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### Risk Factors and the Agricultural Industry

On Wednesday, June 8th, Dr. Risto Rautiainen gave an hour long webinar on risk factors that are prevalent in the agriculture industry. Dr. Rautiainen has acquired his masters in agriculture and his PhD in occupational and environmental health. In the past, he has worked as the Safety Agronomist and Head of the Occupational Safety Department of the Finnish Farmers' Social Insurance Institution and has served as the Center Coordinator and Deputy Director at the University of Iowa, Great Plains Center for Agricultural Health. Currently, Dr. Rautiainen is with the Central States Center for Agricultural Safety and Health as their director as well as chairs the National Occupational Research Agenda Surveillance working group for Agriculture, Forestry and Fishing.

Risks are present in all professions, albeit some more than others. Most industries are at risk for basic things such as fires, loss in capital, theft, vandalism, and other basic problems. The agriculture industry itself though is exposed to an incredibly high number of risk factors compared to other occupations. These risks can come from outside the operation, from the operation itself, and can even be created by the farmers. On top of the ones mentioned above, farmers face other risks like market price fluctuations, extreme weather such as floods and droughts, pests impacting both crops and animals, losses to vehicles and property, health and safety risks, as well as issues that can arise for both the environment and food quality being produced. These hazards are classified as risk factors which are defined as any attribute, characteristic, or exposure to an individual that increases the likelihood of developing a disease or injury.

Farmers are always dealing with risk. It is part of the profession. In this webinar alone we examined over thirty different risk factors that lead to higher rates of injury that have been studied and looked at what rate they affect those who work in the agricultural industry. There are two steps that go into identifying a risk factor. The first part is the study design. You can conduct different types of studies to try and identify these factors. Studies usually are made up of cross-sectional studies such as surveys, case-control studies, and cohort studies. The second step is to interpret the results acquired through the study. There are two different types

of measurements that are usually used, odds ratio and relative risk. Odds ratio is the most widely used, although you will see relative risk occasionally. Lastly, there are two different ways to analyze the statistical results yielded from the studies. One is through unilateral analysis where you look at the association of one risk factor and outcome and the second is through multivariate analysis where you also look at the association of one risk factor and outcome but are adjusting or controlling for other confounding factors. There is a three step process to utilize the information after it has been analyzed. First, you should identify and target those who have that particular risk factor for an intervention. Interventions are designed to mitigate that specific type of risk. Then, an intervention should be designed and implemented so that it works for the target population. After a certain amount of time, you should follow up with an evaluation to see if the intervention was successful.

There are two different types of risk factors, modifiable and non-modifiable. Modifiable risk factors are actual behaviors. These include things like not wearing a seatbelt and keeping foldable ROPS in the down position. This also includes problems that occur in the work environment. Issues such as missing shields, guardrails, and other safety equipment. Modifiable risk factors also cover things that can be changed, even if it isn't easy. Examples of this are education level of the farmer, farm size, and crops grown on the farm. Non-modifiable risk factors are composed of things that cannot be controlled or changed. Age and gender are both considered this type of risk factor. One point of confusion for those who try and identify risk factors is derived from the difference between association and causation. Just because something is associated with risk does not mean it is causing it. To find if something is the cause of the risk factor and not just associated with it one must use the Bradford Hill criteria for causation<sup>1</sup>. It is a list of nine criteria that includes strength, consistency, specificity, temporality, biological gradient, plausibility, coherence, experiment, and analogy. For something to be considered the cause of a risk factor it must have all or most of these nine criteria.

Sometimes something will show up as a risk factor for injury, but it won't make any sense. Two commonly cited examples of this are education level and technology used. If a farmer is educated up to high school or higher, the risk factor of them sustaining an injury increases. The same goes with computer and internet use. If these are utilized during the farming process the chance of injury slightly goes up. Researchers are not quite sure why this is the case. Usually though, discrepancies like this occur for one of two reasons. The intervention put into place may have failed or the results of those surveyed could be biased. For example, people with injuries and illnesses volunteer to participate in surveys more readily than those who have not sustained an injury. On top of that, those in intervention groups become more knowledgeable on the subject matter and more often report injuries while controls do so less.

The largest risk factor that leads to injury that those in the agricultural industry face is without question challenges to social conditions in the farmer's life. While this may encompass a wide

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<sup>1</sup> <http://www.who.int/bulletin/volumes/83/10/792.pdf>

variety of different problems, it is mostly made up of family strife or conflict with neighbors going on at the time that an injury results. When a farmer is experiencing challenging social conditions, they are three times more likely to sustain an injury than when that isn't the case. Along with challenging social conditions, other top risk factors that lead to injury include those earning a higher income, those who spend more time farming, farmers suffering from hearing loss, and the number of workers employed on a farm.

Working in the agricultural industry can be dangerous. The risk factors listed above are just a short sample of many that farmers face. But by abiding by safety regulations, following a Farm Risk Map, and identifying and mitigating sources of risk, farming can be done safely and without injury.