HETA 90-0337-2290
BIRMINGHAM NEWS COMPANY
FEBRUARY 1993
BIRMINGHAM, ALABAMA

NIOSH INVESTIGATORS:
Ruth Shults, R.N., M.P.H.

I. SUMMARY

In July 1990, the National Institute for Occupational Safety and Health (NIOSH) received a request for a health hazard evaluation from the Graphic Communications International Union (GCIU) Local 55N. NIOSH was asked to evaluate a perceived cancer cluster among pressmen at the Birmingham News Company in Birmingham, Alabama.

On August 30, 1990, NIOSH investigators made a site visit. Activities included a walk-through inspection to observe the newspaper printing process, a review of personnel files of deceased Local 55N members who were identified by the union as having died of cancer, and discussions with management concerning the existence of records with which to conduct an evaluation of the cancer cluster.

To address the perceived cancer cluster, information supplied by management and the union was used to construct a list of all pressmen ever employed by the Birmingham News Company and to identify former employees who were known to have died. The employee list was then cross-referenced with a computerized list of deaths supplied by the Social Security Administration (SSA).
Forty of the total 181 pressmen were determined to be deceased, and death certificates were obtained for all 40.

This compiled information was then analyzed using the NIOSH Life-Table Analysis System (LTAS) computer program. Based on the general population experience, 42 pressmen would have been expected to die during the time period of January 1, 1940, to December 31, 1990, yielding an Standardized Mortality Ratio (SMR) of 95 (95% confidence interval (CI) = 67 to 129). Eleven pressmen died of heart disease, while 17 were expected, resulting in an SMR of 65 (95% CI = 32 to 115). Fifteen pressmen died of some kind of cancer, while 8.7 were expected, resulting in an SMR of 172 (95% CI = 95 to 282). Among these 15 deaths, 7 were due to respiratory system cancer, while 3 were expected, resulting in an SMR of 232 (95% CI = 92 to 477).

While none of the 95% confidence intervals for the SMRs were statistical significant, the results suggest that, as a group, the Birmingham News Pressman may have a decreased risk of death due to heart disease and increased risk of death due to respiratory system cancer. Although a causal role for occupational exposures cannot be ruled out, cigarette smoking may have contributed to the excess in respiratory system cancer.

KEYWORDS: SIC 2711 (Newspapers: Publishing, Publishing and Printing), printing, cancer, mortality.

II. INTRODUCTION

In July 1990, the National Institute for Occupational Safety and Health (NIOSH) received a request for a health hazard evaluation from the Graphic Communications International Union (GCIU) Local 55N. NIOSH was asked to evaluate a perceived cancer cluster among pressmen at the Birmingham News Company in Birmingham, Alabama.

A site visit was conducted on August 30, 1990, and attended by representatives from Birmingham News Company management, GCIU Local 55N, and NIOSH representatives. After an opening conference, we conducted a walk-through inspection to observe the newspaper printing process, reviewed the personnel files of deceased Local 55N members who were identified by the union as having died of cancer, and interviewed management concerning the availability of records with which to conduct an evaluation of the cancer cluster.

III. BACKGROUND

A number of epidemiologic studies have demonstrated increased mortality due to cancer in newspaper printers.[1,2,3,4] Nicholson conducted a large mortality study of New York City newspaper pressmen for the years 1950 through 1976.[1] The study found a significant excess in deaths due to bronchogenic carcinoma, cancer of the buccal cavity and pharynx, and noninfectious respiratory disease. In that study, cancer of several other sites (larynx, kidney, bladder, prostate, and leukemia) and cardiovascular disease were also elevated, but not at a level of statistical significance. Other studies have not found a significant excess in cancer deaths in pressmen.[5,6] Historically, pressmen have been exposed to carcinogens including polycyclic aromatic hydrocarbons (PAHs) in carbon black inks, solvents such as toluene, benzene and methylene chloride, and mineral oil.[1,7] Elevated risk of cancer of the respiratory system, blood (leukemia), and bladder have been associated with these exposures. While no causal relationship has been established, these substances are mentioned as potential contributing factors to the elevated cancer rate seen in pressmen in some studies.

IV. METHODS

The primary concern of this investigation was to determine if there was an excess of cancer deaths in Birmingham News Company pressmen. To address the perceived excess, information supplied by management and the union was used to construct a list of all pressmen ever employed by the Birmingham News Company and to identify former employees who were known to be dead. A total of 181 current and former pressmen were identified. The employee list was then cross-referenced with a computerized list of deaths supplied by the Social Security Administration (SSA). This comparison was done to identify any former employees whose death was not known to management or the union.

