A Mortality Survey at the Anniston Plant 1979-1989

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Background

There is increasing interest in the incidence of illnesses such cancer and heart disease among our employees. Further, communities around our plants are sometimes concerned that our operations may be impacting their health. To address these concerns, we are producing a yearly mortality surveillance report of all our U.S. locations. This report on employees working at the Anniston plant from 1979 to 1989 provides our workers and communities around that plant with health information to help evaluate the safety of our operations.

Methods

Monsanto has maintained a computerized occupational health data system (MARS) which contains demographic information on all employees working at Monsanto since approximately 1979. We evaluated the completeness of this list for the Anniston plant by comparing it to plant payroll files. We found that all of the Anniston workers were in the MARS data base. We also found 4 workers who were on the payroll but were not in MARS and these workers were added. The total study cohort includes 376 workers at the plant some time during 1979 to 1989.

Vital status information on the 376 workers was obtained through Monsanto payroll and pension files, and the National Death Index. Follow-up was complete for 373 (99%), and 10 were deceased (3%). Death certificates were obtained for all the decedents. Death certificates were coded by two trained nosologists according to the ICD eighth revision (U.S. DHEW 1968). Differences in coding between the nosologists were reconciled through discussion.

Statistical Analysis

We calculated standardized mortality ratios (SMRs) to compare mortality rates for males and females with those of the U.S. White populations. 95% confidence intervals were calculated using the Fisher exact method (Rothman and Boice, 1979). The Occupational Cohort Mortality Analysis Program (OCMAP) is used to conduct the SMR analysis (Marsh, 1982). Person year enumeration begins at hire or 1/1/79 for those hired before 1/1/79 and be accumulated through the end of the study date for workers who are alive, until the last date of contact for those lost to follow-up, and until the date of death for deceased workers. Analysis was restricted to the most common causes of death (i.e., all external causes of death, all heart disease, total cancers, and cancers of the lung, colon, prostate (males only), and breast (females only)).

Results

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Table 1 shows the observed and expected deaths, SMRs and 95% confidence intervals for the total plant population. The 376 workers had mortality rates below or consistent with expected levels. There were 3 cancers observed with 5.8 expected. For specific cancers, one lung cancer was observed with 2.1 expected (SMR=0.5, 95%CI=0.0-3.5) and one colon was observed with 0.5 expected (SMR=0.5, 95%CI=0.1-15.5). The other cancer was a stomach cancer.

Table 2 stratifies the data by duration of employment. There were no deaths among employees who worked less than 10 years at the plant (SMR=0.0, 95%CI=0.0-1.3). Among longer term employees the SMRs were consistent with expected levels. There were three cancers observed with 5 expected (SMR=0.6 95%CI=0.1-2.1). Mortality rates for heart disease (SMR=0.8, 95%CI=0.2-2.2) and accidents (SMR=0.6 95%CI=0.0-4.4) were less than expected. Although not presented in Table 2, evaluation of these data by latency periods (i.e., the duration of time between hire date and death) was very similar to the findings for duration of employment.

Discussion

The follow up and vital status ascertainment in this study was virtually complete eliminating the concern for selection bias. Our evaluation of the mortality patterns of employees working between 1979 and 1989 is complete. A weakness of the study was the small number of employees at the plant and the relatively short period this group of employees were followed which resulted in imprecise estimates for the SMRs.

Long term workers (i.e., employees working 10 or more years for Monsanto) had no mortality excesses and had mortality patterns similar to short term workers. Further, the findings for the Anniston plant are similar to other mortality surveillance projects done within other companies (Pell et al., 1978; Divine et al., 1985; Hanis et al., 1985; Pifer et al., 1986; Teta et al., 1990; Olsen et al., 1994). SMRs for total mortality and all cancers in these studies are similar to SMRs for Anniston.

Conclusions

The data from this study should offer reassurance that employees working at the Anniston plant between 1979 and 1989 experienced no excess mortality from cancer, heart disease, or accidents.

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Table 1. Standardized mortality ratios (SMR), 95% confidence intervals (CI), observed and expected numbers of deaths for Anniston workers by cause of death.

Cause of Death (ICDA Codes)	Observed/Expected	SMR(95% CI)
All causes of death (0-999)	10/21.7	0.5 (0.2-1.0)
All cancer (140-209)	3/5.8	0.5 (0.1-1.9)
Colon (153)	1/0.5	2.1(0.1-15.5)
Lung (162)	1/2.1	0.5 (0.0-3.5)
Breast (174)	0/0.2	0.0 (0.0-30.7)
Prostate (185)	0/0.2	0.0 (0.0-25.7)
All heart disease (390-398, 400.1, 400.9, 404, 404, 410-414,420-429)	5/7.3	0.7 (0.1-1.9)
All accidents (800-999)	1/3.2	0.3 (0.0-2.4)

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Table 2. Standardized mortality ratios (SMR), 95% confidence intervals (CI), observed (obs) and expected (exp) numbers of deaths for Anniston workers by duration of employment.

Cause of Death	< 10 Years Worked SMR(95%CI) [Obs/Exp]	10+ Years Worked SMR(95%CI) [Obs/Exp]
All causes of death	0.0 (0.0-1.3) [0/3.9]	0.6 (0.2-1.2) [10/17.8]
All cancer	0.0 (0.0-6.9) [0/0.7]	0.6 (0.1-2.1) [3/5.0]
Colon	0.0 (0.0-101.8) [0/0.1]	2.3(0.1-17.4) [1/0.4]
Lung	0.0 (0.0-27.7) [0/0.2]	0.5 (0.0-3.9) [1/1.9]
Breast	0.0 (0.0-73.6) [0/0.1]	0.0 (0.0-52.6) [0/0.1]
Prostate	0.0 (0.0-936.4) [0/0.0]	0.0 (0.0-25.5) [0/0.2]
All heart disease	0.0 (0.0-7.0) [0/0.8]	0.8 (0.2-2.2) [5/6.5]
All accidents	0.0 (0.0-3.6) [0/1.5]	0.6 (0.0-4.4) [1/1.7]

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