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**Studies on Occupational Health and Safety in Agriculture****Osman Gökdoğan<sup>1\*</sup>, Oktay Erdoğan<sup>2</sup>**

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**Abstract** This study has been investigated the studies on occupational health and safety in Turkey and in the world. The material of the study comprised of the relevant studies conducted in Turkey and in the world. The national and international studies on occupational health and safety in agriculture have been identified, the accessible ones have been investigated, summarized and assessed. The assessments concluded that the majority of the agriculture-related occupational accidents are due to tractor accidents and tractor accidents generally occur due to over-turning of tractors. Most of the tractor accidents are fatal. Occupational accidents in agricultural sector are increasing with the rising of agricultural mechanization level and this has a negative impact on the health and safety of the labourers. Therefore, occupational health and safety in agricultural sector is an area that has a lot of room for improvement and providing in-service training and continuing the efforts in the area of occupational health and safety is highly important for bringing the occupational accidents to a minimum level. Furthermore, the collaboration between public institutions, NGO's (Non-Governmental Organizations) and universities need to continue with regards to occupational health and safety.

**Keywords** Agriculture, Occupational health and safety, Tractor, Work accident

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**Introduction**

Agricultural sector contains significant risks regarding human health. In 335 thousand fatal occupational accidents in the world, 170 thousand agricultural labourers lost their lives [1, 2]. According to International Labour Organization (ILO) data, 1.3 billion people are employed in the agricultural sector and 170 thousand of these people lose their lives each year, a great number of labourers are faced with various occupational accidents and are subjected to occupational diseases. According to European Union Statistics Office (EUROSTAT), agricultural sector is deemed to be the second most hazardous sector, following construction sector [3]. The economies of most of the developing countries are dependent on basic industries, unlike the developed countries, and a majority of their population is involved in agriculture. The approximate number of people employed in agriculture in Turkey is 5.6 million and this corresponds to 21.5% of the total employment figure in Turkey. When these figures are compared to the European Union (EU), employment in agriculture is 12.6 million and the share in total employment is 5.9%. In Turkey, the agricultural population is approximately 21 million and it's ratio to the total population is 28%, and in EU the approximate agricultural population is 28 million and the ratio to total population is 6% [4, 5].

The tangible damages that occur due to occupational accidents can be categorized into two main groups; namely visible (direct) and invisible (indirect) damages. But calculation of the invisible damages is particularly difficult. However, ILO data indicate that the total cost of occupational accidents and vocational diseases correspond to a rate between 1% and 3% of the Gross Domestic Products (GDP) in industrialized countries. In terms of developing countries, such losses are estimated to correspond to 4% of their GDPs [6, 7]. According to the 2009



data taken from the Turkish Statistical Institute's National Accounts Department, GDP in Turkey is 953.974 billion TL. Based on this figure and ILO criterion, the cost to be incurred in Turkey with regards to occupational accidents and vocational diseases can be estimated as around 38 billion TL per annum. In other words, further to the 1000 fatalities on average per year, the occupational accidents in Turkey also have a monetary dimension that can be expressed in billions of USD [7, 8].

Children and youngsters are affected more by the risks of this sector. It has been reported that the sector with the highest increase in terms of fatal occupational accidents among younger labourers in Europe is agriculture and more than 30% of the accidents in farms consist of accidents suffered by children and adolescents [9, 10]. It is known that children are being employed in agriculture, particularly in rural areas, in Turkey too. According to the Turkish Statistical Institute (TSI), 392 thousand children (41% of all the working children) are working in agriculture [10, 11]. In line with the advancing technology, the risks that are existent in agricultural works are going through changes. While removing former risk groups, mechanization is introducing new risks to the working life. In order to have a sustainable occupational health and safety, it is inevitable to establish and develop a perception and culture on this issue [12]. Training, inspection and reviewing appear to be the basic factors in occupational health and safety [13, 14].

### **Overview**

Works based on occupational health and safety have been assessed and summarized below. Agriculture is listed among the most hazardous works in United States of America (USA). Rollover of tractors is the leading cause of fatalities in this sector in USA. 23% of the accidents are machine related (including tractor accidents), 19% are motorized vehicle related (such as ATV) and 16% are suffocation related. Furthermore, 167 agricultural labourers are being injured, leading to loss of labour, each day in USA [15, 16].

According to The National European Statistics on Accidents at Work (ESAW) and Austrian Workers Compensation Board (AUVA) data, solid-fertiliser distributors are involved in accidents each year in Austria [17, 18]. According to the studies conducted in India and China, causes related to the occupational accidents with tractors and agricultural machines are use of tractor, harvest machines and power take-offs [19, 20].

With regards to fatalities due to tractor roll-overs in Sweden, fatality ratio per 100 thousand tractors has decreased from 12 to 0.2 from the 1957-1964 period to the 1986-1990 period, and during the same period the number of tractors used in agriculture in Sweden has increased by a ratio of 275% while the ratio of tractors equipped with ROPS (Roll Over Protection Structure) has increased from 6% to 93% [5, 21].

The types of cost in non-fatal agricultural accidents have been investigated in a study held in Britain, concluding that the average cost of 33 tractor roll-overs was 4486 USD. 61% of this cost was damage-related, 17% was due to delay in business, 15% was related to measures while 7% consisted of health costs [22, 23].