Using the information supplied by management, the union, and the SSA death file, 40 pressmen were determined to be deceased and the remainder were assumed to be alive. If a former employee's name did not appear in the SSA death file, or on the union's list of deceased members, and, if management did not provide a death certificate, he was assumed to be alive. We obtained copies of death certificates for all of the 40 deceased pressmen. The underlying causes of death were coded from the death certificates by a nosologist using the codes of the International Classification of Diseases (ICD) in effect

at the time of the death. Because only two women worked as pressmen, they were excluded from analysis. One pressman was excluded from analysis because his date of birth was not available. After exclusions, 178 names were eligible for analysis.

The gathered information was then entered onto a computer master file which included: name, social security number, date of birth, date first employed by Birmingham News Company, date last employed by Birmingham News Company, vital status (alive or dead), date of death (if applicable), and coded cause of death.

Several assumptions were necessarily used in entering data. Information in the SSA file was available for deaths occurring through December 31, 1990. Therefore, we selected December 31, 1990, as the study end date. Information on race was not available for all pressmen. Of the 40 deceased pressmen, 37 (92%) were white and the remaining 3 (8%) were black. We assumed that the proportion of blacks among living pressmen was similar to their proportion among deceased pressmen. Based on that assumption, the death rates of U.S. white males was used to obtain the expected numbers of deaths for the analyses.

This compiled information was then analyzed using the NIOSH Life-Table Analysis System (LTAS) computer program. This system was specifically designed to analyze occupational cohort mortality data such as that collected in this evaluation. The cohort (group of workers) was defined as all male pressmen employed by Birmingham News Company since its creation in 1929, through the study end date of December 31, 1990. Each member of the cohort was followed from January 1, 1940, or his date of first employment, (whichever was later) until his death or study end date (whichever came first). Each person contributed one person-year at risk (PYAR) for each year that he lived after his first day of employment at the Birmingham News Company after January 1, 1940. The PYAR was summed over time within five-year age and calendar-time period groupings. The total PYAR within each stratum were then multiplied by the corresponding cause-specific death rates from the U.S. white male population. This resulted in the expected number of deaths in that grouping. The expected number of deaths was compared with the number of deaths that was observed during the study period. Cause-specific standardized mortality ratios (SMRs) were obtained by dividing the observed number of deaths by the expected number of deaths.[8]

Excess deaths result in an SMR greater than 100, while deficits result in an SMR less than 100. For example, an SMR of 166 denotes 66% more deaths than expected, while an SMR of 42 denotes 58% fewer deaths than expected. The statistical significance of the SMRs was determined to measure the probability of a difference between the observed and the expected occurring by chance. Statistical significance is influenced by the number of people in the cohort and the frequency of the specific causes of death. In the absence of other prior assumptions about the cause of death, an SMR is assumed to be "statistically significant" if there is less than a 5% probability that the differences observed (excesses or deficits) are the result of chance alone. In SMR analysis, statistical significance is expressed as a confidence interval around the ratio of observed number of deaths divided by expected number of deaths. For example, a confidence interval, expressed as (95% CI = 70 to 120) indicates that the SMR for these data will fall somewhere between 70 and 120 ninety-five out of one hundred times. If a confidence interval includes the number "100", as in the previous example, its SMR is assumed as not statistically significant. A confidence interval that includes the number "100"

indicates that the SMR could possibly be 100, and therefore, you cannot reject a chance occurrence.

V. RESULTS

Of the 178 pressmen, 40 died during the study period. Forty-two would have been expected to die during this same time period, yielding an SMR of 95 (95% CI = 67 to 129), which is not statistically significant.

The LTAS is designed to looked at 26 different cause of death categories. Of these, there were no observed deaths in 14 categories. Of the 12 categories with observed deaths, 9 showed an excess (SMR above 100) and 3 showed a deficit (SMR below 100). None of the excesses or deficits were statistically significant. The expected number of deaths for each of the 12 cause of death categories, the calculated SMR, and confidence interval for each SMR are listed in Table 1.

Because the proportions of deaths due to specific causes can vary by region, the analysis was rerun using the cause-specific death rates from the Alabama white male population. The SMRs were similar, and none of the excesses or deficits were statistically significant. The remaining discussion pertains to the initial LTAS which used U.S. rates.

