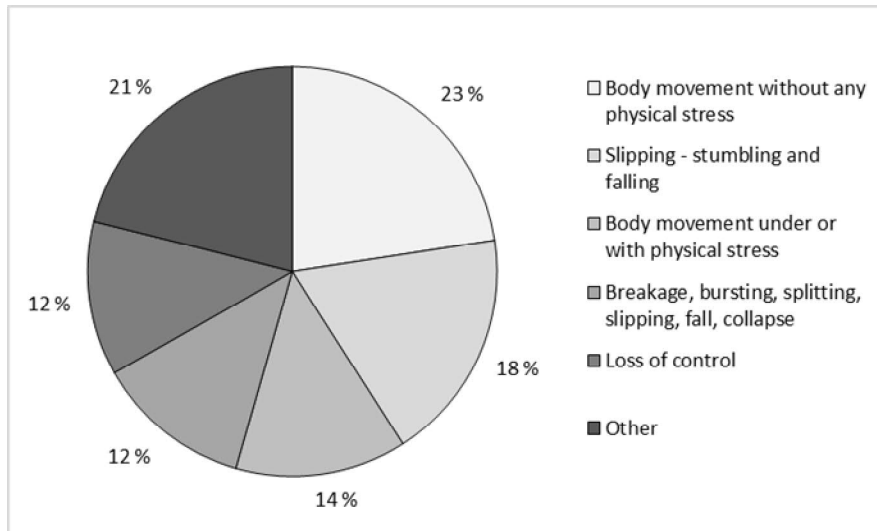


Fig. 3. Percentage of accidents based on the ESAW variable, deviation, between 2016–2020 (n = 8481)

The most common causes of accidents based on the ESAW variable, contact-mode of injury, were contact with a sharp, pointed, rough, or coarse material agent, such as knives (23%), impact with or against a stationary object (the victim is in motion), such as stairs (22%), trapped or crushed, for example with machines and/or conveyor belts (14%), sudden physical or mental stress, such as back stain (14%), and struck by an object in motion or collision with, for example, a box or a pallet (12%) (Fig. 4).

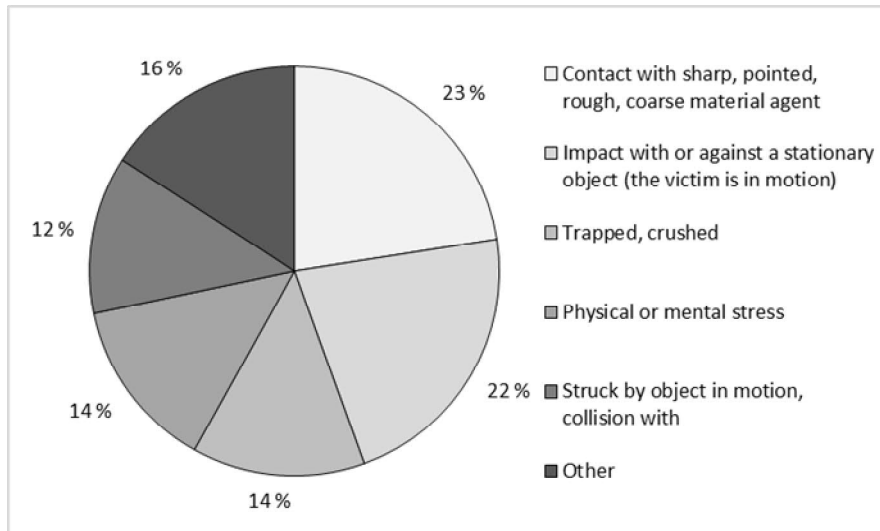


Fig. 4. Percentage of accidents based on the ESAW variable, contact-mode of injury, between 2016–2020 (n = 8481)

The most common causes of accidents based on the ESAW variable, type of injury, were wounds and superficial injuries (44%), dislocations, sprains, and strains (26%), concussion and internal injuries (16%), burns, scalding, and frostbite (5%), and bone fractures (4%) (Fig. 5).