In Turkey, where almost 25% of the labour force is employed in agricultural sector, the ratio of fatalities due to occupational accidents and vocational diseases is 1.6% per 100 thousand labourers. According to TSI data, a total of 504 occupational accidents happened in 2012 among herbal and animal production sector workers, who are subject to Law No 5510 Article 4-1/a. Of these accidents, 424 accidents involved male labourers and 80 accidents involved female labourers. A total of 380 occupational accidents occurred in 2011, this time 325 of them involved male labourers and 55 involved female labourers [16].

A study has been conducted in the Thrace region of Turkey, including the provinces of Tekirdağ, Kırklareli, Edirne and Çanakkale, investigated the occupational accidents and diseases encountered by the farmers involved in agricultural activities in the rural regions and this study has concluded that 29.3% of the farmers have experienced a light or severe occupational accident. 14% of the farmers have been observed to have an occupational disease. It has also been concluded that 95.7% of the farmers never received any training on occupational accidents and diseases while 74.3% never received any training on agricultural pesticides [24].

In another study has been evaluated the role of the tractor accidents in the past years with regards to occupational safety in agricultural sector in the Aegean Region of Turkey, the conclusion was that 1/3 of the farmers had an accident during the past five years. The main reasons of these accidents have been reported to be rolling over, collisions and hits. The study has also indicated a lack of knowledge in terms of safe-use of tractors [25].



Agricultural mechanization related occupational safety issues have been investigated in Çukurova Region of Turkey and it has been reported that 74.3% of the accidents during the 1990-1992 period occurred when using a tractor and 25.7% occurred when using an agricultural machine, 38.6% of the accident victims were in 15-24 age group and 0.23% were over the age of 64 and 219 of the accidents, 33.44% of the 655 total accidents, took place during the month September [5, 26].

Occupational accidents involving agricultural tools and machines have been studied in some districts of Ankara province in Turkey and it has been reported that the average number of people involved was 1.24 per accident and 51% of the victims died; majority of the accidents (68%) included rolling-over, tumbling or falling into a ditch; 96% of the tractors involved in accidents did not have a standard cabin or a safety top. 72% of the accidents took place whilst working with agricultural vehicles, ploughs and threshing machines. The main reason behind the accidents has been reported as carelessness by the operator (62%) [27].

The reasons and particular details of tractor accidents that took place in Isparta province during the 1995-2003 periods have been analysed on the basis of accident reports. The findings indicated that tractor related accidents mostly took place in central Isparta and on the highway and included one or two vehicles. Furthermore, tractor accidents were due to collision (57.6%), rolling-over (35.8%), swerving off the road (4.4%), hitting pedestrians (1.1%) and falling off the vehicle (1.1%) [23].

In a study assessing the accidents involving tractors and business machines in Karaman province during the 1973-1993 period, the main reasons behind fatal tractor accidents were rolling over, running over, collision and falling [23, 28].

With the purpose of assessing the occupational accidents related to the use of tractors and agricultural machines in Tokat province of Turkey, face to face interviews have been held with victims or witnesses of accidents that took place during the 2000-2014 periods. The leading causes of those accidents have been respectively listed as operator carelessness (60%), people other than the operator not observing the safety rules (32%), lack of maintenance of the agricultural tool/machine, business machine or tractor (12%) and operator's lack of knowledge and experience regarding the tractor/agricultural tools and machines he/she is using (11%) [18].

After assessing the tractor and agricultural machines related accidents in Kayseri province of Turkey, it turned out that 34.1% of the accidents happened due to rolling over, tumbling, falling into a ditch, 18.2% due to being run over and 13.6% due to being hit by a tractor or collision with another vehicle. 62.5% of the tractors involved in the accidents did not have any standard cabin or safety top. The causes of the accidents have been reported as carelessness by the operator (38.5%), operator's lack of technical knowledge about the machine used (10.7%) and operator's lack of experience about the machine used (9.8%) [29].

The tractor and agricultural machine related occupational accidents that took place in Çumra district of Konya province of Turkey, over the past twenty years have been investigated. Carelessness was the leading cause of the accidents by a ratio of 32.60%, followed by power take-off accidents by 20.90%, overloading and bad terrain by 11.60%, failure to take necessary measures by 7%, speeding by 4.70% and getting a limb caught in the belt pulley by 2.30% [5].

The tractor and tool-machine usage-related accidents that took place in Erzurum province of Turkey have been investigated, leading to the conclusion that 76% of the agricultural machines involved in the accidents were tractors, 47% of the accidents involved rolling-over, tumbling, falling into a ditch and being run over by a tractor and 69% of the tractors involved in the accidents did not have a standard cabin or a safety top. The leading cause of the accidents was carelessness by the operator by 63% as well as lack of training [30].

In Çine district of Aydın province of Turkey, the concept of occupational safety and producer's approaches in agriculture have been examined, and it has been determined that because it is fairly new issue, the producers still do not have much of a grasp with regards to some of the terms and concepts regarding occupational safety in agricultural activities. However, in terms of producer's age, daily working hours, work experience, branches of the agricultural production, clear explanation about the work before commencing it, the possibility of having an accident during the works, diseases caught from animals and working environment, working in cold and warm weather, the necessity to take measures against possible hazards in agricultural activities, the difference between groups was statistically meaningful [31].



In conclusion, occupational accidents have a direct relation with the increase in the level of agricultural mechanization and largely effect the occupational safety of labourers, causing loss of machines, time and money as well as the death of the labourers [32]. Occupational health and safety in agricultural sector is one of the areas that need improvement and the studies on this field need to be continued. Effective collaboration is required between the Ministry of Labour and Social Security and the Ministry of Food, Agriculture and Livestock and universities [16].

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