There were 7 respiratory system cancer deaths, while the expected was 3, resulting in an SMR of 232 (95% CI = 92 to 477). All 7 deaths were due to lung or bronchus cancer. There were no deaths due to cancer of the blood or lymphatic system. There were 2 deaths due to cancer of the urinary organs, including the bladder, while the expected was 0.4, resulting in an SMR of 424 (95% CI = 51 to 1529). The number of deaths due to all cancers combined was 15, while the expected was 8.7, resulting in an SMR of 171 (95% CI = 95 to 282). The excess in respiratory cancer deaths (4 excess deaths) was the largest contributor to the overall excess in cancer deaths.

The most common cause of death among pressmen was heart disease, which accounted for 11 of the 40 deaths. Seventeen deaths due to heart disease were expected, yielding an SMR of 65 (95% CI = 32 to 115). A deficit in deaths due to heart disease is a common finding in many occupational studies. This deficit is assumed to occur because workers generally are more active and healthier, and therefore, less likely to die of heart disease than the general population.

VI. LIMITATIONS

Some limitations to this type of mortality investigation warrant discussion. The mortality of 178 pressmen from the Birmingham News Company who were employed over a 50-year period were analyzed. When the mortality experience in relatively small cohorts, such as this one is analyzed, the resulting statistics can be unstable (that is, uncertain and subject to change by the addition of new data). This instability is demonstrated in this study by the wide confidence intervals seen in Table 1.

The accuracy of personnel data determined the accuracy of the study cohort. To help insure that the cohort was complete, the union's representative thoroughly reviewed the employee information provided by the personnel department, comparing it with

information in the union's records. However, it is possible that neither the personnel department's nor the union's records were fully complete and accurate. NIOSH representatives questioned whether the employee list was complete because, although hiring began in 1929, the first recorded termination occurred in 1960. During that 31 year period, the record shows that 47 pressmen were hired, and each one remained employed through 1959. It seems possible that other pressmen may have been employed for periods of months or years during the 31-year time span from 1929-1960, but their names were not recorded on the official personnel list or on the union's membership rolls. The effect of using an incomplete employee list on the results of the analysis is uncertain.

Because race information was not available on all pressmen, we could not compare differences in death rates by race. Mortality rates for white males were used as the comparison population. Lung cancer rates are generally higher in blacks than in whites, so if we underestimated the number of black pressmen, the SMR for respiratory cancer may be slightly overestimated.

Mortality investigations are limited by the lack of available information on exposures outside of work that may be related to the diseases under study. In particular, the lack of information on cigarette smoking may be important for studies of lung cancer. For example, if the occupational group being studied has more cigarette smokers than the general population to which they are being compared, the risk of lung cancer attributed to occupational exposure may be overestimated. Researchers have shown, however, that differences in cigarette smoking habits are unlikely to entirely account for an excess in lung cancer as large as that observed in this study.

Finally, this investigation looked only at deaths. Pressmen who were alive as of the end of 1990, even though diagnosed with cancer, would not have been counted as having the disease in this investigation.

VII. DISCUSSION

The most common non-occupational cause for lung cancer is cigarette smoking, accounting for an estimated 85% of lung cancers among men.[9] When a group under study contains more smokers than in the general population, it is common to find excesses of lung cancers and deaths due to other diseases of the respiratory system, compared to the general population. These diseases include bronchitis and emphysema. There were 4 respiratory system deaths other than cancer, while the expected was 2.8, resulting in an SMR of 142 (95% CI = 38 to 363). Three of these 4 deaths, and 5 of the 7 respiratory system cancer deaths, occurred in pressmen between the ages of 60 and 69 years, which is the general age category in which death due to cigarette smoking will be evident. No direct information on smoking habits was collected, therefore, it is impossible to determine with any degree of confidence if cigarette smoking contributed to the excess in lung cancer deaths among Birmingham News Company pressman.

VIII. CONCLUSIONS

This mortality study of 178 pressmen who were ever employed at the Birmingham News Company found 5% fewer deaths than expected due to all causes (SMR = 95). There were 35% fewer deaths than expected due to heart disease (SMR = 65). A 132% excess in deaths due to respiratory system cancer was found (SMR = 232), as well as an 71%

excess in deaths due to cancer of all sites (SMR = 171). The excess in respiratory cancer deaths (4 excess deaths) was the largest contributor to the overall excess in cancer deaths.

While none of the SMR increases or decreases was statistically significant, the results suggest that, as a group, the pressman may have a decreased risk of death due to heart disease and increased risk of death due to respiratory system cancer. The elevated SMR for deaths due to respiratory diseases other than cancer suggests that cigarette smoking may have contributed to the excess in respiratory cancer deaths among the pressmen. However, the possibility that occupational exposures contributed to the excess in respiratory cancer deaths cannot be ruled out.