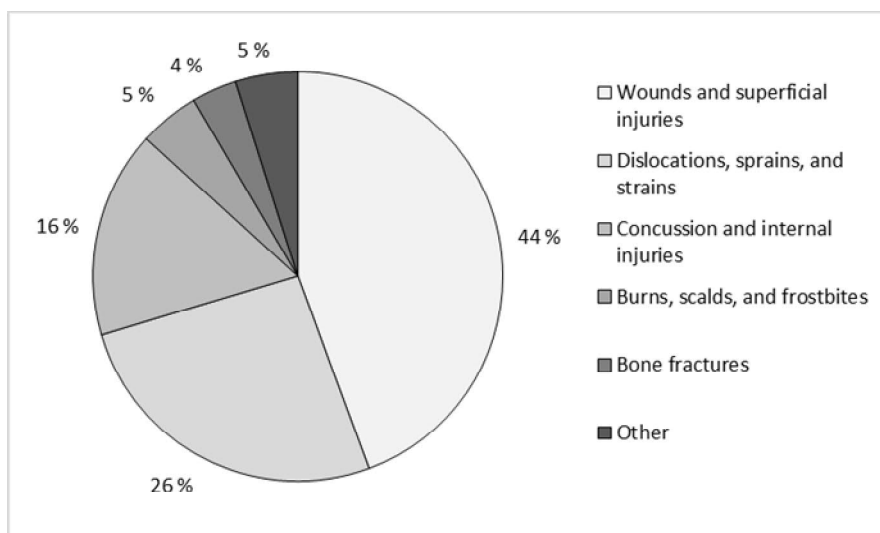


Fig. 5. Percentage of accidents based on the ESAW variable, type of injury, between 2016–2020 (n = 8481)

In terms of the ESAW variable, part of body injured, the body parts most commonly injured in occupational accidents were: fingers (27%), hands (10%), legs, including knees (10%), ankles (5%), back, including the spine and vertebra (5%), arms, including elbows (5%), eye(s) (5%), and other body parts (32%).

4. Discussion

The results of this descriptive analysis showed that there was a slightly decreasing trend in the number and frequency of accidents at work in the food industry in Finland during the period under study. However, the frequency rate was higher in the food industry than in manufacturing industry in general, which is in line with the results reported in previous studies (Kim, 2015; Newman et al., 2015). This might be explained by the work tasks requiring manual handling of materials, using hand tools, operating machines, and working along assembly lines (Stave & Törner, 2007). In the food industry, the safety emphasis is on food safety (see, e.g., Nayak & Waterson, 2017; Newman et al., 2015) and OHS may receive less attention and be allocated fewer resources.

Based on the study's results, employees experienced about 1700 occupational injuries per year requiring compensation for medical treatment and/or lost work time. Most of the accidents were minor causing less than 4 days of incapacity for work, with wounds and superficial injuries. However, the percentage of severe accidents was higher than in manufacturing industry in general. When the number of severe accidents decreases, more attention should be paid to minor accidents to improve employees' health and safety. Moreover, in the case of minor injuries and hazardous situations, there is often a possibility that severe accidents may occur.

Handling of objects and hand-held tools and movement in general were the most hazardous work tasks. In line with previous studies (Syron et al., 2017, 2019; Törner et al., 1995) upper extremities (e.g., hands and fingers with wounds), trunk (e.g., back strain), and lower extremities (e.g., strained, wounded, and bruised legs) are the most exposed body parts in food industry. Focusing accident prevention on these factors may support the food industry in its effort to reduce the number of accidents and improve safety and health at work. However, more information and a more in-depth analysis is needed to obtain data about accidents at the company level (Stave & Törner, 2007) and regarding the severity of the accidents.

This study has some limitations. The analysis was based on quantitative data from reported accidents; thus, detailed information concerning the causes and possible prevention actions could not be retrieved. Moreover, ESAW classification only provides a superficial understanding of the variables. In future studies, the qualitative data could be analyzed to suggest practical prevention strategies. Future research could also review the analysis at the company level and compare the results to the company-specific statistics and related qualitative accident investigation reports, when available. Particularly, possible preventive actions could be dis-

cussed and steps to implement them could be recommended based on the company-specific examples and experiences.

In the present study, all the reported and compensated accidents at work were selected for the analysis. To increase the study's reliability and to better compare the results with other (European) studies, only accidents causing at least 4 days of incapacity for work could be analyzed. However, insurance-based accident registers are considered to have reliable data (European Agency for Safety and Health at Work, 2000), and the coverage of the Finnish database is generally considered good. Accidents that are not compensated by an insurance company were not included in this analysis. In the future, studies could analyze minor accidents and incidents in the food industry based on company data (e.g., first aid, near miss and hazardous situation case reports) to identify comprehensive prevention actions.

The results of this study can be utilized in health and safety management in the food industry to determine how to develop and implement preventative measures. However, this study is a preliminary analysis on the topic, and further in-depth comparative, correlational or trend analysis could be carried out. The results will be utilized in establishing priorities for the subsequent project aiming at developing safety culture and implementing occupational accident prevention in the food industry. Future analyzes could be conducted to follow-up on the trends in occupational accidents in the food industry and to evaluate the effectiveness of the implementation of prevention activities in the field. Moreover, future studies could analyze the differences of the circumstances, causes, and consequences of the accidents at work between food industry and other industries.

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