


# Chapter 7


## Barriers of Agrisupply Chain Management: During Mental and Physical Stress During Farming in Tractor

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### ABSTRACT

*In the agriculture sector, farmers do supply chain activity on their fields continuously in difficult weather conditions without using any modern technology or tools. Their work is usually manual and repetitive in nature. So, farmers suffer from musculoskeletal disorders and body pain. The use of tractors has in some way resolved the heavy manual work of farmers. However, the noise and vibration of tractors during work also have a negative impact on their bodies. The discomfort and static posture of farmers during tractor driving on rough agricultural ground led to muscle pain and stiffness. Sometimes slipped discs occur due to jerks on rough ground. So, this study is aimed at finding the risk factors that lead to work-related musculoskeletal disorder (WMSD) in tractor operators or farmers using tractors for agricultural purposes. Hence, a study is conducted on farmers driving tractors for performing agricultural operations with ergonomic tools such as rapid upper limb assessments (RULA) and quick exposure checks (QEC).*

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## **INTRODUCTION**

The agricultural sector is a traditional one, and farmers use conventional tools for farming. There are many different technologies or tools being developed to improve the agriculture sector in terms of workplace safety and productivity. Compared to manual labour in farming for preparing land, the use of a tractor has a lot of benefits in terms of reduction of labour, reduction of heavy manual work, and time-consuming operations in hot summers and heavy rain. Simultaneously, tractors can help with many farming jobs, like tilling, sowing, harrowing, pushing, pulling, loading, unloading, ploughing, etc. It could relieve farmers from heavy, hard, and repetitive work. When the farmers were habituated to work with the help of old tools, they either suffered from injuries and cuts or musculoskeletal disorder problems. This physical stress impacts their minds, and farmers suffer from mental illness. The use of tractors in farming has resolved the physical and mental problems of farmers, which occur due to manual labour, but the tractor driver or farmer who operates the tractor is in great danger. Tractors overturning and rolling over are hazards that occur due to uneven agricultural land and the heavy weight of tractors. Working at heights and on stairs increases the risk of falling for farmers. The noise generated during driving is very unpleasant and may be the cause of hearing loss for farmers using tractors. During farming operations, the farmer has to drive a tractor on uneven agricultural land, which causes back pain due to unrestricted movement, vibration, sustained posture, and poor posture. Kumar et al. (1999) explained the adverse effect of vibration generated during driving a tractor on the farmers' back bone. Kumar et al. (2005) explained that Indian tractors are the main cause of hearing loss in operators due to a lack of noise and vibration control systems. Toren et al. (2002) wrote that risk of low-back and hip symptoms among farmers might be due to driving tractor. Sometimes, tractor drivers face accidents due to unguarded power takeoffs. Hence, uncomfortable sitting posture for long hours in an adverse climate with heavy vibration offered by a tractor increases physical stress on the driver or farmer driving a tractor. It may cause psychological and mental stress among them, which affects their behavioural changes and reduces productivity in the workplace. Chauhan et al. (2020) have discussed muscle problems, body and back pain in agri work place are the main cause of mental pressure. Hence, more ergonomic research or analysis is essential to studying the posture problems of tractor-driving farmers and the impact of physical stress on mental health is not observed in any of the literature. So in this paper, mental stress of tractor farmers is measured with respect to physical stress /discomfort.

There are many ergonomic tools for analysis postural discomfort in the workplace. Tajvar et al. (2021) have identified few comfortable agri practices methods by tools like (RULA) and (QEC). Lin et al. (2020) have tried to reduce participants' ergonomic risk by considering work ability index and demographic data by (QEC) tool. Mokhtarinia et al. (2020) have identified the Quick Exposure Check (QEC) to monitor the threat of musculoskeletal disorders in their place of work. Li and Buckle (1998) have used the Quick Exposure Check tool to measure workplace safety among health and safety professionals. Sukadarin et al. (2013) have quantified ergonomic risk factors by performing posture analysis for oil palm workers by QEC. Chiasson et al. (2012) have used Quick Exposure Check (QEC) as the other ergonomics method to assess the safety of manufacturing sectors. Maulik et al. (2012) have developed the Quick Exposure Check (QEC) for medical laboratory technicians and healthcare professionals to check work-place musculoskeletal symptoms. Hossain et al. (2018) have implemented the Quick Exposure Check (QEC) method for analyzing work-related musculoskeletal disorders (WMSD). From the study, he found that the most common work-related diseases affect mostly the lower back, neck, and upper and lower extremities. Yusuf et al. (2016) used Rapid Upper Limb Assessment (RULA) analysis to decrease the work

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