Cancer mortality among Iowa farmers: recent results, time trends, and lifestyle factors (United States)


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Objectives: To update the cancer mortality patterns among Iowa (United States) farmers for the years 1987-93 and compare these results with those previously reported for 1971-86 as well as relate the PMR patterns to risk-factor survey data.

Methods: We extracted usual occupation and cause of death from 88,990 Iowa death certificates for White males aged 20 and older for the years 1987-93. Proportional mortality ratios (PMR), adjusted for age, and 95 percent confidence intervals (CI) were calculated using deaths among nonfarmers to generate expected numbers. We compared lifestyle profiles for farmers and nonfarmers using male controls (n = 1,596) from a population-based case-control study conducted in Iowa from 1986-89.

Results: Iowa farmers had deficit PMRs for all-cause cancer mortality (PMR = 0.92, CI = 0.90-0.94) and for lung (PMR = 0.70, CI = 0.66-0.73), liver (PMR = 0.65, CI = 0.50-0.86), and other cancer sites strongly related to smoking and alcohol use. Farmers at all ages had excess deaths for cancers of the prostate (PMR = 1.26, CI = 1.19-1.33), rectum (PMR = 1.29, CI = 1.07-1.56), brain (PMR = 1.10, CI = 0.92-1.32), multiple myeloma (PMR = 1.17, CI = 0.98-1.40), non-Hodgkin's lymphoma (PMR = 1.09, CI = 0.96-1.23), and Hodgkin's disease (PMR = 1.62, CI = 1.04-2.54). Younger farmers (aged 20 to 64 years) had excess deaths for colon cancer (PMR = 1.52, CI = 1.26-1.83) and skin melanoma (PMR = 1.60, CI = 1.07-2.38), while older farmers (aged 65+ years) had excess deaths for cancers of the pancreas (PMR = 1.18, CI = 1.04-1.34), lip (PMR = 1.58, CI = 0.59-4.21), and leukemia (PMR = 1.26, CI = 1.09-1.46). Since the 1970s, the PMR for stomach cancer has declined to expected values, while the PMRs for prostate, large intestine, pancreas, and Hodgkin's disease have increased; PMRs for other sites are consistent with earlier data. A survey from 1986-89 showed that farmers, compared with nonfarmers, smoked less, used less alcohol, had less formal education, and consumed more total calories, and calories from protein, fat, and meat while consuming fewer calories from fruits and vegetables.

Conclusions: Iowa farmers continue to be at elevated risk of mortality due to certain cancers, and, of particular interest, the risk for prostate and colon cancer appears to be increasing since 1975. Cancer Causes and Control 1998, 9, 311-319

Keywords: Cancer mortality, farming, lifestyle, men, United States.
Introduction

Farmers generally have been considered to be at lower risk for all-cause and smoking-related cancer mortality but at elevated risk for certain other cancers including cancers of the hematopoietic and lymphatic systems; skin melanoma; and cancers of the lip, stomach, prostate, connective tissue, and brain. The cancer experience among farmers is of interest because this is an important occupational group and knowledge of cancer risks may suggest preventive measures. The cancer experience among farmers, including time trends, is also of interest because farmers appear to be at elevated risk of certain cancers (i.e., non-Hodgkin’s lymphoma [NHL], multiple myeloma, skin melanoma, and cancers of the prostate and brain) which are rapidly increasing in the general population. Thus, further study of farmers may help explain these trends.

Much of the interest in cancer among farmers has focused on their exposure to agricultural chemicals (e.g., herbicides, insecticides, fungicides), many of which may be potential carcinogens, as well as other potential carcinogens in the work environment of farmers (e.g., ultraviolet light, solvents, fuels, and animal viruses). In contrast, except for tobacco use, less attention has been paid to lifestyle factors among farmers such as alcohol use, overweight, diet, and physical activity.

We present data which address time trends in the cancer mortality experience of Iowa farmers. To understand the proportional mortality data better, we compare cancer-related risk factors between farmers and nonfarmers who participated as controls in a population-based case-control study in Iowa (United States).

Materials and methods

We obtained computerized Iowa death-certificate files for all White males aged 20 years and older from the Iowa Department of Public Health for the years 1987 through 1993 (n = 94,760). We restricted our analysis to this group because there are very few non-White farmers in Iowa and because of generally poor occupational data on female decedents. This group was also the focus of previous reports of cancer mortality in Iowa farmers from 19/1/78 and 19/9/86.

Nosologists at the Iowa Department of Public Health coded both the underlying cause of death using the International Classification of Diseases, Ninth Revision (ICD-9) and the usual occupation using the 1990 US Bureau of the Census occupational codes. Of the 94,760 death certificates, we excluded those with missing occupation (n = 5,585) and those coded as retired (n = 33), student (n = 246), or did not work/unable to work (n = 806), leaving a final sample size of 88,090. A farmer was defined by occupational codes 473-477, 479, 484, 486-488, with the vast majority (95 percent) classified as ‘farm operators’ (occupational code 473).

We used proportional mortality ratios (PMR) adjusted for age in five-year intervals as our measure of risk; 95 percent confidence intervals (CI) for the PMR were also calculated. Expected numbers were based on the mortality experience (all deaths) of Iowa decedents not classified as farmers. PMRs were reported for all males aged 20 years and older, and separately for ages 20 to 64 and 65 years and older. The latter stratification was chosen because 65 years is a common retirement age as well as the age when most Iowa men begin participation in Medicare. We chose not to conduct a standardized mortality ratio (SMR) analysis due to our inability to get accurate denominator data. Specifically, census data only provided ‘current’ occupation (not ‘usual’ occupation), and thus accurate denominator data were not available for older farmers. Also, census data were only available for the years of 1982 and 1990, and extrapolating denominators for farmers in the intervening years was problematic.

We present data for all malignant cancers (ICD-9 codes 140-209) and site-specific cancers, but we also examined other common diseases to ensure that no single disease greatly skewed the PMRs; none did. For example, the PMR for all circulatory disease (ICD-9 codes 390-459, 13,010 deaths among farmers) was 1.05 (CI = 1.04-1.07); for chronic obstructive pulmonary disease (ICD-9 codes 490-496: 1,441 deaths among farmers) was 0.89 (CI = 0.85-0.93); for other respiratory disease (ICD-9 codes 460-489 and 497-519: 1,557 deaths among farmers) was 0.92 (CI = 0.88-0.97); for digestive diseases (ICD-9 codes 520-579: 738 deaths among farmers) was 0.95 (CI = 0.89-1.02); and for injury or poisoning (ICD-9 codes 800-999: 1,192 deaths among farmers) was 1.25 (CI = 1.19-1.31).

To assess whether there was a difference in the stage at diagnosis between farmers and nonfarmers who died of colorectal or prostate cancer from 1987 to 1993, we linked these decedents by death certificate number to the State Health Registry of Iowa’s cancer database for the years 1973-93. The cancer registry is part of the US National Cancer Institute’s Surveillance, Epidemiology, and End Results (SEER) program, and is the repository for detailed data on all cancers diagnosed in Iowa residents since 1973.

To understand the PMR patterns better, we compared risk and lifestyle data of male farmers and nonfarmers who participated as controls in a population-based, case-control study of six cancer sites conducted in Iowa from 1986 to 1989. Men aged 40 to 64 years were selected randomly from computerized Iowa driver’s license records, whereas men aged 65 to 86 were selected randomly.