Farming and the risk of developing osteoarthritis in Alberta, Canada

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PMID: 38826129 DOI: 10.22605/RRH8383

**Introduction**

Osteoarthritis (OA) is a prevalent chronic musculoskeletal (MSK) disease that causes pain, joint stiffness and muscle weakness, which impacts physical function and quality of life[**1-5**](https://www.rrh.org.au/journal/article/8383#ref_1). According to the Global Burden of Disease Study, MSK diseases are the second greatest cause of disability worldwide, with the greatest increase of disability over the past 20 years[**6**](https://www.rrh.org.au/journal/article/8383#ref_6). Projected estimates of OA are affiliated with an aging population and the obesity epidemic[**7-9**](https://www.rrh.org.au/journal/article/8383#ref_7). In Canada, the prevalence of OA is projected to increase from 13.6%[**10**](https://www.rrh.org.au/journal/article/8383#ref_10) to 25% in the general population by 2040, and up to 30% of the workforce will have OA[**11**](https://www.rrh.org.au/journal/article/8383#ref_11). The economic burden of OA to individuals, the healthcare system, and society is significant[**12**](https://www.rrh.org.au/journal/article/8383#ref_12), with 18.9 (95% confidence interval (CI) 9.6–37.7) million years lived with disability (YLDs) globally[**7**](https://www.rrh.org.au/journal/article/8383#ref_7).

Farming is an occupation that includes heavy physical workloads[**13**](https://www.rrh.org.au/journal/article/8383#ref_13), and this can predispose a person to developing knee OA[**14-16**](https://www.rrh.org.au/journal/article/8383#ref_14). In the Canadian farming population, the prevalence of OA was 13% in Saskatchewan[**17**](https://www.rrh.org.au/journal/article/8383#ref_17), and 15% in the rural population of the neighboring province, Alberta[**18**](https://www.rrh.org.au/journal/article/8383#ref_18). Male farmers, who typically have a high physical workload, differed significantly from other work classes[**15**](https://www.rrh.org.au/journal/article/8383#ref_15),[**19**](https://www.rrh.org.au/journal/article/8383#ref_19),[**20**](https://www.rrh.org.au/journal/article/8383#ref_20). When compared to urban residents, Swedish farmers had a greater risk of developing OA (2.1; 95%CI 1.4-3.2)[**21**](https://www.rrh.org.au/journal/article/8383#ref_21), although this was based on a cohort of males aged 40–50 years, with a relatively short follow-up period of 13 years. An increased likelihood for both total hip (OR: 3.6; 95%CI 2.1 to 6.2) and knee replacement (OR: 5.1; 95%CI 2.1 to 12.4) was seen in male farmers in Iceland[**22**](https://www.rrh.org.au/journal/article/8383#ref_22). While OA has been examined in other occupations such as construction, carpeting, painting, fishery, and mining[**15**](https://www.rrh.org.au/journal/article/8383#ref_15),[**23**](https://www.rrh.org.au/journal/article/8383#ref_23), farming has often not been examined in spite of the high occupational demands associated with it.

Given that the susceptibility of developing OA is significantly affected by extrinsic risk factors including injury, and repetitive and excessive joint loading[**24**](https://www.rrh.org.au/journal/article/8383#ref_24), the risk of developing OA may increase in certain occupations[**14**](https://www.rrh.org.au/journal/article/8383#ref_14). The objective of this study was to estimate the annual incidence and mortality rates of OA among three random samples – Alberta farm, non-farm rural and urban residents – using provincial administrative health records over a period of 21 years. We also examined the hazards of developing OA among the farm and non-farm rural residents as compared to urban cohorts.

**Methods**

***Study design and population***

This was a longitudinal retrospective study that used provincial administrative data to identify OA cases over 21 years. Alberta, a Canadian province, had a farm population of 165 560 individuals in 2001[**25**](https://www.rrh.org.au/journal/article/8383#ref_25). The main types of farming in Alberta include oilseed and grain farming (34.3%), beef and feedlots (20.9%), and dairy and milk farming (5%)[**26**](https://www.rrh.org.au/journal/article/8383#ref_26).

The study cohort consisted of 430 293 individuals, comprising three groups randomly selected: farm, non-farm rural, and urban residents. Alberta Health created a farm cohort based on the population registry in the fiscal year 1997–98. Through probabilistic matching with Alberta Agriculture and Rural Development and the Farm Fuel Tax subsidy, 143 431 farm family members of all ages with personal health numbers (PHNs) were identified. The Farm Fuel Tax file contained the names and addresses of farms and farmers that were eligible for farm fuel tax rebates from the Alberta government. Virtually all farms in Alberta that are involved in agricultural production qualify for this rebate. The non-farm rural cohort was generated with a random sample of 143 431 rural residents who were not in the farm group and their residence was located in a wide-area rural region. The urban group was a random sample of 143 431 urban residents who did not have postal codes that were for small towns or rural locations. As a closed population, no additional residents were added to the initial provincial cohort.

The inclusion criteria for this study cohort consisted of those who were 20 years or older during the fiscal years 2000–01 through 2020–21. Individuals aged less than 20 years who turned 20 years during any time during the observational period were included in the fiscal year they turned 20 years. Exclusion criteria were death, migration, or reaching 110 years of age. To optimize the identification of incident cases, a run-in period of 3 years (fiscal years 1997–98 through 1999–2000) was used to remove prevalent OA cases. After applying the general inclusion and exclusion criteria, 379 784 individuals were followed from 1 April 2000 to 31 March 2021 ([Appendix I FigA1](https://www.rrh.org.au/journal/article/8383#blue1)).