As printing press technology has evolved, use of the carcinogens of concern in this study has been largely discontinued. Therefore, if the increased risk for lung cancer seen in this study was due to occupational exposure, those pressmen who began employment at the Birmingham News Company after the introduction of new printing press technology should not be at increased risk from process-related exposures.

There is no effective screening method for lung cancer, so the disease is often in an advanced stage when it is diagnosed. In light of medicine's limited ability to diagnose and successfully treat lung cancer, smoking cessation remains the single most important risk reduction strategy for lung cancer.[9]

IX. REFERENCES

1. Nicholson WJ, Seidman H, Hoos D, Selikoff IJ [1981]. The mortality experience of New York City newspaper pressmen, 1950-1976. New York, New York: Environmental Sciences Laboratory, Mount Sinai School of Medicine of the City University of New York and American Cancer Society.

2. Lloyd JW, Decoufle P, Salvin LG [1977]. Unusual mortality experience of printing pressmen. J Occup Med 19(8):543-550.

3. Greenburg M [1973]. A proportional mortality study of newspaper workers. Brit J Indust Med 29:15-20.

4. Moss E [1973]. A mortality survey in the newspaper industry. Ann Occup Hyg 16:195-196.

5. Bertazzi PA, Zocchetti C [1980]. A mortality study of newspaper printing workers. Am J Indus Med 1:85-97.

6. Dunn JE, Weir JM [1968]. A prospective study of mortality of several occupational groups. Arch Environ Health 17:71-76.

7. Parmeggiani L, ed. [1989]. Encyclopedia of occupational health and safety. 3rd ed. Vol 2. Geneva, Switzerland: International Labour Office, pp. 1790-1795.

8. Waxweiler RJ, et al. [1983]. A modified life-tables analysis system for cohort studies. J Occup Med 24(2):115-124.

9. American Cancer Society [1991]. Cancer facts and figures - 1991. Atlanta, GA: American Cancer Society.

X. AUTHORSHIP AND ACKNOWLEDGEMENTS

Report Prepared by: Ruth A. Shults, R.N., M.P.H.
Health Officer
Medical Section

Originating Office: Hazard Evaluations and Technical Assistance Branch
Division of Surveillance, Hazard Evaluations, and Field Studies

XI. DISTRIBUTION AND AVAILABILITY OF REPORT

Copies of this report may be freely reproduced and are not copyrighted. Single copies of this report will be available for a period of 90 days from the date of this report from NIOSH Publications Office, 4676 Columbia Parkway, Cincinnati, Ohio 45226. To expedite your request, include a self-addressed mailing label along with your written request. After this time, copies may be purchased from the National Technical Information Service (NTIS), 5285 Port Royal, Springfield, Virginia 22161. Information regarding the NTIS stock number may be obtained from NIOSH Publications Office at the Cincinnati address.

Copies of this report have been sent to:

1. The Birmingham News
2. Birmingham Newspaper Printing Pressmen
3. Jefferson County Department of Health
4. OSHA Region IV

Copies of this report shall be posted by the employer in a prominent place accessible to the employees for a period of 30 calendar days.

Table 1
Causes of Death and SMRs for 40 Deaths
Compared to U.S. White Male Population
Birmingham News Company
January 1, 1940 - December 31, 1990

Cause of Death	Observed	Expected	SMR	95% C.I.[1]
Heart Disease	11	17.0	65	(32, 115)
Respiratory System Cancer*	7	3.0	232	(92, 477)
Digestive Organs Cancer*	4	2.3	170	(46, 434)
Urinary Organs Cancer*	2	0.4	424	(51, 1529)
Male Genital Cancer*	1	0.7	135	(3, 747)
Other Sites Cancer*	1	1.1	91	(2, 505)
Other Circulatory Diseases	5	4.2	118	(38, 274)
Other Respiratory Diseases	4	2.8	142	(38, 363)
Other Digestive Diseases	2	1.8	105	(12, 380)
Unspecified or Benign Tumors	1	0.1	866	(21, 4808)
Accidents	1	2.5	40	(1, 222)
Mental Disorders	1	0.2	363	(91, 2011)
All Deaths	404	2.0	95	(67, 129)
* All Cancer Deaths	15	8.7	171	(95, 282)

[1] Confidence Interval

☆U.S. GOVERNMENT PRINTING OFFICE: 1993 - 750-125/80004