

## **March 2018 Update from the Field: Ergonomics and MSDs**

**Association of Risk Factors with Musculoskeletal Disorders in Manual-Working Farmers.** Jain R, Meena ML, Dangayach GS, Bhardwaj AK. Archives of Environmental & Occupational Health. 2018;73(1):19-28.

The current study is aimed at recognizing the risk factors for major work-related issues (ie, musculoskeletal disorders [MSDs]) among 138 manual-working farmers. Data were collected using modified Standardized Nordic Questionnaire and the Rapid Upper Limb Assessment score sheet. Different factors influencing MSDs were detected using logistic regression methods. The highest occurrence rate for MSDs was observed in the lower back (71.4%), followed by fingers (62.1%), shoulders (56.4%), and hands/wrists (55%). Factors such as age, gender, daily working hours, hand dominance, perceived fatigue, and work experience were found to be associated with MSDs in one or more upper body regions. The outcome of multinomial regression showed that gender is the most influencing factor for MSDs in all upper body regions except the shoulders. The outcomes of study indicate high occurrence of MSDs among manual-working farmers and highlight the significance of individual and work-related factors.

**Exploring Head and Neck Vibration Exposure from Quad Bike Use in Agriculture.** Kociolek AM, Lang AE, Trask CM, Vasiljev RM, Milosavljevic S. International Journal of Industrial Ergonomics. 2018;66:63-69.

**Objectives:** Although musculoskeletal disorders of the low back have been linked to excessive whole body vibration during vehicle use, there is a need to explore head/neck vibration in occupational environments. Resonant frequencies may amplify vibration transmitted to the head/neck and increase risk of musculoskeletal disorders.

**Methods:** An observational fieldwork study directly measuring vibration exposure at the seat and head of 10 rural workers operating quad bikes over farm terrain for ~30 min.

**Results:** Vertical axis root-mean-squared acceleration was higher at the head/neck compared to the seat. Mean spectral coherence was strong ( $>0.8$ ) in the vertical axis from 1.3 to 4.9 Hz, indicating a strong relationship between vertical vibrations measured at the seat and the head. Power spectral densities demonstrated system amplification, with mean and peak seat-to-head transfer functions of 1.44 (95% CI  $\pm 0.08$ ) and 1.66 ( $\pm 0.14$ ), respectively, from 1.3 to 4.9 Hz. There was also a peak phase lag of 66.5 ( $\pm 13.9$ ) at 4.9 Hz for head relative to seat measured vertical vibration, which may increase compressive loads of the cervical spine.

**Conclusions:** While it is unknown whether these amplified and out-of-phase vibrations measured at the head/neck increase the risk of musculoskeletal disorder, the current biodynamic response to vibration exposure may help explain previously reported high prevalence of neck pain in farmers that use quad bikes. Our future laboratory based studies will aim to validate these fieldwork seat and head data and explore the effect of such vibration transmission on spinal biomechanical models as well as on proprioceptive and perceptual pathways that may also relate to injury.

**Small Changes Make Big Differences: The Role of Ergonomics in Agriculture.** Fathallah F, Duraj V. Resource Magazine. 2017;24(6):12-13.

Agriculture is one of the most hazardous occupations, not only in terms of fatalities but also musculoskeletal disorders (MSDs). MSDs are injuries to and compromised function of the body's system of muscles, tendons, ligaments, nerves, and spinal discs. Ergonomics is the term we commonly use in the evaluation and design of tools and workplaces to minimize the risk of MSDs.

Ergonomics is about fitting the job to the worker, by looking at the worker-workplace interface and

helping workers avoid awkward postures, excessive forces, and repetitive motions. The term is based on two Greek words: ergon, meaning work, and nomos, meaning natural laws. Its first use can be traced to 1857, which was around the time when significant strides were being made in the early mechanization of agriculture.

Looking at this topic from the worker's perspective, the area of biomechanics is about understanding the motions, forces, and mechanisms of the body, from overall movements to specific muscles, tendons, and other tissues. Broadening this concept of human capabilities and limitations is the area of human factors, in which cognitive, physiological, psychological, and social elements are considered in the overall worker-workplace interface for improving safety and health.